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Working Party on Agricultural Quality Standards

Specialized Section on Standardization of
Seed Potatoes

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REPORT ON ITS THIRTY-THIRD SESSION

Addendum 1

LIST OF PESTS AND DISEASES

Note by the secretariat: At the session it was decided to continue work on this list and to publish the text as an addendum to the report.

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
FUNGUS							
Black dot	Dartrose	<i>Colletotrichum coccodes</i>	Unregulated	Visual observation of tubers and identification on selected sites	Warm summers: yellowing, curling up and withering of the leaves and stem, and (a typical symptom of early destruction of the roots) sloughing of the epidermis of the roots and formation of numerous black dots	At harvest time, slight discoloration with silky microsclerotia. Discoloration becomes more pronounced during storage but does not spread like silver scurf.	
Dry rot	Fusariose	<i>Fusarium solani</i> var. <i>coeruleum</i> , <i>F. sulphureum</i> , <i>F. avenaceum</i> et al.	Regulated with defined tolerance (dry rot)	Visual observation of tubers and identification on selected sites		Small circular patches rapidly develop into concentric bands with a white/orange mycelium. On the surface the infection looks identical to gangrene, but inside the tuber there are cavities lined with mycelium. The tuber may gradually dry up until it becomes hard and "mummified".	
Silver scurf	Gale argentée	<i>Helminthosporium solani</i>	Unregulated	Visual observation of tubers and identification on selected sites		Light silvery patches may appear during the storage period, especially when the temperature is above 6° and humidity is high.	Regulated with tolerance in some regions
Dry rot or gangrene	Gangrène	<i>Phoma foveata</i> and <i>Phoma exigua</i>	Regulated with defined tolerance (dry rot)	Visual observation of tubers and identification on selected sites	Black pycnidium may appear at the base of the stems at the end of the crop or after haulm defoliation.	Dry rot, dark depressed areas giving rise to "thumbprint" patches	May be regulated without tolerance in some regions

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
Powdery scab	Gale poudreuse	<i>Spongospora subterranea</i>	Regulated with defined tolerance	Visual observation of tubers confirmed by microscope	Formation of cankers or galls on the roots, initially white then turning brown.	Light-coloured blisters which take on a darker hue with age. The blisters break to release a brownish powder.	May be regulated with tolerance in some regions
Leak and pink rot	Pythiales	<i>Pythium</i> spp, (wet rot agent), <i>Phytophthora erythroseptica</i> (pink rot agent)	Regulated with defined tolerance (wet rot)	Visual observation of tubers and identification on selected sites		Tuber rot	
Late blight	Mildiou	<i>Phytophthora infestans</i>	Regulated with defined tolerance (wet or dry rot)	Visual observation of plants and tubers	Small discoloured blemishes which turn brown and are surrounded by a yellow ring on the upper side of the leaves. On the underside, a characteristic white felting.	Rust-coloured mottled areas on the surface which may extend towards the centre of the tuber	
Stem canker	Rhizoctone brun	Perfect state: <i>Corticium</i> ; imperfect state: <i>Rhizoctonia solani</i>	Regulated with defined tolerance	Visual observation of plants and tubers	Contaminated plants stand upright, sometimes (not always) with small above-ground tubers where leaf meets stem. The infected parts of plants that have been pulled up display brown, dry necrotized areas.	Irregular black sclerotia developing on surface before harvesting	

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
White mould	Sclerotiniose	<i>Sclerotinia sclerotiorum</i>	Unregulated	Visual observation of stem	Rotting of the stem-ends, covered with a whitish mycelium. Large black sclerotia can often be noted inside the stems.	Rot is relatively rare, starting on the stem-heel, with sclerotia present on the rot.	
Skin spot	Oosporiose	<i>Polyscytalum pustulans</i>	Unregulated	Visual observation of tubers		Small dark blisters 0.5 to 4 mm in diameter developing on the surface, either isolated, or in groups	
Early blight	Alternariose	<i>Alternaria solani</i> and <i>Alternaria alternata</i>	Unregulated (or dry rot on tubers)	Visual observation of leaves and tubers	Well-defined necrotic blemishes, of variable size, located more often on the bottom leaves, concentric rings on the large blemishes	Brown and black rot, very dry, quite typical, with shrinking	
Potato wart disease	Galle verruqueuse	<i>Synchytrium endobioticum</i>	Regulated, no tolerance	Visual observation of tubers	Tumours, due to cell proliferation, of highly variable size (from a few mm to the size of a fist), develop on the lenticles, stolons, and parts of the stem under the ground. The tumours turn progressively blacker, releasing a black spore powder.	Tumours	

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
Verticilium wilt	Verticilliose	<i>Verticillium dahliae</i> and <i>V. alboatrum</i>	Unregulated	Visual observation of leaves and plant	Yellowing (sometimes on only one side of the plant), followed by withering of the foliage then the whole plant. Small black sclerotia may be observed on the dead stems	Brown blemishes on the vascular ring, which can evolve into cavities	
VIRUS							
Potato virus A	Virus A	PVA	Regulated with defined tolerance	Visual observation of plant and ELISA test	Primary infection (contamination during current year): mild mosaics (easier to see in overcast weather). Secondary infection (contamination dates from previous year): pronounced mosaics		
Potato virus M	Virus M	PVM	Regulated with defined tolerance	Visual observation of plant and ELISA test	Spoon-shaped, limp, curled-up leaves		

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
Potato virus S	Virus S	PVS - Two types of virus: the PVS ^o or ordinary strain, very widespread in Europe, and the PVSA Andean strains, classified as quarantine parasites	Regulated with defined tolerance (mild viral infection)	Visual observation of plant and ELISA test	Generally weak (latent) symptoms		
Potato virus X	Virus X	PVX	Regulated with defined tolerance	Visual observation of plant and ELISA test	Primary infection (due to contamination during the current year): faint mosaics, most easily seen in overcast conditions; secondary infection (contamination in the previous year) pronounced mosaics		
Potato virus Y	Virus Y (Y ^o >Y ^N > Y ^{NTN})	PVY		Visual observation of plant and ELISA test			

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
PVYo	Y ^o		Regulated with defined tolerance (serious viral infection)	Visual observation of plant and ELISA test	Primary infection (contamination during the current year) emerges through the appearance of black necrotic blemishes, on the veins and the undersides of leaves. Secondary infection (contamination during the previous year) produces pronounced symptoms: mottle, crinkle and mosaic		
PVYn	Y ^N	Necrotic PVY	Regulated with defined tolerance (generally mild viral infection)	Visual observation of plant and ELISA test	Primary infection: weak mosaics; secondary infection: more or less marked mosaic symptoms		
Potato Tuber Necrotic Ringspot Disease	Y ^{NIN}	Necrogenic virus	Regulated with defined tolerance (generally mild viral infection)	Visual observation of plant, immunoassay and PCR	Basically crinkle-type (like Y ^o) rather than mosaic (classic Y ^N)	Surface necroses in the form of rings or arcs that do not extend inside the tuber	
Potato virus YC	Y ^c	Potato virus (stipple streak strain)	Regulated with defined tolerance (mild viral infection)				

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
Potato virus YW	Y ^w		Regulated with defined tolerance (mild viral infection)	PCR			
Leaf roll	Virus E (enroulement)	Potato leaf roll virus	Regulated with defined tolerance (severe viral infection)	Visual observation of plant and ELISA test	Primary infection: leaves at the top of the plant are slightly curled and show yellowing. Secondary infection: the leaves at the base are tightly curled and hardened, plant growth habit is straighter and the internodes are shorter.		
Mop top	Mop top	Potato mop top virus	Unregulated	Visual observation of plant and tubers, ELISA test and PCR	Leaves at the base can show bright yellow blemishes, sometimes with curved or chevron patterns. Shortening of the internodes on the top leaves giving plant a bushy appearance	Brown necroses, ring-shaped or in lines, more or less concentric, which often penetrate into the tuber flesh without interruption	
Tobacco rattle virus	Rattle	Tobacco rattle virus	Unregulated	Observation of tubers and PCR	Some strains can cause symptoms on the foliage with light blemishes and diffuse outlines.	Curved, corky brown patterns visible in cut tuber. Symptoms sometimes visible on outside.	

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
Tomato spotted wilt virus	TSWV	Tomato spotted wilt virus	Unregulated		In current-year infection, brown blemishes and round or concentric necrotic ring blemishes which dry up and then fall off. The attack starts at the top of the plant, with symptoms ranging from discoloration or chlorosis of the top to necrosis and death at the apex	Deformation of the tubers, bursting, cracking and dark stains on the surface or under the skin. In some cases, there are internal rust-type stains, but occasionally concentric rings appear combined with rot.	In some regions, regulated, no tolerance
BACTERIA							
Black leg	Jambe noire	<i>Erwinia carotovora</i> subsp. <i>atroseptica</i> and subsp. <i>carotovora</i> , <i>Erwinia chrysanthemi</i>	Regulated with defined tolerance in leaves and tuber (wet rot)	Observation of plant and tuber	Early attacks can cause blanking [death of sprouts before emergence]. Yellowing and coiling of leaves, followed by the black leg phenomenon, i.e., damp black rot at the base of the stems		

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
Ring rot	Flétrissement bactérien, pourriture annulaire	<i>Clavibacter michiganensis subsp. sepedonicus</i>	Regulated, no tolerance	Observation of plant and tuber, IF test and PCR	Symptoms not always present. When they are, late wilting of the foliage, occurring quite late, with yellowing, coiling and necroses of the foliage, unlike <i>Ralstonia</i> .	Browning of the vascular ring starting at the stem-base which then develops into soft rot (not damp)	
Brown rot	Pourriture brune	<i>Ralstonia solanacearum</i>	Regulated, no tolerance	Observation of plant and tuber, IF test and PCR	Symptoms not always present. When they are, rapid wilting of the foliage. In severe attacks, a bacterial exudate may ooze out when the stem is cut.	Reddish brown coloration of the vascular tissues, visible when tubers are cut. A beige rot turning to brown then develops on the vascular ring. Pressing the tuber produces a whitish bacterial exudate from the vascular tissue.	
Common scab	Gale commune	<i>Streptomyces scabies</i> and other strains: <i>Streptomyces europaeiscabies</i> , <i>S. stelliscabies</i> and <i>S. reticuliscabies</i> .	Regulated with defined tolerance	Observation of tuber	Symptoms sometimes visible on roots or stolons when attack is early	Blister or raised scab producing craters in the tuber; cork scab, known as flat or superficial scab, producing superficial corky blemishes	
VIROID							
Potato spindle tuber viroid	Viroïde des tubercules en fuseau	Potato spindle tuber viroid	Unregulated	Observation of plant and tuber. Test by molecular hybridization and PCR	In the case of a virulent strain, dark green leaves, crinkling, spoon-shaped leaf roll.	Reduction in tuber size combined with deformation giving rise to spindle-shape tubers	In some regions regulated, no tolerance

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
PHYTOPLASMA							
Stolbur	Stolbur	Mycoplasm. The principal vectors are insects of the families of cicadelles (Macrosteles sp, Hyalestes sp)	Unregulated	Visual observation of leaves and tubers			In some regions regulated, zero tolerance
NEMATODES							
Cyst nematodes	Nématodes à kystes	Globodera rostochiensis and Globodera pallida	Regulated with a zero tolerance	Visual observation of the field and soil analysis			
Root knot nematodes	Nématodes à galle	Meloidogynes chitwoodi and fallax	Unregulated	Observation des tubercules et coupe pour analyse binoculaire, digestion enzymatique et PCR			In some regions regulated, zero tolerance
Free living nematodes	Nématodes libres	Ditylenchus destructor Nématodes or very small worms	Unregulated	Observaiton des tubercules	No visible symptoms		In some regions regulated, zero tolerance
PESTS							

Disease	French name	Agent	ECE status	Recommended diagnostic method	Symptoms - vegetation	Symptoms - tubers	Comment
Colorado beetle	Doryphore	<i>Leptinotarsa decemlineata</i>	Unregulated	Visual observation of eggs, larvae and adults	Leaf damage		In some regions regulated, no tolerance
Wireworms	Taupin	<i>Agriotes sp.:</i> <i>A. obscurus,</i> <i>A. sputator,</i> <i>A. lineatus</i>	Unregulated	Visual observation of tubers		Tuber damage: tunnels dug into flesh	
Tuber moth	Teigne	<i>Phthorimea opercullella</i>	Unregulated	Visual observation of leaves and tubers	Damage to leaves and the leaf stalks by perforation and drilling. Grey felting on the surface.	Caterpillars dig tunnels into the tubers, lining them with silk thread and expelling blackish excrement outside	In some regions regulated, no tolerance