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NEBRASKA

# POTATO EYES

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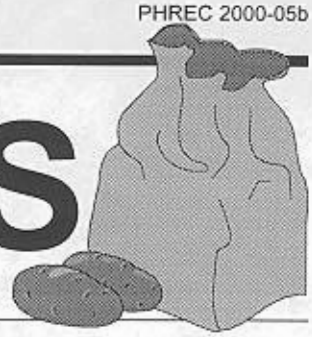


## New Soil Fungicide

Most Nebraska growers already use a Ridomil pre-pack such as Ridomil MZ and Ridomil Bravo as a foliar application to potato for controlling leak (*Pythium* spp.) and pink rot (*Phytophthora erythroseptica*). Now **Novartis** has received full registration for **RIDOMIL GOLD EC**. It is applied as a band in-furrow at planting.

### Reasons Why This Is Good

Here are the reasons that I used to support its registration.

1. Ridomil's (metalaxyl's) primary mode of uptake is through the roots and uptake by stems and leaves is secondary and less efficient. Upon uptake, it translocates to the tubers where tubers are protected from pink rot and leak. This requires higher residues on foliage to get into tubers. With a soil application, less Ridomil would be needed to achieve control.

2. Full-field exposure is needed with a foliar application while a banded application at planting would expose much less ground.

3. In a field trial with pink rot-inoculated tubers, there was a 100% loss without Ridomil and a single, banded, soil treatment can work even better than two foliar treatments, 8% versus 45% tuber infection from very stressed plants. Labeling will recommend a furrow treatment plus one foliar treatment.

4. Environmentally, application at planting would be much safer than the current foliar application. **RIDOMIL GOLD EC** is placed locally in a smaller area where it would do the most good with more efficient uptake by the plant.

5. At-planting application makes good sense with regard to insensitivity management by minimizing the exposure of high populations of pink rot and leak since only a band of the soil is treated.

6. By eliminating one or two foliar application of Ridomil pre-packs, blight control programs will not be influenced. Blight treatments then can be applied based on proven forecasting models and neighboring disease incidence.

7. A disadvantage of foliar application is that, if plants are are stressed, the vine takes up little Ridomil.

Alexander D. Pavlista

## Inside this issue...





## Controlling Volunteer Potatoes

Last year, after a mild winter, there were scattered reports of volunteer potatoes growing in wheat and corn fields. This past winter was even warmer. The ground didn't freeze more than a couple of inches and in many areas not at all. Besides potentially greater insect problems such as Colorado potato beetle, aphids and European corn borer, and maybe sand chafer, a problem may develop with respect to volunteer potatoes in rotation crops. Potatoes can act like weeds, competing for resources -- light, nutrients and water. Volunteer potatoes may act as hosts for early and late blights, leaf roll and other viruses and infected tubers may act as sources for all of these. They may interfere with cereal harvest. Volunteer potato tubers can survive and continue to propagate for several years.

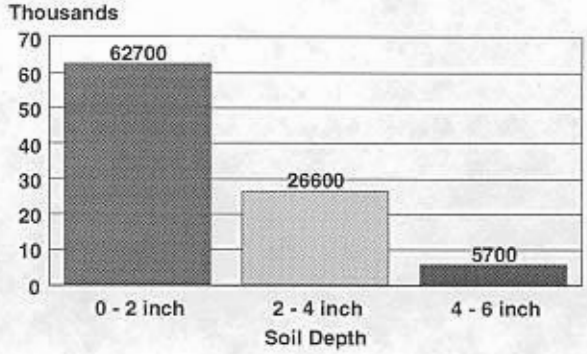
Although most potato growers in the State rent and not own the land on which potatoes are grown, neighbors whose land is being used may want to know how to deal with a potential volunteer potato problem. So in the interest of a good neighbor policy, here are some suggestions.

Studies in the U.K. show that 50,000 to 150,000 tubers per acre were left in the field after harvest, 15% of them were larger than two inches and 32% were burried deeper than two inches. As many as 20,000 tubers/acre remained viable after a mild winter (Lutman, 1977). In Washington studies, 95,000 tubers of Russet Burbank per acre have been reported to be left behind after harvest and 5,700 tubers per acre may be as much as six inches deep (Figure 1; modified after Eberlein et al., 1997).

Fall plowing can bury tubers even more deeply, protecting them from freezing. In dry soil, tubers won't freeze until the ground around them is below 25 F. To eliminate tubers left behind in the field, soil needs to freeze at least six inches which is common in Nebraska. (Table 1).

The obvious first step to minimizing volunteer potatoes is to minimize the number of tubers unharvested and to destroy those left behind. Some useful manufacturing practices are narrowing pitch chain spacing and post-harvest shallow tilling. Some commercial growers apply MH30 (maleic hydrazide) toward the end of the season for sprout inhibition; apply no later than two

Figure 1. Soil Depth of Potato Tubers Left in Field After Harvest



# Controlling Volunteer Potatoes (cont'd)

weeks before vine desiccation. MH30 application has been reported to lower volunteer potato population by 70-80%.

Competitive crops to plant after potatoes are small grains, especially winter wheat, and corn. Sugar beet, dry bean and onion do not compete well against volunteer potato and should be avoided following a warm winter. Planting small grains and corn after potato, therefore, is recommended.

## SMALL GRAINS

When small grains are planted, there are a number of herbicides that may be used against volunteer potato (Table 2; modified after Eberlein et al., 1997). Bronate and Buctril burn down potato foliage sufficiently to allow small grains to grow and be competitive. Banvel, Curtail and Harmony (plant growth regulators) injure potato causing stunting and leaf mal-formation but not kill the plant. The most effective is Roundup but it should only be used in commercial grains not those grown for seed. It should be applied after the hard-dough stage when grain moisture is less than 30%. Potato plants should be killed before grain harvest.

## CORN

In corn, herbicide application should be used with conventional tillage. Roundup is recommended after Roundup-Ready corn and for that matter, after Roundup-Ready soybean. Recent studies report that cultivation plus a sequence of atrazine applied pre-emergence followed by post-emergence application of 2,4-D plus Banvel is the best treatment program (Table 2). Substituting atrazine with Bladex is acceptable but there may be more second generation tubers. However, using Bladex avoids atrazine-related crop rotation problems. Tough with crop oil and Liberty have also been mentioned as giving good control. Starane has Section 18s ('emergency use') in Oregon and Washington, but misses some weeds. It is also more expensive than 2,4-D plus Banvel.

## LATE CROPS

For late-planted crops when volunteer potato may emerge before planting, application of Roundup (glyphosate) is suggested to kill emerged sprouts. New sprouts could emerge a few weeks later and small tuber could be produced before the season ends.

## OTHER CROPS

For row crops in which herbicides can not be used, a minimum of four cultivations are usually needed starting when potato plants are three to six inches tall.

## CULL PILES

Another place for volunteer potato is in cull piles that did not thoroughly freeze. Even buried piles as deep as 18 inches can produce volunteer sprouts. Cull piles can be designated as **non-crop** areas and thereby allow the use of several broadleaf herbicides (Table 3; modified after Eberlein et al., 1997).

## GLYPHOSATE

There is more information available about glyphosate (Roundup) for control of volunteer potato then other herbicides. With cultivation, it is the most effective treatment in most cases. Although most effective when applied in June or July, it is effective in April and May. Low temperatures, <50F, will lower its absorption by potato plants (Masiunas and Weller, 1988); light intensity does not affect efficacy. The stage of growth of the potato at the time of application does not play a role in efficacy either (Smid and Hiller, 1981). Glyphosate is effective when applied about ½ to 1 lb/ac. It translocates throughout the plant and directly lowers sprout viability; for example, approx. 1 lb glyphosate/a lowered viability of green-house grown tubers from 85% to 3% sprouting (Lutman and Richardson, 1978).

Table 1. Lowest soil temperatures at four inches below ground for period from November 1, 1999 to March 1,2000 (four month period).

| Site | # days <28F | # days <30F | Longest Period at <30F | Lowest Average Daily °F |
|---|---|---|---|---|
| Ainsworth | 2 | 10 | 5 | 27.8 |
| Alliance No | 1 | 10 | 3 | 27.9 |
| Alliance We | 0 | 3 | 1 | 29.0 |
| Champion | 0 | 0 | 0 | 31.7 |
| Gordon | 3 | 16 | 8 | 26.3 |
| Kearney | 1 | 5 | 3 | 27.7 |
| Minden | 0 | 1 | 1 | 30.0 |
| Monroe | 3 | 11 | 4 | 26.8 |
| O'Neill | 0 | 4 | 3 | 28.8 |
| Sidney | 2 | 6 | 2 | 27.3 |

[Scottsbluff is not included since readings were estimated.]

Table 2. Herbicides for Volunteer Potato in Rotation Crops.

| Rotation Crop | Herbicides | Comments |
|---|---|---|
| Small Grains | Bronate<br>Buctril | spring use<br>burn down |
| | Banvel<br>Curtail<br>Harmony | stunt growth<br>tubers may form |
| | Roundup | late season use<br>complete kill |
| Corn | atrazine then 2,4-D+Banvel | best treatment with cultivation |
| | Bladex then 2,4-D+Banvel | acceptable with cultivation |
| | Liberty<br>Tough | possibly acceptable |
| | Starane | OK, expensive |
| Late Crops as Beans | Roundup | pre-planting re-sprouting occurs |
| Row Crops without herbicides | | four cultivations |

Table 3. Herbicides for Non-Crop Areas As Cull Piles.

| Short Residue | Longer Residue |
|---|---|
| Buctril ^ | Amitrol ^ |
| Gramoxone ^ | Arsenal *^ |
| Ignite ^ | atrazines *^ |
| Protocol ^ | Banvel ^ |
| Rodeo ^ | Contain *^ |
| Roundup ^ | Pramitol *^ |
| | Surefire ^ |
| | Topsite * |
| | Tordon ^ |

* soil applied, ^ foliar applied

# Seed Piece Treatments

There is a flurry of activity in developing new treatments for seed pieces, not only improving the fungicidal activity but also adding insecticidal activity to dusts. Liquid applications to seed pieces are being developed. Two major companies are active in developing seed treatment products, Gustafson and Novartis.

**Gustafson** works exclusively on seed treatments of many crops for many years. They make the TOPS line of products with current full registration on TOPS MZ and recently EVOLVE (TOPS MZ Curzate/CZ). MZ Curzate has a Section 24c in Nebraska. TOPS MZ Gaucho contains the ai of Admire/ Provado and is expected next year. GENESIS is a liquid seed treatment of the ai in Admire. Both of these have a Section 24c in a few States and result from a partnership with Bayer. TOPS 2.5D and TOPS 5D will no longer be available this year due to the newer, better products.

**Novartis** has entered the potato seed treatment business with MAXIM and MAXIM MZ. They are also developing a seed treatment containing an insecticide, the ai of Adage.

<Product Strengths

**TOPS MZ** somewhat suppresses spread of late blight from seed to seed during cutting. It has good activity against the spread of *Rhizoctonia solani* (stem canker, black scurf) (Table 1) and *Fusarium* spp. (dry rot), but fair against *Helminthosporium* spp. (silver scurf). It has both contact and systemic activities.

**Evolve** is TOPS MZ with cymoxanil (Curzate), and has contact and systemic activities. It has excellent activity against spread of late blight from seed to seed (Table 1) and the same activity on stem canker, dry rot and silver scurf as TOPS MZ. The highest stands or emergence (Table 2), and yield (Table 3) of late blight-inoculated seed were from those treated with Evolve.

**MZ Curzate** is Evolve without the thiophanate-methyl (TOPS). It has excellent activity against seed-borne late blight spread and against dry rot, but may be weaker on stem canker than TOPS MZ. It has contact activity only.

**TOPS MZ Gaucho** will be like TOPS MZ against seed-borne diseases but, with imodacloprid (ai of Admire) added, there will be activity against Col. potato beetle, aphids and other foliar feeding insects. There is also evidence from Idaho and Nebraska, but not in Washington, suggesting some activity against wireworm feeding not only on seed but also on harvested daughter tubers.

**Maxim** has contact activity only. It works excellent against silver scurf and good activity against stem canker and dry rot. It has no activity against late blight spread. Application of Maxim to cut seed should be just before planting; treated cut seed should not be stored.

**Maxim MZ** is Maxim with mancozeb added to suppress late blight transmission from seed to seed. Activity against late blight is similar to that of TOPS MZ but less than for Evolve and possibly less than MZ Curzate.

*Data used in Tables were provided by Gustafson and Novartis.*

Table 1. Percent cut seed infected with late blight and percent sprouts with stem canker in two trials in Maine, 1997 and 1999.

| Treatment * | % late blight 1997 | % stem canker 1999 | 1999 |
|---|---|---|---|
| Inoculated | 13% | 20% | 12% |
| TOPS MZ | 2% | 0% | .3% |
| Evolve | 0% | 0% | .3% |
| MZ Curzate | nd | 0% | .5% |
| Maxim | 29% | 25% | 0% |
| Maxim MZ | nd | 0% | 0% |

nd = no data

Table 2. Percent emergence compared to uninoculated check in trials conducted in Maine (1997, 1998), North Dakota (1997, 1998), Oregon (1997), Washington (1997, 1998), and Wyoming (1998). All sites were combined and statistically analyzed.

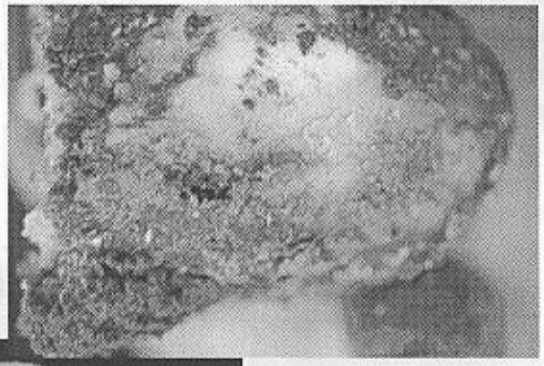
| Treatment * | Stand |
|---|---|
| Inoculated | 31% |
| TOPS MZ | 59% |
| Evolve | 73% |
| Maxim | 21% |

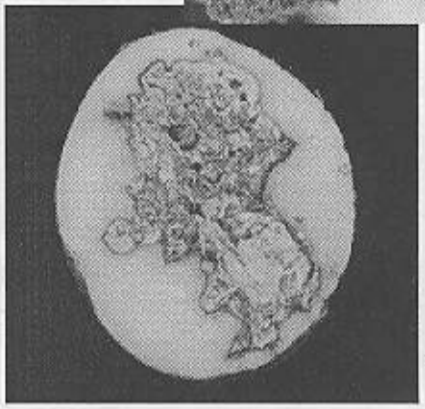
Table 3. Yield as percent of uninoculated check (=100%) in No. Dakota 1998 and Wyoming 1998 trials.

| Treatment * | ND98 | WY98 | ND99 |
|---|---|---|---|
| Inoculated | 0% | 0% | 0% |
| TOPS MZ | 100% | 91% | 77% |
| Evolve | 100% | 96% | 113% |
| Maxim | 0% | 0% | nd |

* All treated seed were inoculated with late blight strain US-8.

**Late blight**





**Dry rot**

University of Nebraska
Panhandle Research and Extension Center
4502 Avenue I
Scottsbluff, NE 69361

# CONTROLLING VOLUNTEER POTATOES

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