Chapter Seven

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. Commercial seed cutting operations should ensure disinfecting all surfaces where tubers touch, especially knives between lots. Use cup rather than pick type planters to minimize wounding. At harvest, use only new bags (since it is impossible to disinfect old ones) or disinfest pallet boxes or storage bins for seed before bringing in new harvest. If disease is found in field, dispose of all potatoes as soon as possible by processing out-of-field or cultivating under the infected field before winter freeze. If found in storage dispose by processing, burying or by cultivating into field to allow freezing; 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. Potato cultivars such as Urgenta, Desiree or Teton are highly resistant to BRR and rarely, if ever, show symptoms of disease when infected. There is, therefore, a risk of symptomless infections occurring in these cultivars, and they have been shown to act as carriers of the disease (7).

**Chemical:** None for field management. For disinfesting storage surfaces and equipment – see Appendix II.

**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 can occur (4).

4. *C. michiganensis* can survive for several years on equipment and storage surfaces (5).

**References:**


BACTERIAL SOFT ROT

_Pectobacterium carotovora_ subsp. _carotovora_

**Cultural:** Do not over-irrigate fields during the growing season. Harvest only mature tubers when soil temperatures are less than 10°C. Minimize mechanical damage during harvest and handling. Protect tubers from desiccation by sun and wind. Cool tubers of early maturing cultivars to 10°C. For late maturing potatoes, store tubers for 7-10 days at 10°-15°C to promote wound healing, then lower temperature to 2-5°C (7°-10°C 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:** See Appendix I for post-harvest treatment.

**Notes:** Blackleg symptoms also can be caused by _E. carotovora_ subsp. _carotovora_

**References:**

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. Time irrigation to prevent plant stress but avoid excess watering. Avoid skinning or bruising tubers at harvest. After vine kill, the longer the tubers stay in ground the more prone they are to infection by blackdot and other soil-borne diseases – therefore harvest as soon as possible. Avoid condensation on tubers.

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

Chemical: See Appendix I.

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

References:


BLACKLEG

Pectobacterium carotovora subsp. atroseptica

Cultural: Plant whole seed that is free from blackleg. Plant in well-drained soil, above 10°C, 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 disinfect 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: Seed treatment to reduce seed rotting, helps in reducing blackleg. See Appendix I.

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:


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 or in soils with pH close to 5.2. 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, Goldruss, 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:**

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 12°C to favour wound healing, then lower temperature to 2-5°C (10°C for processing tubers). Maintain humidity at 90% RH with adequate air circulation and prevent free moisture or condensation on tubers. For planting, 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:

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:** Use fungicides when conditions favour early blight development. Rotate fungicide chemistry to prevent resistance development in the pathogen. See Appendix I.

**Notes:** Early blight normally affects senescing foliage, hence older and lower leaves often show the disease first. Early maturing varieties tend to show the disease before late maturing varieties.

**References:**


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: None.

References:

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 fungicide applications according to late blight forecasts for your region. Always apply at least one spray before row closure. Apply fungicides every 10-14 days in hot dry weather when the risk of infection is low, and every 5 to 7 days in late blight favourable weather particularly when late blight risk is high.

References:

**LEAF ROLL**

Potato leaf roll virus

**Cultural:** Plant certified seed free of potato leaf roll disease. 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:**

LEAK

*Pythium ultimum*

**Cultural:** Grow potatoes on well-drained soils. Do not irrigate soils heavily. Harvest in cool weather when tubers are mature. 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 10°C and marketed as soon as possible.

**Resistant Cultivars:** None.

**Chemical:** See Appendix I.

**References:**


MOSAICS

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

**Cultural:** Use certified 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:**

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 17-18°C. Minimize bruising and cutting at harvest. If possible, harvest wet areas of fields last and store separately from healthy tubers. 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 8°C in a continuously ventilated dry storage facility (80-85% relative humidity) until all affected tubers have dried up. Process potatoes as soon as possible if continuous ventilation fails to stop the spread of pink rot decay.

**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:**

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 stage.

**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:**


RHIZOCTONIA (BLACK SCURF)

*Rhizoctonia solani*

**Cultural:** Use disease-free certified 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.

**Note:** The longer the tubers are in ground after senescence or top-killing, the greater the chance of blackscurf development on the tubers.
References:


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, wound healing and rapid emergence. Whole seed is quite resistant to decay. Stressing seed by putting it in direct contact with systemic insecticides or bands of liquid fertilizer apparently increases levels of seed piece decay.

**Resistant Cultivars:** None.

**Chemical:** See Appendix I.

**References:**


SILVER SCURF

*Helminthosporium solani*

**Cultural:** Plant disease-free certified seed tubers and practice crop rotation. Harvest tubers as soon as they are mature. Cull out noticeably infected ones at time of digging and grading. Rid the field of all tubers left after harvest. Maintain stable levels of relative humidity and temperature in storage after harvest. Avoid condensation on tuber surface. After a crop is removed and also before a new crop is brought in, thoroughly disinfect storage walls and structures that will come in contact with tubers during storage.

**Resistant Cultivars:** None.

**Chemical:** See Appendix I.

**Notes:** Resistance of *H. solani* to thiabendazole may limit this product’s effectiveness. There may be cross-resistance to thiophanate methyl.

**References:**


**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:**

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. Avoid moisture stress.

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:

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)
REFERENCES

GENERAL REFERENCES


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

<table>
<thead>
<tr>
<th>Disease</th>
<th>Active Ingredient</th>
<th>Trade Name</th>
<th>C* or D</th>
<th>Formulation</th>
<th>PCP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacterial Soft Rot</strong></td>
<td>hydrogen peroxide</td>
<td>Biosafe StorOx</td>
<td>C</td>
<td>27% SN</td>
<td>27432</td>
</tr>
<tr>
<td>Black Dot</td>
<td>aoxystrobin</td>
<td>Quadris</td>
<td>C</td>
<td>250 g/L</td>
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<tr>
<td></td>
<td>aoxystrobin</td>
<td>Abound</td>
<td>C</td>
<td>250 g/L</td>
<td>26536</td>
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<td>aoxystrobin + difenoconazole</td>
<td>Quadris Top</td>
<td>C</td>
<td>200 g/L + 125 g/L</td>
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<td>Blackleg</td>
<td>thiophanate-methyl</td>
<td>Senator PSPT Seed Piece Treatment</td>
<td>C</td>
<td>10% DU</td>
<td>14599</td>
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<td><strong>Dry Rot</strong></td>
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<td>0.5% PO</td>
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<td>hydrogen peroxide</td>
<td>Biosafe StorOx</td>
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<td>27% SN</td>
<td>27432</td>
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<td>mancozeb</td>
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<tr>
<td></td>
<td>boscalid</td>
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<td>copper oxychloride</td>
<td>Copper Spray</td>
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<td>dimethomorph + mancozeb</td>
<td>Acrobat MZ</td>
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<td>9% + 60% WP</td>
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<td>famoxadone + cymoxanil</td>
<td>Tanos</td>
<td>C</td>
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<td>Reason**</td>
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<td>mancozeb + zoxamide</td>
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<td>66.7% + 8.3% WG</td>
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<td>metalaxyl-M + chlorothalonil</td>
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<td>Green Earth Bordo Copper Spray</td>
<td>D</td>
<td>53% WP</td>
<td>17482</td>
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<td>King ECO-WAY PTV Fungicide Spray</td>
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<td>53% WP</td>
<td>29968</td>
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<td>tribasic copper sulfate + carbaryl</td>
<td>Wilson Garden Doctor Insecticide Fungicide</td>
<td>D</td>
<td>7% + 5% DU</td>
<td>17424</td>
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<td></td>
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<td>King PTV Dust</td>
<td>D</td>
<td></td>
<td>29619</td>
</tr>
</tbody>
</table>

* C = Commercial or D = Domestic registration  ** Must be used in tank mix.
## APPENDIX I. Fungicides Registered for Controlling Plant Diseases on Potato (continued)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Active Ingredient</th>
<th>Trade Name</th>
<th>C* or D</th>
<th>Formulation</th>
<th>PCP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Blight</td>
<td>azoxystrobin</td>
<td>Quadris</td>
<td>C</td>
<td>250 g/L SU</td>
<td>26153</td>
</tr>
<tr>
<td></td>
<td>chlorothalonil</td>
<td>Bravo 500</td>
<td>C</td>
<td>500 g/L SU</td>
<td>15723</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bravo 720</td>
<td>C</td>
<td>720 g/L SU</td>
<td>29225</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Echo 720</td>
<td>C</td>
<td>720 g/L SU</td>
<td>29355</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bravo Ultrex</td>
<td>C</td>
<td>82.5% WG</td>
<td>29306</td>
</tr>
<tr>
<td></td>
<td>copper oxychloride</td>
<td>Copper Spray</td>
<td>C</td>
<td>50% WP</td>
<td>19146</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guardsman Copper Oxychloride</td>
<td></td>
<td></td>
<td>13245</td>
</tr>
<tr>
<td></td>
<td>copper hydroxide</td>
<td>Kocide 101</td>
<td>C</td>
<td>50% WP</td>
<td>14417</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kocide 2000</td>
<td>C</td>
<td>35% WP</td>
<td>27348</td>
</tr>
<tr>
<td></td>
<td>cyazofamid</td>
<td>Ranman 400 SC</td>
<td>C</td>
<td>400g/L</td>
<td>27984</td>
</tr>
<tr>
<td></td>
<td>cymoxanil</td>
<td>Curzate 60 DF**</td>
<td>C</td>
<td>60% WG</td>
<td>26284</td>
</tr>
<tr>
<td></td>
<td>dimethomorph</td>
<td>Acrobat WP**</td>
<td>C</td>
<td>50% WP</td>
<td>27700</td>
</tr>
<tr>
<td></td>
<td>dimethomorph + mancozeb</td>
<td>Acrobat MZ</td>
<td>C</td>
<td>9% + 60% WP</td>
<td>24546</td>
</tr>
<tr>
<td></td>
<td>famoxadone + cymoxanil</td>
<td>Tanos</td>
<td>C</td>
<td>25% + 25% WG</td>
<td>27435</td>
</tr>
<tr>
<td></td>
<td>fenamidone</td>
<td>Reason 500SC**</td>
<td>C</td>
<td>500 g/L SU</td>
<td>27462</td>
</tr>
<tr>
<td></td>
<td>fluazinam</td>
<td>Allegro</td>
<td>C</td>
<td>40% SU</td>
<td>27517</td>
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<tr>
<td></td>
<td>mancozeb</td>
<td>Dithane DG Rainshied NT</td>
<td>C</td>
<td>75% WG</td>
<td>20553</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manzate 200 DF</td>
<td>C</td>
<td>75% WG</td>
<td>21057</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Penncozeb 75DF</td>
<td>C</td>
<td>75% WG</td>
<td>25397</td>
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<tr>
<td></td>
<td>mancozeb + zoxamide</td>
<td>Gavel 75 DF</td>
<td>C</td>
<td>66.7% + 8.3% WG</td>
<td>26842</td>
</tr>
<tr>
<td></td>
<td>mandiproamid</td>
<td>Revus</td>
<td>C</td>
<td>250 g/L</td>
<td>29074</td>
</tr>
<tr>
<td></td>
<td>maneb</td>
<td>Dithane M-22</td>
<td>C</td>
<td>80% WP</td>
<td>4918</td>
</tr>
<tr>
<td></td>
<td>metalaxyl-M</td>
<td>Ridomil Gold 480EC</td>
<td>C</td>
<td>480 g/L EC</td>
<td>25384</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ridomil Gold 480SL</td>
<td>C</td>
<td>480 g/L SC</td>
<td>28474</td>
</tr>
<tr>
<td></td>
<td>metalaxyl-M</td>
<td>Ridomil Gold/Bravo</td>
<td>C</td>
<td>480 g/L</td>
<td>26443</td>
</tr>
<tr>
<td></td>
<td>+ chlorothalonil</td>
<td>Ridomil Gold SL/Bravo</td>
<td>C</td>
<td>+ 500 g/L</td>
<td>29239</td>
</tr>
<tr>
<td></td>
<td>metiram</td>
<td>Poliram DF</td>
<td>C</td>
<td>80% WG</td>
<td>20087</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poliram 16D</td>
<td>C</td>
<td>16% DU</td>
<td>22029</td>
</tr>
<tr>
<td></td>
<td>propamocarb HCl</td>
<td>Tattoo C</td>
<td>C</td>
<td>375 g/L + 375 g/L</td>
<td>24544</td>
</tr>
<tr>
<td></td>
<td>+ chlorothalonil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pyraclostrobin</td>
<td>Headline</td>
<td>C</td>
<td>250 g/L EC</td>
<td>27322</td>
</tr>
<tr>
<td></td>
<td>tribasic copper sulfate</td>
<td>Copper 53W</td>
<td>C</td>
<td>53% WP</td>
<td>9934</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green Earth Bordo Copper Spray</td>
<td>D</td>
<td>53% WP</td>
<td>17482</td>
</tr>
<tr>
<td></td>
<td></td>
<td>King ECO-WAY PTV Fungicide Spray</td>
<td>D</td>
<td>53% WP</td>
<td>29968</td>
</tr>
<tr>
<td></td>
<td>tribasic copper sulfate</td>
<td>Wilson Garden Doctor Insecticide</td>
<td>D</td>
<td>7% + 5% DU</td>
<td>17424</td>
</tr>
<tr>
<td></td>
<td>+ carbaryl</td>
<td>Fungicide</td>
<td>D</td>
<td></td>
<td>29619</td>
</tr>
<tr>
<td></td>
<td></td>
<td>King PTV Dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late Blight, Tuber</td>
<td>phosphorous acid, mono</td>
<td>Confine (post harvest, suppression</td>
<td>C</td>
<td>45.8% SN</td>
<td>29100</td>
</tr>
<tr>
<td></td>
<td>and di-potassium salts</td>
<td>only))</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* C = Commercial or D = Domestic registration
** Must be used in tank mix, see label.
## APPENDIX I. Fungicides Registered for Controlling Plant Diseases on Potato (continued)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Active Ingredient</th>
<th>Trade Name</th>
<th>C* or D</th>
<th>Formulation</th>
<th>PCP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pink Rot and Pythium Leak (suppression only)</td>
<td>metalaxyl-M + chlorothalonil</td>
<td>Ridomil Gold/Bravo</td>
<td>C</td>
<td>480 g/L</td>
<td>26443</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ridomil Gold SL/Bravo</td>
<td>C</td>
<td>+ 500 g/L</td>
<td>29239</td>
</tr>
<tr>
<td></td>
<td>phosphorous acid, mono and di-potassium salts</td>
<td>Confine (post harvest, suppression only)</td>
<td>C</td>
<td>45.8% SN</td>
<td>29100</td>
</tr>
<tr>
<td>Pink Rot</td>
<td>metalaxyl-m and s isomer</td>
<td>Ridomil Gold 480EC (in furrow)</td>
<td>C</td>
<td>480 g/L EC</td>
<td>25384</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ridomil Gold 480SL (in furrow)</td>
<td>C</td>
<td>480 g/L SC</td>
<td>28474</td>
</tr>
<tr>
<td></td>
<td>phosphorous acid, mono and di-potassium salts</td>
<td>Confine (post harvest, suppression only)</td>
<td>C</td>
<td>45.8% SN</td>
<td>29100</td>
</tr>
<tr>
<td>Rhizoctonia Canker and Black Scurf</td>
<td>azoxystrobin</td>
<td>Quadris (in-furrow)</td>
<td>C</td>
<td>250 g/L SU</td>
<td>26153</td>
</tr>
<tr>
<td></td>
<td>fludioxonil</td>
<td>Maxim PSP</td>
<td>C</td>
<td>0.5% PO</td>
<td>26647</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maxim Liquid PSP</td>
<td>C</td>
<td>40.3% LI</td>
<td>29110</td>
</tr>
<tr>
<td></td>
<td>fludioxonil + thiamethoxam</td>
<td>Maxim Liquid PSP + Actara 240SC</td>
<td>C</td>
<td>40.3% LI + 240 g/L</td>
<td>29110</td>
</tr>
<tr>
<td></td>
<td>penthiopyrad</td>
<td>Vertisan</td>
<td>C</td>
<td>200 g/L</td>
<td>30332</td>
</tr>
<tr>
<td></td>
<td>thiabendazole</td>
<td>Mertect SC Fungicide</td>
<td>C</td>
<td>45% SU</td>
<td>13975</td>
</tr>
<tr>
<td>Seed Piece Decay</td>
<td>captan + diazinon</td>
<td>Co-op Potato Seed piece Treatment</td>
<td>C</td>
<td>7.5% + 0.1% DU</td>
<td>15755</td>
</tr>
<tr>
<td></td>
<td>mancozeb</td>
<td>Dithane M-45 8% Dust Potato Seedpiece Fungicide</td>
<td>C</td>
<td>8% DU</td>
<td>10186</td>
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<tr>
<td></td>
<td></td>
<td>Condor MZ</td>
<td>16% DU</td>
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<tr>
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<td>MancoPlus Potato Seed Piece T.</td>
<td>16% DU</td>
<td>26157</td>
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</tr>
<tr>
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<td></td>
<td>Tuberseal Potato Seed Piece D.</td>
<td>16% DU</td>
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<tr>
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<td>Potato ST 16</td>
<td>16%</td>
<td>24734</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Solan MZ</td>
<td>16%</td>
<td>29377</td>
<td></td>
</tr>
<tr>
<td></td>
<td>metiram</td>
<td>Polyram 16D Fungicide Dust</td>
<td>C</td>
<td>16% DU</td>
<td>22029</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Polyram 16D Seed Piece Treat.</td>
<td>16%</td>
<td>25867</td>
<td></td>
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<tr>
<td></td>
<td>thiophanate-methyl</td>
<td>Senator PSPT Seed Piece Treatment</td>
<td>C</td>
<td>10% DU</td>
<td>14599</td>
</tr>
<tr>
<td>Silver Scurf</td>
<td>azoxystrobin</td>
<td>Quadris (in furrow)</td>
<td>C</td>
<td>250 g/L SU</td>
<td>26153</td>
</tr>
<tr>
<td></td>
<td>azoxystrobin</td>
<td>Abound (in furrow)</td>
<td>C</td>
<td>250 g/L SU</td>
<td>26536</td>
</tr>
<tr>
<td></td>
<td>Bacillus subtilis QST 713 strain</td>
<td>Serenade ASO (Post harvest)</td>
<td>C</td>
<td>1 x 10⁷ CFU/g</td>
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<tr>
<td></td>
<td>fludioxonil</td>
<td>Maxim PSP</td>
<td>C</td>
<td>0.5% PO</td>
<td>26647</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maxim Liquid PSP</td>
<td>C</td>
<td>40.3% LI</td>
<td>29110</td>
</tr>
<tr>
<td></td>
<td>hydrogen peroxide</td>
<td>Biosafe StorOx</td>
<td>C</td>
<td>27% SN</td>
<td>27432</td>
</tr>
<tr>
<td></td>
<td>thiabendazole</td>
<td>Mertect SC Fungicide</td>
<td>C</td>
<td>500 g/L SU</td>
<td>13975</td>
</tr>
<tr>
<td></td>
<td>thiophanate-methyl</td>
<td>Senator PSPT Seed Piece Treatment</td>
<td>C</td>
<td>10% DU</td>
<td>14599</td>
</tr>
<tr>
<td></td>
<td>phosphorous acid, mono and di-potassium salts</td>
<td>Confine (post harvest, suppression only)</td>
<td>C</td>
<td>45.8% SN</td>
<td>29100</td>
</tr>
<tr>
<td>Verticillium Wilt</td>
<td>thiophanate-methyl</td>
<td>Senator PSPT Seed Piece Treatment</td>
<td>C</td>
<td>10% DU</td>
<td>14599</td>
</tr>
</tbody>
</table>

* C = Commercial or D = Domestic registration
APPENDIX II. Products Registered for Disinfecting Farm Machinery and Storage Areas.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Active Ingredient</th>
<th>Trade Name</th>
<th>Formulation</th>
<th>PCP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial Ring</td>
<td>N-alkyl dimethyl benzyl ammonium</td>
<td>Ag-Services Incorporated General Storage</td>
<td>10% LI</td>
<td>14957</td>
</tr>
<tr>
<td>Rot</td>
<td>chloride</td>
<td>Disinfectant</td>
<td></td>
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</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Trade Name</th>
<th>Formulation</th>
<th>PCP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>metam</td>
<td>Vapam Liquid Solution</td>
<td>380 g/L SN</td>
<td>6453</td>
</tr>
<tr>
<td>methyl bromide*</td>
<td>Methyl Bromide Fumigant</td>
<td>100% SN</td>
<td>16495</td>
</tr>
<tr>
<td>Chloropicrin 100</td>
<td>Chloropicrin 100 Liquid Soil Fumigant</td>
<td>99% Liquid</td>
<td>25863</td>
</tr>
</tbody>
</table>

*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.

APPENDIX IV. Registered Topkillers and Desiccants.*

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Trade Name</th>
<th>Formulation</th>
<th>Next Registration</th>
<th>PCP No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>diquat</td>
<td>Reglone Dessicant</td>
<td>240 g/L</td>
<td>2015</td>
<td>26396</td>
</tr>
<tr>
<td>glufosinate</td>
<td>Ignite 15 SN Herbicide and Dessicant (British Columbia)</td>
<td>150 g/L SN</td>
<td>2014</td>
<td>23180</td>
</tr>
</tbody>
</table>

*Desiccants 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.