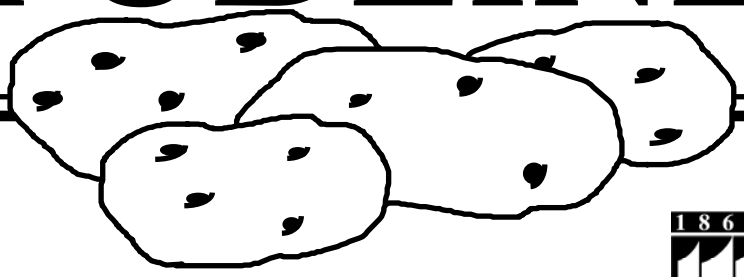
SPUDLINES



MARCH 2008 **SEED ISSUE**
VOL. 46 NO. 1

THE UNIVERSITY OF MAINE Cooperative Extension

Dear Potato Grower,

This is the first issue of SPUDLINES for 2008 with another issue scheduled in April. In this issue, articles are presented on the seed and seed handling. I want to put in a push for Maine seed. This and the risk of importing late blight or worse, should make buying Maine seed an easy choice. Peter Sexton reports on corn possibilities and nitrogen management and Greg Porter reports on wood ash results.

Sincerely,

Steven B. Johnson, Ph.D.
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.

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

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March 21	**Maine Potato Board Annual Meeting** Presque Isle Inn and Convention Center, Presque Isle

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POTATO RING ROT

Steven B. Johnson, Ph.D.
Extension Crops Specialist

Potato ring rot is caused by the bacterium *Clavibacter michiganensis* subsp. s*epedonicus*. Maine has a zero tolerance in seed lots for the disease and the disease is a quarantine issue in many parts of the world. The disease derives its name from the breakdown of the tuber vascular ring, frequently appearing as a creamy-yellow to light-brown, cheesy rot. In severe cases, a cheesy discharge can be forced out from this tissue when the

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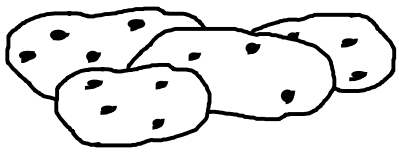
tuber is squeezed. Severely diseased tubers may show dry, cracked areas on the surface. The disease can cause a wilt. Not all cases have any or all the stems expressing wilt. Wilt symptoms are more common under heavy infection and dry weather.

The pathogen can survive between seasons in infected seed tubers or as dried slime on many surfaces. The bacterium is easily transferred mechanically from tuber to tuber during seed cutting or other mechanical operations. While there are reports of the bacterium infecting sugar beet roots and seed, and some Solanaceae plants are susceptible via mechanical inoculation, the pathogen causes disease only in potatoes. Some potato varieties rarely express symptoms and are considered symptomless carriers. The bacterium does not survive well in our conditions in the absence of potato tubers or plant debris.

Disease exclusion measures include the use of clean seed and good hygiene before and after planting and harvest.



SOME THOUGHTS ON NITROGEN AND POTATOES

Peter Sexton, Ph.D.
Extension Crops Specialist

Nitrogen is important for all crops, and more so for potatoes because of the combination of a relatively weak root system and a high yield potential. The crop needs nitrogen to develop a healthy canopy. A shortfall will cause early senescence of the crop, as N is moved from tops to tubers during bulking.

On the other hand, if N rates are increased, tuber size profile will continue to increase even after total yield has reached a maximum response to N. On the negative side, specific gravity declines as N rates are increased, and excessive N will cause delayed maturity and increased susceptibility of the crop to disease problems later in the season.

Previous work we have done—calculating returns versus N rates from a processing contract—indicated an optimum rate in the range of 170 to 190 pounds N per acre for Russet Burbank, and 140 to 160 pounds per acre for Shepody potatoes. Varying the cost of N fertilizer in this analysis showed that the estimated optimum rate only declined by 1 pound of N for every five-cent increase in the cost of N. In other words, at a cost of 30 cents per pound, the optimum rate of N was estimated at 188 pounds per acre; whereas at a cost of 70 cents per pound, the optimum rate was estimated at 180 pounds of N per acre (for Russet Burbanks grown for processing). This indicates that it won't pay in the end to cut back much on N rates even though costs are going up. This is especially true where premiums are paid for large tuber size.

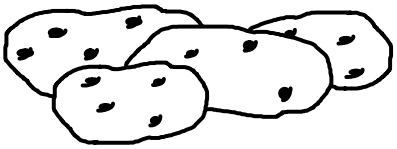
Nitrogen is very dynamic in the soil. A soil test that would predict soil N mineralization would be very helpful in guiding N application. There are researchers in our region working on developing such a test, but it remains a work in progress. Split application of N to avoid leaching loss early in the season would seem helpful, but it has been shown to decrease yields in drier seasons—probably because the N does not become available when it is needed. Also, with varieties that are prone to internal defects (such as hollow heart), it seems to me that there is a risk. If a topdressing of N is followed by a drought period, increased tuber defects result, because when it does rain there is a large pulse of both N and moisture available all at once. Varieties that has very good tuber types, such as Russet Norkotah, are less susceptible to this problem. In the irrigated west where N can be applied with irrigation water and moisture stress avoided, split application of N is a proven and time-tested way to optimize use of N. In our environment it has not shown consistent benefits.

What ***is*** well worked out is petiole nitrate testing. You can decrease the amount of N applied in the spring and then use petiole testing to guide further N application in-season. Be careful not to decrease N rates beyond what can be added back by foliar application. If you decrease your N rate by 15 pounds per acre at planting, this can readily be made up for in-season if petiole testing shows the need. How much you might decrease N rates at planting depends on how much you feel you can add back if the need shows itself. Keep in mind that if there is no rainfall in between applications, back-to-back applications can lead to leaf burn.

If we assume a cost of $2100 per acre to grow potatoes, with $650 a ton for fertilizer and an application rate of 1200 pounds per acre, then fertilizer represents only about 20 percent of the cost of growing the crop. The crop still has to be carried through the season and protected from pests and diseases. If the crop cannot be adequately fed and protected, it is probably wiser to scale back acreage to what can be managed. Efficiency

is important, but you doesn't want to be in the position of decreasing the return on investment, or risking the whole investment, by not providing needed inputs.

This is a complex issue given contracts and consideration of long-term markets, but it seems that under the current circumstances with commodity prices where they are, one way to economize on fertilizer costs would be to consider increasing acreage of rotation crops that are less expensive to grow. Prices of oilseeds and small grains are going up and inputs are modest relative to potatoes. The logistics of harvesting, transporting, and storing or marketing these crops need to be thought through, but if these points can be resolved rotation crops may provide some economical options to consider.

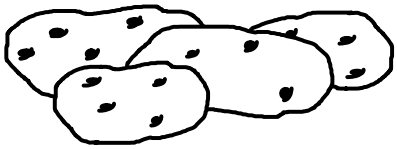


MAINE'S 2008 POST-HARVEST TEST RESULTS: APHIDS TO BLAME?

Steven B. Johnson, Ph.D.
Extension Crops Specialist

The Post-Harvest Test results are not as good as they have been in recent years. We are not alone in this situation. At present, there is a lot of head scratching as to what is the reason for the higher-than-expected levels of virus in the seed, as aphid levels were low most of the season. There is some thought that a July flush of aphids may have transmitted some of the virus. Expect to hear more about this.

From the data supplied by Bob Batteese, Director of the Maine Department of Agriculture's Division of Plant Industry, only 65 percent of the samples met the Foundation Seed Class tolerance of no more than 0.55 percent total virus. This compares to 84 percent last year and 77 percent the year before. Don't be fooled by the increased acreage meeting certified seed requirements (0.55 to 5 percent virus), as this is where some of the Foundation seed ended up. The real issue is that 1.9 percent of the seed acreage failed to make any seed grade. This is up from 0.1 percent in 2006 and 0.7 percent in 2005. Data from 1999 to 2007 appear in Table 1. The 2007 crop had nine varieties with rejected acreage. This compares to two varieties in 2006 and seven in 2005.



POTATO DORMANCY IN STORAGE

Steven B. Johnson, Ph.D.
Extension Crops Specialist

Most potatoes undergo a dormant, or resting, period. The dormancy length of potato tubers is consistent neither between varieties, nor from year to year within varieties. Growing-season stress, storage temperature, and time can all affect the physiological age of seed and therefore have an impact on dormancy. Growing-season stress can have a marked influence on the physiological age of seed the following planting season.

Dormancy is gradually lost during storage, and potato tubers sprout. Pipping is the breaking of dormancy followed by sprout elongation. Once sprouting has begun, it will continue. The longer the tuber has been sprouting, the more advanced its physiological age.

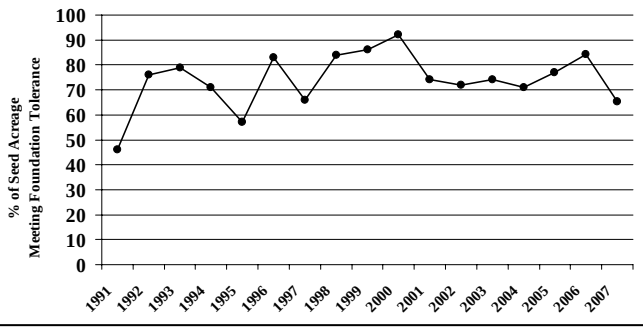
A portion of the research conducted in Greg Porter's program at the University of Maine includes potato dormancy. The table below includes some information from the Maine Agricultural and Forest Experiment Station bulletin, *2007 Maine Potato Variety Trials, NE1014 Regional Trials and Advanced Breeding Lines, Exeter, Presque Isle, and St. Agatha, Maine*, which is published annually. The potato dormancy listed below is based on storage at 45 degrees F and 85 percent relative humidity.

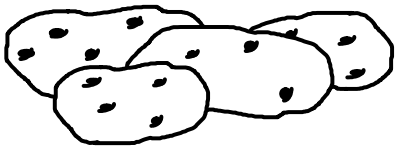
Crop Season	Storage Season	Days to Pip	
		Superior	Russet Burbank
2006	2006-2007	153	191
2005	2005-2006	142	188
2004	2004-2005	97	195
2003	2003-2004	120	190
2002	2002-2003	133	171
2001	2001-2002	125	167
2000	2000-2001	154	177
1999	1999-2000	128	167
1998	1998-1999	128	170
1997	1997-1998	68	53
1996	1996-1997	99	84
1995	1995-1996	114	65
1994	1994-1995	104	83
1993	1993-1994	114	119

1992	1992-1993	106	112
1991	1991-1992	126	130

I have attempted to correlate long or short dormancy with heat unit accumulation and rainfall, but no clear-cut patterns have appeared. Generally, the more growing-season stress tubers experience, the more physiologically aged the harvested tubers are, and the shorter the dormancy is. Drought stress appears to have more influence than heat unit accumulation, but quantification of the relationship is elusive.

Figure 1. Percentage of Seed Acreage Meeting Foundation Tolerance 1991-2007 Crops





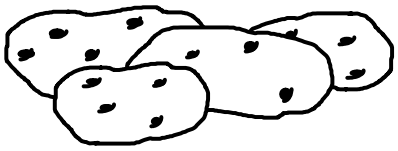
NAP COVERAGE DEADLINE

Doreen Conlogue
Aroostook County Executive Director
Farm Service Agency

Producers in need of insurance coverage for crops not covered by federal crop insurance (FCIC) can enroll in the Farm Service Agency (FSA) Noninsured Crop Assistance Program (NAP). NAP is a federally funded program that provides coverage to producers for non-insurable crops when low yields, loss of inventory or prevented planting occurs due to natural disasters. Crops eligible for NAP coverage are those for which crop insurance is not available, including fruits and vegetables, aquaculture, pecans, turf grass, and forage crops, just to name a few.

NAP coverage requires a service fee of $100 per crop per producer, with a cap of $300 per county. Out-of-pocket expenses will not exceed $900 for any producer, even if production occurs in more than three counties. Service fees may be waived for eligible limited-resource producers.

NAP applications for coverage must be filed and service fees paid by the applicable closing date. Application closing dates vary by crop. Aroostook County producers can contact the FSA Office in their area for specific crop application sales closing dates. Houlton: 532-9407, Fort Kent 834-3831 or Presque Isle 764-4151. More information on NAP and additional disaster assistance programs is available online at http://www.fsa.usda.gov/.



THE SUN MAY NOT ALWAYS BE YOUR FRIEND

James Dwyer
Extension Crops Specialist

One of the greatest health risks for those of us who work in agriculture is exposure to the sun. It is easy to think about chemical risk, but many of us never think much about that sunburn on our arms, noses, or ears until we find that red mark or sore that will not heal, and then your doctor tells you that you have skin cancer. Then you think, “I wish I had paid more attention.” I speak from personal experience.

Skin cancer is an occupational hazard for those who work outside, including farmers and farm workers. The nature of farm work involves spending many working hours outdoors, and often in direct sunlight. Avoidance of the sun by farmers and farm workers is nearly impossible; therefore, it is important for farm workers to take extra steps to reduce sun exposure and the risk of skin cancer.

Skin cancer is the most common form of cancer in the United States, surpassing lung, breast, colorectal, and prostate cancers. The American Cancer Society estimates that there are more than one million cases of skin cancer in the U.S. each year. Research has shown that overexposure to sunlight, especially when it results in sunburn, is a major factor in the development of skin cancer.

What is skin cancer? Skin cancer is a disease in which malignant (cancer) cells are found in the outer layers of your skin. The three most common types of skin cancers are named for the types of skin cells from which they arise: basal cell carcinoma, squamous cell carcinoma, and malignant melanoma. These are sometimes divided

into two categories: nonmelanoma and melanoma cancers. Most nonmelanoma skin cancers develop on sun-exposed areas of the body, like the face, neck, lips, and back of the hands. In melanoma skin cancer, the cancer cells are found in the cells that color the skin, called melanocytes. Malignant melanoma is a more serious type of skin cancer. People who burn easily, freckle, or have fair complexions experience greater color changes, and are at higher risk for developing skin cancer.

What you can do to reduce your risk? Promote sun safety on the farm with the following practices.

Sunscreen:
Farm workers should protect themselves from skin cancer by applying sunscreen year-round. Sunscreens recommended for outdoor workers should have an SPF rating of at least 15. Sunscreen should be reapplied every two hours.

Clothing:
Wear lightweight clothing to cover your skin. The thought of wearing long-sleeved shirts in the summer might sound unbearable, but proper clothing can help protect skin from the sun.

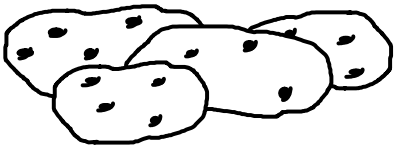
Sunglasses:
Farm workers should also wear sunglasses with 99–100 percent UV absorption to protect their eyes from sun exposure.

Avoidance:
The easiest way to reduce overexposure to ultraviolet radiation is to avoid the sun, especially between the hours of 10 a.m. and 3 p.m. For farmers, avoidance may be difficult, but seeking shaded areas and wearing a hat will be most beneficial. A wide-brimmed hat is recommended, but a baseball style hat is better than nothing. Apply sunscreen to the tops of the ears for better protection!

Anyone who finds one of the following types of areas on the skin should seek medical advice:

* An area that does not heal properly.
* Any change on the skin. This could include changes in the size or color of a mole.
* Scaliness, oozing, bleeding, or change in appearance of a bump or nodule.
* The spread of pigmentation beyond its border, such as dark coloring that spreads past the edge of a mole or mark.
*A change in sensation, itchiness, tenderness, or pain.

The more proactive that you are, the less risk that you assume. For more information, please contact your health-care provider or the American Cancer Society.

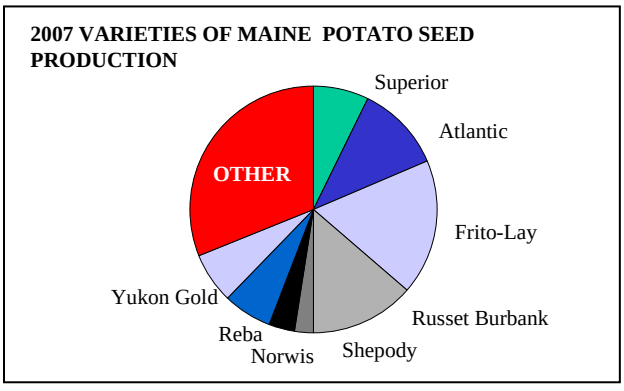


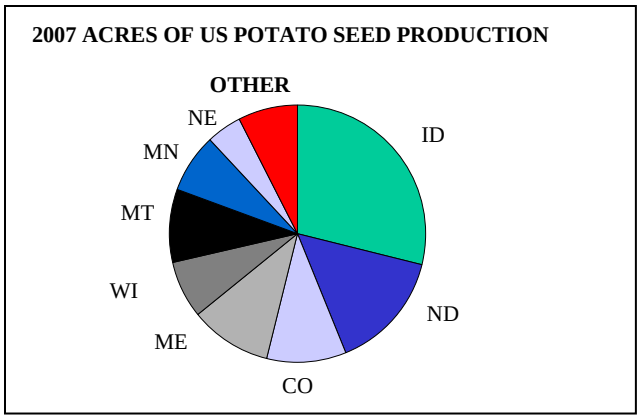
2007 SEED POTATO PRODUCTION IN MAINE POTATOES FOR PROCESSING LEAD

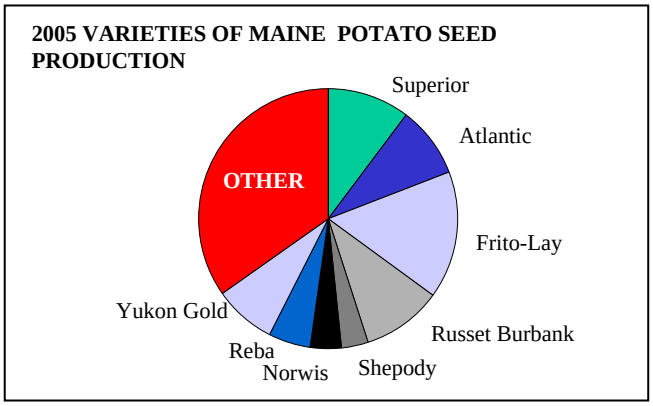
Steven B. Johnson, Ph.D.
Extension Crops Specialist

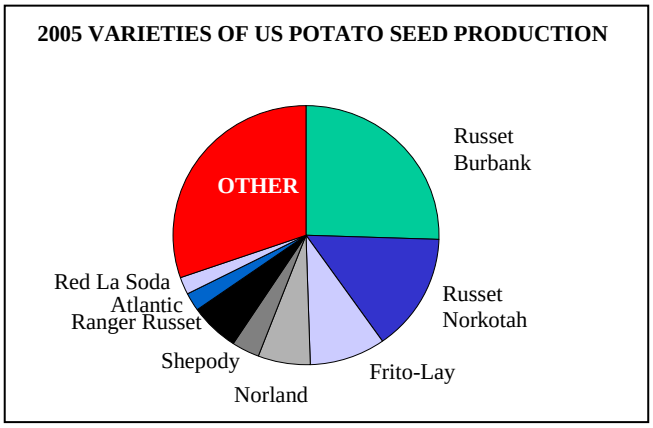
There were 108,631 acres of potato seed accepted for certification in the United States from the 2007 crop. This is compared to 113,313 acres and 137,386 acres accepted from the 2001 and 2005 crops, respectively. Maine is the third leading state in the country for seed acreage, moving just ahead of Colorado. The eight leading potato seed-producing states account for 96 percent of the total U.S. seed acreage.

Frito-Lay varieties make up the leading seed acreage in Maine. Maine produces 24 percent of the nation's seed acreage for Frito-Lay; this is up from 17 percent in 2005. The variety 'Superior' was the leading seed acreage in Maine in 2001; in 2005 'Superior' barely edged out 'Russet Burbank' for second in Maine acreage. In 2007, the varieties Russet Burbank and Atlantic each comprised more acres than 'Superior' in Maine. In 2001, Maine produced 70 percent of the nation's acreage for 'Superior'; in 2005, Maine produced 64 percent and in 2007, Maine produced 52 percent of the nation's acreage for 'Superior'. Clearly, the movement from fresh to processed potatoes is well underway in Maine.









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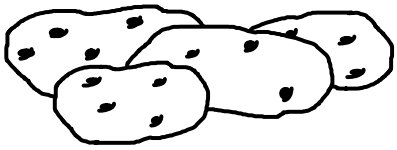

WOOD ASH SHOWS PROMISE IN AROOSTOOK FARM EXPERIMENTS

Gregory A. Porter, Agronomy Professor and
Paul C. Ocaya, Research Associate
Department of Plant, Soil, and Environmental Sciences

Alternative liming materials and fertilizers may be considered as growers' attempts to control their production costs. Wood ash is available locally from several plants and may be useful as a nutrient source and liming material. We conducted a 2007 experiment at Aroostook Research Farm in Presque Isle to study the effects of wood ash applications on soil fertility, pH, yield, quality, and nutrient uptake by Russet Burbank potatoes.

The amendment treatments were

1) no lime or ash,
2) 1 ton/acre CCE Ag Line,
3) 2 ton/acre CCE Ag lime,
4) 2.5 ton/acre wood ash, and
5) 5 ton/acre wood ash.

The lime and ash treatments were spread on the soil surface on June 6 and then incorporated with a harrow. Russet Burbank potatoes were planted on June 7 at 16-inch spacing. The goal of the wood ash treatments was to provide approximately 1 and 2 tons per acre CCE, respectively. Analyses of the spread ash indicated that the material actually provided 0.8 and 1.6 tons/A CCE, respectively. We collected soil samples before the wood ash and lime applications and after potato harvest. Additional soil samples were collected from the potato hills during June, July, and August.

Most plots received a standard per-acre fertilizer treatment of 180 pounds N, 150 pounds P_2O_5 , and 180 pounds K_2O; however, two additional treatments were included in which the P and K fertilizer rates were adjusted downward to account for expected nutrient content of the wood ash. Based on historical wood ash analyses, the additional treatments were

1) 2.5 ton/acre wood ash, 180-139.5-119 N-P-K fertilizer; and
2) 5 ton/acre wood ash, 180-129-58 N-P-K fertilizer.

The plots were vine-killed on September 20 (105 days after planting) and harvested on October 2. Yield, size, grade, and specific gravity were determined. Fry color was measured from 50ºF storage. Plant and tuber samples were collected to determine nutrient uptake (lab results will be available later this year).

Here is how the spread material performed compared to our projections, which were based on historical analyses (pounds/acre):

	Projected nutrient content	Actual nutrient analysis
K_2O	122 soluble	352 total
P_2O_5	21	86
Mg	82	84
Ca	734	1113
B	1.0	1.2
Zn	6.8	8.3

It is clear that the material we spread had significantly greater nutrient content than anticipated, that it increased soil fertility, and that it needs to be managed as both a liming material and a significant source of K_2O, P_2O_5, Ca, B, and Zn (Table 1).

The soil on this site started at a pH of 6 and had medium-high phosphorus availability (15.7 pounds/acre Modified Morgan P), medium potassium availability (144 pounds/acre, 3.5 percent saturation), high magnesium availability (235 pounds/acre, 18 percent saturation), and high calcium availability (1557 pounds/acre, 73 percent saturation). Wood ash resulted in a more rapid increase in soil pH and nutrient levels within the potato hill than that resulting from the agricultural lime treatments (Figure 1). When compared to the lime treatments after potato harvest, the wood ash treatments had higher soil pH, CEC, available P, K, Ca, B, and Zn (Table 1).

Crop vigor, plant stands, yield, tuber size, hollow heart, and external defects were not significantly affected by the treatments. Specific gravity was lowest for the high ash rate when no fertilizer adjustment occurred, but high specific gravity was maintained when the ash was combined with a reduced rate of P and K fertilizer. Fry color tended to be lightest for the treatments with the highest K availability (ash plus standard fertilizer rate). The effect on fry color is not surprising given that past research has shown that high K availability results in lighter fry color.

Summary: The results indicate that wood ash can be used effectively as a liming and nutrient source in potato systems that utilize a scab-resistant potato variety. Lab analyses are needed to determine the CCE and nutrient content of the actual material being spread. The fertilization program will need to be adjusted appropriately to assure a high quality potato crop and to maximize cost benefits. Uniform/accurate application techniques and careful monitoring of soil fertility levels will be critical for management of wood ash in potato systems. While this research focused on ash application ahead of potatoes, application before planting grain rotation crops would quite likely be an effective strategy. Growers should check with their University of Maine Cooperative Extension office for current information on nutrient management programs, fertilizer rate recommendations, and amendment loading rates.

Table 1. Selected soil test results for the 2007 wood ash experiment.

Soil Test Variable by Treatment	After Harvest October 5 121 DAT	% Change from May Samples
<u>1 ton/A CCE Ag Lime</u>		
pH	5.5	- 7
M. Morgan Avail P (lbs/A)	19.3	+ 24
Potassium (lbs/A)	202	+ 36
Magnesium (lbs/A)	292	+ 24
Calcium (lbs/A)	1720	+ 13
Boron(ppm)	0.2	0
Zinc (ppm)	0.4	+ 33

Soil Test Variable by Treatment	After Harvest October 5 121 DAT	% Change from May Samples
<u>2.5 ton/A wood ash (0.8 ton/A CCE)</u>		
pH	5.8	- 5
M. Morgan Avail P (lbs/A)	22.6	+ 45
Potassium (lbs/A)	286	+106
Magnesium (lbs/A)	247	+ 5
Calcium (lbs/A)	2372	+ 49
Boron (ppm)	0.4	+100
Zinc (ppm)	1.0	+233

Table 2. Wood ash and Ag-lime effects on Russet Burbank yield and quality, 2007.

Lime or Ash	Yield (cwt/A)		% Ext. Defs		%	Spec	Fry Color[2]	
Program	Tot.	US#1	total	scab	10 oz	Grav	Agtr.	Index
Std. Fertilizer Rate:								
No lime or ash	374	335	10.7	0.0	14	1.084	73.6	2.4
1 ton/A CCE Ag lime	341	306	12.3	0.0	17	1.083	72.9	2.3
2 ton/A CCE Ag lime	358	332	7.2	0.2	11	1.085	71.7	2.4
2.5 ton/A wood ash	359	325	9.6	0.0	12	1.082	79.8	1.9
5 ton/A wood ash	355	325	8.8	0.1	15	1.079	78.5	2.1
Reduced Fertilizer Rate:								
2.5 ton/A wood ash	345	308	11.1	0.0	11	1.084	71.9	2.2
5 ton/A wood ash	344	322	6.8	0.0	9	1.087	70.7	2.4
Treatment Effect[1]	ns	ns	ns	ns	ns	*	*	*
$LSD_{0.05}$	ns	ns	ns	ns	8	0.006	6.7	0.4

[1]Analysis of variance F-test results for treatment effect: ns=no significant effect, *=significant at 5%, **=significant at 1%.
[2]December fry color from 50ºF storage. Agtr.=Agtron score, higher numbers indicate lighter color. Index values are converted from USDA fry color charts where lower indices indicate lighter color. An index of 1.0 indicates that all slices were USDA fry category #1; An index of 2.0 indicates that all slices were USDA fry category #2, etc.

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