MAPLE SYRUP DIGEST

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COVER: Sugar house of James D. Hulbert of Johnstown, New York.

GREETINGS FROM YOUR PRESIDENT

This month is when the 38th Annual Meeting of the North American Maple Syrup Council occurs. The Maple Syrup Producers Association of Connecticut is hosting the meeting in Meriden, Connecticut, October 22-25, 1997.

In the time that has passed, since the last Council meeting, I believe the Industry, for the most part, has pulled together to work on its problems. The North American Maple Syrup Council and the International Maple Syrup Institute are working jointly, thru committees, on two major issues. Namely adulteration of maple syrup and certification of equipment used in the manufacturing of maple syrup. Both of these subjects will take time, but at least we are working on them together. I hope we can keep this working relationship going between the two organizations, because I feel it is vital for our Industry.

It's Together in Connecticut '97
See Your There

Sincerely,

Robert S. Smith
President

LETTER TO THE EDITOR

Dear Editor:

The other day my neighbor told me the government paid him $1,000 to not raise any corn. I wonder if you could tell me if they would pay me to not make any Maple Syrup.

I am too old and crippled to do any work and since I don't have a sugar bush anyway, getting paid to not make syrup would be right up my alley. I have never made any syrup so I don't know anything about it, but I don't think it would be too hard to learn enough to not make any.

I would also like to know if they pay more to not make fancy syrup than they do to not make the dark, commercial grades. I would rather not make fancy because I don't like the dark kind, but I figure I might better not make the kind that they pay the most for.

Yours truly,
A. Ole Mann

P.S.

A few years ago the government paid me to clear the trees off from a piece of my land. Would they also pay me to plant maple trees on this land for the purpose of not making syrup (for pay) when they get big enough to not tap?

DEADLINE FOR NEXT ISSUE
IS NOVEMBER 1, 1997

IMSI BUSINESS

First, I want to address the Research Review Committee of the North American Maple Syrup Council. I wish to acknowledge and thank Darrell Russ, Connecticut, and David Marvin, Vermont, for their dedication service to the committee for the past some ten years. They have both resigned from the committee recently, and deserve our heart felt thank you for their conscientious work. My personal thanks to both of these guys for their assistance. And, in the same light, I wish to welcome the new members replacing those retiring. My sincere thanks to Luc Lussier, Quebec, and Warren Wells, New York for volunteering their services to the committee. Both are well qualified and I am certain they will do a great job for our industry. And in memory, I wish to acknowledge the late Bob Lamb and his wife Florence, who provided the funds while the Research Fund was being formed. With their help, and with your contributions, our industry now has an active and functional research fund.

At the last meeting of the IMSI, in Bennington, Vermont, on the 31st of July, in conjunction with Maplerama, two committees initiated significant resolutions. First, a joint resolution by the IMSI and the NAMSC was concerning adulteration and the potential of tracing syrup from the producer to the consumer by some form of "Certificate of Analysis." The resolution reads: *"A joint committee of the IMSI and the NAMSC shall study the production and integrity of 'pure' maple syrup and develop an internationally accepted process of certification of 'pure' maple syrup from the producer to the consumer."* The second committee which is monitoring the "Equipment Certification" developed the following resolution" *"A joint committee of the IMSI and the NAMSC shall observe, study and assist in the development of the 'international' standards for manufacturing or processing of pure maple syrup products."* Both resolutions are significant and should be of great interest to all maple producers.

The IMSI has resolved all 'road blocks' existing in delay of APAC approval for the EUROFINS test for adulteration. The process should result in an acceptable test upon which we can prosecute any adulterer successfully.

The IMSI is working out the details for creation of an international "Gold Medal" maple syrup contest. This will be a significant promotional effort which should benefit members and be incentive for larger packers to join the IMSI.

The IMSI and NAMSC Convention is being held at Meriden, Connecticut, October 22, 23, 24, 25, 1997. All maple people are invited and you will benefit by attending. I get a feeling that the industry is very healthy. I often say that when my phone is not ringing things are pretty good. My phone has been relatively quiet. The surplus is gone, supplies are reasonably adequate. Prices are good, but not running rampant. Producers have made money. The packers have made money. Things are good. If we use reasonable discipline and do not over produce, we may be on the threshold of good times.

Lynn Reynolds,
Executive Director

BIOLOGICAL CONTROL: A MAJOR COMPONENT IN INTEGRATED PEST MANAGEMENT[1]
I. Overview and Introduction

By
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Department of Entomology
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Integrated Pest Management, or IPM, is widely accepted today as the philosophical basis of managing pests of commercial crops. It is endorsed officially through statements by President Clinton, and embodied in policies advocated and promoted by the United States Department of Agriculture (USDA). IPM attempts to minimize cost of 'controls,' of whatever kind, and to use, when necessary, only those control tactics which are environmentally sound and economically justifiable. We want to nudge, rather than bludgeon, the natural production system. Our overriding goal is to create an environment in which a pest has difficulty surviving, or at a minimum an environment in which pest populations do not build to levels which cause economic damage to the crop we are attempting to produce. IPM was proposed initially for management of insect pests in agricultural crops; early development took place in cotton ecosystems in California in the 1950's and 1960's. The philosophy has become the basis of more and more insect and disease pest management programs in crops across the spectrum, from short-term glasshouse production (where there may be multiple crops in a year) to long-term, relatively stable systems such as those found in forests.

The production of maple syrup depends on maintenance of a healthy stand of sugar maple trees for many decades, in spite of repeated tapping to harvest sap from the trees and in the face of the normal hazards to which trees are exposed as they grow, mature, and age. Tapping activity physically opens a tree to potential invasion of pathogens by providing infection courts with each drilling through the bark. Removal of sap in excessive quantities has the potential to weaken, or stress, the tree; stressed trees are, in general, more vulnerable to attack by both insects and diseases. Growers have learned, through many years of experience, how to balance sap collection while at the same time minimizing or preventing damage to their trees — the investment capital on which they depend. Problems may arise when Mother Nature throws a curve in the form of unanticipated insect outbreaks, drought, or other environmental perturbations. Because we are dealing with a resource (the trees) which is in place for a long time, we must be concerned with management practices which can be maintained over — and which are effective for — long periods of time. Such a situation is one that is favorable for development and implementation of an IPM program.

Integrated pest management has been defined as the utilization of all available methods, in an economically sound and environmentally acceptable manner, to maintain the population of a pest organism below its economic threshold. Implicit and explicit in this definition is the acceptability, at carefully determined times and for clearly defined reasons, of *all* methods of pest reduction. These include, for example, silvicultural manipulations of the crop (in this case the sugar maple trees, to control age, spacing, and species composition of the forest), the use of chemical or biological pesticides to bring about the immediate suppression of a problem that has grown to unacceptable levels, and the use of biological organisms to reduce pest populations, maintain pest populations at economically acceptable levels, and minimize the likelihood of future eruption of these pests. In the final analysis, we are attempting to create a natural environment in which the organism(s) we value, i.e., the sugar maple trees, grow and prosper. At the same time those organisms which might damage the trees are, themselves, subjected to forces which mitigate against their survival and development. Because we are dealing, in the management of a sugarbush, with a crop which is in place for a long period of time, we opt, whenever possible, for management techniques which will persist over time. Such techniques will minimize repeated expenditures for short term 'control' actions, while simultaneously contributing to long term 'management' activity and stability.

Biological control, that is, the use of beneficial living organisms to assist in the management of populations of pest organisms, has gained renewed popularity in recent years. By its nature, biological control focuses on long term, sustainable management. Consequently, it is highly desirable and may have great promise for use in a program designed for management of pests in a crop which depends on stability over time for maximum return. Extensive legal and operational safeguards are in place to insure that the use of biological organisms for control of a pest will be environmentally compatible, sound, and safe, and that there is virtually no possibility that the organisms used will, themselves, become pests at some time in the future. Even though the initial costs of establishing a biological control program may not be particularly low, the long term return on investment is where dividends are realized. Once established, 'classical' biological control requires minimal or perhaps or subsequent financial inputs over the years to maintain itself. 'Augumentative' or 'inundative' approaches to biological control require repeated, even annual, inputs. But the environmental benefit, coupled with the economic benefit, justifies such investments in those situations where they are used.

Many insect pests of crops in the New World, and also plants which have become weeds, have been introduced from abroad both through our own carelessness and through honest ignorance. Well-known forest pests such as the gypsy moth and the European spruce sawfly, pests of fruit such as the codling moth on apple, the Oriental fruit moth on a number of stone fruits, and the cottony cushion scale on citrus, the Hessian fly in wheat, and purple loosestrife which has become a widespread weed in much of the eastern

United States, were all either brought to this country accidentally or escaped containment once they were brought in deliberately. In each case, these pests arrived without any of the natural enemies that help to keep their populations below the economic threshold in most years in their areas of origin.

Let me describe the three major approaches to biological control.

Almost 110 years ago, the first — and extremely successful — attempt was made to recreate a natural balance between a pest insect, the cottony cushion scale which was devastating citrus crops in California, and natural enemies common in its native home in Australia. Within 18 months after the introduction of the vedalia beetle (a 'ladybird beetle' which feeds on the scale) into California, the citrus industry was quite literally saved from the brink of extinction. The introduction of a natural enemy, usually from the native home of the introduced pest, has come to be known as **'classical'** biological control. The introduced beneficial species may be a parasitoid, a predator, or a pathogen.

'Augmentative' biological control involves the release of relatively large numbers of individuals of a beneficial species. This species usually is a parasitoid or a predator; the addition of large numbers of individuals is designed to add to the already-present population of this species in the area of the release. It is *not* the introduction of a *new* species for purposes of establishment. Augmentation may be necessary because established populations of the beneficial species have been decimated as a result of too few hosts being present for a few years, differentially adverse weather conditions or other environmental stresses, or perhaps accidental reduction of the beneficial species as a consequence of use of toxic insecticides.

'Inundative releases' for biological control consist of the application of large numbers of individual parasitoids or predators to relatively a small area during a concentrated period of time. Rarely is there an expectation that the species being added will become established and maintain naturally-reproducing populations. In a single growing season, there may be multiple releases within the same generation of the pest, or during each generation of a multivoltine pest. The objective of an inundative release is to kill as many of the hosts as possible, much as one would if a chemical insecticide were used; the objective is not the establishment of the parasitoid in the environment as a continuing and sustainable component of the natural system. In effect, inundative releases are the use of a biological insecticide.

This is the first of a series of articles in which I will describe in some detail, and with examples of successful programs, biological control of insect pests. Subsequent articles will elaborate on the several kinds of biological control I have identified, that is, classical, augmentative, and inundative, and finally I will attempt to assess possibilities of implementing one or more of these into management of pests of sugarbushes. Intertwined with the benefits, I will also identify some of the challenges that those of us on the research and development side of the picture must be overcome before these technologies can be turned over to growers for routine implementation in their own operations. We must continue to work to transform the 'art' of biological control into the

'science' of biological control. Only as we understand the details of the biology and behavior of each of the players in the pest management puzzle will we progress toward our goal. Working together, we will succeed, but it will not happen overnight.

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[1]First article in a series. Second article starts on page 25 of this issue. Based on a portion of a Conference presented at Akdeniz University, Antalya, Turkey, 1955.

NEWS FROM THE AMERICAN MAPLE MUSEUM

By Eleanor Allen

As Summer gives way to Autumn, with maples turning brilliant hues in the crisp October air, the volunteers at the American Maple Museum can look back on a busy summer. It began, as always, with the re-opening festivities in May when Dr. Melvin R. Koelling and Lewis J. Staats were inducted into the Maple Hall of Fame. Despite intermittent rain, the event was well attended. Several manufacturers came to meet producers in person, including Leader, Dominion & Grimm, Waterloo, Sugarhill, and Beaver River tubing. Dewey Hochstatter, developer of a new vehicle for use in the woods, brought his vehicle for all to examine. The craft exhibitors showed great fortitude, displaying their wares in the wet weather. The 1996 Maple Queen, Angie Wright, of Schoharie County turned over her crown to Martha Holland, of St. Lawrence County, who became the new Maple Queen for 1997. Other contestants were first runner up, Sara Baker of Chenango County, second runner up, Karina Marin of Schoharie County, Amber Briot (Miss Congeniality) of St. Lawrence County, Shannon Garrison, Amanda Pate, and Christina Johnson. Lynn Reynolds and Mr. and Mrs. Paul Richards judged the Maple Queen contest.

At the ice-cream social and cakewalk, on July 5th, participants were entertained by the vibrant Country Stompers, while enjoying hot dogs and maple cotton candy as well as ice-cream served with strawberry or maple sauce.

The Directors of the museum had a busy four days in early September manning the food booth at the Agribusiness Field Days in Lowville, NY and immediately afterward, hosting back-to-back pancake breakfasts during the Lumberjack Festival in Croghan. These events are a major source of income for the museum.

Attendance at the museum between the months of May and August was excellent. It increased by more than fifty percent over attendance last year.

The museum participated in a program sponsored by the Dodge-Pratt Northam Foundation to provide summer employment to college students in the north country. Under this program the museum hired a summer intern, Trista Marolf, whose modest salary was paid by the Dodge-Pratt Northam Foundation. Trista did an efficient job painting the windows and doors of the museum. She also helped with the ice-cream social and general maintenance work at the museum.

Although formally closed for the winter, the museum will open for group tours during the autumn and winter months, if arrangements are made in advance. It will also be open to the public for pancake breakfasts on February 22nd and on May 16th, the date set for the 1998 re-opening festivities. For further information about these events, or to arrange a group tour of the museum, please call 315-346-1107. The mailing address is PO Box 81, Croghan, NY 13327.

NEW YORK NEWS

By Mrs. Marion Wells

More than 200 maple producers from six states and Canada met at the Peek 'n Peak Resort in Clymer, New York to attend the 1997 Maple Tour. The Chautauqua Area producers were the host of an exciting and entertaining two day affair. Nine producers opened their sugar houses, with each one showing some different innovative practices or equipment which has worked well for them. At Troy Firth's sugar bush in nearby Spartansburg, Pennsylvania, we had a look at sugar bush improvement practices and also a film on logging with horses. Using horses may take a little more time, but it has many benefits for the sugar bush operator; less soil compaction and less tree injury are some of the benefits. Another Pennsylvania stop was at Ted Solinko's syrup barn in Bear Lake. This 15,000 tap operation on tubing features 90% rented trees using many high-tech innovations.

Lloyd and David Munsee have a new roadside sugar house that features many nice ideas in equipment and construction. Gordon and Colleen Anderson's sugar house showed us some new wrinkles in bucket washing using the old wringer washer. An RV mobile unit helps them market their produce at various craft shows.

Fred Croscut of Sherman, New York and John Lown of Bemus Point have sugar houses fired with natural gas. Fred's business is 50+ years old, while John's maple operations are combined with apple cider production from his 500 tree orchard.

At the Red Brick Farm near Chautauqua, Darl Redlecki showed us the equipment and methods he uses to crystal coat maple sugar. At Newton Brothers new dairy complex in Sinclairville, we saw their new state of the art dairy operation; everything computerized from feeding to manure flushing.

Lewis and Myrna Rice have a picturesque setting for their sugar camp located in a valley sugar bush. Tubing and a vacuum system bring in the sap from 1,150 taps.

Martha Holland, New York State Maple Queen from St. Lawrence County attended the tour and spoke at the banquet. Entertainment was presented by the Junior Guilders of the Lucille Ball Little Theater in Jamestown, New York. The maple deserts at the banquet were a big hit and the recipes were requested by many in attendance.

Thanks to the Chautauqua Region producers for an enjoyable maple tour. The Sunday night cruise on the Chautauqua Belle on Chautauqua Lake started the tour off just right. As a result of the tour, a new maple association was formed — the Chautauqua Region Maple Producers. Congratulations Chautauqua!!

The family of

Robert M. Lamb

acknowledges with grateful appreciation the kind expression of your sympathy

COLLECTION OF PARASITES FOR POTENTIAL USE AS BIOLOGICAL CONTROL AGENTS FOR PEAR THRIPS, *Taeniothrips inconsequens*

By
E. Alan Cameron
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In 1995, with support from a NAMSC research grant, Dr. David A.J. Teulon (a former postdoctoral student) and I spent two weeks in southwestern Turkey to investigate the possibility of collection enemies (parasitoids and/or predators) from that part of the native range of the pear thrips (Cameron and Teulon 1996). During the last decade, the pear thrips, *Taeniothrips inconsequens* (Uzel) (Thysanoptera: Thripidae), has caused considerable damage to sugar maple stands as a result of its serious adverse impact on the production of maple syrup throughout much of the northeastern United States and parts of eastern Canada. The insect was introduced into the New World early in this century, and arrived without any of its natural enemies. Thus released from important naturally-occurring population-regulating factors, it spread widely and from time to time reaches outbreak proportions. Our team at Penn State has been working since 1989 to understand the insect and its effects of sugar maple (Teulon and Cameron 1996; Teulon *et al.*, 1993, 1997), and to develop management practices to minimize the damage caused (Cameron *et al.*, 1996).

During our 1995 exploration, we identified a new species of insect, a parasitoid in the Hymenoptera genus *Ceranisus*, in numbers that suggested it might play an important role in regulating populations of pear thrips. In Turkey, pear thrips was fairly easily collected from blossoms of a relatively common native woody shrub, *Arbutus andrachne*. With the support of an additional NAMSC research funds grant, I returned to Turkey in April, 1997, to collect material of this species, and of other potential beneficial species if encountered, with the objective of bringing back enough living material to establish laboratory colonies for further study. If our expectations are borne out, we expect eventually to provide adequate numbers of individuals for field release in an effort to establish this new species in our sugar maple areas.This collection phase of the investigation is the first in a long series of steps to be taken in a classical biological control program, the goal of which is to regain control over the pest insect and to do it in an economically acceptable, and environmentally sound and compatible manner.

During our earlier trip, we established an excellent cooperative relationship with Prof. Dr. Irfan Tunc, an entomologist with the Faculty of Agriculture, Akdeniz University, in Antalya. Once again, he and his colleagues were most cooperative, and supportive of our efforts. I was provided with full-time assistance of a student during the time we were in

Turkey. This student, Ms. Emine Bulut, and my wife, Jule, constituted the 'field crew' that assisted with the collection of parasitoids.

Unfortunately, weather in 1997 was unusually cold and wet. I was told that this year Antalya Province, the area in which we collected, had the coldest April in 106 years. During the time we were in Turkey (April 4-23), we encountered considerable rain (and snow one day) and cold, especially during the first two weeks. This disrupted normal insect and plant development, and made collecting much more difficult than had been anticipated. Instead of being able to send at least one or two shipments back to the United States during the time we were there, I was able only to bring living material with me when I returned — as hand-carried baggage. (Of course, all of the necessary state and federal permits and permission for importation into the United States had been obtained, along with official documentation from Turkish authorities to clear the shipment.)

As during the collections two years ago, parasitoid adults were associated primarily with second-stage thrips larvae. Individuals of both sexes of parasitoid were collected with aspirators, held in escape-proof containers, and provided with a sugar/water solution for moisture and nourishment from collection and during transit. An employee of the USDA Biological Insect Research Laboratory, Newark, DE, met us on arrival in Philadelphia and carried the sealed package of insects directly to the quarantine facility operated by that lab where the package was opened.

The preliminary reports are that at least two species of parasitoids were included in the material (along with some incidental material that will be identified for the record, but which has no potential for biological control). Sufficient numbers survived the holding period of from two to seven days overseas, and transportation, to allow exposure to a thrips colony in the quarantine facility in an attempt to initiate a laboratory colony. Because the biology of this new species is unknown, we must await development under laboratory conditions before we can proceed further with studies. So far, the identity of the second species we collected in some numbers is not known. Once we have an identification, we will be able more quickly to determine what, if anything, is known about its biology as well. Still ahead is a series of critical studies to evaluate the potential of any species which is being considered for release in a new environment to attack native insects. Should the species collected overseas show evidence that they might attack species other than the targeted pest, extended studies will have to be undertaken, still in the quarantine facility, before any consideration will be given to release — even to our laboratory for further laboratory testing. No releases into forested sites will be approved until thorough evaluation of likely consequences has been completed. This process could take several years, or might move more rapidly depending on information gained at critical steps of the investigation. If there is a probability that what is viewed as a 'beneficial' species might cause adverse impact on native species, permission for release is not likely to be granted.

As progress on these investigations continues, I will keep the Research Committee informed. We have only just begun what could turn out to be an exciting and valuable effort to assist producers across the sugar maple region. However, as with any research efforts, there are no guarantees of success. We can only pursue each next logical step as it comes. I gratefully acknowledge the continuing support of our program by the Research Committee of NAMSC, the support and assistance of our Turkish colleagues and friends, and especially the field support and assistance of Emine Bulut and Jule Cameron.

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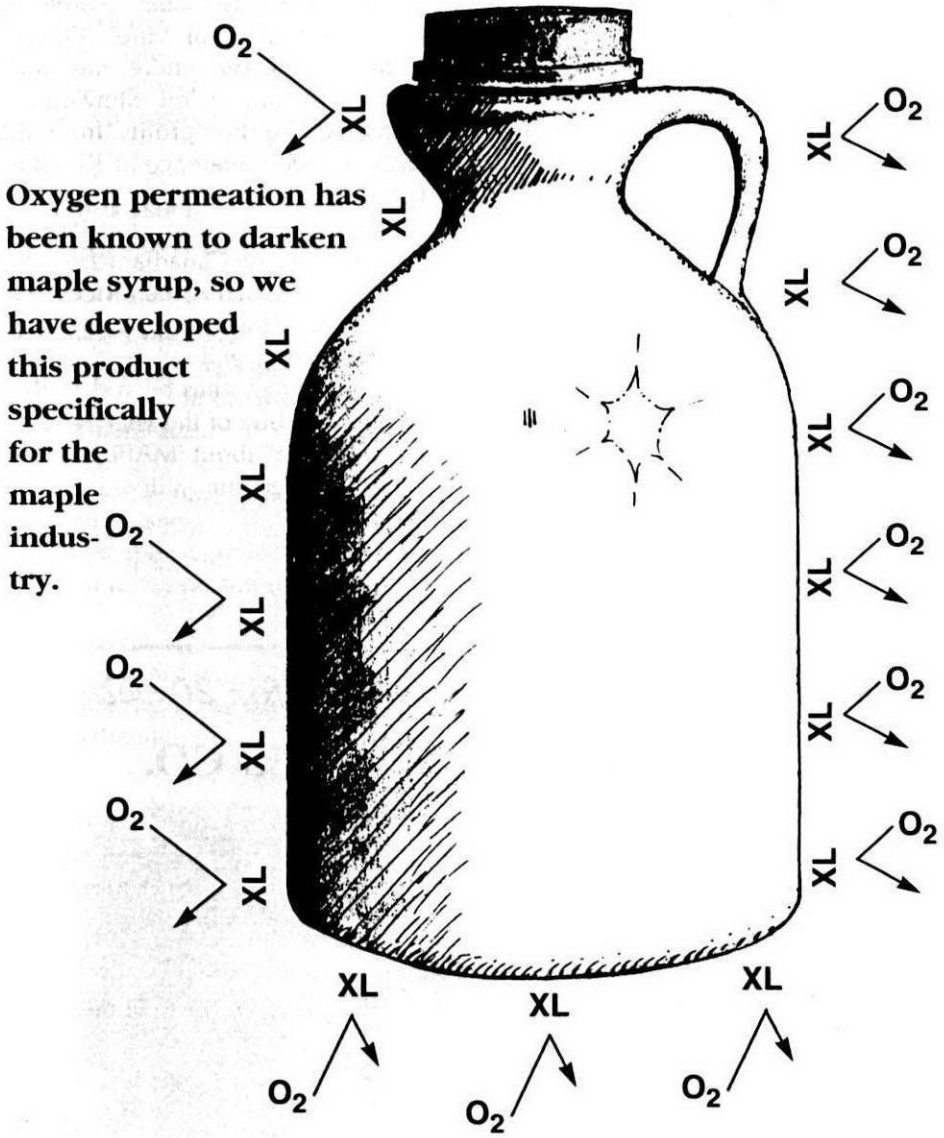

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ONTARIO PRODUCERS LAUNCH TEACHER'S GUIDE

The Ontario Maple Syrup Producers Association has released its new "Perfectly Natural" Teacher's Activity Guide. The information and activities presented will assist elementary school teachers to help the students connect with the cycles of the year, develop an understanding of our heritage, explore changes in technology and learn about maple syrup production. The specific outcomes have been identified for each activity; many of the activities can be used at a variety of student levels by adjusting performance expectations or by adding additional expectations.

The guide was made possible by the assistance of the Ontario Federation of Agriculture, the North Simcoe Private Land Stewardship Network and the profits from the NAMSC '95 conference at Kingston, Ontario.

Copies of the guide are available for $10.00 (U.S. or Canadian) from the secretary of OMSPA, Ken McGregor, at R.R. #6, Strathroy, Ontario N7G 3H7. The price will deliver the guide to your door and has been described as "the best buy of the year" to carry the message about MAPLE to our younger generation.

THE STEPS

Wake up early,
Go to bed late,
Get your feet wet,
'cause you stepped in the lake

Do all these things
Just to make sure,
That the maple sugar is made
And sold to the person next door.

Carry heavy buckets,
Get splashed by the sap,
Put more wood in the fire,
Drill in more taps.

Do all these things
Just to make sure,
That the maple sugar is made
And sold to the person next door.

Start up a fire,
Cook the sap 'til the temperature is right,
Watch the steam rise up,
Far into the night.

Do all these things
Just to make sure,
That the maple sugar is made
And sold to the person next door.

Empty the hot sap
Into a jug,
Then put it in a filter
That looks like a rug.

Do all these things
Just to make sure,
That the maple sugar is made
And sold to the person next door.

After the saps through the filter
You have to wash that rug-like thing,
You dunk it in cold water
And after that your hands start to sting.

Do all these things
Just to make sure,
That the maple sugar is made
And sold to the person next door.

Now the maple sugar
Is in a small tank,
You sit there and watch the maple sugar
Like watching money in a bank.

Do all these things
Just to make sure,
That the maple sugar is made
And sold to the person next door.

Now the syrup is getting hotter,
It is getting nice and thick,
You're hoping Daddy spills it,
So you will get a lick!

Do all these things
Just to make sure,
That the maple sugar is made
And sold to the person next door.

Now the syrup's in the bottle
You pick out the perfect label,
You put the stickers on
and lay them on the table

Do all these things
Just to make sure,
That the maple sugar is made
And sold to the person next door.

Now you have a finished product,
You're very proud of it,
You take it to the store,
Lets do it again, cause it is not time to quit!

By
Suzanne Anderson
Ms. Jackson's Fifth Grade Glass

WRIGHT RECEIVES HUBBELL AWARD

At the annual banquet of the 1997 New York Maple Tour, Neil Wright of Camden, New Your received the Charles Hubbell Award. Given to an outstanding maple producer, the Hubbell Award recognizes the work and dedication to the New York State Maple Industry. The award was presented by Roger Sage, himself a recipient of the award in 1996.The award is presented by the New York State Maple Producers Association in cooperation with the New York State Department of Agriculture and Markets.

Neil has been making syrup since the early 1950's in the Camden area and in North Osceola, New York. At one time he had 4,700 taps which produced 1,800 gallons of maple syrup. There were times when he rented trees or bought sap from other producers. Neil was instrumental in starting the Northern New York Maple Producers Coop. Also, he has long been active in the New York State Maple Producers Association. He currently is a member of the promotion committee of the NYSMPA. Neil was recently a featured speaker on the maple telecast beamed from Cornell University throughout Northeastern North America.

In 1946 Neil married Frances Musch and they raised four daughters and a son; they now have six grandchildren as well. Fran and Neil celebrated their fiftieth wedding anniversary last October. Fran and Neil were honored with the Camden Chamber of Commerce Citizen of the Year Award in 1994. Neil was conferred the honor of "Sage of Tug Hill" by the Tug Hill commission for his knowledge of the history of the Hill.

Neil has long been an ardent supporter of pure maple products and believes that pure maple syrup is a gourmet product to be sold as such!

BIOLOGICAL CONTROL: A MAJOR COMPONENT IN INTEGRATED PEST MANAGEMENT[1]
II. Classical Biological Control

By
E. Alan Cameron, B.C.E.
Department of Entomology
Penn State University
University Park, PA 16801

In the first article in this series, I presented an overview of the integrated approach to pest management, commonly called IPM. I also briefly described the three major approaches to biological control — classical biological control, augmentative releases, and inundative releases. And I noted that biological control is one of the important elements in an IPM approach to coping with insect and disease pests of crops. This second article will elaborate on 'classical' biological control.

In the 1880's, the citrus industry in California was threatened with destruction as a result of damage caused by the cottony cushion scale, *Icerya purchasi*. Fruit production was reduced by over 95% in a matter of just a few years. The Department of Agriculture of the State of California sent an entomologist, Mr. Koebele, to Australia. There he was able to find both a coccinellid predator, a 'ladybird beetle' called the vedalia beetle (*Rodolia cardinalis*), and a parasite in the order Diptera (*Cryptochaetum iceryae*), which attack the damaging scale insect. Modern transportation facilities were not available a century ago. Through laborious efforts, Koebele maintained colonies of the scale pest on small citrus trees in pots on the deck of the steamship on which he returned to America. On some of these small trees, he also maintained colonies of the two natural enemies. Enough individuals of both beneficial species survived the journey that Koebele and coworkers were able to initiate colonies in a laboratory in California once he returned, and have adequate numbers of the beneficial insect species available for release into California citrus groves.

Within a year, the Vedalia beetle had dramatically reduced scale infestations, especially in the major citrus growing areas of southern California. The beetle became established in its new environment quickly, and spread rapidly, especially in the hot, dry Mediterranean climate in inland areas. Within only two or three years, citrus production had returned to previous levels, and the citrus industry was, quite literally, saved. The parasitic fly became established more easily in some of the cooler and more humid citrus production areas near the coast in southern California, and in northern California. Both species remain today, over 100 years later, as the major factors in preventing resurgence of the cottony cushion scale. (In the early 1960's, I spent a number of days searching for both the scale, and its predator and parasite, in southern California so I could make shipments to colleagues in the Mediterranean area. It was exceedingly dif-

ficult to find any individuals of either the pest or its natural enemies, so effective has the regulation of the pest remained. That is just one indication of how efficient and effective this particular introduction of beneficial insects has been.)

This example represents the first documented example of the successful use of one species of biological organism to control another species. The success of this program stimulated a lot of work, especially in the United States, over the next half century, to try the same technique to reduce pest problems. A large number of our insect problems in North America are the result of accidental introduction of a pest species from abroad. If suitable host material is available as food, pest populations often increase rapidly once an introduced insect gains access to a new geographic area. The normal complex of natural enemies, which exists in lands where the pest is native, is not present to prevent explosive population growth. The overriding goal of classical biological control is to re-establish at least the most critical elements which put adverse pressure on the growth of the pest population, and thus reduce or eliminate the economic damage which would otherwise be caused.

There are some important factors which we must remember in any discussion of biological control.

1. Our goal is NOT eradication of the pest. Eradication means the elimination of every last individual of the target species. This objective (eradication) *may* be

justified when a newly-arrived pest is discovered shortly after its introduction, when populations are still confined to a very small geographic area, and usually before populations have increased to damaging levels. (Indeed, this goal is under active consideration as an option in addressing the recently-discovered Asian longhorned beetle, which attacks maples among other species, in the Bronx.) Because the goal of an eradication program is the elimination of ALL of the individuals of the pest species, more rigorous control methods — such as the use of chemical insecticides in multiple applications — are commonly used.

2. Successful biological control programs have as an important goal the long-term maintenance of pest populations at levels below the economic threshold. That means that we must be willing to tolerate low numbers of the pest species to serve as a food reservoir for the beneficial species. It also means that most of the successful species which have been used in biological control programs have effective mechanisms for searching for, and finding, their host so they, also, can survive when host populations are low.

3. It is not always clear where a particular pest may have originated. An insect in its native range may normally be kept 'under control' by a complex of natural enemies, and its biology and behavior may not even be well-known. Once the pest insect escapes the suppressive forces of its regulating agents, populations can grow rapidly in the new environment. It is very important to expend the time and effort necessary to attempt to determine the native range of the pest, and then to give priority to searches in that area of the world for potential natural enemies. Modern molecular biological techniques may be used to determine the genetic variability of populations. In an area of introduction, the genetic diversity will be much less than one would find where the species is native. This is a new and

DEADLINE FOR NEXT ISSUE IS NOVEMBER 1, 1997

emerging technology, one that has not been used widely to this time but which is being used in some important studies and is forcing some changes in long-held beliefs about the origins of some pest populations.

4. When introductions of biological control agents are made to a new area of the world, it is essential that we do not simultaneously introduce natural enemies of the beneficial insect. We must carefully exclude, for example, hyperparasitoids and pathogens which might 'control' the beneficial species which we wish to establish! That would defeat all of our efforts. As a result of this need, material introduced into the United States or Canada today must be reared in a secure quarantine facility for AT LEAST one generation to insure that no unwanted organisms accompanied the beneficial species when it was brought to a new geographic area of the world. That means, of course, that we must also be able to rear the pest insect, or a suitable laboratory substitute (called a 'factitious host'), as well as the parasite under artificial conditions. Often this is a very difficult additional challenge that must be overcome.

In April, 1995, during an investigation funded in substantial part by a Research Grant from the NAMSC, David Teulon and I discovered a new species of parasitoid which attacks pear thrips in Turkey. We reported on these studies in a poster presented at the Fall, 1995, annual meeting in Kingston, Ontario, and in an article in the *Maple Syrup Digest* in early 1996. For a number of reasons, we believe that pear thrips is native to Turkey and probably other parts of Asia Minor rather than to Europe as has been commonly accepted until recent years. In addition to the new species of parasitoid, we recovered smaller numbers of additional species of insects parasitizing or preying upon pear thrips. Many steps must be taken before any of these potentially valuable natural enemies can be introduced to and liberated in the New World. But our preliminary evidence suggests that they deserve to be investigated in more detail. In April, 1997, I returned to Turkey to collect numbers of this new species of parasitoid, and brought them back as the next step in a biological control effort. A brief report of this work appears in this issue of the *Maple Syrup Digest* and progress reports will continue to appear as significant developments occur.

If the parasitoids we collected turn out to be restricted to attacking pear thrips and even perhaps some close thrips relatives, it is possible that one or more of these species might ultimately be introduced to and released in our sugar maple forests, become established, and contribute to continuing long-term control of this pest insect. This effort, then, would take its place in a growing list of 'classical biological control' success stories. Programs take years to implement, and there may be setbacks along the way. But if all goes well, and if the early promise is borne out at each critical step along the way, we may look back in the early 21st century with satisfaction in our accomplishments. The North American Maple Syrup Council will be justifiably proud of its support of the development of the environmentally sound biological component of an integrated pest management program directed against the pear thrips.

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[1]Second article in a series. Based on a portion of a Conference presented at Akdeniz University, Antalya, Turkey, 1995.

Members of the American Maple Hall of Fame, at the 1997 induction ceremonies. Left to Right: Russ Davenport, 1986; Charles Bacon, 1993; Harold Tyler, 1992; Paul Richards, 1988; Lewis Staats, 1997; Gordon Gowen, 1987; Lynn Reynolds, 1995; Ture Johnson, 1981; and Edward Farrand, 1982.

ARCHIE'S SUGARBUSH

(Taken from the October, 1985 issue of the Maple Syrup Digest)

Dear Mr. Editor:

My wife, she sez, "Honest Archie, sometimes she calls me Truthful Archie, why don't you tell that nice editor man about the corn field?" Well, it waz like this —

It wuz the summer after the bumper syrup crop year. We decided to plow up the east forty and plant sweet corn. We'd made so much syrup that year and so much steam had come off our 16 evaporators, the steam went up and mixed with the clouds carrying acid rain from the steel mills. This caused a chemical reaction called interoxynitrogeneration. In ordinary language this means changing oxygen to nitrogen.

Well, ya see, the east forty, being on the lee side of the sugar bush, was right in the path of those rain storms and got the most of that nitrogen. We didn't realize this until the sweet corn came up. It grew so fast and so big we couldn't even reach the ears using a step ladder so picking waz impossible. We tried putting it in the silo but couldn't get the stalks through the chopper.

We did manage to get one ear down using a chain saw. We shelled off 96 bushels of corn and then took the cob to the saw mill. They sawed out 180 feet of boards but they were so full of knot holes from the kernels we couldn't sell 'em. The only salvation was to tap the corn and see what we could make of the sap.

We found out, right away, that we had to bore the holes clear through the stalk and hang a bucket on each side so they'd balance when they got full. Ya see, the stalks were only 5 to 6 inches in diameter but they ran so much sap we had to use 10 gallon buckets and one would have tipped them over when they got full.

We only had enough buckets to tap 10 of the 40 acres but that was a good thing. Our 16 evaporators wouldn't have handled any more. We only made one run through. Ya see, the folks that bought the corn syrup got drunk every time they had pancakes. They didn't complain, but the State Alcoholic Beverage Board did.

Your Truthful friend,
Archie

RECIPES

Following are some recipes featured at the 1997 New York Maple tour — thanks to Myrna Rice.

SHAGGY MAPLE CUSTARD PIE

3 eggs
1/4 C. sugar
1 C. maple syrup
2 1/2 Tbl. flour
1/8 tsp. salt
1 tsp. vanilla
1 1/4 C. milk
1/4 C. melted butter
1/4 C. quick oatmeal
1/2 C. sweetened coconut
1/2 C. chopped nuts

Have pastry ready for 1 9" pie crust. Preheat oven to 350 degrees. Beat eggs and sugar together. Add other ingredients, beating in coconut, oatmeal and nuts last. Pour into pie shell and bake at 350 degrees F. for 40 minutes. Serve with a spoonful of whipped cream on top of each piece.

MAPLE APPLE PIE

Pastry for 9" pie (double crust)
Mix together and set aside:
1/2 C. maple syrup
1/8 tsp. salt
3 Tbl. flour
1/4 tsp. cinnamon

Fill crust with sliced apples. Pour syrup mixture over apples and dot with butter. Cover with top crust. Bake at 400 degrees for 20 minutes, then reduce heat to 350 degrees for approximately 30 minutes or until crust is golden brown. Note: if you prefer, you may use only 1 curst. Fill with apples and syrup mixture, then top with crumb topping: 1/4 C. brown or maple sugar (granulated), 1/2 C. flour and 1/4 C. soft butter.

MAPLE NUT CAKE

2 1/4 C. sifted cake flour
1/2 C. sugar
3 tsp. baking powder
1 tsp. salt
1/2 C. shortening
1/2 C. milk
1 C. maple syrup
2 eggs
1/2 C. chopped nuts

Sift flour, sugar, baking powder and salt into mixing bowl. Add the shortening, milk and about 1/4 cut of the maple syrup. Beat for about 2 minutes. Scrape the bowl and add remaining maple syrup and the eggs. Continue to beat for an additional 2 minutes. Blend in the chopped nuts. Pour the batter into greased and floured pans. Bake in moderate 350 degree oven for 25-30 minutes for layers or 35-40 minutes for 9 x 13 oblong. Cool and frost with a maple frosting. Recommend: creamy maple frosting.

CREAMY MAPLE FROSTING

2 1/4 C. conf. sugar
1/4 tsp. slat
1 egg
1/4 C. maple syrup
1/3 C. soft butter

Mix conf. sugar, salt and egg together, then add syrup beating well. Add butter last and beat until well blended and fluffy. Spread on cake and sprinkle with nuts (if desired).

COMING EVENTS

1997 NAMSC AND IMSI COUNCIL MEETINGS
October 22-25, 1997
Meriden, Connecticut
Contact: Avis Norman
387 Country Road, Woodstock, CT 06281
860-974-1235 FAX 860-974-0496

CENTRAL NEW YORK MAPLE CONFERENCE
January 24, 1998
Delaware County BOCES
at Route 206, Masonville, New York
9:00 to 3:00
Date and Place Tentative

NEW HAMPSHIRE SUMMER TOUR HELD

By
Barbara Lassonde

The New Hampshire Maple Producers Association held their summer meeting in July at Bascom Maple Farms, Inc. in Acworth. After the business meeting and pot luck lunch, members toured the huge new facility. In 1997, the Bascoms produced over 8,800 gallons of syrup, using two reverse osmosis machines and one 4' x 12' steam evaporator powered by a 200 h.p. steam boiler. In addition to their wholesale/retail and mail order operation, the Bascom family sells maple equipment and purchases bulk drum syrup, which is stored in a 5,000 drum refrigerated warehouse. It is later sold in bulk to other producers, industrial users, or packed in jugs for private labels, corporations and distributors. The Bascoms also operate a modern 385-head dairy farm.

From there, we drove down the road to visit Dave and Alvin Clark's sugar house. The Clarks produced nearly 1,100 gallons of syrup in 1997 in their 5' x 14' wood-fired evaporator with a steam-away pan and forced draft. Three quarters of their 3600 taps run directly to the sugar house through a liquid-cooled vacuum system, and most of their syrup and candy is sold retail and through mail order.

The last stop was nearby at Batchelder's Sugar House. Here, Ron and Robert Batchelder and Mike Sweeney made 197 gallons of syrup last year from 850 taps on leased trees. Boiling is done on a 4' x 10' Grimm with a preheater, hood, and a wood saver. Finishing is done in a 16" x 32" Leader gas-fired finisher. About half of their syrup is sold retail and the rest is sold in bulk and wholesale.

CLASSIFIED

FOR SALE: 3' X 12' Grimm Lightning raised flue wood fired evaporator. S.S. pans, S.S. stack, alum. hoods, preheater, wood saver grates with blower. $3,500. Negotiable. *717-746-3359* Wyalusing, PA.

FOR SALE: 4200 gallon truck mount stainless steel bulk milk tank. Excellent storage tank. Priced to sell. Contact David Slocum, P.O. Box 157, Farmersville Station, NY 14060. *716-676-2426.*

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FOR SALE: 3 1/2' x 10' Grimm drop flue evaporator, s.s. finish pan, retinned arch, forced draft, preheater, includes stack. Good condition. *603-798-5860.* $2,000.

REMINDER
Research Proposal Guidelines

Research projects may be submitted for consideration based on the following guidelines:

(1) Proposals must be received no later than July 1, 1998 for consideration in 1998. Proposals received after that date will be considered in 1999.

(2) Proposals shall be complete and detailed in content. However, proposals shall contain a short concise cover statement briefly explaining cost, scope, objective, procedure, and anticipated value to the maple industry.

(3) Proposals shall contain detailed estimated cost breakdown, within the detailed report.

(4) Proposals shall be submitted with a minimum of forty (40) complete copies.

(5) Proposals must contain a complete reference section listing and explaining any similar or duplicating research previously accomplished. Proposals for duplication of previously completed research must contain detailed explanations of why such duplication is warranted.

(6) Results or progress of funded projects must be presented annually at the convention of the NAMSC and must be published in the Maple Syrup Digest as soon as possible after completion.

(7) Send proposals to: Lynn H. Reynolds, Research Committee, North American Maple Syrup Council W10010 Givens Road, Hortonville, WI 54944.

Remember: July 1 Deadline.

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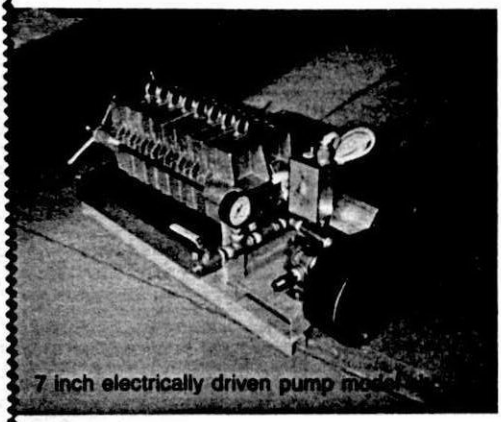

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