

# SPUDLINES



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Dear Grower,

This is the April/May issue of SpudLines for 2006. We hope that you will find the articles interesting and informative. As we enter this planting season, we strongly encourage growers to monitor soil temperatures in regards to planting potatoes. Also, please remember to take time to train your workers on the EPA Worker Protection Standards.

All the best,

James Dwyer, Crops Specialist

This publication is in part supported by a grant from the Educational Committee of the Maine Potato Board. The potato growers, processors and brokers of Maine pay assessments. Portions of these assessments were approved for the educational purpose of keeping Maine potato growers and related Maine industry people informed.

Potato pest information will be available this season at: <http://www.maine potato ipm.com> as well as at our new website:

<http://www.umaine.edu/umext/potatoprogram>

## Upcoming Dates of Interest - 2006

- |            |   |
|------------|---|
| July 10-12 | Potato Marketing Association<br>of North America<br>Presque Isle, Maine     |
| July 12-16 | Maine Potato Blossom Festival<br>Fort Fairfield, Maine                      |
| July 14    | Industry Dinner<br>Fort Fairfield Community Center<br>Fort Fairfield, Maine |
| July 23-27 | Potato Association of America<br>Annual Meeting<br>Madison, Wisconsin       |

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## Looking Towards the 2006 Potato Crop Pests – What to Expect

James D. Dwyer, Extension Crops Specialist

As we anxiously await better weather, it is hard not to wonder what to expect for potato pests this year, and how we are going to control them. The first question on everybody's mind is potato late blight. Will we have any? The best guess is that yes, there will be some late blight. The unknown is how much. The open winter from Caribou south has definitely worked to our advantage, and hopefully

reduced the number of volunteer potatoes. North of Caribou, growers may need to manage volunteers. Either way, since there was some late blight in the area last season, it will be imperative for growers to take extra care with seed selection again this year. Make sure that your seed has been tested by the Maine Department of Agriculture for late blight. Use the best seed treatment available—this will pay you dividends.

As we get into the foliar protection period of the season, please remember that rate, timing, and coverage are the keys. We strongly recommend closely following the “no blight” recommendations. This information will be available at 1-888-USE-UMCE or 207-760-9IPM. Information will also be available at [www.maine potato ipm.com](http://www.maine potato ipm.com) and [www.umaine.edu/umext/potatoprogram](http://www.umaine.edu/umext/potatoprogram), as well as in the *Pest Alert* newsletter.

All growers and packers will also need to carefully manage cull piles. Cull pile management is critical, considering that there was some late blight in the area last season. All cull piles should be controlled by June 10, 2006. The Maine Department of Agriculture will be doing flyovers this year to ensure cull pile compliance. Uncontrolled cull piles place the entire industry at risk.

Colorado potato beetle populations appeared to be rising slowly over the last few years, and we expect that this trend will continue. We also know that some CPB populations within the state have developed resistance to neonicotinoid insecticides. Resistance to neonicotinoid insecticides initially means shorter length of control for the in-furrow and seed treatment products. It also means that growers using a seed treatment of in-furrow neonicotinoid material should **not** use a foliar neonicotinoid material later in the season. Exposing the beetle population to a neonicotinoid material only once during the season will help to delay the further development of resistance.

Another question that has been asked is what impact the open winter has had on the European corn borer population. One would hope that the open winter has caused some level of mortality, but it is doubtful that significant levels of mortality have occurred. We have collected live larvae from potato stalks already this spring and they are doing

well. UMaine Cooperative Extension will be trapping and scouting for ECB, and we strongly encourage all growers to be doing the same for 2006.

The mild winter should have provided excellent overwintering conditions for aphids. Luckily aphid populations have been lower in recent years compared to historical levels. There is no real way to predict what the populations will look like; however, if spring comes early, seed growers may want to be scouting early for early-season buckthorn aphids.

This season appears to have the potential for strange weather. Already, the mid-portion of the country has seen violent storms. If this pattern continues, this could result in an increased potential for leafhoppers and green peach aphids to reach our area—only time will tell.

Looking towards the coming season and trying to anticipate the pest situation is in all honesty a “best guess”; but if you have a pest management plan in place and scout on a regular basis, you will be prepared to respond quickly and appropriately to the realities.

### **Neonicotinoid Resistance in the Colorado Potato**



#### **Beetle: Who is at Risk?**

Andrei Alyokhin, Asst. Prof. of Applied Entomology, Univ. of Maine

Several potato farms reported considerable Colorado potato beetle populations following in-furrow imidacloprid (Admire®) applications during the 2005 growing season. Subsequent bioassays of beetles collected on those farms confirmed that the beetles were either resistant or tolerant to imidacloprid (please refer to the previous issue of *Spudlines* for details). The problem fields were few and far between. However, their existence indicates that there is a real threat of a more wide-scale failure of imidacloprid and related compounds. Colorado potato beetle has an impressive track record of resisting a wide variety of chemicals used to control it. This includes imidacloprid, which is no longer particularly effective against this pest on

Long Island, New York. Although Long Island growers continue using Admire®, they do it mostly to control aphids and leafhoppers. Supplemental applications of other chemicals are necessary rather early in the growing season to control Colorado potato beetles.

Imidacloprid is the oldest and most widely used neonicotinoid insecticide. Thus it is not surprising that the first resistance reports are dealing with this compound. However, all neonicotinoid insecticides are closely related to each other, which is why there is strong and repeatedly demonstrated cross-resistance among the neonicotinoid insecticides. It is not necessarily complete, with some chemicals performing slightly better than other chemicals against the same pest population. Nevertheless, even more efficient neonicotinoids either fail to provide an acceptable level of crop protection immediately or after a short period of use. Consequently, substituting imidacloprid with thiamethoxam or acetamiprid is not going to work.

Resistance threat does not mean that imidacloprid and other neonicotinoid insecticides are bad and should not be used. They still remain the best chemical option available to potato growers. The goal of any resistance management program is to keep insecticides effective for as long as possible, not to discontinue using them. The latter will happen on its own if resistance management is ignored. At this point, I am not aware of any new products at advanced stages of development that are comparable to neonicotinoids in their convenience of use (read: seed treatments), high efficiency, and relatively low nontarget toxicity. Therefore, it is in everybody's best interest to keep neonicotinoids as a viable control option.

The first step in a resistance management program is to identify fields where the beetles are at high risk of developing resistance. Generally speaking, any field that has been treated with any neonicotinoid insecticides is at risk. However, on some of them the risk is higher than on the others. Below is the list of fields with different management histories arranged in the descending order relative to the risk of resistance development.

High risk • **Fields that have noticeable beetle populations following**

**neonicotinoid applications.** This should immediately raise the red flag regarding possible resistance development. Please let us know if you experience such a situation, so that we can test your beetles for resistance.

- **Nonrotated fields continuously treated with neonicotinoids.** This effectively kills off all susceptible beetles, while leaving only resistant mutants in the population. After a number of years, their numbers will build up above the economic thresholds.
- **Nonrotated fields treated with non-neonicotinoid insecticides following neonicotinoids.** This would kill at least some of the resistant mutants.
- **Rotated fields continuously treated with neonicotinoids when in potatoes.** Efficiency depends on the distance between rotated and nonrotated fields. Resistant mutants will have to move in search of new fields. Many of them will never make it and die of hunger. There will also be lots of mixing between the beetles from different fields, and mating between resistant and susceptible beetles. As a result, resistance genes will be diluted in the population.
- **Rotated fields treated with non-neonicotinoid insecticides following neonicotinoids.** This would kill most of resistant mutants and greatly enhance the dilution effect.
- **Fields never treated with neonicotinoids.** There will be no selection pressure towards resistance development. However, there will be rather obvious trade-offs.

Low risk

Of course, being at high risk does not necessarily mean developing a problem. However, it certainly means a high probability of developing it. Therefore, it would be wise to take action before the threat actually materializes.



## **The Effect of Fusarium Head Blight on Cereal Grains**

Matt Williams, Extension Educator

Weather-related problems occurred in our cereal crops both in Maine and in the Canadian Maritimes over the last several growing seasons. One of those problems was a relatively high level of Fusarium head blight (FHB), commonly known as scab. This fungus can and did result in the development of a mycotoxin known as deoxynivalenol (DON), or vomitoxin.

The Food and Drug Administration (FDA) established the following advisory levels for DON in food and feed in 1993:

- 1 part per million (ppm) for finished grain products for human consumption
- No standard for raw grain going into milling process
- Cattle, over four months old: 10 ppm (providing grain at that level doesn't exceed 50 percent of diet) (Dairy One, the major feed analysis laboratory in the Northeast, will report concerns at 4 ppm for dairy)
- Poultry: 10 ppm (providing grain at that level doesn't exceed 50 percent of diet)
- Swine: 5ppm (not to exceed 20 percent of ration)
- All other animals: 5 ppm (providing grains don't exceed 40 percent of diet)
- Canadian tolerances are 1 ppm for hogs and dairy

\*\*0 tolerances are reported in specialized markets like fish food, malting barley.

In 1993, ELISA tests for vomitoxin were only sensitive in ppm. Starting last fall, some laboratories have been reporting with tests sensitive in parts per billion (ppb), but the standards have not changed. However, those markets claiming zero tolerance standards may have to change.

### **Causes and Control**

Like late blight in potatoes, FHB must have the combined requirement of inoculum and weather conditions to occur. Warm, wet, and rainy weather at flowering leads to FHB. Fortunately these

combined factors are rare in our climate, but they can and do occur and will no doubt occur again.

In the long run, resistant varieties are the best way to eliminate the economic threshold problems that are being encountered in the major grain growing regions. Development of these varieties is out of our control but when variety options are available we should move to them.

Cultural control is based on crop rotation, with a potato rotation being very favorable due to the tillage practices. Crop residues that resist rapid breakdown allow the Fusarium to grow and develop spores that are blown onto the grain heads and develop when conditions are favorable. Corn is one such residue and FHB problems have become more prevalent where corn is grown.

The FHB results in shrunken kernels, so in many cases it can be reduced with proper cleaning. More often than not the infected kernels are blown out behind the combine. The levels of DON detected this year indicate that some level of affected kernels will exist in the seed planted this spring. This seed has little to no potential to produce FHB in the field since infected seedlings generally die, but it could pose a threat to plant stands. Fortunately, seed treatment with products such as thiram (e.g. Vitavax<sup>®</sup>, or Vitaflo) has been shown to be effective in preventing plant stand loss. Growers should insist on clean, treated seed and avoid planting uncleaned seed, especially if it is low test weight.

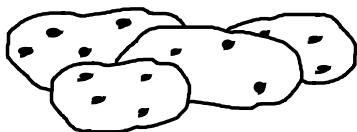
DON is frequently a problem in areas of the U.S. and Canada that commonly grow corn and wheat together, and growers in these areas are experimenting with a fungicide applied at flowering. Folicur<sup>®</sup>, (tebuconazole) currently labeled for peanuts and grasses grown for seed, has been shown to reduce the levels of mycotoxin, however it must be applied exactly at flowering. Other fungicides normally applied to protect the flag leaf, such as Tilt<sup>®</sup>, (propiconazole) have not shown control. Folicur<sup>®</sup> is not currently labeled for, but is probably eligible for, a section 18. The more practical problem is that the timing is so critical, probably only a one-day window, and growers will have to be able to stage the growth of the crop. Directed sprays are necessary, making aerial

application ineffective as well as the use of standard nozzle settings. This means that tramlines such as those used in Europe will be needed. It is important to note that this practice (use of Follicur) can reduce the level of toxin but often not the level of FHB.

### **Perception is Reality?**

Barley and wheat are perceived by many as the host of the problem. However, testing in New Brunswick in the 2004 crop showed that oats were equally infected, with both sides of the border coming in with readings hovering around 4 ppm on most samples in all the cereals. The oat market does not test for toxins the way the barley and wheat markets routinely do. It is equally interesting that the malting market was not significantly affected. This can probably be explained by the sampling technique in which the malting barley is screened for plumpness first, and low test weight kicks it out of spec.

The current market is likely to discourage growers, and some sectors of the potato industry may question the value or threat of cereals in rotation. However in the long run it is the potato itself that, when grown too frequently, develops disease cycles that cannot be managed by existing chemistries. No rotation crop is going to cure the problems of a short rotation, and any crop that is grown with frequency will develop a set of problems of its own. A good rotation should be viewed as a program rather than a crop: a crop that can be managed to value-added status for increased income, a crop that can be grown to break disease cycles, or a crop that can be grown to improve soil quality management. Any crop that is traditionally grown for cash market can also be managed as a green manure crop. It comes down to your best use.



### **Proper Technique for Taking a Soil Sample**

Steven B. Johnson  
Extension Crops Specialist

As long as you are investing time and money to collect a soil sample and have it analyzed, it makes good sense to collect it properly. Soils are sampled to determine their nutrient status. This is the basis for decisions on fertilization for the next crop. A specific field may have low spots or major soil changes within it. Part of the field may have been limed more last year than another part; part of the field may not produce the same crop as another portion. The person working the fields knows them better than anyone else. Apply that information when taking a soil sample.

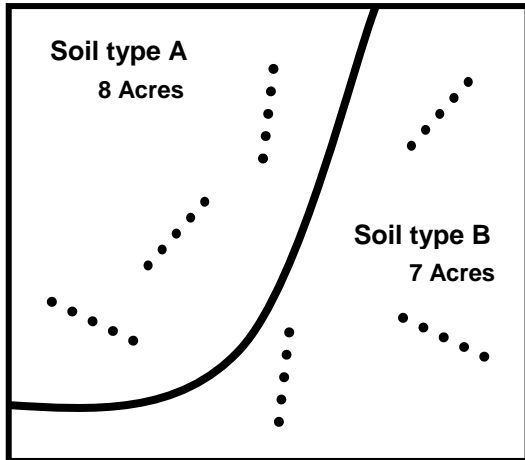
Environmental concerns about soil samples arise not from the sampling but from the lack of sampling. A certain amount of fertilizer is required to produce a crop. Fertilizer and lime applications should be made based on tests of the soil sample. If no soil sample is taken, there is no scientific basis for lime or fertilizer application. Deficient or excessive fertilization can occur when the correct amount to apply is not known. Deficient fertilization or imbalance in the fertilizer can result in poor growth and crop yield. Surface runoff and groundwater contamination are frequently consequences of over fertilization.

Soil samples are typically taken in the fall, but there is nothing wrong with sampling in the spring. Winter often catches up with Maine farmers before the fall soil sampling is completed. Spring soil sampling then becomes a necessity. Spring soil sampling leaves little time to study the analysis once it is returned from the laboratory: in some cases you may need to place your fertilizer order before you have time to adequately evaluate the analysis.

Limit the field area represented by any one soil sample to eight acres. Each sampled area should be of uniform soil type and have undergone similar past cropping practices and lime treatments. If a field to be sampled has major soil differences, or part of the field has been cropped or limed differently or produces differently, the field should be divided for multiple sampling. Take separate samples from areas of the field that perform or have been treated differently. If additional lime or

reduced phosphorous and potassium are required, this will be revealed from soil tests. Taking more soil samples from a field will save, not cost, in the long run.

The actual soil sample should be a composite of at least 15 separate subsample sites in the designated area of eight acres or less. Adequately travel through the entire area to be sampled and take the soil from subsample sites at regular intervals. The results from the soil sample will be no better than the sampling job. It is imperative to obtain a representative sample. The volume of soil needed for a soil sample is about one pint. The best way to manage this is to collect more than one pint of soil, mix thoroughly, and remove one pint. From each of the subsample sites, collect soil with a soil probe, auger, trowel, or spade. The soil should be taken from the plow layer, or about the top eight inches. Turf or hay crops should be sampled at about half that depth. Mix the soil from all the subsample sites completely and package the actual soil sample from this mix. It is important to use a clean container to collect the subsamples. Any fertilizer or other residue can distort the analysis.



The cost of taking a soil sample and having it analyzed amounts to less than one tenth of one percent of the cost of potato production. This is a small price to pay for environmentally and economically responsible application of fertilizer and lime. A soil sample can save money if it shows that less fertilizer is required. Producing an optimal yield from correct fertilization and liming is always beneficial. With the amount of investment and risk riding on a crop, the time and money used to sample soil will be well invested.



## Seed Program Announces Elimination of Generation 4 Seed in Maine

Terry Bourgoïn, Director, Div. of Plant Industry,  
Maine Dept. of Agric., Food and Rural Resources

In 2005 an amendment was made to CMR 01-001, "Rules Governing Certification of Seed Potatoes in the State of Maine." One of the changes to the rules was the elimination of the 4<sup>th</sup> generation of seed in Maine's seed certification system. According to Chapter II of the rules, "Production Requirements," under A. 3e, "Propagation of Certified and Foundation Seed Classes,"

"Beginning 2007, Generation 4 seed potatoes may not be planted or sold as seed. Beginning in 2006, Generation 3 seed potatoes are not eligible for certification but can be sold as seed for table stock or processing use."

Below you will find an explanation of the impact of this rule change on eligible generations of seed for certification and planting in 2006 and beyond:

1. Beginning in 2006,
  - Generation 3 (year 7 field-grown) seed potatoes and Generation 4 (year 8 field-grown) seed potatoes **may not be entered for recertification.** These generations are only allowed to be planted for table or processing stock.
  - Generation 2 (year 6 field-grown) seed potatoes are the oldest generation allowed for recertification.
2. Beginning in 2007,
  - Generation 4 (year 8 field-grown) seed potatoes **may not be planted in Maine, or sold as seed.**

The rules allow for waivers of the Generation requirements in the event that a shortage of seed of

a particular variety exists. Waiver requests must be submitted to the Department of Agriculture in writing.

Feel free to contact the Division of Plant Industry at 207-764-2036 for further information about this matter.



***Positive Attitude: The Distinguishing Feature of the Worker Protection Standard in the Potato Industry***

Gene Meserve, Inspector  
Maine Board of Pesticides Control

I recently spent some time with Max Miller, Maine Board of Pesticides Control inspector for northern Maine. My job was to let Max educate me about Worker Protection Standard (WPS) compliance within the northern potato industry, and to write this article about our findings. As a pesticide inspector from southern Maine, I was impressed with the positive attitude both potato farmers and suppliers take towards WPS.

Our first stop was an unannounced visit to Irvine & Marr Farms in Washburn. The ease and graciousness of Steve Marr's welcome, and the open attitude he, Rob Blackstone, and Rick Fitzherbert showed us, illustrated the long-standing working relationship that existed between the farm and Max.

During Steve's explanation of how they made WPS work for them, it was easy to see that he had simply merged the typical, informal, everyday farm operation discussion with the formal WPS Central Information Display. Each morning they discuss what took place the day before, and what is planned for the upcoming day, and then update the display as needed. As I turned in the direction that Steve was looking when describing these activities, I could see last year's display still hanging in its place by the wash sink. A WPS video is also used to train all handlers and workers.

When asked how much trouble it is to do the information display, training, decontamination, etc., Steve's instant response was, "No problem. I think

it's great. It smartened us [the industry] up." He then went on to voice his and everyone's concern about health and safety, the safety of future generations, and his own desire to stay healthy and in business for a long time to come. It seemed that Steve was happy that his pre-WPS crew safety concerns now had a tangible, legitimate structure in place for their expression.

Our next stop was to see Scott Smith, farm manager of Cavendish Farms in Presque Isle. Scott also sees WPS as a good thing for the industry. When asked if WPS compliance takes much time, Scott's reply was, "No, it doesn't. It's no different than teaching safety in the packing shed or tractor safety. It's just teaching safety." Scott has his Central Information Display in the shop where the crew meets each day. Even though the training is good for five years, Scott likes to do the WPS training every year in order "to keep everyone on the same page and safe." He uses a WPS flip chart or his own materials.

An alternative WPS training approach used by some growers is to have AmeriCorps trainers train the crew. In one case that I am familiar with, the grower uses a WPS video to train their local help and has AmeriCorps train the migrant crew. AmeriCorps has the advantage of offering WPS training in Spanish, if needed; in this case, training in person may be more effective than using a video. The contact is Jack Frost at the Training and Development Corporation in Ellsworth, 664-2344.

Both Irving & Marr and Cavendish Farms use what is locally referred to as a "GEMPLER'S kit" to meet the decontamination requirement for handlers and workers. The locally available version of the GEMPLER'S kit is, according to Doug Beaulieu of United Agricultural Products (UAP), a less expensive alternative to the one offered by GEMPLER'S (a division of Lab Safety Supply, Inc.). "We (area suppliers) tried to give growers options," says Doug. According to Doug, both UAP and Maine Potato Growers offer these kits. Other suppliers may also have them for sale. The supplies contained in these kits must be provided within a quarter mile of agricultural worker or pesticide handler work sites.

A homemade kit includes

- 1 roll paper towels
- 3 gallons potable water
- 1 16-oz eye flush water
- 1 Tyvek suit
- 1 2-oz bottle hand and body soap

Max Miller is proud of what the farmers and suppliers have accomplished concerning WPS. He sees the suppliers, along with Univ. of Maine Cooperative Extension, as having taken a lead role in WPS training. It was also obvious to me, as I watched Max and farmers interact, that Max also deserves credit. He is very happy to see that farm owners have come to understand that WPS is in their own best interest, as well as that of their workers. One serious health and safety incident avoided pays for years and years of WPS compliance. WPS is the law, but it is also common sense. If your farm is one of the few that still does not have WPS in place, contact the Board of Pesticides Control today. A request for a WPS compliance assistance visit costs nothing, but a failed WPS inspection will now result in a fine and could easily result in a health and safety incident that could cost far more.

Gene and Max, both inspectors with the Maine Board of Pesticides Control, can be contacted at 287-2731.



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Left to right: Max Miller, Pesticide Inspector, Board of Pesticides Control; Scott Smith, Cavendish Farms, Presque Isle; Rob Blackstone, Steve Marr, and Rick Fitzherbert, Irvine & Marr Farms, Washburn.

### Some Questions and Answers About Irrigating Potatoes in Maine

Peter Sexton, Extension Crops Specialist

**Question:** What kind of yield increase from irrigation can one expect with potatoes in Maine?

**Answer:** This depends on rainfall, management, and variety grown. In Greg Porter's research program at University of Maine's Aroostook Research Farm, which included a number of varieties, there was an average yield increase of 49 cwt per acre from irrigation over 11 seasons. There was significant variation among seasons in the response of the potato crop to well-managed irrigation. In some wet years (for example, 2003) there was effectively no yield response, while in some dry years (such as 1995) irrigation resulted in a yield response of about 100 cwt per acre. If we group the seasons into

three groups based on yield increase, the data suggest that about one year out of three will produce little or no yield increase from irrigation (less than 25 cwt per acre). One third of the time, the yield response will be greater than 70 cwt per acre, with the final third somewhere in between 30 to 70 cwt per acre. Of course, everything depends on management. Applying excessive amounts of water can decrease quality and lead to problems in storage. On the other hand, applying water too late during drought stress means that some preventable yield loss has occurred. The main temptation I see is to wait too long before starting to irrigate, and then try to make up for it by applying too much water.

**Question:** What are the advantages and disadvantages of center pivot versus hose-reel irrigation systems?

**Answer:** Center pivot systems cost more to set up, but they require less labor and apply water in an efficient and uniform manner. Their profitable use is limited to larger fields where they can cover a large area. Hose-reel (traveling gun) systems cost less and can be moved around for use in smaller fields, or in corners of larger fields that center pivots cannot reach. However, hose-reel systems deliver water less uniformly, making runoff and erosion more difficult to manage. From what I have seen, people who use both systems clearly prefer the center pivot because once it is set up, it takes less of their time to run, and they can uniformly apply small or large amounts of water. Costs will vary from field to field based on the size and shape of the field and distance to a source of water—often times they are in the range of \$700 to \$1000 an acre. For specific cost estimates, talk with a supplier of irrigation equipment and review all of the costs involved, including development of a water source, for a particular field.

**Question:** When should water be applied?

**Answer:** Timing of water application depends on current soil moisture and stage of crop growth. A useful term to define at this point is “plant-available water.” This is the proportion of available water that is in the soil. For example, if the soil profile holds 2 inches of water when it is fully charged, and if the soil currently holds 1.5 inches, then the soil has 75 percent plant-available water. If the soil currently holds 1 inch, it has 50 percent plant-available water, and if the soil only holds 0.5 inch of available water, it has 25 percent plant-available

water. Most crops go into drought stress at somewhere around 50 percent plant-available water (when half of the available water has been used). Potatoes have a weak root system and tend to stress more easily than other crops. They are thought to go into drought stress somewhere closer to 60 percent plant-available water (i.e. when 40 percent of the water has been used, starting from a full profile).

During early-season growth, the crop is less sensitive to drought stress. If there is limited water availability from an irrigation pond, this is not the time to apply it. Before tuber initiation we suggest irrigating when the soil is at 55 percent of the available water in the profile (in terms of soil water potential, this is -65 to -80 kPa for sandy loam to silt loam soils, respectively). In other words, we suggest waiting until mild stress starts to develop before irrigating during vegetative growth. This conserves water, helps avoid problems with verticillium later, and hopefully helps to promote root growth. From tuber initiation to late bulking, the crop is sensitive to drought stress both in terms of quality and quantity. During this period, irrigate before stress develops. Ideally the crop should not experience any drought stress. Drought stress during bulking directly results in yield loss. For center pivot systems during bulking we suggest an irrigation threshold of 65 percent plant-available water (-45 to -50 kPa soil water potential for sandy loam to silt loam soils, respectively). For hose-reel systems during bulking we suggest an irrigation threshold of 75 percent plant-available water (-35 to -40 kPa soil water potential for sandy loam to silt loam soils, respectively). The reason for the lower threshold for the hose-reel system is that with these systems it typically might be seven to ten days before the same spot can be irrigated again, versus a time of two or three days for a center pivot. In order to keep up with crop water use, growers using hose-reel gun systems will want to start earlier and apply more water than growers using center pivots. During late bulking and maturation, water use drops off dramatically. Irrigation toward the end of the season in certain circumstances may be profitable, but it entails greater risk. Because the crop uses less water, if the soil gets too wet due to rainfall or excessive irrigation, it will take longer to dry out. This means the tubers will sit in wet soil longer, making them more prone to pink rot and late blight, if present. Also, the crop is less responsive to



## Evaluation of a Mustard Green Manure

Peter Sexton, Extension Crops Specialist

irrigation during late bulking and senescence. This means that there is less benefit, but greater risk, associated with irrigation late in the season. If the crop is being marketed right out of the field, the situation is more forgiving than if the crop has to be stored for sale later. The decision to irrigate or not is really a judgment call during this period. Current weather, predicted rainfall, field drainage, the presence or absence of disease problems, the need to store the crop, and the response of the variety to irrigation, are all factors that need to be considered.

**Question:** How much water should be applied per irrigation?

**Answer:** Depending on soil conditions, and the likelihood of rainfall, I would suggest applying from 0.5 inch up to 0.75 inch of water per application for a center pivot system during bulking. With a hose-reel system the grower may want to apply 0.75 inch up to one inch of water, if runoff can be avoided. As described earlier, how often a given field can be irrigated dictates to a certain extent how much water to apply. With a center pivot, the field can be irrigated two or three times a week. With a hose reel system, it might be seven to ten days before the same spot can be irrigated again. In general, the grower using a hose-reel system will want to start earlier and apply more water than the grower using a center pivot. A center pivot allows you to operate on a smaller margin of soil moisture because you can return to the same point and irrigate again in a couple of days, if need be.

On average, the potato crop in Maine uses a little less than 0.2 inch of water per day in July and August—a little more if the weather is hot and dry. Applying 0.5 inch of water will supply about two and a half days of water use. Applying smaller amounts of water requires making repeated applications, which keeps the foliage damp longer and does not provide the profile with moisture to any depth. Applying 0.75 inch of water provides about four days of crop water use. Putting on more than 0.75 inch results in the risk of excess moisture should you get a heavy rain. If it does not rain, then four days is plenty of time to get back on the crop with another irrigation using a center pivot.

As mentioned earlier, it seems that growers using a hose-reel system are often constrained by how frequently the field can be irrigated. As a result they generally apply more water per irrigation.

Following the successful use of mustard green manures to help improve soil quality and suppress Verticillium wilt in Washington, a series of trials was initiated to evaluate green manure mustard (variety Caliente 119) grown ahead of potatoes in Maine. Diseases of interest were black scurf (*Rhizoctonia solani*), powdery scab (*Spongospora subteranea*), and white mold (*Sclerotinia sclerotiorum*). On-farm trials with large (60 feet wide) replicated plots were established at three sites in 2003 and 2004 in Maine. Mustard was sown at a seed rate of 10 lbs per acre, mowed at late flowering, and then disked into the soil. In the following season, tuber yield was measured at each site and compared to that of potatoes grown in barley check plots. With the collaboration of Mr. Andrew Plant and Dr. Steve Johnson, incidence of white mold on leaves and stems, and *Rhizoctonia* incidence on tubers, were evaluated at one site over two years. On average across all the sites, total tuber yield was 8 percent greater following mustard green manure versus barley. Mustard green manure was associated with decreased incidence of *Rhizoctonia* on tubers, and increased incidence of white mold on leaves and stems, in the following potato crop. The increase in white mold was not of great magnitude; on average the potatoes yielded better after the mustard green manure than after barley grown for grain. No effect was observed on incidence of powdery scab.

Growers interested in using a mustard green manure should avoid close rotations with canola, soybean, clover, or alfalfa in order to avoid building up white mold in the soil. Also it is probably not a good idea to use a mustard green manure on fields where potato varieties susceptible to white mold, such as 'Superior', will be grown.

On the other hand, where *Rhizoctonia* or annual grasses are a problem, a green manure mustard may be quite helpful. In my opinion, the observed yield increase associated with a mustard green manure was great enough to warrant growers pursuing it further. I would proceed, but I would proceed with caution. Start on a limited acreage and evaluate

mustard on your farm. At this point, I would suggest including it in a long rotation (one year out of six). For maximum benefit, prompt disking in after mowing is important. Avoid fields or varieties where white mold is an issue.



### **Cutworms**

James D. Dwyer, Extension Crops Specialist

The incidence of cutworm for potato producers and the producers of rotation crops has dramatically increased within the state of Maine during the recent years. This increased insect activity has been noted for corn, canola, and potato producers. Isolated populations of these insects have been significant and, at times, created dramatic crop loss situations.

The cutworm population in Maine is composed of primarily two different species, Variegated and Black cutworms; however, several other species are also present. The Black cutworm, typically, cuts plants off at the soil surface; and the Variegated cutworm typically climbs and cuts leaves off. Canola and corn growers need to be aware that these insects also have the ability to feed underground and can be active during times when it can be difficult to differentiate between feeding damage and uneven plant emergence. Careful diligent scouting is required when scouting for cutworms. Growers are encouraged to scout corn, canola, and potato fields carefully as these crops emerge and continue scouting through the early growth stages. Growers are also strongly encouraged to carefully inspect any areas with emergence problems especially in corn and canola. Cutworm damage during this time frame can mimic emergence problems and carefully digging in the affected area may be necessary in order to discover the presence of these insects. In potatoes, cut-off leaves or wilted portions of plants may indicate cutworm activity. Digging near the base of the affected plant may reveal the presence of cutworms. Most surface activity will occur at night.

A growing degree-day model from the mid-west may be an aid in predicting the insect's activity. Combining the model with pheromone trapping can provide valuable information for scouting and detection. In 2004 pheromone traps were placed in several locations trapping for both Black and Variegated cutworm. Comparing the model to field observations, the model based one year's observation lined up very well. The biofix or starting point is defined as the time when significant moth numbers are being caught in the pheromone trap. This was June 1. The model predicts that based upon a 50 degree F base temperature, initial feeding will occur between 91 and 311 growing degree days. We found initial feeding within this time frame. We hope that this model will provide growers; and Cooperative Extension with an additional tool to assist in making manage decisions for this insect pest.

Growers should be aware that cutworms can create significant damage in many crops and should be actively scouting for cutworms especially early in the season. Growing degree day information and field scouting reports will be published in Pest Alert and posted on our website at [mainepotatoipm.com](http://mainepotatoipm.com). Growers should also be aware that the neonicotinyl insecticides do not provide cutworm control. As growers investigate products for cutworm control, be sure that the product selected is labeled for the target crop.

## Good Luck To Terry Bourgoin

We here at Cooperative Extension want to wish Terry Bourgoin all the best as he leaves his position as Director of the Division of Plant Industry for the Maine Department of Agriculture, Food and Rural Resources, to take a position with the USDA's Animal Plant Health Inspection Service. Terry will begin his new position April 17, 2006.

The potato industry will miss Terry, as he has been an integral part of Maine agriculture for over 20 years. Terry has made many contributions to the industry here in Maine by overseeing the Seed Certification Program and Porter Seed Farm. He has also been very active at the national level working with the Potato Association of America's Seed Certification Subcommittee.

It has been a pleasure to work with Terry—his hard work and common-sense approach has been greatly appreciated. We will miss working with him at the Maine Department of Agriculture but will look forward to working with him in his new role with USDA/APHIS. We want to say “thank you” to Terry and wish him all the best.

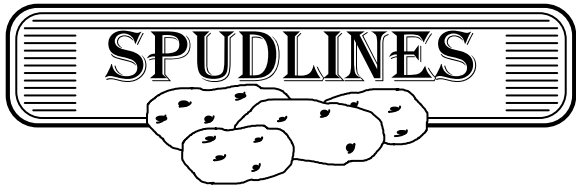


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