Chapter Eight

DISEASES OF POTATOES

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POTATO (*Solanum tuberosum*)

BACTERIAL RING ROT

Clavibacter michiganensis subsp. *sepedonicus*

Cultural: Clean then disinfect all storages and potato equipment thoroughly at least once annually. To do this, first remove all soil and plant debris then use a recommended disinfectant (see Appendix II). When planting, use only certified disease free seed, and disinfect all equipment (please see note 4) between seed lots. Use cup rather than pick type planters to minimize wounding. At harvest, use only new bags for seed since it is impossible to disinfect old ones. If disease is found, dispose of all potatoes as soon as possible then thoroughly disinfect the premises as described previously. Practice crop rotation and do not plant potatoes in an infested field for 2 seasons.

Resistant Cultivars: None.

Chemical: None.

Notes:

1. All grades of Canadian seed potatoes have a zero tolerance for bacterial ring rot.

2. Bacterial ring rot was declared a 'pest' under the Agricultural Pests Act of Alberta in 1939. In 1942 it was also declared a 'pest' in British Columbia. It is also a declared 'pest' in Saskatchewan. In 2005, the Bacterial Ring Rot Regulation came into effect in the Province of Manitoba. Legislation aims to eradicate the disease on commercial potato farms.

3. Symptomless (latent) infections of ring rot occur (5).

4. *C. michiganensis* can survive for several years on equipment and storage surfaces (6).

References:

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BACTERIAL SOFT ROT

Erwinia carotovora subsp. *carotovora*

Cultural: Do not over-irrigate fields during the growing season. Harvest only mature tubers when soil temperatures are less than 10ºC. Minimize mechanical damage during harvest and handling. Protect tubers from desiccation by sun and wind. Cool tubers of early maturing cultivars to 10ºC. For late maturing potatoes, store tubers for 7-10 days at 10º-15ºC to promote wound healing, then lower temperature to 2-5ºC (7º-10ºC for processing tubers). Provide good ventilation to prevent low oxygen concentrations and development of moisture films on tuber surfaces. Do not wash tubers before storage; however, if washing is necessary before marketing, use a chlorinated rinse water, dry the tubers as soon as possible and package them in well-aerated containers. When washing use only clean water and change it frequently to reduce the soft rot inoculum level. Control other diseases that predispose tubers to soft rot. Remove culls and other plant refuse to prevent insect transmission in storage.

Resistant Cultivars: None.

Chemical: None.

Notes: Blackleg symptoms also can be caused by *E. carotovora* subsp. *carotovora*

References:

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BLACK DOT

Colletotrichum coccodes

Cultural: Use certified seed. Rotate with grains (preferably five years). Other solanaceous crops such as tomatoes, peppers and eggplant should not be used in rotations with potatoes. Control nightshade weeds. Soil should be adequately fertilized. Irrigate but avoid excess watering. Avoid skinning or bruising tubers at harvest.

Resistant cultivars: There are no potato cultivars resistant to black dot. Cultivars producing thin-skinned tubers are more susceptible.

Chemical: None.

Note: In storage, keep relative humidity at or above 90 percent. If possible, store at 40°F

References:

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2. Denner, F.D.N., *et al.* 2000. Effect of soil solarisation and mouldboard ploughing on black dot of potato, caused by *Colletotrichum coccodes*. Potato Res. 43: 195-201.
3. Andrivon, D., *et al.* 1998. Colonization of roots, stolons, tubers, and stems of various potato (*Solanum tuberosum*) cultivars by the black-dot fungus *Colletotrichum coccodes*. Plant Pathol. 47: 440-445.
4. Denner, F.D.N., *et al.* 1998. The effect of seed- and soilborne inoculum of *Colletotrichum coccodes* on the incidence of black dot on potatoes. Potato Res. 41: 51-56.
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BLACKLEG

Erwinia carotovora subsp. *atroseptica*

Cultural: Plant whole seed that is free from blackleg. Plant in well-drained soil, especially when using cut seed. Treat cut seed with approved fungicides then plant immediately or suberize it well before planting to reduce infection by *Fusarium* spp. and other pathogens that predispose it to bacterial invasion (see Note 1). Plant on land with at least two or three years between potato crops. Avoid excessive irrigation to prevent seed-piece decay and subsequent stem invasion. Remove potato culls and other plant refuse to avoid insect transmission. Frequently clean and disinfest seed cutting and handling equipment as well as planters, harvesters and conveyers to eliminate contamination. This should be done at least between different seed lots. Avoid washing seed potatoes and exercise care during handling operations to minimize damage. Remove infected plants as soon as they appear, if practical.

Resistant Cultivars: None.

Intermediate: Russet Burbank (Netted Gem).

Chemical: None.

Notes:

1. Fungicidal seed piece treatments do not directly control blackleg.

2. Seed potatoes in Canada are inspected in the field for blackleg.

3. Blackleg bacteria may be present on tuber surfaces even in the absence of foliage or tuber symptoms.

References:

1. Hyman, L.J., *et al*. 2000. A competitive PCR-based method for the detection and quantification of *Erwinia carotovora* subsp. *atroseptica* on potato tubers. Let. Appl. Microbiol 30: 330-335.
2. Sharga, B.M., and Lyon, F.D. 1998. *Bacillus subtilis* BS 107 as an antagonist of potato blackleg and soft rot bacteria. Can. J. Microbiol. 44: 777-783.
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Also see the references under BACTERIAL SOFT ROT on page 3.

COMMON SCAB

Streptomyces scabies

Cultural: Use a 3-5 year rotation. Plant scab-free seed on land free of scab. Use an acidic fertilizer, such as ammonium sulfate, for nitrogen and irrigate adequately especially during tuber initiation. Increased irrigation at tuber set is the most effective control method to date (2007).

Cultivar Ratings: The following ratings are from 2005 and 2006 trials conducted by Dr. Eugenia Banks, in Ontario soils heavily contaminated with common scab:

Very Tolerant Cultivars: Superior, MSA 8254-2B Russet, Rio Grande Russet, AC 92009-4RUS, Cecile, Amandine, Goldrush, velox, Russet Burbank, CV 92028-1 Liberator

Cultivars with Good tolerance: Cherokee, Onaway, Altitude, A 175-1, Stampede Russet, Dakota Diamond, B 1992-106, Fabula, NY 126, Keuka Gold, Lady Christil, Satina, Dark Red Norland, Viking, Purple Viking, Klondike Rose, Mozart, Baby Boomer, Red Pearl, Gemstar, Peribonka.

Chemical: None recommended.

Note: The addition of sulfur to increase soil acidity is generally not recommended because of high cost and the danger of causing excessive soil acidity.

References:

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DRY ROT

Fusarium spp.

Cultural: Harvest during dry, cool weather if possible. Top killing at least two weeks prior to harvest encourages a good skin set which helps to reduce damage at harvest. Avoid bruising and wounding the tubers when harvesting. Store tubers for 7-10 days at 12ºC to favour wound healing, then lower temperature to 2-5ºC (10ºC for processing tubers). Maintain humidity at 90% RH with adequate air circulation. Treat seed-pieces with a fungicide for control of seed-piece decay (see Appendix I). Handle seed with non contaminated equipment and store in clean containers.

Chemical: See Appendix I.

Notes: Cross-resistance to thiabendazole and thiophanate-methyl has been identified for at least one species of the fusarium dry rot pathogen complex, i.e. *Fusarium sambucinum.*

References:

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EARLY BLIGHT, BROWN SPOT

Alternaria solani, A. alternata

Cultural: Minimize stress by controlling weeds, maintaining adequate soil moisture and fertility. Avoid potatoes, tomatoes, or egg plants in the crop rotation for at least 2 consecutive years. Use seed potatoes free of the disease. Permit tubers to mature in the ground before digging. Avoid bruising during digging and handling.

Resistant Cultivars: None.

Chemical: See Appendix I.

References:

1. Guenther, J.F., *et al.* 1999. Assessment of pesticide use in the U.S. potato industry. Am. J. Pot. Res. 76:25-29.
2. Shtienberg, D., *et al.* 1999. Integrated management of early and late blight in potatoes. *In*: Modern fungicides and antifungal compounds II. pp. 247-255.
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FUSARIUM WILT

Fusarium spp.

Cultural: Grow potatoes on land free from wilt fungi. Use disease-free potatoes for seed. Do not add inoculum such as infested soil, diseased tubers or plant refuse to clean fields. Practice crop rotation. Follow good soil management, including the use of proper irrigation practices.

Resistant Cultivars: None.

Chemical: See Appendix I.

References:

1. Mantecon, J.D. 1993. Evaluation of seed-piece treatments for the control of fusarium potato wilt and stem-end rot in Argentina. Tests Agrochem. Cultiv. 14: 52-53.
2. Emmond, G.S. and Ledingham, R.J. 1972. Effects of crop rotation on some soil-borne pathogens of potato. Can. J. Plant Sci. 52: 605-611.

LATE BLIGHT

Phytophthora infestans

Cultural: Destroy cull piles by burying or spraying them with a herbicide. Plant only healthy seed potatoes. Kill infected potato tops 2 weeks before harvest to reduce tuber infection during harvest (see appendix IV for desiccants and top killers). Harvest late so that infected tubers rot and remain in the soil. Remove diseased tubers before storage and maintain adequate air circulation in the pile. Maintain good air circulation to dry out decaying tubers. Infected tubers should be held at a temperature that is as low as practical. Cool temperatures needed for suppression of tuber rot tend to have a negative impact on frying colour, in chipping and french fry potatoes.

Resistant Cultivars: None.

Chemical: Follow label instructions when applying registered fungicides listed in Appendix I. Time spray applications according to late blight forecasts for your region. Always apply one spray before row closure. Apply sprays every 10-14 days in hot dry weather when the risk of infection is low. Apply fungicides every 5 to 7 days in late blight favourable weather particularly when late blight warnings are high.

References:

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11. Daayf, F., *et al*. 2001. Relationships between RAPDs, Gpi-allozyme patterns, mating types, and resistance to metalaxyl of *Phytophthora infestans* in Canada in 1997. Am. J. Potato Res. 78: 129-139.
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LEAF ROLL

Potato leaf roll virus

Cultural: Plant leaf roll-free seed. Rogue out infected plants if practical. Control aphids to limit virus spread. Top-kill seed potatoes as early as possible after aphid vectors appear.

Resistant Cultivars: None.

Chemical: None. (See note).

Note: Limit virus spread by reducing aphid vector populations with registered insecticides.

References:

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LEAK

Pythium ultimum

Cultural: Grow potatoes on well-drained soils. Do not irrigate soils heavily. Harvest tubers when they are mature in cool weather. Avoid bruising and injuring potatoes. Store the potatoes at the proper temperature and humidity (refer to section on dry rot above for more details). Tubers harvested in hot, sunny weather are likely to develop leak and should be cooled below 10ºC and marketed as soon as possible.

Resistant Cultivars: None.

Chemical: See Appendix I.

References:

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MOSAIC

Potato virus X, potato virus S, potato virus A, potato virus Y

Cultural: Use seed that is free of viruses. Avoid rubbing foliage with clothing, machinery, etc. Disinfest cutting knives and equipment as often as possible. Rogue diseased plants from seed fields. Reduce aphid populations to limit spread of viruses A and Y as described for leaf roll.

Resistant Cultivars: None.

Chemical: None (see note 2).

Notes:

1. Disinfest equipment (see Appendix II).

2. Insecticides recommended for leaf roll limit spread of viruses A and Y.

References:

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2. Peterson, L.C., *et al.* 1961. Viricidal disinfectants for the potato-cutting knife. Am. Potato J. 38: 382-387.

PINK ROT

Phytophthora erythroseptica

Cultural: Plant potatoes in well-drained soil. Do not over irrigate potatoes during the growing season. Allow tubers to mature underground for 2-3 weeks after top-killing. Do not harvest potatoes when soil temperatures rise above 17-18ºC. Minimize bruising and cutting at harvest. Remove field heat from healthy potatoes gradually in a humid environment (90-95% relative humidity) to thicken skin and increase tuber resistance to infection in storage. Remove field heat as rapidly as possible from potatoes harvested from warm damp soil if symptoms of pink rot appear in storage after harvest. Store pink rot infected potatoes at or below 8ºC in a continuously ventilated dry storage facility (80-85% relative humidity) until all affected tubers have dried up. Process potatoes as rapidly as possible if continuous ventilation fails to stop the spread of pink rot decay. If possible, harvest wet areas of fields last and store separately from healthy tubers

Resistant Cultivars: None.

Chemical: See Appendix I.

Notes:

1. Symptoms of leak and pink rot are so similar that it can be difficult to correctly identify the causal agent. Pink rot and Pythium leak may occur together. The two diseases can be distinguished by the symptoms they are causing: pink rot is firmer with a pink coloration after cutting (below) while Pythium leak is a soft, watery, cavity rot with a black ring around the outer edge.

2. Tuber flesh adjacent to darkened areas colonized by the *P. erythroseptica* pathogen turn pink 30-45 minutes after an infected tuber is cut open.

References:

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POWDERY SCAB

Spongospora subterranea f. sp. *subterranea*

Cultural: Crop rotation (minimum of 6 years). Use well-drained soils and avoid planting on contaminated land. Plant only disease-free seed. Do not use manure from animals fed infected tubers as the resting spores of the fungus will pass unharmed through the digestive tract. Restrict irrigation at tuber set.

Resistant Cultivars: Russet Burbank typically does not show tuber infection but does produce root galls.

Very Susceptible cultivars: Dakota Pearl, AC Glacier Chip, Niska.

Chemical: None.

Note: It is important to differentiate between common and powdery scab before making management decisions.

References:

1. Harrison, J.G. *et al.* 1997. Powdery scab disease of potato - a review. Plant Pathol. 46: 1-25.
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RHIZOCTONIA (BLACK SCURF)

Rhizoctonia solani

Cultural: Use disease-free seed. Avoid planting in cold, wet soil and cover seed pieces with not more than 5 cm (2 inches) of soil when planting early in cool soil. Harvest the tubers as soon as they are mature. Avoid growing potatoes in fields or portions of fields where the disease has been severe.

Resistant Cultivars: None.

Chemical: See Appendix I.

References:

1. Tsror, L., *et al*. 2001. Biological control of black scurf on potato under organic management. Crop Prot. 20: 145-150.
2. Errampalli, D., and Johnston, H.W. 1999. Effect of chlorine disinfection prior to planting on black scurf (*Rhizoctnia solani*) and common scab (*Streptomyces scabies*) of potatoes. Phytopathol. 89: S24.
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SEED PIECE DECAY

Fusarium spp., *Pythium* spp., *Erwinia carotovora*

Cultural: Cut, treat, and plant the seed the same day. If cut seed cannot be planted the same day, then store it at 10-15°C with high humidity to facilitate suberization. Never allow cut seed to stand in the hot sun or in a drying wind. Plant in soils sufficiently warm and moist to promote good sprout growth and wound healing. Whole seed is quite resistant to decay. Stressing seed by putting it in direct contact with systemic insecticides or bands of liquid fertilizer apparently increase levels of seed piece decay.

Resistant Cultivars: None.

Chemical: See Appendix I.

References:

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SILVER SCURF

Helminthosporium solani

Cultural: Plant disease-free seed tubers and practice crop rotation. Harvest tubers as soon as they are mature. Cull out noticeably infected ones at digging and grading. Rid the field of all tubers left after harvest. Maintain stable levels of relative humidity and temperature in storage after harvest. Thoroughly disinfect storage between crops.

Resistant Cultivars: None.

Chemical: See Appendix I.

Notes: Resistance of *H. solani* to thiabendazole may limit this product's effectiveness.

References:

1. Hervieux, V., *et al*. 2002. Effect of organic and inorganic salts on the development of *Helminthosporium solani*, the causal agent of potato silver scurf. Plant Dis. 86: 1014-1018.
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11. Firman, D.M., *et al.* 1995. Effects of seed size, planting density and planting pattern on the severity of silver scurf (*Helminthosporium solani*) and black scurf (*Rhizoctonia solani*) diseases of potatoes. Assoc. Appl. Biol. 127: 73-85.
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SPINDLE TUBER

Potato spindle tuber viroid (PSTV)

Cultural: Use seed tubers known to be free from PSTV. Avoid mechanical transmission by planting whole, rather than cut seed, and avoid leaf contact by equipment in field operations. Decontaminate knives and other equipment as frequently as possible (see Note 1). Rogue diseased plants in seed fields.

Resistant Cultivars: None.

Chemical: None.

Notes:

1. For disinfestation use sodium hypochlorite 6% (household bleach, dil. 1:10 not a.i.); ammonium based disinfectants or soapy water.

2. Amendments to the Canada Seeds Act call for a zero tolerance for spindle tuber in all classes of seed potatoes.

References:

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VERTICILLIUM WILT

Verticillium albo-atrum, Verticillium dahliae

Cultural: Treat seed pieces to prevent soil- and seed-borne infection. Use a 3-or 4-year rotation with cereals or grasses to reduce soil-borne inoculum. Control susceptible weeds.

Resistant Cultivars: None.

Chemical: See Appendix I.

Notes: Plant parasitic nematodes, particularly *Pratylenchus* spp., may increase the incidence and severity of verticillium wilt. Nematicides or soil fumigants (please see appendix III) applied for the control of these nematodes may also suppress verticillium wilt. (Preharvest interval - 90 days).

References:

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OTHER DISEASES

The following diseases of potato are currently of minor importance and/or are diseases for which no practical control measures are currently recommended:

Black Pit (*Alternaria alternata*)

Calico (Alfalfa mosaic virus)

Corky Ring Spot (Spraing) (Tobacco rattle virus)

Phoma Rot (*Phoma* sp.)

Potato Mop Top Virus

Purple-top Wilt (aster yellows phytoplasma)

Witches'-broom (potato witches'-broom phytoplasma)

QUARANTINE DISEASES

The following diseases do not occur at present or are of limited distribution in Canada and are under quarantine regulations:

Columbia Root-knot Nematode (*Meloidogyne chitwoodi*)

Golden Nematode (*Globodera rostochiensis*) - Confined to areas of Vancouver Island, B.C., Quebec and Newfoundland.

Wart (*Synchytrium endobioticum*) - Confined to areas of Newfoundland and Prince Edward Island

PVY^{N} (Potato virus Y - necrotic strain)

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APPENDIX I. Fungicides Registered for Controlling Plant Diseases on Potato.

Disease	Active Ingredient	Trade Name	C* or D	Formulation	PCP No.
Bacterial Soft Rot	hydrogen peroxide	Biosafe StorOx	C	27% SN	27432
Blackleg	thiophanate-methyl	Senator PSPT Seed Piece Treatment	C	10% DU	14599
Dry Rot	fludioxonil	Maxim PSP	C	0.5% PO	26647
	hydrogen peroxide	Biosafe StorOx	C	27% SN	27432
	metiram	Polyram 16D Fungicide Dust Polyram 16D Seed Piece Treat.	C	16% DU 16% DU	22029 25867
	thiabendazole	Mertect SC Fungicide	C	45% SU	13975
	thiophanate-methyl	Senator PSPT Seed Piece Treatment	C	10% DU	14599
Early Blight	azoxystrobin	Quadris	C	250 g/L SU	26153
	boscalid	Lance	C	70% WG	27495
	chlorothalanil	Bravo 500	C	500 g/L SU	15723
	chlorothalanil + carbaryl	C-I-L Deecop Insecticide-Fungicide for Vegetables	D	18% + 18% SU	13723
	copper oxychloride	Copper Spray Guardsman Copper Oxychloride	C	50% WP	19146 13245
		Later's Copper Spray Fungicide	D	50% WP	16140
	copper oxychloride + carbaryl	Later's Potato and Tomato Dust Insecticide Fungicide Co-op Potato-Tomato Dust	D D	7% + 5% DU	16106 17423
	dimethomorph + mancozeb	Acrobat MZ	C	9% + 60% WP	24546
	famoxadone + cymoxanil	Tanos	C	25% + 25% WG	27435
	fenamidone	Reason	C	500g/ L SU	27462
	mancozeb	Dithane DG Rainshield NT Manzate 200 DF Dithane WSP 80% Penncozeb 75DF	C	75% WG 75% WG 80% WP 75% WG	20553 21057 23655 25397
	mancozeb + zoxamide	Gavel 75 DF	C	66.7% + 8.3% WG	26842
	maneb	Dithane M-22	C	80% WP	4918
	metalaxyl-m + chlorothalonil	Ridomil Gold/Bravo Twin Pak	C	480 g/L + 500 g/L SU	26443
	metiram	Polyram DF Polyram 16D	C	80% WG 16% DU	20087 22029
	pyraclostrobin	Headline	C	250 g/L EC	27322
	pyrimethanil	Scala SC	C	400 g/L	28011
	tribasic copper sulfate	Griffin Basicop Fungicide	C	53% WP	19003
		Wilson Bordo Fungicide Spray	D	53% WP	17482
	tribasic copper sulfate + carbaryl	Wilson Garden Doctor CIL Deecop CIL Garden Doctor	D	7% + 5% DU	17424 14160 26445
	zineb	Clean Crop Zineb 80W	C	80% WP	14562
	zineb + carbaryl	Co-op Bug & Blight Control King PTV Potato Dust Manchester 2 in 1 Bug Killer	D	4% + 5% DU	10644 10711 11515

* C = Commercial or D = Domestic registration

APPENDIX I. Fungicides Registered for Controlling Plant Diseases on Potato (continued)

Disease	Active Ingredient	Trade Name	C* or D	Formulation	PCP No.
Late Blight	azoxystrobin	Quadris	C	250 g/L SU	26153
	chlorothalanil	Bravo 500	C	500 g/L SU	15723
	chlorothalanil + carbaryl	C-I-L Deecop Insecticide-Fungicide for Vegetables	D	18% + 18% SU	13723
	copper oxychloride	Copper Spray Guardsman Copper Oxychloride	C	50% WP	19146 13245
		Later's Copper Spray Fungicide	D	50% WP	16140
	copper oxychloride + carbaryl	Later's Potato and Tomato Dust Insecticide Fungicide Co-op Potato-Tomato Dust	D D	7% + 5% DU	16106 17423
	cyazofamid	Ranman 200 SC	C	400g/ L	27894
	cymoxanil	Curzate 60 DF	C	60% WG	26284
	dimethomorph + mancozeb	Acrobat MZ	C	9% + 60% WP	24546
	famoxadone + cymoxanil	Tanos	C	25% + 25% WG	27435
	fenamidone	Reason 500SC	C	500 g/L SU	27462
	fluazinam	Allegro	C	40% SU	27517
	mancozeb	Dithane DG Rainshield NT Manzate 200 DF Penncozeb 75DF	C	75% WG 75% WG 75% WG	20553 21057 25397
	mancozeb + zoxamide	Gavel 75 DF	C	66.7% + 8.3% WG	26842
	maneb	Dithane M-22	C	80% WP	4918
	metalaxyl-m + chlorothalonil	Ridomil Gold/Bravo Twin Pak	C	480 g/L + 500 g/L SU	24125
	metiram	Polyram DF Polyram 16D	C	80% WG 16% DU	20087 22029
	pyraclostrobin	Headline	C	250 g/L EC	27322
	tribasic copper sulfate	Griffin Basicop Fungicide	C	53% WP	19003
		Wilson Bordo Fungicide Spray	D	53% WP	17482
	tribasic copper sulfate + carbaryl	Wilson Garden Doctor CIL Deecop CIL Garden Doctor	D	7% + 5% DU	17424 14160 26445
	zineb + carbaryl	Co-op Bug & Blight Control King PTV Potato Dust Manchester 2 in 1 Bug Killer	D	4% + 5% DU	10644 10711 11515

* C = Commercial or D = Domestic registration

APPENDIX I. Fungicides Registered for Controlling Plant Diseases on Potato (continued)

Disease	Active Ingredient	Trade Name	C* or D	Formulation	PCP No.
Pink Rot and Pythium Leak	metalaxyl-m + chlorothalonil	Ridomil Gold/Bravo Twin Pak	C	480 g/L + 500 g/L SU	24125
	metalaxyl-m + mancozeb	Ridomil Gold MZ 68WP	C	4% WP + 64%	25379
Pink Rot	metalaxyl-m	Ridomil Gold 480 EC (in furrow)	C	480 g/L EC	25384
Pink Rot suppression	metalaxyl-m	Ridomil Gold 480 SL (in-furrow)	C	480 g/L	28474
Rhizoctonia Canker and Black Scurf	azoxystrobin	Quadris (in-furrow)	C	250g/ L SU	26153
	fludioxonil	Maxim PSP	C	0.5% PO	26647
	thiabendazole	Mertect SC Fungicide	C	45% SU	13975
Seed Piece Decay	captan + diazinon	Co-op Potato Seed piece Treatment	C	7.5% + 0.1% DU	15755
	mancozeb	Dithane M-45 8% Dust Potato Seedpiece Fungicide MancoPlus Potato Seed Piece T. Tuberseal Potato Seed Piece D. Potato ST 16	C	8% DU 16% DU 16% DU 16% DU	10186 26157 17042 24734
	metiram	Polyram 16D Fungicide Dust Polyram 16D Seed Piece Treat.	C	16% DU 16% DU	22029 25867
	thiophanate-methyl	Senator PSPT Seed Piece Treatment	C	10% DU	14599
Silver Scurf	fludioxonil	Maxim PSP	C	0.5% PO	26647
	hydrogen peroxide	Biosafe StorOx	C	27% SN	27432
	thiabendazole	Mertect SC Fungicide	C	45% SU	13975
	thiophanate-methyl	Senator PSPT Seed Piece Treatment	C	10% DU	14599
Verticillium Wilt	thiophanate-methyl	Senator PSPT Seed Piece Treatment	C	10% DU	14599

* C = Commercial or D = Domestic registration

APPENDIX II. Products Registered for Disinfecting Farm Machinery and Storage Areas.

Disease	Active Ingredient	Trade Name	Formulation	PCP No.
Bacterial Ring Rot	dimethyl benzyl ammonium chloride	Ag-Services Incorporated General Storage Disinfectant	10% LI	14957

APPENDIX III. Soil Sterilants and Nematicides Registered for Controlling Soil Borne Diseases.

Active Ingredient	Trade Name	Formulation	PCP No.
metam	Vapam Liquid Solution	33% SN	6453
methyl bromide*	Methyl Bromide Fumigant	100% SN	16495
1,3-dichloropropene	Telone II**	94% SN	15893
1,3-dichloropropene + chloropicrin	Telone C17**	78.3 + 16.5% SN	16324
1,3-dichloropropene+ methyl-isothiocyanate	Vorlex Plus Liquid Soil Fumigant**	40% + 20% SN	18353

*Registration for methyl bromide will not be renewed the next time the label is reviewed. Consequently methyl bromide will only be available for the next two to three years. Registration for this chemical is being withdrawn because of the potential damage this product may do to human health and the environment.
** Not available in British Columbia.

APPENDIX IV. Registered Topkillers and Desiccants.*

Active Ingredient	Trade Name	Formulation	Next Registration	PCP No.
diquat	Reglone Liquid Herbicide and Dessicant	240 g/L	2007	26396
glufosinate ammonium	Ignite 15 SN Herbicide and Dessicant (British Columbia)	15% SN	2003	23180
	Liberty (Prairie Provinces)	150 g/L EC	2004	24081

*****Dessicants are applied so that foliage infected with late blight dies and dries out completely before harvest. This control measure decreases levels of tuber infection at harvest and in so doing reduces levels of storage decay.