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LIST OF DISEASES AND PESTS

Note by the secretariat

This document is based on ECE/TRADE/C/WP.7/GE.6/2006/9. It contains an amended bibliography and pictures of diseases and pests.

NOTE: This text presents a list of the major diseases affecting potatoes, as well as a basic description of each disease and the extent of certification measures for each disease. More detailed information on the symptomology and epidemiology of the diseases can be obtained from the following textbooks:

Compendium of Potato Diseases (2001, 2nd edition). W.R. Stevenson and others, eds. St. Paul, Minnesota, USA, American Phytopathological Society.

European Handbook of Plant Diseases (1998). I.M. Smith and others, eds. Oxford, UK, Blackwell Scientific Publications.







Diseases, Pests and Disorders of Potatoes in Israel (2006, 2nd edition). L. Tsrer and S. Warshavsky, eds. Israel Vegetable Growers Organization. Website: www.yerakot.il. E-mail: irgun@yerakot.org.il.






Fiches descriptives des maladies et ravageurs de la pomme de terre (2000). France, FNPPT (Fédération Nationale des Producteurs de Plants de Pommes de Terre)/GNIS (Groupement National Interprofessionnel des Semence et Plants).



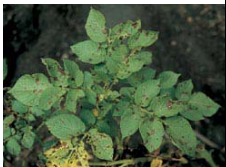


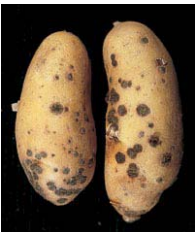
Kartoffel-Krankheiten, Schädlinge und Unkräuter (2003). W. Radke, W. Reickmann and F. Brendler, eds. Gelsenkirchen, Verlag Thomas Mann.






Maladies et ravageurs de la pomme de terre (1991). W. Radke and W. Rieckmann, eds. Translated and adapted into French by M. Magnenat. Gelsenkirchen-Buer, Verlag Thomas Mann.




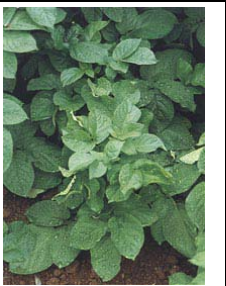
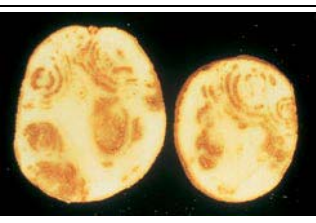
Potato Diseases (2005). A. Mulder and L.J. Turkensteen, eds. The Hague, NIVAP. Website: www.nivap.nl.

Disease	French name	Agent	Status in UNECE Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
FUNGUS								
Potato wart disease	Galle verruqueuse	<i>Synchytrium endobioticum</i>	Zero tolerance	Visual observation of tubers and stem base	Tuber: tumours Plant: tumours and galls on stolons and stem base			
Late blight	Mildiou	<i>Phytophthora infestans</i>	Tolerance for wet or dry rot	Visual observation of plants and tubers	Tuber: rot at harvest and in storage Plant: necrosis of leaves and stems			
Dry rot	Fusariose	<i>Fusarium solani</i> var. <i>coeruleum</i> , <i>F. sulphureum</i> , <i>F. avenaceum</i> and other <i>F. spp.</i>	Tolerance	Visual observation of tubers and identification on selective medium	Tuber: storage rot Plant: non-emergence or weak plants			
Gangrene	Gangrène	<i>Phoma foveata</i> and other <i>Phoma spp.</i>	Tolerance for dry rot	Visual observation of tubers and identification on selective medium	Tuber: storage rot			May be regulated without tolerance in some regions
Leak and pink rot	Pythiales	<i>Pythium spp.</i> (wet rot agent), <i>Phytophthora erythroseptica</i> (pink rot agent)	Tolerance for wet rot	Visual observation of tubers and identification on selective medium	Tuber: rot, primarily soon after harvest			
Rubbery rot		<i>Goetrichum candidum</i>	Tolerance for wet rot	Visual observation of tubers and	Tuber: storage rot			








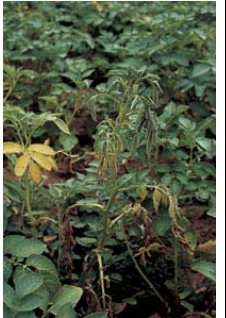
Disease	French name	Agent	Status in UNECE Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
				identification on selective medium				
Rhizoctonia Black scurf (on tuber)/ Stem canker (on the plant)	Rhizoctone brun	Perfect state: <i>Corticium</i> ; imperfect state: <i>Rhizoctonia solani</i>	Tolerance on tubers (black scurf)	Visual observation of plants and tubers	Tuber: surface blemish Plant: uneven emergence, wilting and stunting		 	Stem canker regulated in some regions. No need for general regulation because regulation of black scurf is seen as more effective
Silver scurf	Gale argentée	<i>Helminthosporium solani</i>	Treated indirectly through tolerance for shrivelled tubers	Visual observation of tubers and identification on selective medium	Tuber: skin blemish			Regulated with tolerance in some regions
Black dot	Dartrose	<i>Colletotrichum coccodes</i>	Treated indirectly through tolerance for shrivelled tubers	Visual observation of tubers and identification on selective medium	Tuber: skin blemish Growing plant: may contribute to early dying disease in warm climates			Regulated with tolerance in some regions


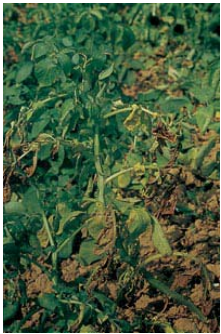
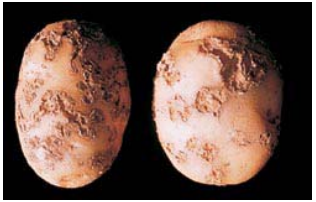

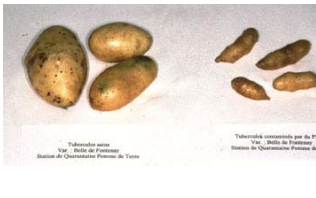
Disease	French name	Agent	Status in UNECE Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Skin spot	Oosporiose	<i>Polyscytalum pustulans</i>	Not regulated	Visual observation of tubers	Tuber: skin blemish and death of eyes Plant: uneven and non-emergence			Regulated with tolerances in some regions. No need for a general regulation, not a barrier to trade.
Early blight	Alternariose	<i>Alternaria solani</i> and <i>Alternaria alternata</i>	Treated indirectly through tolerances for dry rot	Visual observation of leaves and tubers	Tuber: largely superficial rot Plant: necrosis of leaves			
White mould	Sclerotiniose	<i>Sclerotinia sclerotiorum</i>	Not regulated	Visual observation of stem	Tuber: rot, rare Plant: wilting and death of individual stems		 	Not to be regulated. Infection is from soil inoculum and not from the tuber
Powdery scab	Gale poudreuse	<i>Spongospora subterranea</i>	Tolerance	Visual observation of tubers with confirmation by microscope	Tuber: surface scab and cankers at rose end			May be regulated with tolerance in some regions





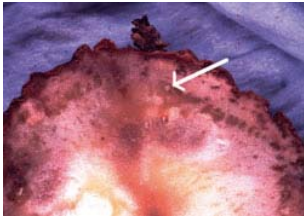


Disease	French name	Agent	Status in UNECE Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Verticillium wilt	Verticilliose	<i>Verticillium dahliae</i> and <i>V. alboatrum</i>	Not regulated	Visual observation of leaves and plant	Tuber: vascular discoloration Plant: wilting and death			No need for regulation in UNECE standard because path of infection is primarily through infested soil and not the seed tuber
VIRUS								
Severe mosaic	Virose grave	Potato viruses Y (all strains), A, V and M, and in combination with PVX and S	Tolerance for severe virus	Visual observation of plant and ELISA test	Plant: with or without discolorations of the foliage. Deformation can be rugosity, crinkle, rolling and rigidity of the leaves or dwarfing of plant Tuber: superficial necrosis caused only by PVY ^{NTN}			Tuber symptoms, regulated with tolerance in some regions
Mild mosaic	Virose légère	PVX, PVS and PVY strains, especially PVY ^N	Tolerance for mild mosaic	Visual observation of plant and ELISA test	Plant: discoloration or mottle of leaves without distortion Tuber: superficial necrosis caused only by PVY ^{NTN}			Tuber symptoms, regulated with tolerance in some regions



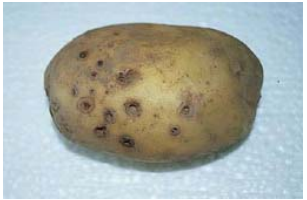

Disease	French name	Agent	Status in UNECE Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
								
Leafroll	Enroulement (Virus E)	Potato leafroll virus (PLRV)	Tolerance for severe virus	Visual observation of plant and ELISA test	Plant: rolling of leaves and stunting Tuber: net necrosis in flesh			
Mop top (Spraying in tubers)	Mop top	Potato mop top virus (PMTV)	Not regulated ¹	Visual observation of plant and tubers, ELISA test and PCR	Plant: marked mottling of leaves and stunting of all or some stems Tuber: necrotic rings or arcs on surface and in flesh			Regulated with a zero tolerance in some regions
Tobacco rattle virus (Spraying in tubers)	Rattle	Tobacco rattle virus	Not regulated ¹	Observation of tubers and PCR	Plant: mottling and distortion of leaves and stunting of some or all stems Tuber: internal discoloured arcs and rings, rarely visible on the surface			Regulated in some regions with tolerances

¹ According to experience in certain areas, the disease can eradicate itself due to low transmission rates.

Disease	French name	Agent	Status in UNECE Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Tomato spotted wilt virus	TSWV	Tomato spotted wilt virus	Not regulated		Plant: leaf spotting and necrosis Tuber: skin blemish and internal necrotic spotting			Regulated in some regions with zero tolerance
BACTERIA								
Blackleg	Jambe noire	<i>Pectobacterium atrosepticum</i> (syn. <i>Erwinia carotovora</i> subsp. <i>atroseptica</i>) and <i>Pectobacterium carotovorum</i> (syn. <i>E. carotovora</i> subsp. <i>carotovora</i>), <i>Dickeya</i> spp. (syn. <i>E. chrysanthemi</i>)	Tolerance for crop and tuber for wet rot	Observation of plant and tuber	Plant: stem rot Tuber: soft rot	 	 	
Ring rot	Flétrissement bactérien, pourriture annulaire	<i>Clavibacter michiganensis</i> subsp. <i>sepedonicus</i>	Zero tolerance	Observation of plant and tuber, test by IF and PCR	Tuber: vascular soft rot Plant: wilting and death			

Disease	French name	Agent	Status in UNECE Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Brown rot	Pourriture brune	<i>Ralstonia solanacearum</i>	Zero tolerance	Observation of plant and tuber, test by IF and PCR	Tuber: vascular soft rot Plant: wilting			
Common scab	Gale commune	<i>Streptomyces scabiei</i> and other <i>S.</i> strains, e.g. <i>Streptomyces europaeiscabiei</i> and <i>S. stelliscabiei</i> .	Tolerance on the tuber	Observation of tuber	Tuber: scabs			
Netted scab	Gale plate	<i>Streptomyces europaeiscabiei</i> and <i>Reticuliscabiei</i>	Tolerance on the tuber	Observation of tuber	Tuber: superficial netted scabs			
VIROID								
Potato spindle tuber viroid	Viroïde des tubercules en fuseau	Potato spindle tuber viroid (PSTV)	Zero tolerance	Observation of plant and tuber. Test by molecular hybridization and PCR	Tuber: elongation of tuber Plant: stunting and leaf rolling			
PHYTOPLASMA								

Disease	French name	Agent	Status in UNECE Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Stolbur	Stolbur	Phytoplasma . [The principal vectors are leafhoppers (<i>Macrostelus</i> spp, <i>Hyalestes</i> spp)]	Zero tolerance	Visual observation of leaves and tubers	Plant: stunting and leaf rolling			In some regions regulated, zero tolerance
NEMATODES								
Cyst nematodes	Nématodes à kystes	<i>Globodera rostochiensis</i> and <i>Globodera pallida</i>	Zero tolerance	Visual observation of the field and testing of soil	Plant: wilting and death			
Root knot nematodes	Nématodes à galle	<i>Meloidogyne chitwoodi</i> and <i>fallax</i>	Zero tolerance	Observation of tuber, microscopic examination of cut tuber, and PCR test	Tuber: surface galls and internal necrotic spots	 		In some regions regulated, zero tolerance
Potato rot nematode	Nématodes libres	<i>Ditylenchus destructor</i>	Zero tolerance	Observation of tuber	Tuber: surface cracking and cortical spotting			In some regions regulated, zero tolerance

Disease	French name	Agent	Status in UNECE Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
PESTS								
Colorado beetle	Doryphore	<i>Leptinotarsa decemlineata</i>	Unregulated	Visual observation of eggs, larvae and adults	Plant: leaf damage			In some regions regulated, zero tolerance
Wireworms/slugs	Taupin	<i>Agriotes</i> sp.: <i>A. obscurus</i> , <i>A. sputator</i> , <i>A. lineatus</i> / <i>Tandonia budapestensis</i> , <i>Arion hortensis</i>	Unregulated	Visual observation of tubers	Tuber: tunnels and holes	 		
Tuber moth	Teigne	<i>Phthorimea opercullella</i>	Unregulated	Visual observation of leaves and tubers	Tuber: leaf Plant: tunnels in flesh damage			In some regions regulated, zero tolerance

Disease	French name	Agent	Status in UNECE Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
						