SPUDLINES

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CROP PRODUCTION ISSUE

THE UNIVERSITY OF MAINE Cooperative Extension

Dear Grower,

This is the April/May issue of Spudlines for 2008. We hope that you will find the articles interesting and informative. As we approach the 2008 growing season, please note that the new 2008 Maine Potato Pest Control Guide is now available online at http://www.umaine.edu/umext/potatoprogram. The Pest Alert newsletter will begin mid to late June depending upon the crop progress and pest pressure.

As we approach the 2008 growing season, many growers are extremely concerned over projected costs. We certainly concur that costs are an issue; however, we would caution growers to be thoughtful about where savings can be realized; some cost-cutting measures have the potential to be very expensive in the long run.

With the record snowfall of this past winter, disposal of cull potatoes has been an issue for some producers. Controlling cull piles in a timely manner will be extremely important in reducing the potential for potato late blight. The time and effort invested in properly managing cull piles can save much more that it will cost. The early and continuous snow cover has created excellent overwintering conditions for most insects. If spring is anything resembling normal, I expect that we will see elevated populations of European corn borers, Colorado potato beetles, and potato flea beetles. We encourage people to begin scouting for pests early.
All the best,

James D. Dwyer, Crops Specialist

Upcoming Programming of Interest

July 18	**Maine Potato Board Meeting**
July 18	**Industry Dinner** **Fort Fairfield, Maine**
August 10-14	**Potato Association of America** **Annual Meeting and Conference** **Buffalo, New York**

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

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Managing for Color

John Walsh
Potato Storage Specialist
McCain Foods Limited

One of the constant truths of farming is that the customer always wants better quality, never worse. And for French fry potatoes, no aspect of quality is more important than color.

Poor color costs farmers and processors alike. First, the customer doesn't want it. Second, fixing poor color on the line consumes water and energy, two increasingly precious commodities. The extra water also leaches solids from the fries. In effect we lose twice: first in recoveries, second in having to deal with the environmental impact of the waste. So it is quite simply much, much better to fix any problems before the potatoes arrive at the factory. And that means managing sugars.

The season-long objective in color management is to maximize the conversion of sugars to starch. Done properly, the end result is potatoes with moderate-high solids and low sugars. In an ideal world that's what we would see every year. More typically, we manage for the best possible color out of the field, but accept that we may need some additional work in storage.

Everything starts with fertility. Nitrogen and potash levels must be appropriate for both the variety and the length of growing season. Here in the Northeast we only have 110-130 days to grow crops, so we must be careful about excessive applications. Cut back a little once planting stretches into late May and early June. Then use petiole testing to fine-tune nitrogen levels to keep the vines vigorous and healthy through to harvest.

A successful fertility program will have the vines starting to senesce just as we are ready to vine-kill and harvest. In the past, vine-killing was a standard yearly practice. Today we manage the vines later into the season to help continue the maturation process. A bonus is that the vines provide some protection against low-temperature sweetening. Remember though, that if your objectives are better skin set or late season late blight control, then vine killing is a must.

At this time, we are also looking at sucrose and glucose levels. High sucrose in September and October will usually lead to color problems in storage. In that case, we typically see color deteriorate about three weeks after harvest. That's how long it takes for the sucrose to convert to reducing sugars.

Cold soils prior to harvest tend to promote even darker color. Low-temperature sweetening is partially reduced if the vines are present, but once frosts start the stage is set for accumulation of both sucrose and reducing sugars, a double whammy for color. Managing the harvest to finish prior to the cold weather is the best solution, but rarely entirely feasible. That means, that at least some potatoes are going to need significant preconditioning to "fix" the color. I will talk more on that in a bit.

During harvest, the goal is to keep the equipment beds full and drops to a minimum. Any reduction in bruising leads to fewer defects and less chance of infection by diseases. But any excess handling also stresses potatoes, and that always means more sugars to deal with. At this point, we need good sugar readings to help us manage the preconditioning process.

Preconditioning is simply an extended curing period. The same temperature considered optimal for wound healing and skin set, 55-57 ^{o}F, is also just right for reconverting sugars to starch. The humidity can be whatever is required to manage curing and rots; high for the former, lower (about 85%) for the latter. The only reason to go below 55 ^{o}F is if rot becomes unmanageable, even with dry air.

When we first started working with preconditioning, we never went beyond six weeks. The worry was that too much time at high temperatures would lead to senescent sweetening. Over the last few years we've learned that, with good management, we can give the potatoes more time if they need it. Today, it is not unusual to keep potatoes at 55-57 ^{o}F well into January and even February, if necessary. Once glucose and color are acceptable, and the pile cooled slowly to the correct holding temperature, long-term management is all

about keeping the temperature uniform and the air fresh.

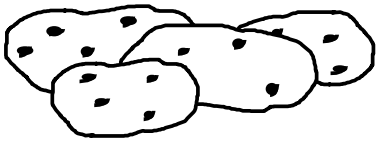
My colleague, Gilles Moreau, coined the term "Total Air Quality" (TAQ) to describe fresh air management. It is a perfect phrase because it correctly emphasizes that we are not just talking about carbon dioxide (CO_2). Other gases, such as ethylene, can also affect sugar levels. Fortunately, CO_2 appears to be the perfect indicator of any potential problems. As long as we keep it below 2500 ppm (0.25 percent), the air will be fresh enough to avoid sugar buildup.

Keeping TAQ high is hardest in the depths of winter, as well as during the warmer days of spring and summer. In the winter, heaters above the pile or before the return air door are the best tool we have. You need about 2¼ BTU for every cfm (total) to warm the return air the 2^oF needed to keep CO_2 low. It is also enough to halve drying times when rot is a problem. Make sure the heater doesn't run when the fresh-air doors are closed. If heaters aren't available, then the next option is periodic flushes with cooler outside air. Most modern control panels offer CO_2 flushes.

A potential pitfall for winter occurs when variable frequency drive (VFD) are in use. At 50 percent speed, the static pressure drops to a quarter of what it was. At low static pressures the exhausts won't open and fresh air can't enter the storage, even if the fresh air doors are open. This is most likely in storages with less than 1 cfm/cwt ventilation capacity. If color darkens unexpectedly, start by propping open the exhausts a little. If that doesn't work, speed up the fans to 60 or 70 percent. The long-term solution would be to power some of the exhausts.

The summer can be trickier because the management choices are a little less appealing, unless you have refrigeration. Without it, you basically accept that you have fewer cooling hours and will have to bring in warm air periodically to flush CO_2. With refrigeration, just ensure that the fresh air door is cracked open a bit whenever the unit is running.

Twenty years ago, color was a perennial issue in our factories here. Today, we have all the tools needed to deliver consistently good color, and have been doing so for quite some time. But remember, our customers are never going to ask for darker color, so we need to use these tools every year.



Fry Color, Carbon Dioxide, and Ethylene

Stephen Belyea
PMIF Potato Storage Consultant

Observation:
Over the past several years there have been occasional reports of fry color deterioration during bin or storage unloading. A typical scenario occurs as follows:

The potatoes in storage are tested regularly for fry color, and fry color history is acceptable to very good. The bin or storage is subsequently opened up and the potatoes are delivered to the processor over a period of several days.
Fry color is tested on every load delivered to the processor, and found to be acceptable to very good on the first day of delivery. During subsequent delivery days, fry color becomes progressively worse, and in some cases deteriorates to the point of being unacceptable. Even more disturbing is that in most cases the fry color will not improve or only improves minimally despite attempts to warm the bin(s) and introduce fresh air.

Investigation:
The one common factor in these occurrences is that the growers were using propane-fueled forklifts or skid steer loaders to shovel out the bins. The first thought to come to mind is that the engine exhaust is producing large amounts of carbon dioxide (CO_2), which in turn creates stress on the tubers and results in conversion of starch into reducing sugars in the tubers.

While CO_2 may have played some part in the loss of fry color, it most likely is not the primary or only culprit. Two factors seem to rule out CO_2 as the only cause:

1. The change in fry color occurs very quickly—much faster than is typical with moderately elevated CO_2 levels.
2. The change in fry color is generally not reversible.

Some growers with this problem have been able to slightly improve the fry color with warming and fresh air, but the fry color improvement has been minimal. When elevated CO_2 levels cause a loss in fry color, we expect that a regimen of tuber warming and/or bin flushing with fresh air will eventually return the fry color to acceptable values.

Possible Explanation:
So what is causing the problem? While we are not certain, it appears that ethylene (C_2H_4) may be a factor.

Ethylene is a naturally occurring plant hormone that affects plant growth, ripening, and senescence. Ethylene is used commercially to ripen fruit and will accelerate the aging process. Ethylene is also known to have a detrimental effect on potato fry color at very low concentrations. Ironically, ethylene can be used to suppress sprouting of potato tubers with minimal or no effect on fry color if introduced into the bins slowly at low concentrations.

Enter the combination of ethylene and CO_2. Work done by Dr. Barbara Daniels-Lake, et.al., (Agriculture and Agri-Food Canada, Atlantic Food and Horticulture Research Centre, Nova Scotia) suggests that a combination of the two gases can produce a much greater effect on fry color than either gas alone.
Any fossil fuel will produce CO_2 and ethylene (along with other gases) when it is burned. However, to date we have only found this problem where propane-fueled shoveling equipment is being used. That may be because there are fewer diesel-powered shovelers being used. Or it may be due to better exhaust cleaners on the diesel-powered equipment.

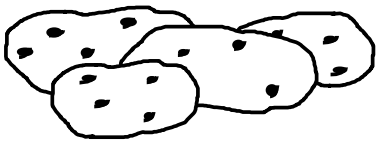
Random tests of propane-fueled forklift exhaust have shown that older forklifts not fitted with catalytic converters produce large amounts of CO_2, ethylene, and carbon monoxide (CO). If engine maintenance is neglected, you can expect emissions to be higher than if the engine is well tuned. On the plus side, one test of a new propane-fueled lift with fuel injection and double catalytic converters showed no detectable ethylene in the exhaust.

Action Steps:
Not every grower has the newest and cleanest-operating shoveling equipment available. However, some simple steps can be taken to minimize the risk of losing fry color during bin unloading:

1. Operate an exhaust fan located near the ceiling of the storage. Ethylene is lighter than air and will tend to collect at ceiling level where it can be exhausted from the storage during bin unloading.
2. Close off all distribution ducts in the plenum to prevent convective air circulation from carrying exhaust gases throughout the bin. Another approach is to close off the return air opening or cover the fans to prevent convective air circulation through the plenum and bin. Be sure to close off any uncovered distribution ducts as you empty the bin.
3. Do not operate the ventilation fans while running any engine in the storage. Operating the fans will circulate undesirable engine exhaust gases throughout the bin.
4. Once bin unloading is done for the day, thoroughly flush the storage with fresh air using the ventilation system fans. (No matter how cold or warm the outside temperature.) If you can, flush the storage before re-opening the distribution ducts.
5. Resume normal ventilation system management.

Several growers who had previously experienced deteriorating fry color during bin unloading have successfully followed the above procedures over the last two years.

We will continue to monitor these occurrences and continue to seek information. If anyone has additional observations or information related to this issue, please let me know so that I can pass it on for other growers' benefit.



Tuning Potato Planters For Improved Potato Stands

Steven B. Johnson
Extension Crops Specialist

Potato planting time always seems rushed, what with rapid weather changes and associated changes in soil conditions. Erratic seed quality and erratic cutting can complicate the rush. Over the years, the needs for seed quality and proper handling and cutting of seed have been stressed heavily and growers have made major improvements in these areas. While these factors can result in poor stands, they are not the only factors that can influence stand. Poorly adjusted potato planters can seriously impact potato stands.

The modern potato planter is not one piece of equipment, but several pieces attached together. The potato planter consists of four or six individual planters and needs to be viewed as such. ***Each individual planter needs to be calibrated in the following ways:***

Hook up: The planter needs to be level while pulled. The planter draw bar should be level when hitched to the tractor. Fertilizer and seed may not be properly placed if the planter is not level. Providing ballast for tractor wheels can reduce slippage.

Tire inflation: The operator's manual lists recommended tire pressure. Improper tire pressure can lead to tire slippage resulting in improper plant spacing. Improperly inflated tires can change the distance covered per tire rotation and thereby change the fertilizer delivered. Uneven tire pressure can lead to uneven seed placement.

Forward speed: The operator's manual lists recommended optimum operating speed. Many planters are operated too fast. Excessive seed movement in the furrow can result from excessive forward speed. As a rule, as the seed spacing decreases, the forward speed should decrease.

Fertilizer depth: Fertilizer should not contact the seed. Fertilizer should be placed about one inch below and two inches to the side of the seed piece. Jack up or drive the planter at least six inches off the floor. Lower the planting mechanism until the opening coulters for the fertilizer just touch the floor. The point of the opening shovel for the seed should be two inches from the floor. The opening coulters or the hydraulic cylinders can be adjusted until the opening shovel for the seed is two inches from the floor. Wobbling coulters should have the bearings replaced.

Fertilizer calibration: The proper rate of fertilizer delivery is as important as the location of the fertilizer. Calibration of the fertilizer delivery entails jacking the planter up, turning each drive wheel a set number of times, usually ten, and measuring the fertilizer delivered. Calibration tables and charts are available listing the expected fertilizer amounts for varied field rates. Fertilizer belts need to be inspected for wear and replaced when worn. Fertilizer flow properties will change with each source and load of fertilizer, as well as weather. It may benefit the grower to calibrate the fertilizer delivery several times during planting.

Picker arm: The picker arm and bearings should be disassembled, cleaned, and checked for wear before reassembly. Spring tension should be consistent for all pickers. Inspect cams for wear and replace as necessary. Wear on the end of a cam can cause premature opening of the picker arm.

Picks: Inspection and maintenance of picks is critical. Worn or, worse yet, broken, or missing picks will quickly lead to erratic stands. Ensure that the release point is consistent for all picker arms.

Picker bowl: The picker bowl, seed hopper, and chutes should be inspected for obstructions or damage. Bolt heads, sharp edges on the hopper, or other potential damage points to the seed should be addressed.

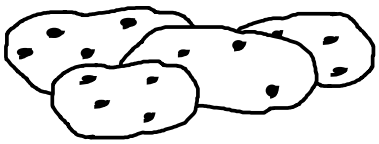
Chain drive: Loose chain drives can cause slippage, leading to erratic fertilizer delivery or seed placement. Chains need to be lubricated and grease needs to be liberally applied to bearings. Replace worn cams, belts, and grease fittings.

Opening shovel for the seed: The tip of the opening shovel should not be rounded from wear. Worn shovels will produce wide, flat furrows,

encouraging seed pieces to tumble. A sharp triangular furrow reduces tumbling, thereby providing better seed placement. Loose or wobbling shovels can result in the planter pulling to one side or the other.

Furrow closing disks: There are two angle planes on closing disks and both should be adjusted. The goal is to cover the seed piece without disrupting the fertilizer band. The closing disks may have to be readjusted with changes in soil conditions, including texture, structure, or moisture. Final settings for covering disks should be performed in the field.

Lubrication: Lubricate belts, chains, sprockets on a regular basis. Grease and oil will reduce the metal-on-metal wear as well as wear from foreign matter contamination.



Gearing Up for Spray Season—Think Safety First

Max Miller
Pesticide Inspector
Maine Board of Pesticides Control

Snow, snow, snow, everywhere we go. But believe it or not, it's time to gear up for seed cutting. Dig out the respirators, dust-filter masks, safety glasses . . . and the reading glasses to read the labeling on your seed treatment. Don't take anyone's word for it—read it yourself and wear your personal protective equipment (PPE). No one is exempt from using PPE.

Worker Protection Standard (WPS) regulations kick in at this point and stay in effect until the crop leaves its immediate surroundings and is considered harvested. There are no post-harvest WPS regulations.

Excluding family operations, everyone working in the field and/or receiving pay from the grower must have received worker or handler training, in either one of these capacities. A valid pesticide applicator's license is the only alternative to training. There is a five-day grace period if workers read a safety brochure first; however, they must have received training at the end of this time. You can't give the rock picking crew new names after five days—they must have training. Retraining is required for each worker every five years.

As an employer, it is your responsibility to keep your crew informed and make certain everyone knows the location of the Central Information Display (CID) and Safety Poster. Employers must be sure that information is accurate, current, and contains the planned applications (including date and time), locations, product names, EPA numbers, REIs, and active ingredients. This is an every day event. Be sure employees are aware of this site and remember that you are responsible.

Employers must know their products and read the labeling before getting started. There may be some things that are not the same as last year; some posting may need to be done. Sign placement must be at the immediate entrance of all usual points of entry to each field where the relevant product is used, not six or seven car lengths away from the immediate entrance. All postings must stay in place until the REI expires. The sign must be covered or removed within three days from the expiration of the REI—otherwise, a fine may result. Remember that posting is only intended for the farm workers; it has nothing to do with the general public.

Pay attention to the signal words on the labeling. These signal words send up red flags as to what kind of PPE is needed. Pressurized systems usually signal the need for safety glasses and goggles. DANGER or WARNING often means, at a minimum, that a chemical-resistant apron and protective gloves are needed, which are labeled specifically for the handling task. CAUTION means one must at least wear a long-sleeved shirt, long pants, shoes, and socks. Remember, individuals are considered handlers if they are handling water-soluble packs. This means no shorts, flip-flops, or tank tops.

It has been rumored that the ground didn't freeze last winter. If that is the case, there will probably be extra insects around to get rid of. This may call for restricted-use pesticide products requiring a private applicator's license. If a license is needed,

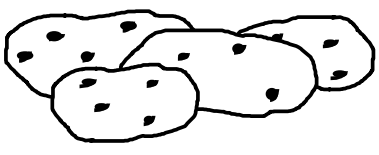
University of Maine Cooperative Extension in Presque Isle offers the exam the second and fourth Fridays of each month. No appointment is necessary; however, calling ahead would be appreciated.

You will be thinking of fungicides as blight season takes shape. It's a good idea to change products to ward off resistance, but this won't erase the need to track the amount of EBDC, if used. It all adds up—stick with what is tried and true and works the best for you. Tins are one option when blight pressure is high: the labeling states that you must be in an enclosed cab to use these products, so filters and the air conditioner must be checked. Everything must be up to snuff before you start your spray program.

Triple rinsing, or the equivalent thereof, allows the industry to recycle its containers. Remove the caps and as much of the labeling as possible, keeping in mind the adage about the old woman who spit in the ocean and shouted, "Every little bit helps!" This program was a long time in the making. I remember the old days of shredding and crushing. Keep up the good work.

Check your decontamination kits. You need a Tyvek® suit, eyewash water, wash water (three gallons for each handler and one gallon for each worker), soap, and paper towels. I knew a fellow who might not have been blind in one eye for more than half of his life if he'd had one of these kits.

Keeping copies of the labeling at the CID site is excellent. It's not a requirement but it gives quick access to antidotes and EPA numbers. We are still struggling with getting these numbers transposed to the key in the spray logbook. Maybe a rainy day would be a good time to get this taken care of. It is a violation not to have the EPA numbers somewhere in the logbook. I've been doing a lot of record inspections this spring and I commend you all on the neatness of your logbooks; even I could tell what you were doing. Play it safe and take some extra time to read the label.



Agricultural Leadership

Hannah Carter
Assistant Professor
University of Florida

Ten years ago I left the potato fields of northern Maine to further my education, with the intent to do some more "learning" and return to the County and the agricultural industry that I loved. It was during my time working for University of Maine Cooperative Extension's IPM program that I realized that for agriculture to continue in Aroostook County, the state of Maine and even in the United States, growers and those involved in agriculture need to go beyond their farms and fields and begin to actively participate in the decision-making processes that affect their homes, farms, and communities. So I set off to another land-grant institution, the University of Florida, to gain knowledge in this area of agricultural leadership.

While I have not made it back to Maine (yet), I have spent the past ten years working on developing the leadership capacity of those involved in Florida's agriculture and natural resource industries. Throughout these years working within Florida's agricultural industry, I have made the following observations:

1. Vince Lombardi had it right when he said, "Individual commitment to a group effort—that is what makes a team work, a company work, a society work, a civilization work." So what commitment are you making to ensure that the potato industry will remain a viable (and vital) part of Maine's agricultural economy?

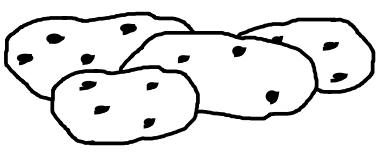
2. Pest and disease pressures, free trade, gas prices, land development—as Thomas Paine put it, "These are the times that try men's souls." And these times and the issues of water, immigration, energy, and the economy are not going to go away. How are you going to address these issues and keep your operation evolving to meet the changes and challenges that are having an effect on your operation? While water and immigration reform may not be at the forefront of concerns to the potato industry currently, the

ramifications of the decisions that will be made on a national level, on these issues and others related to agriculture, will be felt by farmers across the country. Be informed, seek knowledge, and be willing to participate in the policy process on the issues that will affect this industry.

3. To be a leader, you do not have to be the smartest, the loudest, the most experienced. All you need is the willingness to take that extra step, the ability to work effectively with people, and a common goal that you want to achieve. Leadership can take many forms, whether it be serving on an industry board, seeking out opportunities to speak with elected officials, or just becoming more knowledgeable on the issues and sharing that knowledge with those around you—everyone in this industry has the capacity for leadership. Instead of leaving those responsibilities of leadership to others, be willing to step up and assume a leadership role.

With the record-breaking snowfall giving way to the spring thaw, potato planting is just around the corner. As you get your equipment ready and your fields prepared, begin to think about the 2008 potato season beyond yields, markets, and spray schedules. Think about the potato industry as a whole: what will be the major challenges to the industry on the local, state, and national levels? As you plan to plant your fields, also plan to get involved in some way to support this industry that we all (yes, including me) care so deeply about.

Dr. Hannah Carter is director of the Wedgworth Leadership Institute for Agriculture and Natural Resources (http://wlianr.ifas.ufl.edu) and a faculty member in the Department of Agricultural Education & Communication at the University of Florida.



Black Dot on Potatoes

Andrew Plant
Extension Educator

Colletotrichum coccodes is a pathogen of worldwide distribution. Over the past two to three growing seasons, black dot has gained significant attention among growers within our production area. Black dot has been documented as infecting numerous plant species, most importantly potato and tomato. On potato, its symptoms are known as “black dot”. The “black dot” symptoms result from the production of small black sclerotia on roots, stems, stolons, and tubers. Confusing the matter as to the extent of black dot’s economic importance is the fact that its symptoms are very similar to several diseases caused by other pathogens. On the tuber, it is often mistaken for silver scurf; on the stem and stolon it is often confused with *Rhizoctonia* canker; on foliage, it is often mistaken for early blight. To further muddy the story of black dot, it’s often simultaneously associated with *Verticillium, Fusarium,* and *Rhizoctonia*, producing a disease called ‘potato early dying.’

The economic importance of *C. coccodes* has been difficult to put a finger on. Yield effects, with the disease’s multiple interactions with other pathogens, timing of infection, and variability in plant health, have been difficult to decipher and replicate. However, the effects upon marketability have been easier to enumerate. As a storage pathogen, black dot produces grayish silvery lesions and small sclerotia that detract from the marketability of the tablestock potato. With the increased consumer demand for high quality, prewashed, fresh potatoes, the market is unwilling to support potatoes that do not look good. In storages, infection of tubers may increase water loss through wounding of the skin. Lastly, from a processing perspective, black dot may make the peeling process more difficult.

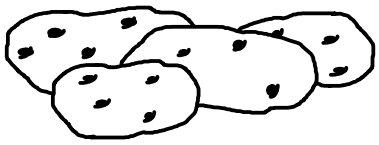
Introduction of the pathogen to potato plants occurs primarily through overwintering sclerotia in field soil and crop debris, and to a lesser extent through seed-borne inoculum. Seed-borne inoculum is of greatest concern in spreading the disease to previously uninfested areas. The black dot pathogen employs a relatively unique mode of infection that

is well timed to the physiological state of the plant part it's infecting. Expression of symptoms is associated with stress events such as wounding, senescence, and herbicide damage. That is why, typically, black dot's presence isn't detected until after vine desiccation. Infection of tubers is generally associated with extended wet conditions, especially at tuber initiation and vine desiccation. It's generally thought that most of what is found on stored tubers is a result of field infection, and that increased symptom appearance during the storage season is probably the growth of latent infections. Spread in storage from infected to uninfected tubers isn't apt to be substantial, most likely only occurring from tuber to tuber contact.

The identification of alternative hosts for *C. coccodes* are incomplete. The presence of these hosts in potato production units is likely to maintain inoculum levels for subsequent potato crops. Common rotation crops such as mustard, canola, alfalfa, soybean, and oats have been shown to harbor the pathogen. Nightshades, timothy grass, and foxtail are a few common weeds that black dot has been shown to colonize. Several small grain rotations, such as rye, wheat, and barley have not shown successful colonization. Weed management and rotation selection ought to be considered if black dot is a problem on your farm.

In regards to control of the pathogen, there is yet to be a silver bullet. Culturally, irrigation practices, crop rotation, and interval between vine desiccation and harvest need to be considered. In regards to the interval between vine desiccation and harvest, for both silver scurf and black dot, as the time between desiccation and harvest increases, so does the amount of infection. Having stated that, I will include a disclaimer, in that it's important to use careful judgment in managing disease risk. Growers must know their disease situation before determining this interval. If late blight or pink rot are a risk, then skin set must be a priority. Weigh the risk of having a storage with late blight or pink rot in it, compared to a storage harboring black dot or silver scurf. In regard to variety selection, early-maturing and thin-skinned varieties tend to be more susceptible to the tuber blemish component of the disease, while late-maturing varieties tend to be more susceptible to the yield loss component. Chemical control has historically been poor. However, azoxystrobin may provide some benefit for tuber infection when applied in-furrow.

In summary, black dot has been in our area and has been, but is garnering increased scrutiny due to market demands. It is my opinion that the tuber blemish aspect of the disease is of greater importance in our area than the yield component. In our area, given our soil types and environment, foliar wounding that would facilitate black dot development doesn't occur often; mechanical or chemical wounding however is possible but preventable through good crop management. For now, the best way to control black dot is through cultural practices and variety selection. Know which on-farm production areas are most prone, and choose rotation schemes and varieties accordingly.



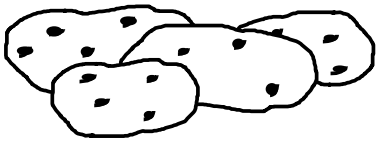
Agricultural Engineer Hired

James Dwyer
Extension Crops Specialist

The Maine Potato Board would like to announce that George McLaughlin of Fort Fairfield has been hired as an agricultural engineer to help service the agricultural engineering needs of the Maine potato industry. Mr. McLaughlin has a background in many types of engineering including construction and site development, coupled with experience in potato production. George will be working closely with Steve Belyea of the Potato Market Improvement Fund, the University of Maine staff, and the Potato Board in order to provide the Maine potato industry with agricultural engineering expertise and information. George will be joining the Maine Potato Board staff in mid May and will be based at the Harley D. Welch Agricultural Center in Presque Isle. You can contact George by calling the Maine Potato Board at 207-769-5061.

The need for additional engineering support for the Maine potato industry has been recognized for several years. As a result the Maine Potato Board,

the Maine Department of Agriculture's Potato Market Improvement Fund, and University of Maine Cooperative Extension have formed a partnership to fund this needed position so that growers will have access to this valuable resource.



Summary of the 2007 Aroostook County Corn Variety Trial

Peter Sexton,
Extension Crops Specialist

-farm observation plots were established at six sites in the County last season with the objective of evaluating the potential for corn in Aroostook County by direct observation of its growth and yield and by developing a database for modeling its performance using historical weather data. Plots were established at St. Agatha (Duane Theriault farm), Caribou (Murray Blackstone farm), Easton (Andy King farm), Presque Isle (Dick Porter farm), Ludlow (Perry Lilley farm), and Sherman (John Cummings farm). At the Caribou, Easton, and Presque Isle sites 13 varieties were planted; at the Ludlow site 12 varieties were planted; at the Sherman site 6 varieties were planted; and at the St. Agatha site 3 varieties were planted. The number of varieties planted varied between sites based on the field size and seed availability. The varieties ranged from 73 to 86 days "Relative Maturity" in season length. In early July there was some hail damage sustained at the Sherman site. Seed samples were taken at two to three-week intervals from each site for determination of grain moisture percentage. For three varieties of interest ('Hyland Baxxos', 'Dekalb DKC 299-97', and 'Pioneer 39W54'), individual grain weight was measured at each sample point. Grain yield was determined in early October for sites that were going to be cut for silage (Sherman, Easton, and Ludlow) and in mid- to late-October for the remaining sites. Yield was determined by harvesting 20 to 30 plants and measuring the number of feet of row taken to obtain bushel per acre yield.

Grain yields at individual sites ranged from 30 to 144 bushels per acre. The average yield of the five earliest lines (as measured by grain moisture) across four sites was 105 bushels per acre. Grain moisture percent and individual seed weight for the three indicator varieties ('Hyland Baxxos', 'Dekalb DKC 299-97', and 'Pioneer 39W54') were regressed against modified growing-degree-days to develop estimates using National Weather Service data for how well corn would do in previous seasons in St. Agatha, Caribou, and Houlton, with the assumptions that the crop would be planted on May 15th each year and that the corn variety would need 1800 modified growing degree days to reach maturity before a killing frost (i.e. approximately 73 to 75 days "relative maturity"). At Houlton the time period evaluated was 2002 through 2007 (six years); at Caribou it was 1995 to 1998 and 2002 to 2007 (ten years); at Frenchville it was 1998 to 2007 (ten years). At Houlton, the model predicted that the crop would mature before a killing frost 4 out of 6 years and would come close to maturity another 1 year out of 6. At Caribou the model predicted that the crop would mature 3 out of 10 years and came close another 3 out of 10. At Frenchville, the model predicted that the crop would mature 1 out of 10 years and came close another 1 out of 10. To mature 8 out of 10 years at Caribou, the model estimated one would need a 68 day variety; for Frenchville, the model estimated one would need a 63 day variety to make maturity 8 years out of 10.

Silver Scurf of Potato – Managing the Disease

Vikram Bisht

Silver scurf can be a major issue to processing and table stock growers. Silvery sheen on the tubers reduces the marketability of the table stock and could increase grade out for processing. The disease has become economically important in many western states in the US and Canada.

The disease, caused by fungus, *Helminthosporium solani,* is seed borne and the main source of primary inoculum. The fungus can survive on the walls and various structures in the potato storage and handling equipment can also be a source of contamination and infection. My research work, conducted in Alberta, Canada, had shown that the pathogen can also survive in the soil for 2 or more years. The trials conducted using silver-scurf free minitubers showed that the progeny tubers showed highest incidence in fields with one year gap after a potato crop, and lesser in soils with no gap after last year's crop. Diseased progeny tubers were found even after 2 years gap between potatoes. Very low frequency (close to 1 % incidence and severity) of silver scurf infection were found even in some fields where potato crop was never planted, implying dispersal of inoculum in the fields. Exactly in what form the fungus survives in the soil has not been identified or reported yet. The soil-borne inoculum appears to have a role in the epidemiology of the disease and possibly introducing the pathogen on to silver-scurf free minitubers or early generation seed stock. This soil-borne inoculum gains importance after top-killing, when the probability of higher disease incidence increases with delayed harvest - longer the tubers stay in the ground.

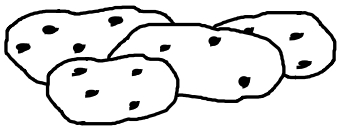
Host range studies on 31 plant species demonstrated that potato was the only crop species infected by the pathogen. Some of the plant types tested were red root pigweed, Lamb's Quarter, Shepard's purse, Kochia, perennial sowthistle, stinkweed, quack grass, chickweed, dandelion, beet, canola, lentil, carrot, peas, tomato, flax, wheat, oat, rye, corn etc.

Thiabedazole (Mertect) seed treatment, which had been normally used as a post-harvest treatment for the control of Fusarium dry rot, had been effective against silver scurf too. However, recent studies have clearly shown that throughout the US, many isolates of both Fusarium dry rot pathogen and the silver scurf pathogen have developed resistance to the fungicide. Cross-resistance against other related fungicides (thiophanate methyl, Easout) has also been reported. My in-vitro trials on the affect of various fungicides have shown that various fungicides affect Helminthosporium solani – mycelial growth of the fungus, the sporulation or the spore germination differently and none of the fungicides tested exhibited activity against all 3 of these parameters. For example EDBC fungicide, mancozeb, significantly reduced spore germination but not the fungal mycelial growth; while Imazilil (Fungaflor™) even at 1 ppm a.i. significantly affected the mycelial growth and sporulation, but had no affect on the spore germination even at 100 ppm. Procloraz, Rovral also had similar effect. Propiconazole (Tilt) was highly effective against mycelial growth and sporulation, but was highly phytotoxic to the potato seed. The trial results show that a combination of fungicides would a good way to reduce the disease problem in storage, whether used as seed treatment or post-harvest tuber treatment. Fludioxomil (Maxim™) and Dithane-ST have shown to be effective seed treatments.

Fungicide seed treatments were effective in reducing infection of progeny tubers; however, there was no carry over fungicidal effect in the next cycle. Mancozeb-ST has proven to be a very effective post-harvest seed treatment, but is meant only for seed potatoes; it has a green dye, which makes it unsuitable for any other purpose.

The influence of storage conditions has a far greater influence on the tuber infection levels than the effect of the fungicides. Infested storage equipment or walls would negate the benefit of fungicide seed treatment. In warm storage (~40+F) with high humidity (>= 90% RH) and circulating air through the infected tubers would create ideal conditions for spore dispersal and secondary spread. Free moisture on tubers would allow the spores to germinate and re-infect. Untreated potatoes would be ideal hosts. Storage trials conducted in Alberta and Idaho, have shown that oxidizing agents, such as chlorine dioxide and Oxidate would be able to reduce the levels of effective inoculum. Post-harvest seed treatment with newer fungicide

chemistry would be further helpful in keeping the storage tubers blemish-free.



New Extension Educator Begins in Houlton

James Dwyer
Extension Crops Specialist

The University of Maine Cooperative Extension would like to announce that Andrew Plant has recently become an Extension Educator of Agriculture, based in our Houlton office. Andrew was employed with UMaine Extension since 2002 as our potato IPM professional before moving to this new position. Among his new responsibilities and interests, Andrew will be working with small farms and alternative crops, promoting local markets for local farms, and home horticulture, including the Master Gardener program. Andrew is very excited about the opportunities, and looks forward to working with area clientele.

Andrew was born and raised in Aroostook County, graduating from Fort Fairfield High School in 1998. He graduated from the University of Maine at Orono in May, 2002, where he received a bachelor of science in biology, and garnered his master of science in botany and plant pathology in 2005. He is currently pursuing a Ph.D. in biological sciences.

Please feel free to contact Andrew at 532-6548, 1-800-287-1469, or by e-mail at aplant@umext.maine.edu.