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FOOD SECURITY

in the

West Bank
and

Gaza Strip

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FOOD SECURITY ISSUES IN THE WEST BANK AND GAZA STRIP

I. Preface

1. This study has been prepared with the assistance of the consultant ASIR, the Arab Scientific Institute for Research and Transfer of Technology, El-Bireh - The West Bank, as part of the food security analyses and review program conducted from time to time by the United Nations Joint ECWA/FAO Divisions in the ECWA region of West Asia of which the Gaza Strip and West Bank are a part, and as a technical investigation of specific agricultural situations and food productivity as required by AOAD, the Arab Organization for Agricultural Development of the Arab League, for its member states.

2. The objectives of this study are the delineation of food security issues in the occupied West Bank and Gaza Strip with specific presentations of the following:

- an objective description of the development in food production and consumption since the Israeli occupation,

- the present nutritional position,

-the role of the public and private sector in the production process,

- recommendations on the means and ways to promote food production and raise the nutritional standard under the prevailing conditions.

This investigation draws heavily on raw data collected in the occupied territories by the ASIR study team from the field, from various relevant department files, and from technical individuals working in these departments. Errors found in the Israeli Statistical Abstracts on food production and consumption of the West Bank and Gaza Strip necessitated the extensive surveys and data collection and required a food scientist and a bioengineer to perform recalculation and analyses of the nutritional status. In addition, the original detailed report on water resources required the expertise of a hydrologist and specialized engineers. The study with its various maps, charts, figures and tables is set-up in a way which could serve as a data base for other future investigations.

II. Introduction

The study area (see map) of the West Bank and Gaza Strip which fell under the occupation of the Israeli military forces in 1967 have become one entity after that occupation and are common in the following:

1. They are connected by two main roads not permitted before occupation as they are just large sections from pre-1948 Palestine[1] separated by the establishment of Israel[2] in 1948 and they continued to have the same Palestinian Arab population augmented by the Palestinian Arab refugees of the 1948 and 1967 Arab-Israeli wars.[3]

2. The occupied entity of the West Bank and Gaza Strip are governed by the same Israeli military government with similar laws and military orders affecting all aspects of life.[4,5]

3. The occupied entity has common trade, movement of people and goods - including food products.[6]

4. The occupied entity has similar problems with respect to progress and constraints on their economic, social, cultural and educational development.

5. The occupied entity has an Arab population common by being Palestinian having the same language, culture, customs, heritage, food consumption habits, life style and aspirations for progress and independence.[2,3]

6. The people of the occupied West Bank and Gaza Strip entity are considered the same population - Palestinians - not just by the Palestinians themselves, but also by their adversaries the Israelis and their government Israel and by all Arab and international agencies and governments.[4,5]

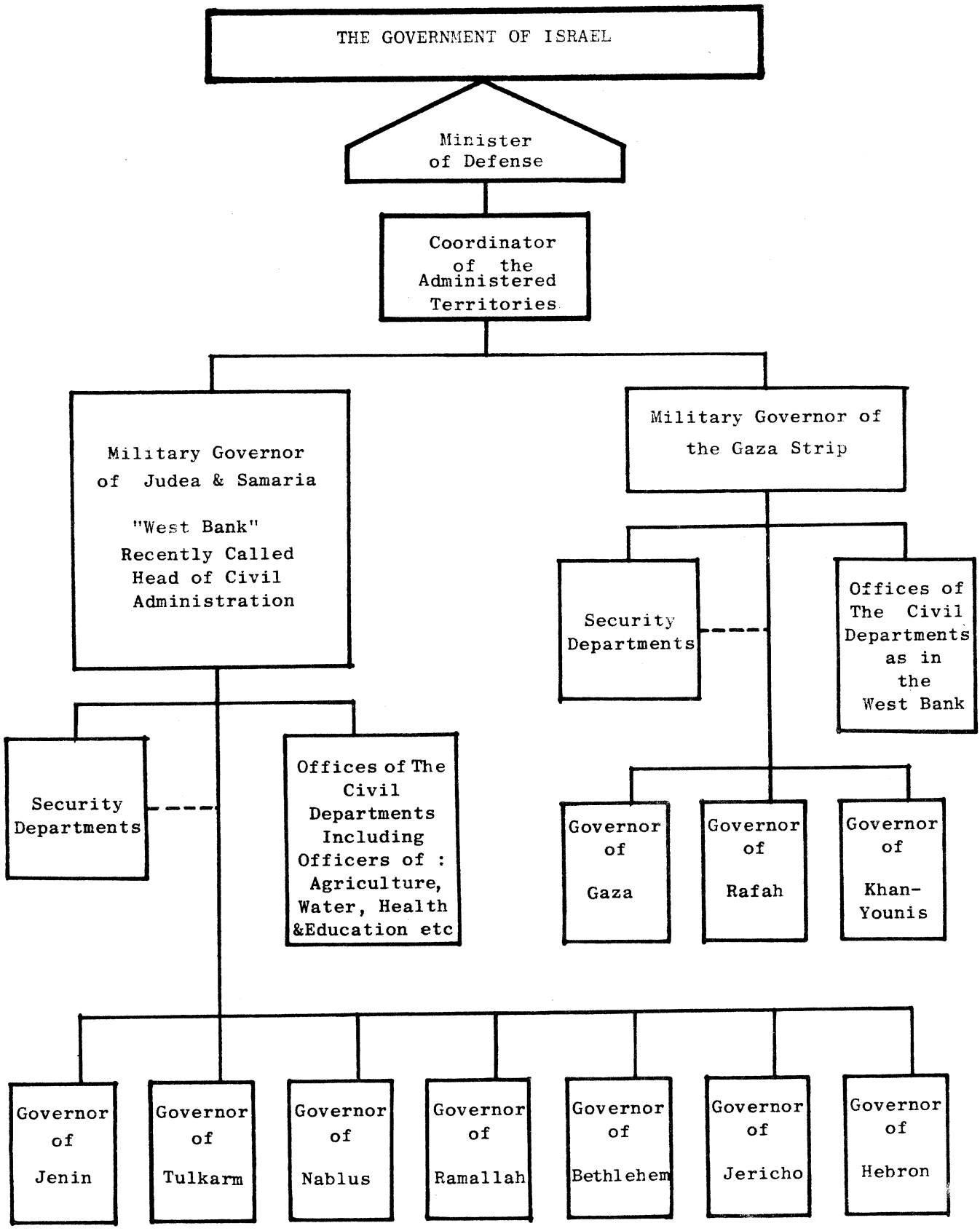
The dispute now betweem Israelis and Arabs is just over the land and independence of the occupied West Bank and Gaza Strip entity.[4,5] The Israelis call the people of this entity the Palestinians of the "administered" territories[4,5,7] while others call them the Palestinians of the occupied territories.[6,7] The era of a former head of the Israeli government, Golda Meir, who stated "that there is nothing called Palestinians" is now gone but what remains in dispute is the remainder of 1948 Palestine - now called the West Bank and Gaza Strip.[2,3] Except for the Israeli government, the West Bank and Gaza Strip are considered and called internationally "the occupied territories" including that of Arab Jerusalem (East Jerusalem).[3,6,8] The Israeli government calls them either the administered territories or alternatively the Gaza Strip or District and Judea and Samaria[9] and excluded East Jerusalem and some of its suburbs to which it applied Israeli laws in 1967.[10]

- see organizational chart of the military administration structure of the occupied West Bank and Gaza Strip.

The Gaza Strip retained its name to this date and is ruled by one Israeli general governor and staff. The West Bank is also ruled by one Israeli general governor and staff but in 1981 the Israeli government of Menahem Begin called it Judea and Samaria - splitting the West Bank into southern and northern districts. The District of Samaria or Nablus governate (Nablus, Jenin and Tulkarem)was known as such during the administration of the Jordanian government and the British Mandate. The district name Judea which the Israeli government created represents the districts of Ramallah, Jericho, Bethlehem, Hebron and what they did not annex of "greater Jerusalem".Some Arab lands and people of the Jerusalem District were made part of the Ramallah and Bethlehem Districts and Jeruslem as a district was abolished soon after occupation. The naming of Judea and Samaria has been up to this date a psychological and political tactic with only one general governor and staff of officers (with headquarters in the Ramallah suburb - Beit Eil) controlling the entire West Bank region.[11] The Gaza Strip is similarly governed by the Israeli government and the various governors of the two occupied areas are under one coordinator who is under the Israeli Minister of Defense. The attached chart illustrates the various divisions and sections in the Israeli military administration of the West Bank and Gaza Strip.

The ruling Israeli military authorities use - as they see fit - a combination of Othoman, British, Jordanian, modified Jordanian and Israeli military orders in governing the West Bank[12,13]and the same is the case for the Gaza Strip except for substituting the use of some Jordanian laws with that of Egyptian laws. The Gaza Strip between 1948 to 1967 was under the administration of Egypt and then was captured by Israel in 1967 along with Egypt's Sinai. The latter was returned to Egypt in 1982 in accordance with a part of the Camp David Accords signed in the USA in 1978 by the governments of Israel, Egypt and the United States of America. Syria's large Golan District like that of the West Bank and Gaza Strip is not only still occupied by Israel but in 1980 even Israeli law has been applied to it and its remaining small Arab population.

Irrespective of what the West Bank and Gaza Strip are named - occupied or administered territories - and irrespective of what the Israelis who run it are called - civil or military - these areas as indicated are an Arab entity which is controlled by the Israelis with military force using military law and despite the dispute between the Palestinian Arabs and Israelis, life in these occupied areas must proceed. Since occupation of the newly formed



The Military Administration Structure of the Occupied West Bank & Gaza Strip as Defined & Set-up by the Israeli Government

Palestinian entity, about two decades have passed. Palestinian babies who were born during the first year of occupation are now graduating from high school and those who were children are now struggling with living and family responsibilities. The world has seen great progress in the last two decades and many changes have occured in food production and consumption during this same time period.[4,15,16] Some changes in food production and nutritional status have been reported to be occuring in the occupied territories with very little real original data[17,18] available other than those in the Israeli Statistical Abstracts[19,20] and translations of these abstracts.[21,22,23] Data on "food security issues" was therefore requested from an independent Arab research institute "ASIR" which exists inside the occupied territories in order to obtain original data, review and evaluate existing data and submit a report on the findings to the U.N. Joint ECWA/FAO Division. Information and data on this subject just before occupation (1966) were compared with those of various time intervals after occupation. The year 1967 was a war year and most data from this year - especially on food production - is unreliable.

In order to achieve the objectives of this study which include:

1. Data on and factors affecting food production and consumption in the occupied West Bank and Gaza Strip,

2. the present nutritional status of the Palestinian people in these occupied areas,

3. the role of the public and private sector in food production, and

4. the recommendations to promote food production and raise the nutritional status under the prevailing conditions,

the necessary data was collected by a team of experts from ASIR, the Arab Scientific Institute for Research and Transfer of Technology, El-Bireh - The West Bank. The study team included: several agricultural engineers and agricultural specialists, a food scientist, a biochemist, several health specialists, a hydrologist, a mechanical engineer, a civil engineer, two attorneys and several economists in addition to various research assistants and reviewers. Furthermore, interviews were made with Israelis working in the agriculture department of the West Bank and Gaza Strip as well as with Palestinian Arab specialists employed by the various departments in the military government administration, including those of:

- agriculture
- social welfare
- water
- health
- interior department, and
- public works.

Other interviews were made with the UNDP personnel and the specialists of the private voluntary organizations working in the occupied areas. Various reports and data were obtained from the departments of agriculture in the West Bank, the Gaza Strip and Jordan and those of the Jordanian Ministry of Occupied Territory Affairs, the Royal Scientific Society of Jordan, the Jordan Agricultural Engineers Society, the Jordan Valley Authority, the Jordanian National Planning Council, the Technical Office of the Joint Committee of the PLO and Jordan. The discussions used in this study were also augmented by data and points of view cited at the following conferences held in 1983 and 1984 in Amman, Jordan:

- the Union of Arab Food Industries conference on olives and the processing and properties of olive oil,

- the University of Jordan conference on sheep production,

- the AOAD (Arab Organization for Agriculture Development of the Arab League of States) conference on cattle production,

- the Jordan Agricultural Engineers' conference on agriculture and its problems in the West Bank,

- the Joint Yarmouk University and Arab Research Center of London conference on Israel and Arab water resources,

- the FAO conference on the role of Arab women in food production,

- the Kuwait Medical Society Conference on health and indigenous diseases,

- the WHO conference on health problems in the Mediterranean region,

- the WHO conference on functions of health laboratories and problems in laboratory analyses,

- the Union of Arab Food Industries conference on grains and food security in the Arab World,

- the Arab Food Industries conference on realization of national food security for Jordan,

- the AOAD conference on the use of solar energy in agriculture,

- the Arab Center for the Study of Arid Lands conference on soil classification.

In addition to these Arab conferences, data from the various research centers and scientific meetings in Israel were utilized and these include that of the publications, pamphlets, and research papers of the following:

- the soil and water research institute and the animal production division of the Volcani Research Institute in Lod

- the College of Agriculture of the Hebrew University of Jerusalem in Rehovot

- the Industrial Economics Department of the Technion in Haifa

- the Agriculture School of Ben Gurion University in Beersheva, the Negev

- The West Bank Data Project in West Jerusalem

- The Weizman Research Institute in Rehovot

- The yearly agri-tech exhibits in the Exhibition Center in Tel Aviv for 1983 and 1984

- the food and beverage industry exhibit in West Jerusalem

- the international soil and salinity conference held at the Volcani Research Institute

- the international conference on water, desertification and environmental adaptations held in Tel Aviv

- the international conference on food and nutrition held in Tel Aviv

- the settlements and absorption center in West Jerusalem

- the office of the Central Bureau of Statistics in West Jerusalem

- the reports of the Truman Research Institute in Jerusalem

- the report of the Coordinator of Government Operations in Judea and Samaria, Gaza District, Sinai and Golan Heights - A Thirteen Year Survey 1967 - 1980.

Studies by local Arab research centers, local groups and individual researchers working alone or with various foreign and Arab agencies were reviewed and relevant parts were employed in this study. These studies and reports include those of the following:

- the Arab Thought Forum of East Jerusalem

- the Rural Research Center of Najah University

- the Documentations and Research Center of Birzeit University

- the Arab Studies Society of East Jerusalem

- the U.N. study on Industrial and Economic Trends in the West Bank and Gaza Strip for ECWA by Dr. Bakr Abu Kishk

In addition, unpublished reports by Sadler and collaborators for the U.N. were reviewed for overall views but none of the data was included because these reports are yet to be published and they include:

- review of the Economic Conditions of the Palestinian People in Israeli Occupied Territories by M.Khouja and P. Sadler

- Options for Development - Palestine, by P. Sadler and B. Abu Kishk

- Palestine: Development of the Industrial Sector by P. Sadler, U. Kazi and M. Jabr.

The most utilized in this study has been the information collected and tabulated from the field surveys in the occupied territories by ASIR researchers and which has been stored in a small computerized data bank at ASIR.

The various individual, international and Arab world reports from which some aspects were used in this study will be cited in the references.

MAJOR FACTORS AFFECTING FOOD PRODUCTION

HUMAN RESOURCES

Currently in 1984 the new occupied entity of the West Bank and Gaza Strip has about 1.5 million Palestinians.[24] Another 3/4 million Palestinian Arabs[19,24] live in Israel in the Galilee, the Negev and the coastal triangle of Palestine whose food supply is interlinked with that of the West Bank and Gaza Strip. The changes in the growth pattern of the Palestinian population of these two areas is shown in TABLE 1 and FIGURE 1.

As shown in TABLE 1 - for the recorded statistics of 1982[19] - the Gaza Strip had 476,300 persons while the West Bank had 871,600 including East Jerusalem's 124,100 Arabs,[19,24] i.e. a total population of 1,347,900 Palestinians.

As shown in FIGURE 1 , since the occupation in 1967 the growth rate of the Arab population in the West Bank and Gaza Strip has been unstable. It was negative immediately after the occupation being minus 0.5% and minus 6.3% for the West Bank and Gaza Strip respectively in 1968.[19] The highest growth rate for the West Bank was 3.0% in 1973[19] as that in other Arab countries.[25] For the Gaza Strip the growth rate fluctuated from 1.7% in 1970 to 3.7% in 1973.[19]

Since 1982, the regulations restricting immigration of Arab youth caused the growth rate to stabilize in both the West Bank and Gaza Strip to about 3.1 and 3.3% respectively.[24] Based on these rates and other growth rate assumptions as shown in TABLE 2, the Palestinian population in the occupied entity of the West Bank and Gaza Strip will be 2,335,100 by the year 2000 and with Arab citizens of Israel who will be 1,304,900 by the year 2000, there will be a total of 3,640.000 Arabs and 4,733,500 Israeli Jews in the whole of the area under Israeli control now. There will be a ratio of 1:1.3 Arabs to Jews - meaning that there will be 4 Arabs for every 5 Jews by the year 2000 and 1.01 Arab to every Jew in the year 2020 - i.e. the Arabs become again the majority in Palestine (50.2%) without even allowing any of the Palestinians outside the country to return and who have been estimated at 2,469,000 in 1980.[26,27] With a 3.0% annual increase, these Palestinians outside the occupied areas will become about 4.5 million in the year 2000 and about 8.0 million in the year 2020. Therefore, the grand total for the entire Palestinian people everywhere in the year 2000 will be about 8.0 million and in the year 2020 will be about 15.0 million irrespective of where the Palestinians live.

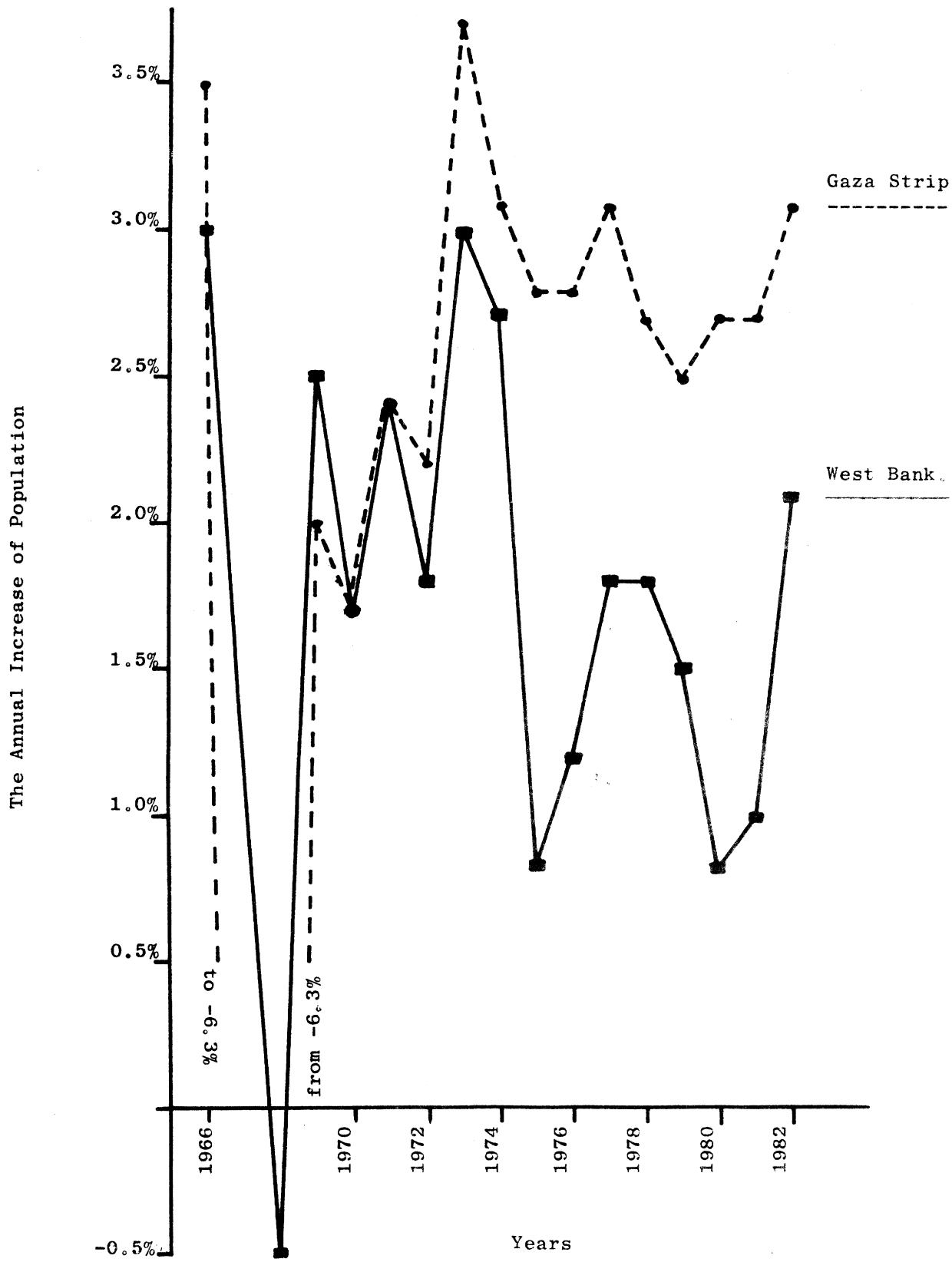


FIGURE 1 . The Annual Increase of Population in the West Bank & Gaza Strip.

TABLE 1:

POPULATION in the WEST BANK (WB)[19] .. INCLUDING JERUSALEM [24] .. *
and the GAZA STRIP (GS) for the PERIOD from 1966-1982
- in thousands -

Year	West Bank	% annual growth	Gaza Strip	% annual growth	TOTAL POP. WB and GS
1966	941.2	3.0	455.0	3.5	1,396.2
1967	651.8	...	380.8	...	1,032.6
1968	648.9	-0.5	356.8	-6.3	1,005.7
1969	605.8	2.5	363.9	2.0	969.7
1970	681.0	1.7	370.0	1.7	1,051.0
1971	703.6	2.4	378.8	2.4	1,082.4
1972	716.3	1.8	387.1	2.2	1,103.4
1973	738.0	3.0	401.5	3.7	1,139.5
1974	753.7	2.7	414.0	3.1	1,167.7
1975	768.7	0.8	425.5	2.8	1,194.2
1976	780.6	1.2	437.4	2.8	1,218.0
1977	802.7	1.8	450.8	3.1	1,253.5
1978	818.5	1.8	463.0	2.7	1,281.5
1979	832.9	1.5	444.7(a)	2.5	1,277.6
1980	842.7	0.8	456.5	2.7	1,299.2
1981	852.9	1.0	468.9(b)	2.7	1,321.8
1982	871.6	2.1	476.3	3.1	1,347.9

* The Israeli law has been applied to residents of East Jerusalem since its occupation by the Israeli forces in 1967. However, internationally and from all other practical aspects, the Arab population of East Jerusalem still functions as an integral part of the West Bank.

(a) The El Arish population was deducted after its return to Egypt in 1979.

(b The Rafah population (about 7000) was deducted after its return to Egypt in 1982.

TABLE 2:

REAL AND FORECASTED POPULATION OF PALESTINIAN ARABS AND JEWISH ISRAELIS FOR THE YEARS 1982 TO 2020

Year	#1 WB & GS Arabs with East Jer.	#2 Arabs in Israel	#3 = (#1+#2) Total Arabs in WB, GS & Israel	#4 Israeli Jews	#2 + #4 Israel, i.e., Israeli Jews and Arabs	Total of #3 + #4	Percent of #3 to (#3+#4)	Ratio of #3 : #4
1982	1,347,900	690,400	2,038,300	3,373,200	4,063,600	5,411,500	37.6%	606:1000
1984	1,432,750	741,000	2,173,750	3,502,600	4,243,600	5,678,300	38.3%	621:1000
2000	2,335,100	1,304,900	3,640,000	4,733,500	6,038,400	8,402,700	43.5%	769:1000
2020	4,300,100	2,647,100	6,947,200	6,897,100	9,544,200	13,960,400	50.2%	1010:1000

* Forecast for the year 1984, 2000 and 2020 were made based on the following assumptions:

1) A growth rate of 1.9% for Jewish Israelis which is 0.1% higher than the 1.8% for 1982 cited by the Israeli Statistical Abstracts.[19]

2) A growth rate of 3.6% for the Palestinian Arabs living in Israel with Israeli citizenship. This assumed value is 0.1% lower than the average of 3.7% for twelve years as reported for this group by the Israeli Statistical Abstracts.[19]

3) A 3.1% and 3.3% estimated growth rate for the resident Palestinian Arabs living in the West Bank and Gaza Strip respectively[24] whose higher values are like those before occupation and approach those of their fellow race in Israel. The increase after 1982 is expected because of the expected rise in number of youth due to recent restrictions placed on their movements across the Jordan River bridges.

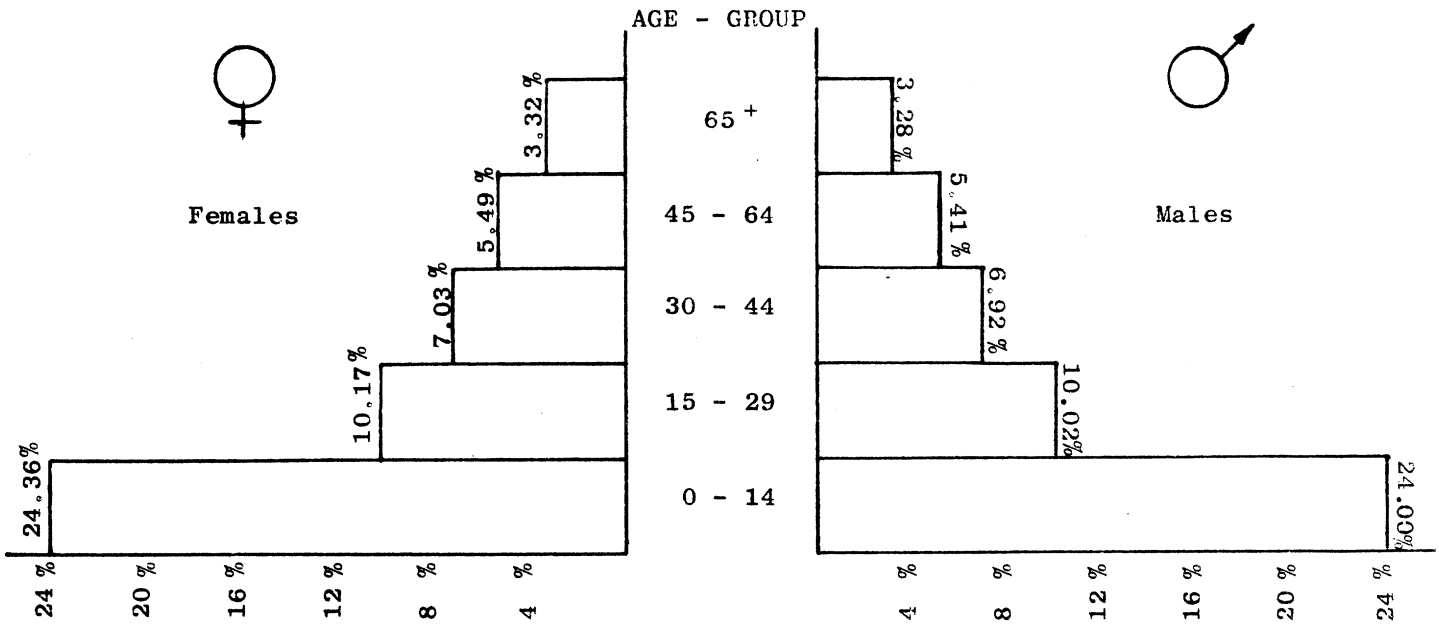
4) A 3.0% growth rate for the Palestinian Arabs living in Arab countries and the rest of the world being similar in productivity to their relatives in the West Bank.[25]

As shown in FIGURE 2A and 2B - the overall decrease in growth rate following 15 years of occupation of the West Bank and Gaza Strip resulted in a decrease in fertility as shown by the decrease in the percent of males and females under the age of 14 between 1967 and 1982. This group of 1-14 year old males and females decreased significantly in the West Bank, as shown in FIGURE 2A, from 48.36% of the population in 1967 to 44.91% in 1982.[19,24] Similarly, the Gaza Strip, as shown in FIGURE 2B, the group under the age of 14 of males plus females decreased from 50.34% to 46.63% in the same fifteen year period. However, as indicated, after 1982 the growth of the Palestinian population in the occupied territories has been increasing at a greater growth rate (about 3.1%)[24] with a shift and increase in the number of males between the age of 16 and 26. Both the Jordan government and the Israeli authorities have enacted laws since 1983 whose combined effect is decreasing the movements across the Jordan River bridges for those males between the age of 16 and 26 with the final result of keeping this age group inside the occupied territories.

It should be pointed out that nearly all of the Palestinian residents of the West Bank hold both Jordan passports and West Bank Israeli ID cards, while those of the Gaza Strip hold either Israeli ID cards only or that along with a Palestinian document given during the Egyptian administration of the Gaza Strip. Consequently, it is much more difficult for movement and travel of all Palestinians of the Gaza Strip and even much more difficult for Gaza youth. If a good training and work program is made for this youth group, the human resources of the Arab economically active group could be increased and fertility rate will climb up to 3.6% as is the case of Arabs living in Israel which is exactly double the growth rate of the Jews (1.8%).[19,24]

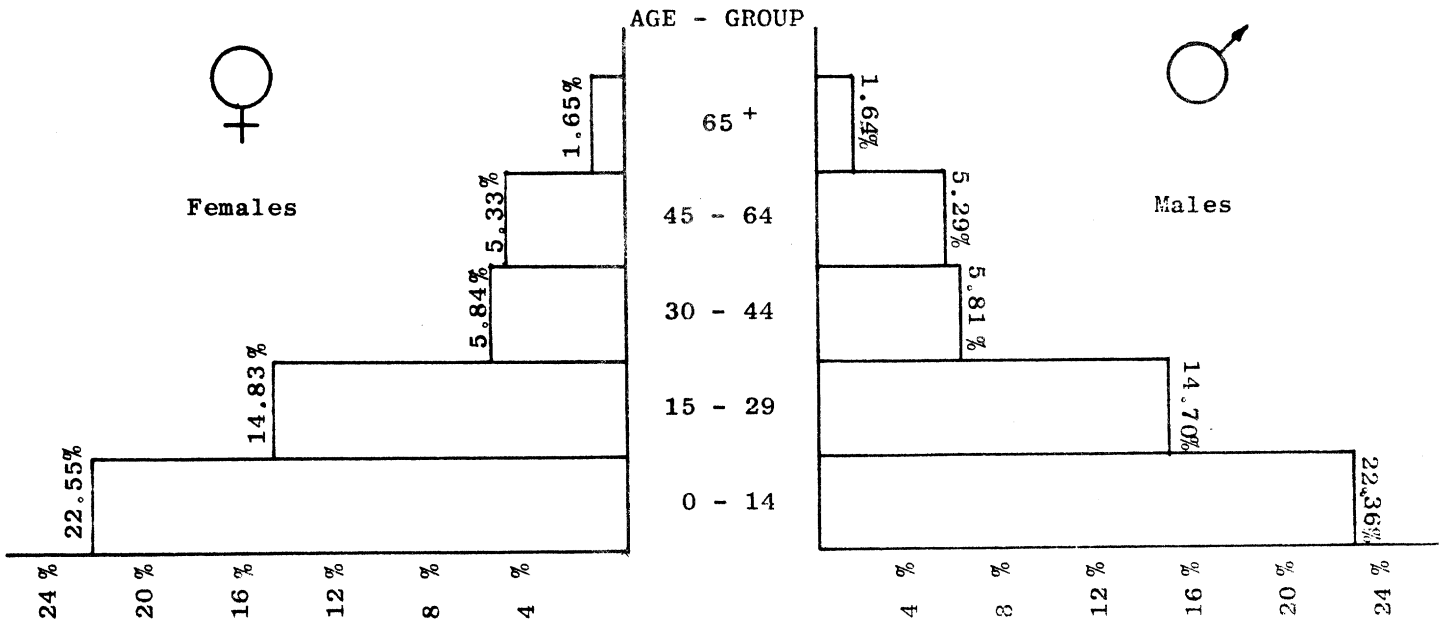
When looking at the economically active group, i.e. those between the ages of 15 to 29 and those between the ages of 30 to 44, a decrease in the percent of the 30-40 age group is observed. FIGURE 2A and 2B shows that those in the age group of 30 to 44 for males plus females decreased from 13.95% to 11.65% in 1982 in the West Bank and similarly, a proportional decrease resulted in the Gaza Strip. This mature group (30-44 years old from whom a large portion of males work outside the occupied areas), contribute considerably to the difference observed between the Gross National Product (GNP) and the Gross Domestic Product (GDP).

It should also be noted that longevity which is an important health parameter has decreased in the Palestinian population of the occupied territories. In 1967, and prior to the occupation, the West Bank had 6.60% of its population over the age of 65 while the Gaza Strip had 4.73%.[19,24] In 1982, there was a dramatic decrease in this highly mature age group



For the Year 1967

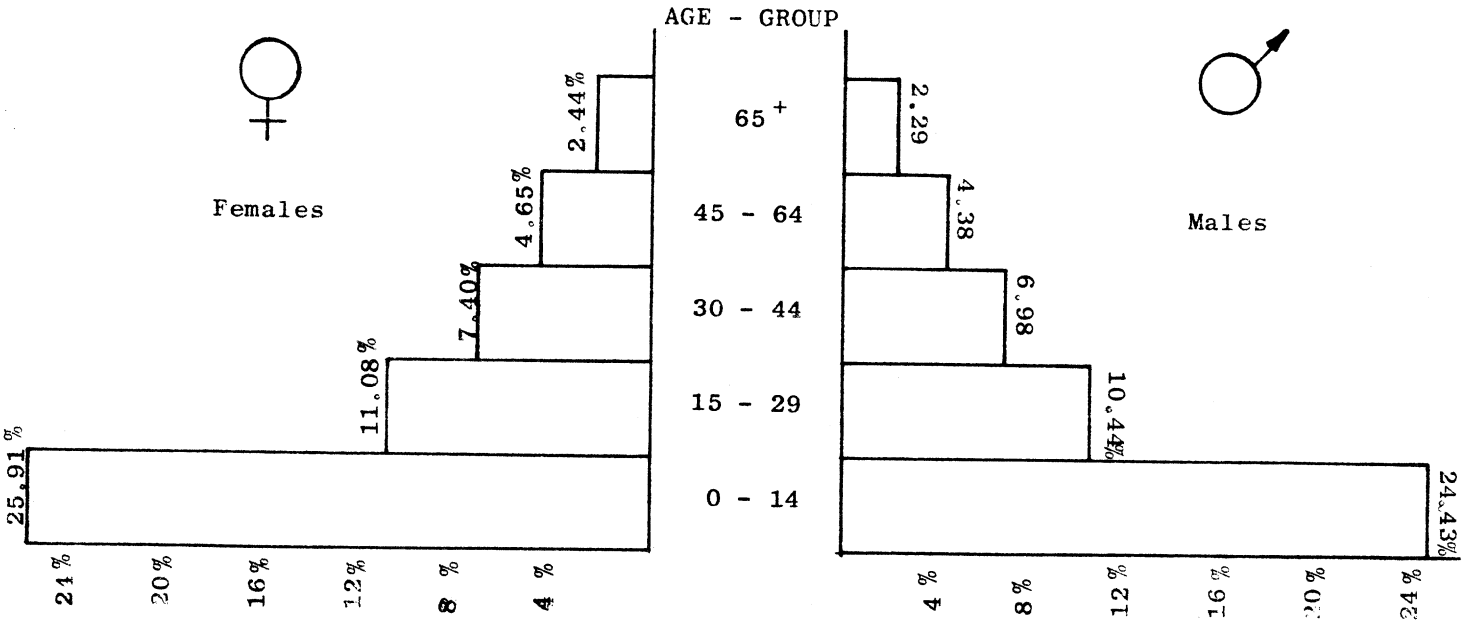
1967 Population = 651,800



For the Year 1982

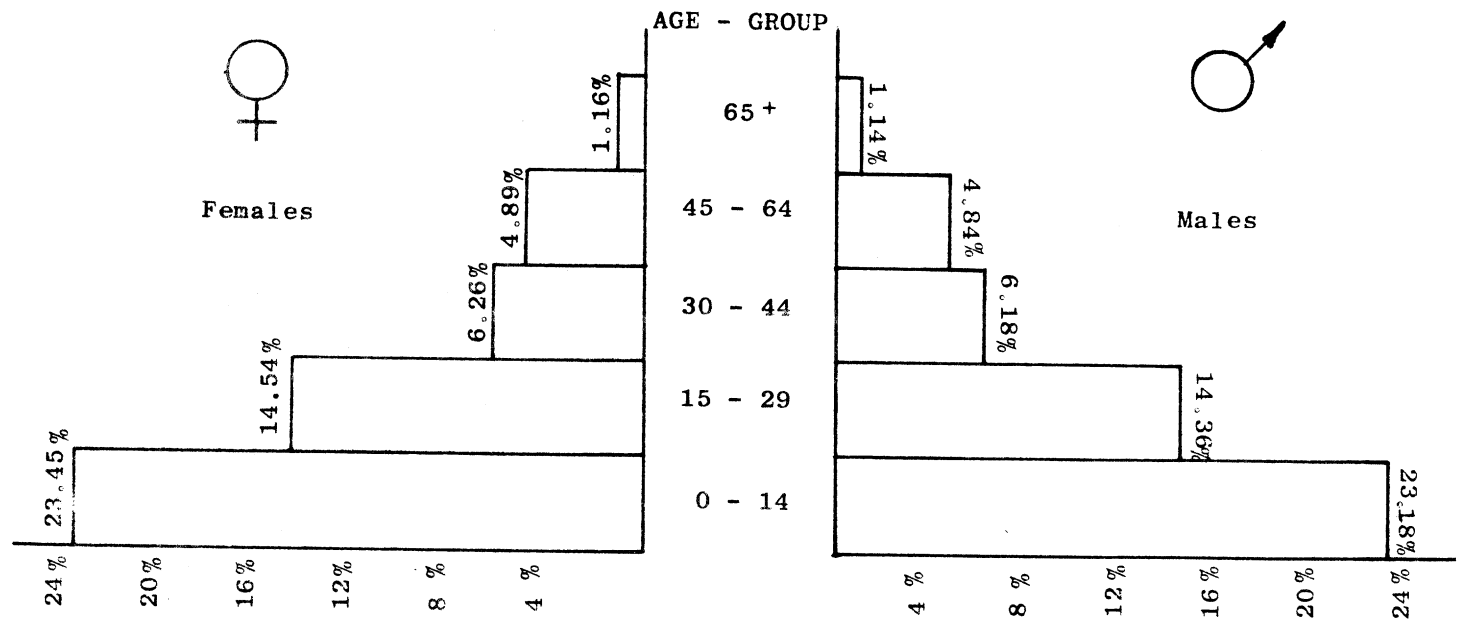
1982 Population = 871,600

FIGURE 2A. Age Groups Distribution of Population in the West Bank for the Years 1967 and 1982.



For the Year 1967

1967 Population = 380,800



For the Year 1982

1982 Population = 476,300

FIGURE 2B. Age Groups Distribution of Population in the Gaza Strip for the Years 1967 and 1982.

of 65 years of age and over becoming only 3.29% and 2.3% for the West Bank and Gaza Strip respectively, i.e. the old mature counselling group has diminished to one-half following the long period of occupation.

The 500 villages in the West Bank constitute about 71% of the population,[28] while the remaining 9 cities including Jerusalem constitute about 28% . The twenty other municipalities which may be called cities are actually large rural towns. Hence, it could be deduced that nearly 2/3 of the West Bank population is rural which could be totally engaged in agriculture if and when the economic opportunities arise. The refugees expelled from their homes by the Israelis in 1948 are counted from the cities only because they have clustered mostly around the 9 major West Bank cities (Jenin, Tulkarm, Nablus, Ramallah, El-Bireh, Jericho, Jerusalem, Bethlehem and Hebron) and with a greater concentration being near the cities of Gaza, Khan Younes and Rafah in the Gaza Strip.

The refugees in the Gaza Strip constitute 78% of the population[29] in constrast to 45% in the West Bank. Another important characteristic of the composition of the population of the occupied territories is that illustrated in the histograms presented in FIGURE 3. It could be seen that a relatively large percent - nearly half of the population - are of the economically inactive group, i.e., the dependent group in the age category between 0-14 years old which is 45% and 47% in the West Bank and Gaza Strip respectively compared to 33% in Israel.[19,24] The smaller percent - 12% - of the 30-44 year age group in both the West Bank and Gaza Strip compared to 17.3% in Israel indicate the great deficiency in having a skilled labor force of the economically active age group in the occupied territories.

The total adult Palestinian population of persons of ages 14 and over in 1982 for the West Bank and Gaza Strip is 652,300. Among them - 118,000 - which is 18% - are male and female students and 339,000 are mature females. When adding the estimated unemployed females of 309,000 and 118,000 as the unemployed students deducted from the population of 652,300 of 14 and over, we obtain a total labor force of 225,000 for 1982 for the occupied territories as a whole.[20,24]

TABLE 3 shows the proportion of the agricultural workers to the total labor force working in the West Bank, the Gaza Strip and Israel between 1969 and 1982. Due to the lack of development of any major agricultural projects in the West Bank and Gaza Strip, 41.7% of the labor force engaged in agricultural work in 1969 dropped to 23.5% in 1973 and to 21.9% in 1982.[20,24] Similar drops occured in the agriculture workers of the Gaza Strip where a decreased occured from 28.4% in 1969 to 17.1% and then to 10.1% in 1973 and 1982

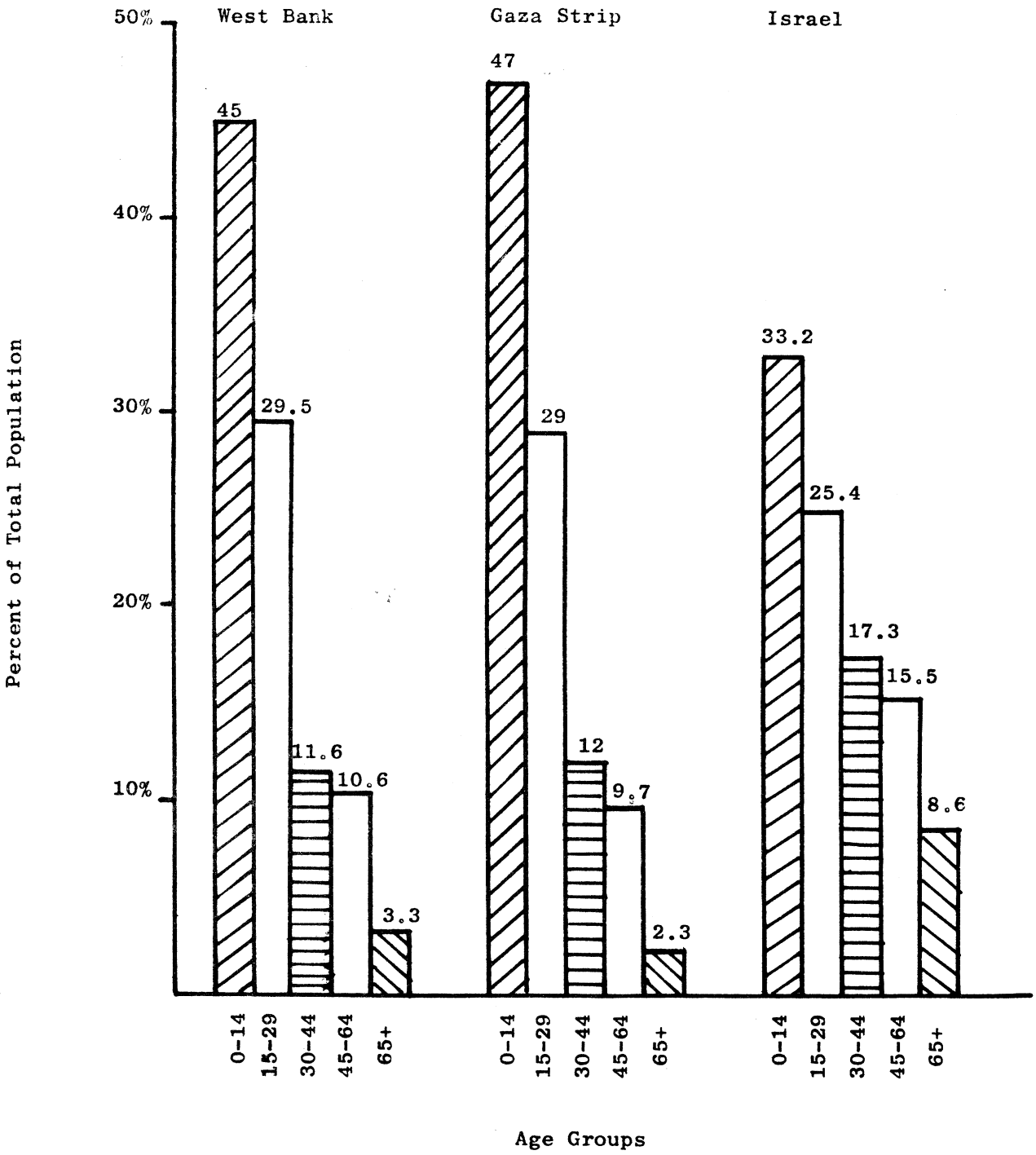


FIGURE 3 . Age Group Comparisons of the Populations of the West Bank, the Gaza Strip and Israel for 1982.

TABLE 3.

PERCENT (%) OF ARAB AGRICULTURAL WORKERS TO THE TOTAL LABOR FORCE WORKING IN THE WEST BANK, GAZA STRIP AND ISRAEL FROM 1969-1982 (20,24)

- in thousands and their percents -

	WEST BANK					GAZA STRIP				
YEAR	TOTAL LABOR FORCE	AGRICULTURAL WORKERS IN ISRAEL No.	AGRICULTURAL WORKERS IN ISRAEL Percent	AGRICULTURAL WORKERS IN WB No.	AGRICULTURAL WORKERS IN WB Percent	TOTAL LABOR FORCE	AGRICULTURAL WORKERS IN ISRAEL No.	AGRICULTURAL WORKERS IN ISRAEL Percent	AGRICULTURAL WORKERS IN GS No.	AGRICULTURAL WORKERS IN GS Percent
1969	114.6	-	-	47.8	41.7%	58.2	-	-	16.5	28.4%
1970	118.4	2.6	2.2%	42.4	36.1%	62.4	2.4	3.8%	16.7	26.8%
1971	119.7	3.3	2.8%	36.7	30.7%	61.8	4.2	6.8%	16.0	25.9%
1972	126.6	4.3	3.4%	34.3	27.1%	64.6	7.9	12.2%	11.4	17.6%
1973	127.7	3.4	2.7%	30.0	23.5%	68.6	8.4	12.2%	11.7	17.1%
1974	139.0	4.5	3.2%	36.0	25.9%	73.5	8.6	11.7%	11.6	15.8%
1975	133.9	4.4	3.3%	31.8	23.7%	72.7	4.8	6.6%	12.3	16.9%
1976	131.3	4.5	3.4%	31.4	23.9%	76.3	5.4	7.1%	12.8	16.8%
1977	128.8	4.5	3.5%	30.7	23.8%	77.3	5.6	7.2%	12.4	16.0%
1978	132.8	4.2	3.2%	32.3	24.3%	80.8	7.3	9.0%	10.3	12.7%
1979	134.1	4.1	3.1%	29.1	21.7%	79.8	6.9	8.6%	9.6	12.0%
1980	137.2	4.0	2.9%	31.3	22.8%	81.3	6.3	7.7%	8.7	10.7%
1981	135.3	3.7	2.7%	28.5	21.1%	82.8	5.8	7.0%	8.4	10.1%
1982	142.8	4.0	2.8%	31.3	21.9%	82.4	6.1	7.4%	8.3	10.1%

respectively.(20,24) This indicates that a 50% and 65% decrease in the agricultural labor force of the West Bank and Gaza Strip respectively occured since occupation.

TABLE 4 shows that the percent of Palestinians working in Israel as laborers in non-agricultural fields such as construction and other Israeli economic branches was 5% for West Bank residents and 6% for Gaza Strip residents in the year 1969 rising dramatically to 31% and 44% in 1982 for the West Bank and Gaza Strip residents respectively. Since the Palestinian agricultural workers employed in Israel are engaged in manual labor such as picking of oranges, filling of boxes, loading of produce, cleaning of farms, etc., their skills are of little value to consider them as "real" agricultural workers with potential skills.

All the values of the labor force were computed using labor registry offices of the West Bank,[20] the Israeli Statistical Abstracts[19] and the values obtained from calculations for East Jerusalem.[24] The term working for the Israeli economy means those workers working in Israel or in the West Bank and Gaza Strip on contract for Israeli industry. A general look at TABLE 3 and TABLE 4 point to the fact that the West Bank and Gaza Strip are becoming a labor camp[30] adjacent to an industrial Israel with nearly one-third (31%) and about one-half (44%) of the labor force of the West Bank and Gaza Strip respectively work in Israel.

The technical capacity of the population of the West Bank and the Gaza Strip to perform work efficiently may be forecasted from their level of education. In both the West Bank and Gaza Strip education is free and the schools are oblidged to keep students (no dismissal) for the first nine years whether that is in government schools or in those run by the United Nations Relief Work Agency for Palestine (UNRWA).

Up to 1982, there was 40% and 31% of the population in the schools and colleges of the West Bank and Gaza Strip respectively.[19] It has been found that the percentage of those in educational institutions is much greater in the West Bank with 40% reported in 1967 compared to only 22.8% in Israel.[24,31] There was also 6.5% and 4.7% of the population of the West Bank and Gaza Strip respectively in high school or post-secondary schools.[2,31]

Over two-thirds of the West Bank and Gaza Strip population have more than 9 years of schooling. In a paper by AMIDEAST,[32] it has been reported that 80,000 Palestinians are in post-secondary educational institutions. In a previous study by ASIR,[33] it was found that the number of college students and post-secondary vocational students is 13.4 per 1000 in the West Bank and 8.5 per 1000 in the Gaza Strip. When comparing this ratio with that in other Arab and foreign countries,[34] it was found as shown in TABLE 5 that this ratio of Palestinian college students is higher than any Arab country and all European countries. Only the Unites States, Israel and the USSR have larger ratios. The ratio for Palestinians everywhere is even higher than Israel.

TABLE 4.

EMPLOYED LABOR FORCE WORKING IN THE WEST BANK, GAZA STRIP AND ISRAEL FROM 1969-1982
(in thousands and their percents) (19,20,24)

	THE WEST BANK					THE GAZA STRIP				
		EMPLOYED FORCE WORKING IN					EMPLOYED FORCE WORKING IN			
	GRAND	Israel		WEST BANK		GRAND	Israel		GAZA STRIP	
YEAR	TOTAL	No.	%	No.	%	TOTAL	No.	%	No.	%
1969	114.6	5/7	5%	108.9	95%	58.2	3.5	6%	54.7	94%
1970	118.4	15.4	13%	103.0	87%	62.4	6.2	10%	56.2	90%
1971	119.7	26.3	22%	93.4	78%	61.8	8.7	14%	53.1	86%
1972	126.6	35.4	28%	91.2	72%	64.6	18.1	28%	46.5	72%
1973	127.7	39.6	31%	88.1	69%	68.6	22.6	33%	46.0	67%
1974	139.0	43.1	31%	95.9	69%	73.5	26.5	36%	47.0	64%
1975	133.9	41.5	31%	92.4	69%	72.7	26.2	36%	46.5	64%
1976	131.3	38.1	29%	93.2	71%	76.3	28.2	37%	48.1	63%
1977	128.8	36.1	28%	92.7	72%	77.3	27.8	36%	49.5	64%
1978	132.8	37.2	28%	95.6	72%	80.8	31.5	39%	49.3	61%
1979	134.1	40.2	30%	93.9	70%	79.8	34.3	43%	45.5	57%
1980	137.2	41.2	30%	96.0	70%	81.3	35.0	43%	46.3	57%
1981	135.3	40.6	30%	94.7	70%	82.8	36.4	44%	46.4	56%
1982	142.8	44.3	31%	98.5	69%	82.4‡	36.3	44%	46.1	56%

‡ Since April-June 1982, data for Gaza Strip area does not include the residents of the part of Rafah which had been returned to Egypt.

The study by ASIR[33] showed that in 1982, only 1,050 students graduated from all the five colleges (universities) of the occupied territory, which had a total of 12,000 students in 1981 and 13,000 students in 1982. There is another 950 students who graduated from post-secondary schools, community colleges and training institutes which had a total of 4,000 students in 1981 and 5,000 students in 1982. Thus, a total of 2,000 have graduated from the higher educational institutions in 1982, and it should be noted that most of the colleges in the occupied territory have been established in the last eight years and the total number of students graduating from them thus far does not really indicate their potential because they are new. It has been reported[35] that the number of university graduates of all the Palestinians inside and outside the occupied areas is 115,000 in 1982 which comes to be 16/1000.

The only draw back to college education in the occupied territories is that the majority of specializations are not technical,[33] with no single agricultural specialization in any of these institutions.

In a comparative study of ASIR on the technological education in the West Bank VERSUS that of Israel,[36] it was found that not only the quality of technical education in the local Palestinian colleges and universities is lagging behind Israel as evident from the small percent of instructors with full qualifications, but also the ratio of technical graduates to the population per 1000 is dismal for the occupied territories. Technical students form less than 10% of the total college students.[36]

For 1981, the Israeli six universities and Weizman Research Institute had a total of 59,000 Israeli college students in 1981 and graduated 40% of their students in technical subjects, while the five West Bank universities and the university in the Gaza Strip had 7,000 Palestinian students of whom 90 students representing less than 10% of the occupied territories graduates were students with specializations in technological fields.[36]

If one compares the number of technical professionals graduating from all the post and pre-secondary level in the occupied territories versus that of Israel, the difference becomes even greater in favor of Israel which graduates 30 times (3000%) more of these technical Israeli persons than that of the West Bank and Gaza Strip.[36]

TABLE 5.

RATIO OF UNIVERSITY STUDENTS TO POPULATION IN SELECTED COUNTRIES[33,34]

Country	Students/1000 Population	Country	Students/1000 Population
Palestinians		* Jordan	11.2
West Bank	13.4		
Gaza Strip	8.5	Egypt	5.4
Palestinians everywhere	16.0	Saudi Arabia	0.5
United States	30.0	Lebanon	6.0
Israel	14.5	Syria	6.0
USSR	18.0	Kuwait	3.0
France	9.0	Libya	1.8
England	8.0	Tunisia	2.0
Greece	8.0	Algeria	7.0
Spain	9.0		

* A large percent of those are Palestinians.

All university education in the West Bank and Gaza Strip is private, i.e.,run by private foundations or groups forming boards of trustees and most of which have their programs in the less costly humanities and liberal arts.[33-36] In the absence of a Palestinian National Authority in the occupied territories, it is difficult to demand that these private universities concentrate on technological education which is so badly needed for development and creation of self-employment.[37,38] The Israeli authorities through their education officer appear to care less about such educational aspirations for the Arabs. It has been argued by some Palestinian scholars that the relatively large number of Palestinian college graduates in the occupied area whether in liberal arts or humanities may constitute an important resource for supportive services and development in general.[34]

(NOTE: An application for establishing an Arab University of Technology in the West Bank emphasizing agricultural and industrial education has been submitted by ASIR. However, no favorable response has been given yet by the Israeli military headquarters.)

LAND RESOURCES

As illustrated in the attached map of FIGURE 4, the total area of the newly formed Palestinian entity (the West Bank and Gaza Strip) is 614,348 hectares* (6,143,480 donums)[39,40] or 6144 square kilometers. Pre-1948 Palestine which includes the West Bank, the Gaza Strip, the Galilee, the coastal plains and the Negab (Negev) is 27,000 square kilometers.[40]

The new West Bank and Gaza Strip entity which formed by Israeli occupation in 1967 constitutes 23% of Palestine which is the area geographically known as such for thousands of years. After 1948, Israel was formed on 77% of Palestine.[40] The UN proposed partition in 1947 considered giving Israel only 30% of Palestine as the Jews at that time only owned 6% of that land.[40,41] The Arab states refused to endorse this partition and Israel then was formed by force on over 70% of Palestine. Palestine land area became under Israeli control with the land area of the West Bank and Gaza Strip becoming under military control and henceforth known as the occupied territories. Although the Israeli government has kept most of the land area of the West Bank and Gaza Strip separate from Israel, it annexed in 1967 many sensitive and important areas such as the Jerusalem area and Latroon area of Ramallah District with a large percent of the land taken outright by the Israeli military and given to Israelis. Since 1967, land confiscations remain unrecognized by the UN and the international community.[42] Thus, land remains the essence of the Israeli-Arab conflict a subject which needs detailed investigation which is out of the scope of this study.

The West Bank alone comprises 94% of the 1967 occupied territories, while the Gaza Strip makes up the remaining 6%. Generally speaking, the West Bank except for the fertile Jordan Valley and some plains in the north and northwest has a hilly terrain which is mostly dry farmed while the Gaza Strip lying on the Mediterranean Sea coast is made up of fertile plains of a sandy nature and is mostly irrigated. Since this study deals with food production from land used by the Palestinians, the changes which occurred to their land resources since occupation will be discussed.

TABLE 6 shows the distribution of land by ownership and utilization as defined by the Israeli military government.[42]

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* one hectare = 10 donum or 10,000 square meters = 2.5 acres

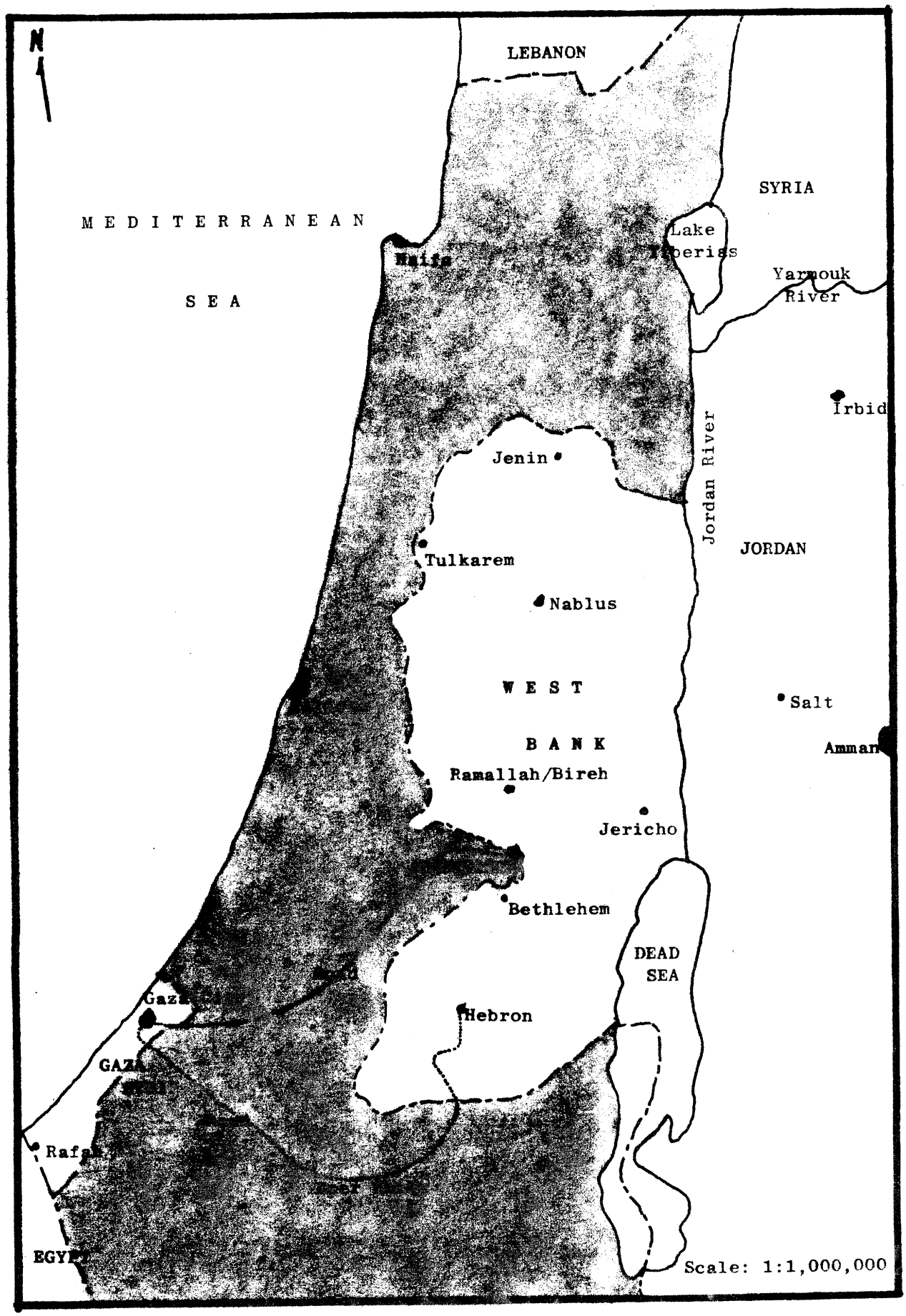

FIGURE 4 . The West Bank and Gaza Strip

TABLE 6.

GENERAL DISTRIBUTION OF LAND IN THE WEST BANK AND GAZA STRIP ACCORDING TO THE CLASSIFICATION OF OWNERSHIP AS DEFINED BY THE ISRAELI MILITARY GOVERNMENT IN 1979

Description	West Bank in (000) hectares	Percent of the total	Gaza Strip in (000) hectares	Percent of the total
Privately owned by ARABS	320.0	54.5%	25.3	68.0%
Absentee owners	43.0	7.4%	0.8	2.2%
Government land	69.6	11.9%	4.0	10.7%
Jewish property before 1948	3.0	0.5%	0.8	2.2%
Land with undefined ownership	150.0	25.6%	6.3	16.9%
TOTAL	585.6	100%	37.2	100%

Immediately after the occupation of the West Bank and Gaza Strip, the Israeli military government has taken over what was registered in the name of the Jordanian government as well as the land of the so-called absentees, who happened to be outside the West Bank when the war erupted in 1967. Thus, according to the Israeli government's own admission, as shown by TABLE 6, 45% of the land in the West Bank and 32% of the Gaza Strip is really under the control of the Israeli government if the contested land which the Israelis classified as undefined ownership also became under Israeli control. Definition and proof of ownership is set by the Israeli government which had declared its intention to take all non-private land first.[43,44] In addition by 1980, 35,868 hectares or 6.2% of the West Bank's privately owned land had been confiscated.[45] Various detailed studies have been made on Israeli land take-over.[42-46] The results of land confiscation and

various other factors will be discussed later on with regard to the resultant decrease in land resources for agricultural purposes.

In 1966, a total of 292,217 hectares were cultivated land[47] in the West Bank and it decreased to 167,190 hectares in 1981,[48] which means a 43% decrease during the first fifteen years of occupation. In this same period, the Israeli military government intensified their expropriation of Arab land by different means and laws using any pretext to take over the land including the following:[42-46]

-1- absentee property, i.e. those Palestinians who happened to be outside the West Bank and Gaza Strip in 1967 when the population census by the Israeli military authorities was made between September 10 to September 25, 1967 for the various districts of the West Bank and Gaza Strip.

-2- registered state domain, i.e. land previously registered in the name of the Jordanian government for public use.

-3- land aquisition for Israeli military use.

-4- land closed for Israeli security purposes.

-5- establishing or expanding the Israeli settlements initiated by the Israeli government or by Israeli private settlers settling over Arab lands after being provided protection by the Israeli military authorities.

-6- fraudulant land sales to Israeli settlement companies using disguised local persons as buyers.*

-7- land for roads, especially to and from the Israeli settlements. The Israeli military government has recently placed under its control as much as 150 meters on each side of certain roads or roads to be established and issued a rule preventing Palestinians from building in these zones.[49,50] Customarily, most development in the West Bank and Gaza Strip has been around the roads. The Israeli military government

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* The Jordanian government has a law against the sale of Arab property to the enemy including any Israeli person or Israeli agency or their agents and there has been recently some convictions with death sentences.

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administration did not open a single major road in the West Bank and Gaza Strip up to September 1984 other than those serving the new Israeli settlements or colonies.[50] The new rule appears to confirm Palestinian complaints that it is made to prevent the growth of Arab towns and the building of new Arab housing projects which are usually established net to the major roads.[50]

The total area thus siezed, i.e. used or fenced, by the Israelis from the Arabs of the West Bank amounts to 0.18 million hectares (1,800,000 donums) which represents nearly one-third of the total area of the West Bank.[42-46] Arab private owners have been often at a loss even when they prevail in their complaints in the Israeli High Court of Justice. This has happened in the case which they won against the Israeli settlement of Elon-Moreh, which was established over Rujeeb's lands, a Palestinian village near Nablus. Despite the fact that they obtained a court order dismantling this settlement, which was subsequently moved to scenic higher grounds overlooking Nablus, the people of Rujeeb were not allowed to use their land under the pretext that it is now designated by the Israeli military government as a security zone area which makes it out of bounds even for its owners. Early in 1984, the Israelis shot and killed a donkey from under one of the Rujeeb farmers who was riding his donkey on his property over the land he and others supposedly freed of settlers in the court. Certainly, agricultural areas like this can not be counted in the output of food production of the West Bank.

It is not fair to expect the Palestinian farmers to bring about food self-sufficiency for the occupied territories when they cannot till or graze their own land or the government land designed for grazing. The land which the Israeli government has actually confiscated, siezed, fenced for settlements or the so-called security of the Israeli settlements is shown in TABLE 7.[48]

TABLE 7.

THE CONFISCATED AREAS FOR SETTLEMENTS IN THE WEST BANK FROM 1967-1980 - in hectares

Location	Area (hectares)	Number of Settlements
Eastern Slopes	13,810	19
Mountain Heights	11,181	52
Jordan Valley	4,980	16
Jerusalem	5,897	14
TOTAL AREA	35,868	101

Because of the variations in the topographical characteristics of the West Bank and the geographical location of the various land sections in this area, it may be classified into four major agricultural land categories as shown in TABLE 8 and FIGURE 5.(24)

TABLE 8.

LAND CATEGORIES OF THE WEST BANK WITH RESPECT TO THEIR TOPOGRAPY[24]

Category	Location	Area (hectares)	Average Rainfall in mm	Type of Agricultural Crops
Fertile Plains	Jenin and Tulkarem	59,000	500-600	Field crops, vegetables - especially melons, citrus & other fruit trees.
Hilly Chains	From Jenin to Hebron	320,000	450-550	Fruit trees - especially olives and grapes.
Eastern Slopes	The western slopes of the Jordan Valley	145,000	200-350	Grazing areas, barley, legumes.
Jordan Valley	Around the Jordan River from Beisan to Jericho	56,000	100-250	Vegetables, citrus & tropical fruit trees and some field crops.
TOTAL LAND AREA		580,000		

These four agricultural sections can best be seen in the attached land map,[24] FIGURE 5, and may be described as follows:

1 - The fertile plains of Jenin and Tulkarem:

This area comprised 59,000 hectares which is mostly characterized by mild weather and intensive agriculture. A significant percent of this area (12,000 hectares) are plains and land with a slope of less than 5% while the remainder is hilly and cultivated with fruit trees - mostly olives. Most of this area is rainfed agriculture (500-600 mm) planted with various field crops, vegetables and melons. Around 4,000 hectares of this area are irrigated from shallow wells and

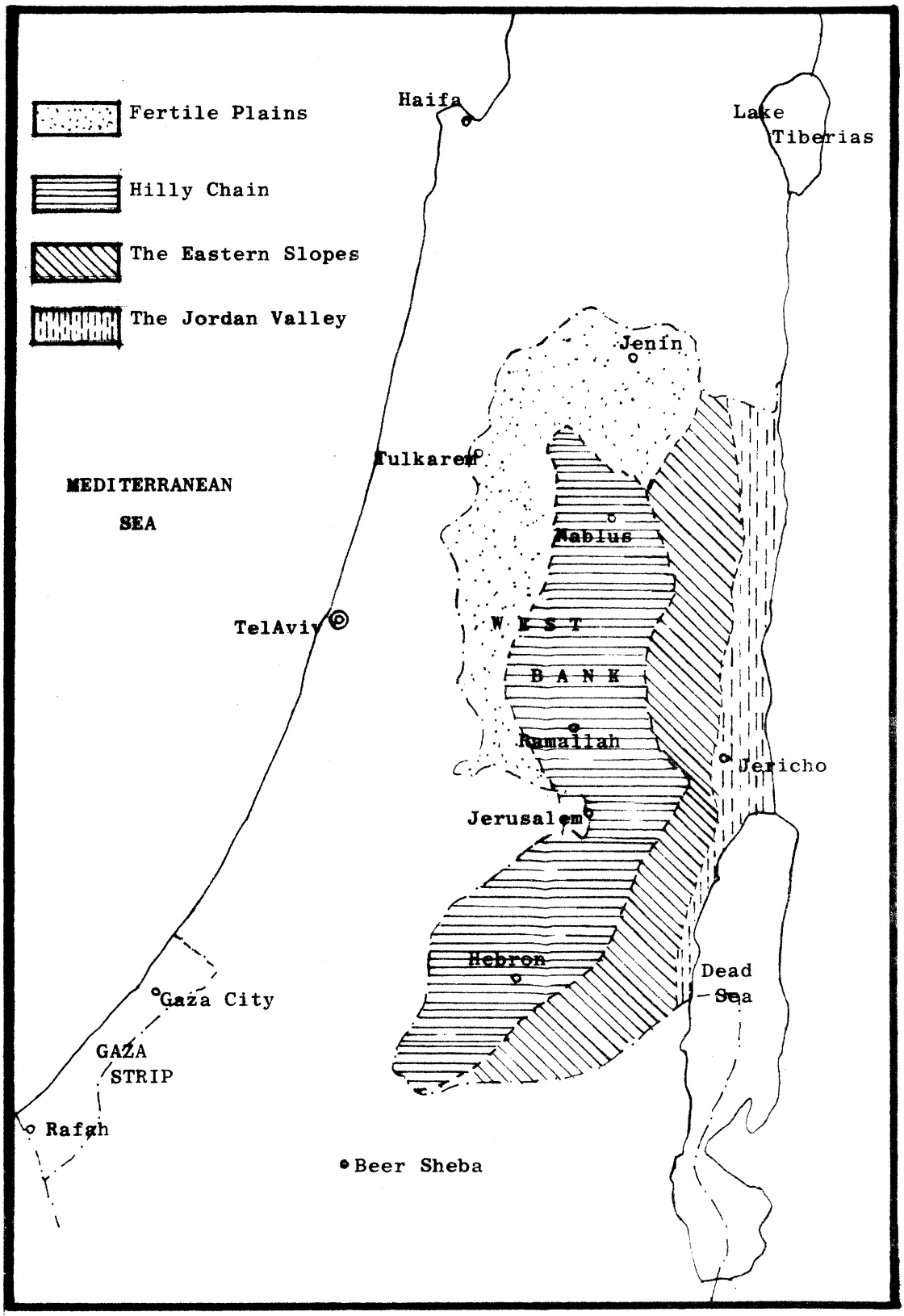

FIGURE 5 . Land Catagories of the West Bank with respect to their Topography

essentially it is the only* irrigated land in the West Bank other than that of the hot Jordan Valley. The fertile plains especially the semi-coastal sections near Tulkarem is very suitable for greenhouses and the production of seedlings.

2 - The hilly chain extending from the edge of the Jenin District through Nablus to Ramallah and ending in Hebron:

This is an area extending 125 km from north to south being about 3 km in width. It is mostly rocky with small fertile valleys in between, and has relatively high rainfalls (450-550 mm). It has the coldest temperatures of the West Bank and separates the coastal plains from the eastern slopes which slopes down toward the deep depression of the Jordan Valley. It is mostly planted by fruit trees especially olives from the hills around Nablus through Ramallah up to the city of Bethlehem - and from then on grapes become the predominant crop especially in the Hebron mountains.

3 - The eastern slopes:

These slopes comprise an area which overlooks the Jordan Valley and are fairly warm in temperature. They have low rainfall (200-350 mm) with marginal land use, e.g. animal grazing. Because of their strategic position on looking at both the valley and the mountain region, the Israeli military settlements were scattered along this region. There are eastern slopes in each of the districts of the West Bank except Tulkarem, i.e. east of the lands of Jenin, east of Nablus, east of Ramallah and Hebron.

4 - The Jordan Valley:

The Jordan Valley comprises an area of 56,000 hectares around the Jordan River extending to the Dead Sea. It has a desert-like climate with very little rainfall (100-250 mm). Around 5,000 hectares of the Valley is cultivated mostly by vegetables of which 3,900 hectares are irrigated and have the advantages of high and early productivity. Israel has concentrated its land confiscation and seizures on the fertile Jordan Valley to use it for profitable agriculture and form a military barrier and attack point toward the East Bank of the Jordan River.

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* The fertile plains of Latroun - West Central section of the West Bank are similar to the fertile plains in Jenin and Tulkarem in being mostly rainfed but also in having a large proportion of irrigated sections. This land area, however, which was siezed by Israel in 1967 is now used exclusively by the Israelis. The land belongs to the Palestinians of three villages of the Ramallah District (Imwas, Yallow and Beit Noba with a population of about 8,000). These three villages were totally demolished and razed out of existance directly after the occupation of the West Bank in 1967.

As will be discussed later, the agricultural development in this highly productive warm winter valley area is totally dependent on the amount of sweet water available for irrigation. The Jordan Valley is reported to have the lowest point in the world near the Dead Sea shore (390 meters below sea level). The Israeli settlements with their deep wells are taking most of the deep water reserves of this valley.[51]

THE COASTAL AREA, i.e., THE GAZA STRIP

This land area around Gaza became an entity following the separation of this district from the mother, Palestine, when Israel was formed in 1948. The Gaza District as such lost most of its lands to the newly established state of Israel in 1948 and only the lands which are adjacent to the cities of Gaza, Khan Younes, Deir El-Balah and Rafah remained in this district. In 1947, the Gaza District of Palestine had a combined population of only 60,000 but,[40] as discussed earlier, this population mushroomed to 476,000 in 1982 due to the absorption of other Arabs in 1948 from the neighboring towns and villages occupied by the Israelis.

The Gaza Strip has the only land area left of Palestine which is on the Mediterranean Sea. Otherwise, nearly all of the large fertile coastal lands of Palestine are now in the possession of Israeli Jews.

The Gaza Strip comprises only a small segment of the coastal plain of Palestine which extends northward into Israel and southward into the Sinai and Egypt. There are variations between the northern area of the Gaza Strip near Gaza City and the southern part near the border city of Rafah - FIGURE 4 - with the area north of Wadi Gaza forming part of the fertile Palestine plain - the "Philistin Plain" - and the area south of Wadi Gaza forming part of the arid Palestine's Negeb - the desert of Palestine.[40,53]

The Gaza Strip is about 45 kilometers from north to south and 5-7 kilometers in width in the north near Gaza City, where the annual rainfall often reaches 400 mm. In the southern end near Rafah, the land area enlarges to 12 kilometers in width and the annual rainfall decreases to less than 150 mm near the Egyptian borders.

The narrowness of this area and its isolation by Israel from the West Bank gave it the name "Strip" - the entire land area of Gaza has been fenced by the Israeli military and it is connected to the West Bank by road through Israel (see FIGURE 4). The land area of the Gaza Strip which is 363 square kilometers is mostly sandy and flat.[40] Gaza Strip agriculture is

dependent on irrigation from fairly productive shallow wells and 90% of the water that is pumped is used for irrigation.[24] Throughout the period since 1948, about three-fourths of the land area of Gaza has come under cultivation and about half of the cultivated land is intensively farmed with the aid of irrigation.

One of the most important forms of land classification is the one according to use. TABLE 9 shows that while most of the cultivated land in the West Bank is dry farmed and is mostly planted by olives in the north and grapes in the south, the majority of the cultivated lands in the Gaza Strip area are irrigated and planted mostly in citrus (oranges and grapefruits).[24]

TABLE 10 shows that 45.7% of the land area in the Gaza Strip is cultivated compared to 27.6% in the West Bank.[24]

In 1980, two Israeli geography researchers stated "As a result of the great population density, the strain on existing soil and water resources is enormous. Every stretch of land fit for cultivation is exploited. This is true even of dunes, wherever more fertile soil is hidden at small depths beneath the sand. Out of the 353 square kilometers of the Gaza Strip, 267 square kilometers were under cultivation in 1967".

Despite the small amount of land available for cultivation and despite the fact that the Palestinians in the Gaza Strip do not have any major industries as Israel, it may be seen from TABLE 10 that up to 1982 about 13,000 hectares or nearly 36% of the Gaza Strip lands were placed by the government of Israel under the control of the ruling Israeli military government including Israeli settlers.

The Israeli government publicly announces from time to time that it intends to add and expand more settlements all over the occupied Arab territories including the Gaza Strip and in most cases the Israeli expansion and take-over of Arab lands is actually carried out, and hence as the years go by, more of the Arab lands are confiscated.[43]

The agricultural land use of the cultivated area in the Gaza Strip has shifted slightly with the years. TABLE 11 shows land use with respect to the years 1967/1968, 1974/1975, and 1982/1983.[24,52] It should be noted from this table that no change occured in these years in the percent of irrigated land. However, the percent of fruit trees (mostly citrus) decreased by 5-6% in 1983 while that of vegetables increased by only about 3%. The total cultivated land area remained about the same and as indicated in TABLE 10, the 1982 ratio of

TABLE 9.

LAND CLASSIFICATION ACCORDING TO USEAGE IN THE OCCUPIED TERRITORIES

IN 1981/1982

LAND CLASSIFICATION	WEST BANK AREA (hectares)	GAZA STRIP AREA (hectares)
1 - Rainfed - Dry Farming:	TOTAL SECTOR 152,199 % of TOTAL 26.24%	TOTAL SECTOR 7,089 % of TOTAL 19.7%
Thereof:		
Field crops (cereals)	50,092	1,700
Melons and Vegetables	8,539	695
Olives	69,159	1,100
Grapes	8,666	820
Other fruits	15,743	2,774
2 - Irrigated:	TOTAL SECTOR 7,858 % of TOTAL 1.35%	TOTAL SECTOR 9,372 % of TOTAL 26.0%
Vegetables and Melons	5,365	2,225
Citrus	2,493	7,147
3 - Uncultivated Land:	TOTAL SECTOR 419,943 % of TOTAL 72.4%	TOTAL SECTOR 19,539 % of TOTAL 54.3%
Natural Pasture; mostly confiscated	160,000	---
Permanent Forests; mostly confiscated	25,494	4,100
Building , Industry and Facilities	14,000	(15,439)
Rocky Lands	220,449	(-)
TOTAL AREA IN HECTARES	580,000	36,000

TABLE 10

DISTRIBUTION OF AGRICULTURAL LAND, IRRIGATED LAND AND ITS PERCENT TO THE TOTAL AREA FOR 1981/1982 [24]

- in hectares -

Description	West Bank	Gaza Strip	Israel	Total Palestine
-Total Area	580,000	36,000	2,012,000	2,628,200*
-Cultivated area	160,000	16,461	427,000	603,461
-% of cultivated area to total area	27.6%	45.7%	21.2%	23.0%
-Irrigated area	7,858	9,372	196,000	206,230
-% of Irrigated area to total cultivated area	4.9%	56.9%	45.9%	34.2%
-Land under Israeli Control	281,600	12,900	100 %	2,012,000
-Land taken & used for cultivation by Israelis	9,375	undeter-mined	427,000	
-Irrigated land used by Israelis	8,499	undeter-mined	196,000	
-Total Irrigated land in the West Bank used by Arabs and Israelis	16,357			
-% of Irrigated land used by Israelis to total irrigated land.	52.0%			
-Cultivated area per person.	0.184	0.035	0.102	0.116

* The area of whole Palestine is 26,282 square kilometers of which Israel is 20,120 square kilometers.

TABLE 11.

AGRICULTURAL LAND USE OF THE GAZA STRIP

FOR THE YEARS 1967 to 1983

- in hectares -

DESCRIPTION	AGRICULTURAL YEAR 1967/1968	1974/1975	1978/1979	1982/1983
Total cultivated area *	16,300	16,900	17,400	17,000
Thereof:				
rainfed crops	7,300	7,400	7,900	7,590
irrigated crops	9,000	9,500	9,500	9,410
% of irrigated land to total cultivated area	55.2%	56.2%	54.6%	55.4%
Fruit trees area	11,800	12,600	12,800	11,400
% of total area	72.4%	74.6%	73.6%	67.1%
Annual crops - thereof:				
Field crops	1,600	1,700	1,600	2,100
% of total area	9.8%	10.0%	9.2%	12.4%
Vegetables	2,900	2,600	3,000	3,500
% of total area	17.8%	15.4%	17.2%	20.5%
Forest	4,100	4,100	4,100	4,100

* The total cultivated area in 1966/1967, i.e. before the 1967 Arab Israeli war, was 26,700 hectares.

cultivatable land per person which is 0.20% and 0.035% for the West Bank and the Gaza Strip respectively is among the lowest in the agricultural countries of the world. When comparing land useage in the agricultural year 1981-1982 with that prior to the occupation, one finds that in the West Bank - as shown in TABLE 12 - that a great reduction in the land available for use in agriculture has occured in 1982 and that has been attributed to land confiscations especially after 1973. For the Gaza Strip, as indicated earlier, there was no significant change in the cultivated land area.

TABLE 12

CULTIVATED LAND IN THE WEST BANK AND GAZA STRIP BEFORE AND AFTER THE ISRAELI OCCUPATION IN 1967

Description	1964	1982
1. The West Bank:		
a. Total cultivated area in hectares.	216,870	160,057
b. Percent of the total cultivated area to the total area of the West Bank.	37.4 %	27.6 %
c. Percent of cultivated area referring to base year 1964.	100 %	73.7 %
2. The Gaza Strip:		
a. Total cultivated area in hectares	—	16,461
b. Perecent of the total cultivated area to the total area of the Gaza Strip.	—	45.7 %

Despite the fact that one expects an increase in the area of cultivated land under the effect of the factors of mechanization, improved agricultural technology, increase in the population, and progress of time, we find that the effects of the Israeli occupation over one of the longest occupation periods in modern history have negated all the positive effects of these factors and have even resulted in a decrease in the cultivated land area of the West Bank. It is obvious from TABLE 12 that the cultivated area has actually decreased by 57,000 hectares in 1982 representing a decrease of 26.3% from the cultivated area in 1964. This is truly a significant reduction in agricultural land utilization with time for Palestinians in the West Bank, who have as of 1982 only 1/5 th of a hectare per person.

As shown in the following TABLE 13, the greatest decrease in cultivated land area has been at the expense of field crops which decreased by more than half (55.6%) of that of 1964.[47] The confiscation of field crops lands is frequent because of its seasonal use in contrast to trees which are of permanent use which gives it some protection against land take-over by the Israeli military authorities and the Israeli settlers.[43]

TABLE 13

DISTRIBUTION OF CULTIVATED LAND IN THE WEST BANK BY THE TYPE OF AGRICULTURAL USE FOR THE YEARS 1964 AND 1982 (in hectares)

Type of Agriculture	1964	1982
a. Field Crops	112,810	50,092
b. Vegetables	27,133	13,904
c. Fruit Trees	76,927	96,061
Total Area	216,870	160,057

The use of land for agricultural utilization versus that for other purposes was shown previously in TABLE 9. The total rain-fed (dry farming) and irrigated land area used by Arabs is 160,057 hectares which represents 27.6% of the total land area of the West Bank. For the Gaza Strip this number represents 16,461 hectares which represents 45.7% of the total area of the Strip. The Israeli settlers have nearly all of their agricultural projects in the fertile irrigated lands of the Jordan Valley stretching from near Beisan to the Dead Sea.[52]

The Israeli cultivated area in the West Bank represents 9,375 hectares as of 1982,[52] of which 8,499 hectares are irrigated[52] and as shown previously in TABLE 10, this represents 52% of the total irrigated area in the West Bank which amounts to 16,357 hectares. About 74% of this irrigated area is in the Jordan Valley.[24] Most of the land taken for Israeli use in the West Bank is for "security" and political presence and not for agricultural utilization.[54] The Israelis use 427,000 hectares of cultivated land in Israel of which 196,000 hectares (45.9%) is irrigated.[24] It is obvious that the Israelis really do not need the West Bank lands for agriculture of which only 4.9% is irrigated and as shown in the next section with the scarce water resources and restrictions on their use a maximum of only 10% could be irrigated if the West Bankers get to use all their land and water resources and capacities including the portion used by the Israelis.[24]

Another land classification is the one for each land district, which is more permanent and official as it is according to the governmental land registration office where the land is registered to its owners by deed (called "taboo" in Arabic). This has been done by the four governments which ruled Palestine in recent history and this includes the Othoman, British, Jordanian and Israeli governments. The only problem with this system is the land registered in the name of the government for public use.[42] Since occupation of the area in 1967, for example, there has been not only an Israeli take-over of land and reassignment of these lands to Israeli settlers and various military uses, but also a shifting of the lands of some towns and villages from one district to another.[24]

TABLE 14 illustrates the changes that took place in the nine registered land districts of the occupied West Bank and Gaza Strip.[24] The alterations by the Israeli military government of the West Bank and Gaza Strip of the size of the districts began in Jerusalem in which this city was first annexed to Israel in 1967 and then most of the Jerusalem District was annexed gradually. In the other districts, other than the land confiscation for settlements and military purposes, the unannexed lands of the suburbs and villages of Jerusalem were either made part of the Ramallah District or of Bethlehem sub-district and even of Jericho. In addition, over half of the

lands belonging to the District of Nablus were made parts of the Tulkarem and Jenin Districts and parts of the Bethlehem District were made part of the Hebron District along with land confiscation and the setting-up of Israeli settlements in each district and the shifting of one district's land to another.

Jerusalem, however, was abolished by the Israelis as a district of the West Bank and some of the suburban lands were confiscated and Israeli settlements were set-up on them.[10] The other parts of the Jerusalem District either:

1 - Remained a part of the West Bank, especially when they had a high Arab population density.
2 - Remained part of the city of Jerusalem where they were either:
    a - confiscated for use by the Israeli government or taken over by Israeli settlers supported by the Israeli government.
    b - remained in Arab possession, or
    c - became absentee land property of the Arabs which became under the control of the Israeli government.

As shown in TABLE 14, Nablus District has seen the largest losses and shifts in its lands since occupation.[24] Land registration shows over a 50% shift in Nablus District lands with over 30% of it being confiscated by the Israelis. Also, to have the town of Salfit and its satellites as part of the Tulkarem District has placed great travel hardships on the farmers of Salfit and its surrounding area when they need official business in Tulkarem, which became being their new district center.

The Jenin and Tulkarem Districts, which had more than half of their lands either confiscated or placed under the Israeli government's control, may be mistakingly thought of as districts whose registered lands have increased - but this anomoly is only due to the shifting of land registration from that belonging to Nablus and adding it to the Jenin and Tulkarem Districts.

TABLE 14

GOVERNMENT REGISTERED LAND BY DISTRICT IN THE WEST BANK AND GAZA STRIP

	LAND DISTRICT								
	Jenin	Tulkarem	Nablus	Ramallah	Bethlehem	Jerusalem City	Jericho	Hebron	Gaza Strip
Total Hectares registered prior to occupation	59,670	31,622	157,300	78,049	55,726	27,769	34,062	117,647	36,000
Total Hectares as registered after 1970	101,000	72,000	72,000	(166,000)		-	39,062	130,000	30,000
Hectares of cultivated land by Arabs - 1982	36,034	34,539	24,512	(31,877)		-	677	28,971	20,561
Hectares of land under Israeli control	33,300	15,410	45,050	10,721	20,062	(80,082)		12,900	11,338
Number of municipalities by District - 1982	5	4	1	6	3	1	1	4	3
Number of villages by District - 1982	80	50	105	73	33	35	16	92	22

When a research investigator evaluates production of the lands of a certain district, he must painstakingly deal with the production as registered in the agricultural department of the military government. Taking this into consideration, a more detailed description of agricultural land use will be shown in TABLE 15 - i.e., the distribution of total cultivated area by district and the type of crops. As was indicated in the topographical classification of the West Bank, the fertile dry-farming in the north and northwestern areas which represent the Jenin and Tulkarem Districts has the largest share of all of the dry-farmed (rain-fed) agricultural crops except grapes which are mostly concentrated in the southern hilly region of Hebron followed by Bethlehem and Ramallah.

The fertile area of the Jenin and Tulkarem Districts have the second largest amounts of irrigated land following the Jordan Valley which has the greatest amount of irrigated vegetables and citrus in the West Bank.[24] TABLE 15 shows that olives are found to be distributed in all districts with the least concentration in Hebron District and the Jordan Valley and a high concentration in the Tulkarem area.[55] Bananas and palm trees can only be grown in the warm Jordan Valley. The table also shows that Gaza is distinguished by its high concentration of citrus trees representing 71% of the total production of citrus in the occupied territories.[24]

The cost of land rental gives another way of classifying the lands of the occupied territories,[24] as shown in TABLE 16.

TABLE 15.

DISTRIBUTION OF TOTAL CULTIVATED AREA BY DISTRICT AND TYPE OF CROPS IN THE WEST BANK AND GAZA STRIP FOR 1981-1982

- in thousand hectares -

TYPES OF CROPS	Jenin	Tulkarem	Nablus	Ramallah & Bethlehem	Hebron	Jordan Valley	TOTAL WEST BANK	TOTAL GAZA STRIP	GRAND TOTAL
Rain-fed farming:									
Field crops (cereals)	13,758	5,613	5,664	8,075	16,772	210	50,092	1,700	51,792
Vegetables and melons	4,201	1,085	389	1,278	1,586	-	8,539	695	9,234
Olives	13,436	21,852	15,143	16,086	2,635	7	69,159	1,100	70,259
Grapes	416	153	146	2,536	5,404	11	8,666	820	9,486
Other fruits	3,119	2,983	2,891	3,757	2,484	449	15,683	2,774	18,457
Forests	-	-	-	-	-	-	25,494	4,100	29,594
Pasture	-	-	-	-	-	-	160,000	na	160,000
TOTALS	34,930	31,686	24,233	31,732	28,881	677	337,633	11,189	348,822
Irrigated Farming:									
Vegetables and melons	770	1,151	136	125	83	3,117	5,382	2,225	7,607
Citrus	274	1,702	143	20	7	347	2,493	7,147	9,640
TOTALS	1,044	2,853	279	145	90	3,464	7,875	9,372	17,247
GRAND TOTALS	35,974	34,539	24,512	31,877	28,971	4,141	345,508	20,561	366,069

TABLE 16.

THE COST OF LAND RENTAL IN VARIOUS DISTRICTS OF THE OCCUPIED TERRITORIES

- dollars per hectare -

DISTRICT	Irrigated Land	Net Profit	Rain-fed Land	Net Profit
Jenin	$ 600.	$ 1,800.	$ 300.	$ 300.
Tulkarem	$ 700.	$ 2,100.	$ 300.	$ 350.
Nablus	-	-	$ 210.	$ 180.
Ramallah	-	-	$ 150.	$ 120.
Hebron	-	-	$ 120.	$ 100.
Jordan Valley	$ 750.	$ 3,000.	$ 60.	$ 50.
Northern Gaza	$ 700.	$ 3,000.	$ 100.	$ 60.
Southern Gaza	$ 600.	$ 2,000.	$ 60.	$ 50.

WATER RESOURCES *

A survey study by ASIR[56] for Save the Children Foundation of the United States showed that water for the West Bank and Gaza Strip is a necessity for Palestinian population stability. The reliable supply of water for both domestic and agricultural use is one of the prerequisites for human survival, community growth and self-dependence. In the West Bank and the Gaza Strip the lack of adequate water supplies for improved methods of agricultural production is one of the most serious constraints on economic progress. (In addition, availability of piped safe and adequate water supplies for domestic use, i.e., human consumption, personal hygiene, household cleanliness and public services was found to be the greatest priority among villagers of the West Bank and Gaza Strip.)[56] Piped water, if not available for home use, was found to cause the greatest impediment on participation of agrarian families in agricultural production because they lose too much time in fetching the needed water.[56] The availability of piped water was shown to increase small home agricultural projects for both plants and animals in over 60% of the villagers surveyed and results in significant savings in the yearly water bill even though the useage of water more than doubled after installing the piped water network.[56]

Groundwater is the most valuable natural mineral resource in the West Bank and the Gaza Strip and availability of water resources play a crucial role in community development. The unavailability of water in about two-thirds of the villages of the West Bank and Gaza Strip is inhibiting their economic growth.[56] Groundwater is one of the limiting factors for increased agricultural production, especially in the Gaza Strip, where water is the most essential element to obtain a balanced food policy and therefore food self-sufficiency for the area.

In the West Bank and Gaza Strip, precipitation in the form of rainfall, dew and sometimes snow is the direct source of all fresh water for the area, and without needed augmentation it is insufficient to meet the actual and potential water needs of these occupied territories. The level of rainfall varies according to the topography and location. The prevailing rain-bearing winds are westerlies on which the rising ground acts to force the moist air upwards, causing precipitation in the hills. The average annual rainfall is between 450-600 mm in the mountainous and northern areas of the West Bank to 150 mm in the Jordan Valley.[24] See FIGURE 6. In Gaza, the average rainfall is 370 mm in the north and 220 mm in the south, with an overall average of 275 mm.[57]

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* Because water resources are so important for the occupied territories and because they require a great deal of technical analyses, only a brief and simplified description of these resources will be given in this sector.

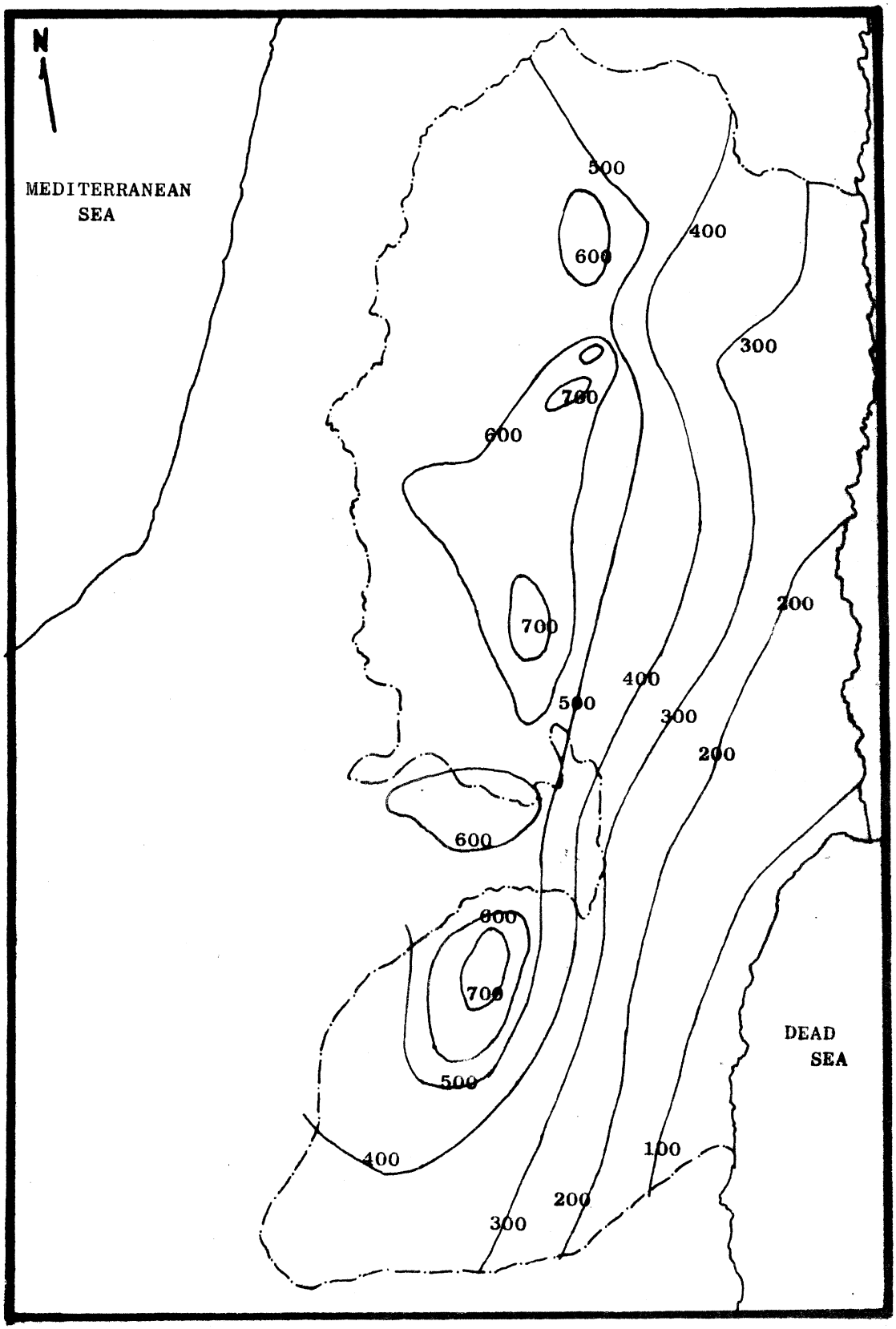

FIGURE 6 . Ten Year Average Yearly Rainfall (millimeters) in the West Bank, 1952 - 1962

In both the West Bank and Gaza Strip, there are only seven months in which precipitation can occur; they are the winter and spring months (October to April). Although the wet season stretches over 7 months, most of the rainfall is really in the four months from December to March, and two-thirds or more occurs in the three months of December, January and February. The summer in the West Bank and Gaza Strip is completely dry. The number of wet days in any one year does not usually exceed 50 days, so that over the whole season there are frequent warm periods which is conductive to evaporation.[24]

Water quantity in the Middle East as a whole is usually computed with the aid of precipitation, runoff and evaporation-transpiration data. Although water shortages for productive use are often caused by low rainfall, it is also linked to high evaporation and infiltration rates. Evaporation is an important factor, since approximately 70-75 percent of the total annual precipitation is lost to the atmosphere by either evaporation or transpiration. The amounts of water evaporated constitute a direct loss from both surface and sub-surface water resources.

The primary factors that influence evaporation and transpiration are:

- climate, including solar radiation intensity and duration, wind conditions, relative humidity, cloud cover and atmospheric pressure;

- agricultural practices and plowing methods;

- vegetative factors (type, color, density, and stage of growth); and

- soil factors (texture, moisture content, chemical composition, fluid properties, and the size, shape, and distribution of pores).

Annual evaporation in the West Bank averages between 1,900 mm per year on the western slopes of the watershed to 2,600 mm per year on the Dead Sea shore. The highest monthly average is in July with evaporation of 8 mm per day in the West and 11 mm per day in the Jordan Valley[24,58] In the Gaza Strip, the mean annual evaporation is 1,800 to 1,900 mm per year.[24,57,58]

Runoff can vary from nil to about 15% in wetter years. On the average, the potential runoff element varies between 7% and 14% of the annual rainfall. It is considered that area-wide runoff will occur in the West Bank and Gaza Strip when rainfall in any one day exceeds 50 mm or when the total on two

successive days is more than 70 mm. Trees are the most effective plants against excessive water runoff and cause the greatest amount of water transpiration. It is locally known that the Israeli military government has curbed the programs of the pre-occupation agriculture departments program in forestration of the West Bank,[59] while in great constrast during the same period the East Bank government of Jordan has multiplied its forestration of the hilly slopes of that region.

It has been established that forestration improves the climates of arid regions by increasing the soil water holding capacity and at the same time returning more moisture to the local atmosphere by transpiration. Some studies showed that increasing the amount of moisture in the mini-environment from forest trees causes an increase in the amount of rain that might occur. For an area which is over 75% dependent on rain-fed agriculture,[24] any permanent increase in the chances for rain, especially in the later winter months of March to May, would be a significant improvement in the land productivity of the occupied territories.

Infiltrating water can either be retained in the soil for the use by vegetation and evapo-transpiration as indicated above or can penetrate more deeply in the ground and replenish the groundwater system and reappear as seepages and springs (or be tapped as well water). For much of the West Bank, with rainfall between 250 and 600 mm,[24] the natural recharge (i.e. underground water replenishment by infiltration) from yearly precipitation is about 30-35%.[58] However, even where the rainfall is low, i.e. less than 200 mm per year as in the eastern slopes of the West Bank and Rafah region in the Gaza Strip, there can be some infiltration because the rain comes during the cooler winter months when the evaporation rates are lower.

The loss of water during transport for irrigation is a major problem since water is usually conveyed in unlined channels or at best gravel-lined. Infiltration rates in these channels can reach a high of 45%.[60] Therefore, for efficient water conservation, the water available at the surface from springs or that which is brought to the surface by pumping must be protected whenever possible from infiltration as well as evaporation by either lining and covering canals or by conveying water through pipes.[61]

SURFACE WATER

The total surface water in the West Bank is estimated to be between a range of 120 and 200 million cubic meters depending on the annual rainfall.[58] The high range could be reached and even surpassed if the Israelis conserve on useage of the tributaries of the Jordan River waters which they have essentially diverted to the Israeli National Water Carrier.[60] The little amount of the remaining flowing water into the Jordan River (after collection from the small canals around Lake Tiberias) is brackish. Additionally , the area immediately near the Jordan River - known as the Zhor - is owned by Palestinian Arabs of the West Bank. However, this land was confiscated by the Israeli military in 1967 and later given to Israelis who pump the water directly from the river for irrigation. (This brackish water is mixed with sweet water before use.) A total of 10 MCM is currently pumped annually from the Jordan River by the Israelis for use on confiscated Arab lands.[62] In other words, all the surface water resources (from rivers - see maps and FIGURE 7) originate in other Arab countries to become water resources for Israeli use - either by diversion from Lake Tiberias to the National Water Carrier or by direct use from the Jordan River in which waters are also supposed to come from the Yarmouk River. Most of the other small seasonal rivers physically inside the West Bank - except in the Jordan Valley - run westwardly toward Israel and their winter season outflows benefit Israel. The seasonal rivers and wadis in the Gaza Strip are very small and form only when rainfall is high and occur and runn well only in the rainy winter season and early spring.[40] In comparing the West Bank to the Gaza Strip, the latter has only a fraction of the surface water that the West Bank has. Lake Sanour, for example, in the Jenin District is a large lake which forms nearly every year due to runoff from the high rains in that area. However, it dries off every summer and the land is then cultivated for late summer crops which can be sold at high prices.

Most of the major winter rivers in the West Bank flow either westwardly to the Mediterranean Sea or eastwardly towards the Jordan Valley. The Western Drainage Area of the West Bank rivers (see FIGURE 8) includes the eastern portions of the basins of the following rivers which end up in Israel (names in parentheses are names used by the Israelis):

(1) Al-Muqqatta (Qishon)
(2) Khadera (Hadera)
(3) Iskandaron (Alexander)
(4) Auja River (Yarkoun)
(5) (Sorek)
(6) (Lakhish)
(7) (Shikma)
(8) (Basar)

- which together cover an area of about 3000 square kilometers. Although figures for the flow in these basins are not available, it is estimated that the runoff from the western drainage basin to some of the Israeli

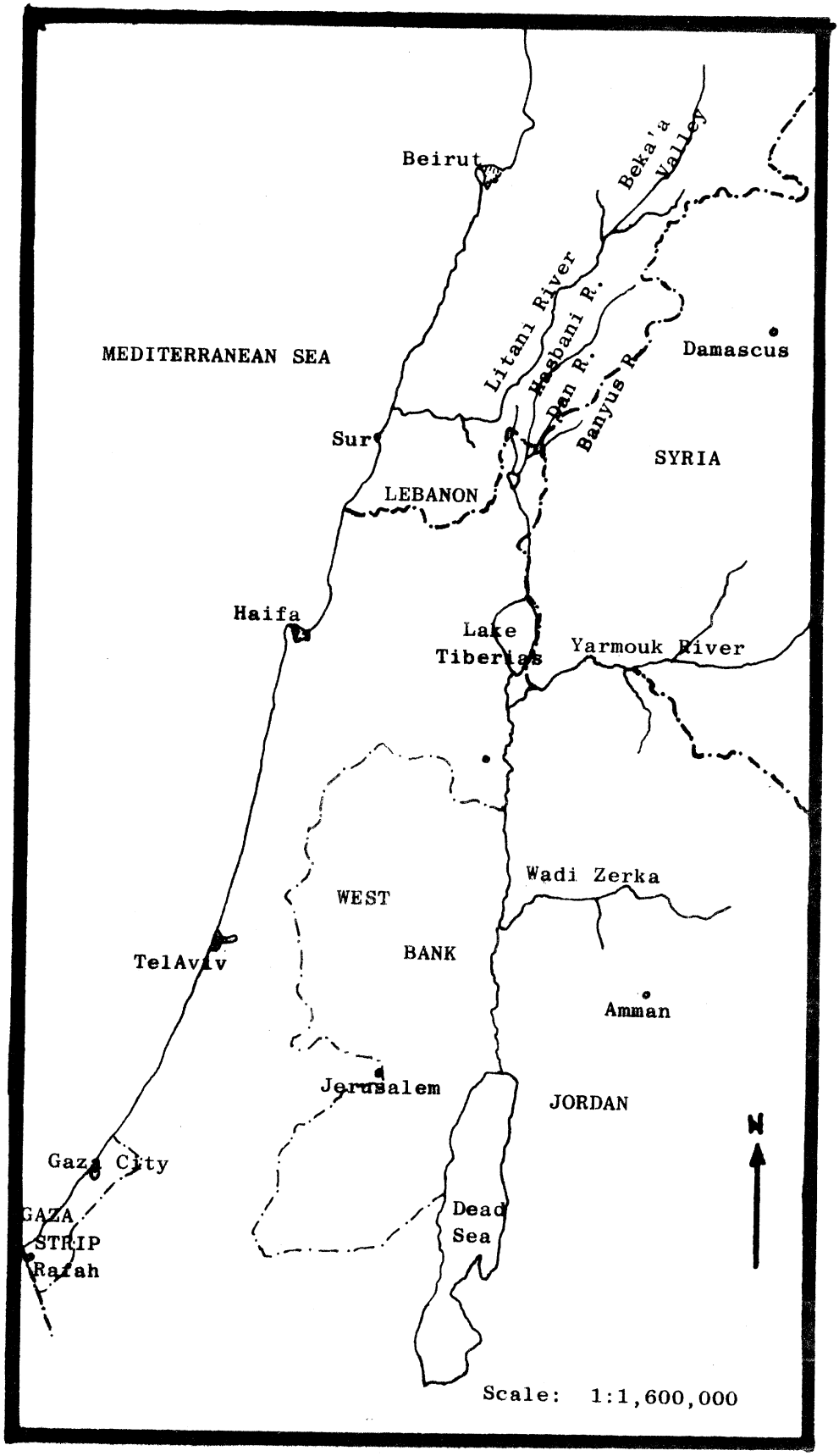

FIGURE 7 . Water Sources Feeding Lake Tiberias and the Jordan River illustrating Arab Origin

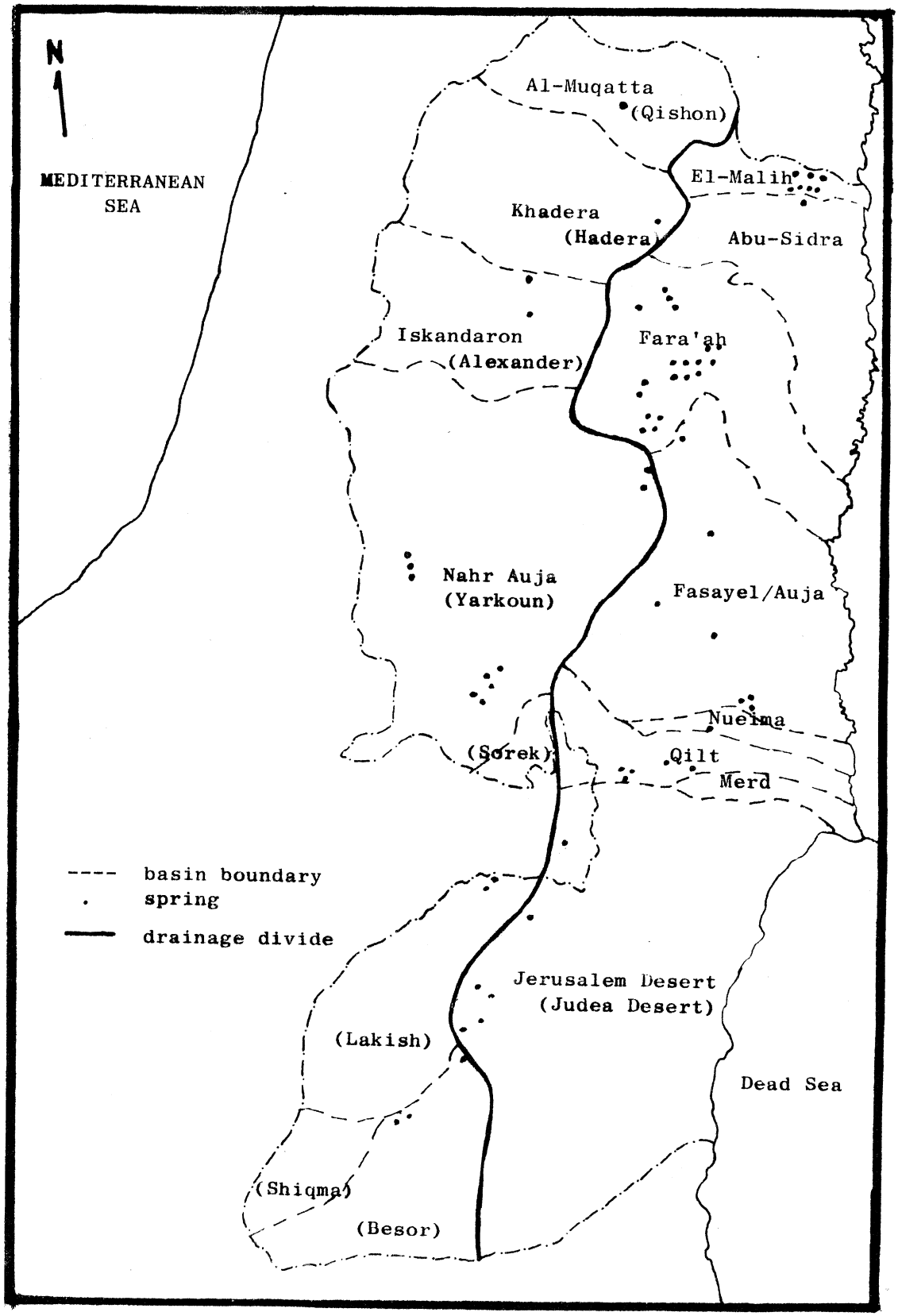

FIGURE 8 . Drainage Basins - West Bank 58, 64

seasonal rivers averages 20-25 MCM per year. Part of this runoff is utilized in various water schemes within Israel.

In the catchment of the Eastern Drainage Basin toward the Jordan River, there are five principal drainage basins covering an area of some 2500 square kilometers forming the follows rivers:

1. - The seasonal rivers El-Malih, Buqui'a and Abu Sidra having a drainage area of about 310 square kilometers.

2. - The river of Wadi Fara'a basin having an area of about 330 square kilometers - with Wadi El-Beidan.

3. - The seasonal rivers of Al-Ahmar, Mallaha, Faysayel/Auja and Nueima which have a drainage area of about 620 square kilometers.

4. - And the rivers of the southern part of the Jerusalem Desert - including the Merd, (Og), (Kumran), (Darga) and (Hazezon) - with a total area of 1100 square kilometers.

The river in Wadi Fara'a which is fed by a number of springs (the largest being Fara'a and then El-Beidan and Ein Miska) has a continuous flow all year, but the other rivers are not perennial). Only limited data is available on the flow of these rivers in the eastern basin but estimates based on the flow of rivers of similar character give a total figure of about 20-25 MCM per year of surface runoff (i.e. not spring flow). Of this 25 MCM, the rivers of Wadi Fara'a yield about 2.5 MCM and Wadi Qilt 10 MCM. The rivers of the southern Jerusalem Desert give an annual flow of between 5-10 MCM, and the northern rivers Al-Ahmar, Malih and Abu Sidra give a flow of about 0.3 MCM annually each. There are no estimations for Bequi'a. (See FIGURE 8 for Surface Water Drainage Basins). The total surface runoff in all of the West Bank (both western and eastern basins) is 40-50 MCM.[58] This significant amount of surface water urgently requires an efficient system of water conservation to benefit the Palestinians in the West Bank.

Surface Water in the Gaza Strip

In contrast to the West Bank and Israel, there are no continuous surface water resources in the Gaza Strip. Wadi Gaza - carrying water about 10 days a year - crosses the strip in between Gaza City and Deir El-Balah. At present all runoff water in this seasonal river flows to the sea.[40]

Despite the fact that Wadi Gaza runs for only a short time, there is a need to devise a conservation method to hold this water before it goes to the Mediterranean Sea because such fresh water is necessary to hold for infiltrating the Gaza land as water storage and to hold down salinity. Any step toward decreasing soil or water salinity in the Gaza Strip is a good indirect aid to the farmers in that densely populated region.

GROUND WATER IN THE WEST BANK AND GAZA STRIP

The ground water hydrology of the West Bank is determined by the geological structure of the area. The mountain ranges of the West Bank constitute a natural replenishment system for a number of ground water basins. Rainwater flowing over rocky surfaces in the hill regions penetates through the various formations which constitute the aquifers of the ground water basins and then flows as ground water.(57)

The main ground water basin which is in the west stretches north/south as shown in FIGURE 9 - Ground Water Basins of the West Bank - while the many fault lines divide the eastern region into separate hydrological basins thus forming many ground water basins in this part of the West Bank.

The potential supply of ground water in the West Bank aquifers (i.e. recharge and storage) has been estimated up to 710 MCM. In normal circumstances, the water retained under ground is 600 MCM. About 55% of it occurs in the western part of the West Bank while the remainder is mostly on the eastern parts. This ground water potential includes up to 60 MCM of brackish water present in the eastern side of the West Bank.

In the Gaza Strip, total recharge from all sources to the system is estimated to be only about 75 MCM per year. Ground water recharge in the Gaza Strip comes from various sources including rainfall, under ground flow and runoff from the eastern adjacent areas, and infiltration from excess irrigation waters.(57)

For the West Bank and Gaza Strip as a unit, ground water is, as stated before, the most valuable natural resource of the isolated occupied territories and essentially the only fresh water resource in the Gaza Strip. The geological and hydrologic environment of each ground water resource system is unique, and far more complex and slower reacting than surface water systems. The geological structure determines various aspects of ground water basins:

- the occurrence and distribution of the ground water

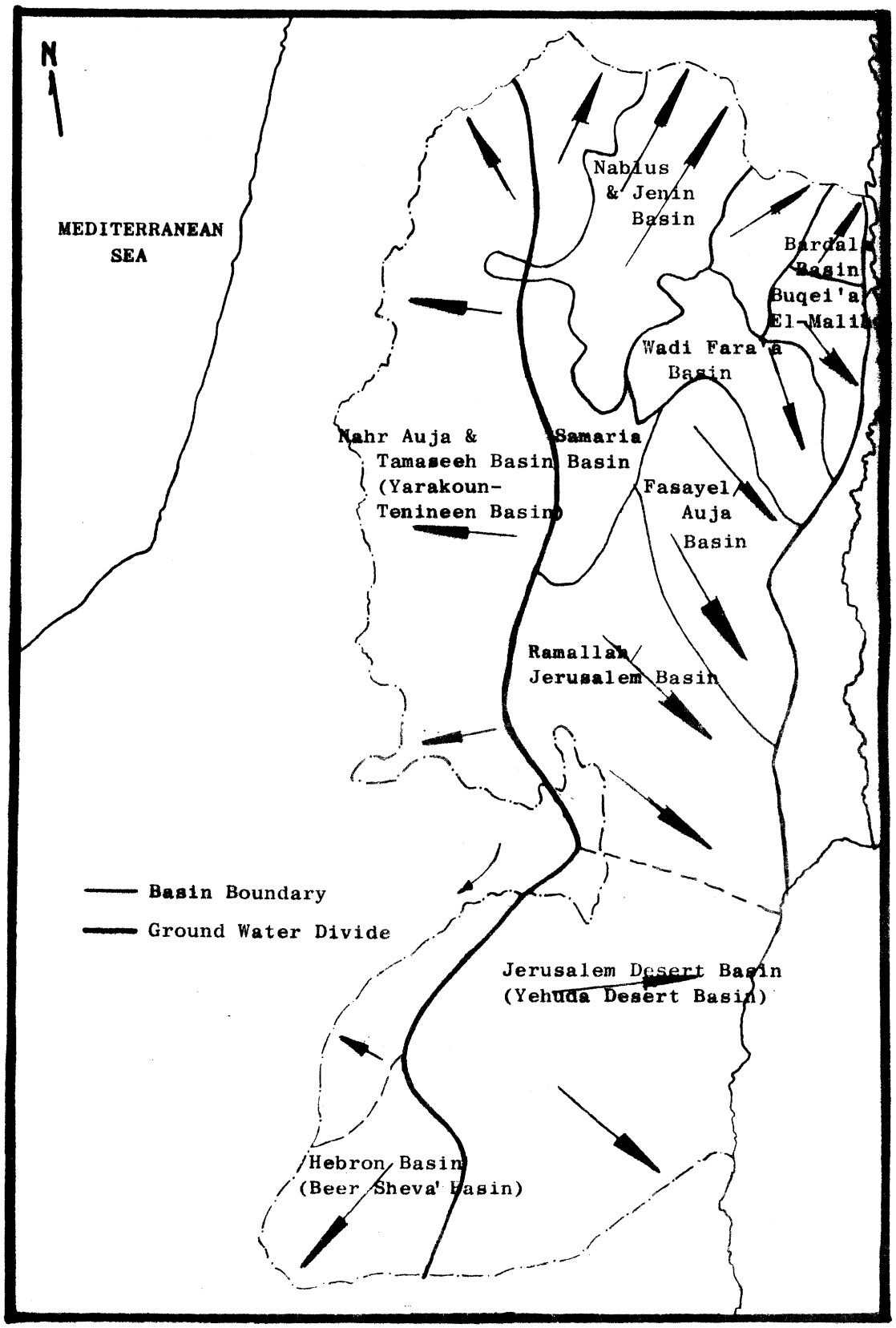

FIGURE 9 . Groundwater Basins - West Bank

- the amount of ground water in storage

- the direction and rate of ground water flow

- the sources and locations of natural recharge, and

- the locations of natural discharge, i.e. springs.

Ground water is, of course, a part of the hydrological cycle.[60] It originates as precipitation or surface water before it penetrates below the ground surface. Ground water moves underground toward a natural discharge point such as a stream, a spring, a lake, or towards an artificail outlet constructed by man, such as a well or drain.[63]

For the West Bank, the systems of ground water aquifers pertaining to that area are divided into the following basins: (See FIGURE 9 - Ground Water Basins and FIGURE 10 - Major Aquifers).

1. The Western Ground Water Basin

The Western Basin is considered as one unit called the Nahr Auja-Tamaseeh (Yarkoun-Taninim) Basin. Water is discharged into the coastal plain. A small portion of the rainwater that seeps through the exposed parts of the Cenomanian and Turonian aquifers in the Western Basin flows in springs draining the sloping aquifers -but most of the water reaches the regional aquifer and it is tapped by wells on both sides of the 1948 Armistice line between the West Bank and Israel - with the greater useage being now on the Israeli side.

The high useage by the Israelis of the Western Groundwater Basin is causing the water level in this Western Basin to drop 0.3 - 0.4 meter/year.[57] To keep the majority of the waters of this aquifer for themselves, the Israeli government who now also control the West Bank through its military forces prevent West Bank farmers in the western half of the West Bank from drilling new wells for agriculture and restrict the use of their old wells.[62] These restrictions, the Israelis claim, are nothing more than a modification of Jordan government water conservation laws.[9]

To prevent further Arab useage of the western aquifer, the Israelis have now point blank military orders that no underground water wells can be drilled for agricultural use in the western plains of the West Bank in the Jenin and Tulkarem Districts. Even the cleaning of agricultural wells needs a license which is difficult to obtain, if ever. Instead they have forced the farmers who have wells to place water meters

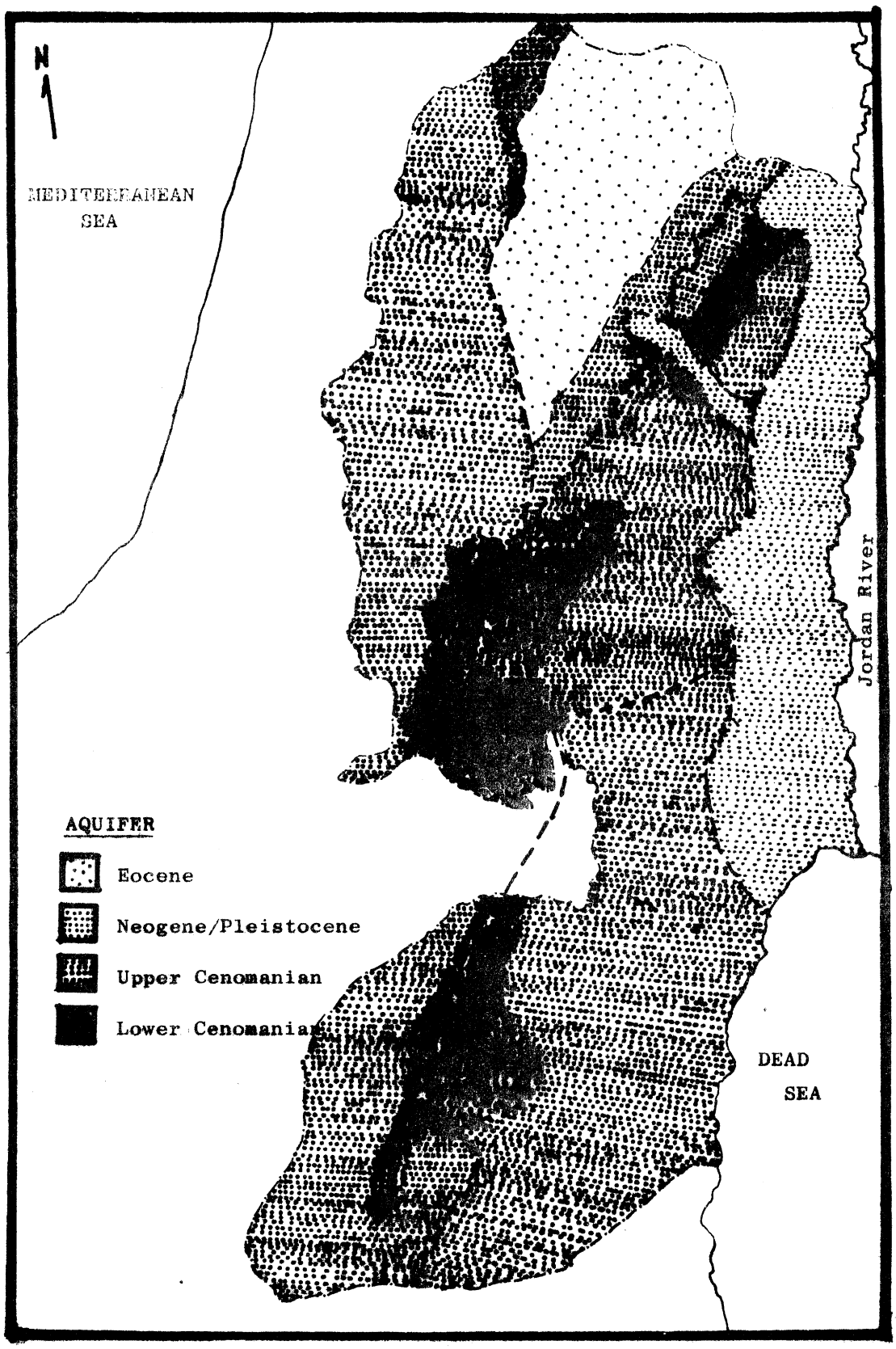

FIGURE 10 . Names of Utilized Aquifers in the West Bank [64]

with Israeli government employees controlling the amount of water to be used. The control of this important underground water resource which originates in the West Bank is no doubt restricting agricultural development and expansion in the fertile north and northwest plains of Jenin and Tulkarem Districts. In general, the policy of greed by the Israelis in controlling and preserving underground and surface water resources for thier lavish use and greenland-making publicity campaign and physically dividing the occupied areas with a so-called "green line" is causing great Arab frustrations and ill feelings in the area.(62)

The natural drainage outlets of this western aquifer are two separate spring systems, the Nahr Auja (Yarkoun) springs and the Temaseeh (Taninim) springs near Carmel. Most of the aquifer is cut off from contact with the waters of the Mediterranean Sea by aquicludes that penetrate to a great depth. The Western Ground Water Basin is estimated to have 300-335 MCM and the natural discharge from springs (including the Nahr Auja (Yarkoun) 235 MCM and the Temaseeh (Taninim) 100 MCM). Now, due to over useage of water by the Israelis with a resulting drop in the water table,(64) this amount of water is pumped from wells near the natural spring outlets within Israel.

TABLE 17. WESTERN GROUNDWATER BASIN

Ground Water Basin	Aquifer	Total Pumped and/or Spring Discharge	Recharge	Area SqKm
Nahr Auja (Yarkoun) and Tamaseeh (Taninim)	Upper and Lower Cenomanian	380-400 MCM	350-370 MCM	1300
Hebron (Beer Sheva)	Upper and Lower Cenomanian	20-21 MCM	16.6-21 MCM	300

Although most of the ground waters of the Nahr Auja (Yarkoun) and Temaseeh (Taninim) basin are actually under the western part of the West Bank, they are used in the water supply of Israel as mentioned above. The water taken from this basin which recharges in the West Bank either through natural discharge or by pumping in Israel provides up to 20% of Israel's water supply.

2. The Northeastern Ground Water Basin

The Northeast Basin is subdivided into two overlying aquifers - both discharging in the valleys of Beisan and Zerein* (now called by the Israelis Yizra'el).(54) The two aquifers are:

- the Samaria basin draining the Cenomanian/Turonian aquifer, and

- the Nablus Jenin basin draining the Eocene aquifer.

The northeastern ground water basins are estimated to have 140 MCM of total natural discharge from springs (including 10 MCM Beisan, 20 MCM Jenin, 70-80 MCM Jalboun (Gilboa) and 18 MCM Wadi Fara'a). The well-known springs near Jenin are all nearly dry due to overuseage of the northeastern ground water basin by the Israelis mainly for cotton irrigation by extensive sprinkling of large areas. Israel obtains approximately over 10% of its water from the Northeastern Basin that originates in the West Bank.

The natural drainage outlets of the West Bank's Samaria Basin are for the most part all in Israel, mainly the springs in the Beisan Valley (4 major and 20 small) with a historical discharge of 40-50 MCM. (For example, the huge and beautiful resort and agricultural springs of Sakhneh lie on the other side of the plains of Arraneh/Deir Ghazaleh/Arabbouneh and

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* Zerein: This village of 2000 population was completely leveled by the Israelis in 1948. The village lands were given to a kibbutz nearby and the village's eastern and northeastern cactus hedge has been fenced and made into a small picnic park overlooking the lush green water-rich Beisan Valley called by the Israelis Beit-Shan.

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down the hill from the West Bank villages of Faqqouah and Jalboun). Today these same springs yield naturally 10 MCM with the remainder being pumped inside the 'green line', i.e, Israel. Again, due to the high useage of the Israelis, the water level in the Samaria Basin drops about 2 meters per year which deteriorates the West Bank underground water supply. The Nablus/Jenin Basin has natural spring outlets in two locations, again in the Beisan Valley [Jalboun (Gilboa) 70-80 MCM] and the Wadi Fara'a springs near Nablus discharging up to 18 MCM per year.

TABLE 18. NORTHEASTERN GROUNDWATER BASIN(64)

Ground Water Basin	Aquifer	Total Pumped and/or Spring Discharge	Recharge	Area SqKm
Nablus/Jenin	Eocene	92-114 MCM	80-95 MCM	300
Samaria	Upper and Lower Cenomanian	35 MCM	40-50 MCM	-

3. The Eastern Ground Water Basin

The Eastern Ground Water Basin drains into the Jordan Valley and includes six almost separate ground water basins:

1 - Bardala
2 - Buqei'a / Wadi Malih
3 - Far'a
4 - Fasayel / Auja
5 - Ramallah / Jerualem, and
6 - Jerusalem Desert (Judea Desert).

Fasayal/Auja, Wadi Qilt, the Jericho Springs and Ein Samiya are from the Upper Cenomanian aquifer. The Lower Cenomanian aquifer is tapped only by the Israelis who now have about 20 deep wells pumping from this strata.

TABLE 19. EASTERN GROUNDWATER BASIN (64)

Ground Water Basin	Aquifer	Total Pumped and/or Spring Discharge	Recharge	Area SqKm
Bardala	Upper and Lower Cenomanian	9-11 MCM	3- 6 MCM	90
Buqei'a / El-Malih	Eocene and Upper and Lower Cenomanian	2 MCM	2- 3 MCM	66
Fara'a	Neogene and Pleistocene	9-10 MCM	9-15 MCM	145
Fasayel / Auja	Upper and Lower Cenomanian	12.5-15 MCM	24-40 MCM	610
Ramallah/Jerusalem	-	25 MCM	50-70 MCM	610
Jerusalem Desert	Upper and Lower Cenomanian	6.2-6.7 MCM	35-40 MCM	590

In summary, from the above tables, the total discharge - either pumped or from springs - from all the groundwater basins discussed in this water section study (regardless of borders) is about 590 - 640 MCM. The total recharge for all these same aquifer systems is from 690 up to 710 MCM. Springflow in the West Bank stems from about 300 springs with 60 major springs being monitored and the remaining considered insignificant as a water supply except for their social and traditional benefits.

FIGURE 11, shows schematically a cross section of the West Bank illustrating rock strata and the surface water shed.(44)

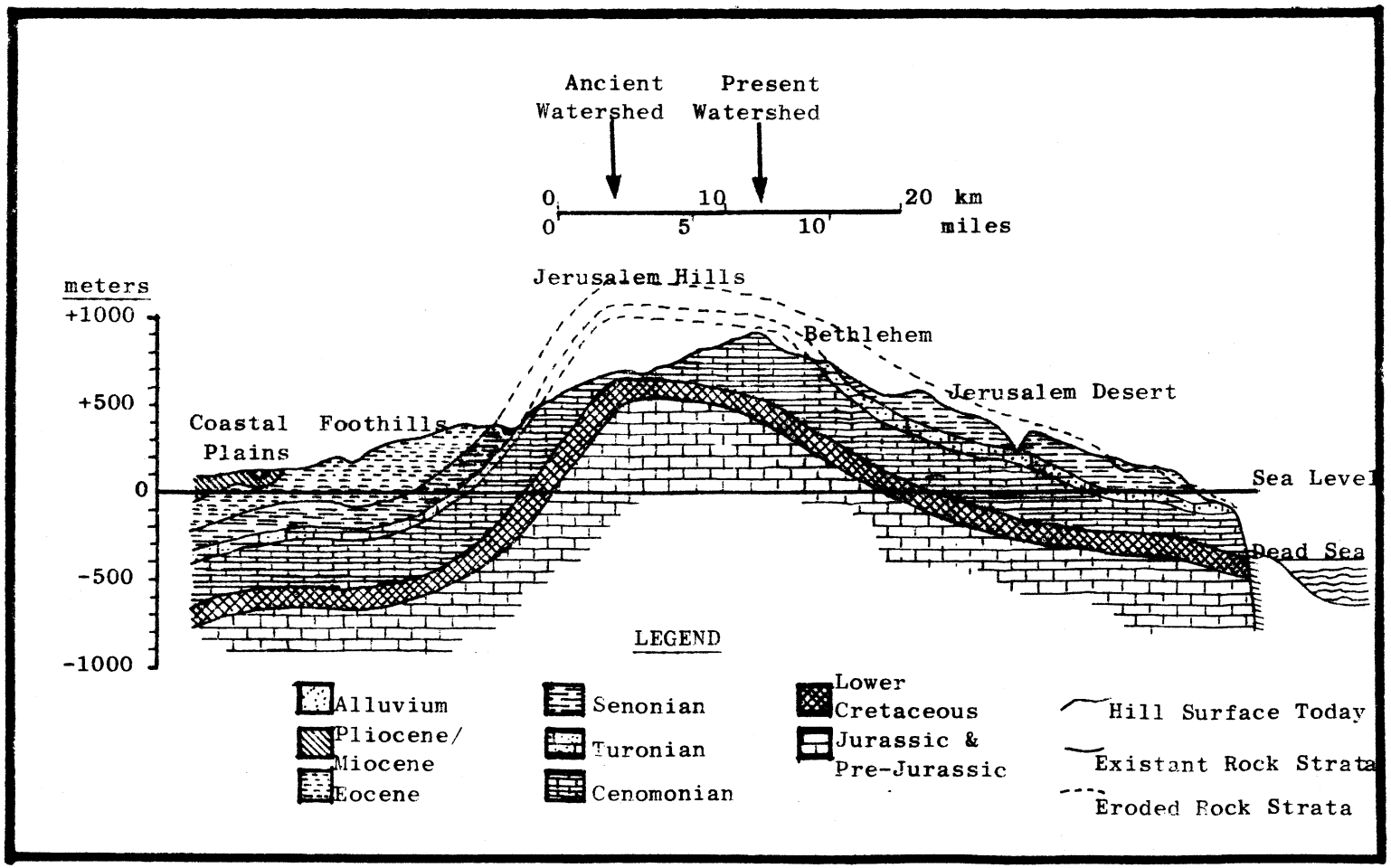

FIGURE 11 . Diagrammatic Sketch of Cross-section of West Bank (through Bethlehem) showing Surface Watershed & Rock Strata [4c]

Underground Water in the Gaza Strip

Ground water is the only fresh water resource of the Gaza Strip. The ground water is replenished by direct rainwater infiltration (about 40 MCM), underground flow from the east (Hebron hills and areas nearby) (10-20 MCM), and return flow from excess irrigation waters and even cesspools (about 20 MCM).[57] (This amount from return flow will no doubt decrease as water conservation methods in agriculture become more intensively utilized.) Water recharge of the underground water system of the Gaza Strip should be done by the ruling Israeli government as they do in Israel in substitute for all the underground water being taken by the Israelis from the West Bank basins.

TABLE 20. GAZA STRIP GROUNDWATER BASIN

Ground Water Basin	Aquifer	Total Pumped*	Recharge	Area SqKm
Southern Coastal Plain	Pleistocene	100-110 MCM	70-80 MCM	360

There is a current yearly overdraft of at least 20-30 MCM from the underground water supply of the densely populated Gaza Strip. The increasing number of Israeli settlers in the Gaza Strip whose per capita use of water is many times more than that of Gazans will undoubtedly aggravate the fresh water balance in the Gaza Strip and push it even further toward higher salinity in certain areas.

If the rainwater remains steady (40 MCM) and the underground flow (up to 20 MCM) is maintained to keep back the saltwater intrusion from the sea and if irrigation water becomes more efficiently used to diminish infiltration, then the annual recharge to the aquifers of the Gaza Strip could be reduced to 50-60 MCM or less and the overdraft could reach 60 MCM.

The source of salinity of ground water in the Gaza Strip is primarily the ground water entering from the east. Seawater intrusion from the west also contributes to this problem. Between these two sources of salinity there is relatively fresh water inflow in the center of the region originating from the rainfall infiltrating directly into the

soil. As a result of higher rainfall in northern Gaza, the salinity in the northern part of the Gaza Strip near Jabalia and Gaza City is much lower than that in the southern part near Rafah.

In general- for both the West Bank and the Gaza Strip, the worth of an aquifer as a fully developed source of water depends on two inherent characteristics:

1 - the ability to store water, and
2 - the ability to transmit water from the recharge area

Important aquifers that occur in the West Bank are composed of limestone and/or chalky limestone. Some flint (a variety of chert) aquifers have also been found in the north of the West Bank. The names of the major aquifers in the West Bank are the Jerusalem, Bethlehem and Hebron formations which are limestone/dolomite of the Cenomanian/Turonian age. These aquifers are considered excellent for holding as well as transmissibility (a measure of permeability) of water, in addition to being thick aquifers (400-900 meters). The deep sandstone formation (Ramali) of disputed age and the Upper Malih formation (a karst limestone) are potentially good aquifers but both have a limited outcrop and exposure and are therefore unexplored. More recent deposits than the Cenomanian, e.g. Eocene, Neogene and Plesitocene which are made of alluvium sediments and/or gravel are found in the shallow wells of the Jenin area and Wadi Fara'a. They are at times good aquifers but in some areas the soluable mineral content in these aquifers is often extremely high.

The total amount of natural recharge (replenishment) of all the aquifers in the central hilly chain of the West Bank between the Mediterranean Sea and the Jordan River is calculated from the total discharge of springs and the total pumpage of wells and the flow to the Jordan River and is estimated as follows - the estimated maximum recharge is also indicated:

TABLE 21.
TOTAL AMOUNT OF NATURAL RECHARGE BY BASIN in the WEST BANK

	Normal Recharge	Maximum Recharge
Western Basin	335 MCM +- 10 MCM	366-390 MCM
Northeast Basin	140 MCM +- 10 MCM	120-145 MCM
Eastern Basin	105 MCM +- 20 MCM	123-175 MCM

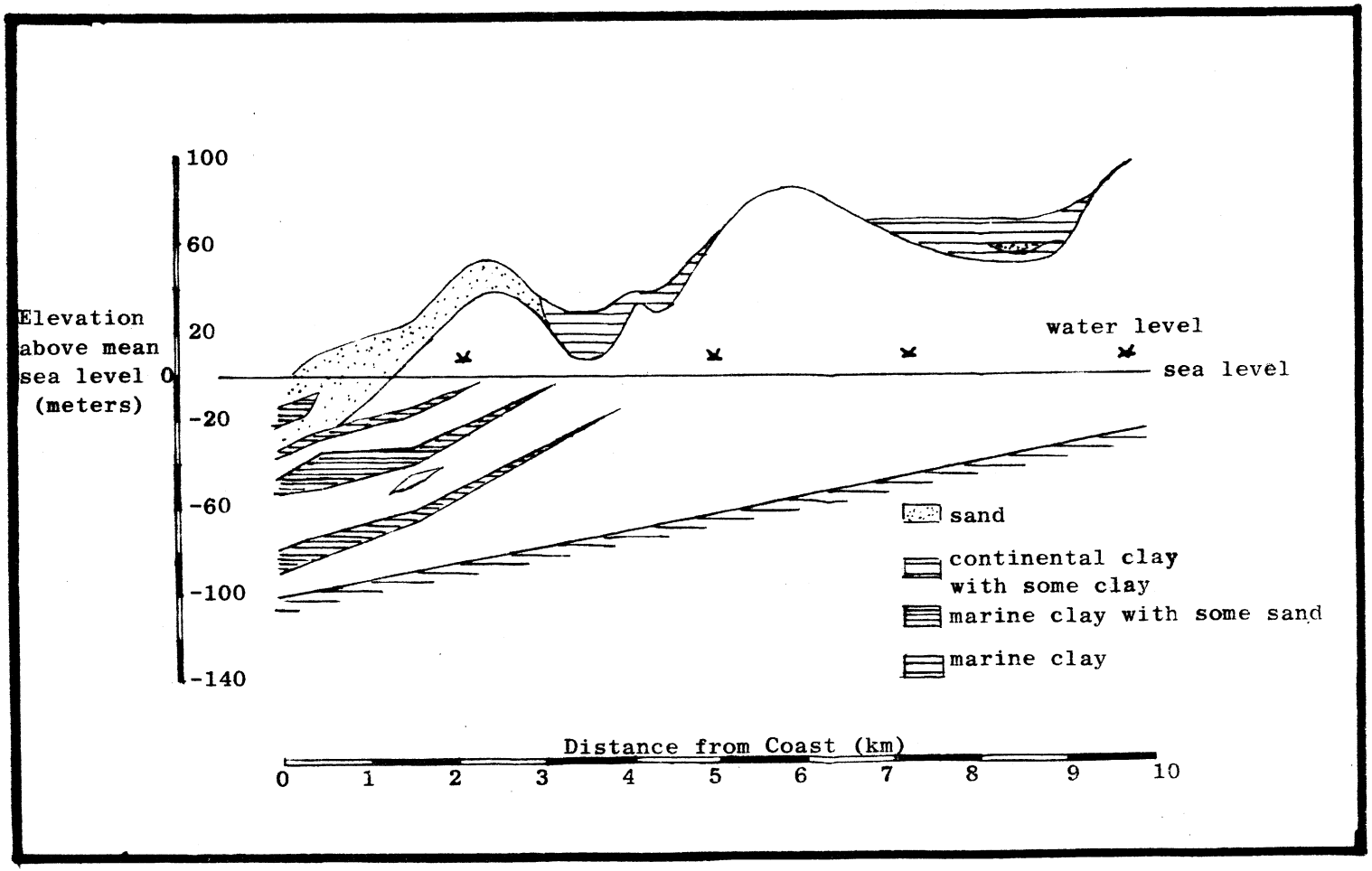

FIGURE 12 . Typical Cross Section of the Gaza Strip [57]

The Israeli Hydrological Service and Tahal Water Consultants (an Israeli company) state that the western basin and the northeastern ground water basin are being mined by the Israelis - i.e., present utilization exceeds natural replenishment - thus taking more than they should from the underground waters originating in the hills of the West Bank. Therefore, the conclusions reached in this study regarding the over-utilization of the areas water resources by the Israelis are backed also even by Israeli independent and governmental consultants.

Gaza aquifers as indicated earlier are primarily coastal deposits consisting of a number of sub-aquifers composed of sand, sandstone and pebbles of Plesitocene age. Their recharge (replenishment) is from rainfall, runoff and under ground flow from the east, and return flow from irrigation water as mentioned previously.

FIGURE 12 shows schematically a cross section of the Gaza Strip illustrating the composition of various layers of sand and clay.(57)

International law prevents any occupying powers from using any resources - water or land - for the benefit of the occupying power be it in the form its colonizers (settlers) or otherwise.(11) As a point of fact, the use of the unutilized water of the West Bank aquifers, as for example in the Jordan Valley, is like opening and taking from the "safety deposit box" of the water resources of the Arab Palestinian people. Israel claims that they have taken the place of the Jordanian government in administering the territories. However, the government in any place is there to serve the population it governs. Even in dictatorship countries, the water remains for the people ruled.(62)

Listed below is an example of how Israeli orders are issued and one of the first orders given here as an example of a series of such orders.(65) This Israeli order issued in 1967 in the West Bank reads as follows:

ISRAELI DEFENSE FORCES
ORDER NO. (92)

In accordance with the mandatory power that I have as the Commander of the Israeli Defense Forces in the area of the West Bank, I give the following order:

Definitions:

1 - In this order:

The designated day: June 7, 1967

Water Rules: All rules which comprise the regulations, systems, orders, ordinance, leaflets and instructions that were followed on the designated day concerning water conveyance, pumpage, supply, use, selling, distribution, monitoring, issuing laws and limiting water shares, establishing water projects, measuring water, preventing water pollution, making studies and testings in all aspects regarding water, drilling wells, listening to objections and arguments and all regulations concerning that, limiting areas for the work of institutes and committees for water, giving required licenses that are requsted for the above mentioned regulations, limiting and collecting fees, taxes and profits related to the previous rules.

The Area: The West Bank
Person in Charge: Whom I assign for this order.
Jordanian Government: The Hashimite Kingdom of Jordan

2 - Responsibilities of the Person in Charge:
The person in charge (right after he is assigned) will get all the power he needs related to water regulations. This person could be anyone and he could currently be employed anywhere.

3 - Responsibility:
The person in charge could do the work himself or assign other people (temporary or permanent) to be in charge of some responsibilities that he himself has.

4 - Employment:
The person in charge is allowed to employ any person in the designated area to do any kind of work stated in the water regulations.

5 - Establishing and employment of water institutes:
The person in charge can assure the continuity of any institute, organization, governmental committee or institute that works or is permitted to work in accordance with the water regulations. He could also stop the work of water committees and establish new ones whether it was established before the designated day or not. He could also renew the license of the organization's membership and assign a director including himself.

6 - Cancellation of employment and authorities:
Any employment or authority will be cancelled unless it was given a new renewal by the person in charge.

7 - Validity (applicability):
The regulations of this order will be applicable on any modification or amendment that might occur on water regulations.

8 - Continuity:

Any work executed from the above mentioned that is included in water regulations that was worked on between the period starting on the designated day and ending at the starting of this order will be considered in accordance with the regulations of this order.

9 - Validity Date:

This order will be in effect August 22, 1967.

10 - Order Name:

This order will be called "Order about Authorities Regarding Water Rules in the West Bank", Order No. 92 for the year 1967.

(Dated and signed on).....August 15, 1967

Supposedly, in accordance with international law and custom, Jordanian law remains in effect in the West Bank. The relevant Jordanian legislation consists of the Natural Resources Regulation Law No. 37 of 1966 and the Ground Water Supervision Regulations No. 88 of 1966. This legislation enpowers the Israeli staff officers responsible for water policy in the West Bank to require the installation of water meters on water sources and to restrict the output from them so as to prevent over-pumping and damage to "the water of the Kingdom". During the period of Jordanian rule over the West Bank, no restrictions were placed on the amount of water pumped from any well. Even if the Jordanian government had implemented this legislation, the water authority would at the same time have helped the farmers in obtaining additional water resources and allowed them to drill others wells at different suitable sites and also easily permitted the maintenance of their wells including cleaning and deepening and repair or well pumps, etc. These taken for granted events are hardly approved by the Israeli military and when they do it takes months or years to get the approval.

Water meters were installed in 1976 on all West Bank and Gaza Strip wells and monthly records were kept of the quantities of water pumped by each well owner for a period of at least one full year.(62) Licenses for the drawing of water were then issued to well owners in 1977. Anyone exceeding their licensed water limit is called before the "military court" where the well owner is either fined or the amount of water overdrawn is deducted from the next year's allotted amount.

Furthermore, the Israelis actually took for themsleves the water rights of the Palestinian citizens of the West Bank who happened to be absent in 1967 - the "designated day". The farmers who had water rights to a certain spring water lost

their rights by mere absence and the Israeli government claimed these rights instead of transferring these water rights to the adjacent farmers or even relatives of the absent farmer(s) as it may occur in other countries of the world.(62)

As explained above, water resources exploited in the West Bank and Gaza Strip are mainly ground water flows which are replenished by rainfall. In the West Bank, there are currently about 314 pumping wells, out of over 700 which have been drilled before occupation. The non-pumping wells are for the most part either too shallow under the present condition of decreased water table - as discussed - or have technically inappropriate or old pumps. TABLE 22 shows a breakdown of water pumpage in 1977-1078 and TABLE 23 shows an up-dated list of Arab domestic wells in the area. Of these 314 wells, 20 are used for drinking purposes, leaving 294 for use in irrigation. In the year 1977-1978, 9,047,000 cubic meters of water was pumped for drinking purposes, compared to 6,430,000 cubic meters in 1976-977. Water pumped for irrigation reached a total of 43,036,000 cubic meters in 1977-1978 — 28,891 cubic meters for the Arabs of the West Bank and 14,145,000 cubic meters for the newly established Israeli settlers. Thus, of this 1977-1978 total of about 43 MCM of water for irrigation, one third of it (about 14 MCM) was used by the 5,000 Israelis residing as settlers in the West Bank at that time and two-thirds by the approximately 700,000 Arab citizens.

The maximum water potential of the West Bank is estimated at close to 850 MCM of which:

- 600 MCM could be derived from ground water sources (with at least 60 MCM brackish water),

- 40-50 MCM from surface runoff,

- and up to 200 MCM from rivers, mainly the Jordan River and its tributaries.

Of this maximum water potential, over 470 MCM end up in Israel:

- 320+ MCM from the western ground water basin,
- 110+ MCM from the northeastern basin,
- 30+ MCM of surface runoff
- and currently 10 MCM from the Jordan River downstream from Lake Tiberias.

This leaves 380 MCM for the West Bank. However, of this 380 MCM remaining for use in the West Bank -

- 53 MCM is projected for the Israeli settlements in the Jordan Valley for agriculture only,

- plus about 10-12 MCM for domestic use throughout the West Bank settlements.

- Also, at least 60 MCM of this water is brackish,

- and probably at least 150 MCM are either difficult or expensive to extract.

So, this leaves about 105 MCM for the West Bank citizens and about 100 MCM of this water is currently either being pumped or is used as springflow.

Gaza Strip Consumption

Water consumption in the Gaza Strip is estimated at 100-120 MCM per year of which about 104 MCM is used for agriculture. All of this water is pumped from a reported 1,776 boreholes - 1,718 being for agriculture and 58 for domestic use as of 1980.[54] The drop in the water table in the Gaza Strip area is said to be 15-20 cm/year on the average due to the deficit in recharge as described above. The average rise in salinity is 15-25 mg/l chlorine per year. The recorded drop in water quality since 1967 is said to be 60% or about 400 mg/l of chlorine.

(66)

TABLE 22. TOTAL PUMPAGE OF WELLS IN WEST BANK IN THE YEAR 1977-1978

Area	No. of Wells Irrig.	Domes.	Total Yearly Pumpage-m3	Percent from Total Pumpage
Jordan Valley				
Jericho	40	-	3,464,500	9.1%
Auja/Faysayel	11	-	1,077,800	2.8%
Jiftlik	29	-	2,656,100	7.0%
Marj Naja	8	-	879,500	2.4%
Bardala	8	-	1,854,800	4.9%
TOTAL	96	-	9,932,700	26.2%
Wadi Fara'a	21	2	2,767,300	7.3%
Jenin District Jenin, Arrabeh, Qabatiya, Sanur, and Jalameh	54	2	3,277,800	8.6%
Tulkarem and Nablus	52	2	10,128,800	26.7%
Qalqilia	68	2	6,798,200	17.9%
Ramallah, Bethlehem, and Hebron	3	7	5,033,600	13.3%
TOTAL ARAB WELLS	294	20	37,938,400*	100.0%
plus				
Total pumpage from Israeli wells in Jordan Valley	17	-	14,144,800**	
TOTAL COMBINED PUMPAGE FROM ARAB WELLS AND ISRAELI WELLS			52,083,200	

* From this total, the quantity for drinking water is about 9,047,000 m3.

** From this total, the quantity for drinking water is about 1-2 MCM.

Note: There is no up-to-date pumpage data for the West Bank because no pumpage report has been released by the military government since 1978. This report was issued for two years only - 1976/77 and 1977/78. Those employed in the water department of the West Bank are given orders by the military officer not to release any data. However, one could move about and read nearly all the water meters of the Arab wells in the West Bank and also measure the flow rate of the springs, but that type of research is too expensive for any nongovernmental research institute.

TABLE 23.

NEW ARAB WELLS OPERATED AFTER 1978 FOR DRINKING WATER PURPOSES (24)

Well Name	Discharge - Cubic Meters per Hour
Qabatiya well	about 90
Zeita well	80
Qaffin well	80
Qalqiliya well No. 2	about 100
Habla well	80
Zawyeh well	80
Beit Iba well	200
Ein Samiya well No. 2	150
Shibteen well No. 4	90
Shibteen well No. 5	about 100
Butn El-Ghoul well No. 3	175

REMARKS: These wells pump annually about 5 MCM.

ARAB WELLS TO BE OPERATED IN 1984-1985

Shufa well
Deir El Ghuson well
Beidan No. 2 well

In addition to the 17 deep wells drilled for Israeli use up to 1978, there are also at least 10 additional wells and are listed below:

2 (3) in Jerusalem area
2 in Latroon area
1 in Kafr Qaddoum
1 in Howara
1 in Kafr Malik
1 in Sali't
1 in Marda

Note: It is believed that these wells with the 17 wells of pre-1978 are now pumping as much as all the Arab wells in the West Bank.

SUMMARY

Israel essentially uses (inside the so-called "green line") or plans to use (in the West Bank settlements) 63% of the waters either actually in the West Bank or originating in the West Bank.[57,58,62,64,66] Of the 37% remaining waters, 24.7% are either brackish or difficult or expensive to extract - thus leaving only 105 MCM or 11.4% for use by the Palestinian citizens of the West Bank.

Availability of natural resources plays a major part in the evaluation of the potential development of a national economy. Availability of resources can be considered to set absolute limits to economic development. In this context, such an approach to water resources availability would place an equilibrium between human populations and natural resources for the production of food. A more applicable approach to this area would be the concept of the relative scarcity in that as the utilization or need of water resources increases, the "developer" must turn to the exploitation of resources that are less and less attractive economically and thus accept an increasing unit cost of price.

In conclusion, the West Bank and Gaza Strip are basically agricultural in nature and water availability is a fundamental factor in considering any plans for increased agricultural output. Water resources in the West Bank and Gaza Strip are currently in one way or another ultimately controlled by the occupation authorities and in the foreseeable future there is little likelyhood that the Palestinian farmer will be able to increase the supply of water available. As pointed out above, the potential sources for future development of the West Bank and Gaza Strip agriculture are the same sources which are either currently being utilized by Israel or are under investigation for exploitation by Israelis for their own development and expansion of settlements in the occupied West Bank and Gaza Strip. Thus, increased food production under the prevailing conditions will depend entirely on the more efficient use and development of existing water supplies - including springs, wells, rainfall, and its resultant runoff.

Agricultural planners during this uncertain period of time will have to confine farm production to the scope dictated by water limitations. All possible efforts must be directed at increasing irrigation efficiency by reducing conveyance losses in the water made available to the West Bank and Gaza Strip farmers. Also, watershed management should be emphasized along with the intensified use of low-quality water for tolerant agricultural crops. Economic priorities will have to be established for individual crops.

FOOD PRODUCTION *

In the previous section it was shown that up to 1982 about 28% and 46% of the area of the West Bank and Gaza Strip respectively is cultivated by Palestinians. As of 1982 the Israeli military government became in control of 48.6% and 35.8% of the total land area of the West Bank and Gaza Strip respectively. Of this land under military control the Isralis have used 3.3% for agriculture production while the remainder is used for their so called "Security" and building of settlements. It has recently been published that they intend to expand their activities in agriculture especially in the Jordan Valley.(52)

As the occupied territories of the West Bank and Gaza Strip have their resources confined mostly to other than good cultivatable land, agriculturally skilled population and good Mediterranean climate, they continued their agricultural activities despite occupation.

FIGURE 13 illustrates the cultivated land area utilization in the West Bank and the changes which occured in the use of this land during a nineteen year period (1964-1982) and shows the areas planted with field crops, vegetables and fruit trees for each year. It could be seen from this figure that:

1 - A decrease in the cultivated land area occured in 1966 because it was a drought year while that of 1964 was a good rainy year. The drop in the area of cultivated land in the drought year 1966 is exhibited by the decrease in area of planted field crops in that year because field crops in the West Bank are totally dependent on rain and farmers do not plant much when the rainy season appears to be poor.

2 - In the sixteen years following occupation shown in FIGURE 13, land confiscation by the Israeli authorities was directed at the traditional field crop lands near the Jordanian borders (e.g. Tubas lands) and the lands without trees. The drop in area planted by field crops in the West Bank between 1968 and 1982 is 43%.

3 - Land area planted with trees increased by about 25% during a sixteen year period of occupation. This is mainly because Palestinians felt they could protect their land from confiscation by Israeli settlers and the fact that trees - especially olives - provide a more secure income under occupation than field crops or vegetables.

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* In the agricultural section the year mentioned means the end of the respective agricultural year, i.e. 1982 means 1981/1982

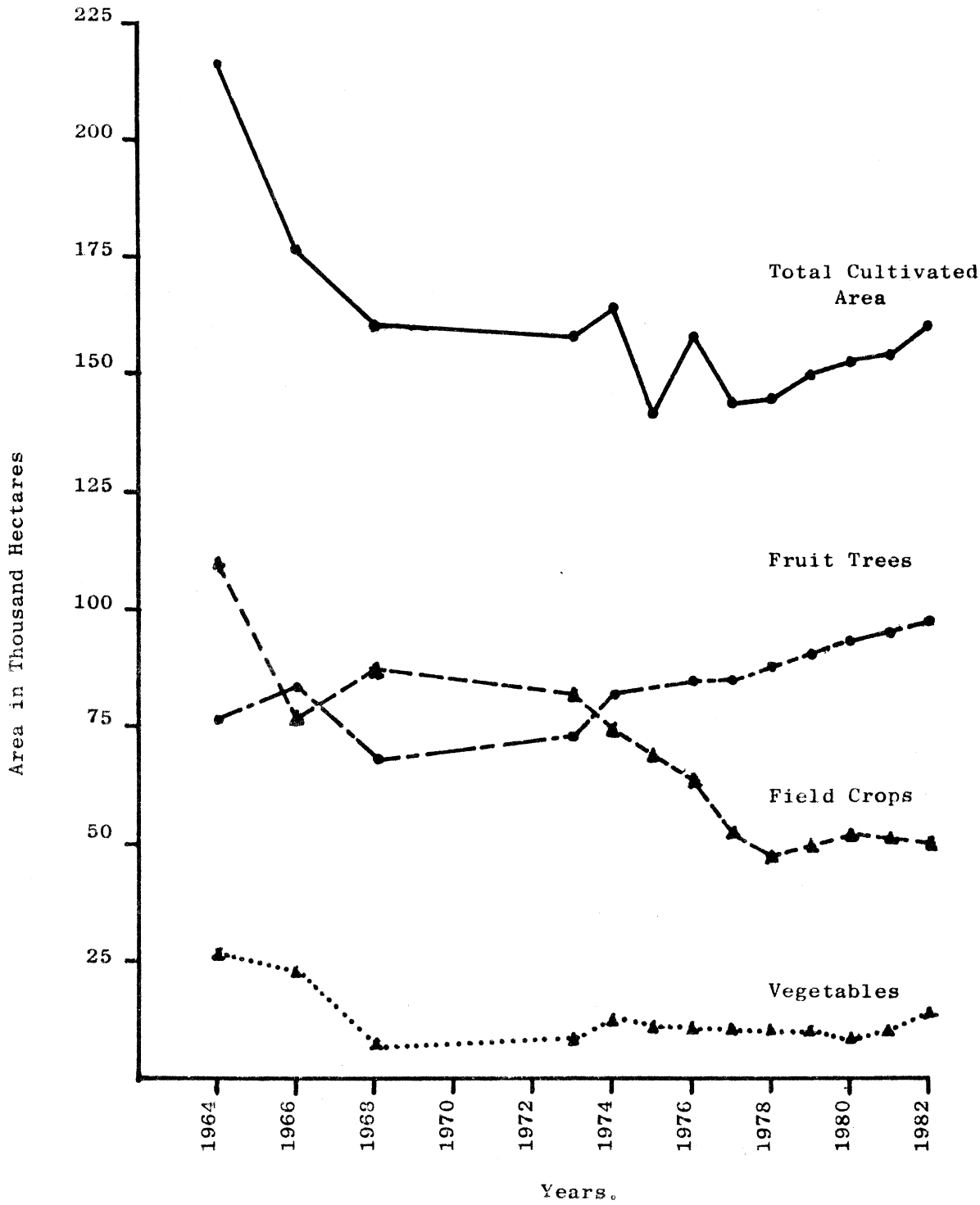

FIGURE 13. Cultivated Areas in the West Bank by Type of Crops.

4 - The percent of land area planted by vegetables before or after occupation remained primarily unchanged and very small - about 6-8% - relative to the total cultivated land area. As will be shown later, changes in the types of vegetables and their productivity did occur after occupation.

Each of the types of plant and animal production will be dealt with for the West Bank and Gaza Strip seperately and placed into groups as outlined below:

I. Plant Production in General in the West Bank and Gaza Strip

A. FIELD CROPS according to prevalance - land use -.

1. In The West Bank:
   Wheat, barley, chickpeas (hummos), lentils, vetch, sesame, tobacco and spices.

2. In The Gaza Strip:
   Barley, wheat, lentils, vetch, chickpeas, fava-beans and other beans.

B. VEGETABLES according to prevalance.

1. In The West Bank:
   Melons (watermelons and cantelopes), tomatoes, onions (including seed onions), squash, cucumbers, cauliflower, cabbage, potatoes, various beans, snake cucumbers (faqoos), eggplants, okra, pepper, garlic, mulookhiyyah (arab spinach), lettuce, spinach and other vegetables.

2. In the Gaza Strip:
   Cucumbers, melons, tomatoes, potatoes, squash, mulookhiyyah (arab spinach), peas, cauliflower, cabbage, various beans, okra, eggplants, pepper, snake cucumbers (faqoos), spinach, and other vegetables

C. FRUIT TREES according to prevalance:

1. In the West Bank:
   Olives, grapes, almonds, plums, figs, citrus, apricots, bananas, apples, peachs, guava, plums, pears and other fruit trees.

2. In the Gaza Strip:
   Citrus, almonds, olives, grapes, strawberries, palms, pears and other fruit trees.

II. Animal Production:

The importance of animal utilization for red meat production and milk products may be classified according to the number of heads and also varies between the West Bank and the Gaza Strip and is as follows:

A. In the West Bank:
Sheep (indigenous Awassi type), goats, indigenous cattle," Assaf" sheep, Friesian cattle.

B. In the Gaza Strip:
Goats, sheep, Friesian cattle, indigenous cattle, & recently production of rabbits has been initiated.

Poultry for the production of eggs also yields the major white meat product in the West Bank and Gaza Strip. Although the West Bank has no fish products of its own because it has no sea outlet, the Gaza Strip on the other hand has a minor fish industry. Honey is another animal product that has recently flourished in the occupied territories.

A-1. Field crops production in the West Bank:

The total areas planted with wheat and barley for each year between 1964 and 1982 is shown in TABLE 24 and illustrated in FIGURE 14.

It can be seen from TABLE 24 below that the area planted by wheat and barley in the West Bank has seen great reduction in the first years of occupation due to closing of large field crop areas near the borders of the West Bank with Israel and with the East Bank. As indicated earlier, following occupation the Israeli fencing and confiscation of lands especially in which there was no trees (as that used for field crops) was much greater than the confiscation of lands with permanent use and planted with trees most of which is privately owned. The how, when and why land is taken requires a complete investigation and is out of the scope of this study.

The area planted with the most common two field crops, wheat and barley, in 1964 - which was a good rainy year (see FIGURE 15) - was 65,220 and 25,328 hectares respectively. In 1966 when rain fall was one of the lowest in years only 41,900 and 17,400 hectares of wheat and barley were planted. Up to 1973, the decline in the land area curve for wheat and barley continued reaching 43,000 hectares for wheat and 15,000 hectares for barley which is a decrease in area by 34% for wheat and 41% decrease in barley.

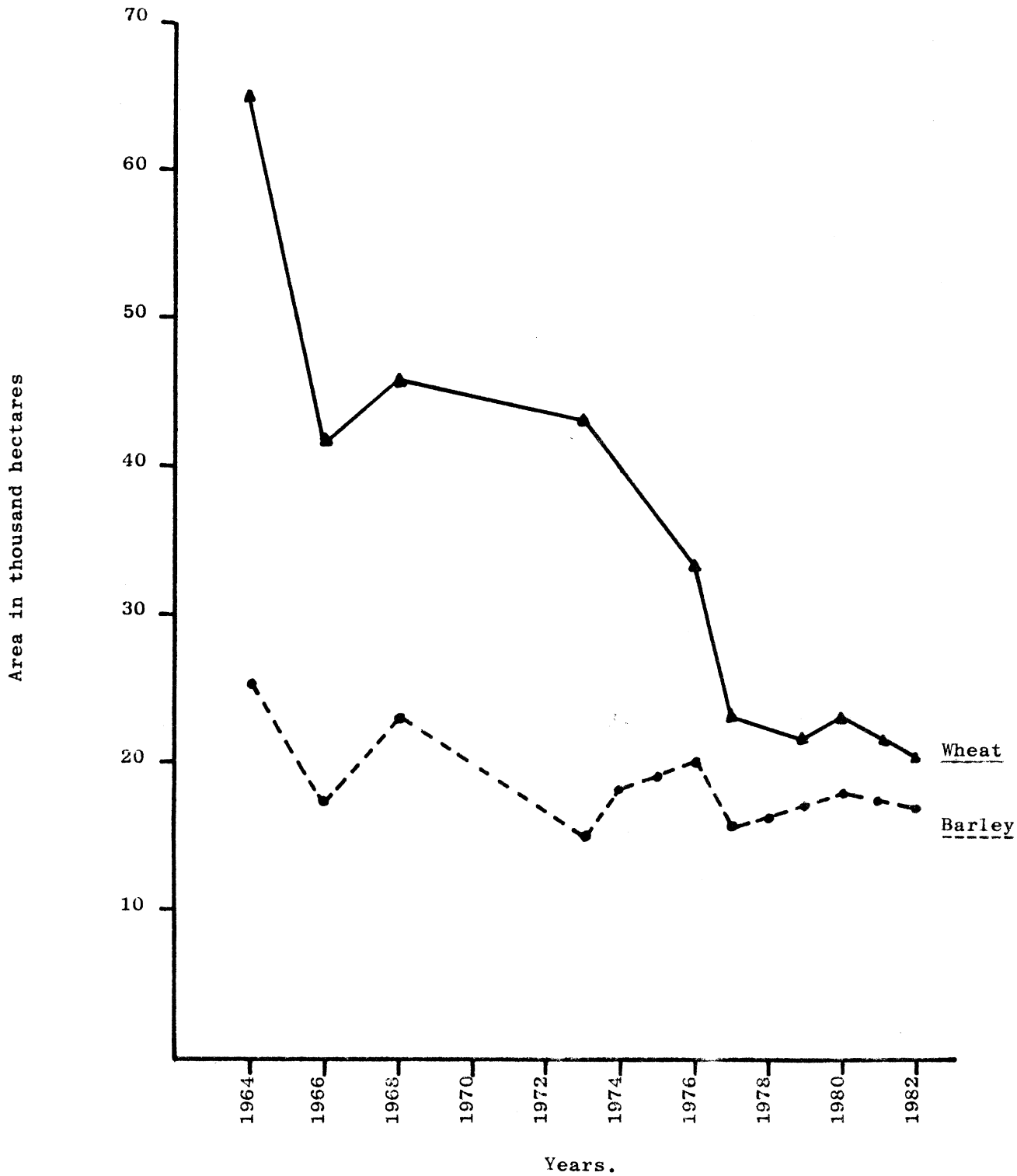

FIGURE 14 . Area Planted by Wheat and Barley in the West Bank.

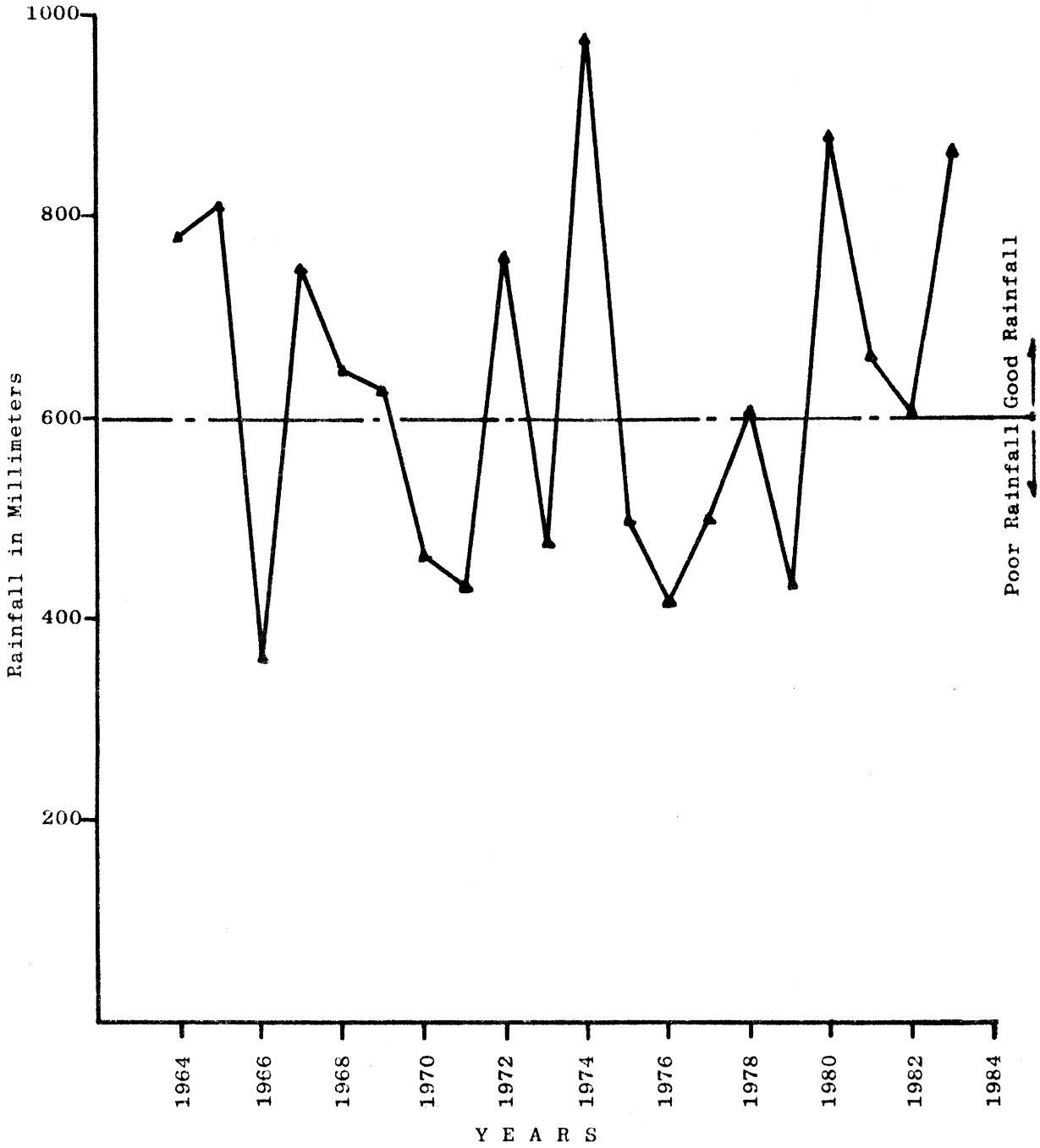

FIGURE 15. Average Annual Rainfall for All Districts of the West Bank

TABLE 24.

Field crops - wheat and barley planted areas in hectares in the West Bank from 1964 - 1982.
- area in thousand hectares -

Year	Wheat	Barley
1964	65.2	25.3
1966	41.9	17.4
1968	46.5	23.1
1973	43.0	15.0
1974	40.0	18.5
1975	37.5	19.0
1976	33.0	20.0
1977	23.5	16.0
1978	22.5	16.2
1979	21.8	17.3
1980	22.9	18.1
1981	22.4	17.4
1982	20.3	17.1

Seven years after occupation - in 1974 - despite a very good rainy year, the declining curve from that of 1964 continued even at a greater decreasing rate until it leveled at 23,500 hectares. In addition to loss of land to the Israelis, the shift from using local wheat for bread to Israeli imported white wheat flour has also contributed to the decline in wheat production. (Israel in turn imports wheat flour from overseas). On the other hand, areas planted by barley which is produced locally for animal feed and of good varieties compared to the imports, not only did the decline in its planted areas stop in 1973, but it actually increased slightly up to 1976 and then leveled.

After many years of occupation and in 1982- also a year with good rain-fall - the West Bank had only 20,270 hectares planted by wheat and 17,080 hectares planted by barley showing a significant decline in the area planted by wheat and barley since occupation.

The decrease in the areas planted by wheat cannot be attributed to that due to gain in land for vegetable crops, whose production has increased, because (as will be presented

later) in the years before occupation, the total hectares planted with vegetables was even greater than after occupation being 27,130 and 23,600 for the years 1964 and 1966, while after occupation in 1976 and 1982 the corresponding area planted by vegetables was only 10,200 and 13,910 hectares respectively.

The small increment in the increase in land planted by fruit trees - as will be discussed later - was also not at the expense of field crops and vegetables as the farmers use rocky mountainous areas not suitable for planting of field crops for the planting of fruit trees. The real reason for the decrease in the total land area of field crops is subject to various interpretations, but one important reason is the Israeli confiscation of lands customarily used for field crops.

In the last two decades, with the introduction of new wheat and barley varieties to the developing countries in the world and other technological advances including: mechanized methods in agriculture, availability of chemical fertilizers and various agrochemicals , the yield per hectare has increased in all of the developing countries in the world. The yield from the land cultivated by Palestinians was no exception especially with their long time experience in agriculture since the days of their forefathers, the Cannanites.

The yield per hectare in 1982 for wheat and barley varied between the fertile northern districts and semi-arid more hilly southern districts by as much as 260%. An average yield of 2700 and 2200 kg/hectares (270 and 220 kg/donum) was obtained from wheat in Tulkarem and Jenin districts respectively, while only 750 kg/hectare was obtained in the Hebron district, south of the West Bank. For barley a similar difference in yield is observed between the northern and southern districts.

TABLE 25 shows the data for wheat and barley with respect to area planted, yield and total production for the West Bank for selected years between 1964 and 1982.

TABLE 25

WHEAT AND BARLEY CULTIVATION WITH RESPECT TO AREA, PRODUCTION AND YIELD FOR THE YEARS 1964, 1966, 1976 and 1982.

Year & Description	Field Crops Total	Wheat	Barley
1. 1964			
Area /(000)hectares	112.81	65.22	25.33
Production /(000) tons.	114.33	69.91	27.13
Yield kg/hectare	1013	1072	1071
2. 1966			
Area /(000)hectares	76.97	41.94	17.43
Production /(000) tons.	51.24	29.73	12.57
Yield kg/hectare	666	709	721
3. 1976			
Area /(000)hectares	65.40	33.00	20.00
Production /(000) tons	56.50	27.60	19.00
Yield kg/hectare	864	836	950
4. 1982			
Area /(000)hectares	50.09	20.27	17.08
Production /(000) tons.	72.58	34.48	27.61
Yield kg/hectare	1449	1701	1617

TABLE 26 shows this data for the various West Bank districts for the year 1964 and 1982, two of the rainy years before and after the occupation.

TABLE 26.

SHIFT IN AREAS OF CULTIVATION OF WHEAT AND BARLEY
IN THE VARIOUS DISTRICTS OF THE WEST BANK
BEFORE AND AFTER THE OCCUPATION

	1964				1982			
WHEAT AND BARLEY	Northern Districts	Central Districts	Southern District	TOTAL WB	Northern Districts	Central Districts	Southern District	TOTAL WB
Wheat								
Area, hectares	34,645	21,225	9,350	65,220	10,278	4,370	5,619	20,267
Production, tons	40,672	18,362	10,880	69,914	22,874	7,391	4,214	34,480
Yield, kg/hectare	1174	865	1164	1072	2226	1691	750	1701
Barley								
Area, hectares	10,129	10,309	4,890	25,328	7,602	2,212	7,261	17,075
Production, tons	12,956	9,168	5,006	27,130	17,543	3,898	6,172	27,613
Yield, kg/hectare	1279	889	1024	1071	2308	1762	850	1617

Note: Northern Districts: Jenin, Nablus, and Tulkarem.
Central Districts : Ramallah, Jerusalem, Bethlehem, and Jericho.
Southern District : Hebron

The total average yield for wheat and barley in 1982 for all the districts of the West Bank were 1701 and 1617 kg/hectare which appear to be low because 28% and 43% of the total area for wheat and barley areas of the West Bank are in the semi-arid low fertile area of Hebron (see TABLE 26). This southern district is hardly suitable for any other dry farming except for some legumes and grazing of which it also has a great portion.

With respect to total output of the West Bank in wheat and barley it could be easily observed that when one compares the two good rainy years of 1964 before occupation and 1982 after occupation that the total output for wheat decreased rather than increased and the decrease was by about 50% which is from 69,910 tons in 1964 to 34,480 tons in 1982. This decrease is as indicated due to a decrease in the land areas planted by wheat and not due to a decrease in yield which in fact incresed greatly in 1982.

For barley there has been no change in the total output before and after the occupation. The great increase in yield of the fertile plains of the northern districts, i.e., Jenin and Tulkarem gave the northern district which include also Nablus an average barley yield of 2308 kg/hectare in 1982. This is nearly three times greater than the average in the southern district of Hebron which gave 850 kg/hectare in 1982. Much higher barley yield were achieved in some plain of the northern district giving yields as that of wheat of over 5000 kg/hectare. An overall average for Tulkarem and Jenin district alone was 3000 and 2800 kg/hectare respectively. Such increase in the yield of barley over that in 1964 - see TABLES 25 and 26 - did not only compensate the loss in land due to Israeli confiscation, but also compensated the shift in the land planted by barley from the fertile north to the less fertile semi-arid south with the least productivity.

Hebron district used to plant 19% and 30% of the West Bank land area by barley before occupation in 1964 and 1966; jumped recently to 43% and jumped recently in the eighties where 43% was planted in the years 1980, 1981 and 1982 after occupation. The average barley yield for these three years in the Hebron District was 1160, 1270 and 850 kg/hectare respectively, whereas the average barley yield in Tulkarem and Jenin for these same years was between 2800 and 3000 kg/hectare.

TABLE 27 shows the total area, the yield per hectare and the total output for other field crops namely the important Middle East legumes which include; chickpeas (garbanzos),lentils, vetch and sesame for the years 1964, 1976 and 1982. The table also shows that the total area planted by legumes except sesame did not change appreciably and remained about 6% of the total cultivated area of the West Bank. Such

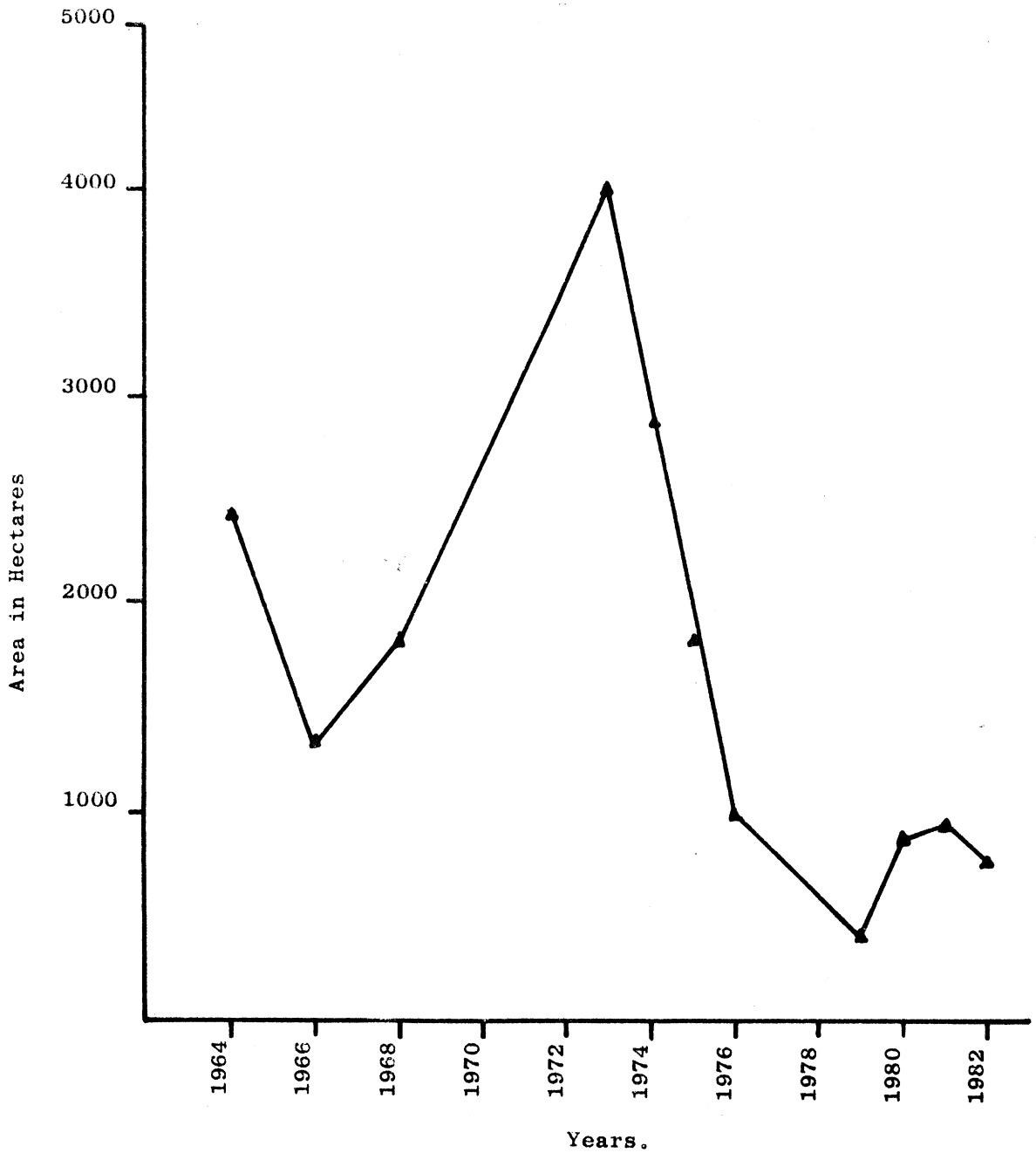

FIGURE 16 . Area Planted by Sesame in the West Bank.

a small area planted by rain-fed legumes is planted primarily to serve the farmers home needs, therefore it is not subject to the same fluctuating factors that influence the production of the large amounts of wheat and barley and vegetables. The yield per hectare however did increase.

TABLE 27.

LEGUMES CULTIVATION WITH RESPECT TO AREA, PRODUCTION AND YIELD FOR THE YEARS 1964 ,1976 AND 1982.

Legumes	1964 Area in hectares	1964 Production tons	1964 Yield kg/ hectare	1976 Area in hectares	1976 Production tons	1976 Yield kg/ hectar	1982 Area in hectares	1982 Production tons	1982 Yiled kg/ hectare
Chickpeas	1,458	1045	717	2,000	2400	1200	1,417	873.3	616
Lentils	3,832	2561	668	4,500	3600	800	3,851	1867.9	486
Vetch	5,869	4064	692	4,000	3900	975	3,847	2828.7	605
Sesame	2,437	1034	424	1,000	430	430	792	264.1	333
Total	13.596	8704		11.500	10.330		9,907	5834.0	

However, the increase from year to year was variable up to 1982 where a significant increase in yield occured for lentils, vetch and sesame. This increase is attributed to the use of fertilizers coupled with a good rainy season.

Sesame which is planted mostly in the northern districts of the West Bank is on the decrease as shown by the curve in FIGURE 16, especially after 1973. Except for one single sharp increase in land planted with sesame in 1973- as shown in FIGURE 16, - land planted with this legume has been on the decline. There was 24,000 hectares planted in sesame in 1964 but only 3% of that, i.e., approximately 800 hectares were planted in 1982. Since over 95% of the West Bank sesame is planted in the northern districts which are very fertile, any encouragement to farmers will bring up an increase in its areas, and hence a good supply of sesame (a highly nutritious legume) could be easily insured for the whole occupied territories.

The planting of sesame is reduced for two reasons:

1. The cheap imports of sesame brought into the area by Israeli merchants, who sell this commodity to Arab merchants and sesame extract (Tahinah) mill owners in Nablus, Ramallah, Jerusalem and Hebron make it difficult for the local Palestinian farmer to compete. The Israelis do not plant sesame because it has to be handpicked, but they consume sesame like the Arabs by using it for the production of its extract (Tahinah) and for the production of sweet products such as Halaweh (sesame candy) and sesame oil (called seerage) in addition to sesame bread. Therefore, when the Israelis import one ship of sesame from abroad at the time of harvest in the occupied territory, the price of sesame goes down to the point that it has not become profitable to plant this crop again, and hence less sesame is planted. The fact that the local sesame variety is prefered by the local population especially for use with thyme* is disappointingly not being considered in encouraging its cultivation.

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* Thyme is called in Arabic za'tar and it is used after drying, grinding, slightly mixing it with roasted sesame, summac, citric acid and some salt which makes it when eaten with olive oil and bread a highly nutritive and cheap breakfast not only in minerals and vitamins but also in essential fatty acids and calories.

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2. The competition over profitability in land use between sesame and other dry-farmed summer crops such as the summer vegetables, watermelons, cantelopes, snake cucumbers and various maize varieties.

White maize has almost disappeared from the West Bank as a crop and only 260 hectares were planted in the West Bank in 1982 essentially all of them in the Hebron District. The northern areas have shifted away from planting white maize to that of the other mentioned profitable vegetables, i.e., various melons. Planting of broom-sorghum, however, continued but also only about 1000 hectares was planted by this crop in the West Bank. This industrial crop which is planted primarily in the Jenin District has a great potential for making various natural brooms in addition to the use of its seeds in animal feed. However, recently imports from Brazil have given a stiff competition to the expansion of this important product.

In order to have comparative information on nearly each field crop planted in the West Bank as a whole and each of its districts within the same year, the essential information on land areas planted in hectares, the yield and production of each field crop has been tabulated and presented for easy comparisons in TABLES 28 through 36. It can be seen from these tables that the West Bank has large land areas very suitable for producing high yields of field crops, especially wheat and barley. Self-sufficiency at least in wheat, barley and legumes could be easily achieved. The lower local prices for wheat and barley do not encourage farmers to plant large areas of these field crops and they are simply planted as part of the agricultural rotation and for insurance against a crash down in vegetable prices which often occurs. Some sort of subsidy must be given to Palestinian farmers to encourage them to plant the badly needed field crops which are the most secure to produce but give the least profits.

As indicated, the largest decrease in field crop areas occured in the first years of occupation due to the closing of most of the West Bank border field crop lands by the military and then using that land for Israeli military purposes including Israeli settlements. However, with all the decrease in land area for field crops especially wheat, the West Bank is still the major producer for this commodity with Gaza planting only 3% of that of the West Bank.

In fact at the current level of average yield of about 2000kg/hectare for wheat in 1983 and using all the West Bank land area for wheat production in 1964, a potential wheat production of 130,400 tons for the West Bank today, would have been currently sufficient for all the wheat consumption of the West Bank and Gaza Strip.

TABLE 28.

Area, Yield and Total Production
of Field Crops for 1982

For:- The West Bank

Type of crops	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Wheat	20267.20	1.701	34479.70
Barley	17075.00	1.617	27612.50
Lentils	3851.30	0.486	1867.90
Vetch	3846.50	0.605	2328.70
Chick peas	1416.70	0.616	873.30
Broom Sorghum	1025.70	3.104	3183.70
Sesame	792.00	0.333	264.10
Dried fava beans	499.10	0.929	463.60
Tobacco	453.80	0.619	280.90
White Sorghum	257.50	0.250	64.40
Cumin	241.30	0.449	108.40
Peanuts	46.00	3.252	149.60
Green feed	33.70	20.000	674.00
Others	287.70	-	224.10
Total	50093.50	-	72578.00

TABLE 29.

Area, Yield and Total Production (by district)
of Field Crops for 1982

For:- Jenin District

Type of crops	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Barley	5027.00	2.30	11562.10
Wheat	4654.50	2.20	10239.90
Lentils	1392.50	0.60	835.50
Chick peas	856.50	0.60	513.90
Sesame	536.50	0.30	161.00
Broom sorghum	358.50	2.60	932.10
Tobacco	280.00	0.66	184.80
Vetch-kersenna	261.00	0.60	156.60
Cumin	240.50	0.45	108.20
Others	151.10	-	68.80
Total	13758.10	-	24762.90

TABLE 30.

Area, Yield and Total Production (by district)
of Field Crops for 1982

For:- Tulkarem District

Type of crops	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Wheat	3074.40	2.70	8300.90
Barley	1346.30	2.80	3769.60
Vetch-kersenna	466.20	0.86	400.70
Dried fava beans	216.90	1.00	216.90
Lentils	121.80	0.65	79.20
Sesame	82.10	0.45	37.00
Broom Sorghum	75.80	2.50	189.50
Chick peas	45.90	0.70	32.10
Peanuts	34.60	3.50	121.10
Green feed	18.70	20.00	374.00
Tobacco	8.60	0.60	5.20
Others	121.60	-	121.30
Total	5612.90	-	13647.50

TABLE 31.

Area, Yield and Total Production (by district)
of Field Crops for 1982

For:- Nablus District

Type of crops	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Wheat	2549.00	1.700	4333.30
Barley	1228.50	1.800	2211.30
Vetch-kersenna	803.30	0.674	541.10
Broom Sorghum	562.50	3.500	1968.80
Dried fava beans	171.00	0.750	128.30
Lentils	140.30	0.600	84.20
Sesame	108.50	0.400	43.40
Chick peas	80.00	0.800	64.00
Peanuts	11.40	2.500	28.50
Cumin	0.80	0.250	0.20
Others	9.00	-	31.50
Total	5664.30	-	9434.60

TABLE 32.

Area, Yield and Total Production (by district) of Field Crops for 1982

For:- Ramallah District

Type of crops	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Wheat	3145.20	1.700	5346.80
Barley	1076.60	1.800	1937.90
Vetch-kersenna	291.90	0.424	116.80
Lentils	165.10	0.400	66.00
Chick-peas	124.90	0.700	87.40
Dried fava beans	102.20	1.100	112.40
Broom sorghum	9.90	2.500	24.80
Sesame	2.00	0.350	0.70
Total	4957.50	-	7716.60

TABLE 33.

Area, Yield and Total Production (by district)
of Field Crops for 1982

For:- Jerusalem District

Type of crops	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Barley	240.00	1.50	360.00
Wheat	120.00	1.40	168.00
Chick-peas	115.00	0.60	69.00
Vetch-kersenna	50.00	0.80	40.00
lentils	13.00	0.45	5.90
Total	538.00	-	642.90

TABLE 34.

Area, Yield and Total Production (by district)
of Field Crops for 1982

For:- Bethlehem District

Type of crops	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Wheat	995.70	1.50	1493.60
Barley	816.20	1.60	1305.90
Vetch-kersenna	468.60	0.35	164.00
Lentils	207.10	0.35	72.50
Chick-peas	87.50	0.55	48.10
Dried fava beans	6.00	0.70	4.20
Total	2581.10	-	3088.30

TABLE 35.

Area, Yield and Total Production (by district)
of Field Crops for 1982

For:- Hebron District

Type of crops	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Barley	7261.00	0.850	6171.90
Wheat	5619.00	0.750	4214.30
Lentils	1811.50	0.400	724.60
Vetch-kersenna	1463.50	0.604	883.90
Sorghum	257.50	0.250	64.40
Tobacco	165.20	0.550	90.90
Chick-peas	106.90	0.550	58.80
Sesame	62.90	0.350	22.00
Broom Sorghum	15.10	3.500	52.90
Dried fava beans	3.00	0.600	1.80
Others	6.00	-	2.50
Total	16771.60	-	12288.00

TABLE 36.

Area, Yield and Total Production (by district)
of Field Crops for 1982

For:- Jordan Valley Area

Type of crops	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Wheat	109.40	3.5	382.90
Barley	79.40	3.7	293.80
Green-feed	15.00	20.0	300.00
Broom-sorghum	3.90	4.0	15.60
Vetch-kersenna	2.30	0.8	1.80
Total	210.00	-	994.10

A-2. Field Crops in the Gaza Strip:

The relatively low rainfall and small land area in the Gaza Strip which is primarily used for the production of irriagated vegetables make it unfeasible to plant field crops. The field crops share of cultivated lands in the Gaza Strip is shown in TABLE 37. It could be seen from this table that in 1967 and 1982 field crops which covered 1600 hectares represented only 9.8% and 12.4% of the cultivated area respectively which is 30 times less than the West Bank.

TABLE 37.

THE FIELD CROPS SHARE OF LAND IN THE GAZA STRIP BETWEEN THE YEARS 1967 AND 1983.
- in thousand hectares -

DESCRIPTION	1967/68	1974/75	1978/79	1982/83
Total cultivated area:	16.300	16.900	17.400	17.000
Thereof:				
-Rain-fed crops	7.300	7.400	7.900	9.590
% of rain-fed crops to total area.	44.8%	43.8%	45.4%	44.6%
-Field crops	1.600	1.700	1.600	2.100
Its % of the total cultivated area.	9.8%	10.0%	9.2%	12.4%

TABLE 38 shows the production of field crops in the Gaza Strip for the year 1982. A grand total of only 2173 tons from all field crops was obtained in the agricultural year 1982/1983, of which wheat gave nearly one-half. The yield for wheat and barley per hectare in Gaza Strip is similar to that in the district of Nablus, which represents the median for the West Bank.

The legumes (chickpeas, lentils and vetch) are not planted on a large scale in the Gaza Strip and their yield is similar to that in Hebron, in the southern district of the West Bank nearest to Gaza. As indicated above there has been no significant change in the trends in the Gaza Strip with respect to the areas or even types of field crops planted since occupation. Field crops production also did not change since occupation and it appears that field crops in general will remain rain-fed (not irrigated) and will not replace any of the more profitable irrigated vegetables in the near future in the Gaza Strip.

TABLE 38.

Area, Yield and Total Production
of Field Crops for 1982

For:- Gaza Strip

Type of crops	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Barley	950.00	1.0	950.00
Wheat	600.00	1.8	1080.00
Lentils	75.00	0.2	15.00
Vetch	40.00	1.0	40.00
Chick peas	20.00	4.0	80.00
Others	15.00	-	7.50
Total	1700.00	-	2172.50

B-1. Vegetables in the West Bank:

For the purpose of this study, there are two types of vegetables:

1. Rain-fed, and this includes: watermelons and cantelopes (melons), onions, snake cucumbers, okra, local (non-hybrid) tomatoes, garlic and other vegetables with a total of 8,538 hectares in 1981/1982,

2. Irrigated, and this includes: tomatoes, squash, cucumbers, cauliflowers and cabbages, potatoes, water-melons, various beans, eggplants, pepper, mulookhiyah (Arab spinach), lettuce, spinach and other vegetables, with a total of 5,365 hectares.

The production of various vegetables in the West Bank with respect to total area and production before and after occupation is illustrated in TABLE 39. It could be seen from the table that the areas of nearly all the rain-fed vegetables decreased immediately after occupation, from 24,457 and 20,821 hectares in 1964 and 1966 respectively to 8,538 hectares in 1982, i.e., the total areas of rain-fed vegetables in the agricultural year 1981/1982 became 1/3 rd of what they were before occupation in 1964.

Due to the decrease of land available for agriculture in general (FIGURE 13) and the rain-fed farming in particular, the area for the more productive irrigated vegetables (intensive type of farming) has doubled from 2,676 hectares in 1964 to 5,365 hectares in 1982.

Considering all factors other than land to be equal, it is known that the use of intensive agriculture such as that employing irrigation for vegetables must be increased at the expense of extensive farming when the land available for agriculture decreases. The Palestinian farmers must resort to the most labor intensive methods to produce more production. FIGURE 17 shows that even with the increase in the irrigated vegetable area, the total area in vegetables (irrigated and rain-fed) has actually decreased by nearly one-half from 27,133 hectares in 1964 to 13,903 hectares in 1982.

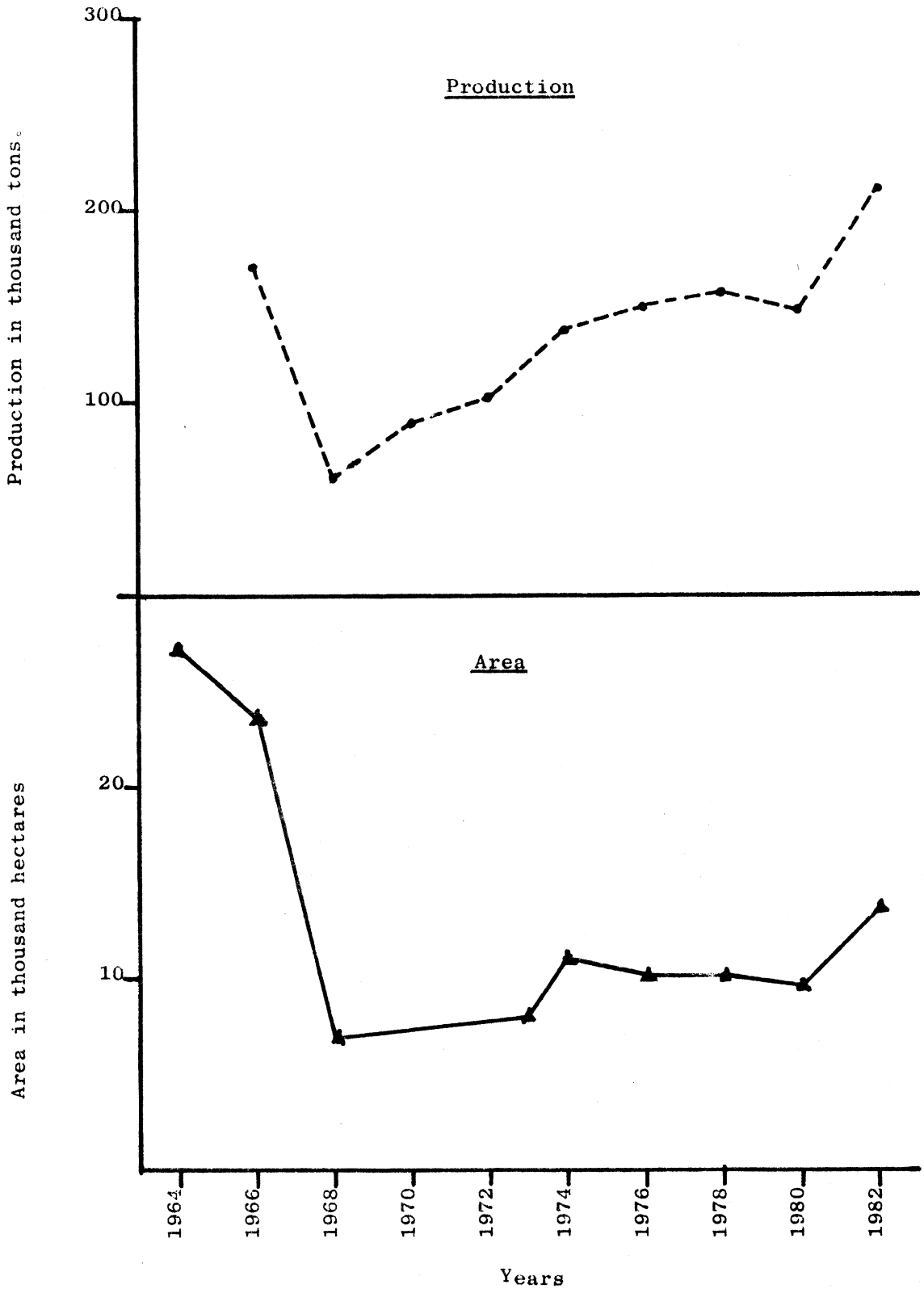

FIGURE 17. Area and Production of Vegetables in the West Bank.

TABLE 39.

TOTAL AREA, PRODUCTION AND YIELD OF VARIOUS VEGETABLES
RAIN-FED AND IRRIGATED - IN THE WEST BANK FOR THE YEARS 1964, 1966 and 1982

Vegetables	1964			1966			1982		
	Area in hectares	Production tons	Yield kg/ hectare	Area in hectares	Production tons	Yield kg/ hectare	Area in hectares	Production tons	Yield kg/ hectare
1.Rain-fed total:	24,457	175,336	---	20,821	141,735	---	8,538	48,570	-
Thereof:									
- water-melons & cantaloupes	7,512	67,608	9,000	6,859	28,009	4,080	2,440	18,548	7,600
- tomatoes	6,828	44,945	6,580	4,924	43,213	8,780	1,194	6,030	5,050
- onions & garlic	1,841	9,355	5.080	1,474	7,436	5,040	2,029	9,041	4,460
- squash	1,114	6,160	5,530	867	5,967	6,880	722	3,595	4,980
- snake cucumbers	1,547	9,032	5,840	1,743	7,294	4,180	577	2,573	4,460
- okra	512	2,563	5,010	343	1,104	3,220	471	1,566	3,320
2.Irrigated total:	2,676	31,898	---	2,754	28,355	---	5,365	163,738	---
Thereof:									
- tomatoes	506	7,716	15,250	635	7,076	11,140	1,352	64,469	47,680
- squash	255	2,641	10,360	226	1,751	7,750	520	11,107	21,187
- cauliflower and cabbages.	921	14,936	16,220	791	8,989	11,360	788	13,272	16,843
- potatoes	1,374	8,549	6,222	1,744	21,074	12,080	645	13,331	20,670
- eggplants	761	9,418	12,380	638	13,736	21,530	503	25,106	49,910
- water-melons & cantelopes	193	1,975	10,230	304	3,375	11,100	244	7,284	29,850
- cucumbers	609	6,385	10,480	597	4,122	6,900	969	17,694	18,260

After 1968- see TABLE 39 and previous FIGURE 13 comparing vegetables to other produce - hardly any change occured in the total vegetable area of the West Bank reflecting the fact that like that of field crops, the decrease in planted areas is due to the land confiscation and closure of lands by the Israeli military authorities mostly in the Jordan Valley immediately near the Jordan River shore called the Zhor.

As shown in TABLE 39, except for onions, okra and snake cucumbers which are produced as rain-fed vegetables in most areas of the West Bank , most of the major vegetables can be produced either by irrigation or without irrigation (rain-fed). The greatest change occuring in rain-fed vegetables in

the following years of occupation are the melons (water-melons and cantelopes), tomatoes, squash and snake cucumbers, which decreased considerably . The West Bank rain-fed melons production in the 1981/1982 agricultural year was only 27% of that of the 1964 base year which reached 67,608 tons. The 1982 crop of tomatoes, squash and snake cucumbers was only 13%, 58% and 28% of that of 1964 respectively.

It is of interest that onions is the only vegetable which did not significantly change either in yield or area planted between the year 1964 and 1982 . The total production of rain-fed vegetables was 175,336 tons in 1964 and decreased down to 48,570 tons in 1982 which is 27.7% of that in 1964.

On the other hand, the production of the vegetables under irrigation increased from 31,898 tons in the base year 1963/1964 to 163,738 tons in the year 1981/1982 agricultural year. This increase represents over five-fold increase (513%) over the base year. As shown in TABLE 39, the great increase in production for the irrigated vegetables is the result of the great increase in yield instead of the increase in area. This increase was achieved by the Palestinian farmers with the great expense of agricultural technology including:

- new varieties,
- fertilizers,
- employment of various agrochemicals,

- mechanization,
- introduction of various methods of protected agriculture (plastic mulch, tunnels, greenhouse, and the use of drip irrigation).

Examples of increase in yield are:

- irrigated tomatoes increased from 15 tons per hectare in 1964 to 47.7 tons in 1982, i.e., 313%, which is an increase of slightly over three folds.
- Similarly,the average yield for squash was 21.19 tons per hectare,
- potatoes 20.67 tons per hectare,
- eggplants 49.91 tons per hectare, and
- melons 29.85 tons per hectare.

The 1982 yields represent a 2-4 fold increase over that of 1964.

Although the Palestinians are supposedly the beneficiaries of the increase in yield, the Israelis who serve as agents of foreign agricultural industry or manufacturers recieve the greater benefits through their sales of various

agricultural products and materials, as stated above, all of which are necessary for the intensively cultivated irrigated vegetables. As will be discussed later, the Arabs who must pay for every aspect of improved technology do not get the full benefit of increased production because (since occupation) marketing has become a much bigger problem than production.

As shown in TABLE 40,, the main vegetable producing areas of the West Bank in 1982 are the Jordan Valley, Jenin, and Tulkarem. Nablus and Hebron Districts produce some vegetables and the central area which includes Jerusalem , Bethlehem and Ramallah are not important plant production areas.

TABLE 40.

VEGETABLE PRODUCTION IN THE VARIOUS DISTRICTS OF THE WEST BANK IN THE 1982/1983 AGRICULTURAL YEAR.

Description	Jordan Valley	Northern District			Central District (*)	Southern District
		Jenin	Tulkarm	Nablus		Hebron
-Vegetable area in hectares.	3,117	4,971	2,235	508	1,403	1,669
-% of total area	22.4%	35.8%	16.1%	3.6%	10.1%	12.0%
-Thereof:						
Rain-fed in ha.	---	4,201	1,085	389	1,278	1,586
Irrigated in ha.	3,117	770	1,151	119	125	83
-Total production in tons	102,902	46,871	39,371	4,279	7,356	6,309
-Thereof:						
Tomatoes	54,000	5,004	7,367	834	1,834	1,460
Squash	7,362	2,393	1,657	173	1,702	1,362
Cucumbers	7,848	4,363	5,072	24	380	9
Eggplants	18,500	727	5,484	57	315	23
Melons	6,154	18,216	1,293	0	0	169
Cauliflower and cabbages	2,465	4,758	2,630	1,679	689	1,053
Onions	216	5,117	1,485	838	199	405
Potatoes	62	3,793	9,314	83	51	28
Snake cucumbers	----	201	11	205	1,344	813

(*): The central district includes Jerusalem, Ramallah and Bethlehem.

The Jordan Valley and the two northern districts of Jenin and Tulkarem plant over 74% of the vegetable area and produce over 89% of the vegetable production in the West Bank. With respect to certain vegetables there are areas of specializations in these districts. For example, of the 77,499 tons of tomatoes produced in the West Bank over 76.6% of these tomatoes are produced in the Jordan Valley and all of these are irrigated.

In general most of the potatoes are produced in the Tulkarem, and Jenin districts and most of the snake cucumbers and the rain-fed tomatoes in the central district of Jerusalem and Ramallah and the southern of Hebron. Additionally, most of the onion is produced in Jenin with seed onions (contracted for by Israeli seed companies) in the Ramallah area and Nablus district.

On the other hand, over 70% of the West Bank melons which include watermelons and cantelopes are produced in the Jenin district. It is interesting to note that most of these melons are rain-fed with a great portion of them planted with white plastic mulch cover in order to result in the following benefits:-

1. Decrease moisture evaporation,
2. Control of weeds,.
3. Increase in the preservation of day-light heat,

all of which are necessary for rapid growth and hence early production and ripening.

The introduction of the use of plastic in the mid-seventies in the West Bank and Gaza Strip caused the greatest advancement in the plant production in these areas. Plastic is used to cover soil around the plants in what is internationally known as plastic mulch and to cover plants in tunnels and green-houses. One of the most important advantages to planting under plastic, in addition to the above mentioned benefits, is the great increase in yield and this advantage resulted in large increase of its use in the occupied areas and this technique has since spread to the East Bank of Jordan especially in the East Jordan Valley.

Recently, the vegetable area covered by plastic in the West Bank's Jordan Valley has been estimated at 1,850 hectares of which there are only about two hectares of greenhouses. In contrast (due to availability of capital and ease of marketing), the implementation of the new agricultural technology of using plastic - especially to cover greenhouses - in the East Bank of the Jordan Valley has been much greater than that of the West Bank of the Jordan Valley. The East Bank's valley had 205 hectares of greenhouses in 1980 compared

to only 1.7 hectares in the West Bank's Jordan Valley in 1983. The vegetable land area covered by plastic mulch in the two valleys of the West Bank and East Bank is equal and is about 1,800 hectares.

TABLE 41, shows the gradual increase of cultivated area under greenhouses and tunnels in the West Bank for the period of 1976 to 1982 and a projection of the expected area for 1985. The introduction of green-houses and tunnels in the West Bank and Gaza Strip started in 1976 with only two tenths of a hectare of greenhouses.

In 1982, greenhouses increased in the West Bank to 35 hectares and the plastic tunnels increased to 22 hectares. By this rate of increase it is estimated that the greenhouses in the West Bank will be expanded to about 70 hectares and the tunnels to about 30 hectares, most of which will remain to be used for the production of cucumbers and tomatoes. The slow rate of adoption of this highly profitable method of agriculture is due to:

- the high cost of greenhouses,
- the lack of availability of loans, and
- the farmer's inexperience in greenhouse culture.

With the shortage in land resources in the occupied area and the difficulty of finding profitable ventures in agriculture , the use of greenhouses and plastic tunnels is, in the long run, the only sure way for an economic development in food production that can balance the extremely high population growth.

Because of the importance of vegetables as a cash crop in each district and because permits of export through the bridges to and through Jordan are given by district, the following TABLES 42, 43, 44, 45, 46, 47, 48, and 49 give the details on the vegetables for the whole West Bank as well as for each individual district with respect to area planted either under irrigation or rain-fed along with the resultant yield and total production. It can be seen from these tables that there are wide variations in the yield and the areas of vegetables in the various districts. The different climates in these eight districts dictate making a program for planting certain vegetables at certain planting times in order to have a better time distribution of harvests.

TABLE 41.

INCREASE OF CULTIVATED AREA UNDER GREEN-HOUSES AND TUNNELS IN THE WEST BANK FOR THE PERIOD FROM 1976 TO 1982 AND THE EXPECTED AREA FOR 1985.

Produce	1976		1978		1980		1982		1985	
	Green-house	Tunnels	Green-house	Tunnels	Green-house	Tunnels	Green-house	Tunnels	Green-house	Tunnels
Cucumbers	—	—	2.2	—	11.6	7.0	32.3	18.8	56.0	25.0
Tomatoes	—	—	—	—	0.2	2.2	1.5	2.0	—	—
Pepper	—	—	—	—	0.2	—	0.2	0.2	—	—
Greenbeans	—	—	0.1	—	0.1	—	0.2	0.3	9.0	—
Cantaloupes	0.2	—	—	—	—	—	0.8	0.5	—	—
Eggplants	—	—	—	—	—	—	—	0.2	—	—
TOTAL	0.2	—	2.3	—	12.1	9.2	35.00	22.0	65.0	25.0

Note: There are 230 hectares of green-houses in Israel and 205 hectares in Jordan as of 1980.

TABLE 42.

Area, Yield and Total Production of Vegetables for 1982

For: West Bank

Type of crops	Area (hectares)		Yield (tons/ha.)		Total	
	Dry Farming	Irri-gated	Dry Farming	Irri-gated	Area (ha.)	Production (tons)
Tomatoes	1193.9	1351.6	6029.5	64469.1	2545.5	70498.6
Watermelon	1968.5	239.8	15162.5	7194.0	2208.3	22356.5
Squash	722.1	520.0	3595.1	11016.9	1242.1	14612.0
Onions	1038.2	31.6	7399.2	861.0	1069.8	8260.2
Cucumbers	0	968.9	0	17694.1	968.9	17694.1
Seed Onions	803.9	5.5	261.4	4.7	809.4	266.1
Potatoes	258.9	385.8	4200.2	9130.5	644.7	13330.7
Cauliflower	292.1	335.5	1557.5	8014.4	627.6	9571.9
Snake Cucumbers	576.8	0	2572.9	0	576.8	2572.9
Eggplants	0	503.4	0	25106.0	503.4	25106.0
Okra	468.4	2.4	1546.8	19.2	470.8	1566.0
Cantelopes	471.6	4.5	3385.4	90.0	476.1	3475.4
Green Fava Beans	179.0	178.9	703.2	1731.8	357.9	2435.0
Beans	9.7	239.8	53.4	2142.4	249.5	2195.8
Cabbage	0	160.3	-	3700.5	160.3	3700.5
Pepper	0	158.8	0	7500.4	158.8	7500.4
Garlic	147.9	2.0	474.3	40.0	149.9	514.3
Mulokhiyah	0	145.6	0	3775.9	145.6	3775.9
Peas	-	-	-	-	-	-
Others	407.2	130.5	1628.2	1247.0	537.7	2875.2
Total	8538.2	5364.9	48569.6	163737.9	13903.1	212307.5

TABLE 43.

Area, Yield and Total Production of Vegetables for 1982

For: Jenin District

Type of crops	Area (hectares)		Yield (tons/ha.)		Total	
	Dry Farming	Irri-gated	Dry Farming	Irri-gated	Area (ha.)	Production (tons)
Watermelon *	1935.3	0	7.7	-	1935.3	14901.8
Onions	654.0	5.3	7.5	40.0	659.3	5117.0
Cantelopes *	454.0	0	7.3	22.0	454.0	3314.2
Tomatoes	238.9	83.9	7.25	39.0	322.8	5004.2
Cauliflower	152.1	118.8	4.2	25.0	270.9	3608.8
Squash	128.5	80.3	3.0	25.0	208.8	2393.0
Cucumber	0	198.3	-	22.0	198.3	4362.6
Potatoes	25.0	165.0	6.5	-	190.0	3792.5
Okra	155.1	0	1.8	-	155.1	279.2
Seed Onions	142.1	-	0.35	-	142.1	49.7
Snake Cucumbers	67.0	0	3.0	-	67.0	201.0
Garlic	54.3	0	5.5	-	54.3	298.7
Cabbage	-	38.3	-	30.0	38.3	1149.0
Mulokhiyah	0	20.3	-	27.0	20.3	548.1
Eggplants	0	20.2	-	36.0	20.2	727.2
Beans	9.7	-	5.5	-	9.7	53.4
Pepper	0	7.4	-	18.0	7.4	133.2
Green Fava Beans	-	6.0	-	10.0	6.0	60.0
Peas	-	-	-	-	-	-
Others	184.9	26.1	-	-	211.0	877.4
Total	4200.9	769.9	-	-	4970.8	46871.0

* Watermelon and cantelopes planted in the Jenin District as rain-fed under the cover of white plastic to induce early production are sometimes (once or twice) given water manually using water trucks. Although this is an expensive method for watering these vegetables, it is often necessary - especially in years of drought.

TABLE 44.

Area, Yield and Total Production of Vegetables for 1982

For: Tulkarem District

Type of crops	Area (hectares)		Yield (tons/ha.)		Total	
	Dry Farming	Irri-gated	Dry Farming	Irri-gated	Area (ha.)	Production (tons)
Potatoes	218.7	215.1	18.00	25.00	433.8	9314.1
Tomatoes	125.3	168.5	5.00	40.00	293.8	7366.5
Cucumbers	0	225.4	-	22.50	225.4	5071.5
Okra	183.7	0	5.00	-	183.7	918.5
Green Fava Beans	142.5	0	4.00	0	142.5	570.0
Onions	116.4	10.7	10.00	30.00	127.1	1485.0
Cauliflower	22.2	91.2	2.50	17.00	113.4	1605.9
Squash	46.8	56.9	5.00	25.00	103.7	1656.5
Beans	0	96.7	-	8.00	96.7	773.6
Eggplants	0	91.4	-	60.00	91.4	5484.0
Mulokhiyah	0	72.0	-	25.00	72.0	1800.0
Cabbage	0	51.2	-	20.00	51.2	1024.0
Water melon	10.6	36.0	15.00	30.00	46.6	1239.0
Snake Cucumbers	42.4	0	0.25	0	42.4	10.6
Garlic	36.7	0	1.50	-	36.7	55.1
Pepper	0	19.6	-	21.50	19.6	421.4
Seed Onions	15.3	0	0.25	-	15.3	3.8
Cantelopes	0.8	2.5	5.00	20.00	3.3	54.0
Peas	-	-	-	-	-	-
Others	123.2	13.3	-	-	136.5	517.6
Total	1084.6	1150.5	-	-	2235.1	39371.1

TABLE 45.

Area, Yield and Total Production of Vegetables for 1982

For: Nablus District

Type of crops	Area (hectares)		Yield (tons /ha.)		Total	
	Dry Farming	Irri-gated	Dry Farming	Irri-gated	Area (ha.)	Production (tons)
Seed Onions	139.6	–	0.4	–	139.6	55.8
Onions	100.8	1.6	8.0	20.0	102.4	838.4
Tomatoes	62.0	16.0	7.0	25.0	78.0	834.0
Cauliflower	6.6	45.0	6.0	25.0	51.6	1164.6
Snake Cucumbers	41.0	0	5.0	–	41.0	205.0
Cabbage	0	25.7	–	20.0	25.7	514.0
Okra	25.0	–	6.0	–	25.0	150.0
Garlic	10.7	–	4.0	–	10.7	42.8
Squash	0	9.9	–	17.5	9.9	173.3
Beans	0	9.8	–	8.0	9.8	78.4
Potatoes	3.5	2.2	8.0	25.0	5.7	83.0
Eggplants	0	1.9	–	30.0	1.9	57.0
Cucumbers	0	1.6	–	15.0	1.6	24.0
Green Fava Beans	0	1.2	–	7.0	1.2	8.4
Mulokhiyah	0	0.8	–	20.0	0.8	16.0
Water meaon	–	–	–	–	–	–
Cantelopes	–	–	–	–	–	–
Pepper	–	–	–	–	–	–
Peas	–	–	–	–	–	–
Others	–	3.3	–	–	3.3	34.5
Total	389.2	119.0	–	–	508.2	4279.2

TABLE 46.

Area, Yield and Total Production of Vegetables for 1982

For: Ramallah District

Type of crops	Area (hectares)		Yield (tons/ha.)		Total	
	Dry Farming	Irri-gated	Dry Farming	Irri-gated	Area (ha.)	Production (tons)
Tomatoes	262.1	1.8	5.00	20.00	263.9	1346.5
Squash	141.2	1.1	7.00	17.50	142.3	1007.7
Seed Onions	123.7	0	.30	–	123.7	37.1
Snake Cucumbers	100.2	0	6.00	–	100.2	601.2
Onions	98.3	0	2.00	–	98.3	196.6
Okra	58.5	0	2.00	–	58.5	117.0
Garlic	29.4	0	1.50	–	29.4	44.1
Potatoes	8.2	0.4	5.50	15.00	8.6	51.1
Beans	0	4.8	–	9.00	4.8	43.2
Cauliflower	3.1	1.1	6.00	20.00	4.2	40.4
Cucumbers	0	3.7	–	15.00	3.7	55.5
Eggplants	0	1.8	–	17.50	1.8	31.5
Cabbage	0	0.9	–	25.00	0.9	22.5
Pepper	0	0.6	–	10.00	0.6	6.0
Mulokhiyah	0	0.4	–	10.00	0.4	4.0
Water melon	–	–	–	–	–	–
Cantelopes	–	–	–	–	–	–
Peas	–	–	–	–	–	–
Green Fava Beans	–	–	–	–	–	–
Others	10.0	10.9	–	–	20.9	148.2
Total	834.7	27.5	–	–	862.2	3752.8

TABLE 47.

Area, Yield and Total Production of Vegetables for 1982

For: Bethlehem District

Type of crops	Area (hectares)		Yield (tons/ha.)		Total	
	Dry Farming	Irri-gated	Dry Farming	Irri-gated	Area (ha.)	Production (tons)
Snake Cucumbers	135.0	0	5.50	–	135.0	742.5
Tomatoes	121.8	–	4.00	–	121.8	487.2
Squash	108.0	2.3	6.00	20.00	110.3	694.0
Seed Onions	41.5	5.5	0.30	0.85	47.0	17.2
Cabbage	0	19.0	–	25.00	19.0	475.0
Cucumbers	0	16.2	–	20.00	16.2	324.0
Eggplants	0	16.2	–	17.50	16.2	283.5
Cauliflower	11.5	3.5	7.00	20.00	15.0	150.5
Beans	0	8.8	–	7.50	8.8	66.0
Green Fava Beans	0	8.4	–	6.00	8.4	50.4
Onions	1.8	–	1.50	–	1.8	2.7
Mulokhiyah	0	0.2	–	10.00	0.2	2.0
Water melon	–	–	–	–	–	–
Cantelopes	–	–	–	–	–	–
Potatoes	–	–	–	–	–	–
Pepper	–	–	–	–	–	–
Peas	–	–	–	–	–	–
Garlic	–	–	–	–	–	–
Okra	–	–	–	–	–	–
Others	23.6	17.7	–	–	41.3	307.8
Total	443.2	97.8	–	–	541.0	3602.8

TABLE 48.

Area(*), Yield and Total Production of Vegetables for 1982

For: Jordan Valley Area

Type of crops	Area (hectares)		Yield (tons/ha.)		Total	
	Dry Farming	Irrigated	Dry Farming	Irrigated	Area (ha.)	Production (tons)
Tomatoes	0	1080.0	–	50.00	1080.0	54000.0
Cucumbers	0	523.2	–	15.00	523.2	7848.0
Eggplants	0	370.0	–	50.00	370.0	18500.0
Squash	0	368.1	–	20.00	368.1	7362.0
Water melon	0	203.8	–	30.00	203.8	6114.0
Green Fava Beans	0	153.3	–	10.00	153.3	1533.0
Pepper	0	127.9	–	13.00	127.9	1662.7
Beans	0	111.8	–	10.00	111.8	1118.0
Cauliflower	0	75.9	–	30.00	75.9	2277.0
Mulokhiyah	0	50.8	–	27.50	50.8	1397.0
Onions	0	10.8	–	20.00	10.8	216.0
Cabbage	0	4.7	–	40.00	4.7	188.0
Potatoes	0	3.1	–	20.00	3.1	62.0
Okra	0	2.4	–	8.00	2.4	19.2
Cantelopes	–	2.0	–	20.00	2.0	40.0
Garlic	0	2.0	–	20.00	2.0	40.0
Peas	–	–	–	–	–	–
Seed Onions	–	–	–	–	–	–
Snake Cucumbers	–	–	–	–	–	–
Others	–	27.4	–	–	27.4	525.5
Total	–	3117.2	–	–	3117.2	102902.4

* Total cultivatable area of Jordan Valley is estimated at (6600) hectares.

TABLE 49.

Area, Yield and Total Production of Vegetables for 1982

For: Hebron District

Type of crops	Area (hectares)		Yield (tons/ha.)		Total	
	Dry Farming	Irri-gated	Dry Farming	Irri-gated	Area (ha.)	Production (tons)
Tomatoes	383.8	1.4	3.75	15.00	385.2	1460.3
Seed Onions	341.7	0	0.30	-	341.7	102.5
Squash	297.6	1.4	4.50	16.00	299.0	1361.6
Snake Cucumbers	191.2	0	4.25	-	191.2	812.6
Cauliflower	96.6	-	7.50	-	96.6	724.5
Onions	66.9	3.2	4.85	25.00	70.1	404.5
Okra	46.1	0	1.78	-	46.1	82.1
Green Fava Beans	36.5	10.0	3.65	8.00	46.5	213.2
Water melon	22.6	0	4.50	-	22.6	101.7
Cabbage	0	20.5	-	16.00	20.5	328.0
Cantelopes	16.8	0	4.00	-	16.8	67.2
Garlic	16.8	0	2.00	-	16.8	33.6
Beans	0	7.9	-	8.00	7.9	63.2
Potatoes	3.5	0	8.00	-	3.5	28.0
Pepper	0	3.3	-	6.50	3.3	21.5
Eggplants	0	1.9	-	12.00	1.9	22.8
Mulokhiyah	0	1.1	-	8.00	1.1	8.8
Cucumbers	0	0.5	-	17.00	0.5	8.5
Peas	-	-	-	-	-	-
Others	65.5	31.8	-	-	97.3	464.2
Total	1585.6	83.0	-	-	1668.6	6308.8

B-2: Vegetables in the Gaza Strip:

The Gaza Strip is more dependent in its agricultural production on vegetables than the West Bank, while about 66,730 tons of the total vegetables were produced in 1982 compared to 2,173 tons of the total field crops, the West Bank produced in the same year about 212,308 tons of vegetables and 72,578 tons of field crops. The ratio of land used for vegetables in the Gaza Strip which is 2,976 hectares in 1982 to the total cultivated area, which is 16,517 hectares is approximately 18% compared to the vegetables area which is 13,900 hectares which is 8.7% of the cultivated area which is 160,000 hectares in the West Bank, indicating the greater emphasis on using land for vegetables in the Gaza Strip being two folds more than the West Bank.

In addition to the larger proportion of vegetable area in the Gaza Strip, almost all types of vegetables are produced and exported from Gaza. Also, some vegetables are planted in the Gaza Strip but rarely planted in the West Bank - such as sweet potatoes,peas,and strawberries.The latter are considered as a vegetable crop as far as agricultural style is concerned.

The most important seven vegetables produced in the Gaza Strip are:

tomatoes, cucumbers, squash , eggplants, potatoes, mulookhiyah, peas, and strawberries.

TABLE 50 shows the area, yield, and production for these major commodities for three selected years.

The total production of vegetables in the Gaza Strip has leveled in the last five years to about 55,000 tons. The area in hectares also has remained constant in the last five years. However, 10 years ago, the area planted in vegetables was only 60% of that at present, which is 1,600 hectares.

Different than the West Bank, the yield per hectare in the Gaza Strip did not change appreciably over the last 10 years, indicating that the agricultural technology in vegetable production in the Gaza Strip was in a very good status even 10 years ago. The Gaza Strip Production of vegetables fluctuated over the years between 32,000 and 56,000 tons.

The area planted by tomatoes in the Gaza Strip was, relatively small in 1978 being 13.1% of the total vegetables area and was 18.8% in 1982. In 1975, the area, planted by tomatoes represented 1/4th of the total vegetables area, and because the yield was also good, fifty tons per hectare , the tomatoes production of 1975 (12,000) tons represented over 1/3rd of the total production of all vegetables. The area and production of cucumbers also fluctuated with the years like

that of tomatoes - reaching a peak of 24,000 tons in 1978 with a yield of 40 tons per hectare. About 16,000 tons were produced in 1982 with an average yield of 37 tons per hectare. The two main vegetables (tomatoes and cucumbers) make up at least 50% of all the vegetables of the Gaza Strip at any given year. The other irrigated vegetables such as squash , eggplants, mulookhiyah and potatoes fluctuated in area planted as well as production between 5% and 14%.

TABLE 50.

THE AREA, YIELD AND PRODUCTION OF THE MAJOR VEGETABLES IN THE GAZA STRIP IN THREE SELECTED YEARS

Vegetables	1974/1975 Area hectares	Yield tons/ hectare	Production tons	1977/1978 Area hectares	Yield tons/ hectare	Production tons	1981/1982 Area hectare	Yield tons/ hectare	Production tons
TOTAL	965		32,973	1,601		55,515	1,595		55,235
Tomatoes	240	50	12,000	210	50	10,500	300	55	16,500
(%) of total	25%			13.1%			18.8%		
Cucumbers	240	40	9,600	600	40	24,000	420	37	15,540
(%) of total	25%			37.5%			26.3%		
Squash	100	30	3,000	135	30	4.050	200	35	7,000
(%) of total	10.3%			8.4%			12.5%		
Eggplants	80	50	4,000	100	50	5,000	120	55	6,600
(%) of total	8.3%			6.2%			7.5%		
Mulokhiyah	100	20	2,000	230	20	4,600	170	25	4,250
(%) of total	10.3%			14.4%			10.7%		
Potatoes	50	30	1,500	200	30	6,000	190	20	3,800
(%) of total	5.2%			12.5%			12.0%		
Peas(rain-fed)	150	5	750	105	5	525	155	3	465
(%) of total	15.4%			6.6%			9.7%		
Strawberries	4.9	25	123	21	40	840	40	27	1,080
(%) of total	0.5%			1.3%			2.5%		

The largest fluctuation occured in the total production of potatoes, a vegetable which is important for the Gaza Strip in substituting for wheat with respect to its utilization as a carbohydrate and protein plant source. Potatoes which can withstand prolonged storage without spoilage could become a good stable export crop for the Gaza Strip if marketing to Arab and foreign countries is secured. However, the low local prices for potatoes, and the difficulty of exporting through Jordan prevents the farmers from planting large areas of this vegetable crop.

Similarly, the export of strawberries could make an excellent cash crop for the Palestinians in the Gaza Strip as it has a relatively high yield and could fetch high prices outside. In 1978, the yield of 40 tons per hectare (i.e., 4 tons per donum) was as high as that for cucumbers. Since the Gaza Strip when compared to the West Bank is unique in having coastal sandy soils, mild to warm weather and relatively good abundant water, the planting of strawberries should be encouraged and their marketing should be secured in advance which requires opening markets in some Arab countries. Also, unlike potatoes, strawberries are very fragile and need speedy export and sales. A small processing plant for this delicious and easy-to-consume commodity can insure more stable prices and hece more expansion of planted land areas with a secured export to Arab countries. Most of the Gaza Strip strawberries are sold in Israel at very low prices, as if the Palestiniam Arabs are nothing but a cheap labor force producing to fit the delicacies of the Israelis taste. The Arabs in neighbouring Arab countries must work with the Palestinians to solve such simple supply-demand problems.

It is unwise for Arab countries to import commodities from foreign countries, when they could be purchased even at a lower prices from the needy/suffering Palestinians living under the harsh Israeli occupation.

TABLE 51 provides comparisons on nearly all the vegetables planted in the Gaza Strip in a single year (1981-1982). These comparations include: areas planted under irrigation, areas rain-fed, yield and total production.

A rapid look at the data in this table and comparing that with the West Bank shows many differences in relative areas of vegetables planted, types of vegetables and yields. In general, the vegetables in the Gaza Strip ripen earlier than those in the West Bank except that of the warm Jordan Valley. Having different planting and ripening periods between the various sections and districts of the West Bank and Gaza Strip due to climate differences and methods of planting makes availability of vegetables as a food in all seasons of the year the most positive aspect for providing good nutrition for all the Palestinians in the occupied territories.

TABLE 51.

Area, Yield and Total Production of Vegetables for 1982

For: Gaza Strip

Type of crops	Area (hectares)		Yield (tons/ha.)		Total	
	Dry Farming	Irri-gated	Dry Farming	Irri-gated	Area (ha.)	Production (tons)
Cucumbers	0	420	–	37.0	420	15540
Tomatoes	0	300	–	55.0	300	16500
Squash	0	200	–	35.0	200	7000
Potatoes	0	190	–	20.0	190	3800
Watermelon	185	0	5.0	–	185	925
Cantelopes	170	0	5.0	–	170	850
Mulokhiyah	0	170	–	25.0	170	4250
Peas	155	–	3.0	–	155	465
Cauliflower	0	130	–	25.0	130	3250
Eggplants	0	120	–	55.0	120	6600
Okra	120	–	2.0	–	120	240
Cabbage	0	95		30.0	95	2850
Green Fava Beans	0	85	–	3.0	85	255
Pepper	0	75	–	15.0	75	1125
Snake Cucumbers	65	0	3.0	–	65	195
Onions	0	55	–	25.0	55	1375
Spinach	0	40	–	17.0	40	680
Beans	0	40	–	7.0	40	280
Garlic	1	–	10.0	–	1	10
Others	–	360	–	1.5	360	540
Total	696	2280	–	–	2976	66730

C-1 Fruits trees in the West Bank:

Fruit trees constituted 60% (96,000 hectares) of all the cultivated land area in 1982 and around 45% of the gross agricultural income. Olives, grapes, almond , plums, figs, citrus, apricots, bananas and apples is the order of prevalance of fruit trees in the West Bank. The main productive fruit trees which are olives, citrus and grapes will be discussed herein with greater details.

Olives:

The olive tree has been the most commonly planted tree by Palestinians in the hilly regions of Palestine, whether they have been under Turkish, British, or Jewish occupation.(54) The Palestinians in the West Bank have now -in 1984- about 7,000,000 productive olive trees representing 70,000 hectares, which is about 10 trees for every man, woman and child living in the West Bank.

Galilee Palestinians have 10,600 hectares out of the 13,000 hectares in Israel representing one million productive trees, and a large portion of it is locally consumed as pickles. It seems as the Palestinian population increases, the number of olive trees increases. TABLE 52 shows the area, yield and total production of olives for the years from 1966 to 1982.

Except for the year 1976-1977 with a sharp increase of 5% in olive culture, there has been a slow but at a steady increase of only about 2% in the number of productive olive trees in the West Bank. When the increase became over 5%, the Israelis placed some obstacles on the subsidized distribution of seedlings by American private voluntary organizations (e.g., CDF - Community Development Foundation of Save the Children Foundation in East Jerusalem).

Since Israel has been established on the fertile coast of Palestine (where the land is usually not used for olives, but rather for citrus products especially oranges), the Israelis have never planted many olive trees. Nearly all the olives planted by the Israelis are not of the oil producing variety as they plant the variety which produces the high-priced olive for pickling. A fact is now established that olive trees for olive oil production are associated only with the Arab presence in the whole of Palestine as a geographical area.

TABLE 52.

AREA, YIELD AND TOTAL PRODUCTION OF OLIVES FOR THE YEARS FROM 1966 TO 1982.

Year	Productive area thousand hectares	Yield kg/ hectare	Total Production in thousand tons
1966	53.7	439	24
1974	61.8	2,006	124
1975	62.7	335	21
1976	62.2	1,061	66
1977	65.4	2,523	165
1978	66.3	1,599	106
1979	65.3	383	25
1980	66.5	2,060	137
1981	55.6	989	55
1982	69.2	1,835	127

Because the olive tree which is planted as a rain-fed tree and on marginal land, its fruit production alternates depending on conditions. The olive fruit formation follows leaf and young tip growth and physiological factors which are associated with environmental factors (such as rain, winds, heat waves and soil nutrients). There is an alternate or cyclic bearing of the olive fruit as seen here in TABLE 52 and FIGURE 18. The alternate bearing has resulted in an overall yield changing from as low as 335 kg/hectare in 1975 to 2523 kg/hectare in 1977 resulting in an annual total production of 21,000 tons as the lowest - see FIGURE 18 for 1975 - and 165,000 tons as the highest for 1977.

The average mean and median of the annual production for the 10 years shown in TABLE 52 is 85,000 tons and the corresponding yield is 1420 kg/hectare - i.e., 142 kg/donum. Olives for the Palestinians in the West Bank form the most important agricultural income representing from 13% to 30% of the Gross Agricultural Income of the West Bank, compared to the citrus and grapes which give only 7% and 6% respectively.

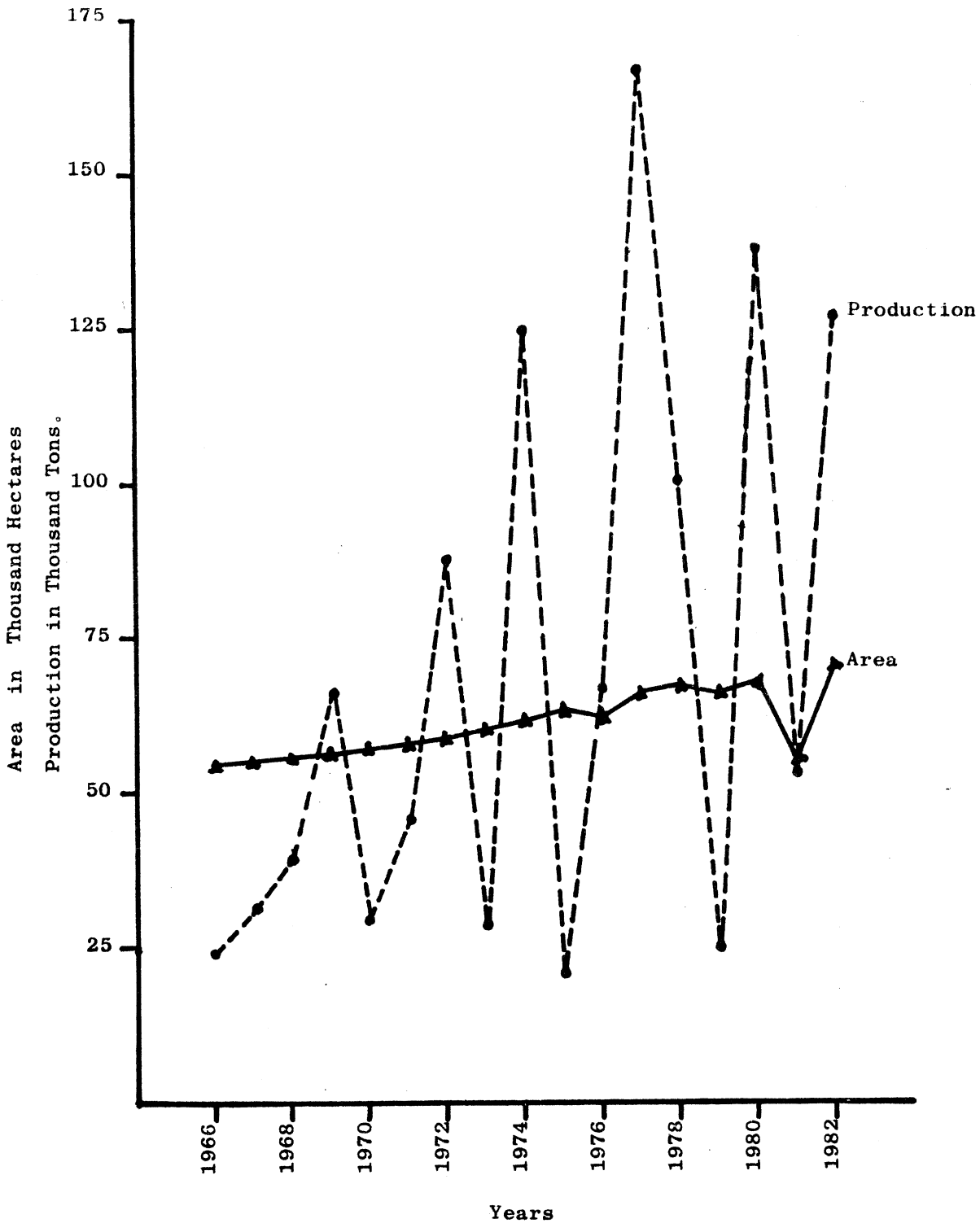

FIGURE 18. Area and Production of Olives in the West Bank.

Income from olives could increase depending on two factors:-

1. Using appropriate agricultural methods and providing good care for olive trees.

2. Taking care of olive oil marketing abroad which needs an appropriate classification as that suggested in a paper by ASIR[67] at the conference of Union of Arab Food Industries held at the Royal Scientific Society in Amman on November 1983.

Olives grow all over the hills of the West Bank with the greatest density in Tulkarem District and followed by that of Nablus, Jenin and Ramallah. The districts of Jerusalem , Bethlehem and Hebron have the least number of olives. TABLE 53 shows the area, yield and production of olives in the various districts of the West Bank.

TABLE 53:

PRODUCTIVE AREAS OF OLIVE TREES, YIELD AND TOTAL PRODUCTION BY DISTRICTS IN THE WEST BANK FOR 1980 - 1981.

Districts	Area in hectares	Yield kg/ hectare	Production in tons	% to total area.
Tulkarem	21,000	2,000	42,000	32.03%
Nablus	14,720	2,300	33,856	22,45%
Jenin	13,160	2,040	26,846	20.07%
Ramallah & Behtlehem & Jerusalem	14,680	2,100	30,828	22,38%
Hebron	2,100	1,750	3,517	3.07%
Total	65,570		137,047	100%

Olives are mainly used for the production of edible oil and in the West Bank only pure virgin olive oil is produced, i.e. oil obtained only by mechanical means without any chemical or heating treatments. Over 300 olive mills are utilized in the West Bank for the sole purpose of producing oil[67]. Olives are also used as pickled olives which are consumed locally. Some olive oil is exported to adjacent Arab countries. TABLE 54 shows the various ways of olive crop disposal.[54]

TABLE 54:

THE VARIOUS WAYS OLIVES ARE DISPOSED OF IN THE WEST BANK IN THE YEAR 1980.

Ways of olives disposal	Quantity tons	Ratio	Remarks
- Olive production	137,047	100 %	
- Quantity of olives used as pickles	15,000	11 %	of the total olives
- Quantity of olives used for oil extraction	122,047	89 %	of the total olives
- Quantity of oil produced	30,512	25 %	of the olive fruits
- Quantity of oil stored from last year	100	0.3 %	by weight
- Quantity of oil for local consumption	8,000	26 %	of the oil produced
- Quantity of oil sold in Israel and Gaza Strip	3,000	10 %	of the oil produced
- Quantity of oil exported or stored.	19,612	64 %	of the oil produced
- Quantity of pomace produced	48,000	35 %	of the olive fruits
- Quantity of oil extracted from pomace.	2,000	4 %	of the pomace weight

It is deduced from TABLE 54 that over 22,000 tons of olive oil could be exported yearly from the West Bank in a fairly good year. Since olive oil sells for about $3 per kg , the 22 million kilograms of olive oil produced could bring up to 66 million US dollars. However, this really does not happen because the problem of marketing food products remains the most difficult obstacle to overcome in the occupied territories.

In contrast to the difficulty in marketing olive oil by hundreds of farmers,it has been pointed out that the vegetable oil company of Nablus (which the Jordanian Government owns 51% of and the remainder is owned by about eight Nablus families) which manufactures a ghee type of oil from imported coconut palm has no difficulties whatsoever in marketing its products to Jordan.(68)

Citrus:

Citrus is the next most important agricultural commodity in the West Bank in value of the product produced. In contrast to olive trees which grow in hilly regions and make up 74% of the total fruit trees, citrus trees make up only 2.6% - 2,600 hectares - which grow in the fertile irrigated sections with mild weather in north and south west plains.

Again, in contrast to olives whose share is from 13% to 30% of the gross agricultural income, the share of citrus is from 7% to 8% and is very steady. The area, yield and total production are shown in TABLE 55 below and this data is illustrated in FIGURE 19 for the years 1966 to 1982.

TABLE 55:

THE AREA, YIELD AND TOTAL PRODUCTION OF CITRUS IN THE WEST BANK FROM 1966 - 1982.

Year	Area in hectares	Yield tons/ hectare	Total production in tons.
1966	1,300	24	31,500
1968	1,300	23	30,000
1969	1,321	25	33,000
1970	1,330	26	35,200
1971	1,342	28	38,000
1972	1,641	29	47,600
1973	2,000	29	58,600
1974	2,050	30	61,500
1975	2,130	30	63,800
1976	2,470	30	74,100
1977	2,530	30	76,000
1978	2,590	31	80,000
1979	2,590	31	79,100
1980	2,540	29	74,300
1981	2,540	29	73,500
1982	2,493	32	79,500

The sharp increase in area of productive citrus fruits in 1968 in the West Bank -FIGURE 19- is due to the planting of large areas between 1963 and 1965. The Palestinian refugees of the coastal areas of Palestine were able after 10 years of expulsion from their citrus groves to transfer their agricultural technology to the West Bank. The greatest impact in the planting of citrus is evident in the semi-coastal area of Tulkarem which is adjacent to their lost and beloved citrus groves on the coast.

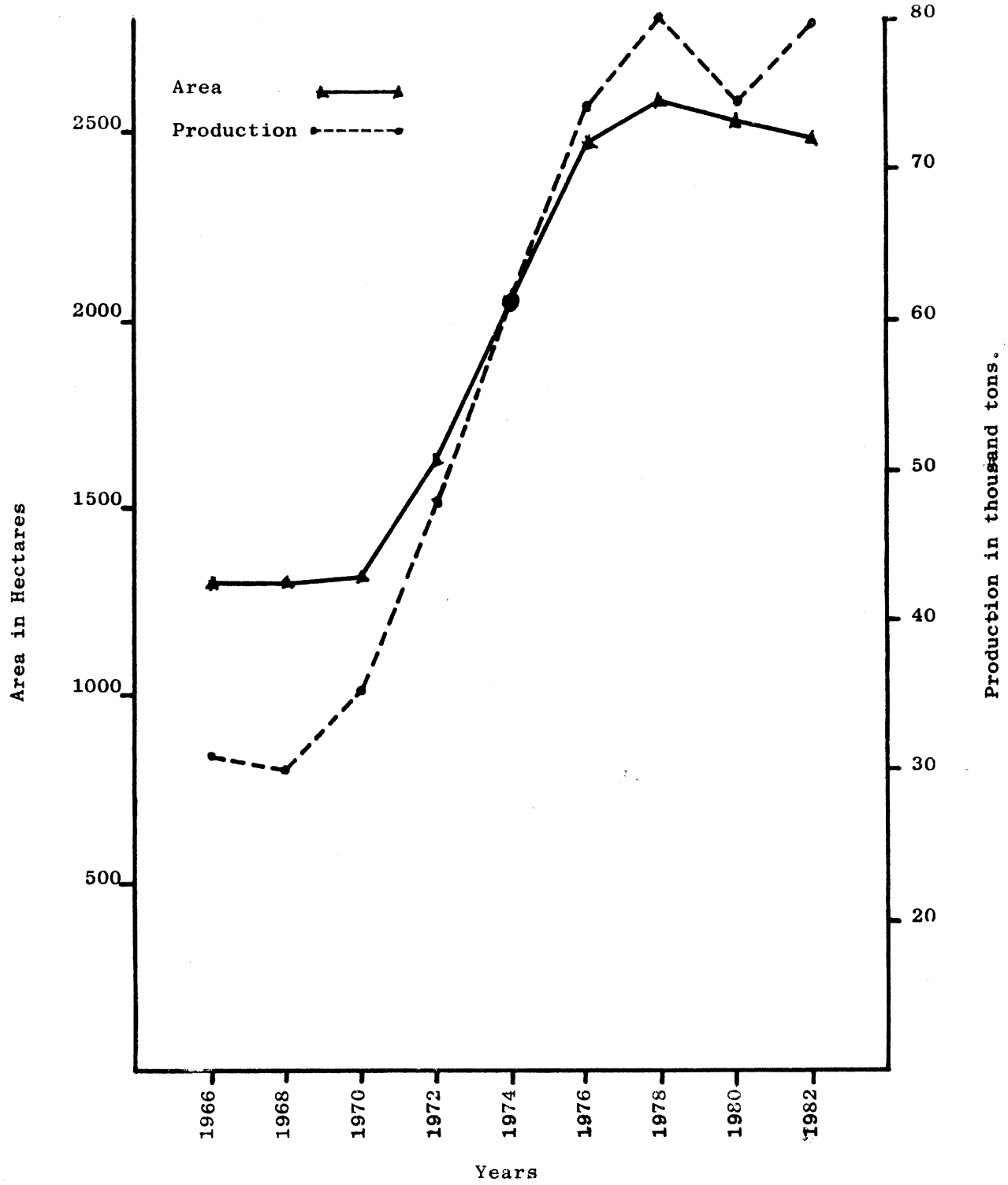

FIGURE 19 Area and Production of Citrus in the West Bank.

It is well known that before 1948, Palestinians practiced citrus culture for hundreds of years in the coastal area of Palestine which since 1948 was taken over by the new state of Israel. The following TABLE 56, shows the distribution of citrus in the various districts of the West Bank,as of 1982.

TABLE 56.

DISTRIBUTION OF CITRUS IN THE VARIOUS DISTRICTS OF THE WEST BANK - 1982

Districts	Citrus area in hectares
-Tulkarem district	1,702
-Jenin district	274
-Nablus district	143
-Jordan Valley area	347
-Ramallah & Central area -including Jerusalem & Bethlehem - .	20 (mostly lemons)
-Hebron district	7
Total	2,493 hectares.

It should be noted that in addition to variations in areas of citrus as shown in TABLE 56 for the various districts, there are variations in ripening of the fruits with that of the Jordan Valley being the first to ripen followed by Tulkarem.

TABLE 57 shows the detailed distribution of the various citrus varieties in the various districts. It should be pointed out that the West Bank produces various grades of shammouti oranges depending on districts. For example, the oranges of Jericho are superior in having greater sweetness, taste and aroma to that of the Tulkarem and Jenin districts. The navel oranges grow well in the Jordan Valley and are also of good quality.

The West Bank as a whole has the other interesting citrus varieties such as the of tangerines and mandarines (see TABLE 57) of which it produces 19,000 tons compared to 28,000 tons of valancia and 17,000 tons of shammouti oranges with very little production of grapefruits. This is in contrast to the Gaza Strip where the farmers there have very little of these

varieties which, in fact, is barely enough for their local consumption. However, as will be shown later, the Gaza Strip has an abundance of grapefruits and the valancia and shammouti oranges.

The future for citrus production in the West Bank is like that of the Gaza Strip being totally dependent on the ability to market various citrus products out of these occupied territories, and on the permission of the ruling Israeli military authorities to allow without preconditions the establishment of citrus juice and canning factories. Such permissions are restricted and controlled, and such factories are extremely necessary for the Gaza Strip which has large citrus production.

The West Bank consumes half of the 80,000 tons of citrus it produces and the other 50% is exported only to Jordan and other Arab countries. The West Bank has no functioning factories for the grading and waxing of oranges, and thus its citrus products are exported to nearby markets. Also, because of the poor marketing in the past two years, some farmers this year (1984) in the West Bank and Gaza Strip have actually cut their citrus groves to be replaced by vegetables hoping to have better revenue. As indicated, proper marketing of food products in general and of citrus and vegetables in particular remains a challenge which needs the full attention of all those concerned with the economic viability of the occupied territories.

TABLE 57.

CITRUS PRODUCTION IN THE WEST BANK (BY DISTRICT) FOR THE YEAR 1979/1980

Commodity	Shammouti	Valancia	Lemon	Tangerine	Mandarin	Other citrus
Tulkarm district:						
Area in hectares	359.5	650.0	130.8	366.5	88.2	105.3
Production-tons.	10,785	22,750	4,578	9,163	2,205	3,159
Jordan Valley:						
Area in hectares	132.6	35.1	100.0	32.0	24.5	67.9
Production-tons.	2,652	878	3,000	800	613	1,698
Jenin district:						
Area in hectares	133.8	25.0	30.8	28.2	12.1	44.7
Production-tons.	3,345	750	924	705	303	1,229
Nablus district:						
Area in hectares	30.0	14.0	28.5	16.1	24.5	41.3
Production-tons.	754	420	855	403	612	1,239
Ramallah district:						
Area in hectares	4.7	—	18.7	—	—	—
Production-tons.	71	—	426	—	—	—
Total:						
-Area in hectares	660.6	724.1	308.8	442.8	149.3	259.2
-Production-tons	17,607	24,798	9,783	11,071	3,733	7,325

Grapes:

Like olives and citrus, the West Bank is known for its good table grape varieties.

TABLE 58 shows the decrease in area planted by grapes from the year 1961 to 1978 and the increase between the years 1978 and 1982.

TABLE 58.

THE CHANGE IN GRAPE AREA, AND PRODUCTION BETWEEN THE YEARS 1961 AND 1982

Year	Area in hectares	Yield kg/ hectare	Production tons.
1961	12,433	4.4	54,839
1964	12,178	4.1	49,711
1966	12,803	2.9	36,529
1968	12,337	2.9	35,100
1970	10,775	2.6	27,750
1972	10,127	4.2	42,000
1974	9,429	6.3	60,000
1976	8,419	5.6	47.250
1978	8,515	6.8	57,902
1980	8,486	7.0	59,402
1982	8,665	7.3	63,41

The decrease in grape production and areas which is observed in TABLE 58 is due to various factors including the following:

1. Attack of the insect (phylloxera) to the grape root system in large areas in Ramallah and Bethelehm districts

2. Lack of care of vineyards due to lack of investment and increase in emigration of the residents, especially of Ramallah district in the mid-fifties.

   The establishment of vineyards in the rocky areas of the central and southern districts requires land reclamation, which requires intensive labor and which is very costly.

3. Lack of knowledge in the protection of vineyards from diseases e.g. powdery mildew and insects , for example – grape fruit fly – .

4. Low revenue and poor marketing of table grapes (the type produced in the West Bank) led to more emphasis on the more profitable vegetables in the fertile areas.

5. Difficulty of obtaining varieties which are resistant to diseases, nematolds, and insects.

6. Difficulty of obtaining high yield grape varieties and the desired seedless varieties.

7. Lack of knowledge on proper fertilization and other speedy methods of growing grape vines.

8. Lack of funds and knowledge on proper trellissing of grape vineyards on hanging lines and the T bar system, which is considered one of the most important factors in growth and increasing yield.

The decrease in both grape areas and yield continued until the begining of 1971, when the new grape seedlings planted in the mid-sixties by modern techniques (i.e. hanging on lines and T system) and proper use of agrochemicals resulted in high yield making it inducive to plant more grapes especially in Hebron area. The yield of 2850 kg/hectare in 1966 nearly doubled by the year 1980 and became nearly three fold by the year 1983.

FIGURE 20 shows the changes which occured in the yield and areas of vineyards between the years 1964 and 1982. The continuous increase in the yield curve after 1971 was interupted by a slight decrease in 1976 and then the yield continued upward until 1982.

Most of the vineyards are found now in the southern district of Hebron , which has 2/3rds of the grapes of the West Bank . The remainder is mostly in the central districts of Bethlehem, Jerusalem and Ramallah.

As indicated earlier, the northern district, which has fertile lands, plants field crops and vegetables and other fruit trees such as olives and stone fruits (mainly almonds) instead of grapes. TABLE 59 shows the area, yield and production for grapes in the various districts of the West Bank. The lack of interest in grape vineyards in the northern districts is reflected in the low yields observed. These districts should be encouraged to plant grape vines,

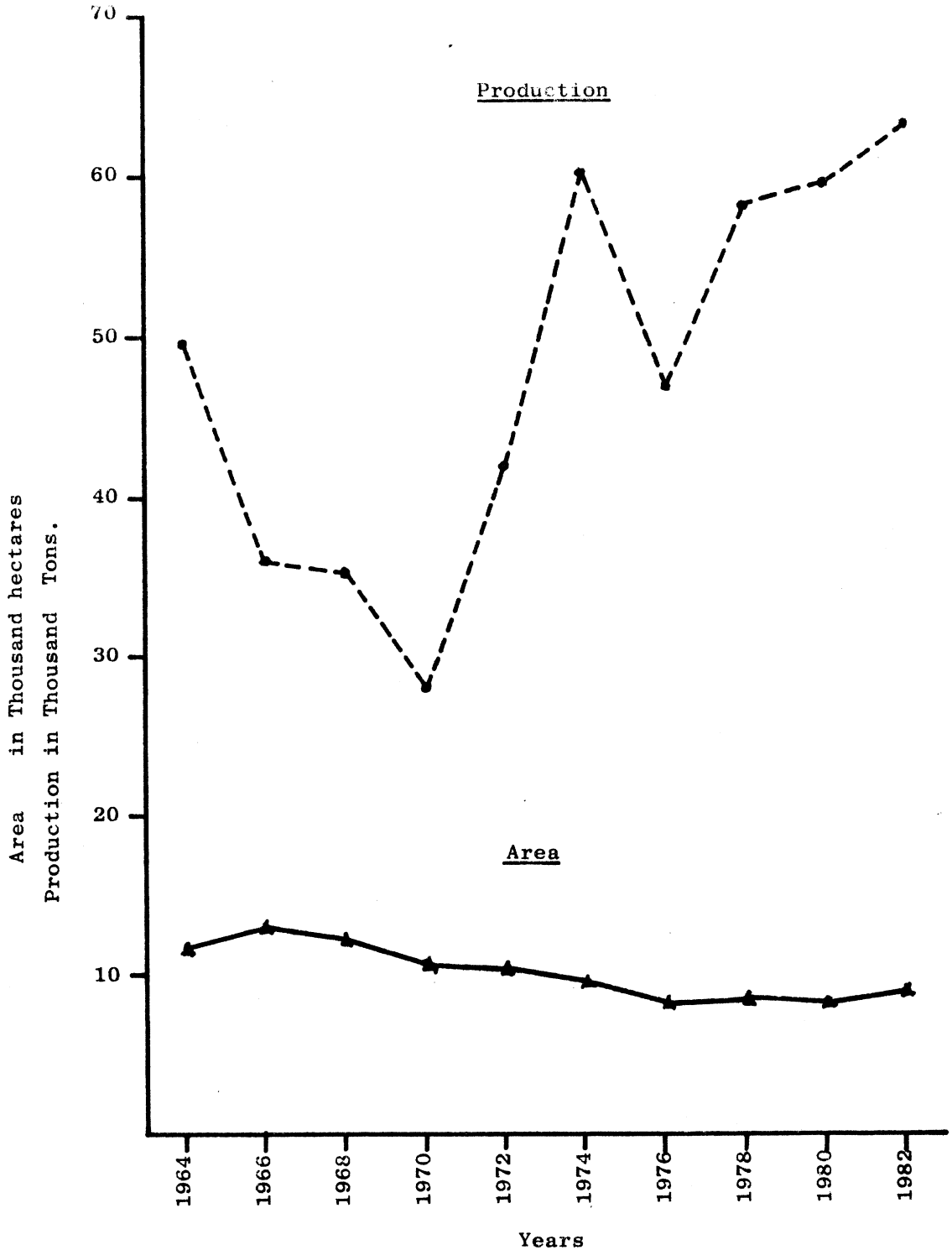

FIGURE 20. Area and Production of Grapes in the West Bank.

especially since grape yield does not fluctuate much with the years such as olives do. The feasibility of planting juice type varieties in the fertile areas of the north should also be investigated.

TABLE 59.

AREA AND PRODUCTION OF GRAPES IN THE WEST BANK FOR THE YEAR 1982

Districts	Area in hectares	Yield tons hectare	Production tons
Hebron	5,404	7.75	41,881
Bethlehem	1,770	7.50	13,275
Jerusalem	35	5.00	175
Ramallah	731	7.50	5,484
Jericho	11	10.00	110
Nablus	146	3.50	511
Tulkarem	153	4.00	612
Jenin	416	3.30	1,372
Total West Bank	8,666		63,420

OTHER FRUITS AND FRUIT TREES IN GENERAL:

The other fruit trees which are of significance are divided into rain-fed and irrigated trees.

The rain-fed are listed below in the order of prevalance:

- Almonds , plums, figs, apricots, apples, peaches, pears, and palms.

The irrigated fruit trees other than citrus are:

- Bananas and guava.

- Other irrigated fruit trees such as mangos, avocados and persimmons have been observed to grow and produce very well in certain Palestinian soils and climates and are very

expensive export fruits, but the Palestinian farmers for various reasons appear to be uninterested in planting these fruit trees for fear of difficulties in marketing. The very valuable papaya fruit trees which grow well in Jericho area have remained on a small scale in the gardens of Jericho city without becoming widespread in the Jordan Valley. Dwarf varieties from foreign countries must be introduced if production of papaya is to become an economic undertaking.

Bananas covered an irrigated area of 418 hectares of the Jordan Valley in 1982 and this area fluctuated with the years. The Abu-Namleh small bush bananas is dominant in Jericho . Although this type is small in size, it has an excellent taste and flavor. These bananas,although not very durable for shipping, fetch higher prices locally and in Jordan. The higher yields of larger size bananas with less flavor are now taking a large share of the West Bank and Gaza Strip's local markets and more of these bananas are being grown in the Jordan Valley.

Upon examining the data for all the fruit trees growing in the West Bank in 1982 as shown in TABLE 60, one obtains a total of 96,000 hectares as the planted area with a total production of 339,000 tons. It is also found that almonds , plums and fig trees rank the third, fourth and fifth in position respectively with respect to area. In fact the area planted by almond trees - which is 7,843 hectares - is only 9.5% less than that of grapes - which is 8,665 hectares. The yield of almonds varies greatly with years almost like olives, but this fact has been ignored because the large percent of the almond orchards found in the northern districts are generally kept without much care.

The production of 5,054 tons of almonds in 1982 is considered as one of the lowest in years and this has been attributed to severe weather conditions including storms and snow in 1982, which was considered as a bad year for the setting of almond flowers.The highest almond yields of 1.2 and 1.3 tons per hectare was obtained in the year 1964 and 1968 respectively,which is double that obtained in 1982. Therefore, following many years of occupation, almond orchards have been the most neglected among all the trees in the West Bank.

The approximately 26,000 tons of plums produced annually in the West Bank as in 1982 are enough to supply a small canning factory and this high yielding tree has also been ignored in the West Bank at a time when planting of almonds and plums are being undertaken on a large scale in Israel and these Israeli orchards are even often irrigated and fertilized using drip irrigation systems to increase their productivity.

TABLE 60.

AREA, YIELD AND TOTAL PRODUCTION OF FRUIT TREES IN THE WEST BANK FOR THE YEAR 1982

Type of trees	Area in hectares	Yield ton/ hectare	Production in tons.
Olives	69158.8	1,865	128959.1
Grapes	8665.3	7.318	63414.9
Almonds	7843.4	0.644	5053.8
Plums	3571.4	7.164	25584.3
Figs	2695.9	4.463	13378.5
Citrus total	2492.8	---	83449.5
- Valancia	709.2	39.058	27700.0
- Shammouti	613.7	27.183	16682.0
- Tangerine	462.1	30.499	14093.5
- Lemon	324.7	41.343	13424.0
- Mandarin	157.3	31.360	4933.0
- Other citrus	255.8		6617.0
Apricots	478.6	2.349	1124.4
Bananas	418.0	32.000	13376.0
Apples	232.2	5.353	1243.0
Peaches	114.3	6.912	790.0
Guava	62.8	28.881	1876.5
Pears	31.1	5.058	157.3
Palms	30.4	3.000	91.2
Other fruits	267.9	---	649.5
Total	96062.9		339148.0

Although the Israelis have essentially no figs, they have an excellent processing system for the figs purchased from the West Bank. The figs in the West Bank are consumed only fresh and bring-in good prices only at the beginning and the end of their season. The area planted by fig trees - which is 2,696 hectares - is ranked fifth among all the fruits of the West Bank and their yield of 4.5 tons per hectare as obtained in 1982 can be considered economic if a processing plant is established to utilize all the figs. However, currently, figs are not even picked in the middle of the season due to their abundance, difficulty in harvest and often their contamination by aphids.

The areas planted by apricots like that of figs and almonds did not increase since 1961. Plums, however, increased significantly. Plum production for the consecutive years from 1961 to 1982 are as shown in TABLE 61.

TABLE 61.

PLUM PRODUCTION FOR THE YEARS FROM 1961-1982 IN THE WEST BANK

Year	Production (tons)	Year	Production (tons)
1961	2,721	1973	6,000
1962	2,982	1974	8,000
1963	2,678	1975	10,500
1964	2,946	1976	17,000
1965	2,622	1977	16,000
1966	3,770	1978	18,000
1968	4,500	1979	18,000
1970	3,500	1980	20,400
1971	4,000	1981	23,700
1972	5,000	1982	25,584

The production of apples which also grow as rain-fed fruit trees should be increased rather than decreased with the years especially if dependency on Israel for apples is to be stopped. Ironically, Israel now harvests occupied Syrian apples from the Golan Heights. The changes which occured with time in the West Bank in apple culture is shown below in TABLE 62.

TABLE 62.

CHANGES IN THE AREAS PLANTED BY APPLES IN THE WEST BANK FOR THE YEARS BETWEEN 1961 AND 1982.

Year	Area (hectares)	Year	Area (hectares)
1961	908	1967	1,008
1962	923	1978	802
1963	964	1980	380
1964	1,013	1981	292
1965	921	1982	232
1966	1,117		

As shown in TABLE 62, a dramatic decrease resulted in apple culture due to lack of care, competition from Israeli-marketed occupied-Syrian apples, and the infestation of apple orchards by borer insects which eliminated many orchards. As shown in TABLE 63, the decrease in apple areas has been partially compensated for by increase in yield. These effectors have been studied in Hebron and the changes in areas which occured in this district between 1961 and 1982 are given below in TABLE 63.

TABLE 63.

CHANGES IN AREA, YIELD FOR APPLES PLANTED IN THE HEBRON DISTRICT FOR THE YEARS 1961 - 1982

Year	Area in hectares	Yield kg/ hectare	Year	Area in hectares	Yield kg/ hectare
1961	221	3.04	1978	196	5.93
1963	261	3.56	1980	84	7.50
1966	350	3.49	1981	83	4.92
1974	254	6.80	1982	81	5.30
1976	240	6.00			

In addition to the southern district of Hebron, the rain-fed apples are grown in large amounts in the central districts of Jerusalem, Bethlehem and Ramallah. Some apples are also grown in the elevated cooler areas of the northern districts. Apples require a yearly period of time with cold temperature in order to produce.

Peaches are fruits which like plums and apricots are from the stone-fruit family which are grown locally by grafting on almond stock. The West Bank has only 114 hectares of peaches and since Israeli peaches are sold at good prices in the West Bank and Gaza Strip to fullfill their demands, the Israeli military authorities issued military Order Number 1039 restricting each farmer's quota of planting peaches or the grafting of trees to peaches to two hectares. Grapes which could also be very profitable were restricted in this order.

Palestinian Arabs should learn from this,that the Israeli government ruling the occupied area wants to keep production of profitable and high yield fruits such as peaches and grapes in the hands of the Israelis. Therefore, farmers should be encouraged to take every opportunity to expand their fruit tree orchards before the Israelis issue other restrictions.

Guava is mainly grown in Tulkarem district and there are only 63 hectares of this fruit which comes in the winter seasons when the summer fruits mentioned above are out of season. Since distribution of fruit production is the desire of farmers and consumers alike, it should be very obvious why planting of guava should be expanded by at least 100 fold if these winter-produced fruits are to be used to some degree as a substitute for summer fruits such as the stone fruits. Due to the fact that watermelons and cantelopes flood the markets in the summer, emphasis should be made on expanding the horticulture of fruit trees which produce in the winter and not in the summer season.

Date palm trees produce around the end of the summer and, disappointingly, the whole West Bank has only 30 hectares of date palm trees. The Jordan Valley has proved to be a very suitable area for the production of date palm trees and the Israelis who have confiscated large areas of the Jordan Valley have now planted huge areas of dwarf date palm and seedless date palm trees. The West Bank relies on imported dates to substitute its needs.

In order to expand the planting of fruit trees in the West Bank and horticulture in general, it should be remembered that this small area of 5800 square kilometers for the entire West Bank has great variations in soil, weather and water availability. Even though the fruits discussed (other than citrus, bananas, and guava) are all grown as rain-fed trees, the environmental variations and traditions in the various districts have resulted in unique distribution for fruits in each district.

TABLES 64, 65, 66, 67, 68, 69, 70, 71, and 72 show the distribution of fruit trees in 1982 in all of the West Bank as a whole and in each district of the West Bank seperately. This data supports the suggestions regarding the expansion of certain fruit trees in various districts of the West Bank. As an example, expansion of areas planted with almonds (which is an important tree in each district, except the Jordan Valley) should be done. The low yield of almonds should improve with fertilizers, ploughing, spraying, pruning and renewal of old trees. Almonds are easy to harvest and store, and their prices do not fluctuate as much as other stone-fruits. The potential for increasing the productivity of each district should be worked out immediately.

TABLE 64.

Area, Yield and Total Production
of Fruit Trees for 1982

For:- The West Bank

Type of trees	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Olives	69158.8	1.865	128959.1
Grapes	8665.3	7.318	63414.9
Almonds	7843.4	0.644	5053.8
Plums	3571.4	7.164	25584.3
Figs	2695.9	4.463	13378.5
Citrus-Total	2492.8	-	83449.5
-Valancia	709.2	39.058	27700.0
-Shamouti	613.7	27.183	16682.0
-Tangerine	462.1	30.499	14093.5
-Lemon	324.7	41.343	13424.0
-Mandarin	157.3	31.360	4933.0
-Other citrus	225.8	-	6617.0
Apricots	478.6	2.349	1124.4
Bananas	418.0	32.000	13376.0
Apples	232.2	5.353	1243.0
Peaches	114.3	6.912	790.0
Guava	62.8	28.881	1876.5
Pears	31.1	5.058	157.3
Palms	30.4	3.000	91.2
Other Fruits	267.9	-	649.5
Total	96062.9	-	339148.0

TABLE 65.

Area, Yield and Total Production (by district)
of Fruit Trees for 1982

For:- Jenin District

Type of trees	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Olives	13435.90	2.18	29290.30
Almonds	2448.50	0.12	293.80
Plums	554.00	3.00	1662.00
Grapes	415.80	3.30	1372.10
Citrus-Total	273.90	-	7390.50
-Shamouti	125.10	20.00	2502.00
-Lemon	27.90	40.00	1116.00
-Valancia	26.30	31.08	817.40
-Tangerine	25.50	36.00	918.00
-Mandarin	14.40	37.00	532.80
-Other citrus	54.70	-	1504.30
Apricots	133.00	1.50	199.50
Figs	25.00	3.00	75.00
Apples	18.70	2.00	37.40
Total	17304.80	-	40320.60

TABLE 66.

Area, Yield and Total Production (by district)
of Fruit Trees for 1982

For:- Tulkarem District

Type of trees	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Olives	21852.00	1.50	32778.00
Almonds	2209.10	0.90	1988.20
Citrus-Total	1702.00	-	60331.00
-Shamouti	370.50	30.00	11115.00
-Valancia	641.10	40.00	25644.00
-Tangerine	387.90	30.00	11637.00
-Lemon	143.00	50.00	7150.00
-Mandarin	94.80	30.00	2844.00
-Other citrus	64.70	-	1941.00
Figs	299.60	3.00	898.80
Apricots	234.90	2.50	587.20
Grapes	153.00	4.00	612.00
Plums	146.30	3.00	438.90
Guava	62.30	30.00	1869.00
Apples	16.70	1.50	25.10
Peaches	2.60	2.00	5.20
Pears	2.30	1.20	2.70
Other Fruits	9.20	-	28.00
Total	26690.00	-	99564.10

TABLE 67.

Area, Yield and Total Production (by district)
of Fruit Trees for 1982

For:- Nablus District

Type of trees	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Olives	15143.00	2.10	31800.30
Almonds	1818.50	1.20	2182.20
Figs	807.30	6.00	4843.80
Plums	174.00	7.50	1305.00
Grapes	145.80	3.50	510.30
Citrus-Total	142.50	-	4717.00
-Shamouti	28.20	30.00	846.00
-Lemon	25.10	40.00	1004.00
-Mandarin	22.70	35.00	794.50
-Tangerine	15.50	35.00	542.50
-Valancia	13.10	30.00	393.00
-Other citrus	37.90	-	1137.00
Apricots	65.40	1.50	98.10
Apples	14.40	3.50	50.40
Other Fruits	12.00	-	52.50
Total	18322.90	-	45559.60

TABLE 68.

Area, Yield and Total Production (by district)

For:- Ramallah District

Types of trees	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Olives	14371.20	2.00	28742.40
Figs	1374.80	5.00	6874.00
Plums	1108.50	8.00	8868.00
Grapes	731.20	7.50	5484.00
Almonds	691.80	0.35	242.10
Apples	35.00	4.50	157.50
Citrus-Total	19.10	-	367.50
-Lemon*	14.20	20.00	284.00
-Shammoti	2.90	15.00	43.50
-Other citrus	2.00	-	40.00
Apricots	14.00	6.50	91.00
Pears	9.80	4.80	47.00
Peaches	9.70	7.30	70.80
Other Fruits	47.60	-	183.00
Total	18412.70	-	51127.30

* Lemons can withstand temperatures colder than other citrus fruits. The few citrus found in this district is in areas close to the Jordan valley.

TABLE 69.

Area, Yield and Total Production (by district) of Fruit trees for 1982

For: Jerusalem District

Type of trees	Area (hectares)	Yield (tons/ha.)	Total Production (tons)
Olives	215.00	2.00	430.00
Almonds	90.00	0.80	72.00
Grapes	35.00	5.00	175.00
Plums	29.00	5.00	145.00
Figs	14.50	2.00	29.00
Other fruits	15.00	-	35.00
Total	398.50	-	886.00

TABLE 70.

Area, Yield and Total Production (by district) of Fruit Trees for 1982

For:- Bethlehem District

Type of trees	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Grapes	1770.00	7.50	13275.00
Olives	1499.80	1.60	2399.70
Almonds	115.30	0.35	40.40
Plums	91.20	7.50	684.00
Apples	66.00	4.50	297.00
Apricots	15.50	5.00	77.50
Figs	11.20	4.00	44.80
Peaches	7.00	7.00	49.00
Pears	4.30	4.50	19.40
Citrus-Total	1.00	-	15.00
-Valancia *	1.00	15.00	15.00
Other Fruits	8.90	-	21.00
Total	3590.20	-	16922.80

* The presence of 1.0 hectare of oranges in the cold district of Bethlehem is an exception. The citrus grown in this district is present only in warm irrigated pockets. Lack of areas with mild winter in Bethlehem district and the lack of water needed for irrigation,which citrus requires, are obstacles which hinder the growth of citrus in this district.

TABLE 71.

Area, Yield and Total Production (by district) of Fruit Trees for 1982

For:- Jordan Valley Area

Type of trees	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Bananas	418.00	32	13376.00
Citrus-Total	347.40	-	10525.00
-Lemon	107.60	35	3766.00
-Shamouti	87.00	25	2175.00
-Tangerine	33.20	30	996.00
-Valancia	27.70	30	831.00
-Mandarin	25.40	30	762.00
-Other citrus	66.50	-	1995.00
Palms	30.40	3	91.20
Grapes	10.70	10	107.00
Olives	6.90	2	13.80
Guava	0.50	15	7.50
Total	813.90	-	24120.50

Note: The Jordan Valley is the only area in the West Bank in which bananas are successfully grown.

TABLE 72.

Area, Yield and Total Production (by district) of Fruit Trees for 1982

For:- Hebron District

Type of trees	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Grapes	5403.80	7.75	41879.50
Olives	2635.00	1.33	3504.60
Plums	1468.40	8.50	12481.40
Almonds	470.20	0.50	235.10
Figs	163.50	3.75	613.10
Peaches	95.00	7.00	665.00
Apples	81.40	8.30	675.60
Apricots	15.80	4.50	71.10
Pears	14.70	6.00	88.20
Citrus-Total	6.90	-	103.50
-Lemon*	6.90	15.00	103.50
Other Fruits	175.20	-	330.00
Total	10529.90	-	60647.10

* Lemons are the only type of citrus trees which can withstand the cold winters of the Hebron District. Furthermore, little water is available for irrigating citrus trees in this district even if areas of warm weather are found.

C-2 Fruit trees in the Gaza Strip:

As shown in TABLE 73, the Gaza Strip has 11,841 hectares of fruit trees which produced 224,000 tons in 1982. Because 60% of this area is planted with citrus, which has high yields, and because most of the fruit trees including citrus are irrigated, the total fruit production in the Gaza Strip is 66% of that of the West Bank even though the Gaza Strip's land area planted with fruit trees is only 12% of that of the West Bank.

When comparing the yields of fruits in the Gaza Strip which is a fertile coastal area, with that of Tulkarem, the only semi-coastal area in the West Bank, it is found that the yield of shamouti oranges which is 3.7 tons per hectare in the Gaza Strip is greater than Tulkarem which is 3.0 tons per hectare. However, the yield in the Gaza Strip for valancia is 2.6 tons per hectare, lemon 3.3 tons per hectare, tangerine 2.5 tons per hectare, which is lower than that of the West Bank's semi-coastal Tulkarem district in which valancia, lemon and tangerine gave yields of 4.0, 5.0 and 3.0 tons per hectare respectively.

These yield differences may be so because the Gaza Strip is essentially specialized in Shamouti oranges in addition to grapefruits while the West Bank has its citrus distributed among the various citrus varieties. In addition, while the Gaza Strip water is at times brackish with considerable salinity, the water in Tulkarem District has absolutely no salinity.

The Gaza Strip like the West Bank has relatively a lot of almonds which are rain-fed but the yields are also poor like the West Bank.

There is more guava (196 hectares) in the Gaza Strip than in the West Bank which has 63 hectares over 99% of which are in the Tulkarem District. The total production of guava in the Gaza Strip is 5,880 tons compared to 1,876 tons from the West Bank.

Another interesting difference from the West Bank is the presence of 200 hectares of date palm trees in the Gaza Strip which produce 2,600 tons compared to only 30 hectares in the West Bank which produce 91 tons.

Furthermore, the Gaza Strip does not grow some of the fruit trees which are grown in West Bank like bananas, apples, pears, peaches, and apricots.

The grapes of the Gaza Strip ripen much earlier than those grown in the southern and central hills of the West Bank around Hebron. However, if the grape areas with trellising in the Jordan Valley of the West Bank are increased as the Israeli settlers have done in thatt valley, large amounts of early grapes could be produced along with that of the Gaza Strip and - as experienced - give very high prices. The yield of grapes and olives in the Gaza Strip is higher than that in the West Bank but the areas planted are much smaller.

The Gaza Strip Palestinians import their needs of olive oil from the West Bank as the amount of olives produced in the Gaza Strip which was 4,400 tons in 1982 is only 3.4% of that of the West Bank.

Since olives are highly productive in the Gaza Strip if irrigated, an intensive assistance program of planting olives there is very worthwhile for the Palestinians rather than planting large quantities in the Hebron hills with low yields as is being done recently. The Hebron District should be encouraged more to continue in planting grapes, the Tulkarem District should continue in planting citrus, almonds and vegetables while the Jenin District should be encouraged to plant more and more almonds, olives, watermelon and cantelopes. Farmers of the Gaza Strip must be encouraged to continue their emphasis on planting citrus and guava as the irrigated fruits in addition to the more salt-resistant olives, with respect to rain-fed trees, almonds and palm trees should receive more care and their rain-fed areas expanded.

Marketing for the isolated Gaza Strip must be secured for certain important vegetables such as strawberries and potatoes, in addition to the traditional vegetables of cucumbers, tomatoes, eggplants, squash, and pepper. Due to apparent higher profits from vegetables compared to citrus, some farmers in the Gaza Strip and the West Bank have recently (1983-1984) cut some of their citrus groves to be replaced by vegetables. The joint PLO - Jordan Committee in Amman gave twenty-five Jordanian Dinars per donum to citrus farmers in the Gaza Strip and the West Bank to compensate for the losses encumbered due to poor marketing and low prices. It seems that efforts of all concerned should be made to secure markets for the produce of the occupied territories rather than provide a subsidy in the form of charity. No matter how often the need for good marketing of plant products (fruits and vegetables) is emphasized in this study, it is going to be the only sure way for insuring continued interest in fruit trees and in farming as a way of living.

TABLE 73.

Area, Yield and Total Production
of Fruit Trees for 1982

For:- Gaza Strip

Type of trees	Area (hectares)	Yield (tons/ha.)	Total production (tons)
Citrus-Total	7147.20	-	204724.90
-Valancia	4702.00	26.00	122252.00
-Shamouti	1495.20	37.00	55322.40
-Lemon	356.60	33.00	11767.80
-Tangerine	40.00	25.00	1000.00
-Mandarin	5.70	25.00	142.50
-Other citrus	547.70	-	14240.20
Almonds	2350.00	0.70	1645.00
Olives	1100.00	4.00	4400.00
Grapes	820.00	5.00	4100.00
Palms	200.00	13.00	2600.00
Guava	196.00	30.00	5880.00
Plums	10.00	20.00	200.00
Figs	6.00	10.00	60.00
Other Fruits	12.00	-	120.00
Total	11841.20	-	223729.90

II. ANIMAL PRODUCTION

A. In the West Bank:-

The largest herds of red-meat animals found in the West Bank are sheep, followed by goats and cattle. A few camels also exist in Hebron District and the Gaza Strip.

White-meat animals are confined to chickens (broilers and egg-layers). No turkey farms, ducks or geese exist in the West Bank. However, some rabbit farms have begun especially in the Gaza Strip, and few rabbit farms were also established in the West Bank.

Sheep and Goats

The changes which occurred in the major animal production of the West Bank, i.e., sheep and goats in a twenty-one year period (1961-1982) are presented below in TABLE 74.

TABLE 74. NUMBER OF SHEEP AND GOATS IN THE WEST BANK from 1961 to 1982

Year	No. of Sheep	% of Base Year 1966	No. of Goats	% of Base Year 1966	TOTAL Sheep and Goats
1961	189,660	50%	191,518	70%	381,178
1962	213,223	56%	190,919	70%	404,142
1963	246,173	65%	200,995	74%	447,168
1964	264,590	70%	223,462	82%	488,052
1965	322,732	85%	261,132	96%	583,864
1966	379,010	100%	272,337	100%	651,347
1970	271,100	72%	163,100	60%	434,200
1972	243,841	64%	171,738	63%	415,579
1973	245,645	65%	175,446	64%	421,091
1974	257,600	68%	175,446	64%	433,046
1975	265,135	70%	219,593	81%	484,728
1976	249,391	66%	194,507	71%	443,898
1977	233,511	62%	170,602	63%	404,113
1978	220,515	58%	149,827	55%	370,342
1979	235,371	62%	156,462	57%	391,833
1980	227,017	60%	153,829	56%	380,846
1981	232,975	62%	161,575	59%	394,550
1982	266,856	70%	162,082	60%	428,938

As shown in this table, the number of sheep in the West Bank fluctuated in the last twenty-one years between 1961 and 1982. An increase is observed in the five years preceeding occupation. In 1961, the number of sheep and goats was 189,660 and 191,518 respectively, and their numbers increased steadily to 379,010 and 272,337 respectively in 1966. These numbers were the maximum reached in the last 21 years. As may be seen in FIGURE 21, a sharp decrease in sheep and goats resulted in the three years following occupation and dropping by 28.5% for sheep and 40% for goats, and the decrease continued at a slower rate until 1981 when the number of sheep and goats became 232,975 and 161,575 respectively.

The local sheep breed in the West Bank has been acclimated in Palestine for thousands of years and is known as the Syrian fat-tail Awassi which is named after the Arab Beduin "Awass" tribe of "Greater Syria".

In contrast to sheep where their number became 62% of the 1966 base year, the relative percent of goats on the other hand did not increase even in 1981 as hybridization did not result in any new breeds and no stimulation of goat breeding occured. The deer-goat hybrid "Yaez" did not catch on with Arab farmers due to its low milk productivity. However, more research on this goat breed is needed before arriving at a final conclusion on its usefulness for this area.

It should be noted that in TABLE 74, the year 1966 was considered a base year for both sheep and goats because it is after this year, the increase in these animals was halted, and after that the occupation occured and the decrease continued. The reasons for the sharp decrease in total number of sheep and goats and the prevention of their future expansion at a large scale are as follows:

1 - Decrease in pasture areas due to land confiscations and restrictions on land use, especially land that was registered in the governments' name.

2 - Increase in cost of shepherds and labor.

3 - Security restrictions by the military on wandering shepherds.

4 - Increase in cost of feed whether it is concentrated or green and dried feed.

5 - Lack of the required large capital for animal projects.

6 - Competition from government subsidized Israeli farmers with Palestinian farmers who do not have any form of subsidy even at times of drastically poor prices.

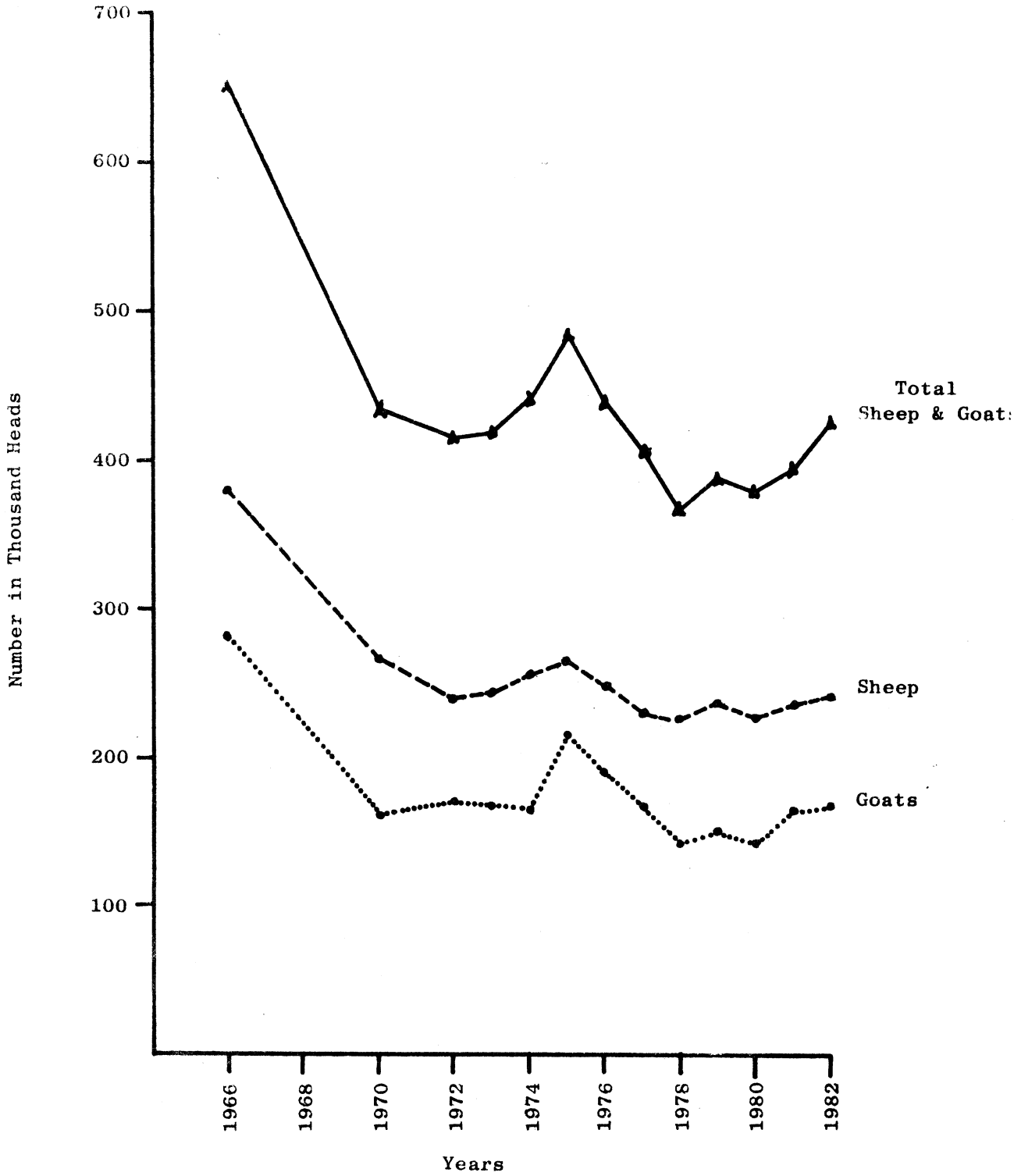

FIGURE 21 . Changes in Numbers of Sheep & Goats in the West Bank from 1966 - 1982

7 - The restrictions imposed by the Israeli government on Palestinian importers of breeding animals such as the case of sheep which when it was imported from Yougoslavia by the Palestinians in Gaza in 1983 as a barter for their citrus. New taxes were imposed by the Israeli government when the sheep arrived at the port and laws preventing the use of the sheep except for immediate slaughter were imposed resulting in great losses to the Palestinian importers. It is believed that this Israeli action was done to inhibit even a thought of repeating the purchase of breeding animals from abroad. To this date in August 1984, the disaster this incident caused in lowering of sheep meat prices stalled at least temporarily the hope of the Palestinian sheep farmers from increasing their sheep flocks, because it may not be profitable. Imported feed prices went up rather than down during this same period. The increase in the number of sheep which was pointed out above in 1981 and 1982 has now come to a halt in 1984.

The distribution of sheep and goats in the various districts of the West Bank for the year 1982 is shown in TABLE 75.

TABLE 75. DISTRIBUTION OF SHEEP AND GOATS BY DISTRICT IN THE WEST BANK FOR 1982

District	Sheep	Goats	TOTAL	% of Total
Jenin	39,630	18,350	57,980	13.4%
Tulkarem	19,004	11,754	30,758	7.1%
Nablus	48,067	24,817	72,884	16.9%
Jerusalem	5,500	1,100	6,600	1.5%
Jericho	17,756	8,082	25,838	6.0%
Ramallah	25,073	27,970	53,043	12.3%
Bethlehem	16,715	16,450	33,165	7.7%
Hebron	89,273	62,103	151,376	35.1%
TOTALS	261,018	170,626	431,644	100%

It can be seen from this table that the District of Hebron, followed by Nablus and Jenin, have the most sheep and goats.

After 1981, sheep breeding for meat and milk production was stimulated by the introduction of the new hybrid sheep "Assaf" whose productivity is excellent in both meat and milk. This breed was made in our area by hybridizing long-tail Freisian rams on the fat-tail Awassi females resulting after three generations of 3/8th Freisian and 5/8th of Awassi. This medium-tail hybrid sheep combines most of the good characteristics of both breeds which include environmental resistance and high productivity. A 2 1/2 year experiment by ASIR gave the following results on the "Assaf" hybrid:

1- The lambs of this breed grow at an average of 8 and 10 kilograms per month for females and males respectively. The males reach about 60 kilograms at approximately six months when the growth rate levels.

2- The female matures at 8-9 months of age.

3- In their first birth they give some twins about 10% without hormones and 40% with fertility hormones.

4- In their second year of production about 80 out of 100 in the sheep herd produce twins provided they are given fertility hormones.

5- Some (about 5%) produce triplets with the hormones.

6- The percent of twins and triplets increasing the concentration of injected hormones but that is not advisable.

7- The selected large females are able to give two births in 14 months without much stress on their reproductivity.

8- Their milk production averages from 300-500 liters per head per year including what they give to their lambs.

9- In general, considering milk, meat and offsprings production, the "Assaf" sheep breed is at least two times better than the local Awassi sheep.

10- The Awassi is more resistant that the "Assaf" to disease and needs less care, less food, less capital and running cost.

11- Different than the "Assaf" sheep, the local "Awassi" breed is able to walk for long distances in various pastures even during the summer heat.

In comparing the "Awassi" pure local sheep with the "Assaf" hybrid sheep, it is as if one is comparing the Friesian cows with the local cow breed.

The large and highly productive "Assaf" sheep may appear to be the solution for future expansion of sheep herds. However, the high capital and running cost of this breed is

too much to handle for the poor Palestinian Arab farmers. It is hoped that those really concerned about the steadfastness of the people in the occupied territories will provide the needed support for expansion of sheep production which has been a part of Arab heritage for thousands of years.

TABLE 76 shows the distribution of the herds of the "Assaf" sheep breed in the various districts of the West Bank. This breed is mostly in the Jenin area, but is now spreading all throughout the West Bank.

TABLE 76. DISTRIBUTION OF ASSAF HERDS* BY DISTRICTS OF THE WEST BANK FOR THE YEAR 1982

District	Number of Herds**
Jenin	31
Tulkarm	8
Nablus	9
Ramallah and Bethlehem	6
Jericho	1
Hebron	2

* The total number of the "assaf" sheep in all the herds in the West Bank in 1982 is around 3000 head

** Herds with 20 heads and over.

It should be noted that an average sheep of the indigenous breed Awassi produces 70-90 kilograms of milk per year beside her lamb while an "Assaf" sheep, as indicated in the example, produces about 200 kilograms beside her lamb. A local goat produces from 100-120 kilograms of milk per year while the so-called "Shami" variety of which there are only a few percent in the area produces an average per goat of 200-225 kilograms of milk per year. This excellent type of goat, however, does not go much in pastures and requires home-feeding just as the case of the "Assaf" breed of sheep.

The meat and milk production from sheep and goats is shown in TABLE 77.

A decrease in production of both sheep meat and milk since occupation has occured. The decrease in the number of sheep and goats and the decrease in pastures were the primary reasons for these reductions. After a 16 year of occupation, the production from sheep and goats in 1982 for meat and milk was only two-thirds of that before occupation.

TABLE 77. PRODUCTION OF MEAT AND MILK AND DAIRY PRODUCTS OF SHEEP & GOATS FOR THE WEST BANK FROM 1967-1982

Year	Total* Meat (tons)	Total* Milk (tons)	% to Base Year 1967
1967	3,257	8,107	100%
1969	2,273	5,657	69.8%
1976	2,223	5,533	68.2%
1977	2,021	5,035	62.1%
1978	1,852	4,609	56.9%
1979	1,959	4,876	60.1%
1980	1,899	4,727	58.3%
1981	1,973	4,897	60.6%
1982	2,144	5,336	65.8%

* Note: About 35% and 40% of the total meat and milk produced respectively is from goats.

CATTLE:

The causes mentioned for the inhibition of sheep herds expansion also apply to that of cattle expansion. In fact, those causes have been more inhibitory to the increase of cattle herds as shown in FIGURE 22 because cattle by nature require more pasture, more care, more feed and more capital and running costs.

The competition of the well-subsidized Israeli cattle farmers in Kibutzes or Moshav cooperatives possessing excellent facilities and highly improved Friesian "Holandy" milking cows and beef stocks cannnot be overcome quantitatively and qualitatively by the poor and poorly supported Palestinian Arab farmers. Therefore, as shown in TABLE 78 and FIGURE 22, one observes that during the last twenty-one years, the number of Friesian cows increased by 83% between 1961 and 1966. Then, after the occupation, the approximately 25% increase observed in the past twelve years is really the result of only a fraction of the natural increase occuring from the unslaughtered expensive Friesian females produced. In essence, the annual rate of increase in the Friesian cattle production in the six years prior to occupation is about four times that after occupation despite the supposedly great development which took place in agricultural technology.

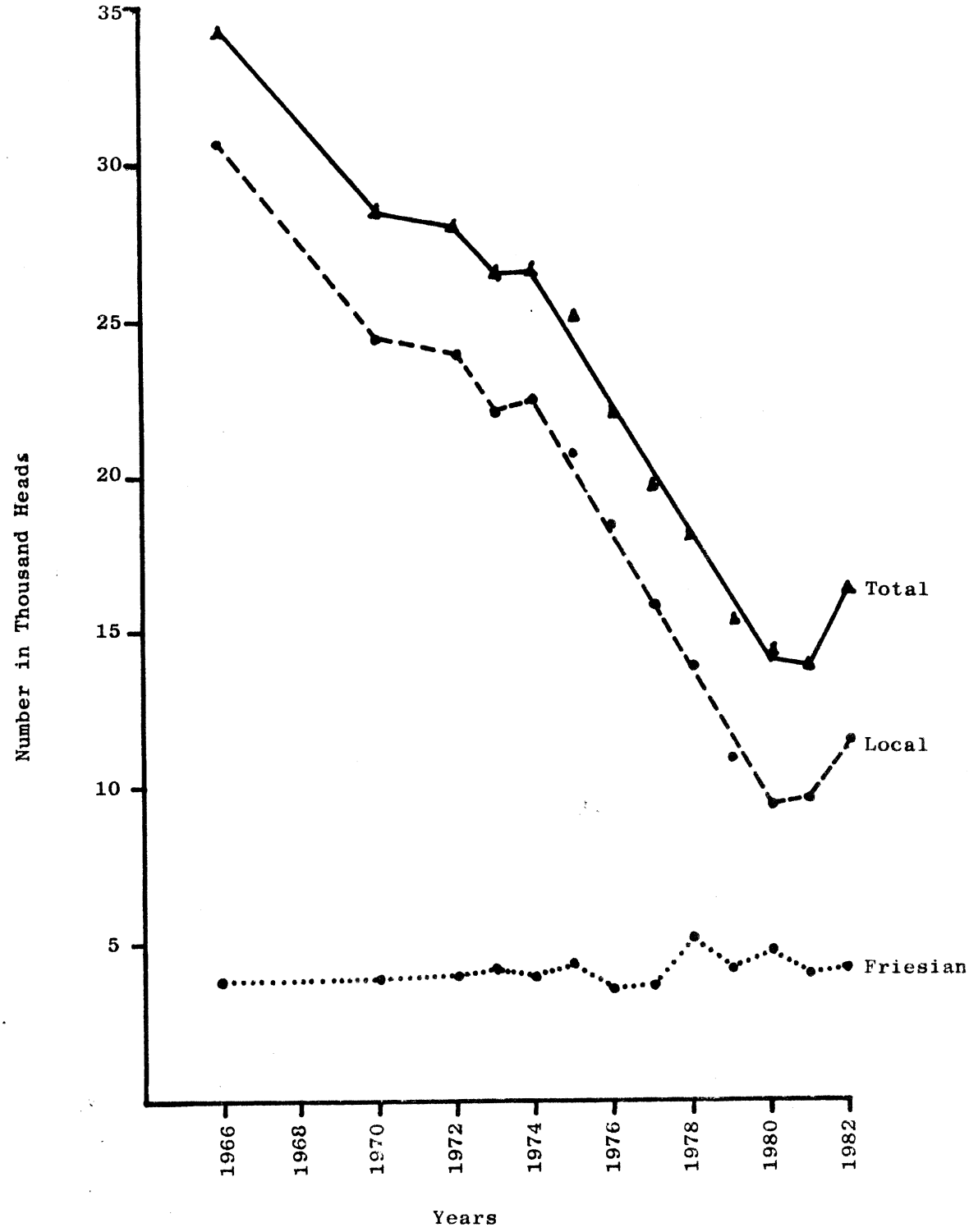

FIGURE 22 . Changes in Numbers of Cattle in the West Bank from 1966 - 1982

TABLE 78. NUMBER OF COWS - FRIESIAN AND LOCAL - IN THE WEST BANK FOR THE YEARS FROM 1961 - 1982

Year	Friesian	% of Base Year 1966	Local Cows	% of Base Year 1966	TOTAL
1961	2,121	45.6%	22,123	72.3%	24,244
1962	1,942	49.9%	22,516	73.6%	24,458
1963	2,487	64.0%	23,954	78.3%	26,441
1964	2,797	71.9%	24,744	80.9%	27,541
1965	3,728	95.9%	28,488	93.1%	32,216
1966	3,888	100%	30,604	100%	34,492
1970	3,880	99.8%	24,700	80.7%	28,580
1972	4,000	102.9%	24,009	78.5%	28,009
1973	4,272	109.9%	22,311	72.9%	26,683
1974	4,150	106.7%	22,500	73.5%	26,650
1975	4,250	109.3%	20,860	68.2%	25,110
1976	3,683	94.7%	18,520	60.5%	22,203
1977	3,864	99.4%	15,884	51.9%	19,748
1978	5,153	132.5%	12,976	42.4%	18,129
1979	4,291	110.4%	10,913	35.7%	15,204
1980	4,160	107.0%	9,838	32.1%	13,998
1981	4,847	124.7%	9,651	31.5%	14,498
1982	4,841	124.5%	11,463	37.5%	16,304

In addition, it should be pointed out that the size of Friesian herds in the West Bank are not of an economic scale and do not exceed a few cows per farmer except in a few cases of 50 or less. The well-subsidized Israelis hardly ever have less than 100 Friesian cows per herd and in most cases there are several hundred per herd.

In contrast to the Friesian cattle which did not significantly change in numbers after occupation, the local cattle breed declined dramatically and by about 65% during a 17 year period of occupation. Before occupation, on the other hand, between 1961 and 1966, there was an increase of 38% in the number of the local cattle breed. In addition to the causes mentioned for the decrease in sheep expansion, the local cattle which was economic to raise before occupation due to its primary dependence on previously abundant hay and pastures became uneconomical as a result of confiscation of pasture land by the Israeli authorities and the high feed cost and the poor productivity of meat and milk in this breed of cattle. It should be pointed out that the Israelis on the

other hand have it easy at least in raising beef cattle. The fencing by the Israelis of a large pasture area and placing an automatic water drinking system for the cattle (as they have done for example in the fertile area they confiscated near Latroon of Ramallah District) does not take much effort or much investment as the land is Palestinian Arab property taken over in 1967 by the Israeli military forces and handed over to "other" Israelis to use as they wish.

It should be pointed out that the percent of fat in milk of local cattle is 4.5-5.5% depending on its purity as a "pure breed", whereas the Friesian has only about 3% and therefore is less suitable for making of local yogurt and cheese. The preservation of the existance of indigenous cattle (as that of local sheep) must be preserved by the Palestinians because of its various unique genetic characteristics and environmental adaptation to the topography, diseases and habitual feeding on the wild plants and flora of Palestine. The separation of pure from mixed breeds whether it is cattle or sheep must be insured by all those who are working in animal production. Each breed is suitable for a certain set of circumstances and the mass introduction by the Israelis of various hybrids of animals to the area may threaten the very existance of indigenous breeds through interbreeding.

There is no question that if pastures were returned and/or developed for the use of the Palestinian Arab farmers, that the indigenous animals breeds whose genes and adaptation took thousands of years to develop and suit Palestine and Palestinians would be in the long run the better breed to raise if an extensive and more durable animal production is to prevail as it was in the past. If pastures could be insured and capital is made available along with good veterinary care and proper use of existing modern agro-technology, the pure indigenous breeds of cattle, sheep and goats which existed in Palestine over a long period of time should be more economic on a large scale and in the long run than the intensively raised hybrids of these animals. However, for the existing conditions, the new hybrids are more suitable.

TABLE 79 shows the distribution of cows in the various districts of the West Bank. From that table it could be seen that nearly one-third of the cows are in the Jenin District and nearly two-thirds are in the three northern districts of Jenin, Tulkarem, and Nablus - indicating that the potential for cattle expansion is in the north where the climate is moderate and the lands there are more fertile and some good pasture space is still available.

TABLE 79.

DISTRIBUTION OF COWS ACCORDING TO DISTRICTS IN THE WEST BANK FOR THE YEAR 1982.

District	Friesian cows	Local cows	Total cattle	% of total
Jenin	690	4,377	5,067	31.1%
Tulkarem	925	1,346	2,271	13.9%
Nablus	1,150	2,575	3,725	22.8%
Jericho	367	---	367	2.3%
Ramallah	525	973	1,498	9.2%
Jerusalem	50	14	64	0.4%
Bethlehem	184	537	721	4.4%
Hebron	950	1,641	2,591	15.9%
Total	4,841	11,463	16,304	100%

The production of milk from cattle in the West Bank for selected years is shown in TABLE 80.

TABLE 80.

PRODUCTION OF MILKING COWS IN THE WEST BANK FOR SELECTED YEARS

Milking cows	# of milking heads			Total milk production in tons			Yield kg of milk per head		
	1966	1978	1982	1966	1978	1982	1966	1978	1982
Local	7651	3244	2866	3060	1298	1146	400	400	400
Friesian	972	1288	1210	2916	3864	3630	3000	3000	3000
TOTAL	8623	4532	4076	5976	5162	4776	--	--	--

As in the case of sheep and goats production, cattle production whether in total number of milking heads or tons decreased as the years of occupation went by. In 1966, there was 8,623 milking cows of the total 34,500 cows in the West Bank which produced 5,967 tons. In 1982, sixteen years later there were 16,300 cows of which 4,076 are estimated as being milking cows which produced 4,776 tons of milk. This is a decrease of at least 50% in the number of total cattle and a 20% decrease in milk production.

All the milk production of cattle in the West Bank is only about 5,000 tons and about 24% of that is produced by the local cattle breed while the remainder is produced by the Friesian cows whose average yearly production per cow in 1982, is 3,000 kg. The local breed produced only an average of 400 kg/head. The total of only 1,210 milking Friesian cows and 2,866 local milking cows distributed all over the West Bank in small herds do not form a sufficient number to justify having at this time a central milk processing plant especially since the small amount of milk produced is scattered in many towns and villages where the cattle are raised. A serious investment in increasing the number of cattle - especially Friesian cows - must preceed any milk processing venture. Without outside investment and funds, the West Bank whose climate, land and tradition is very suitable for raising of cattle could not ever become self-sufficient in milk production.

POULTRY:

In contrast to production of red meat, which has been on the decline since occupation, TABLE 81 shows that the number of chicken farms including broilers and egg-layers have been on the increase.

TABLE 81 does not give detailed information on chicken farms prior to occupation. However,it has been indicated that although the number of chicken farms prior to occupation were less than that after occupation, the size of these farms before occupation was larger. The number of eggs in 1964 is estimated at 70 million eggs. This is more than double the number of eggs produced in the West Bank in 1982, which was 31 million eggs. An estimate of 30 million has been made for 1983 and estimates of much less in 1984, indicating a down trend in egg production since 1981 where 43 million were produced that year. Competition from nearby well subsidized Israeli farmers is the cause for lack of growth in egg production in the West Bank.

TABLE 81.

DETAILS ON THE NUMBER OF CHICKENS AND CHICKEN FARMS IN THE WEST BANK FOR THE YEARS 1966, 1972, 1980, 1981 AND 1982.

Item	1966	1972	1980	1981	1982
- Total number of farms.	388	615	585	699	706
- Total number of chickens (000)	-	4120	3029	4492	4153
- Number of farms for egg-laying hens.	33	47	49	49	41
- Number of egg-laying hens(000)	-	120	117	180	155
- Number of eggs produced (million)	-	29	28	43	31
- Number of mixed farms	30	27	25	22	19
- Number of farms for broilers.	325	541	511	628	646
- Number of broilers (000).	-	4000	2912	4312	3998
- Production of broilers in tons - live weight.	-	7200	5242	7741	7996

The farms for production of broilers require less investment than those for egg-laying hens. A production cycle for broilers is about two months, while the egg-laying production cycle is about two years. It takes an average of 55 days for broilers to grow from one day old chicken to selling weight , while an egg-laying hen has to be one-half year old before it starts production and any egg farm's economical yield begins after one year and ends six months later. Fasting of chickens according to a known procedure could re-charge their egg production for another one year, although at a lower rate of egg production. Thus egg production is a greater and much more involved and complex type of investment than that of broilers.

The number of broilers fluctuate depending on prices. A farmer may choose not to start a certain cycle when the prices of broilers are down and or the prices of concentrated feed is high. The fast profitability of return on money from small

and short time investment in production of broilers in more suitable for the current instability of the Palestinian farmer's situation , who usually suffers from the stiff and unfair competition he faces in all other agricultural sectors with hardly any assistance from any one in times of economic crisis and losses. There are at least 10 times more broiler production farms than those for egg production .

Different than cattle and sheep which have pasture limitations, different management systems and complete disease control problems, chicken production of broilers and eggs have become in the hands of the Palestinian farmers a well defined procedure to follow. This has become also true in various other Arab countries.

Investment and subsidy can help Palestinian farmers easily reach a self-sufficiency in chicken meat and egg production for the West Bank and Gaza Strip, whereas stimulation of cattle andEsheep production requires a more complex form of support.

B. In the Gaza Strip:-

Because the Gaza Strip is a highly populous coastal strip of land which is surrounded by a fence erected by the Israeli military, and because most of its small fertile land is planted by either citrus or vegetables, there is little room for extensive animal production in this occupied territory, i.e., grazing by sheep, goats, and cattle.

TABLE 82 shows the animal production for all the major types of animals raised in the Gaza Strip between 1968 and 1982.

It could be seen from this table that, only after a few years of occupation and in 1975, the number of meat producing animals - cattle, sheep, goats, broilers, and fish - were reduced between 1/2 and 1/3rd that of 1968. The year 1968 is the closest year to the occupation year of 1967 for which data is available. It is not an easy matter to obtain data about the Gaza Strip in general and especially before occupation because that data if present is with the Egyptain Government.

TABLE 82.

ANIMAL PRODUCTION IN THE GAZA STRIP FOR SELECTED YEARS.

Animal Production	1968	1975	1976	1977	1978	1979	1980	1981	1982
- Cattle	11,500	3,100	10,800	14,600	15,000	12,000	12,000	6,000	3,525
- Sheep	11,000	5,150	5,500	5,000	7,000	5,000	15,000	15,000	15,000
- Goats	14,000	6,800	7,680	8,400	9,000	6,000	25,000	30,000	21,000
- Camels	1,200	3,110	1,810	2,000	2,500	2,900	2,500	5,000	500
- Chicken broilers									
Number (000)	350	123	70	467	467	400	1,120	1,660	1,440
Weight (tons)	525	185	105	700	700	600	1,680	2,500	2,160
- Egg-laying hens									
Number (000)	50	50	50	40	50	50	13	17	42
Eggs in millions	10	10	8	10	10	10	2.6	3.4	8.4
- Milk in tons	8,938	2,475	8,265	11,118	11,450	9,138	9,500	5,250	3,094
- Fish in tons	3,700	2,230	2,070	3,000	2,400	2,000	2,400	1,600	1,240

It is interesting to note that of all the cattle in the Gaza Strip more than 2/3rd is Friesian, and in this case this number is more than that in the West Bank . The fertile coast of the Gaza Strip and the availability of water for irrigation can insure the green alfalfa feed necessary for Friesian cows production. Another unique aspect of the Gaza Strip is the presence of some camels and which decreased to few hundreds after part of the city of Rafah was returned to Egypt in 1982 along with Sinai Beduins. Production of rabbits is being expanded and seems to be a very promising venture in the Gaza Strip using French and other hybrid stocks,but the number of rabbits there is still too small to have any economical significance.

With large numbers of citrus trees in Gaza Strip, bees production should be encouraged in the large citrus groves. Maintaining bee hives is the least costly among all other conventional projects of animal production

The Gaza Strip is the only part of Palestine to which the Palestinians still have access to the sea and fish with their own boats. However, in spite of the great demand for fish, the fish production of 3,700 tons in 1968 which went down to 1,600 and 1,240 tons in 1981 and 1982. The two fishing cooperatives in the Gaza STrip are in very poor conditions. Large investment and assistance for fishing is one of the most immediate food production projects which needs implementation

in order to serve the common people. Assistance requires the aid and intervention of international agencies as the Israelis have restricted fishing licenses in fishing areas, fishing time, type of boats,etc.,and this resulted in the decrease of the number of fishermen from 1,500 to 1,000 since occupation with a parallel reduction in the fish being caught.

The UNDP and Save the Children Foundation (CDF) have projects to alleviate some of the problems pertaining to fishing activities along the Gaza coast. Since nearly 75% of the fish caught is of the small sardine variety and there are no facilities for its processing and packaging, it has to be sold daily at low prices to the Israeli manufacturers.

FOOD CONSUMPTION

The food habits, tradition and environment of the Palestinian people as an integral part of the Arab world and Islamic culture dictates certain food consumption patterns and food needs. Their poor economic situation shifts the emphasis on consumption from more costly foods to less expensive and less processed ones.

The majority of the Palestinians living in this area or near it usually eat or consume certain foods ,whether they are produced locally or imported. An attempt will be made in this section to deal with: What is eaten? How much is eaten? From where the food is obtained? and, How the neighbouring Israeli producer and their military government affected Palestinian consumption.

It should be pointed out that certain foods produced by Palestinians in the occupied territories are sent to relatives and associates in neighboring Arab countries, e.g. olive oil, pickled olives, cheese, sweets, dried and process thyme, almonds and other dried and processed fruits.

As shown in FIGURE 23, the West Bank and Gaza Strip who have an excess in the production of fruit and vegetables are the fruit and vegetable basket for Jordan and the Arab Gulf states. Furthermore, what is produced and consumed in this area is slightly subsidized from outside the area by fellow Arabs especially those who are Palestinians.

Tabulation of data is performed on the sources of food supply and the ways and means of its disposal of which consumption will be the item of this discussion. These data are shown in TABLE 83 and are obtained as a result of calculations taken from that of the local production of various food products as reported in the previous section and from the Foreign Trade Data taken from the Israeli Statistical Abstracts which is the only way to obtain such governmental information. Some consumption data was obtained using population and production figures of certain agricultural commodities whose consumption is totally from known local production e.g. olive oil and grapes. The report on consumption will deal only with the major commodities consumed, i.e. citrus and grapes for fruits, tomatoes and potatoes, melons and pumpkins (all types of squash) and for the field crop wheat and finally for the animal products red meat, white meat, milk and eggs.

TABLE 83 shows the supply of food commodities of the occupied territories - The West Bank and Gaza Strip - by source and disposal for the year 1981-1982. The consumption and production of plant and animal products will be dealt with

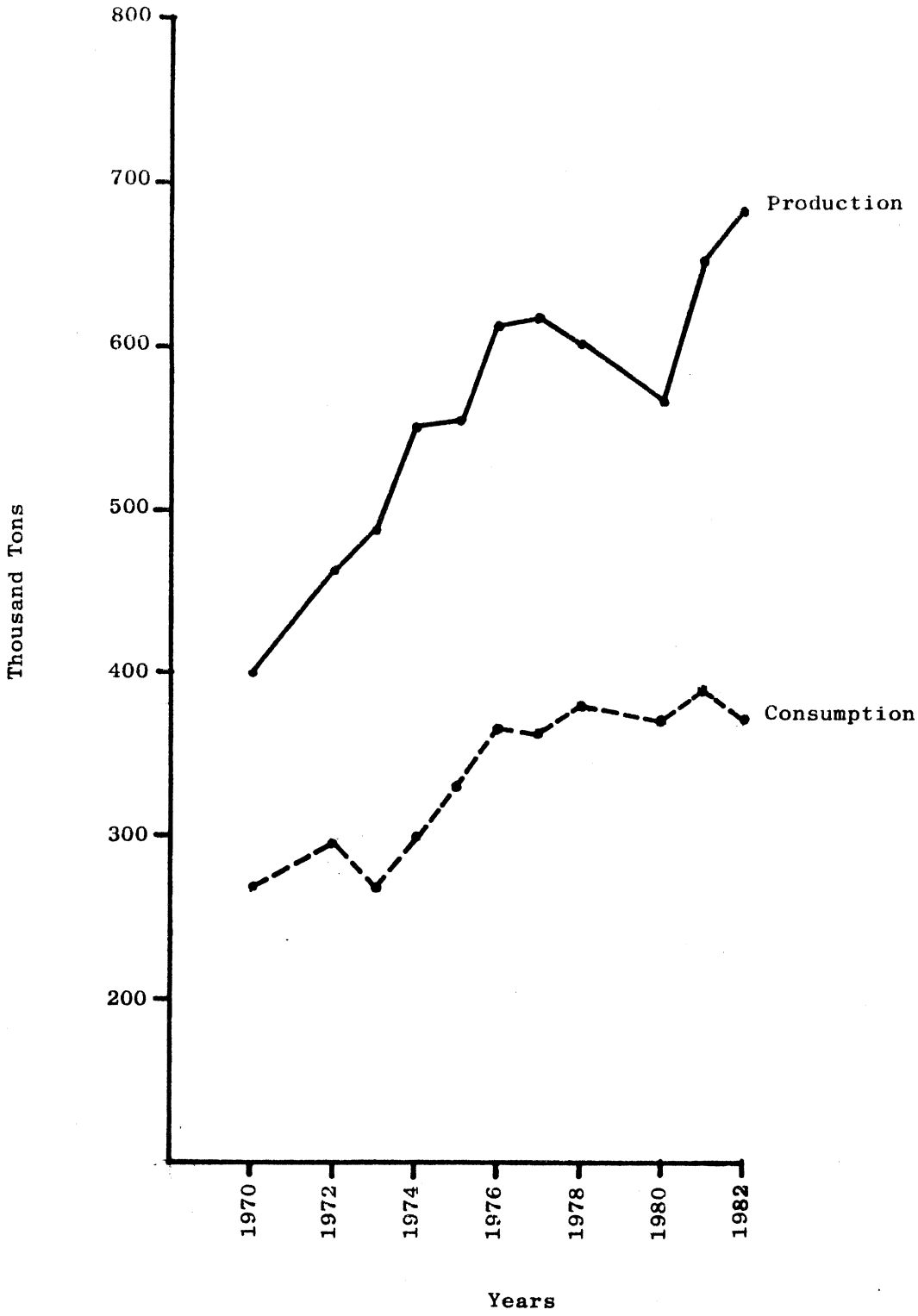

FIGURE 23 . Production and Consumption of Vegetables & Fruits for the West Bank and Gaza Strip

separately and the year 1981-1982 is taken as a representative and more recent example for various foods consumption. The consumption patterns did not change greatly with the years as did production and, therefore, 1982 will be used in the various analyses of self-sufficiency of the major food products and the vegetables as a whole.

TABLE 83.

SUPPLY OF FOOD COMMODITIES OF THE OCCUPIED TERRITORIES BY SOURCE AND DISPOSAL FOR THE YEAR 1981-1982 BY PERCENT.

Commodity	Total (000) tons.	Source of Supply From		Disposal-Consumption To		
		West Bank & Gaza Strip	Israel	West Bank & Gaza Strip	Jordan	Israel & Overseas Exports.
1.Fruits(excl.olive)	443.7	90.7%	9.3 %	38.5 %	43.8%	17.7%
Thereof:						
Citrus	287.5	97.9%	2.1 %	20.5 %	57.7%	21.8%
Grapes	41.5	98.3%	1.7 %	57.8 %	31.2%	10.8%
2.Vegetables and Potatoes	313.4	87.4%	12.6 %	65.3 %	13.4%	21.3%
Thereof:						
Tomatoes	118.0	86.9%	13.6 %	66.4 %	20.9%	12.7%
Potaotes	18.6	69.9%	30.1 %	81.2 %	13.4%	5.4%
3.Melons & Pumpkins	51.3	56.7%	43.3 %	58.7 %	36.2%	5.1%
4.Wheat	143.9	24.7%	75.3 %	100 %	—	—
5.Animal Production						
Thereof:						
Red-meat	6.610	41.0%	59.0 %	100 %	—	—
White-meat	13.754	59.3%	40.7 %	100 %	—	—
Milk	24.668	62.3%	37.7 %	86.2 %	13.8%	—
Eggs(millions)	71.5	55.1%	44.9 %	100 %	—	—

Plant Production and Consumption:

It could be seen from TABLE 83 that citrus consumption in the occupied territories is about 20% of the total production - which is 288,000 tons - and that about 80% of that production is exported. About 30% of that export goes to and through Jordan. The remainder is exported through Israel and its ports.

The occupied territories consume about 60% of its grapes production -which is about 40,000 tons- and about 30% of the grapes are exported to and through Jordan and about 10% are exported to and through Israel.

It should be noted that Jordan received large amounts of West Bank's grape seedlings few years ago and these seedlings are expected to make Jordan compete and even cause some limitations on the export of grapes to or through Jordan, as has become the case for melons and other vegetables whose export are limited to certain amounts or are prevented all together from entering Jordan after certain specific dates in the year.

With regard to all the fruits as a whole (excluding olives), the occupied territories consume about 40% of what they produce which is a total of about 400,000 tons. About 65% of the olive oil produced is in excess of the consumption needs of the occupied territories which are 10,000 tons annually. The surplus of oil is exported or stored. Because olives have alternate bearing years - enough olive oil is always stored from the year before to satisfy the local consumption. Imports of coconut type palm oil are processed to satisfy the commercial needs of one single vegetable oil company in the West Bank which hydrogenates this oil to a plant ghee type of product used in place of the margarine in western cultures.

The vegetables excluding potatoes are consumed to the extent of 60% of the total production which is about 260,000 tons. Approximately 30% of the production is exported to and through Israel and the other 10% is exported to and through Jordan. The West Bank and Gaza Strip import only 15% of their potatoe needs from and through Israel.

The West Bank and Gaza Strip which produce 29,000 tons of melons, export 18,000 tons of these melons to Jordan but also import 22,000 tons of melons from Israel. This does not indicate that the melons sold to and through Jordan are bought from Israel and exported to Jordan. The seasonal production of melons in the West Bank and Gaza Strip is restricted to certain seasons in which there is excess beyond local

consumption needs during those periods. Therefore, either the melons produced locally would have to be dumped and wasted or be exported to compensate the farmer who uses this exportable commodity as a cash crop. Import of some melons to the occupied territories is done to satisfy consumers demand in certain periods. In fact this melon example applies to many commodities exported from the West Bank to and through Jordan. Hence, the claims made that the Palestinians subsitute all their exports to Jordan by imports from Israel is of little validity and the final analysis harms the Palestinian farmers, who are the essence of steadfastness in the occupied territories.

With respect to field crops, the occupied territories produce 36,000 tons of wheat ,which is the main cereal commodity consumed. This production represents only 25% of the consumption needs which is 144,000 tons. The West Bank alone produces 97% of the total wheat production in the occupied territories and that production satisfies 40% of the West Bank consumption needs. If all the land which was planted by wheat in 1964 - which is 65,000 hectares- was planted with wheat today, the West Bank at the current overall average yield of 2,500 kg/hectare is able to produce 130,440 tons which is enough wheat to cover nearly all the consumption needs of both the West Bank and Gaza Strip.

Self-sufficiency in barley could easily be achieved if all the marginal field crop lands confiscated are planted with this crop. Barley as a field crop is an essential constituent of animal feeds in general and of all the animal feed concentrates used by about dozen feed factories in the West Bank and Gaza Strip. These feed factories import not only barley, but also white maize (sorghum), which used to be planted in a large scale in the West Bank before occupation , while now it hardly exists.

The importation of soybeans is done by the Israelis who extract its oil and then the remaining pomace is processed by them and sold to the Palestinian farmers to be used as the essential protein source in all the concentrated feeds. Since imports are done by Israelis and under the control of the Israeli government , it became economically risky for farmers to plant crops which could easily be imported and compete strongly against locally produced feeds. In the case of animal feeds (different than human food) the taste, flavor and color are not the essential characteristics which determine price, and hence the locally produced higher nutritive quality barley, sorghum or vetch are not appreciated or evaluated by the farmer in determining the price of these feeds. The imported barley which has been extracted in the beer production process does not have the same nutritious qualities of local unprocessed barley.

The Palestinians of the West Bank and Gaza Strip consume nearly 3,000 tons of lentils and produce 1,880 tons of the locally preferred variety, which is about 60% of this area's needs. It appears to be quite simple to raise this local production to reach self-sufficiency for the whole occupied area. However,although threshing of lentils is now mechanical, its manual harvesting and collection remains the obstacle against its expansion to reach self-sufficiency. The same case is true for the other rain-fed legumes chickpeas (gorbanzos) and fava beans.

One of the traditionally and nutritionally important legumes in the Palestinians diet is sesame and the production of this crop can also reach self-sufficiency if mechanization and more productive varieties are employed. Planting of summer legumes as sesame and chickpeas could be a good substitute for rain-fed vegetables if a program to encourage their production is to be adopted. The fact that there is an occupation authority which brings in cheap sesame imports and looks only for its interests without providing protection to the farmers in the occupied areas have made the farmers nearly avoid the planting of their excellent sesame variety. This variety is very suitable in many ways in the local diet, e.g. thyme and zaa'tar eaten with olive oil and spread with breads, cakes and sweets because of tradition and flavor , local sesame is greatly needed by the consumer.

Despite the great desire by the consumers to have this variety, the farmers produced in 1982 only 264 tons ,which could be sold easily to local consumers at relatively high prices. Large amounts of sesame production could be utilized in production of Tahinah (sesame extract or sesame resin), but the locally produced sesame cannot compete against the cheap imports brought into the markets by Israeli importers and greedy Palestinian merchants and tahina mill owners. The West Bank and Gaza Strip import more than 3,000 tons of sesame and, therefore, the local production is only about 8% of demand. Local sesame production could be increased whenever that becomes economically feasible in the fertile clay soils of Jenin and Tulkarem where the yield is greatest. Sesame oil (Tahinah) along with olive oil provides a good source of energy to the Palestinian population. Their combined fatty acid composition makes these oils a healthy diet source for fullfilling human fatty acid needs. Sesame oil along with the homogenized chickpeas (hommus) covered with olive oil and eaten along with a loaf of whole wheat bread and some green peppers is only one example of a complete breakfast meal eaten locally in which all the consumed ingredients are locally produced. The adoption of such daily diet consumption patterns for other locally produced food products can greatly help in achieving self-sufficiency in the occupied territories.

Animal Production and Consumption:

The consumption of animal products in the occupied territories has been the subject of many debates as to amount and varieties. As shown earlier the production of the red-meat animals has decreased since occupation. Poultry decreased initially but then increased slightly and remained insufficient. Eggs production has never been as great as that before occupation. Therefore, the population had to rely on imports, which due to one prevailing Israeli policy over the occupied areas, had to be only from Israel.

The West Bank and Gaza Strip consumption and production data for 1982 shows that the total red meat consumption predominantly from sheep, goats and cattle was 6,610 tons of which only 2,707 tons were locally produced, i.e. 41% of the total needs.

With repect to white meat, which is primarily from chickens, the 1982 consumption was 13,754 tons from which 8,157 tons were produced locally which is about 60% of the total needs.

The problems and needs for increasing animal production in general were discussed in previous sections.

Milk Production and Consumption:

Milk production in the occupied territories has been restricted to small farms in rural communities with meager marketing capabilities. Thus making the urban communities largely deprived of the greatly desired local milk products. This is in contrast to the presence of one large well organized competing Israeli company (Tnuva) which represents an aggregate of all milk producers in Israel, whether they are kibutz communities, mushave cooperatives or private farmers. Arab cities are great consumers of the milk products of this company.

As shown previously and in TABLE 83, the combined milk production of the West Bank and Gaza Strip is only 15,362 tons. The Gaza Strip with its very small pasture land area produces 34% of the total, due to the fact that the strip has a larger proportion of Friesian milking cows compared to the West Bank. The restrictions discussed earlier on problems of increasing number of productive animals including cattle and sheep makes it impossible to increase milk production while the land is controlled by an occupying military government. Production of sheep milk which is not subsidized in Israel by the Israeli government, is the only animal product in which Palestinian farmers have a chance to compete against Israelis. The total supply of milk and milk products for the occupied

territories is about 24,664 tons of which 21,264 tons are consumed locally and the other 3,400 tons are processed into cheese and transported to Palestinian relatives outside the occupied territories.

Egg Production and Consumption:

As shown in TABLE 83, the occupied territories need of eggs is 71.5 million of which the local production is 39.4 million which is 55% of the total consumption needs of eggs. The West Bank share of the total egg production is 78.7% . Self-sufficiency in egg production is economically difficult to attain in the occupied territories, although theoretically easy to achieve. The yearly egg consumption is well known and egg production can be well managed according to set procedures in the majority of farms. The difficulty in achieving or maintaining self-sufficiency of eggs in the occupied territories is due to the fact that the control on number of eggs brought from Israel into the markets of the Palestinian areas is in the hands of the Israeli authorities and therefore, cannot presently be in any way controlled by the Palestinians.

The sudden piling up of excess government subsidized Israeli eggs at certain times into the markets of the occupied areas is done freely when the Israelis desire, without looking into the interest of the Palestinian farmers. Instability and frequent dips in the prices of eggs had led some Palestinian farmers to decrease their egg laying flocks , while others had to totally abandon their egg production farms. Therefore, having large economically efficient farms is a risk for any farmer because their losses could be catastrophic and hence most animal production in the occupied territories is left on small family scale to avoid sudden marketing shocks.

Support of egg farms is needed and very worthwhile if an improvement in self-sufficiency of egg production is desired. Egg consumption in the West Bank is expected to increase with the increase in their population. The locally produced eggs are preferred by the local consumer and are in demand despite their higher prices. The steady production of any agricultural commodity anywhere in the world requires certain encouragements and guarantees by the national authority of that country. An alien occupation authority as that of the Israelis has looked only after the interests of its government and its Israeli farmers and people, leaving production problems and consumption demands of the Palestinians at the mercy of the Israelis. Since there is such an unfair competition,and there is an occupation, the Palestinians will have to suffer until a just and peaceful solution is achieved for the Palestinian problem as a whole.

NUTRITIONAL STATUS OF PALESTINIANS IN THE OCCUPIED WEST BANK AND GAZA STRIP

The nutritive situation in the West Bank and the Gaza Strip was calculated from the food production of various commodities in these occupied territories and from the total supply of foods imported from Israel and from estimates of food consumption based on selected interviews in the population. Data in the Israeli Statistical Abstracts on per capita consumption differed from that presented here for meat, milk, eggs and vegetable oils and fats. However, there was an agreement on the per capita consumption from fruits and vegetables.

It is common knowledge that the food consumption of Arab nations as a whole depend more on plant sources - especially cereals [15,18,25,70,72] - in their nutritive intake than industrial nations and their satallites as for example, Israel. TABLE 84 gives the food consumption of major food substances in the West Bank and Gaza Strip as compared to that of other countries with respect to quantity and quality.

The values in this table support the premise that plant sources compose a larger share of the nutritive needs of the Palestinians in the West Bank and Gaza Strip as well as the Arab countries as a whole. The Palestinians in the occupied territories take about 93% of their nutrients from plant sources and about 7% from animal sources. The Palestinians in the West Bank and Gaza Strip are consuming slightly less foods from animal sources compared to both the Arab countries as a whole and the standard values for the Arabs as a whole. The difference becomes much greater when the Palestinians consumption of animal products is compared to the Americans in the USA and to the Israelis.

TABLE 84.

THE CONSUMPTION OF THE MAJOR FOOD SUBSTANCES IN THE WEST BANK AND GAZA STRIP WITH RESPECT TO THEIR RELATIVE AMOUNTS AND CALORIES FOR THE YEAR 1982.

	West Bank (24)	Gaza Strip (24)	Arab Countries (17,18,24)	U.S.A. (17,18,24)	European Countries (17,18,24)	Israel (19,24)	Standard. for Arabs (17,18)
1). Nutrition Source:							
a. Plant sources: Cereals, sugar, vegetable oils, fruits, vegetables, and pulses.	92.7%	92.7%	92.0 %	70.0 %	75.0 %	69.2%	<88.0 %
b. Animal sources: Meat, eggs, milk.	7.3%	7.3%	8.0%	30.0%	25.0 %	30.8%	>12.0 %
2). Total Protein (gm)	66.6	64.6	69.0	107.0	96.0	94.5	>56.0
a. Plant protein (gm)	54.6	54.9	55.2	34.2	43.2	46.5	39.0
Percent of total	82.0%	85.0%	80.0%	32.0%	45.0%	49.0%	<70.0%
b. Animal protein (gm)	12.0	9.7	13.8	72.8	52.8	48.0	>17.0
Percent of total	18.0%	15.0%	20.0%	68.0%	55.0%	51.0%	>30.0%
3). Total K.Calories:	2434	2382	2480	3537	3410	3032	>2200
a. Plant source (%)	94.2%	95.4%	90.7%	63.0%	68.0%	79.0%	88.0%
b. Animal source (%)	5.8%	4.6%	9.3%	37.0%	32.0%	21.0%	12.0%

TABLE 85 provides data for 1982 on the absolute amounts and calories of the various food substances consumed by Palestinians in the West Bank and Gaza Strip compared with that of Israel.

TABLE 85.

THE QUANTITIES OF FOOD SUBSTANCES CONSUMED DAILY PER CAPITA IN THE WEST BANK AND GAZA STRIP AS COMPARED TO ISRAEL FOR THE YEAR 1982.

Food substances	West Bank[24] Quantity (gm)	% of total	Gaza Strip[24] Quantity (gm)	% of total	Israel[19,24] Quantity (gm)	% of total
Meat(red + white meat): WB- 15.3 + 30.2 = 45.5 GS- 10.8 + 25.7 = 36.5 IS- 60.5 + 120.5 =181.0	45.5	2.9 %	36.5	2.7 %	181.0	8.9 %
Eggs	14.2	0.9 %	6.7	0.5 %	57.0	2.8 %
Fish	4.7	0.3 %	10.4	0.8 %	23.8	1.2 %
Milk & dairy products	53.3	3.4 %	47.0	3.5 %	560.2	27.4 %
Cereals & their products	359.5	22.6 %	378.1	27.9 %	291.0	14.2 %
Potatoes and starches	58.4	3.7 %	37.0	2.7 %	111.2	5.4 %
Sugar and honey	68.8	4.3 %	50.5	3.7 %	86.3	4.2 %
Pulses,oil seeds & nuts	24.7	1.6 %	22.6	1.7 %	26.4	1.3 %
Vegetables	408.2	25.7 %	363.6	26.8 %	323.0	15.8 %
Fruits	514.7	32.4 %	369.3	27.2 %	322.8	15.8 %
Oils and fats	35.9	2.3 %	35.1	2.6 %	61.1	3.0 %
Total	1587.9	100 %	1356.8	100 %	2043.6	100 %

The proportions of consumed food substances by Palestinians versus Israelis are illustrated in the circle diagrams of FIGURES 24, 25 and 26. From TABLE 85 and the diagrams it could be seen that the largest portions consumed by Palestinians are fruits, vegetables and cereals representing about 85% of all foods consumed.

In the West Bank, the average per capita is 515 gms of fruits (32.4% of the diet),408 gms of vegetables (25.7%) & 360 gms of cereals (22.6%). In the Gaza Strip Palestinians consume slightly less fruits and vegetables being an average 369 & 363 gms per capita respectively, which represents 27.2% and 26.8% of their diet. Slightly higher amounts of cereals are consumed 378 gms, which represent 28% of the diet.

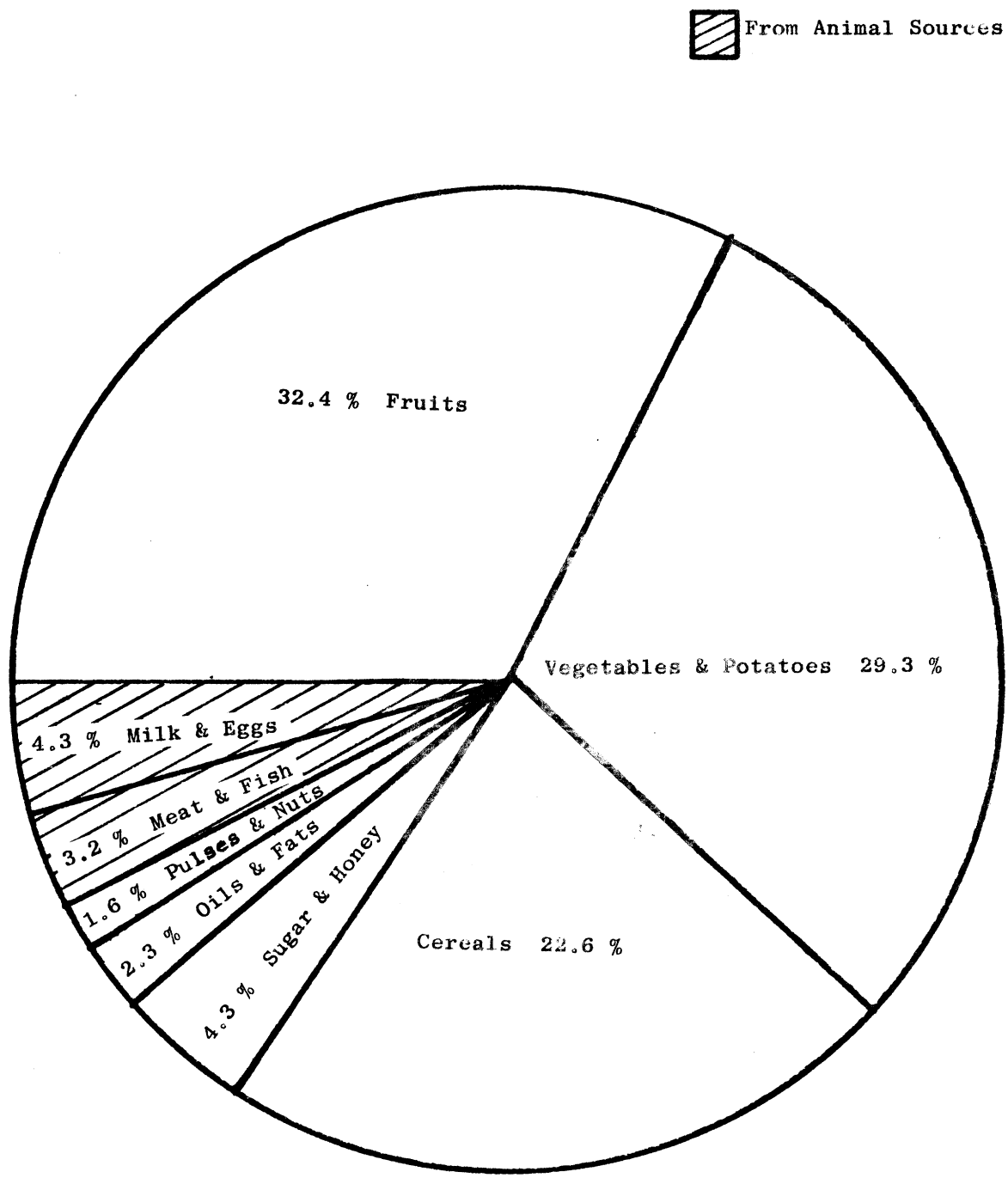

FIGURE 24 . The % Share of Food Substances in the Total Diet of the Population in the West Bank in 1982

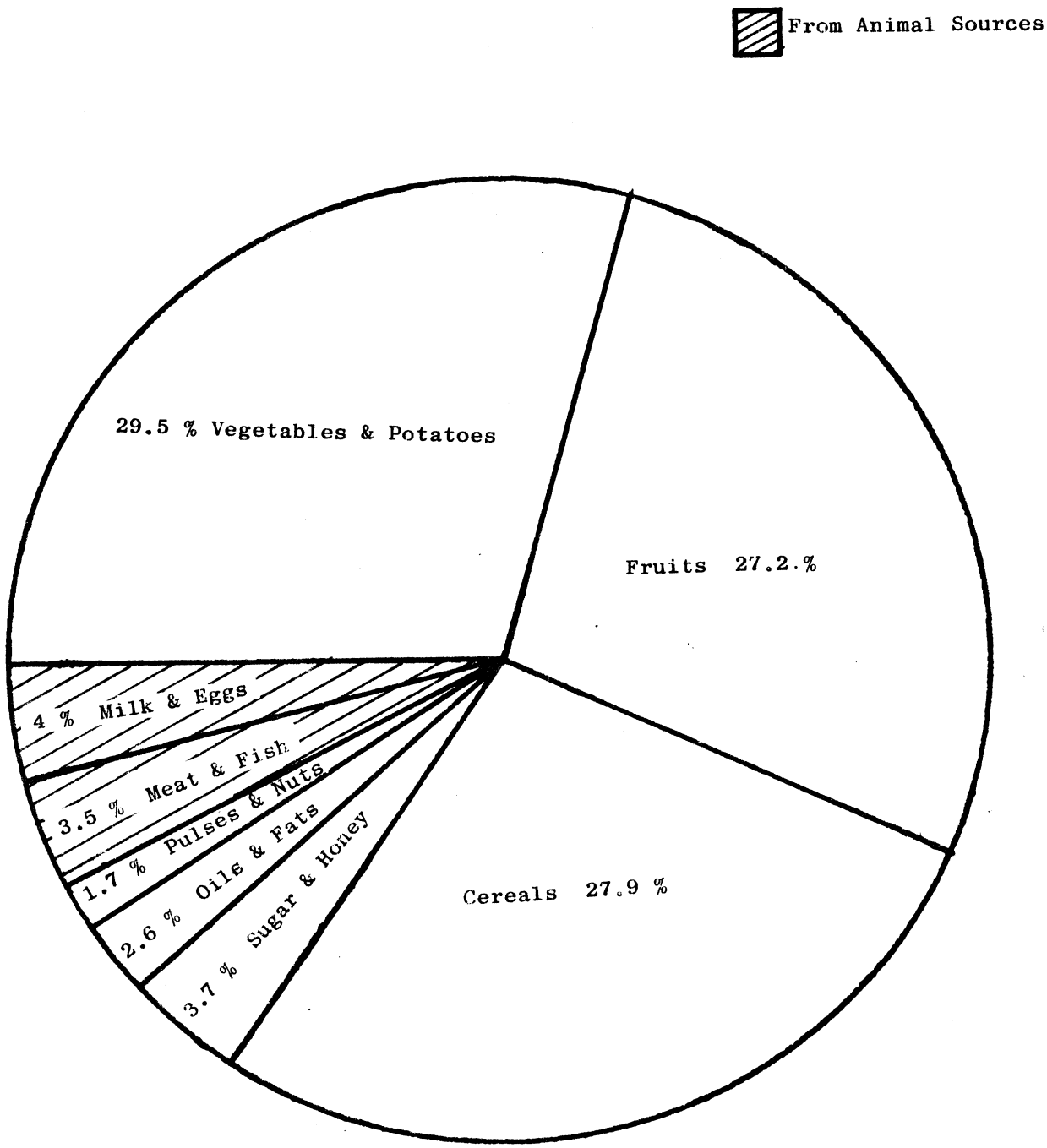

FIGURE 25 . The % Share of Food Substances in the Total Diet of the Population in the Gaza Strip in 1982

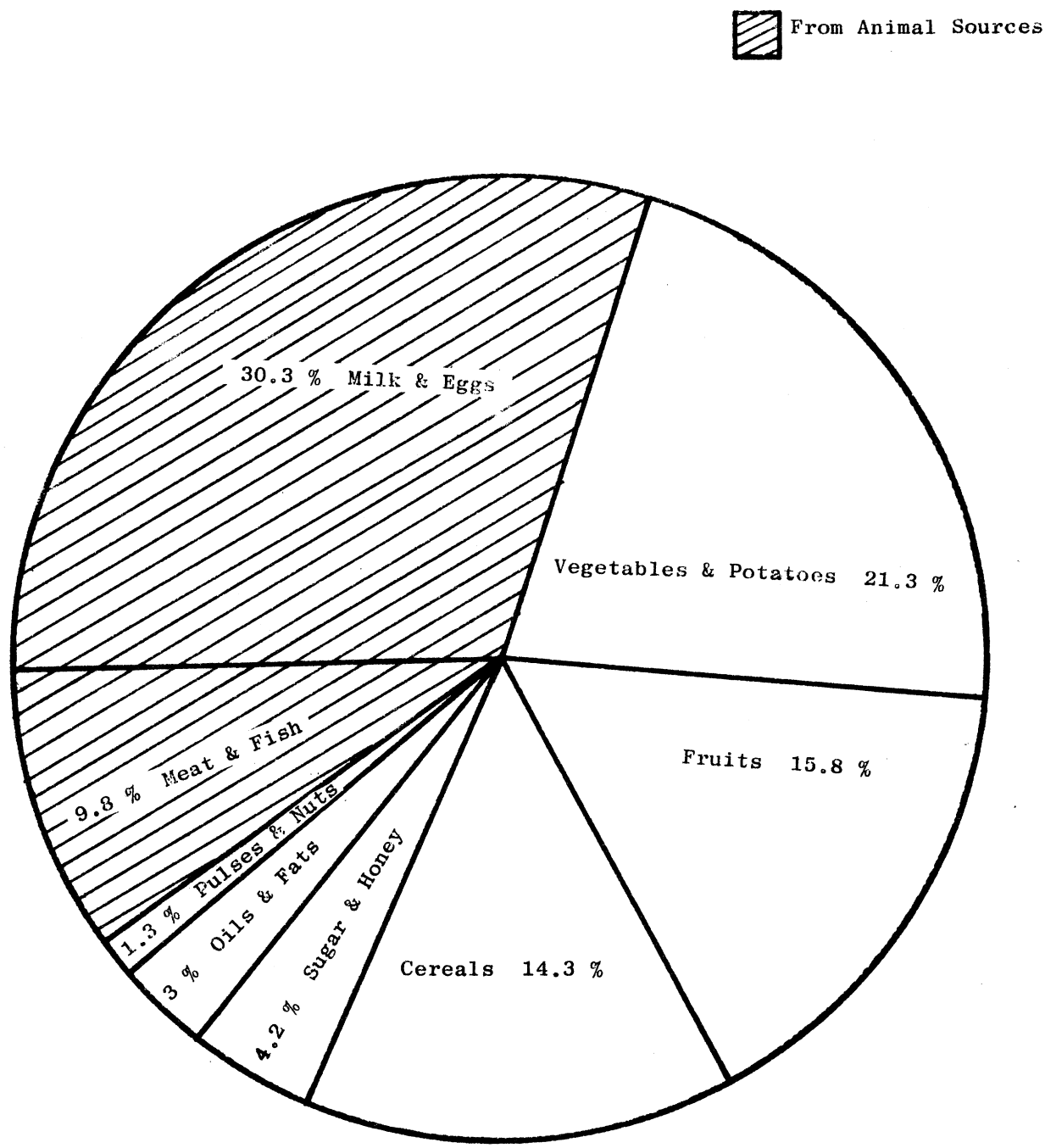

FIGURE 26 . The % of Food Substances in the Total Diet of the Population in Israel in 1982

Meat consumption in the West Bank comprising the red meats (beef, lamb and goats), with a total average per capita of 15.3 gms, and the white meats with an average of 30.2 gms (primarily chicken) represent a total of 2.9% of the total foods consumed in the West Bank. In the Gaza Strip 10.8 gms and 25.7 gms of white meat are consumed . Thus the total red and white meat consumption per capita in the Gaza Strip 36.5 gms is 80% of that of the West Bank's 45.5 grams.

The consumption of Israelis on the other hand, whose per capita intake is an average of 181 gms of both red and white meat per day, which is 4 - 5 times more than the daily per capita consumption of Palestinians living under Israeli occupation and supposedly with the same foods available for purchase by the two peoples.

Furthermore,the daily per capita cunsumption of Israelis of fish is 23.8 gms per day compared to the Palestinians' 4.7 gms of fish per day in the West Bank (which has no sea outlet) and 10.4 gms per day in the Gaza Strip, which has a fishing coastal area with limited fishing capabilities.

A greater difference is observed in the comsumption of milk products, where the per capita Israeli consumption is more than one-half kg, while that for a Palestinian in the West Bank and Gaza Strip is less than one-tenth of that amount. It has been estimated that the daily consumption of an Israeli youth in ice cream alone is more than the daily consumption of a Palestinian consmes of all types of milk and dairy products.

As shown in FIGURES 24 and 25, the total daily food consumption of a Palestinian is 1,588 gms per capita in the West Bank and 1,357 gms in the Gaza Strip - and that food is mainly from plant sources (cereals, fruits and vegetables) with only 7.5% of the whole diet being from animal sources. These consumption figures are significantly less in quantity than the 2,045 gms consumed daily by an Israeli person and are much less with respect to food from animal sources (FIGURE 26).

As shown in FIGURES 27 and 28, the Palestinians are eating less in food quality and in total food quantity, especially from those foods with high protein value. A Palestinian is forced to extract 82-85% of his proteins requirement from plant sources which include cereals im addition to that from vegetables and fruits (which are poor protein sources)rather than obtaining the needed proteins from their rich natural sources of animal proteins, which include meats, milk, eggs and fish.

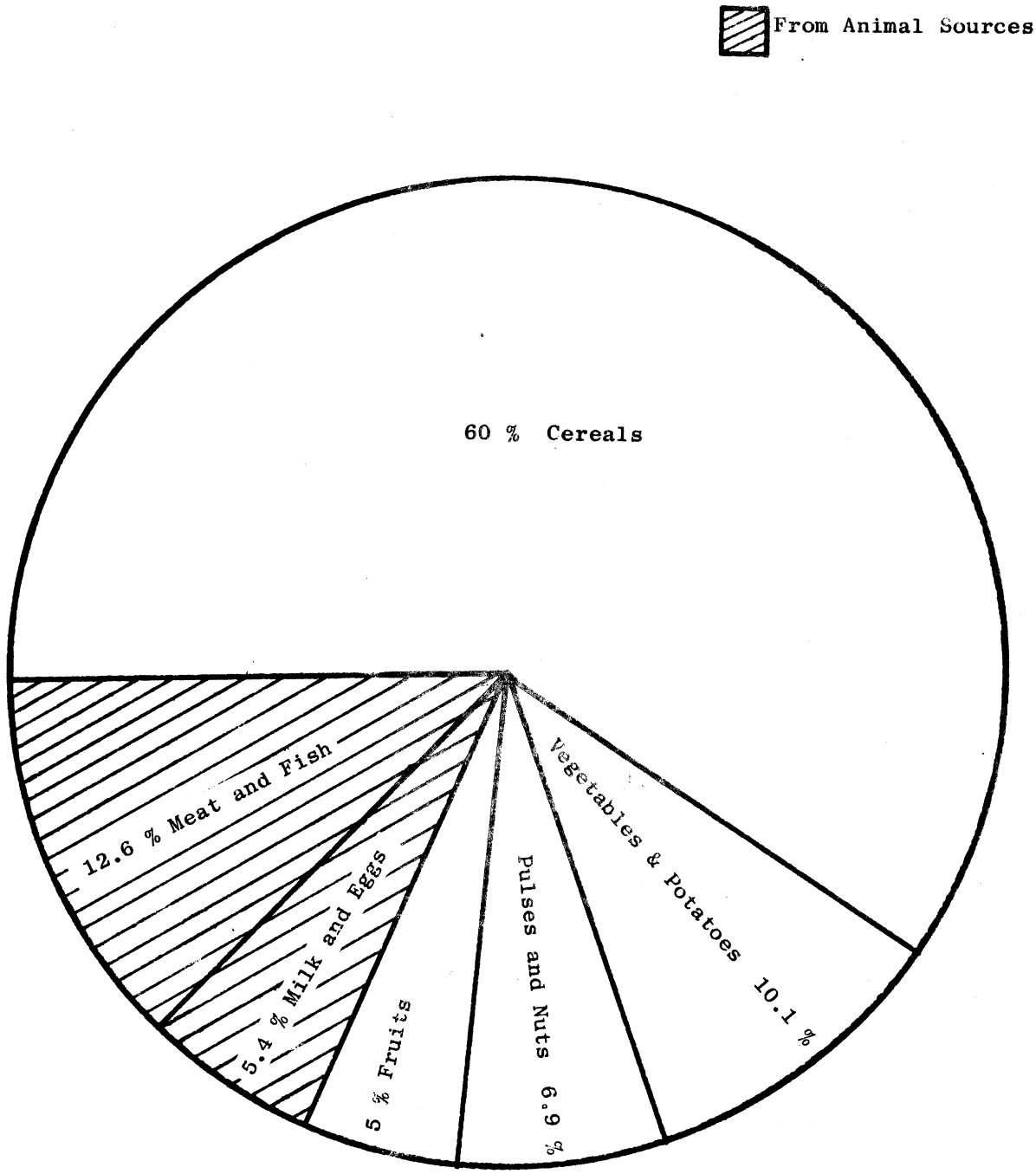

FIGURE 27 . The % Contribution of Various Food Substances to Protein Intake in the West Bank in 1982

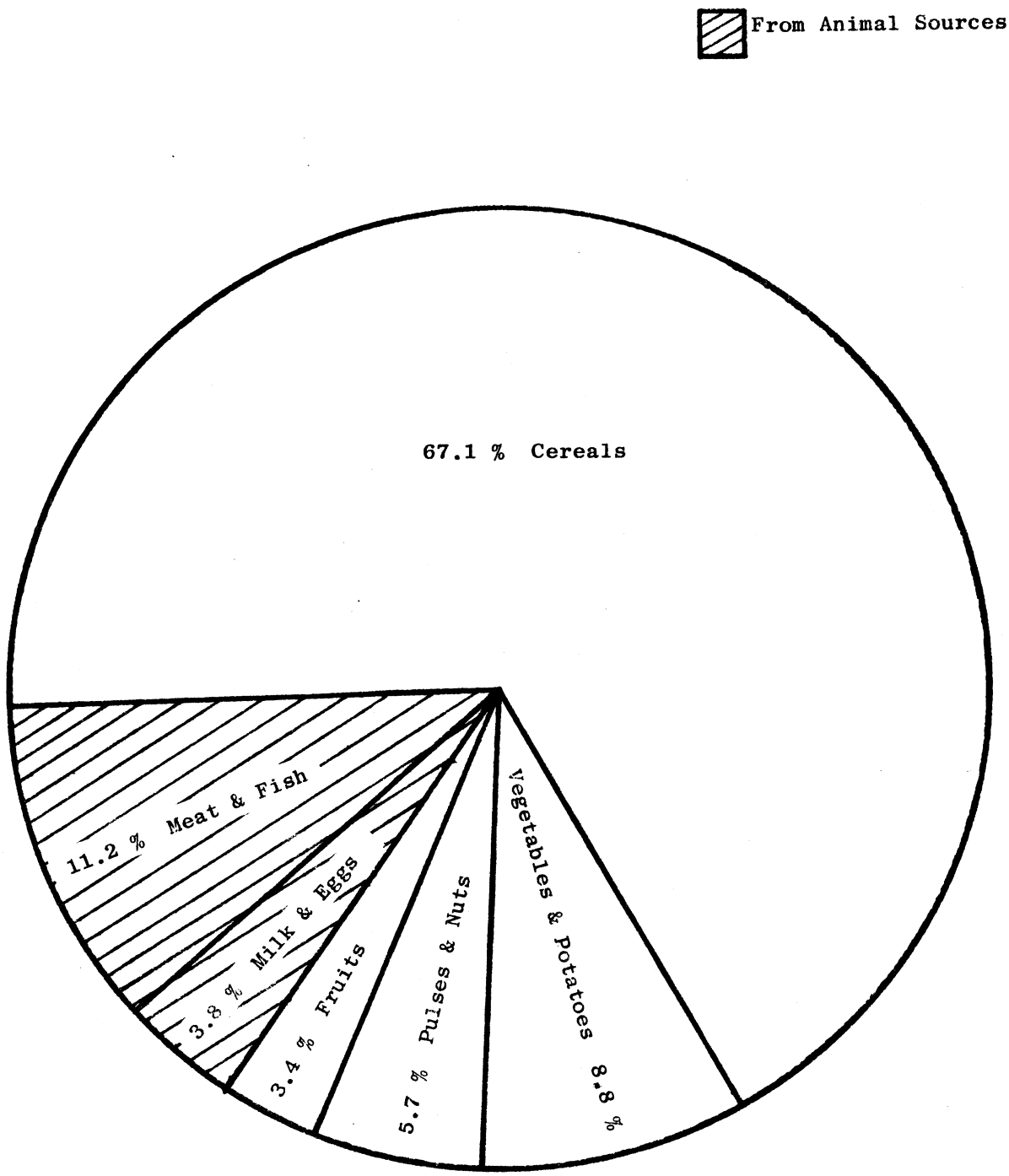

FIGURE 28 . The % Contribution of Various Food Substances to Protein Intake in the Gaza Strip in 1982

Animal proteins also have certain amino acid composition and specific co-factors associated with these proteins, which make them more appropriate for human metabolism.[73,78] Additionally, meat contains many of the essential inorganic elements for cell function. Plant protiens require supplementation with essential nutrients,which if not present in the diet, there will be retardation of children's growth and development,[16,78] anemia in pregnant and growing females.[76,77]

Plant proteins obtained in the diet from vegetables, fruits and cereals lack in most instances the iron necessary for blood regeneration,[77] the vitamin B-Complexes necessary for many enzymatically catalyzed protein build-up reactions etc.[74,76] More biochemical details are out of the scope of this study.

The deficiency of lysine in bread made from cereals[72,80] has alerted many industrial nations especially the U.S.A. to enrich their bread with lysine. No such flour supplement programs are contemplated by any one for the occupied West Bank and Gaza Strip and this specific problem was recently discussed at an Arab Food Security grain conference in Amman, Jordan.[81] Extensive consumption of cereals has been reported to cause anemia because flour with high bran content contains phytates which bind iron and prevent its absorption in the body if animal proteins or a special source of iron is not provided in the diet.

FIGURE 29 shows that the Israelis consume only 49% of their proteins food from plant sources and 51% from animal sources , which are distributed nearly equally between meats (red meats, white meats and fish) and the combination of milk and eggs. The Americans consume 32% of their proteins from plant sources and the remaining 68% from animal sources.

It is interesting to note that the Israelis eat half as much fruit as Palestinians and 3/4th as much vegetables.

The Palestinians are not getting as much proteins now for growth and development from animal sources[24] as recommended by the standard for all Arab countries which include mostly poor states in world standards.[17,18,72]

This standard[17,18,72] suggests that not less than 30% of the total proteins must be from animal sources and not more than 70% from plant sources. In the West Bank and the Gaza Strip , the Palestinians are obtaining only 18% and 15% of their total proteins respectively from animal sources whereas, the minimum percent recommended for Arab countries is 30% , thus the Palestinians are recieving poorer protein in types and amounts not only less than the Israelis and the Americans , but also less than the Arabs. The total calories they received per day

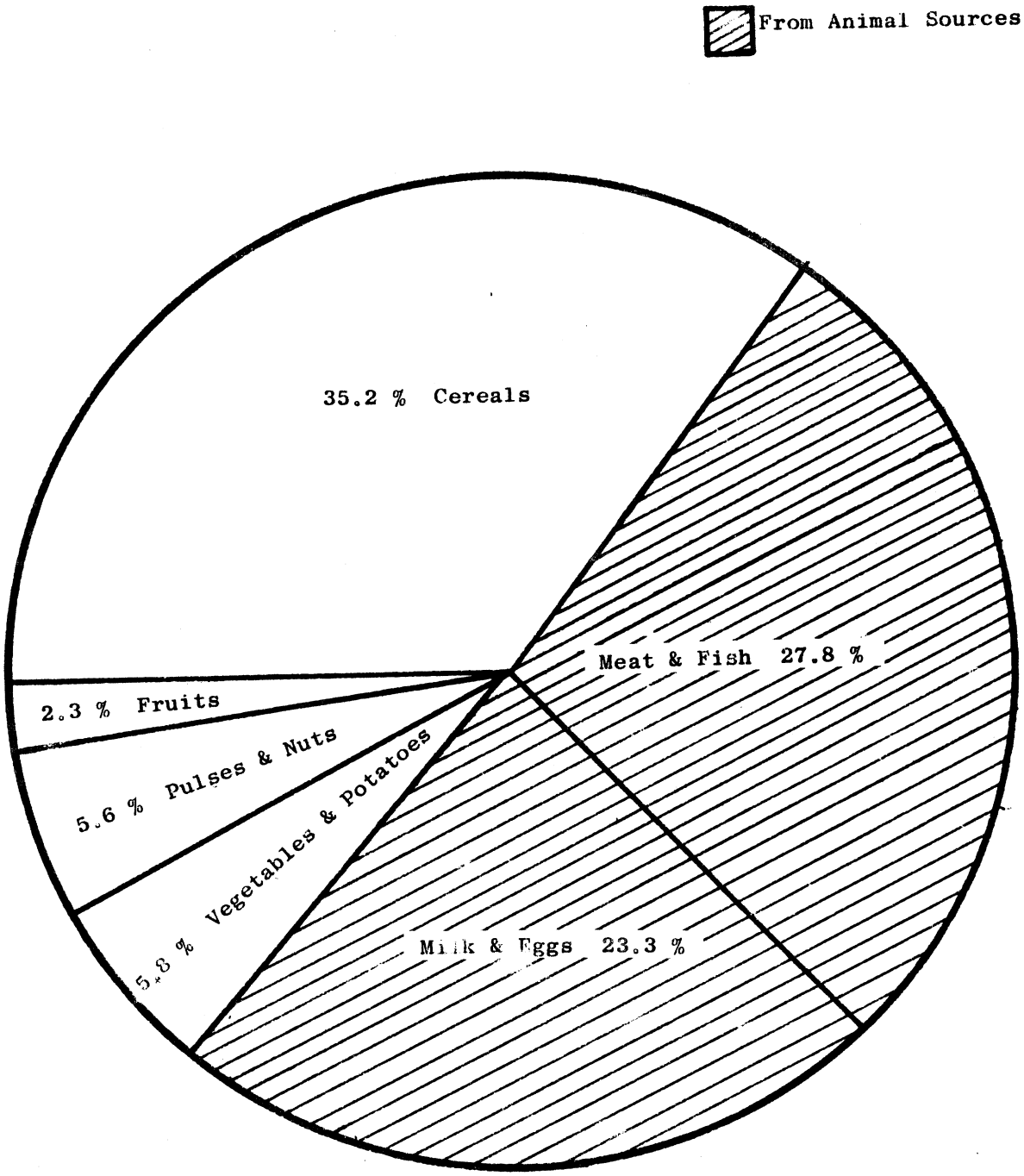

FIGURE 29 . The % Contribution of Various Food Substances to Protein Intake in Israel in 1982

in 1982, 2,434 kilo calories per person,are also less by 20% than the kilocalories the average Israeli receive 3,032 and 31% less than the Americans receive (3,537) received in the same year. In addition to lower calories, the Palestinians consume also a food diet which is of poorly balanced composition.

From the above , it is concluded that the nutritional status of the Palestinian Arabs living under occupation is below world standards with respect to consumption from essential food sources i.e. they are able to obtain only a small fraction 7.3 % of their overall food diet from animal sources. The U.S.A. and Israel obtain 30 % of their food from animal sources and the standard recommended for the average person in Arab countries not is to consume not less than 12 % from animal sources,[17,18,72] which is nearly double that what the Palestinians are obtaining in their food. This is to say in general terms that the Palestinians in the West Bank and Gaza Strip are eating half as good food as their fellow Arabs in the Arab world.

The poverty which the majority of the Palestinians under occupation face from day to day is preventing them from purchasing a well-balanced food diet which in turn is creating for them an unhealthy situation. Such an unhealthy nutritional situation is very damaging to a population in which 73% are women and children under the age of 15 who require high protein foods, especially from animal sources for their growth and development.

The poor nutritional picture which the majority of the Palestinians are facing in the eighties appears to be the result of erosion of agricultural resources, and the increase in cost of living and transformation from people who are agricultural producers to laborers who are unable to purchase well balanced food for their families.

The following TABLES 86 and 87 and histograms of FIGURE 30 shows the changes which occured in the nutritional status of the Palestinians during various interval periods of occupation. TABLES 86 and 87 illustrate the average number of grams of fat and of protein and the total kilo calories which the Palestinians in the West Bank and Gaza Strip consumed in the years 1969, 1975 and 1982. The years were selected as being those representing the begining of occupation, midway through occupation and the most available recent data after long occupation.

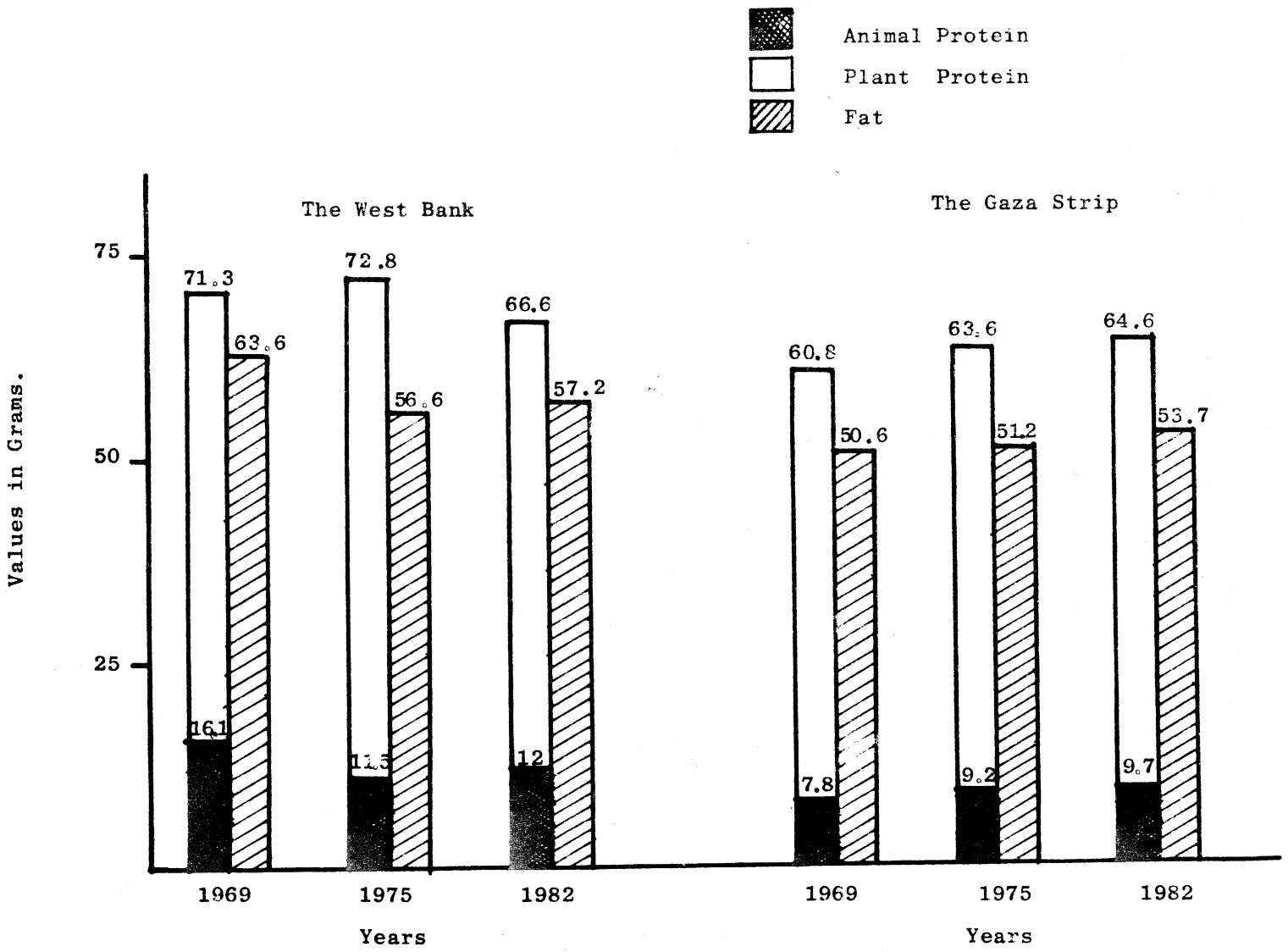

FIGURE 30. Values of Average Daily Intake Per Capita of Protein and Fat in the West Bank and the Gaza Strip for selected years.

TABLE 86.

THE WEST BANK DAILY PER CAPITA ENERGETIC AND NUTRITIVE VALUES BY TYPE OF FOOD FOR SELECTED YEARS.

Type of food	1969 Fat gms.	1969 Protein gms	1969 Total K calories	1975 Fat gms	1975 Protein gms	1975 Total K. calories	1982 Fat gms	1982 Protein gms	1982 Total K. calories
- Meat total :-	7.8	12.0	118	5.0	7.9	81	5.2	8.00	79.0
- Milk & dairy products.	2.7	2.8	56	1.9	2.0	40	1.9	2.00	40.0
- Oils and fats	38.5	0.0	340	33.1	0.0	293	33.7	0.00	298.0
- Eggs	0.8	0.9	11	1.2	1.2	16	1.5	1.6	20.0
- Fish	0.1	0.4	2	0.1	0.4	2	0.1	0.4	2.0
- Cereals & cereal products.	5.3	40.9	1286	5.4	42.6	1326	5.0	40.0	1258.0
- Potatoes and starches.	0.0	0.4	18	0.1	1.1	47	0.1	1.0	45.0
- Sugar & honey	0.0	0.0	279	0.0	0.0	240	0.0	0.0	267.0
- Pulses,oil seeds and nuts.	5.9	8.0	157	6.6	8.8	170	4.1	4.6	93.0
- Vegetables	0.6	4.0	63	0.9	6.3	99	0.8	5.7	90.0
- Fruits	1.9	1.9	140	2.3	2.5	180	4.8	3.3	242.0
- From Animal Sources, amd its (%) to total.	11.4 17.9%	16.1 22.6%	187 7.6%	8.2 14.5%	11.5 15.8%	139 5.6%	8.7 15.2%	12.0 18%	141.0 5.8%
TOTAL :-	63.6	71.3	2470	56.6	72.8	2494	57.2	66.6	2434

The calculations of grams of fats, protein and calories in a given food were based on the AUB Food Composition Tables[82] and when not found, from the standard in the Israeli Statistical Abstract for 1982.[19]

TABLE 87.

THE GAZA STRIP DAILY PER CAPITA ,ENERGETIC AND NUTRITIVE VALUES BY TYPE OF FOOD FOR SELECTED YEARS

Type of food	1969 Fat gms	1969 Proteins gms	1969 Total K. calories	1975 Fat gms	1975 Proteins gms	1975 Total K. calories	1982 Fat gms	1982 Proteins gms	1982 Total k. calories
- Meat	2.0	3.0	30	3.9	4.8	54	4.0	6.3	62
- Eggs	0.6	0.7	9	1.3	1.4	18	0.7	0.8	10
- Fish	0.2	1.3	7	0.2	1.3	7	0.9	0.9	5
- Milk & dairy products.	2.0	2.8	44	1.6	1.7	34	1.6	1.7	33
- Cereals and cereal products	5.5	41.8	1311	5.6	44.0	1367	5.5	43.3	1354
- Potatoes and starches	-	0.7	27	-	0.7	32	-	0.6	28
- Sugar & honey	-	-	209	-	-	249	-	-	280
- Pulses,oil seeds & nuts	4.3	5.5	107	4.8	3.9	88	4.7	3.7	81
- Vegetables	0.5	3.7	59	0.6	4.1	65	0.7	5.1	80
- Fruits	1.5	1.3	97	1.7	1.6	119	2.7	2.2	158
- Oils and fats	34.0	-	302	31.5	0.1	278	32.9	-	291
- From animal sources and its (%) to total	4.8	7.8	90	7.0	9.2	113	7.2	9.7	110
	9.5%	12.8%	4.1%	13.7%	14.5%	4.9%	13.4%	15.0%	4.6%
TOTAL:-	50.6	60.8	2202	51.2	63.6	2311	53.7	64.6	2382

It may be concluded from these TABLES 86 and 87 and histrograms of FIGURE 30 that the nutritional status of the Palestinians in the West Bank and Gaza Strip did not improve even after a 14 year period (1969-1982) of living under the total control of the Israelis. In fact, for the West Bank, the per capita consumption of total proteins and animal protein in 1969 was greater than in 1982 and even the total calorie intake in 1969 was greater than that of 1982.

A person consumed only two-thirds of his proteins from meats compared to that in 1969. Fish consumption which was

also small in 1969 remained unaltered after many years of occupation. Fish like other meats cannot be afforded obviously by the poor majority of the Palestinians even though it is well known that Arabs like to eat fresh fish as food.

Egg consumption did increase but the increase is far from being enough for balancing total body needs of proteins from animal sources. The increase in consumption of eggs in 1982 over 1969 may be because eggs remain a relatively cheap and available source of food. Furthermore, eggs remain the cheapest source for animal proteins for a deprived people with little capacity for animal production. For the majority of the Palestinians with poor purchasing power, it is a great burden to purchase the more expensive badly needed animal products of milk, eggs, meats imported mostly from Israeli producers.

The Gaza Strip was a totally closed area for the first years of occupation due to strong Palestinian armed resistance. As a result, 1969 is not expected to go well with a high and nutritious food consumption. The average person in the Gaza Strip in 1982 - except for fish - consumed less of every food and food constituent and received less calories than his brethren Palestinian in the West Bank. The protein consumption from fish in 1982 is 0.9 grams per person utilizing an average of 10.4 grams of fish per day compared to 0.4 grams of fish protein or 4.7 grams of fish for the West Bank. The per capita Israeli consumption of 23.8 grams of fish per day is more than double that of the Gaza Strip.

In absolute quantity, the West Bank consumes 54% more animal proteins per capita than the Gaza Strip.

In general, using animal protein consumption as a criteria, the overall nutritional status of the Palestinians in the occupied Gaza Strip whose majority are landless refugees living in highly concentrated camps is at least 1.5 times as bad as the Palestinians living in the West Bank and the nutritional status of Palestinians in the occupied West Bank is at least four times worse than Israeli Jews and six times worse than the Americans. Furthermore, the conclusions reached about difficiencies in total proteins and animal proteins for the West Bank apply here for the Gaza Strip. The tables presented previously provide exact figures on nutritional status for those who are interested in various comparisions and in numerical values of various nutrition parameters.

THE ROLE OF THE PUBLIC AND PRIVATE SECTOR IN FOOD PRODUCTION

A - The role of the public sector:-

In nearly all countries of the world, their food security is stimulated by direct and indirect government assistance of food production by the farmers, agriculture cooperatives and food companies. In addition, assistance is provided by international and local private agencies including cooperatives .[83,84]

Researchers studying the effects of nearly two decades of occupation and military control of Palestinians have concluded that the ruling Israeli military establishment and recently their mirror image the colonizing settlers are reaping off the essential benefits of these occupied areas and using the Palestinians as cheap labor for Israel .[2,3,6,7,8,11,12,30,43-46,62]

It has been also pointed out that the fact that there has been an agricultural progress in methods and procedures all over the world including the West Bank and Gaza Strip whose people are known to be good in agriculture, cannot be attributed to a creation by Israel which has applied many of the U.S. and the European agricultural techniques in increasing the food products of a land and water they did not have to pay for.

Israel could indeed increase the food security of the West Bank and Gaza Strip it now controls,using the role of any government overlooking the interest of the farmers under its jurisdiction . However, as will be shown below the ruling Israeli military administration of the West Bank and Gaza Strip have been given no directive or policy from their Israeli government except to do the least positive possible when matters are obvious and to have the hidden role of discouraging food production and food security of the areas they occupy.

As found from this study and based only on humanitarian expectations, all what the Palestinians in the occupied territories request[85] from the ruling Israeli military administration is not an aid but to just modify some of the harsh military orders and regulations of which about 1300 were issued up until March 1984 many of which restrict agricultural activities including food production and marketing. The Palestinian farmers' requests from the Israelis include the following:

1. To change their policy and stop Israeli organizations and groups from taking over farmers private lands and setting up settlements on them.

2. To change their policy and stop the Israeli settlers from taking over important underground water resources.

3. To change their policy and stop the Israeli farmers from selling their excess production in the West Bank and Gaza Strip markets as they do prevent the farmers of the occupied territories from selling their agricultural produce in Israeli markets.

4. To change their policy & stop the Israeli settlers from freely selling their subsidized produce in the West Bank markets.

5. To change their policy and modify their measures at the bridges of collective punishment to an area where a resistance against occupation took place.

6. To change their policy and cancel the military orders of closing down the pre-existing Arab lending institutions and banks without giving other alternatives, or even allowing foreign organizations to give a helping hand in this matter.

7. To change their policy and cancel their military orders of bringing in the money obtained in Jordan for selling farmer's produce. Limiting the money coming from Jordan to 700 Jordanian Dinars or $2,000 often does not really pay for the expense of transportation and the farming expenses.

8. To change their policy and allow funds to come into the occupied territories such as from charity and governmental organizations and investment money and aid from Palestinian's relatives abroad without restrictions as was done before occupation.

9. To change their policy and cancel their military orders restricting trucks crossing and re-crossing through the only two bridges to Jordan within only one day and ease the restrictions on imports through these bridges and on the methods of checking and delays which - as a direct result - lowerd the imports through Jordan and raised imports from and through Israel as shown in FIGURE 31.

10. To change their policy and allow seeds and other agro-industrial products and materials to come through the Jordan bridges.

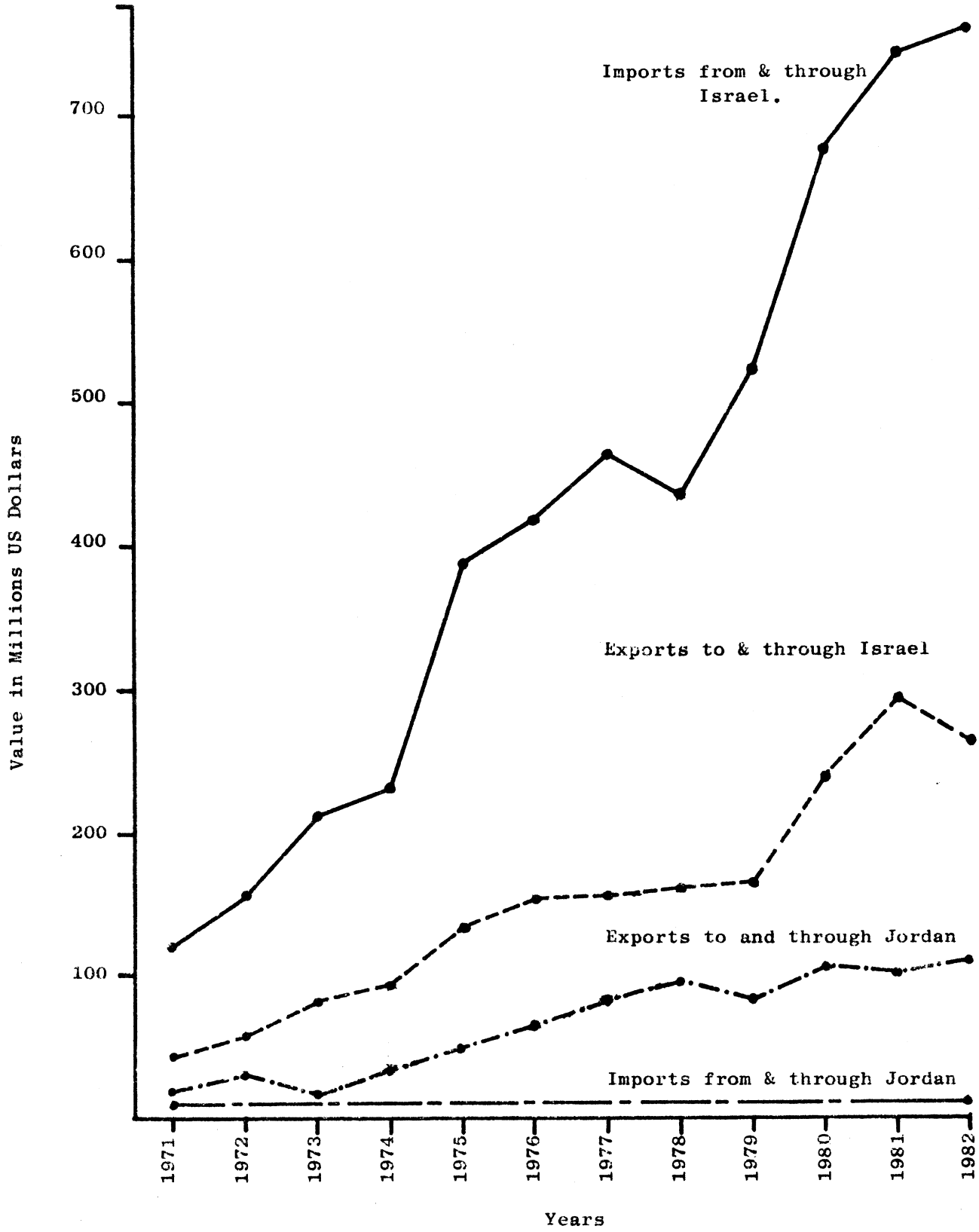

FIGURE 31. Foreign Trade of the West Bank and Gaza Strip.

11. To change their policy and cut-out all the fees on crossing the bridges for people and trucks as was the case before the occupation.

12. To change their policy and allow without restrictions the sale of produce from the West Bank and Gaza Strip in Arab East Jerusalem. The West Bank and Gaza Strip products are not allowed to be sold in Israel except by special permissions. The Israelis with disregard to all U.N. Resolutions and Norms of International Law, have annexed parts of the occupied territories to Israel e.g. East Jerusalem, villages surrounding Jerusalem , farm land of the three leveled villages near Latroon were also annexed to Israel in 1967. The Palestinian Arabs in the occupied territories cannot freely truck their products through these annexed territories without the military authorities prior permission. Many confiscations of trucked products have occured and with heavy fines added on. It seems it is not enough that the Palestinians are not now free to move in their own country but also even their vegetables and fruit products!

13. To change their policy of limiting the amount of seeds sold to the farmers through their Israeli governmental seed organizations , e.g. potatoe seeds.

14. To change their policy and allow unrestircted overseas sales of agricultural produce directly from the occupied territories through the only air and sea outlets controlled by Israel in addition to the land shipping to Jordan.

15. To change their policy and allow freely the setting up of sorting, grading, packing, canning , waxing, freezing and cold storage facilities in the most economically feasible places without any political manipulations, pre-conditions or strings attached.

16. To change their policy and allow the direct importation of agricultural machinery and materials by Palestinian agencies in the occupied territories even through Israeli ports without many restrictions , delays in inspection, additions of unexpected customs , taxes and duties for clearing out of the ports. The Palestinians in the occupied territories need a free trade zone status as an incentive to economic development, especially if one is really set-up between the United States and Israel. The Palestinians of the West Bank and Gaza Strip do not want to be excluded from the preferential trade with the U.S. and be told one time you are not under Israel and then another time you are - depending only on Israel's own selfish interests.

17. To change their policy and allow the opening of agricultural training college and schools and driver-operator schools for licensing of agricultural machinaries including tractors and earth moving equipments.

18. To change their policy and cancel the military orders No. 1019 and 1039 restricting the areas of planting without providing assistance or financial responsiblities in marketing. Restricting the planting of fruit trees as grapes & peaches seems to be without any justifications for an occupied territory which is not part of Israel itself. As indicated, this area should not be treated one time as part of Israel and another time not depending on Israel's selfish interests.

19. To change their policy and allow the uninhibited new registration of agricultual cooperatives and permit the complete functions of the existing agricultural cooperatives including their obtaining of funds as for example from charity organizations such as ANERA (American Near East Refugee Aid) whose funds are primarily from AID in the United States.

20. To change their policy and allow the uninhibited movement of transfer of techology through agricultural technicians under the age of 26. Israeli military law now requires that a person of this age must remain outside the occupied territories for at least nine months.

21. To change their policy and allow farmers to use without charge the lands of their relatives who are considered by Israel as absentees and non-residents, because they happen to be outside the territories during the take over of the West Bank and Gaza Strip in June 1967. This ridiculous Israeli law is allowing the Israeli military government to put its hands and control on many properties of the people in the occupied areas.

22. To change their policy and allow the Palestinians to use or keep their underground water reserves for future useage.

23. To change their policy and allow the utilization of the so called security zones and other bordering areas to be cultivated by its rightful owners as was the case before occupation rather than fence it and or use it for Israeli settlers.

24. To change their policy and allow all the Arab owners of land in the West Bank and Gaza Strip to use their land or rent it directly to those living in the occupied areas as

that alone will encourage investment from Arab sources as the case was before the occupation.

25. To change their policy and allow people in the occupied areas to build on their land without interference from the various authorities including the so called "green patrols" as the case was before occupation.

26. To change their policy and allow without restrictions and procrastination the permits for complete utilization of all springs and all underground wells in the West Bank and Gaza Strip as was the case before occupation.

27. To change their policy and cancel all the military orders and rules which in the opinion of a neutral committee are resulting in great harm to farmers in a third world area receiving hardly any aid from any one.

28. To change their policy and provide the basic agricultural assistance their fellow Arabs are receiving in the East Bank of Jordan whose poor government in Jordan has provided some subsidy,although small but sufficient for example to make the East part of the Jordan Valley better utilized than the West part - notice the greenhouses there - when the opposite was true before occupation and both farmers lived under one Jordanian government.

29. To change their policy and have equal rules for selling agricultural produce in the occupied territories as in Israel. For a law of preventing Arab produce and Arab agricultural materials e.g. agricultural plastics from being sold in Israel, there should be a law restricting the sale of Israeli agricultural products and materials from being sold in the occupied territories. Again, Israel should not look only at its selfish intersts.

30. To change their policy and stop cutting down the technical staff and budget of the agricultural department in the West Bank and implement a serious agriculture extension program for the West Bank and Gaza Strip at least in animal production as, for example, in the control of animal diseases of which Israel itself benefits.

31. To change their policy and stop the cutting down and closure of the activities of the agricultural experiment stations in the West Bank and canceling some of them all-togethher. Opening some more permanent stations in the West Bank and Gaza Strip is needed rather than closing them down.

32. To change their policy and create the atmosphere needed for investment by declaring that lands confiscated or fenced will be returned and that the occupied lands are subject to negotiations for just and lasting peace.

What has been indicated is simply summary of the frustrations and difficulties the Palestinian farmers are facing due occupation with respect to food production and improving their economic status and the self-sufficiency of their area in food and nutrition.

What will be pointed out below is what has actually been done for the agriculture sector and food production in the West Bank and Gaza Strip by the various government, before and after and dufficiency by the military government the 1967 Israeli occupation of these territories:

The activities of the public sector as they existed before occupation and some of which continued thereafter by the so-called "Take-Over Government" replacing the Jordanian and Egyption governments in the West Bank and Gaza Strip respectively. These activities included the following:

A. Agriculture Extension Services:-

Before 1967, the West Bank with its various districts had important agricultural institutions and organizations assisting farmers and consumers and these include:-

1. A central administration in Amman,Jordan, with a staff of agricultural extension agents with officers in all districts and sub-districts with various specialities and levels.

2. An agricultural department also with a central department and sub-departments in each district.

3. A central Jordan governmental cooperative department to look after and assist the registered private cooperative organizations. This still even exists today in Amman, Jordan.

4. An assistance subsidy program in food sufficiency assisting producers and consumers from the Ministry of Supply e.g. grains.

5. A governmental agricultural lending institute in Amman, Jordan, to give farmers loans. Lending activities in the East Bank is continuing and at a fairly good level.

6. Agricultural grants provided by AID (called at that time the American Point IV Program) .

7. Governmental assistance programs in providing seeds, trellising of grape trees, irrigation canals, land reclamation etc.

8. Looking after and assisting the governmental training schools of Tulkarem and Arroub near Hebron. The good standards of an agricultural school as was that of Khadoorie Agriculture School in Tulkarem is something now to be desired and eighteen years later.

9. Establishing and staffing the agricultural research and demonstration experimental stations.

10. Looking after and staffing the governmental veterinary department and providing vaccines and insect control dipping basins.

11. Looking after and staffing of water department with engineers and technicians.

12. Establishing forests and production of free forestry seedlings on a large scale and looking after and staffing of a forestry department.

13. Providing a government artesian wells drilling machine at minimal cost and providing free inspection of springs and wells.

14. Providing scholarships and traineeships to agricultural staff outside the country inorder to develop certain skills.

15. Providing materials and staff to eradicate insects and diseases affecting agriculture.

16. Providing grazing areas on governmental lands and providing animal production farmers with feed and barley in years of drought.

The Egyptian government which was administering the Gaza Strip have provided assistance and administration supervision in nearly all of the above mentioned 16 sectors which the Jordanian government provided for the West Bank. But since Egypt unlike Jordan did not annex the Gaza Strip to it, the Egyptians 'role was not so much in administration. The Egyptians' role in the Gaza Strip was in the form of assistance rather than establishing direct aid and permanent infrastructure of the departments involved in agricultural production and food consumption. The Gaza Strip is considered by the Egyptians as a Palestinian segment of the mother land Palestine. The United Nations Relief Works Agency for Palestine (UNRWA) even up to this date has provided most of the assistance to this area which is nearly 75% landless refugees.

In addition, Free Trade and a Free Trade Zone was set-up during the Egyptian administration with the rest of the world (which is needed now) with special assistance in the marketing of citrus. The Egyptians' excellent colleges of agriculture and experimental stations provided education and training for the outstanding Palestinian students in the Gaza Strip. None of the Gaza Strip or West Bank Palestinians study now at Israeli agricultural colleges or institutions.

The fact that, unlike Israel, Egypt has never flooded the food markets of the Gaza Strip with their agricultural products, but rather acted as an importer and distributer of Gaza produce to the Arab world was in itself a form of assistance for the Palestinians there.

The complete open trade links Egypt provided to the outside without having to go through various military restrictions and inspection as done by the Israelis today is the reason why the Gaza Strip till now has some foreign trade with countries overseas as for example Yougoslavia with which the Strip still has a strong barter trade in citrus .

Importation of the Gaza Strip needs was done by the Egyptians without the huge customs and taxes the Israelis now levy on anything coming to the occupied territories.

Some of the above mentioned positive public role which the relatively poor Jordanian and Egyptian governments managed to carry-out for the West Bank and Gaza Strip respectively may be compared with that done by the Israeli military government in order to illustrate the changes which occured after a long period of Israel's occupation of these Palestinian Arab areas.

Most governments in the world have in the last two decades multiplied their efforts in assisting their farmers in food production and in subsidizing the food produced in order to ease the burden on the consumers and farmers alike. Unfortunately, as outlined in the thirty obstacles listed, the burdens rather than assistance have multiplied for the Palestinians in the West Bank and Gaza Strip.

Despite the fact that the occupied West Bank and Gaza Strip new Palestinian entity had no government of its own, and is ruled by Israeli occupiers, who are foreign to its Arab people and whose role as indicated has been to take advantage of the human, water and land resources of this occupied Palestinian lands, the Israelis have, nervertheless, had to continue some of the services necessary to maintain food production at least unitl 1975. After 1975 , the Israeli authorities appear to have implemented a policy of cutting down on assistance to agricultural development in the occupied territories and even placed more restrictions on food production in general.

The cutting down on agriculture extension programs for the Arabs was coupled by an increase in setting up of Israeli settlements over Arab land during this same period.

The changes which occured in Public Role in food production and consumption since occupation are discussed below.

TABLE 88 shows the changes which occured in the technical manpower of the agriculture department in the West Bank from 1968 to 1984.

TABLE 88.

THE AGRICULTURAL DEPARTMENT STAFF OF THE WEST BANK DURING SELECTED YEARS FROM 1968 TO 1984.

Staff	1968	1972	1976	1980	1984
- Administrative staff	30	120	43	42	34
- Specialized extension agents.	1	11	10	9	6
- Agricultural Assistants	10	20	6	6	3
- District extension agents	40	103	68	64	61
- Veterinary doctors	12	20	19	15	16
- Animal inspectors	25	26	25	25	25
- Forestry assistants	90	80	60	51	38
- Supportive staff	30	100	68	55	40
- Technical laborers	20	150	42	31	18
- Seasonal laborers	2000*	400*	200*	40*	15*
Total	258	630	341	297	241

(*): Not included in the total.

In the first few years of occupation there was an increase in the number of all technical agricultural staff except those in the forestry section which showed a continous decline from 1968 up to 1984.

The number of those involved in animal care, animal and meat inspection went up slightly and then remained unchanged. There is no question that control of animal diseases by a good veterinary staff in the occupied areas is a necessity for the protection of Israel's own live-stocks .

One of the most obvious changes which occured after occupation involves the total agricultural man power especially the changes in the seasonal laborers involved in work at the experimental stations and demonstration plots. This number was very large in the first period of occupation up to 1972 and just prior to the 1973 October War, then began to decline rapidly indicating as would be shown later a cut-down on all experimental work in general.

Before going further in details on experimental stations, it should be pointed that not only technical forestry workers were decreased but also there was a dramatic decrease in the number of government forestry nurseries and the number of forest tree seedlings produced and which used to be planted on governmental lands or distributed for free to farmers as still is the case now in Jordan.(59)

TABLE 89, shows the decrease in the production of forestry seedlings in the West Bank.

TABLE 89.

PRODUCTION OF FORESTRY SEEDLINGS IN THE WEST BANK.

Nursery	District	Date of foundation	Production before 67.	Production in 1983.	Remarks
Qabatiah	Jenin	1957	2 millions	zero	cancelled in 1973
Al-Aroub	Hebron	1935	3/4 million	zero	cancelled in 1973
Wadi Al-Quf	Hebron	1958	3/4 million	40,000	still functioning.
Anabta	Tulkarem	1961	1/2 million	zero	cancelled in 1968
Total seedlings			4 millions	40,000	

The budgets by the Israeli authorities for forestry in the West Bank between the years 1968 and 1983[59] are as follows:-

The budget for the year 1968 was	41,400 JD.*
The budget for the year 1970 was	32,000 JD.
The budget for the year 1973 was	13,200 JD.
The budget for the year 1983 was	6,011 JD.

* One JD equaled 3.0 US dollars at that time.

It could be seen that before 1967 there was four forestry nurseries producing one million seedlings per year ,but after occupation only one nursery remained with a capacity of only 40,000 seedlings and the productivity of even that nursery is now being decreased . The huge cut in forestry budget also shows the policy of the Israeli government in cutting down on expansion of this important public sector which serves against soil erosion, prevention of desertification , landscape beautification, wood resources and last but not least modification of weather and increase in precipitation.

On the short run the Israelis see forests in the slopes of the West Bank as an efficient biological material which utilizes and prevents the excess water run-off on the hilly slopes of the West Bank from recharging their aquifers through the rain on the hilly slopes of the West Bank.

Forests, before occupation, composed a total of 25,500 hectares in the West Bank (14.6% of that is man-made) which represents 4.5% of the total area of the West Bank. No increase in the forests area occured after occupation.

In the Gaza Strip there is 4,100 hectares of forest land and the discussion presented above about the West Bank applies also here for the Gaza Strip. Public forests in the Gaza Strip are being used now for expansion of Israeli settlements near them.

The cutting down on experimental stations in the West Bank is another parameter showing a disintegrating public role for agricultural development in the occupied areas. TABLE 90 shows the reduction which took place in experiment stations including the decrease in technical staff .

TABLE 90.

AGRICULTURE EXPERIMENTAL STATIONS IN THE WEST BANK.

Name	Date of Establishment	District Location	Total Experimental Area in Hectares	Experimental Area Used	No. Technical Staff 1969	1979	1984	Changes After Occupation
1. Beiteen	1974	Ramallah	2.0	1.7	2	9	0	Closed in 1978.
2. Noorshams	1969	Tulkarem	2.3	0	3	3	0	Cancelled and transferred to Khadoorie.
3. Bira	1965	Hebron	30.0	0	1	1	0	Closed in 1980.
4. Qabatyah	1957	Jenin	12.0	2.0	4	2	0	Closed in 1983 for experiments and now has only one guard.
5. Al-Farah	1954	Jordan Valley	40.0	11.0	25	18	6	Most of the area changed to commercial production.
6. Al-Arroub	1935	Hebron	20.0	0.8	2	4	2	The experimental area changed to commercial production.
7. Beit Qad	1934	Jenin	75.4	6.8	5	2	2	Few experiments on field crops.
8. Asker	1933	Nablus	8.0	1.8	2	2	1	Has a small soil lab which is still functioning and now is the major center.
9. Jericho	1927	Jericho	10.0	0	6	4	2	Had a soil lab and was closed.
10. Khaddoori	1926	Tulkarem	200.0	12.0	55	30	15	Khadoorie used to be an excellent agricultural/vocational school and agriculture as well as the school's academic level was steadily eroded to a standard community college as of 1983.

As seen above, after occupation all the experiment stations show either a reduction in services and technical staff or outright closure as the case is for 40% of those stations. Furthermore, it is well known that the Agriculture Department under Israeli Military Administration which, in general, had fairly good activities up to 1972, has later cut down not only on staff and experimental stations but also drastic cuts were made in:

- operational budget including that for observation plots,

- the transportation facilities and agricultural materials necessary to carry out any experiments,

- the small agriculture pamphlet called "The Agricultural Magazine" which in the first years of occupation was published in the West Bank every month, then became bimonthly, and in 1983 only quarterly, and in 1984 so far only one issue in eight months was published, i.e. one single issue up to the middle of August of this year (1984). This is in addition to limiting the number of copies available for distribution.

- The special issue magazine on specialized agricultural topics has also been reduced in the eighties to only once or twice per year and in 1984 none has been published.

In the Gaza Strip, the agricultural pamphlet called "The Farmer" also has been subjected to similar cut downs. It is difficult to obtain detailed information on the skeleton staff, operation and budget of the agriculture division in the Gaza Strip because that is totally integrated with some Israelis who are actually working and administering that department.

It appears that the Israeli policy of introducing new agricultural practices and technology through a strong extension service in the early years of occupation, i.e. up to 1973, have paid off by the fact that the Palestinian farmers have only or primarily the Israeli markets as a supply to depend on for application of the new agricultural practices and agriculture needs, e.g. plastics, seeds, fertilizers, herbicides and machines.

Jenin District as an example increased its area planted under plastic cover in the last few years. For example, in 1982, there was only 1,935 hectares of watermelon and 454 hectares of cantelopes planted under plastic cover. In 1984, this district planted 2,300 hectares of watermelon abd 1,700 hectares of catelopes, i.e. a total of 4,000 hectares of these melons under plastic cover which used 500 tons of white plastic purchased mostly from Israeli factories. At the price of 0.7 JD per kilogram, i.e. 700 JD per ton which amounts to 350,000 JD for the 4000 hectares which is about one million US dollars for one type of plastic.

Furthermore, a hectare needs two-thirds kilogram of the hybrid melon seeds which sell at 100 JD per kilogram (about 260 US dollars per kilogram) which amounts to 67 JD per hectare (or $174). Therefore, the 4,000 hectares of cantelopes and watermelons in the Jenin District require also another 268,000 JD for seeds which is about 700,000 US dollars. Thus,

for farmers in the Jenin District to produce two melon products, they must pay 1,700,000 US dollars to the Israeli agro-industry for seeds and plastic alone. This is not to mention the needed fertilizers, insecticides and herbicides which also must be purchased from Israeli sources. Despite this high cost for melon production, Palestinian farmers have the difficulty of marketing it through Jordan and many times they don't make any profits.

The government of Jordan has its own bureaucratic procedures and quotas for acceptance of West Bank and Gaza Strip products. Often the farmers lose rather than make money from planting of vegetables which - if marketing is secured - should be the most profitable to produce. In addition to the problems of high running expenses and poor marketing. The farmers lack also:

- efficient and economic trucking system across the bridges
- cold storage facilities
- canning factories
- factories for producing agriculture materials.

These deficiences are in both the West Bank and Gaza Strip which makes it very frustrating and sometimes unprofitable for farmers to work in agriculture, even though their yields and productivity is very high.

The closure of lending institutions and banks in the West Bank and Gaza Strip, the lack of available funds coupled with the difficulty to obtain licenses from the Israeli authorities for factories, especially for those pertaining to food production, make it a real challenging problem for Palestinians engaged in agriculture in the occupied territories.

The absence of any public agriculture projects to help decrease the operation cost on farmers and the absence of any public subsidies and hardly any aid to farmers when they are faced with troubles such as the lack of rain, difficulty in marketing and poor prices and other common agricultual problems make food production a very undependable business to operate in.

There is hardly a country or entity in the world where farmers face as many obstacles and at the same time feel less secure about the profitability of their production more than those in the occupied West Bank and Gaza Strip.

B - The role of the private sector:-

The private sector in the West Bank and Gaza Strip consists of farmers, agricultural cooperatives, small food companies, trade middlemen, trucking companies and the like. Nearly all the burden of food production in the occupied territories has become the responsibility of the private sector.

The cooperatives in the West Bank, (86-89) number of members, their dates of establishment and the functions and the projects they are undertaking with the cost is tabulated below in TABLE 91.

TABLE 91.

AGRICULTURE COOPERATIVES IN THE WEST BANK AND THEIR FUNCTIONS UP TO 1982

Type of Agriculture Cooperative	TOTAL NUMBER	No.of coops Registered before 1967	No.of coops Registered after 1967
1. Rural credit and saving	142	141	1
2. Agricultural marketing, machinery and irrigation	28	11	17
3. Animal production (poultry, bees, and sheep)	30	7	23
4. Agricultural industry (olive oil mills)	19	8	11
5. Union of Olives (pressing and marketing)	1	1	-
6. Multi-purpose agricultural cooperatives	18	9	9
GRAND TOTALS	238	177	61

In addition to the 238 agricultural cooperatives listed in the previous able up to the beginning of 1984, there were also another 381 non-agricultural cooperatives of which two hundred and twenty three are educational school children cooperatives, most of which ceased their functions after occupation. The other 158 cooperatives have the function of securing housing, drinking water, health services, road and electrification to their members.

Due to the absence of public role in infrastructure services after occupation, the private sector using cooperatives and even just community committees to obtain funds and carry-out the necessary functions became extremely active in carrying out the burdens for developing their communities. After occupation, the 158 non-agricultural cooperatives were much more active than the 238 agricultural cooperatives.

It could be seen from the table, that the number of agricultural cooperatives in the West Bank registered in the fifteen years under the Jordan government regime was 177 compared to only 61 cooperatives in the same period under the control of the Israeli military government occupation forces. Except for cooperatives involving olive pressing most of these cooperatives have been ineffective and of benefit only to the few who run them, especially when it comes to proper utilization of grant funds.

The loaning capabilities of the cooperatives have essentially vanished after the Israeli occupation due to restrictions on bringing in funds to the occupied areas while they were relatively flourishing during the administration of the government of Jordan and gave a total sum of 457,283 Jordanian Dinars in the fifteen years of Jordan administration of the West Bank while almost none during a fifteen year period of Israeli occupation. The number of lending cooperatives registered before occupation was 141 compared to only 1 registered after occupation during the same interval of 15 years.

The limitations on the functions of this type of cooperatives along with the closure of the commercial banks and their branches in the West Bank and Gaza Strip after 1967, has been catastrophic to the farmers and others who have to get their loans when urgently needed from private sources at extremely high rates and for short periods.

The foreign and local private voluntary organizations have not yet enacted a loan system and foreign banks are not allowed by the Israeli government to open up branches in the West Bank and Gaza Strip. The Palestine Bank in Gaza, which

won a court battle to open up again has yet to gain permission to deal with foreign currencies as Israeli banks do, which restricts its loaning activities and useful public functions.

The Gaza Strip has only a few agricultural cooperatives up to 1984 and they appear to be more effective than similar ones in the West Bank in servicing the interests of all the members. These include:

1) the Fishermen Cooperative (Al-Ekhlas) - Gaza City
2) the Al-Tawfeeq Fish Cooperative - Gaza City
3) the Strawberry Agriculture Cooperative - Gaza City
4) the Vegetable Cooperative -Deir El-Balah
5) the Citrus Waxing and Packing Cooperative - Gaza City
6) the Citrus Production Cooperative - Gaza City
7) the Citrus Farmers Cooperative - Gaza City
8) the Agriculture and Marketing Cooperative -Khan Younis
9) the Vegetable Cooperative - Rafah

Laws in the Gaza Strip prohibit the formation of unions and restricts community activities and hence the number of cooperatives and promotion of cooperative work is very limited in the Gaza Strip.

Examples of the sources of assistance for the Gaza Strip cooperatives include that provided by the United Nations Development Projects (UNDP) to the fishermen cooperative and the grant given to that fisherman cooperative and to the strawberry cooperative by the Community Development Foundation of the Save of the Children Foundation of the United States.

Effective marketing cooperatives are the most needed for the West Bank and Gaza Strip, as the indirect assistance which was provided to aid in the marketing of the large citrus crop of the Gaza Strip by the Palestine Liberation Organization (PLO) in the early eighties was restricted when the Israeli Military issued an order preventing farmers from using the PLO in marketing. This directive was made public in a news item published in the local Arab Jerusalem Newspaper (Al-Quds).

Due to the vacuum existing in the role of public sector in providing basic infrastructure needs and economic development including agriculture, various foreign private voluntary organizations (PVOs) increased their activities or opened branches in Jerusalem . Most of the new organizations which opened branches after occupation are American and receive most of their budget from AID, the U.S. governmnet Agency for International Development. ANERA , American Near East Refugee Aid one of the largest American organizations assisted by AID to work in the occupied territories, does not even have any other branch in the world except that in Jerusalem.

The aid provided by the Private Voluntary Organizations (PVO'S) is greatly appreciated by the Palestinians in the occupied areas. They have, as shown by TABLE 92, performed various humanatarian tasks badly needed for a population living under occupation.

From TABLE 92 it can be seen that many of these voluntary organizations give aid in agriculture, but the relative amount of funds actually spent annually on agricultural projects in the occupied areas is small and is estimated at $950,000 which is less than 10% of all the grants given in 1983 which totaled about 11 million dollars. The projects to be funded must be submitted to and approved by the military social welfare officer who in the end gives less permission to submitted agriculture and other economic projects than others.

In a study[90] by the former Vice Mayor of Jerusalem, who heads a so-called "West Bank" Data project center in West Jerusalem, it was found that during the last 6 years a difference of 18% in the approval of projects was found between so called economic, infrastructure, and social projects (e.g. water & health). The study was restricted only to the American PVO'S and concluded that the assistance by the American PVO'S is simply freeing Israeli Government funds to set up Israeli settlements. This assumption appears to be far from the truth because, as indicated in this section of this study, the Israeli Government hardly even gives any assistance to Palestinians irrespective of whether the projects are infrastructure or economic.

In the field survey study by ASIR,[56] water projects were recently found to be among the most desired projects with a great feasibility and priority in several selected villages of the West Bank and Gaza Strip. As this study was being completed, a full page press report appeared on August 29,1984 in the local Arabic newspaper (AL-QUDS)[91] which also disagreed with the conclusion of the former Israeli Vice Mayor. In addition, the article suggested that he may have some ulterior motive and political objectives in biasing his research to recommend to the Palestinians that PVO aid is not to their best interests. The article pointed out that the PLO-Jordan Joint Committee and the local community both participate with the PVO'S in order to make the project possible.

The assistance from the joint committee also requires military approval, however, that usually proceeds at a "low key" without much publicity or by simply attributing the aid to that " from Amman" or " from Jordan " or just "from across the bridge".

Other non-governmental organizations which assist in agriculture development in the occupied areas include those coming from Arab sources. However, such aid is not regular and its effect so far has been minimal.

TABLE 92.

FOREIGN PRIVATE VOLUNTARY ORGANIZATIONS IN THE WEST BANK AND GAZA STRIP

Name	Abbreviation	Country of Origin	Before of After 1967	Type of Activities	Yearly Budget
Community Development Foundation /Save the Children	CDF	USA	after	Water, health, agriculture, social and economic development	++
American Near East Refugee Aid	ANERA	USA	after	Agricultural cooperatives and municipalities.	++
American-Near East Training Services	AMIDEAST	USA	after	Graduate scholarships and traineeships only to USA.	++
Menonite Central Committee	MCC	USA	before	Agriculture development of small projects, social development and small water projects	+
Catholic Relief Services	CRS	USA	after	Health edc., roads, water, school rooms, social dev., & food dist.	++
Lutheran World Federation	LWF	Geneva	before	Medical services, roads, and social welfare.	+
Cooperative for American Relief Everywhere	Care	USA	before	Food dist., small edc. and economic development. Left area in 1984.	+ closed
International Christian Committee	ICC	Geneva	before	Health clinics, small water projects.	+
Pontifical Mission for Palestine	same	Vatican	before	Social welfare, education, economic development	+
Swedish Organization for Individual Relief	SOIR	Sweden	before	Social welfare.	+
American Friends Service Committee	AFSC	USA		Legal aid	+
Red Cross	RC +	Switzerland	before	Health & humanitarian work especially prisioners.	+
The Mormon Church Church of the Latter Day Saints	Mormons	Sweden	After	Education and welfare.	+

++ - positively this budget 1-4 million $ per year
+ - the budget is less than 1 million $ per year

Investment and aid by Arabs in the Arab world to Arabs in the occupied areas can actually shift the food security of the occupied areas to self-sufficiency in almost all food commodities needed especially the deficient and high capital requiring animal production projects. For example, farmers in the occupied areas can easily double and triple their animals and animal production if a support as well as subsidy is provided against Israeli meat, dairy and egg products. Also, many of the presently productive farmers engaged in plant production will switch from producing the apparently more profitable but difficult to market vegetables to the production of stratigically needed foods as cereals, e.g. wheat, if a fixed subsidy or financial support is given for planting such field crops. Investment of Arab capital in certain branches of agriculture in the occupied territories will stimulate overall agricultural productivity and consequently increase self-sufficiency.

From the forementioned, the major burden of food production and supply in the occupied territories falls on the back of Palestinian farmers alone, who have (considering difficult prevailing conditions) actually performed well using their own resources and without the help of hardly anyone.

The increase in the purchase of fertilizers by the farmers is a good indication of their increasing attempts to improve their production. Up to 1970 the maximum amount of fertilizers purchased annually by farmers of the West Bank and Gaza Strip from Israel was 14,000 tons and several years later their annual purchase of fertilizers jumped to 30,000 tons .

In the northern districts of the West Bank (Jenin and Tulkarem) and the Gaza Strip, an average of 500 kg of mixed fertilizers is used per hectare of wheat or barley i.e. a sack of 50 kg of fertilizers per donum of land. This is slightly lower than the average used by the Israeli farmers (750 kg per hectare of wheat), but much greater than that used in fertilization of wheat by farmers in the rest of the Arab world (70-90 kg per hectare) excluding Egypt and Saudi Arabia who use quantities similar to that used in the West Bank and the Gaza Strip.

The prevalence of small property holdings require that more farmers must cooperate together in the use of expensive machinaries to cultivate their small land lots. The forced cooperation among farmers in rental of agricultural equipment has actually helped in overcoming many of the obstacles in land cultivation, crop care and harvesting. Almost every agricultural step in the major agricultural areas of the West Bank (Districts of Jenin, Tulkarem, and the Jordan Valley) as well as in all of the Gaza Strip, has some sort of mechanization. The use of animals for plowing of land has completely disappeared from the major agricultural districts

and animals are used only in the rocky and very hilly areas of the southern and central districts around Hebron, Ramallah, Bethlehem and Jerusalem. TABLE 93 shows a list of the various agricultural equipment and their increase in a five year period (1978 - 1982).[24]

TABLE 93.

AGRICULTURAL EQUIPMENTS AND IMPLEMENTS USED BY FARMERS IN THE WEST BANK IN THE YEARS 1978 AND 1982.

Type of Equipment	1978	1982
- Harvesters and combines	67	40
- Threshers	547	3057
- Tractors	1620	2198
- Cultivators, ploughs and and furrow makers.	1973	3661
- Discs and rotivators	267	298
- Seed planters	40	57
- Fertilizer and manure spreaders.	78	174
- Plastic spreaders	77	140
- Sprinklers and dusters	1054	3795
- Pale binders	14	24

The expense of purchasing a combine harvester and the competition from Israelis coming in to the open West Bank fields with their large and modern combine-harvesters have put many Palestinian farmers owning these agricultural machines out of business. This is an important reason why one observes in TABLE 93 that there is a decrease in the number of these expensive machines. Assistance in this sector is badly needed.

The less expensive and difficult to rent agricultural equipments such as large tractors and their accessories (cultivators ,ploughs, furrow makers, discs, rotivators , seed planters, spreaders of fertilizers and plastics) have increased considerably with the years indicating the great increase in the role of the private sector in food production and dependence on itself in agricultural development.

FIGURE 32 shows the increase in the number of tractors (large and small) owned by farmers in the West Bank between 1966 and 1982. It could be seen from this figure that there was a steady increase in the number of tractors used by

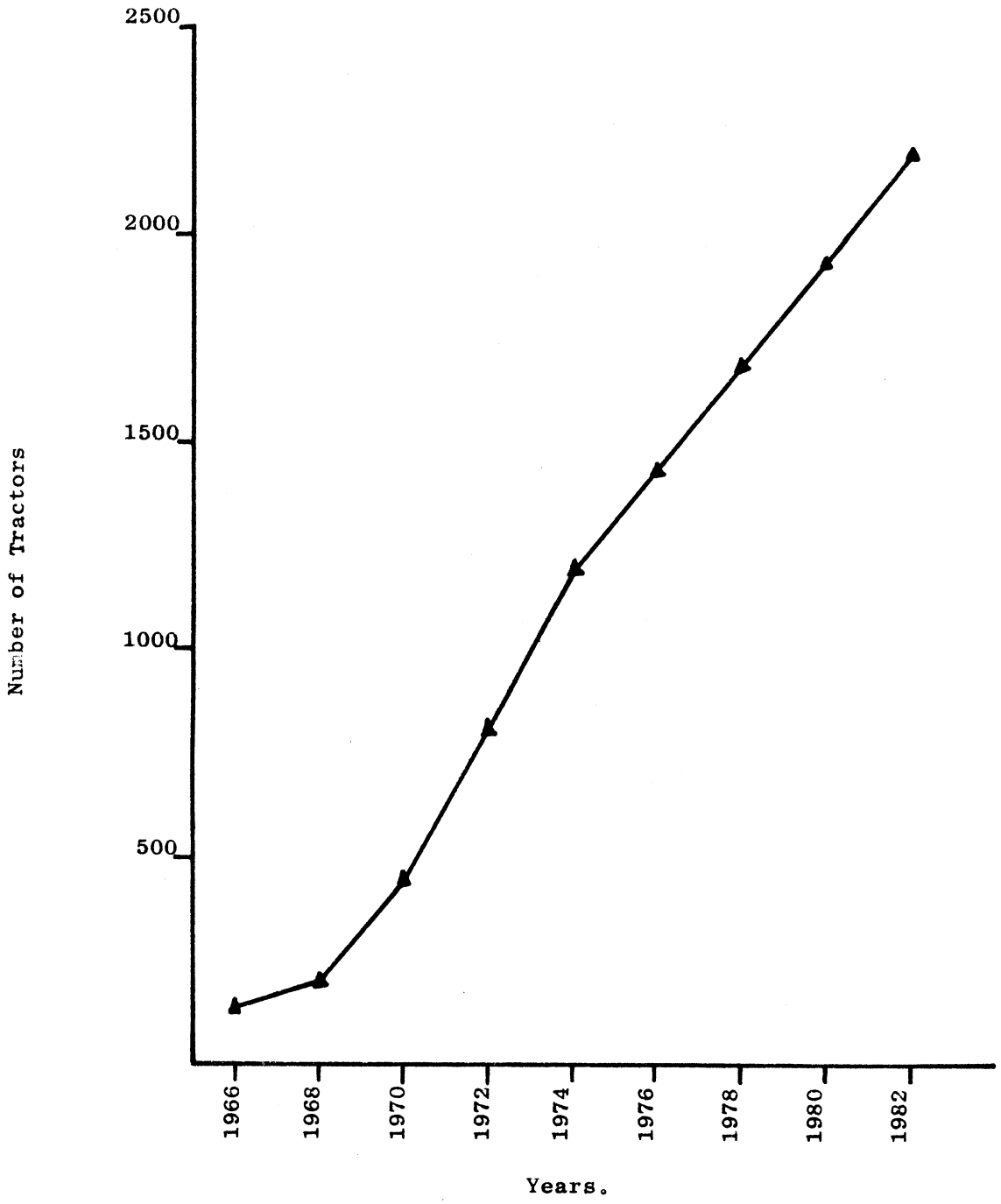

FIGURE 32. Increase in the Number of Agricultural Tractors in the West Bank between 1966 & 1982

farmers throughout the last fifteen years. The total number of farmers owning at least one piece of agricultural equipment in the West Bank was 1353 farmers in 1978 and increased by over 66% to 2215 farmers in 1982. Such a rapid increase in the private investmnet of farmers in mechanization indicates again their rapid adaptation to use of modern agriculture technology.

Another indication of private sector role in food production is that given in TABLE 94 showing a considerable investment by farmers in the West Bank in having a large number of olive presses for the production of olive oil.(24)

TABLE 94.

THE DISTRIBUTION OF OLIVE PRESSES IN THE WEST BANK IN 1982.

District	Type of Press		
	Old	Semi-automatic	Full Automatic
Tulkarem	77	33	5
Jenin	38	14	3
Nablus	20	22	5
Ramallah & Bethlehem	60	15	10
Hebron	3	4	4
Total	198	86	27

Grand Total = 311 olive presses.

The Gaza Strip has only two presses (one of them automatic) as Gaza has only a small number of olive trees compared to the West Bank.

In addition to olive presses, there are also a few but out-dated factories for the exraction of the remaining olive oil residue from olive pomace. The olive oil produced is used for the production of soap. However, because the refined olive oil extracted by organic solvents from pomace is greenish in color, which is not desired in soap, the practice of using lcoal refined olive oil has vanished. Either refined Italian olive oil or that alone or mixed with other oils and fats is used now for making soap in the West Bank. Attempts to revive use of local refined olive oil has not been too successful due to technical and economic difficulties.

A good example of private investment in food production in the Gaza Strip is also shown in TABLE 95 by the considerable investment required in many citrus factories for grading, waxing and packing of oranges.(24)

TABLE 95.

ORANGE GRADING, WAXING AND PACKING FACTORIES IN THE GAZA STRIP FOR 1982.

Name of factory	Year of Founding	Capacity Boxes/day	Total Boxes/yr.	# of workers
Al Jam'eyeh Packing Co.	1978	12,000	956,000	130
Ghazi Al-Shawwa Co.	1967	10,000	823,246	135
Abu El-Khair Co.	1969	10,000	800,000	180
Sharrab Co.	1959	10,000	858,048	120
Karni Co.	1968	10,000	------	----
Shawwa & Mughrabi Co.	1968	10,000	829,287	140
Mortaja Co.	1977	12,000	1,160,132	150
Yazji Co.	1973	35,000	1,500,506	300
Total			6,927,219	1155

Food industry in the West Bank and Gaza Strip is all a private sector endeavor. However, it is not limited to olive presses and citrus packing plants. There are also factories for the production of various food products. These include:

- factories for production of Tahinah (i.e. sesame resin or extract)
- factories for making biscuits
- factories for making sweets
- factory for making tomatoe paste
- factories for canning of beverages
- small factories for grape preserves and dried grape products
- factory for making the alcoholic beverage - Arak (anise extract with alcohol)
- factories for making chocolates
- factories for making wine
- small factories for making ice cream
- small bakeries
- feed mix factories
- small flour mills

None of the above have over 20 workers and in addition to these small factories there is also:

- the vegetable oil company in Nablus which is the largest food company in the occupied territories. This large company is still 51% owned by the Jordan government and several families from Nablus. The vegetable oil used to make products of this company is not olive oil but rather a type of thick coconut palm oil imported from the tropics and refined with harsh chemical and physical methods. It is hydrogenated, colored yellow and flavored with butyric acid to become granular and yellow to immitate in color, texture and flavor the animal product ghee (samneh) which is the fat layer of heated butter.

The possibility of using olive oil to make plant ghee instead of that of the imported palm should be investigated especially since olive oil contains enough stearic acid which easily solidifies and becomes granular by itself at cold temperature. Olive oil has been reported to be the most suitable fat for combating of heart disease and other ailments and contains enough antioxidants to make it anti-carcinogenic.(92)

EFFECT OF ADVANCES IN THE AGRICULTURAL SECTOR ON:

A. - Betterment of Economic Conditions and Life Status in the Occupied Territories:

For the West Bank and Gaza Strip the support of agriculture production and agriculture sector as a whole plays an important role not only in the economic development, but also in betterment of the population stability and improvement of their nutritional status and hope to reach a food self-sufficiency.

TABLE 96 shows the contribution of agriculture during several years to the Gross Domestic Product (GDP) and its share in the Gross National Product (GNP) of the West Bank and Gaza Strip relative to other economic sectors.

TABLE 96.

THE RELATIVE CONTRIBUTION OF AGRICULTURE AND OTHER ECONOMIC BRANCHES TO THE ECONOMY OF THE WEST BANK AND GAZA STRIP WITH RESPECT TO (GDP) AND (GNP) .

In millions US $.

Economic Branch	The West Bank						The Gaza Strip					
	1977	1978	1979	1980	1981	1982	1977	1978	1979	1980	1981	1982
Agricultural sector	124.2	172.8	159.0	292.0	218.1	215.6	61.6	55.7	54.1	53.5	60.4	47.2
Industrial sector	26.7	34.3	35.4	51.3	42.9	46.4	21.3	22.2	25.8	25.9	23.4	24.7
Construction sector	66.1	68.2	86.7	103.6	97.1	95.3	34.3	40.9	57.8	60.8	68.9	65.5
Other branches(services)	210.1	209.9	232.9	311.5	286.0	328.7	88.4	71.1	92.8	142.3	135.7	146.1
Total Gross Domestic Product (GDP)	427.1	485.2	514.0	758.4	644.1	686.0	205.6	189.9	230.5	282.5	288.4	283.5
Excess of factor payments from and to abroad (*)	138.2	142.0	180.5	216.5	229.6	268.9	76.1	86.3	122.2	153.0	177.2	195.8
Total Gross National Product (GNP)	565.3	627.2	694.5	974.9	873.7	954.9	281.7	276.2	352.7	435.5	465.6	479.3
% of Agricultural sector to (GNP)	22 %	27.6%	22.9%	30 %	25 %	22.6%	21.9%	20.2%	15.3%	12.3%	13 %	9.8%
% of Agricultural sector to (GDP)	29.1%	35.6%	30.9%	38.5%	33.9%	31.4%	30 %	29.3%	23.5%	18.9%	20.9%	16.6%

(*): Net from Palestinian workers outside the occupied territories.

From TABLE 96 and other considerations the agricultural sector and food production in the occupied territories is essential to the steadfastness of the Palestinians in these areas because :

1. It contributed over many years (1977-1982) from 29% to 39% of GDP of the West Bank and from 17% to 30% of GDP of the Gaza Strip. And contributed from 22% to 30% of GNP of the West Bank and from 10% to 22% of the GNP of the Gaza Strip. Decline in the agricultural sector in the last two years (1982 and 1983), especially in the Gaza Strip, is due to poor marketing as in the case of citrus . This hard blow to the Palestinian farmers is occuring dispite their proven increase of productivity over the years. Lack of any support for marketing is the single most challanging problem for agricultural development in the occupied territories .

2. Agricultural production of foods in both the West Bank and Gaza Strip provides about 30% of the income generated from exports. The exports from agricultural production of the West Bank makes up 31.2% and 25.3% of the value of all the West Bank exports for the years 1977 and 1982 respectively. See TABLE 97. This does not include the large exports of the industrially refined coconut palm oil of the Nablus Plants Oil Company.

As shown in TABLE 97,[20,24] over one-half (57.3%) of the agricultural products of the West Bank are exported to or through Jordan. The decline in percent of agricultural exports relative to other exports was the result of an increase in volume of other exports including palm oil relative to agricultural products. It can be seen that the value of agricultural products exported actually increased from 35.1 million dollars in 1977 to 49.2 million dollars in 1982.

On the other hand, not only the relative percent of the agricultural sector in the Gaza Strip declined in 1982 to 27.5% of all exports compared to 1977 reporting 52.8% of all exports; but alarmingly also the absolute value of the agriculture exports declined from 65.9 million dollars in 1977 to 50.0 million dollars in 1982. As indicated, poor marketing and hence poor prices rather than poor production have been considered the cause for the decrease in value of agriculture production in the Gaza Strip.

Since in both the West Bank and Gaza Strip - in contrast to Israel - (see footnote to TABLE 97 and the report[71] in the study of the ECWA/UNIDO Joint U.N.Division) - the agricultural exports of these occupied territories are primarily fresh food products, it is encouraging to find that the occupied territories after so many years of occupation are still able to export so much fresh food products in addition to what they consume.

TABLE 97.

VALUE AND PERCENT OF EXPORTS AND IMPORTS OF THE AGRICULTURAL PRODUCTS FOR THE YEARS 1977 AND 1982 FOR THE WEST BANK AND GAZA STRIP - IN MILLIONS OF DOLLARS

Transaction	The West Bank 1977	The West Bank 1982	The Gaza Strip 1977	The Gaza Strip 1982
EXPORTS:-				
-Grand total of all exports:	112.5	194.4	124.8	181.5
-Total agricultural exports value:	35.1	49.2	65.9	50.0
-% of agricultural exports to grand total exports:	31.2%	25.3%	52.8%	27.5%
-Agricultural exports to or through Jordan:	20.1	31.8	37.9	28.4
its % of total agricultural exports:	57.3%	64.6%	57.5%	56.8%
-Agricultural exports to or through Israel:	15.0	17.4	28.0	21.6
its % of total agricultural exports:	42.7%	35.4%	42.5%	43.2%
IMPORTS:-				
-Grand total of all imports:	246.6	456.6	219.2	310.6
-Total agricultural imports value:	45.3	51.5	38.4	36.1
-% of agricultural imports to grand total imports:	18.4%	11.3%	17.5%	11.6%
-Agricultural imports from or through Jordan:	0.3	0.4	0.0	0.0
its % of total agricultural imports.	0.7%	0.8%	0.0%	0.0%
* -Agricultural imports from or through Israel:	45.0	51.1	38.4	36.1
its % of total agricultural imports:	99.3%	99.2%	100%	100%

(*): These imports include agricultural machinaries including tractors, harvesters etc.,as well as agrochemicals (insectisides, herbicides, fungicides, fertilizers), and seeds, plastics,peat moss and out of season and special fruits and vegetables e.g. avocados, mangos, potatoes, peanuts, pears, apples, persimmons, large hybrid bananas, pomegranates, celery, hybrid anise and head lettuce. The great value of equipment and materials imported from or through Israel is the reason for the large annual imports bill ($87.2 million in 1982) which the West Bank and Gaza Strip pay to Israel.

In every year examined, the net in profit from food exports exceeds that of agricultural imports (see preceeding table) including that of unexpensive equipment and materials and the imports of certain foods for consumption. Such a profitability by the agricultural sector is good, however, the magnitude of profit is decreasing with the years especially for the Gaza Strip whose relatively large citrus crop is finding great marketing difficulties with little effective help from any one. The Arab countries should be able to enact a preferential import and subsidy policy for purchase of all the excess agricultural produce of the occupied territories if indeed there is to be an effective policy to aid Palestinian Arab farmers to work and stay on their land. This is certainly a more effective and more dignified form of support than the irregular grants given by the Arab countries from time to time.

3. As shown previously, agriculture contributes more to the income of laborers and the people at large in the occupied territories. There is no sector in which as many people are involved as in agriculture.

4. Agriculture has the potential to decrease the occupied entity of the West Bank and Gaza Strip's dependence on Israel for income more than any other economic sector.

5. Support and success of the agricultural sector and hence food production has the effect of improving the nutritional status of the people in the occupied territories and hence bring about a generation of healthier and more productive Palestinians in general.

6. Support and success of the agricultural sector increases the attachment of the people to their land thus preventing emigration and encouraging return of Palestinians who are able to return to their land.

7. Support and success of the agricultural sector stimulates various agricultural industries, food industries[31] and agricultural research and technology in general.

EFFECT OF ADVANCES IN THE AGRICULTURAL SECTOR ON:

B. - Deteriorating Nutritional Quality and Health Status in the Occupied Territories:

Economic pressures which the farmers have faced since occupation and the readily available worldwide agricultural technology resulted in an increase in the use of accelerated methods of production with high yields. These methods included planting under plastic, use of hybrid seeds (e.g. of various vegetables, fruits and wheat) and the increase use of chemical fertilizers , insecticides, herbicides, fungusides and concentrated animal feeds.

These agricultural advances and materials have resulted in many changes in the food value per unit of food. These changes include many examples such as the following:-

1. Dry-farmed or irrigated vegetables planted under plastic have less total solids, minerals and vitamins and even less organic flavor material per kilogram of product than those planted without plastic.

2. Soft hybrid wheats have less proteins, minerals and vitamin E content than the local hard wheat varieties, especially when they are not heavily fertilized.

3. The cow's milk purchased from Israel which represents the majority of the milk consumed in the occupied territories has been found to contain the various agrochemicals consumed by cattle.

4. The chickens and eggs produced on Israeli feed concentrates have an off flavor and the eggs also have less of the nutritious yellow pigment than those chickens raised on normal feed. The off color and flavor of such eggs made them undesirable in local markets but are purchased because these eggs are sold cheaper than the locally Arab produced eggs.

5. Agrochemicals especially insecticides used heavily on vegetables and fruits is decreasing the value of food as a healthy consumable substance. The insecticides are found to go inside the harvested produce by penetrating the permenable skin of the vegetable or the fruit eaten. Cases of nervous system anamolies, stomach pains and other unpleasant symptoms were reported by a hospital in an Israeli area adjacent to the occupied areas. (93)

Cancer, hardening of arteries and thrombotic diseases may be caused by ingesting insecticides. The Palestinians in the occupied territories can not afford nor do they have the

facilities and funds to combat dangerous maladies entering their body through sprayed foods.

6. The grape leaves consumed from a sprayed vineyard are more likely to cause damage to human health than those which are not sprayed. Chemical sprays such as those used on grape leaves have been shown to damage mitochondrial membranes in living cells.

7. The tomatoes produced by rain-fed agriculture have more flavor, solids, nutrients, color and pungency than the drip irrigated tomatoes grown under plastic or in a green house.

8. Spring water and shallow underground water which one drinks in a highly advanced agricultural area using agrochemicals is likely to be less healthy to drink than the water from a less "advanced" agricultural area. Water contamination in highly developed agricultual areas has been reported all over the world. (94)

In general, intensive farming using agrochemicals as done by the Israelis from whom some food products are purchased can be dangerous to health of Palestinians if consumed over a long period of time.

RECOMMENDATIONS ON THE MEANS AND WAYS TO PROMOTE FOOD PRODUCTION AND RAISE THE NUTRITIONAL STANDARDS IN THE OCCUPIED TERRITORIES UNDER THE PREVAILING CONDITIONS

There exists a possibility to bring about advances on every aspect discussed in this study which can bring about improvements in food production and nutritional status in the occupied territories. Therefore, each of these aspects will be dealt with separately with respect to the most possible and most practical improvements.

Human Resources

1. The most important resource for bettering food productivity and overall nutritional status in the occupied territories is an investment in a forgotten important resource, which is the large number of farmers and laborers engaged in agriculture.

Farmers will no doubt and can easily obtain most of their nutritional food needs from the land if they can spare some money from sales of their agricultural produce. It is essential to provide some form of assistance to farmers and laborers working in agriculture in order to stay working in agriculture rather than having to work as laborers in Israel, building its economy and infrastructure. Some grants for small agriculture projects and loans for larger ones should be provided without much red tape. The effort done to date in the area of grants and loans for the agriculture sector is too small and has too much bureaucratic procedures and red tape to benefit the common farmer.

2. Farmers must be provided with subsidies and an agricultural insurance or relief assistance in times of disasters, e.g. wars and natural disasters such as is the case in years of drought, in some years of snow, years of poor harvest for olives and citrus, years in which losses occur due to closure of the transport bridges to Jordan during critical harvest times, etc.

3. An urgent establishment of a training program in agricultural technology (to work with greenhouses, production of seedlings, animal breeding, etc.) for farmers and the large number of Palestinian youth males and especially females who are mostly unemployed. There has to be economic training programs for the large number of male youths who are increasing in numbers in the West Bank and Gaza Strip and have very little to do except for being laborers in Israel. The increase is a result of the recent combined effect of regulations by Israel and Jordan of restricting their movements to outside the occupied territories.

LAND RESOURCES

1. Providing support for farmers to plant trees as that will protect land from Israeli confiscation and provides a more solid and stable income over the years. The cost of planting trees and loss of revenue while waiting for trees to start production must be provided with some sort of a support system.

Trees suitable for rain-fed regions include olives which must not be from olive cuttings but from that of olive grafts on wild olive root with its known water-seeking fibrous root system.

Additionally,it is recommended that farmers be assisted in planting jojoba in their rain-fed lands, as this industrial oil-producing dwarf tree has been introduced recently from the United States to the West Bank with a remarkable success. A technical agricultural feasibility study must be conducted in order to execute such programs.

2. Plant a tree support system from subsidized nurseries should include planting any tree a farmer can plant in the rain-fed regions of the West Bank and Gaza Strip.

3. Provide a plant protection system against tree insects which have devastated for example the almond crop in the West Bank and Gaza Strip for the last few years.

4. Hindering and preventing Israel's land confiscations by providing financial support for a legal land office(s) in the occupied territories through the use of effective and reputable Palestinian attorneys, joint and alone with Israeli lawyers interested in defending Palestinian property rights in the Israeli courts and provide publicity against radical take-over of Palestinian lands.

WATER RESOURCES

1. Provide support for various systems of water conservation and better water utilization in both the West Bank and Gaza Strip by giving the aid either directly to farmers or through UNDP, EEC and/or the American private voluntary organizations allowed to work in the occupied territories. Such assistance may include the following:

a. support a better utilization of common-use springs by providing funds to set-up concrete or covered canals or pipes based on pure technical feasibility studies.

b. provide funds for cleaning or deepening of underground water wells and repair of spoiled or inefficient well equipment when permissions are available.

c. assistance in construction of water reservoirs or polyethylene lined earth pools based on technical plans.

d. provide assistance in setting-up terraces, erosion control barriers, small water-spreading dams and rain-gathering wells.

e. provide aid to drip irrigation systems and planting under plastic especially under plastic tunnels and greenhouses.

f. provide aid for forestration for control of water runoff in the land of any person willing to plant forest trees on his property.

2. Provide funds for drilling the very deep wells the Israeli Military Authorities claim in their Ministry of Defense 13 year study that permissions were given to the Arabs for drilling but the Arabs lacked the funds.(9)

3. Provide funds for major sewage treatment plants in the large municipalities of Nablus, Jenin, Tulkarem and El-Bireh with the ultimate aim of using that sewage water for irrigation of suitable trees and crops based on technical feasibility studies. Jojoba is one of the crops being now irrigated on a very large scale in Israel in the Negev desert by Ben Gurion University. This project which received World Bank support should be implemented in the West Bank and such an experiment will eventually benefit all the Arabs who contribute to such a Palestinian research.

4. Aid in the establishment of a legal office with technical consultants to defend Palestinian water rights in the same manner pointed out for the land office.

FOOD PRODUCTION

1. Provide grants and loans to set-up heated greenhouses to produce off-season (early) vegetable produce and thus minimize dependence on Israel. This aid should be based on a purely technical feasiblity study.

2. Provide grants and loans for planting trees and vegetables whose produce is imported from Israel but can be grown easily in the West Bank and Gaza Strip, e.g. avocados (rich in nutrients and calories), mangos, apples, persimmons, potatoes, mushrooms, asparagus, hybrid anise, head lettuce and strawberries. The latter is also produced in the Gaza Strip but not in sufficient quantities.

3. Provide a subsidy for planting of the less profitable but more secure field crops, e.g. wheat in land areas known to give high yield. The Jordan government has done that for its farmers and if such a system is adopted in the occupied territories, alot of marketing problems will be solved in addition to increasing the self-sufficiency in wheat.

4. Provide a stable fund to provide grants for a research institute to set-up technical agricultural demonstrations to counsel farmers. In the area of plant production, the support for demonstrative and training procedures may include:

a- advantages of gas fumigation of soil in producing more productive vegetables and seedlings

b- procedure of increasing the yield of olives by urea sprays in the flowering period and providing two waterings in the summer

c- procedure of spraying ripe olive fruits by various hormone sprays to cause their collective fall and hence speed the harvest of olives

d- chemical and fertilizer treatments of soil to eradicate in irrigated lands the broom rape plant parasite which attacks vegetables and nearly wipes out their productivity

e- procedure of producing expensive seeds purchased in large quantities from Israel. For example, farmers should be shown how to produce onion and potatoe settings for planting of onions and potatoes rather than purchasing the onion and potatoe settings from the Israeli companies. It is ironic that Palestinian farmers produce the onion seeds for the Israeli companies who in turn make the settings and sell them to the farmers. It should be noted that the current price of some hybrid seeds such as watermelon, cantelopes and tomatoes is 300, 350 and 3000 US dollars per kilogram respectively.

In the area of animal production , the support for demonstrative and training procedures may include:

a- artificial insemination of animals and proper useage of various nutrients and drugs for protection against diseases and the use of various hormones to synchronize the timing of birth and increase the twinning of animals.

b- increasing the projects for raising Freisian cattle and the "Assaf" hybrid sheep and the "Shami" type of goats as all of these are high milk producers and can be

raised on concentrated feed without the need for large pastures as most of the pasture lands have been confiscated by the Israelis.

c- provide research funds for finding methods of producing a local cheap animal concentrated feed(s) and provide animal feed support system directly for the farmers themselves.

d- provide aid for research on improving the breeding of existing animal stocks and giving support to farmers willing to raise new breeds.

e- provide aid to demonstrate the efficient methods in egg production and white meat production including rabbits and fish with grants and loans to farmers wanting to use the improved methods in animal production

5. conduct studies on means and ways of increasing animal production in general and of the animals products purchased from Israel in particular with plans on setting up a comprehensive animal production program and execute the practical easy-to-follow aspects of that program, e.g. establishing breeding farms for cooperatives, institutes and farmers. Start dairy products factories with sheep and goat carton milk and yogurt of which the Israeli Tnuva Company is selling large quantities in all the markets of the West Bank and Gaza Strip.

6. provide small loans and grants to farmers interested in having self-sufficiency for their families in animals products (e.g., milk products, eggs, honey, etc.) Raising a small number of animals near the homes and having few bee hives thrive free on the abundant flora of Palestine has no economic risks and is useful in building up a food self-sufficiency for the entire occupied area.

7. Provide aid to establish good flour mills and modern bakeries with a good distribution system based on technical feasibility studies. Not to have bread in Arab stores on some Jewish holidays shows how dependent the people of the occupied territories are on the Israeli food industry.

8. Provide aid in setting-up food facilities for cold storage, packing and food processing plants based on technical feasibility studies showing the consumption and competition of Israeli products locally and the economics of exporting the excess during varied times of the year.

9. Provide aid to insure a more organized and economic trucking system for the West Bank and Gaza Strip to truck fruit and vegetable produce across the Jordan River bridges

during glut of production. There is a need for the efficient transport of the large quantities of fruits including citrus and of vegetables including melons during the permitted fixed periods by the Jordan government for bringing in specific agricultural products into or through Jordan. Provide transit shipments of vegetables and fruits direct to the Arab Gulf States. With the increase in production of vegetables by Jordan, the restrictions by the Jordan government on produce from the occupied territories will become even more stringent. The PLO-Jordan joint committee and other interested parties in the welfare and steadfastness of the Palestinian people should work out a way to at least allow such hard-to-produce Palestinian commodities to go transit out of Jordan for export.

FOOD CONSUMPTION

In general, as pointed out above, a decrease in the dependence of West Bank and Gaza Strip Palestinians on consumption of the Israeli produced food products must be worked out. The consumption of traditional foods proven scientifically to have long lasting health effects on Arab populations must be supported in various ways including publicity campaigns by Arab media, e.g. using the close-by Arab television networks, the local press, producing articles for school children, etc.

Some of the recommendations pertaining to how food consumption may result in the improvements of food production and nutritional status of Palestinians include the following:

1. Encouragement of the consumption of olive oil which contains over 77 organic substances in it and which has been reported to be better for health than industrially produced corn oil, refined soybean oil and hydrogenated oils. The availability of large supplies of olive oil in the West Bank throughout the year will insure a good and reliable source of calories for the people in both the West Bank and Gaza Strip.

2. Establishing standards for as many food products as is possible with proper labeling, e.g. for olive oil, processed meats, animal feeds, fruit juices, etc. Starting food labeling with defined food standards should begin with cooperatives, UNRWA and other agencies. Such actions will bring about consumer demand for such food criteria and hence improve food quality.

3. Encouragment of consumption of unsprayed fruits and vegetables produced in the West Bank and Gaza Strip and which are better for health than those that are sprayed heavily with chemicals as those produced in Israel.

4. Encouragement of consumption of milk and dairy products obtained from home raised Arab cattle and sheep which have less harmful chemical residues than Israeli produced milk and other dairy products. Various reports at the Volcani Research Institute in Israel has been published showing large chemical residues in Israeli milk.

5. Encouragement and guidance of family dependence on having its own food as discussed above and have complete storage of basic food needs from a period of one month to one year depending on the food substance, e.g. flour, olive oil, sesame, lentils, chickpeas, dried almonds, tomatoe paste, fruit preserves, honey, concentrated yogurt preserved in olive oil, dried vegetables (e.g. beans, mulookhiyah, okra, etc.) and store needed drited fruits (e.g. figs, dates, raisens) and the foreign imports of sugar, rice, tea and spices.

In a poor and occupied country in which security and continuity of food supply can be interrupted and can be a serious issue at any time as in the case of curfews imposed often by the Israeli Military Authorities, local farmers should be encouraged to have a few of their own home gardens and animals in addition to the stored necessities mentioned.

NUTRITIONAL STATUS

1. Refer to relevant points on food production and consumption as disucssed above.

2. Implement a model program for enrichment of wheat flour with the essential amino acid, lysine, in order to increase the amount of protein intake from bread. Large percent of the lysine in bread is lost during its baking due to a protein-carbohydrate reaction at high temperatures. Tunisia and other countries have been experimenting with a grain similar to wheat called "Triticale"[95] which is rich in lysine and most industrial countries do enrich their bread with lysine and their markets have the so-called "enriched bread".

3. The lack of consumption in the percent of animal proteins consumed by Palestinians in the West Bank and Gaza Strip is alarming and indicates possible nutritional deficiences in iron and the B group of vitamins.

The possibility of anemia in Palestinian children, Palestinian mothers and growing females whose need for proteins, iron and B vitamins is the greatest requires a statistical representative analyses of the blood of these

groups and their growth and development patterns. A program of nutritional supplements should in the meantime be done at least as a precaution. The high consumption by Palestinians in the West Bank and Gaza Strip of cereals and of vegetables and fruits as shown in this study is not sufficient for proper growth and development of children.

PUBLIC AND PRIVATE SECTOR CONTRIBUTIONS TO BETTERMENT OF FOOD PRODUCTION AND NUTRITIONAL STATUS

1. Refer to the relevant points mentioned in human, water and land resources and to those in food production and consumption.

2. Provide assistance to extension activities for agricultural development by providing aid to new or existing scientific research centers in the West Bank. The fact that this study showed a great decline in the activities of the agriculture extension service and the experimental stations requires having some help or a substitute for the poor public role in this important matter.

3. Provide funds from Arab sources to match the available funds for various projects (agriculture, water or other infrastructure) which are supported by the private voluntary organizations in East Jerusalem who are allowed by the Israel government to work in the occupied territories but lack all the necessary funds. Any infrastructure or development of projects in the occupied territories has the final result of improving the overall economical status and the ability of the people in the occupied territories to utilize their resources on agricultural productivity and the improvements of their nutritional status. Any assistance to villages irrespective of its type is an assistance to over 70% of the population in the occupied territories and to the farmers who can then increase their agricultural productivity.

4. Pressure must be placed by Arab governments and international humanitarian agencies on the United States government and the United States Senate to have AID, the Agency for International Development of the US, request the Israeli government to allow at least the humanitarian funds earmarked for assistance by the American AID supported PVO's (private voluntary organizations) be disseminated in the occupied areas according to experts recommendations without rejections, procrastinations and pre-conditions on the local Palestinian population by the Israeli military government administration.

5. Funds should be set-aside by Arab organizations for setting up of a vocational training center and a practical agricultural technology college in the occupied territories if and when permission by the Israeli authorities is granted. The absence of any agricultural college in the occupied territories must be dealt with seriously if skilled agricultural entrepreneurs are to be produced.

6. Since agriculture was shown in this study to be the spinal cord of the economy of the West Bank and Gaza Strip, the assistance programs of the PLO-Jordan government joint committee, the Islamic Conference, the Islamic Bank, UNDP, EEC and other interested governmental agencies should be concentrated more on developing the agriculture sector in the occupied territories through a technical assistance plan for three or five years of development in all of the critical agricultural sectors defined in this study. Several hundred million dollars are needed for the agricultural sector if such a plan is to be implemented.

There are many other recommendations for the possible improvements of food production and raising the nutritional status in the West Bank and Gaza Strip but considering the presence of a foreign occupation government ruling these territories whose interest and the Palestinian residents interests are often in conflict, it would be a great achievement to implement even a small portion of the recommendations suggested herein.

Arabs in position of responsibility should be able to explain their point of view especiallly at the United Nations that all the needed improvements in food production in the occupied territories and the raising of nutritional status is a humanitarian matter and improvements and aid should not be held back and considered a political matter by Israel.

The data presented in this study justified the immediate need for implementing some of the means and ways recommended for assistance in food production and in the utilization of locally produced food products as nutritional substances and as income generating commodities.

If all the recommendations fail to be implemented, the least that can be done for the people in the occupied territories is to insure marketing of excess food products, e.g. various fruits and vegetables, olive oil, etc.

The Palestinian farmers must be assisted with establishing a marketing and public affairs cooperative or association outside the occupied areas with a branch inside whose objectives should be restricted to:

- solving problems of certificate of origin required by Jordan
- providing a system of organized trucking
- making marketing campaigns
- providing needed information to farmers in their capacity as exporters and to others as importers
- lobby in Arab countries and in Jordan for direct export (transit) out of Jordan to the Arab Gulf States

This non-profit association can also act as liaison with all existing governmental and non-governmental agencies and organizations working on various matters including sympathy to assist the Palestinians in the marketing of the produce of the occupied territories. Good marketing of food products will:

- stimulate farmers to produce more and that in turn will increase the overall food production,

- make food products plentiful in the occupied areas,

- provide a good source of cash and hence improve the overall nutritional status, and

- increase the dependence of the Palestinians on themselves.

In only a short time from now, i.e. by the year 2000, the number of Palestinian Arabs outside Palestine who are mostly living in Arab countries is reported in this study to be 4.2 million[24] which is 1.8 times more than those living in the West Bank and Gaza Strip (2,335,100 persons) during the same year. Such a large number of Palestinians outside should be able to accept a program of giving preference to purchasing West Bank and Gaza Strip produce. Israel was successful in marketing a brand called "Jaffa" oranges so why not adopt a brand called "Palestine" oranges at least for consumption by those Palestinians outside. There is no fear from any competition coming from Israel to use a name brand for oranges called "Palestine".

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