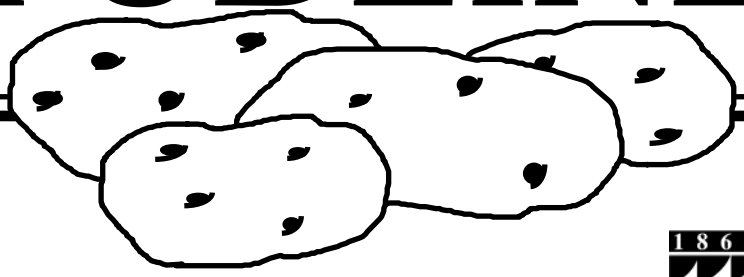
SPUDLINES



MARCH 2001 **SEED**
VOL. 39 NO. 1 **ISSUE**

THE UNIVERSITY OF MAINE Cooperative Extension

Dear Potato Grower,

This is the first issue of SPUDLINES for 2001 with another issue scheduled in April/May. In this issue, articles are presented on seed treatments and the current readings from the Florida test. I want to put in a push for Maine seed. The virus levels are some of the lowest that have ever been seen. This and the risk of importing late blight or worse, potato wart, should make buying Maine seed an easy choice.

John Jemison describes issues with bringing land of CRP. Jim Dwyer expands on this with an article on white grub. We welcome Erin Chadbourne to the Presque Isle Staff. She is an IPM professional and brings new ideas to our programming.

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.

Sincerely,

Steven B. Johnson, Ph.D.
Crops Specialist

Upcoming Programming of Interest

March Wednesday	**Monday Agriculture Winter School** SJV Technology Center, Frenchville
March Tuesday	**Tuesday Agriculture Winter School** Houlton High School, Houlton

For further information, call 764-3361

For information on license credits, call 760-9ipm 24 hours per day

WHITE GRUB

James D. Dwyer
Crops Specialist

During the past couple of seasons, we have seen an increase in the incidence of white grub being found in potato fields that have recently come back into production after being seeded down for a number of years. White grub is a large subterranean insect that feeds typically on the roots of grass and can be very destructive to potatoes. The adult form of the white grub is commonly known as the June bug.

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White grubs are among the most destructive insect pests of turfgrass and can cause serious injury to potatoes. They feed below the soil surface on the roots and rhizomes of many common grasses as well as soybeans, corn, and potatoes. This insect is capable of consuming the entire root system of a plant. In areas where they are abundant, white grubs are capable of destroying large areas of turf. They can cause substantial economic loss for potato growers.

After hatching, white grubs begin feeding on the roots and underground stems of plants. In turf, the first evidence is the appearance of localized patches of grass displaying symptoms of moisture stress. In potatoes, foliar symptoms will only appear with severe infestations. Damage in turf is most apparent from mid-August through early September when white grub feeding activity is greatest. Damage in potatoes may not be evident until harvest, when large feeding galleries can be found.

Several animals—especially skunks, raccoons and moles—are highly attracted to white grub infestations, and signs of their foraging in an area are strong indications of white grub activity. Flocks of birds feeding, particularly starlings, can be additional evidence of a possible infestation.

If a grower is planning to bring ground that has been out of production back into production, white grubs as well as wireworms should be considered severe potential threats. Please remember that for processing potatoes there is a zero tolerance for wireworms.

Late summer plowing destroys many larvae, pupae and adults that are in the soil. Late summer plowing also exposes these life stages to predators. To be effective, however, the plowing must occur before the insects go below the plow depth to overwinter. A rotation program of oats, barley or wheat with clover and corn has proved satisfactory in some regions as a control strategy. Growers should also be aware that most chemicals that will provide control for wireworms will also control white grubs in potatoes. As always, please read and follow all pesticide label instructions.

Spudlines is published by the University of Maine Cooperative Extension to provide information for the Maine Potato Industry. The annual subscription rate is $5.00. The Educational Committee of the Maine Potato Board provides sponsorship of growers they represent and the allied industry needed to support their growers. For further information, contact: **Steven B. Johnson, UMCE, PO Box 727, Presque Isle, ME 04769; (207) 764-3361 or toll free in Maine 1-800-287-1462 or electronically at *sjohnson@umext.maine.edu***

BRINGING CONSERVATION RESERVE LAND BACK INTO PRODUCTION

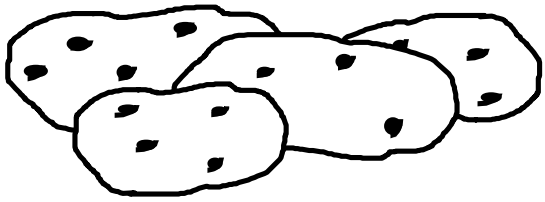
John Jemison, Ph.D.
Water Quality Specialist

The possibilities of increasing acreage should have all sectors of the industry smiling. However, the success of this increase will be based in part on how the new acreage is managed. Many are planning to bring back conservation reserve land back into production. This may be a risky proposition unless you give a good bit of thought into why that land was put into conservation reserve program in the first place. Many of these soils are shallow to bedrock, highly erodable, or simply poorly productive and not able to support profitable agricultural production.

Before planning to put these lands into potato production, consider the fertility and pest situation these fields are in today and the potential problems. Many of these fields have not had any weed management for over a decade. As a result, expect weeds, woody vegetation, and some insect pressure when these fields go back into production. Manage the fertility first, and then seeding this down to a solid forage stand is an option. After a year of forage, consider putting the field into potatoes. Also, don't expect that just because this soil has not been into production that the soil will have improved greatly by not being worked each year. It likely hasn't become worse, but you may have to add organic material to significantly improve soil quality.

How conservation reserve program fields are managed and the crop rotation selected will influence the success of bringing marginal land into production. Ensure all necessary diversions and filter strips to minimize soil loss off the field are in place. Livestock manure used either on potatoes or the rotation crop would help build soil organic matter. In planning for the future, consider rotations that minimize soil disturbance and will return the most amount of organic material to the soil. Even if potatoes could be produced, considered planting a grain undersown with clover and leave the clover for an additional year. This will reduce the number of times that soil is disturbed and exposed to erosion and organic matter mineralization.

Where does the Maine potato industry want to be in five to ten years? Increasing potato acreage by half is great for the industry, but it is only good if we can maintain the yield and quality. Preserving the long-term soil quality will help us keep the industry at 90,000 acres of potatoes over the long term.



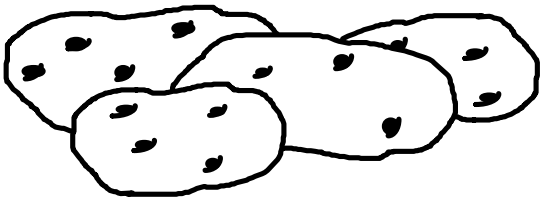
SEED PROMOTION EFFORTS CONTINUE

James D. Dwyer
Crops Specialist

The Maine Potato Board continued its seed promotion efforts in marketing the 2000 seed crop. Don Flannery, Assistant Executive Director of the Maine Potato Board and seed

growers Frederic Flewelling and Robert Shaw traveled to Florida in November to visit markets and Florida growers. In East Palatka, at the Putnam County Agricultural Center, Terry Bourgoin presented an educational program on the Maine Seed Program management to about twenty-five growers. Don Flannery gave a growing season review and promoted the high quality of Maine seed to the audience. Field and storage visits with the Florida growers proved very informative. Several seed dealers also made the trip and took the opportunity to visit customers. It was a pleasure to hear all of the positive comments about the high quality of Maine seed.

In a separate trip to North Carolina, Mike Corey, Executive Director of the Maine Potato Board, seed grower Brent Buck and several dealers visited potato growers in the Elizabeth City area. North Carolina growers are very supportive of Maine seed and are pleased with the quality they are receiving. It was also very pleasing to learn about the cooperation between the researchers from the University of Maine and North Carolina State University on plant breeding. There was much concern about potato wart at both meetings.



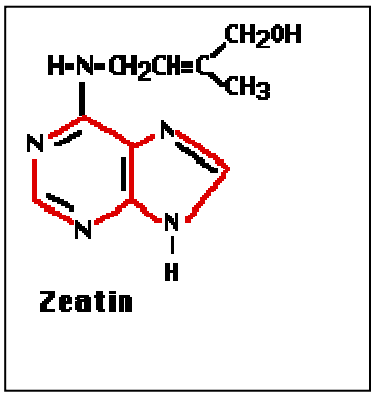
PLANT HORMONES AND PLANT GROWTH REGULATORS: CYTOKININS

Steven B. Johnson, Ph.D.
Crops Specialist

This is the second installment of a series of articles about plant hormones and plant growth regulators. Plant *hormones* are naturally produced substances that are produced in one part of a plant and transported to other parts, where they exert an effect that is disproportionate to their very small concentrations. Plant hormones exert an influence on plant growth, as do water and nutrients. Hormones exert an influence on plant growth when present in quantities of less than one part per million. *Plant growth regulators* (PGR) are substances synthesized outside of the plant but cause hormone-type activity when applied to plants.

Cytokinins are plant hormones that are derivatives of and have a chemical structure similar to the amino acid adenine. Cytokinins are essential ingredients for growing plant cells in culture. Without cytokinins in the medium, plant cells will not divide by mitosis. Cytokinins have been implicated in many plant activities, usually along with some other plant hormone such as auxin or ethylene. One of the clearest examples of cytokinin activity occurs in the germination of seeds. The endosperm of monocot seeds, such as corn, contains large stores of the precursor to the cytokinin zeatin. When a corn kernel germinates, zeatin moves from the endosperm to the root tip where it stimulates mitosis. Zeatin is the abundant cytokinin found in most plants. Synthetic cytokinins or plant growth regulators include kinetin and benzylaminopurine (BAP).

History of Cytokinins



In 1913, a compound found in phloem tissue was discovered to have the ability to stimulate cell division. In 1941, coconut milk was also discovered to have this ability. The first cytokinin was isolated from herring sperm in 1955. This compound was named kinetin because of the compound's ability to promote cell division. Kinetin is a plant growth regulator. The first naturally occurring plant cytokinin was isolated from corn in 1961 and was later called zeatin. Zeatin is the most common form of naturally occurring cytokinin in plants. Cytokinins have been found in almost all higher plants.

Biosynthesis of Cytokinins

Cytokinin concentrations are highest in meristematic regions and areas of continuous growth potential such as roots, young leaves, developing fruits, and seeds. Cytokinins are believed to be synthesized in the roots and translocated via the xylem to shoots. Cytokinin biosynthesis happens through the biochemical modification of adenine. Degradation of cytokinins occurs largely by the enzyme cytokinin oxidase.

Physiological Effect of Cytokinin

Cytokinins are defined more by their biological activity rather than by structure. The major function of cytokinins in plants is to promote cell division. The physiological response to cytokinins will vary depending on the type of cytokinin and plant species. Cytokinins are at times, have an influence plant growth by:

- stimulating cell division.
- regulating root or shoot production
- cytokinins can also have effects on cell enlargement.
- stimulating the growth of lateral buds to partially overcome apical dominance
- enhancing stomatal opening
- stimulation of development of chloroplasts and chlorophyll synthesis
- delaying senescence
- promoting nutrient uptake

Cytokinin-Imitating PGR-Type Materials Available for Potato Production

	Cytokinin	GA	IAA
	%	%	%
Triggrr	**0.012**	0	0
Early Harvest PGR	**0.09**	0.03	0.045
Stimulate	**0.009**	0.005	0.005

Other PGR-Type Materials Available for Potato Production:

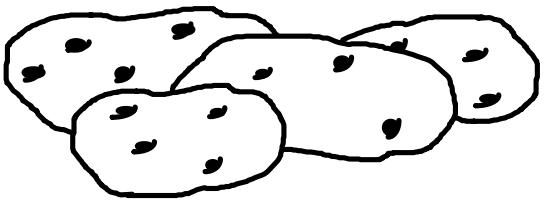
	GABA	l-glutamicAcid
	%	%
Auxigrow	29.2	29.2

Fertilizers:

ACA Plus (7-0-0)
acetic acid

Crop Set (0-0-0)

S	1.5%
Cu	0.2
Fe	0.5
Mn	1.5



SEED POTATO RESULTS FROM THE FLORIDA TEST

Steven B. Johnson, Ph.D.
Crops Specialist

One of the requirements for potato seed planted in Maine is that it has to be certified. The Division of Plant Industry, with the Maine Department of Agriculture, is the agency responsible for confirming that standards have been met. After passing field inspections, the next part of the potato seed certification process is a winter test. This is commonly known as the "Florida Test," where seed is grown in November, December and January. In fact, the state of Maine has a farm in Florida where these tests are performed. The virus levels are recorded and published annually in the Maine Florida Test Directory. Seed coming into Maine must be winter-tested or have a waiver to be admitted without a winter test. Seed inspectors also plant 20-pound (approximately 100 seed piece) samples of seed imported into Maine in a specific plot on the Aroostook Farm. These samples are also rated for virus content as a double check.

I have reviewed the data from both the imported seed plots and the Maine Florida Test Directory. Maine imports many varieties of potato seed from many areas. I chose to look at only one seed area and only two important varieties, Russet Burbank and Shepody. For the 2000-2001 season, less than one percent of the Russet Burbank and none of the Shepody lots from Maine were rejected based on the Florida Test. These results represent the seed lots to be planted this coming spring and the readings are an improvement over the previous season. Of the seven leading varieties by acreage, the 2000 crop of seed had no acres rejected.

Bear in mind that virus levels over five percent are rejected as certified seed. For the upcoming season less than one percent of the Russet Burbank and none of the Shepody seed lots were rejected based on the Florida Test. **Maine seed has never looked better.** If you were not happy with the performance of your Shepody seed, it may be that, for the second consecutive year, over half of the lots entering Maine from this one seed area would have been rejected if they had been inspected in Maine. There are times the "devil you know" may be preferable to the "devil you don't know."

	Russet Burbank				Shepody			
		VIRUS LEVEL				VIRUS LEVEL		
Source	**# of tests**	0-0.55 %	0.56-5.0 %	>5.0 %	**# of tests**	0-0.55 %	0.56-5.0 %	>5.0 %
99-00								
Maine	**140**	86	13	1	**82**	84	16	0
99-00								
Maine	**111**	66	34	1	**72**	63	35	3
Imported	**9**	11	89	0	**10**	20	80	0
98-99								
Maine	**65**	49	42	9	**72**	40	54	6
Imported	**19**	32	63	5	**22**	5	41	55
97-98								
Maine	**74**	27	61	12	**92**	70	19	11
Imported	**14**	21	57	21	**10**	0	40	60
96-97								
Maine	**55**	53	42	3	**84**	60	38	2
Imported	**20**	50	50	0	**17**	29	41	29

EVALUATION OF POTATO SEED PIECE FUNGICIDES 2000

Steven B. Johnson, Ph.D.
Crops Specialist

Single-row plots, forty feet long were established near Van Buren, Maine (47° 6' 15.8" latitude, 67° 55' 35.1" longitude) in a Caribou gravely loam soil. Each of the twenty six treatments were replicated four times and arranged in a randomized complete block design. Seed pieces were hand planted at a plant spacing of one foot and a row spacing of three feet. Hand-cut seed pieces were treated and hand planted on 17 May. Seed pieces of treatments listed as 7d were cut and treated on May 10, 7 days before planting. The treated seed pieces were planted two inches deep and immediately covered with four inches of soil. Rubber examination gloves, changed with treatments, assured no cross contamination of materials or seed occurred. The plots were fertilized with 1100 pounds per acre of 15-15-15. The plots were maintained by the grower as part of the regular field maintenance and appropriate weed, insect, and disease control measures were performed. A rating of plant emergence and vigor were made on 29 June. On 9 August, plant ratings for *Rhizoctonia* lesions were performed. The rating system used was 0 -- no infection, 1 -- one lesion less than 2 mm, 2 -- larger lesion or more than one small lesion, 3 -- coalescing of lesions, but stem is not girdled, 4 -- stem girdled, 5 -- stem dead. The plots were top killed on 14 September. The center twenty feet of the plots were harvested on 9 October. Yield determination and a visual rating of tuber incidence and severity covered by *Rhizoctonia* sclerotia were made on the washed tubers. This is part of an ongoing effort by Cooperative Extension Staff. Please note that not all of the seed-piece treatments evaluated may be legal in Maine.

There is excess material remaining when 16 ounces of material is used per 100 pounds of cut seed, and coverage may be inadequate with 8 ounces per 100 pounds of cut seed. Seed pieces with only liquid Maxim applied did not perform as well as other treatments.

					Tuber	
Treatment	Rate per 100 pounds of seed	Emergence 29 June	Vigor 29 June	*Rhizoctonia* stem rating	*Rhizoctonia* incidence	*Rhizoctonia* severity
		(percent)	(percent)	(0-5)	(percent)	(percent)
Check	0.0 oz	92.00	88.75	1.28	13.75	3.00
Check + 7 days	0.0 oz	93.50	86.25	0.35	4.50	2.50
Max Liquid/Firbark 7d	2.37 ml/8.0 oz	97.75	88.75	0.38	3.75	2.50
Max Liquid/Alderbark 7d	2.37 ml/8.0 oz	95.00	91.25	0.20	5.75	2.50
Max Liquid 7 d	2.37 ml/8.0 oz	98.50	91.25	0.48	7.75	2.00
Max Liquid/Firbark	2.37 ml/8.0 oz	98.50	90.00	0.40	4.25	2.25
Max Liquid/Alderbark	2.37 ml/8.0 oz	95.50	91.25	0.53	4.50	2.00
Max Liquid	2.37 ml/8.0 oz	92.75	82.50	0.18	12.75	3.50
Maxim dust	8.0 oz	95.50	88.75	0.15	5.50	4.00
TopsMZ	8.0 oz	97.75	87.50	0.35	4.25	2.00
TopsMZ	12.0 oz	94.00	90.00	0.30	4.00	3.50
Evolve	8.0 oz	94.25	88.75	0.28	19.28	2.00
Evolve	12.0 oz	93.50	87.50	0.48	10.25	4.00
L1036-AL	12.0 oz	97.75	87.50	0.28	7.00	3.50
L1037-AL	12.0 oz	97.00	91.25	0.35	14.00	4.75
TopsMZ Gaucho	12.0 oz	97.75	87.50	0.25	19.25	4.50
PCC553-2	8.0 oz	94.00	91.25	0.08	8.25	1.75
PCC553	16.0 oz	94.25	96.25	0.15	15.00	3.50
PCC555-2	8.0 oz	95.75	86.25	0.15	8.00	4.50
PCC555	16.0 oz	97.00	92.50	0.72	25.00	10.00
PCC555-3	16.0 oz	94.75	88.75	0.18	5.50	6.25
MZ	16.0 oz	96.25	90.00	0.30	19.25	4.00
MZ+	16.0 oz	98.50	86.25	0.75	6.50	4.00
Auxigo	3.0 oz	97.00	95.00	1.20	22.75	3.50
MZ+ & Auxigo	16.0 oz+3.0 oz	97.75	93.75	0.43	27.75	5.25
MZ & Auxigo	16.0 oz+3.0 oz	95.50	96.25	0.60	37.50	5.75
LSD (P = 0.05)		5.21	6.76	0.61	24.01	4.04

Treatment	Rate per 100 pounds of seed	Plot Yield 23 September				
		up to 1 7/8 inch (pounds)	1 7/8 to 2 1/4 inch (pounds)	2 1/4 to 2 1/2 inch (pounds)	2 1/2 to 3 1/4 inch (pounds)	Total
Check	0.0 oz	6.20	7.10	3.63	25.24	42.86
Check + 7 days	0.0 oz	4.59	6.33	3.21	30.53	45.78
Max Liquid/Firbark 7d	2.37 ml/8.0 oz	6.18	8.83	1.94	20.95	36.69
Max Liquid/Alderbark 7d	2.37 ml/8.0 oz	4.89	9.35	2.28	24.60	43.06
Max Liquid 7 d	2.37 ml/8.0 oz	4.39	7.28	1.74	33.38	51.45
Max Liquid/Firbark	2.37 ml/8.0 oz	5.48	7.40	2.59	23.93	41.54
Max Liquid/Alderbark	2.37 ml/8.0 oz	4.68	5.75	1.80	24.83	39.00
Max Liquid	2.37 ml/8.0 oz	4.35	5.30	1.71	27.73	42.28
Maxim dust	8.0 oz	6.16	8.87	1.61	24.11	41.24
TopsMZ	8.0 oz	7.36	6.90	2.79	30.44	48.96
TopsMZ	12.0 oz	6.20	6.35	2.51	23.95	39.86
Evolve	8.0 oz	4.30	4.29	1.65	25.93	37.99
Evolve	12.0 oz	5.79	7.10	2.35	28.25	45.94
L1036-AL	12.0 oz	6.08	6.00	2.93	27.48	44.58
L1037-AL	12.0 oz	5.78	5.58	3.03	26.08	42.60
TopsMZ Gaucho	12.0 oz	5.14	7.10	3.09	32.93	49.38
PCC553-2	8.0 oz	7.28	7.65	2.34	25.23	43.31
PCC553	16.0 oz	5.03	7.25	1.93	22.60	37.43
PCC555-2	8.0 oz	6.38	8.04	2.43	25.15	44.04
PCC555	16.0 oz	5.05	8.38	2.49	29.58	47.40
PCC555-3	16.0 oz	5.31	5.70	1.64	31.48	45.85
MZ	16.0 oz	5.00	8.34	2.56	19.04	37.43
MZ+	16.0 oz	4.15	4.80	1.00	27.28	44.98
Auxigo	3.0 oz	5.23	5.60	2.56	31.33	46.51
MZ+ & Auxigo	16.0 oz+3.0 oz	6.53	7.95	2.49	24.68	44.34
MZ & Auxigo	16.0 oz+3.0 oz	5.29	6.33	3.38	26.88	42.06
LSD (P = 0.05)		2.02	2.17	1.52	10.06	11.49

MEET ERIN CHADBOURNE

Erin Chadbourne joined the University of Maine Cooperative Extension in January 2001 as a Potato Pest Management Professional. Erin will be assisting Jim Dwyer with the Potato Integrated Pest Management Program in the Presque Isle Extension Office. Her major duty will be to oversee the Aroostook County portion of the Potato IPM Program. She will also be assisting in educational program delivery and other Extension projects.

Erin graduated from Southern Illinois University with a Bachelor of Science degree in Plant and Soil Science/Science Specialization with a minor in chemistry in May 1997. Erin earned her Master of Science degree in Weed Science in January 1999 from Southern Illinois University. For her Master's thesis, Erin evaluated the effect of selected post-emergence herbicides on glyphosate-resistant soybean growth, development, and yield under weed-free conditions. Erin has interned summers for American Cyanamid as a Technical Service Representative Assistant.

Erin, a southern Illinois native, is acclimating to "The County" very well despite the bone-chilling winds and the frost-heaved roads. Erin is acquiring an appreciation for this area and its people, the potato industry, all the recreational activities, and Moxie! Erin is looking forward to the 2001 growing-season and meeting the potato growers of Aroostook County.

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