



Vineland Research Station

*Celebrates 100 Years of Agricultural
Research Excellence*

1911-2011



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The Dominion Entomological Laboratory (1911)

To study the biology and control of insect pests of tree fruits grown in the region, Agriculture Canada founded the Dominion Entomological Laboratory in 1911. The location of the laboratory - on the south shore of Lake Ontario in the province's key tender fruit growing region - was ideally suited for this research. Throughout the years, as new pests and diseases arose in fruit and vegetable crops, the Vineland facility was uniquely positioned to provide ongoing support to the horticultural industry.

And since its humble beginnings in 1911, the station has evolved to become a world-renowned research facility with expertise in the development of alternative and environmentally-acceptable pest management options for the protection of fruits and vegetables.

Growth in research and facilities

When it first opened in 1911, the Dominion Entomological Laboratory was housed in a provincial horticultural station on site that provided office space and orchard plots for federal staff. In 1925, a two-storey brick building was constructed on the grounds to house the scientists working in the entomology laboratory. In 1934, an expansion added more office space, a chemistry laboratory, a basement workroom and a library. A greenhouse and connecting house were constructed and attached to the provincial station in 1939.

Dominion Laboratory of Plant Pathology begins (1912)

As a complement to the entomological laboratory, research on plant disease organisms began in 1912 when the Dominion Laboratory of Plant Pathology was established in nearby St. Catharines. Its original home was a field laboratory in a peach orchard; after several moves to larger quarters, in 1928 the laboratory acquired

a 14.5-hectare farm within the city confines. In the later years the Niagara School of Horticulture (now known as Niagara College) called it home until 1999.

Plant pathology research expanded during the '40s and '50s with increased emphasis on diseases of tree fruits, plant virus diseases, diseases of ornamentals, and plant parasitic nematodes. Noteworthy contributions from this laboratory included comprehensive studies

on peach canker, the development of effective pesticide application schedules for control of plant diseases, and physical/chemical, epidemiological and serological studies on fruit viruses.

Vineland Research Station is born in 1968

The entomology and pathology laboratories amalgamated in 1960, and by 1968 the present complex at Vineland Station was completed with 29 hectares of experimental orchards

and field plots nearby at Jordan Station. The new research station was organized into three key areas: entomology, plant pathology, and nematology/chemistry/computer science. These interdisciplinary programs focused on four commodity groups: tree fruits, grapes and berries, vegetables and ornamentals. Some work was also done on forages.

Amalgamation and new directions

The final amalgamation occurred in 1992, with the Vineland Research Station joining the London Research Institute and the Delhi Research Station, to form the Pest Management Research Centre; in 1997, it was renamed the Southern Crop Protection and Food Research Centre. The Centre is a part of Agriculture and Agri-Food Canada's network of 19 research centres and 31 satellite research farms.

One hundred years ago the federal government established a research station at Vineland Station in the horticultural heartland of the Niagara Peninsula in Ontario.

Dr. John Potter, former Researcher-in-Charge who also worked as a research scientist (nematology) at Vineland for more than 35 years before retiring in 2001, was an eyewitness to many changes and discoveries in research at the station.

Dr. Potter noted there was “a lot of cooperation” between AAFC and the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) and the University of Guelph, who also have a research presence at Vineland.

“The federal scientists were primarily focused on pest control and OMAFRA and the University of Guelph were more involved with other aspects of plant production,” he said. “We put our strengths together.”

Many new insights into plant diseases, ranging from Plum Pox Virus to Fire Blight, have been gained as a result of

research conducted at the Vineland Research Station over the past century. For example, AAFC research was instrumental in determining the numbers of nematodes that were damaging crops and what levels could be tolerated, as well as which plant species were most sensitive.

Today the Vineland Research Station conducts research on a range of horticultural issues relating to plant pathology, entomology and tree fruit breeding. The research being conducted at the Research Station addresses specific ag-sector needs and priorities. Key to the many research successes is the hard work of the research scientists, support staff, technicians, field crews and students. Although the Vineland Research Station has gone through many changes over the years, its commitment to research excellence remains unchanged.



Dominion Entomological Laboratory in Vineland, 1934.



Agriculture and Agri-Food Canada's Vineland Research Station, 1968-present.



Message from the Minister of Agriculture and Agri-Food Canada

I would like to take this opportunity to congratulate the Vineland Research Station as it celebrates 100 years of excellence in agricultural research.



Gerry Ritz, P.C., M.P.
Minister of Agriculture
and Agri-Food

Over the past century, researchers at Vineland have played a key role in studying and resolving crop protection issues in the Niagara region. Today, as part of a larger collaborative group, the Vineland Research Station continues to lead the way with research that is helping to shape the innovative, competitive and modern agricultural sector of the future.

In addition to your remarkable centennial, Agriculture and Agri-Food Canada's (AAFC) 125th anniversary of our Research Branch reminds us of the importance of agricultural research and the sustainable production of abundant, safe, high-quality food for all Canadians.

Thank you for your ongoing dedication and hard work on behalf of Canadian farmers, the horticultural industry, and consumers. I sincerely wish you continued success in the years ahead.



Message from the Science Director

A hundred years ago, no one could have predicted the progress that would be made when a small entomological lab was built in the Niagara region. The Vineland Research Station has provided essential knowledge, practices and techniques for control of both existing and emerging pests and diseases of horticultural crops.

Vineland research scientists have used their expertise to help Canadian farmers manage threats to their crops, improve the environmental performance of agriculture in the Niagara region, and work with many organizations to ensure a thriving horticultural industry.



Dr. Gary Whitfield
Science Director

I would like to sincerely thank the Vineland staff, alumni and students for their commitment over the years to excellence in agricultural research. You should be proud of your many accomplishments. As we look to the next century, I know that you will continue to rise to new challenges and opportunities.

What's bugging grapes, apples, peaches ...?

The Codling Moth, the Oriental Fruit Moth and the Grape Berry Moth ... they sound innocent enough, but these pests can be devastating when they devour fruit crops in Ontario. Fortunately, Vineland Research Station has been on the case for several decades.

Since the 1990s, research priorities have included making existing insecticides more effective, evaluating new insecticide chemistries and finding ways to lessen the use of insecticides altogether.

A major contribution has been the development of an insecticide-resistance management program for the Oriental fruit moth, the key insect pest of peaches in Ontario that's responsible for up to 30 per cent loss of crops. Dr. David Pree discovered that resistance had developed to certain insecticides that had been used for approximately 20 years. A modified insecticide-control program was developed that used several effective compounds in rotation to reduce the likelihood of insecticide resistance.

Alternatives to and Lessening the Use of Insecticides

In a pioneering study led by Dr. Mitch Trimble of Vineland, it was demonstrated for the first time that two key pests of apple in Ontario, the codling moth and the apple maggot, could be controlled by applying insecticide sprays to a 20 metre wide "border zone" along the periphery of an orchard. Before this discovery was made, insecticides

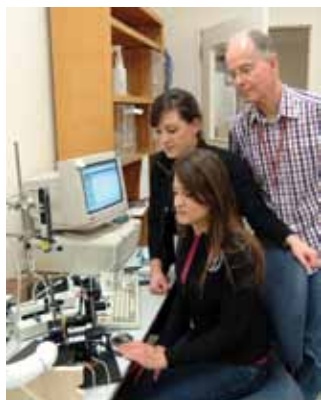


Inspecting a pheromone-baited trap for monitoring the activity of obliquebanded leafrollers in an orchard.

were sprayed over an entire orchard. The "Border Spray Program" was widely adopted and resulted in annual pest control savings of \$1 million per year to the Ontario apple growing industry!

Another successful, sustainable and cost-effective management program tackled the Oriental fruit moth problem. Drs. Trimble and Pree discovered that by maintaining a low level of pheromones (compounds that the female emits to attract males) in an orchard, the male fruit moths are prevented from locating sexually receptive females – hence, no young fruit moths are created. This is called the sex pheromone-mediated mating disruption technique. Combined with insecticides, this integrated program requires the use of 60 per cent less insecticide compared to a conventional, insecticide-based program. "I know several fruit farmers who only use the mating disruption technique and no insecticide," says Dr. Trimble.

Through this research, Vineland has led the way in using mating disruption technologies in Canadian fruit production for controlling the Codling Moth, the Oriental Fruit Moth, the Grape Berry Moth, and the Obliquebanded Leafroller.



Dr. Mitch Trimble and visiting students working with electroantennogram.



Field → Storage → Table

Canadians are used to enjoying high quality fruit year round and Vineland Research Station has played a significant role in making this possible.

Vineland's expertise in tree fruit diseases has resulted in the development of many new disease management strategies for plants, both while in the field and in storage (known as "post-harvest diseases").

Early detection is an essential first step to understanding the diseases so that farmers can apply management practices in a timely fashion to preserve their crops. By focusing on the detection, diagnosis, characterization and control of diseases, researchers have made significant progress that's helping Canadian fruit growers.

In the Field

For example, molecular detection methods for bacteria, fungi and viruses that cause diseases in apples, peaches, and plums have been developed at Vineland. Currently, methods are being developed to detect fungicide resistance in grape powdery mildew and apple scab pathogens, both of which cause significant losses to their industries.

Although grape production has increased significantly in the Niagara region, producing many award-winning wines, questions remain when it comes to controlling fungal diseases on grapevines. Through an international collaborative research initiative between Canada and Israel, AAFC Researcher Dr. Deena Errampalli of Vineland

is studying factors involved in the resistance in grapevines against the *Botrytis* pathogen, which causes particularly invasive fungal disease.

In Storage

After fruit has been picked, the challenge is to keep it fresh in storage. Here are just a few of the control methods created at Vineland for the management of post-harvest diseases:

- Fungicides were identified that are safer to humans and the environment.
- Biological control agents were discovered that protect against blue and gray mold.
- One of the bacterial control agents (*Bacillus amyloliquefaciens* C06) which reduced peach decay up to 100 per cent and significantly prolonged peach shelf life was discovered.

These studies were also instrumental in obtaining fungicide registrations for reduced risk and biological control products in Canada.

Healthier produce from the field means it will last longer in storage. Fresher produce in storage means fruit growers have a healthy, vibrant industry and consumers enjoy produce that is safe, healthy, nutritious and delicious!



Dr. Deena Errampalli evaluating for diseases on apples stored for eight months in controlled atmosphere storage.

Did you know? After harvest, apples can be stored for up to 12 months in controlled atmosphere storages.

The War on Plum Pox Virus

In 2000, a devastating plant disease caused by the *Plum Pox Virus (PPV-D)* was discovered in Ontario which posed a serious threat to peach, plum, apricot and nectarine production.

Representing 85 per cent of Canada's stone fruit production, the Niagara region was hit hard and, over the past decade, the entire tender fruit production and processing industry in the area was threatened.

Realizing the potentially serious implications of this disease, in 2003 the federal government funded a PPV

Plum Pox Virus (PPV) is a quarantinable plant disease that drastically reduces the yields and life spans of stone fruit species, including plums, peaches, apricots, nectarines, almonds and ornamental varieties. PPV does not kill trees, but it can significantly reduce yields.

eradication program with research programs established at AAFC and the Canadian Food Inspection Agency (CFIA). These programs aimed at better understanding disease progression and ways of stopping the spread of the virus through vector control (the organism responsible for disease transfer). With proven expertise in virology, molecular technologies, entomology and available containment facilities for PPV research, as well as its location in the heart of the fruit-producing Niagara region, the Vineland Research Station was the obvious choice to undertake this project.

Research focused on better understanding the epidemiology (the study of the patterns of health and disease in tree populations) of the disease as well as

improvements in virus detection and, ultimately, the development of fruit varieties resistant to PPV. Breeding for plant resistance is one of the most effective, long-term strategies for controlling diseases such as PPV.

Through extensive studies, Vineland was able to make headway in the battle with PPV through:

- improved virus detection through “targeted” sampling of infected leaves in the tree canopy
- improved molecular detection tools allowing for greater accuracy and reduced costs
- identifying a window of susceptibility when oil sprays could be applied to trees to offer more protection from viruses
- identifying the important role of aphids in spreading PPV through orchards
- providing sound research data to help fight the virus

As well, a team of AAFC researchers was able to generate a PPV-resistant germplasm and develop a highly efficient technology for gene transfer. This was accomplished with the assistance of AAFC researchers at the Southern Crop Protection and Food Research Centre in London, Ontario, the Eastern Cereal and Oilseed Research Centre in Ottawa and the Pacific Agri-Research Centre in Summerland, British Columbia.



Pox symptoms of plum pox virus on a peach grown in Niagara.



A Biologically Friendly Way to Fight Fire Blight

Researchers at Agriculture and Agri-Food Canada's Vineland Research Station and Pacific Agri-Food Research Centre and Brock University have developed a novel and environmentally friendly approach to control fire blight bacteria in the orchard.

The fire blight pathogen is a serious threat to commercially grown pear and apple varieties. However,

Fire blight is a bacterial disease that causes leaves and branches on infected fruit trees to appear torched or burnt. In Ontario, this disease affects pear, apple, quince, mountain ash, hawthorn and ornamental plants Pyrocantha and Cotoneaster.

AAFC scientists have discovered two commonly found orchard microorganisms which are proving up to the challenge: a bacterium and a bacteriophage (or roughly translated "bacteria eater").

Bacteriophages are bacterial viruses that kill bacteria and release large numbers of new phages ("eaters") which repeat the cycle. The bacterium has a dual role; it acts as a control agent and serves as a carrier of phages.

In the spring, opened flowers are sprayed with the 'carrier and phage' cocktail, and the warmer weather encourages

the carrier and phage to multiply within the floral cup. The presence of this combined biopesticide (a naturally occurring organism that controls pests) prevents growth and/or kills the fire blight bacteria.

Early field trials in pear and apple orchards have been very successful, demonstrating that the carrier and phage system can actually reduce the incidence of diseased blossom clusters by 50 per cent!

Research is continuing to identify highly effective phages, study phage resistance in host bacterium and follow the environmental fate of the phages in the orchard ecosystem. The ultimate goal is to develop a biopesticide that will be both highly effective and consistent, something that fruit growers can look forward to.

The biological control program at Vineland is a member of a larger AAFC Biopesticide Group of 20 scientists who are working towards the development of biopesticides which can be introduced into integrated pest management practices. Given AAFC's dedication to this issue, fire blight may soon be a thing of the past.

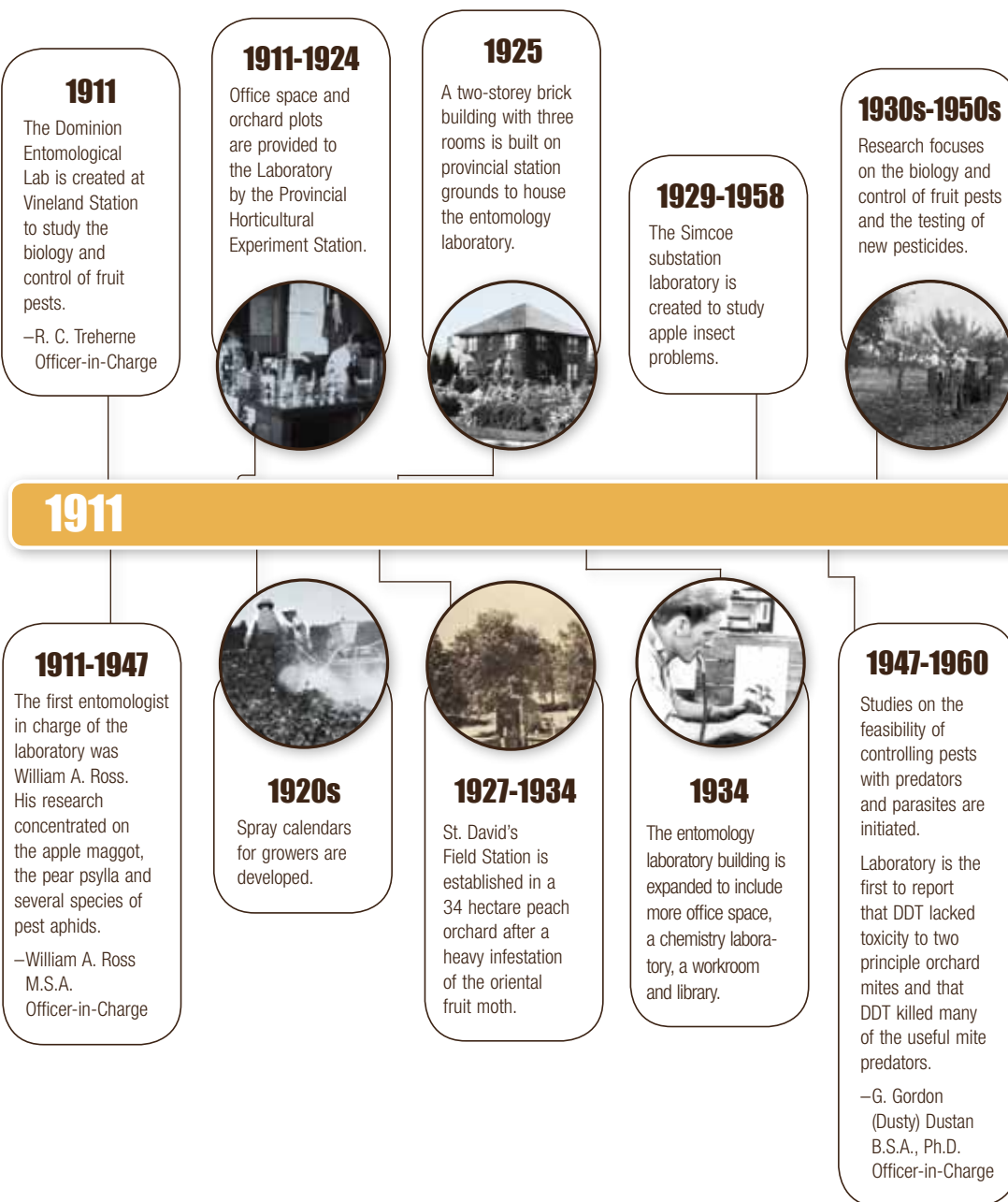
Integration of environmentally friendly and low risk biopesticides into Integrated Pest Management (IPM) practices is one of the hallmarks of AAFC research.



Dr. Antonet Svircev counting bacteria on a culture plate.

Vineland (AAFC) – History Timelines

Dominion Entomological Laboratory 1911 – 1968



Dominion Laboratory of Plant Pathology 1912 – 1968

1912

The Dominion Laboratory of Plant Pathology, a one-room portable lab, is opened in St. Catharines. Research on plant disease organisms begins.



1912 – 1917

Research focuses on the life cycles of pathogens, the development of pesticide application schedules and the evaluation of pesticides for controlling plant pathogens.

–W. A. McCubbin
B.A., M.A.
Officer-in-Charge

1918-1922

1918 – Work on peach canker and tomato diseases are published.

–W. H. Rankin A.B.
Officer-in-Charge

1940s-1950s

Research emphasizes plant virus diseases, diseases of ornamentals and plant parasitic nematodes.



Studies are done on the peach canker; pesticide application schedules for control of plant diseases; fruit viruses.



1912



1913

The Laboratory is moved to larger quarters in the centre of St. Catharines.

1916-1921

Seven papers are published on diseases of potatoes.

–P. A. Murphy
Officer-in-Charge



1923 – 1959

1928 – The Laboratory is moved to the outskirts of St. Catharines and acquires 14.5 hectares of farmland on Niagara St.

–G. H. Berkeley
B.A., M.A., Ph.D.
Officer-in-Charge



1952

Intensive research and studies on nematodes begins. (A nematode is a roundworm. Some nematodes are parasites that can cause significant crop losses.)

1960 – 1964

1960 – The Dominion Entomological Laboratory and the Plant Pathology Laboratory are merged to become Vineland Research Station. Dr. Chant is its first Director.

–Donald A. Chant
B.A., M.A., Ph.D.,
Director

Vineland Research Station 1968 – 1992

1964 - 1969

In the 1970s, the nematology group in Vineland is the largest in Canada. The relationship is shown between the structure of the nematode and its ability to transmit virus diseases to specific hosts (eg. plants).

—W. B. Mountain
B.Sc., Ph.D.
Director

1970 – 1971

1968 – The present complex of office-laboratory-greenhouse facilities at Vineland Station is completed with 29 hectares of experimental orchards and field plots nearby.

—Gerald M. Weaver
B.Sc., Ph.D.
Director

1972 – 1980

1975 – The Smithfield Experimental Farm (west of Trenton) is linked with the Vineland Research Station.

—Arthur J. (Bud) McGinnis, B.Sc., M. Sc., Ph.D.
Director

1977

The 26 hectare research farm at Jordan Station is planted with tree fruits, grapes, berries and vegetables.



1980 – 1991

1986 – Vineland Research Station celebrates its 75th anniversary. Research activities include entomology, pathology, and nematology/chemistry/computer science with 19 scientists on staff.

—Donald R. Menzies
B.S. A., M.Sc., Ph.D. Director

1992



Increased emphasis is placed on integrated pest management of diseases and pests.



1974

An experimental prototype sprayer is developed permitting modification and evaluation of droplet size, distribution and output.



Researchers make significant contributions on the timing of applications of pesticides which improved disease and insect control, reducing costs to farmers.



A nuclear stock program to provide virus-free planting material for small fruits is relocated to Vineland from Ottawa and new programs are developed for grape and tender fruit crops.



Vineland Research Station 1992 – Present



1991 - 1999

1995 – Harrow pear breeding program is transferred to Vineland, and an integrated pear breeding program is developed. New fire blight-resistant varieties (eg. Harovin Sundown) are introduced to much acclaim.

–C. Frank Marks Ph.D.
Director

2004 – 2007

2003 – Research on the distribution, host range, improved sampling and virus detection techniques is initiated. A national program on breeding for resistance to plum pox virus (PPV) focuses on developing resistant fruit varieties.

–Gary H. Whitfield
Ph.D.
IPM Theme Leader

2008 - present

Research has contributed in support of registration of preharvest and postharvest reduced risk fungicides and biocontrol agents for tree fruits.

–Gary H. Whitfield
Ph.D.
Science Director

2011

The Vineland Research Station continues to conduct research on a range of horticultural issues relating to plant pathology, entomology and tree fruit breeding.

September 10, 2011

– Vineland Research Farm celebrates 100 years of agricultural research excellence.

1992

1992 - 1997

1992 – The Vineland Research Station is officially linked with the London Research Institute and the Delhi Research Station forming the Pest Management Research Centre providing closer integration of programs at all three sites in Southern Ontario. In 1997, the three stations were renamed the Southern Crop Protection and Food Research Centre (SCPFRC).

–Greg Poushinsky
M.Sc.
Research Manager

2000 - 2005

2002 – A new national Minor Use Pesticides Program (MUPP) is established with AAFC, Health Canada, industry and the provinces. AAFC Vineland is one of nine MUP Program test sites across Canada. Many insecticides, herbicides and fungicides are registered for minor use crops (peaches, apples, pears, grapes and vegetables) through the trials and research.

–Gilles Saindon
Ph. D.
Director

2007 - present

Studies are done on sex pheromone-mating disruption of grape berry moth for use in Integrated Pest Management (IPM) programs. The fit of new low-risk pesticides for use in IPM programs is studied to minimize resistance build-up in insect population.

–Karl M. Volkmar
Ph.D.
Research Manager



2010

An apple breeding and evaluation program is initiated with Vineland Research and Innovation Centre (VRIC).

2011

2011

Research Scientists
Entomology - Mitch Trimble, Ph.D.
Plant Breeding - David Hunter, Ph.D.
Plant Pathology - Deena Errampalli, Ph.D.,
Lorne Stobbs, Ph.D.,
Antoniet Svircev, Ph.D.

Minor Use Pesticides Program at Vineland

The Vineland Research Station is one of the nine test sites across Canada collaborating with the Minor Use Pesticides Program (MUPP). The program helps Canadian farmers manage disease, weeds and insect problems that can threaten the minor use crops.

A minor use pesticide refers to the crop-protection treatments (with insecticides, herbicides and fungicides) usually used on low acreage, high value crops or where pest control is needed on a small portion of the overall crop acreage.

The MUPP was established in 2002 as a joint initiative between AAFC and Health Canada's Pest Management Regulatory Agency (PMRA) together with industry and the provinces. The MUPP works with growers, the provinces, manufacturers and the United States' IR-4 Specialty Crops program to establish grower-selected crop/pest needs, and match them with potential solutions, particularly reduced risk pest control products.

AAFC then conducts field and greenhouse trials and commissions lab analyses to collect the required data, including efficacy and residue information, before sending submissions to PMRA for the registration of new minor uses. Many of these new uses replace older chemistries and formulations which have been taken off the market.

"The MUP Program helps growers stay competitive in a global market through access to new pest control products that are safer, more selective and have less detrimental effect on the environment," says Dr. Errampalli, MUPP Test Site Manager.

In a typical year, 20 residue trials and 20 efficacy trials with insecticides, herbicides and fungicides are conducted for tree fruits (peaches, cherries, plums, apples and pears), grapes and vegetables at Vineland to support MUPP submissions. Additional trials are also being conducted on berries, vegetables and post-harvest storage treatments.

These products all have the advantages of reduced risk to human health while being more selective to the target pests (less toxic to beneficial insects). This ensures they are good candidates for inclusion in integrated pest management systems.

Gathering efficacy and residue information involves measuring the effectiveness of the pesticide and the pesticide remaining on the plant.



Robert Wismer testing reduced-risk pesticide on lettuce.



Protecting Fruit Trees

Plant diseases are not only costly to the industry, but control has become more difficult as pathogens develop resistance to traditional methods.

Tree fruit production in the Niagara peninsula has been affected by many plant pathogens (disease-causing organisms) including peach canker, brown rot of stone fruits, plum and cherry black knot, powdery and downy mildew of grape and fire blight in pears and apples.

Removal of many pesticides from the marketplace due to human or environmental risks has also created new challenges in plant protection. Fortunately, Vineland researchers have always provided targeted, science-based solutions to these challenges.

For example, peach canker studies identified factors contributing to increased fungicide resistance and the effect of fungicides on orchard microflora. Peach canker toxin, identified by AAFC researchers, was used to screen for resistance in tissue cultured seedlings. The seedlings were added to the clonal peach material and evaluated for canker resistance and other desirable horticultural characteristics, thereby helping to develop trees resistant to peach canker.



Custom engineered sprayer for pesticide application.

Brown rot in stone fruit is another challenge. Researchers identified factors which contributed to early and late season susceptibility to the brown rot, the importance of latent infection and methods for detection of the latent stage. Studies on black knot in cherry and plum examined the role of rain and temperature on fungal spores, the dynamics of spore release, general epidemiology and control of black knot. This research provided growers information on disease control practices that would decrease the incidence of brown rot and black knot in the Niagara orchards.

Research studies have revealed the presence of grape powdery mildew resistance to some of the conventional fungicides. As a result, new provincial disease control recommendations were introduced that incorporate petroleum, plant oils and reduced risk fungicides to combat build-up of resistance in powdery and downy mildew of grape.

Researchers have also examined the efficacies of environmentally friendly biological control agents or biopesticides (naturally occurring microorganisms or their derived substances) to control apple scab, brown rot in stone fruit and fire blight in pome fruit. This work supported the eventual successful registration of three biopesticides for fire blight in Canada. The biopesticides have been incorporated into integrated pest management practices for the control of fire blight in the orchard. Growers can therefore avoid a heavy reliance on traditional chemical pesticides.

Coordination between private industries and Vineland researchers has identified many successful products that could be integrated into disease management practices to control plant diseases and avoid pesticide resistance.

Nematode and Virus Control

In a quest to maintain a healthy fruit industry, two groups of pests - nematodes and viruses - have always proven troublesome. Their effects can be devastating to soil and crops, leaving growers frustrated and looking for pesticide controls.

In an effort to find environmentally-friendly options for growers, the Vineland Research Station – a major centre of study for both nematology (the study of nematode round worms) and virology (the study of viruses) - has focused its attention on alternative pest-control methods.

Since the 1990s, Vineland has experienced many successes in developing alternative pest control methods for nematodes which have included:

- discovering *Tagetes* marigolds are a useful alternative to commercial nematicides;
- proving a mix of wheat, rye straw and poultry manure eliminates overwintering nematodes in strawberry fields/soils;
- demonstrating certain prairie grasses, mustards, flaxes and sorghum crops show promise as alternative cover or rotation crops; and
- developing a mustard-bran based product to replace fumigants



Dr. Lorne Stobbs inspecting plants for virus symptoms in a greenhouse.

In addition, Vineland's studies on the transmission of viruses by insects and nematodes has resulted in several exciting developments such as: new resistant plant varieties, improved diagnostics, better management and monitoring of vectors and diseases, as well as the use of oils, anti-transpirants and other bio-rational products to control various viruses.

Vineland's research also extends into examining fruit crops infected by phytoplasmas (small bacteria-like organisms) and developing alternative control measures. One development was the use of hot water therapy which was adapted to eradicate crown gall disease - caused by tumour-producing bacterium - from nursery plants and ornamentals.

Vineland Research Station's expertise and efforts in nematology, virology and battling bacteria have resulted in a win-win situation for all those concerned - fruit growers, the horticultural industry, the environment and Canadian consumers who enjoy the fruits of their labours!



Nematology researchers installing nematode experiments in a field.



“Pear”nting 101

Since the early 1960s, AAFC research centres in Ontario have been conducting tree fruit breeding activities. Originally conducted at the Greenhouse and Processing Crops Research Centre in Harrow, Ontario, the pear breeding program was transferred to the Vineland Research Station in 1995.

At the outset, the major objective of the program was to develop varieties resistant to diseases and to extend the harvest and marketing seasons. By using “superior fruits” – those showing characteristics such as hardiness, disease resistance, later harvest and extended storage life – this goal has been realized through controlled hybridizations which produced first-class offspring. These offspring or “cultivars” have exhibited superior traits, are resistant to fire blight (a widespread, damaging disease that kills fruit trees) and taste delicious.

The success of any tree-fruit breeding program depends not only on superior fruit parents but also patience. Breeding resistant varieties to withstand pests and disease can take up to 20 years!

To date, AAFC has introduced six fire blight-resistant pear cultivars for commercial production in Canada: ‘Harrow Delight’ (1981), ‘Harvest Queen’ (1981), ‘Harrow Sweet’ (1990), ‘AC Harrow Crisp’ (2000), ‘AC Harrow Gold’ (2000) and ‘Harovin Sundown’ (2008). Three additional selections will be introduced in the near future.



Vineland Harovin Sundown Pear.

Building on this success, AAFC and the Vineland Research and Innovation Centre (VRIC) will launch a collaborative apple breeding program at Vineland in the coming years. This program will focus on product quality, consumer preference, market drivers and developing new technologies to enhance efficiency in apple breeding.

*After years of research at Harrow and Vineland, a new pear was developed by AAFC scientists. Researchers invited the public to ‘name the pear’ and, after 11,000 votes were cast, the **Harovin Sundown** pear was officially announced at the 2008 Ontario Fruit and Vegetable Convention.*

“Participating in the ‘name-the-pear’ event at the Royal Agricultural Winter Fair was one of the most rewarding experiences in my life as a pear breeder,” recounts AAFC Researcher David Hunter.

The name illustrates the collaborative research efforts of AAFC scientists from both centres: haro (Harrow) and vin (Vineland).



Dr. David Hunter observing fruit set on pear trees at the Jordan Farm.

Vineland Research Station ... throughout the years



Scientists working at former plant pathology lab circa 1930.



Applying pesticides on the research farm, 1940.

"Amongst other things, AAFC Vineland Research Station has played a vital role in crop protection materials, testing and evaluation. The Tender Fruit Industry looks forward to our continued partnership for the next hundred years."

– Adrian Huisman, Secretary/General Manager, Ontario Tender Fruit Producers' Marketing Board



Examining diseased tree tissues under the microscope.

"Over the 63-year history of the Grape Growers of Ontario, research has played a pivotal role in growing and establishing healthy vineyards. AAFC Vineland Research Station's early research work on establishing "nuclear" stock to developing a heat treatment for the elimination of viruses in grape vines set the stage for healthier and productive vineyards."

– Debbie M. Zimmerman, CEO, Grape Growers of Ontario



Vineland Research Station ... throughout the years



Pruning peaches at the Jordan Farm orchards.

"Research and innovation are the building blocks of Canada's plant science industry. The cutting-edge research done at facilities like the AAFC Vineland Research Station helps provide Canadian farmers with the crop protection tools they need to supply a healthy, abundant and affordable food supply to consumers now and into the future."

— Lorne Hepworth, President & CEO, CropLife Canada

"The contributions of the AAFC-Vineland support staff to the success of the research projects at the Vineland Research Station are important. The research scientists rely and depend on the assistance from lab technicians, the librarian, farm and greenhouse crew, administrative and building maintenance staff to carry out the research projects."



In 1994, Vineland Research Station constructed a fully integrated co-generation unit – the first of its kind and a role model for many private sector companies! The 325kVA natural gas powered equipment supplies approximately two-thirds of the total electricity for the facility, reducing the need for coal-produced electricity (and CO₂ emissions) and using heat generated for the greenhouses – all of which is more environmentally friendly and saves money. Today, it helps reduce electrical bills and operates during extended power outages.

Did You Know?

The Vineland Research Station, now a satellite site of the Southern Crop Protection and Food Research Centre is a part of Agriculture and Agri-Food Canada's network of 19 research centres.

Research Station's Mandate

Research activities at Vineland in the Niagara Peninsula region of Ontario support development of improved methods of integrated pest (insect and disease) management for fruits, grapes and vegetables.

Jordan Farm

In addition to its main office/laboratory in Vineland Station, there is a field research site at Jordan Station which accommodates the Centre's field research in tree fruits (apples, peaches, plums, cherries), grapes, small berries (strawberries and blueberries) and annual vegetables (bell peppers and celery).

Facts & Figures

- Five research scientists and a total staff of 30
- Home for the AAFC Minor Use Pesticide Program - Vineland site
- The main office-laboratory complex is located in Vineland Station.

- A field site at Jordan Station, located four kilometres southeast of Vineland Station, has 64 hectares and accommodates about 95 per cent of the Station's field research.
- Scientists and technicians are involved in collaborative programs with other AAFC Research Centres, the Vineland Research and Innovation Centre, the University of Guelph and Brock University.
- Weather-monitoring station is located on the farm at Jordan Station
- Linkages and networking with provincial departments, universities and industry groups including: Ontario Tender Fruit Producer's Marketing Board, Grape Growers of Ontario, Ontario Apple Growers and Crop Life members (Syngenta, Dow Agro, Dupont, Bayer, Arysta Life Science, Chemtura, Engage-Agro, Valent, Crompton, and Gowan)

Co-located at the Research Station are:

- Vineland Research and Innovation Centre
- Pest Management Centre's Analytical Chemistry Lab





The staff, field crews, technicians, support staff and students of the Vineland Research Station today.

It takes a team to build a research station

Behind every discovery, innovation and program at Vineland Research Station, there's always been a dedicated team of support staff, technicians, and researchers hard at work.

Over the past century, hundreds of these professionals have contributed their expertise and efforts to the often time-consuming but gratifying work of horticultural research.

Since the early 1900's, the research station has also welcomed many students to assist, learn and grow with staff. Students have come from various universities and colleges across Canada, and many programs have employed up to 10 students for months at a time.

"Mentoring and training of students and post doctoral fellows is an important part of our program at Vineland," says Dr. Deena Errampalli. "Their participation is mutually beneficial for them and for us."

Partnering for success

The team effort continues with collaborations at all levels – local, regional, national and international. Vineland's

partners include the Ontario Ministry of Agriculture, Food and Rural Affairs, the University of Guelph, the Pest Management Centre, numerous universities, various Ontario marketing boards (including tender fruit and grape), producer and industry groups.

Since 2007, the Vineland Research Station has been part of a new and exciting government and industry led initiative – the Vineland Research and Innovation Centre – which aims to be a world-class hub of horticultural research and innovation excellence. Collaborations between Vineland (AAFC) and the Vineland Research and Innovation Centre hold a promising future for the horticulture industry.

"AAFC Vineland scientists have a long history of effective collaboration with industry in the Niagara region," says Dr. Karl Volkmar, Research Manager of the Southern Crop Protection and Food Research Centre. "AAFC researchers will continue to play a vital role with the Vineland Research and Innovation Centre in addressing the challenges facing agriculture producers in the Niagara region."

Vineland Centenary Organizing Committee Members:

Deena Errampalli (Chair), Peter Raakman, Ruth Loewen, Lorne Stobbs, Jane Thorpe, Lori Bittner, Theo Olthof, Trish Vickers, Robert Wismer, Kathleen Jensen, Gary Whitfield, Karl Volkmar
