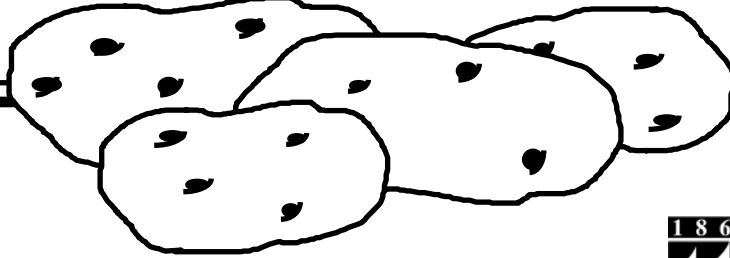


# SPUDLINES



DECEMBER 2006  
VOL. 44 NO. 3

CONFERENCE ISSUE



Dear Potato Grower,

Despite some trials and tribulations, this last season ended up well for the most part. The market has been strong; so we have some reasons for optimism. As we try to look ahead to next year, several issues come to the fore. Colorado Potato Beetle and Late Blight, of course, are always topics of concern and reasons for diligence. Marketing potatoes and development of alternative crops (particularly canola for biodiesel) are also points of interest. In this issue of Spudlines we try to cover all of these topics to some degree. I hope it makes good reading and is informative.

The agenda for the Maine Potato Conference is included with this issue of Spudlines. We are planning to have some focus on storage issues at the conference this year.

On behalf of all the folks in our office, let me extend our personal best wishes for a cheerful holiday season and a prosperous new year to you all.

All the best,  
Peter Sexton, 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.

## Upcoming Programming of Interest

- |                            |  |
|----------------------------|--|
| <b>January<br/>9-10-11</b> | <b>Augusta Ag. Trade Show</b><br>Civic Center, Augusta   |
| <b>January<br/>24-25</b>   | <b>Annual Maine Potato<br/>Conference</b><br>Caribou Inn and Convention Center,<br>Caribou                         |
| <b>February<br/>7-8</b>    | <b>New England Regional Training<br/>for Ag. Service Providers</b><br>Wentworth Hotel, New Castle<br>New Hampshire |
| <b>March<br/>14-15</b>     | <b>Northeast Potato Technology<br/>Forum</b><br>Delta Prince Edward Hotel<br>Charlottetown, PEI                    |

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## Update on Imidacloprid Resistance in Maine Populations of the Colorado Potato Beetle

Andrei Alyokhin, Assistant Prof. of Entomology

During the past growing season, we continued monitoring populations of the Colorado potato beetle for signs of resistance to imidacloprid using the same technique as during the 2005 growing season. Samples were taken on farms that were using imidacloprid and either reported Colorado potato beetle problems, or had high beetle populations based on scouting reports. Some of the populations were the same as in 2005, but several additional farms were also sampled.

Adult beetles were collected and shipped overnight to Dr. Galen Dively at the University of Maryland. Eggs laid by those beetles were incubated until hatching. The larvae were then fed artificial diets containing a range of imidacloprid concentrations. Lethal concentrations—killing 50 percent of the population (LC50 values)—were calculated based on larval mortality. The Colorado potato beetle strain never exposed to imidacloprid was used as a reference. Dively's lab has been conducting such tests since 1995 and the diet incorporation bioassays that they use have come to be considered an industry standard.

Figure 1 summarizes results of the diet incorporation bioassays. *Ref* was a reference strain never exposed to neonicotinoids. Beetles are considered *susceptible* when the imidacloprid concentration killing 50 percent of exposed larvae is below four parts per million, *tolerant* when the concentration is between four and eight parts per million, and *resistant* when the concentration is above eight parts per million. In practical terms, susceptible beetles can be successfully controlled by a single application of imidacloprid at planting time. Tolerant beetles can still be controlled by imidacloprid to some degree, but additional applications of non-neonicotinoid insecticides are required later in the season to prevent beetle damage. Resistant beetles experience relatively few negative effects from feeding on imidacloprid-treated plants.

We detected four populations that were tolerant of imidacloprid and another two populations that were

borderline between susceptible and tolerant. We did not detect any resistant populations, which is a marked improvement from the 2005 growing season. It is worth noticing that AR5 and AR6 populations had similar highly susceptible beetles with approximately the same LC50 values as laboratory susceptible *Ref* strain (Fig. 1). AR5 population came from an organic farm that has never used imidacloprid. AR6 came from a conventional farm that relied on foliar applications of imidacloprid to control beetle populations instead of more common in-furrow or seed applications.

SM2 and SM3 were populations from the original resistance hotspot in southern Maine.

Unfortunately, despite a three-year effort to break resistance, these still remain tolerant. It is likely that already very few susceptible beetles remained on these farms when resistance management plans were first implemented. Therefore, it takes time for the susceptible beetles to “dilute” resistant genes by mating with resistant beetles.

CM1 and SM1 populations came from the fields that first reported resistance last year, making the problem less advanced than in SM2 and SM3 populations. The field where CM1 was first sampled in 2005 was rotated across the road in 2006. Also, an approximately two-acre untreated refuge was left on the edge of the field planted in 2006. As a result, there was a dramatic drop in beetle resistance (Fig. 2). The field where SM1 population was collected in 2005 and 2006 was not rotated, and the entire field was treated with imidacloprid at planting. Not surprisingly, the beetles appear to have become more tolerant to imidacloprid in 2006 (Fig. 3).

Our results indicate that although imidacloprid resistance remains a threat, the situation is currently under control. Nevertheless, every grower who wants to be able to continue to use neonicotinoids for years to come should be paying serious attention to resistance management. Our results indicate that if appropriate actions are taken in a timely fashion, neonicotinoid insecticides will remain a valuable tool for Colorado potato beetle control. Growers should let us know if they notice considerable beetle populations following neonicotinoid applications, so that we can test the beetles for resistance.

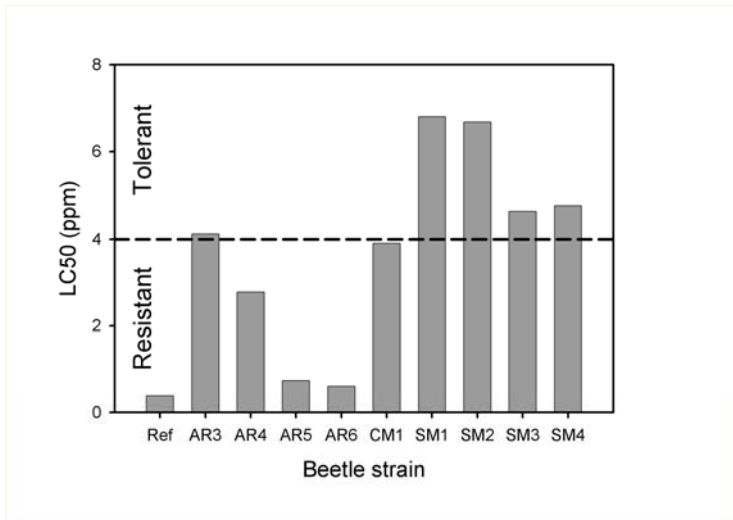


Fig. 1. Concentration of imidacloprid required for killing 50% Colorado potato beetle larvae in diet incorporation bioassays. Beetles are considered susceptible when concentration is below 4 parts per million, tolerant when the concentration is between 4 and 8 parts per million, and resistant when the concentration is above 8 parts per million. Ref was a reference strain never exposed to neonicotinoids.

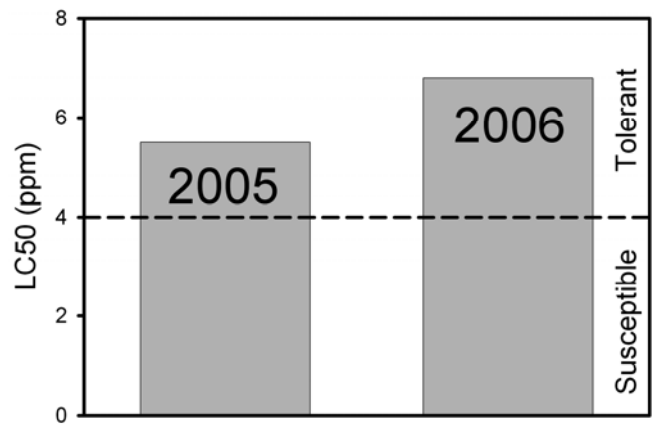


Fig. 3. Changes in imidacloprid resistance on



second-year non-rotated potato field. The whole field was treated with imidacloprid at planting.

### Know Your Weather

*Steven B. Johnson, Extension Crops Specialist*

“Red sky at morning, sailors take warning. Red sky at night, sailors delight.” This old bit of folklore still rings true, but what really is being observed? The quick answer is the sun reflecting off cirrus clouds. These are the very high wispy clouds formed mainly out of ice. The mare’s tail is a cirrus cloud formation that is a common sight in our summer skies.

Cirrus clouds tend to form at the beginning and at the end of weather fronts. The red color in the sky comes from a scattering of sunlight, usually caused by suspended particles in the atmosphere. These particles are in greater concentration in the lower atmosphere where rays from the setting or rising sun pass through.

In our area, the prevailing wind is from west to east, so most weather fronts travel in an easterly direction. If the rising sun reflects off cirrus clouds that are the leading edge of a bad weather front, a reddish sky appears, hence the phrase: “Red sky at morning, sailors take warning.” If the setting sun in the west reflects off cirrus clouds that are the trailing edge of a bad weather front that has just passed through toward the east, the setting sun reddens the departing clouds, hence the phrase, “Red sky at night, sailor’s delight.” The old timers who observed this and put it into folklore were outstanding observers.

### Late Blight Seed Testing

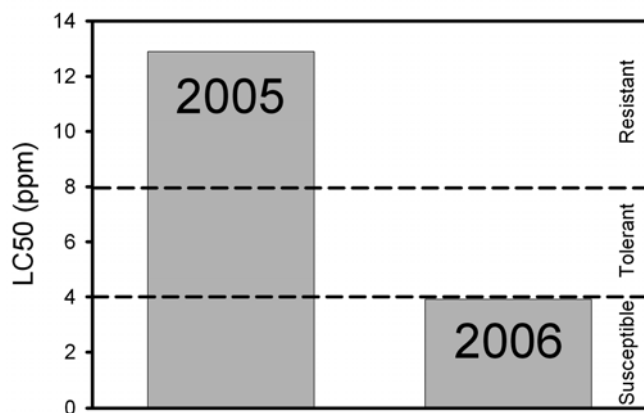


Fig. 2. Changes in imidacloprid resistance on rotated potato field with an untreated refuge.

## Available Again this Year

Steven B. Johnson, Extension Crops Specialist

Late blight-infected potato seed initiates late blight epidemics early. The onset of such epidemics is difficult to predict and impossible to control. Early-starting epidemics are the most devastating and need to be avoided at all costs.

Potato growers in Maine have the opportunity to have their seed lots screened for late blight, which is caused by *Phytophthora infestans*. This program is a resurrection of the mid-1990s late blight seed screening and should provide a measure of assurance to seed recipients. The Maine Department of Agriculture's Division of Plant Industry is performing the screening.

Again this year, seed screening is a **requirement** for FSA clients. Whether these clients have a late blight seed screening performed in Maine, or elsewhere, there are no exceptions. In any case, seed screening is highly recommended for all.

The screening program is designed to find seed lots that have a high probability of becoming a late blight problem if planted. The test will not guarantee that tested seed lots are free of late blight, only that they have been tested, and to a certain level of probability should not be late blight sources when planted.

Testing for seed potatoes grown in Maine costs growers \$35 per sample, with the balance of the cost of the test subsidized. The catch is that this price is good only through January 12, 2007. For requests after January 12, the subsidy will be reduced and the cost of the test will be \$100 per sample, so don't delay. For additional details, call Allison Todd at 764-2036.

This test is voluntary and the results will be reported back to growers. The reported results will not be available to seed customers unless they are released by seed growers. I wouldn't mind the test being mandatory this year. In fact, I feel that every seed recipient should insist that this test be performed and I will be encouraging this practice for all potato growers. Know your seed source and have it tested. You don't want to plant a problem.



### Outlook on Aroostook County Agriculture: Interview with Vern DeLong

Peter Sexton, Extension Crops Specialist

Vern DeLong is in his 16<sup>th</sup> year as Executive Director of the Agriculture Bargaining Council (ABC). The ABC is responsible for negotiating contracts with processors on behalf of its membership in the state of Maine.

**Question:** *Where do you see the potato market going?*

**Vern:** If I could answer that with any certainty, I would be a rather wealthy fellow. In my opinion, given supply and demand across North America, the market looks like it will be strong well into next year. The tablestock market should be profitable, assuming quality is good. The seed market should be strong—I don't see any problems with seed growers being able to move quality seed at profitable levels. I expect open processing potatoes will find a home in the marketplace with prices at or near contract prices.

**Question:** *What is your long-term view of the marketplace?*

**Vern:** For northern Maine, I think our future rests on our ability to produce quality processing potatoes. Currently 65 percent of our acreage goes to processing potatoes of one sort or another. I believe Maine will always produce potatoes for the fresh market, but I don't expect that part of the industry to show major expansion in the future. I expect the seed market to remain strong serving our own industry and the eastern seaboard. Our office works to secure more markets for all sectors, but our emphasis is on processing. One of the goals of the ABC is to have another processor in the area, which would be a boon for everyone. If we had another processor I think our acreage could readily go to 90,000 acres. The potato industry supports quite a few jobs in our area and it would be helpful for maintenance and development of infrastructure here if acreage were to increase. It would be a great benefit for the whole community.

**Question:** *What role do you see the United Potato Growers marketing cooperative playing in the market?*

**Vern:** United deserves credit for attempting to restore some profitability to potato farming and they have had a positive impact—their kind of vision is what is needed. Instead of whining they took action. My concern is that guaranteeing profitability tends to increase acreage of current growers and it tends to draw in people who have not grown potatoes in the past. It can be tough to hold

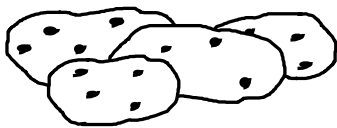
growers together once they are convinced something will be profitable.

*Peter Sexton, Extension Crops Specialist  
Noel Currie, CHB Proteins  
John Cancelarich, Regent Associates  
Heather Darby, Univ. Vermont Extension*

**Question:** *What opportunities do you see for the potato industry in northern Maine to diversify?*

**Vern:** I think we will see some dairies begin to move to Aroostook County. Restrictions on land use in other parts of New England seem to be putting a squeeze on some dairies and I believe some of these will relocate here. This should be a win-win situation for both dairy and potato farmers. Initially, the number of farmers who benefit will be limited, but I am hopeful it will develop over time. For potato farmers, there is a potential to increase soil quality with the addition of manure and to add value to the rotation cycle of their production system. For dairy farmers, the availability of land for manure application and for forage production should be beneficial. We know this can work; it just takes the right combination of personalities to make it go. The rapid expansion of the dairy industry in Idaho is an example of how this could develop in our area.

The value of oilseed crops such as canola and soybean has increased greatly in the last few months. Demand for these crops as potential sources of renewable energy may continue to increase in the future. As long as this is the case, it presents an opportunity for our growers to diversify their production. Our growers have shown they can competitively produce canola, and if the market is strong this is a viable option for us. The whole arena of energy crops is developing and the direction petroleum prices will take remains uncertain, but if demand for renewable energy continues to increase, this area should present some profitable options for our growers in the future.



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**Pilot Production of Biodiesel from Canola  
Grown in Northern Maine: Preliminary Results**

Over the last thirty years, the United States has become progressively more dependent on imported petroleum. In 1970, the U.S. imported about 3.4 billion barrels of oil, or approximately 23 percent of our national oil consumption. In 2003, the U.S. imported about 12.25 billion barrels of oil, or more than 60 percent of our national oil consumption. From 1970 to 2006, the market price of oil increased approximately twenty-fold (from \$3.40 a barrel to more than \$60 a barrel – much of this change occurring in the last three years).

Concern over fuel costs—as well as the environmental impact of burning petroleum—has led to increased interest in renewable fuels such as biodiesel and ethanol. In order to assess the potential for relatively small-scale production of biodiesel, a pilot study was conducted in Aroostook County, using locally grown canola to produce biodiesel. The canola was produced in Presque Isle, crushed in Washburn, and then processed into biodiesel.

**Canola Production.** Canola was sown at a rate of 6 pounds per acre in May, 2005 on two farms in Presque Isle. The farms represented two types of management systems: low-input management and conventional management. The low-input site received no herbicide or fertilizer applications. At the conventional management site, an herbicide (trifluralin) was preplant incorporated at a rate of 1.5 pints per acre, and nitrogen was applied at a rate of 70 pounds per acre as ammonium nitrate. Both fields were direct combined when seed moisture was less than 11 percent. The seed was kept in one-ton tote bags in an unheated storage (temperatures of -20 to 10 C) until it was crushed. No mold or heating of the seed was observed.

Costs of production were estimated by interviews conducted with the farmers after the end of the season. The canola yielded 0.55 tons per acre under low-input management and 0.85 tons per acre under conventional management in Presque Isle, Maine. The variable cost of production was estimated to be \$147 per acre under the low-input system, and \$204 per acre under conventional management. These costs assume custom application of fertilizer and herbicide, and custom combining costs. Given the costs cited above, the cost per ton to produce and store canola seed was \$241 under conventional management, and \$268 under low-input management.

**Oil Extraction.** Oil was mechanically extracted from canola seed using an extruder and an expeller that had been set up for crushing soybeans. For canola, the seed was run through the extruder and the expeller, and then the meal was run through both steps a second time. The extraction was done in the winter in an unheated structure with temperatures ranging from  $-15$  to  $-5^{\circ}\text{C}$ . Under warmer conditions, we anticipate that a single pass through the extruder, followed by two passes through an expeller, would be sufficient. Under the arrangement used here, the system had a crushing capacity of half a ton an hour. If there were two expellers set in a series, and the canola seed was warmed before crushing, then this system would have a capacity of one ton of canola per hour.

For economic analysis in this study, the cost of oil extraction was estimated assuming a facility with two expellers set up in a series, crushing one ton per hour. Noel Currie of CHB Proteins estimates a cost of \$52.44 per ton to crush canola seed. Incorporating a half-time labor requirement (i.e. half of one employee's time is spent in other enterprises in the immediate vicinity) then the cost estimate would be \$44.74 per ton.

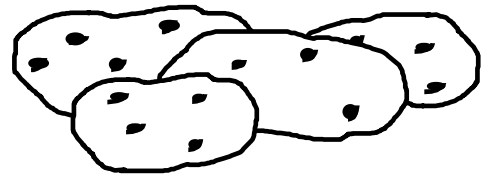
**Biodiesel Production.** A small-scale batch system (50 gallons per batch) was constructed for processing canola oil into biodiesel. Approximately 20 batches were run to produce 1000 gallons of biodiesel. The biodiesel was pumped into a 1200 gallon tank for storage and the glycerin by-product was composted.

Impurities—such as soaps, excess methanol, or residual catalyst—were removed from the biodiesel by sprinkling warm water over its surface and allowing the water to settle to the bottom of the tank. The water with impurities was then pumped out of the tank using a small sump pump. This was repeated three times. Apart from raw material, the cost of processing canola oil into biodiesel using this system is estimated at \$0.84 per gallon.

**Economic Evaluation.** As noted earlier, the variable cost of producing canola seed under conventional management in northern Maine is estimated at \$241 per ton. The cost of mechanically extracting oil from canola seed with the system used in this study is estimated at \$52 per ton; hence the cost to grow and crush one ton of canola seed is estimated at \$293. The output per ton of canola seed grown was approximately 1180 pounds of meal and 92 gallons of oil. The market price for canola meal generally ranges from \$140 to \$160 per ton in Maine. Subtracting this range of value for the meal from the cost per ton of processed canola seed results in a cost estimate of \$ 0.28 to \$ 0.30 per pound of canola oil. The breakeven cost for biodiesel produced in this system

would range from \$ 3.03 to \$ 3.16 per gallon. Assuming a median value of \$150 a ton for canola meal yields a breakeven price estimate of \$3.09 a gallon for biodiesel. Note that these cost estimates do not include any effect from government subsidies for use or blending of biodiesel.

The Houlton Band of Maliseet Indians is planning to build a biodiesel plant with an annual production capacity of 3 million gallon per year near Houlton, Maine. If such a facility is built, it would operate at a much larger scale than what was measured in this pilot study.



## A Market for High Quality Fresh Potatoes? Results of a Consumer Survey

*John Jemison, Extension Agronomist*

Over the past couple of years, I have developed an interest in promoting healthy food systems. I see local foods (e.g. Maine potatoes) as a key component in these systems. As I have given presentations on these issues, the one thing I regularly hear from people is “Why don’t I see Maine potatoes in the grocery stores any more?”. Right or wrong, it has raised a question for me ... Is there a market for a high quality fresh potato?

Over the past couple of summers, I set up a potato display at a number of venues (Orono Festival Days, Rogers Farm Garden Day, and the Somerset and Piscataquis County Fairs). I developed a survey to try to assess consumer interest in Maine potatoes, and specifically what they found important in their potato selection process. I chose these locations because I thought people might share a few minutes of their time and tell us about their interest in potatoes.

We collected 280 surveys. The first question of the survey asked participants how many times a week did they cook and eat fresh potatoes at home. Of those responding, a little more than a third of the people cooked fresh potatoes at home two or three times a week. A quarter of the respondents ate fresh potatoes once a week. Another 20% cook and eat them three to

five times a week. This looked like a promising market opportunity.

We also asked them which ways they prepared potatoes at home. It likely won't surprise you that baked potatoes were the most popular (39%), and mashed potatoes came in second (33%). Lastly roasted potatoes, my personal favorite, came in third at (15%). It is useful to recognize that most people use different potato varieties for each of these uses, and this adds diversity to the potential market.

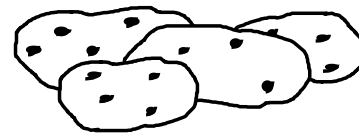
We then gave the survey participants the chance to rate 10 factors on a scale of one to five specific characteristics they thought were most important in their decision making process. We included the following characteristics: 1) size; 2) price; 3) source (Maine vs. other areas); 4) skin color; 5) flesh color; 6) lack of blemishes on skin; 7) grown using organic practices; 8) specific variety; 9) novelty potatoes; and 10) potato surface cleanliness. Summarizing all the data, we found that the most highly rated factor was source (3.99/5.0). The second most highly rated characteristic was lack of blemishes on the skin (3.79/5.0) and the third factor was size (3.48/5.0). My interpretation of these data is this: Maine consumers would like a locally grown potato, free of surface blemishes, that meet their size requirements of what they want to cook. Interestingly, potato price came out ninth out of these ten characteristics (3.16/5.0). So, I don't think cost is necessarily preventing consumers from buying more potatoes. It seems to me that a market could be developed for a consistently high quality potato, and people would look for that potato and very possibly pay a premium for it.

Perhaps the time is right to explore development of a system that would guarantee specific quality. The Italians have had a system in place "protected designation of origin" for many years, and Italian food quality is renowned world-wide. This wine quality system has been in place since the early 1960's which recognizes and demands quality, specific production practices, and aging and storing to get a specific taste. For example, specific wines labeled as D.O.C.G. (source of origin controlled and guaranteed) mean that they are a specific variety, from a specific origin, with quality controls, specific length of aging, etc., and these methods are guaranteed. More recently, they have developed similar quality guarantees for food called D.O.P. (Protected Designation of Origin). Coming with this designation is a guarantee of quality and specific taste. For example if one buys DOP Parmigiano Reggiano (parmesan cheese), you will get a quality product with a specific taste because it was produced under specific requirements. You can buy Kraft parmesan cheese at any store, but I assure you it doesn't

have the quality or the specific taste of DOP Parmigiano Reggiano.

Is it possible to have DOP designated potatoes from Maine? There are many DOP cheeses in Italy, so, why can't we have several DOP potatoes in Maine. What I would envision is a potato grown using specific production practices and with specific quality characteristics. If a potato didn't meet these characteristics, it would be sold for a standard price, but it just wouldn't be a DOP spud. With this would come a higher price to the grower who produces this higher quality product, and consumers would recognize this as a high quality product worthy of a higher cost.

Who knows where this might go? I think it is worth looking into.



## **2006 Convention of the Produce Marketing Association -- San Diego, CA**

*James Dwyer, Extension Crops Specialist*

The Produce Marketing Association is a trade association comprised of more than 2,100 members who market fresh fruits, vegetables, and related products worldwide. Members of this organization are involved in the production, distribution, retail and food service industries. The central purpose of this organization is to "sustain and enhance an environment that advances the marketing of produce and related products and services."

In October, the Produce Marketing Association held its meeting and convention in San Diego, California. Over 17,000 people were expected to attend the convention and trade show. The trade show was spectacular! The latest in fruit and vegetable varieties and packaging were being featured. Huge colorful displays were featured from companies like Dole and Chiquita and massive attention getting displays from countries like Mexico, and states such as California and Texas. People were serving items like fresh strawberries dipped in chocolate, mini bananas, freshly steamed corn on the cob with chipotle butter as well fried potatoes. One booth had a performer doing magic tricks in order to draw people to their booth. Others had TV and Sports figures hoping to encourage people to stop at their booths.

Bob Davis of Maine Farmers Exchange, Andy Yeager of Smith Farms, Rosalie Dwyer and Jim Dwyer of Cooperative Extension all represented the Maine Potato Industry at the San Diego convention site. The Maine Potato Board's booth was located in a high traffic area near one the trade show entrances.

We had the opportunity to speak with not only buyers from the northeastern and southeastern United States but also people from Brazil, Argentina, Mexico, China, Vietnam, Germany, France, England, and many other countries. It was tremendous exposure for the Maine Potato Industry.

The Maine Potato Board has participated at the Produce Marketing Association trade show for 25 years and was presented a plaque recognizing its 25 years of continuous participation. In fact, there are only four entities that have participated in PMA longer than the Maine Potato Board; Chiquita, Dole, Calavo Growers

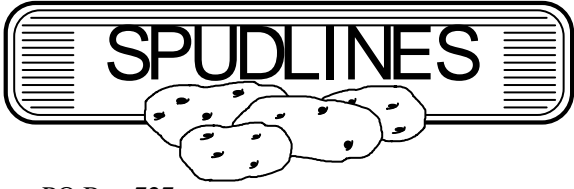


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and Northwest Cherry growers. This continuous participation allows the Maine Potato Board to pick their preferred location within the trade show.

The convention provides amazing exposure for the Maine Potato Industry. It was estimated that there were 17,000 attendees from 70 different countries and 2000 different produce related companies represented.



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