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UNIVERSITY

New York State
Agricultural
Experiment Station

from MOLECULES *to Markets*

ALLEN PLANT CO.

AMBERG'S NURSERY

AMES ORCHARD

ANFIC

APPLEWOOD ORCHARDS

ARNESON NURSERY

ASGROW

BALEY NURSERIES

BARHAM SEEDS

BAYER NURSERIES

BRITTINGHAM FARMS

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BUTLER NURSERY

C&O NURSERY

CAHOON FARMS

CONGDON & WALLER

COOLEY FARMS

DAISY FARMS

DATU, INC.

DOWELANCO

DUPONT

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EMPIRE NURSERY

FLEMINGS NURSERY

FOUR MILE NURSERY

FOWLER BROS.

HARRIS MORAN

INNOVATIVE BIOTECHNOLOGIES, INC.

KROHNE FARMS

LEWIS NURSERY

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VAN WELL NURSERY

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JUANITA'S MEXICAN KITCHEN

GREAT LOCAL FOODS

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ADIRONDACK TROUT &

SALMON, INC.

MINISSALE'S ITALIAN &

AMERICAN RESTAURANT

CHICKEN TOM'S, INC.

VILLA VALENTI RESTAURANT

THE CAFE

MOUNTAIN MAN

CHIP'S FISH MARKET & REST.

SALSA BROTHERS, INC.

M. G. HURD & SONS

MISTY MEADOW FARM

MY LINH'S

JEFFERIES CO. ASSOC.

CHEESE CAKE

ELLIS FRUITS & VEGETABLES

BLUMENFELL SPECIALTY FOODS

NORTHERN SOY

ONTARIO ORCHARDS

JOE COOL INT., INC.

CULINARY INSTITUTE

TRI TOWN PACKAGING CORP.

G ENEVA EXPERIMENT STATION

means Business for New York

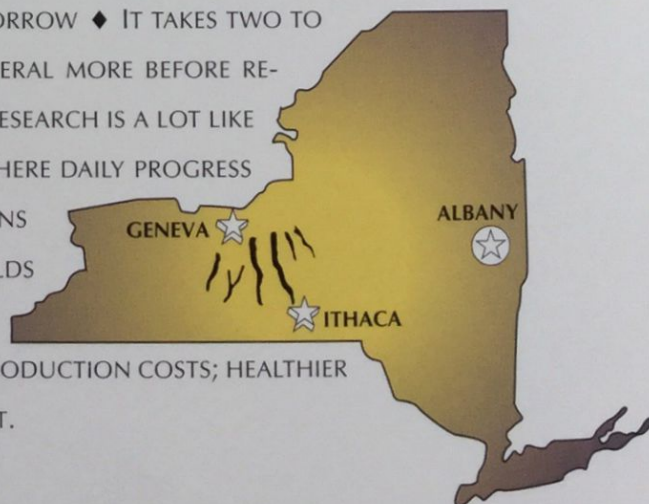


AT THE NEW YORK STATE AGRICULTURAL EXPERIMENT STATION AT **GENEVA**, THE PEOPLE ARE COMMITTED TO SERVING THE FOOD AND AGRICULTURE INDUSTRIES OF NEW YORK ♦ RESEARCHERS AT THIS WORLD-CLASS RESEARCH INSTITUTE GENERATE NEW KNOWLEDGE FOR INDUSTRY, GROWERS, PROCESSORS, AND CONSUMERS, AND ANTICIPATE FUTURE CHALLENGES ♦ **GENEVA** EDUCATES THROUGH OUTREACH WITH CORNELL COOPERATIVE EXTENSION ♦ RESEARCH AND DEVELOPMENT AT **GENEVA** YIELD HIGH RETURNS TO THE NEW YORK STATE ECONOMY ♦ **GENEVA** HAS BEEN AN IMPORTANT ECONOMIC DEVELOPMENT ENGINE FOR NEW YORK STATE SINCE IT WAS FOUNDED IN 1880.

GENEVA IS PARTIALLY SUPPORTED BY THE STATE UNIVERSITY OF NEW YORK (SUNY) THROUGH THE BUDGET FOR CORNELL UNIVERSITY'S STATUTORY COLLEGES.

AGRICULTURAL TECHNOLOGY THAT IS DEVELOPED AND TESTED TODAY BECOMES ACCEPTED PRACTICE IN THE FIELDS AND PROCESSING PLANTS OF TOMORROW ♦ IT TAKES TWO TO FIVE YEARS TO PRODUCE RELIABLE RESULTS, AND SEVERAL MORE BEFORE RESULTS ARE ADOPTED BY INDUSTRY ♦ AGRICULTURAL RESEARCH IS A LOT LIKE FARMING AND A LOT LIKE LEGISLATING: A PROCESS WHERE DAILY PROGRESS CONTRIBUTES TO WEEKLY, MONTHLY, AND YEARLY GAINS

♦ THE RESULT IS DECADES OF INCREASINGLY BETTER YIELDS IN FIELDS, ORCHARDS AND PROCESSING PLANTS; HIGHER QUALITY FRUITS AND VEGETABLES; REDUCED PRODUCTION COSTS; HEALTHIER PLANTS; HEALTHIER DIETS; AND A SAFER ENVIRONMENT.



GENEVA Means Business

A LONG-STANDING PARTNERSHIP BETWEEN NEW YORK STATE TAXPAYERS AND SCIENTISTS AT **GENEVA** FUELS THE NEW YORK STATE AGRICULTURAL EXPERIMENT STATION — ONE OF THE STATE'S MOST VALUABLE RESOURCES FOR ECONOMIC DEVELOPMENT ♦ **GENEVA** SCIENTISTS ARE A CRITICAL LINK IN THE EMPIRE STATE'S FOOD CHAIN ♦ MORE THAN 17 MILLION PEOPLE IN NEW YORK DEPEND ON RESEARCH CONDUCTED AT **GENEVA** ♦ FOR ABOUT 50 CENTS PER NEW YORKER PER YEAR, **GENEVA** HELPS TO GUARANTEE THE SUPPLY OF ECO-
QUALITY FRUITS AND
TURE OF FARMING AND
STEWARDSHIP OF 25%
YORK STATE; AND THE
A PORTION OF THE \$21
SEGMENT OF THE



NOMICAL, SAFE, HIGH-
VEGETABLES; THE FU-
FOOD INDUSTRIES; THE
OF THE LAND OF NEW
ECONOMIC VITALITY OF
BILLION AGRICULTURE
STATE'S ECONOMY.

How does GENEVA mean business for New York?

- ♦ **GENEVA** contributes directly to a healthy bottom line for New York's #1 industry—food and agriculture.
- ♦ **GENEVA** impacts thousands of jobs by fostering new products, new processes, and new businesses for New York.
- ♦ **GENEVA** research and outreach programs reduce the use of pesticides and the cost of production.
- ♦ **GENEVA** helps New York's fruit and vegetable industry, which has a raw-product value of \$450 million, maintain its competitive edge in domestic and foreign markets.
- ♦ **GENEVA** reduces adverse impacts on the environment by the precise use of pest management tools.
- ♦ **GENEVA** laboratories provide low-cost testing and analytical services to New York farmers, food processors, seed companies, wineries, and consumers.
- ♦ **GENEVA** faculty are internationally recognized leaders in their fields. They are committed to the development and application of new technologies that help keep New York's economy viable.

*This report illustrates the remarkable extent to which research and extension at **GENEVA** mean business for New York.*

YIELDING Economic Benefits

Research, development, and educational outreach conducted by GENEVA contribute directly to the economy of New York State, leading to new technologies, new businesses, new products, and new jobs.

ECONOMIC MAGNET:

For every \$100 the state provides, GENEVA raises another \$76 from federal grants, contracts, and other sources, including fruit and vegetable growers, processors, and associations who directly support GENEVA's research programs. As an example, in 1994, Canandaigua Wine Company, the second largest wine producer in the United States, established a \$250,000 endowment for wine and grape research at GENEVA that was matched by John Dyson, owner of Millbrook Winery.

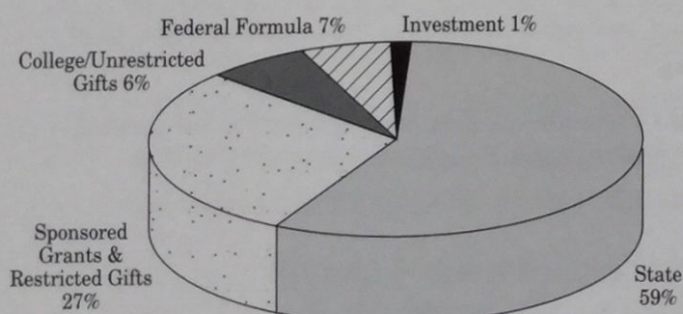
PAYBACK: Dollars invested in agricultural research and development have a 150% multiplier effect, increasing income to growers, processors, and all segments of the multi-billion dollar economy that interact with the agriculture sector. Although only 2 percent of the nation's population are farmers, Americans spent \$546 billion on food in 1990.

GRAPES: Application of GENEVA's research on scouting for insect pests, new cultural and disease management practices, and application of weather information reduces pesticide applications and increases yields in New York State's 33,000 acres of vineyards. Implementation of available integrated pest management technologies on all grape acreage in New York could save the industry \$6 million annually.

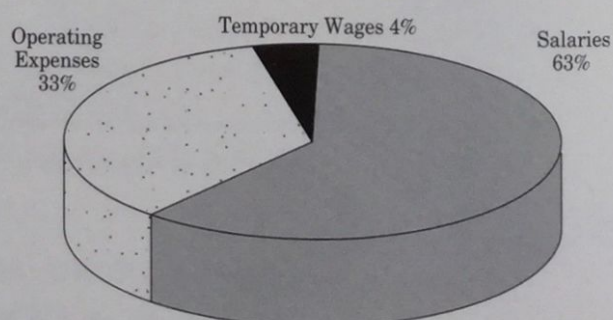
SMALL FRUITS: Plant breeders, entomologists, and plant pathologists have joined together to help the New York Small Fruits industry that has a farm gate value of \$44 million. Honeoye and Jewel strawberry, and Heritage and Titan raspberry developed at GENEVA are mainstays of the Small Fruits industry in New York.

APPLES: Five varieties of apples developed at GENEVA—Empire, Cortland, Jonagold, Jonamac, and Macoun—account for nearly 20% of New York's commercial apple production. New varieties, dwarfing rootstocks, high density plantings, enhanced training systems, and other cultural practices increase the competitiveness of New York apples in the world market and help New York maintain its position nationally as the third largest apple producing state. In 1994, New York growers generated \$130 million at the farm gate.

GENEVA INCOME 94/95 (% of \$19 Million)

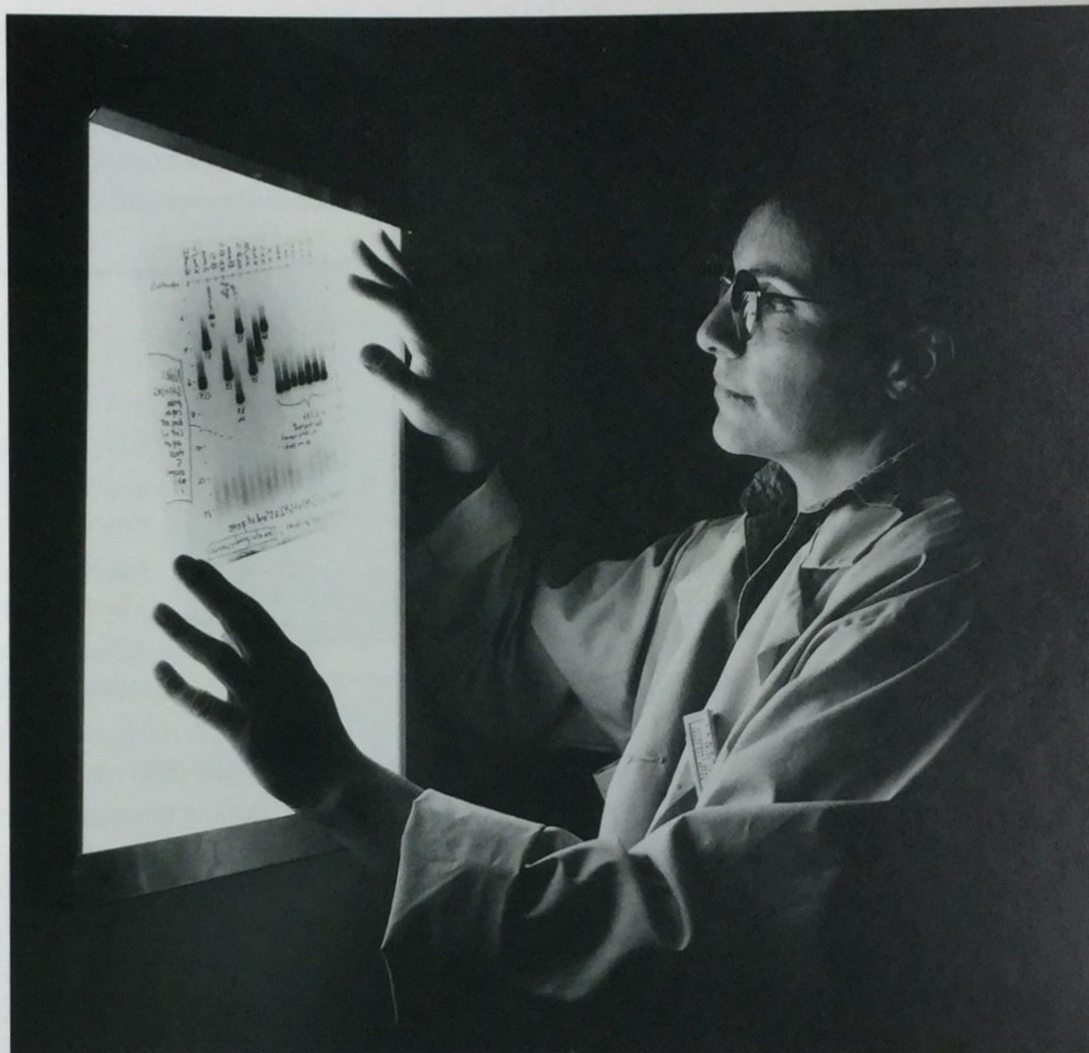


EXPENDITURES 94/95 (% of \$19 Million)



WINE: Since the New York legislature passed the Farm Winery Act in 1976, 87 new wineries have been established in the state. Total production from all 106 wineries is now 25 million gallons, gross sales are well over \$300 million, and New York has become the second largest wine producer in the U.S. GENEVA's viticultural and enology research helps New York farm wineries improve wine quality. Workshops, newsletters, and seminars at GENEVA ensure that research information generated at the Station arrives where it belongs—in the hands of vineyard managers and winemakers.

VEGETABLES: Scientists at GENEVA conduct research and outreach education on sweet corn, cabbage, peas, beans, tomatoes, onions, squash, and beets, developing new varieties and improving production methods for New York's \$250 million vegetable industry. The future of the state's vegetable industry has never been stronger; growers are increasing production to meet new demands of New York-based processors.



REDUCING PRODUCTION COSTS: Research-backed methods of pest forecasting and monitoring, action thresholds, and biological control methods developed at GENEVA help New York fruit and vegetable growers reduce the use of pesticides. GENEVA helped New York apple growers reduce pesticide costs by \$60-\$100/acre/year, helped turf managers at golf courses cut pesticide use by 54% annually, and saved New York processing sweet corn growers \$500,000/year.

ASSISTING MANUFACTURERS: GENEVA is a major resource for the fruit and vegetable portion of New York's \$6.4 billion food processing industry, offering expertise in production, quality, taste, food safety, and waste recovery on site or in GENEVA's 10,000 sq. ft. food processing pilot plant. One example: Indian Summer, a New York fruit juice company, saved \$40,000/year based on advice it received from GENEVA.

LAUNCHING NEW ENTERPRISES: GENEVA food scientists help fledgling and established entrepreneurs—large and small—negotiate health, safety, and licensing regulations to develop hundreds of food products to satisfy new markets and changing consumer demands for freshly packaged, quick, nutrient-enhanced, gourmet, and ethnic foods. Since 1988, over 1,700 companies have received assistance.

IMPROVING *Crop Varieties*

GENEVA introduces better varieties

that help New York's \$450 million fruit and vegetable industry compete in domestic and global markets. GENEVA breeders are integrating classical and molecular approaches to produce varieties that better withstand the stresses encountered in New York, including diseases, insects, cold, and drought. Other characteristics improved through breeding include flavor, crispness, shelf-life, and yield.

"FIVE APPLE VARIETIES
DEVELOPED AT GENEVA—
EMPIRE, CORTLAND, JONAGOLD,
JONAMAC, AND MACOUN—
ACCOUNT FOR NEARLY 20%
OF THE STATE'S TOTAL
PRODUCTION OF 1.13 BILLION
POUNDS OF APPLES."

DAN DONAHUE, EXEC. SEC.,
NYS HORTICULTURAL SOCIETY

♦ GENEVA plant breeders are improving the shipping and shelf-life characteristics of many varieties of fruits and vegetables. Reduced spoilage ensures greater returns for growers and bigger savings for consumers.

♦ Vegetable germplasm developed at GENEVA has resulted in beans, tomatoes, and crucifers with increased tolerance to extremes of temperature and moisture, and resistance to diseases like root rot, grey and white mold, and downy mildew. Commercial seed companies use the improved genetic material to develop new varieties.



♦ GENEVA has released over 224 varieties of fruits. Some of the more important ones include: Empire, Cortland, Macoun, Jonagold, and Liberty apples; Cayuga White, Einset Seedless, Glenora, and Melody grapes; Jewel and Honeoye strawberries; Heritage and Titan raspberries; Ulster and Hudson cherries; Brighton and Eden peaches; Stanley and Castleton plums; and Highland and Aurora pears.

♦ GENEVA researchers have pioneered new technologies like genetic engineering that have the potential to improve existing varieties by changing key attributes while retaining the original varietal characteristics. New molecular techniques will save consumers and industries money by accelerating the development of new varieties and increasing the number of attributes that are improved.

♦ New varieties of higher-quality fruits and vegetables encourage consumers to eat "5 a day" thereby reducing the risk of heart disease, cancer, diabetes, and other debilitating health disorders.

♦ DEVELOPED HI-DRI CABBAGE WHICH IS HIGHER IN SOLIDS, REDUCING OR ELIMINATING LIQUID WASTE AND INCREASING PACK-OUT FOR SAUERKRAUT PRODUCERS BY ABOUT 25% (DICKSON).

♦ BRED AND NAMED THE APPLE VARIETY, EMPIRE. IN THE PAST 10 YEARS, EMPIRE HAS BECOME A MAJOR FRESH MARKET APPLE. IN 1995, NYS PRODUCED OVER 95 MILLION POUNDS OF APPLES, AND EXPORTED MANY VARIETIES, INCLUDING EMPIRE, TO 14 COUNTRIES (WAY).

♦ RELEASED CAYUGA WHITE, THE FIRST GRAPE BRED SPECIFICALLY FOR THE NEW YORK WINE INDUSTRY, RESULTING IN COMMERCIAL SUCCESSFUL WHITE WINES (EINSET AND ROBINSON).

♦ INTRODUCED THREE NEW DWARFING APPLE ROOTSTOCKS THAT ARE RESISTANT TO FIRE BLIGHT AND CROWN ROT (CUMMINS AND ALDWINCKLE).

GROWING Crops Competitively

To be competitive with other states and countries,

New York fruit and vegetable growers are continually challenged to improve quality, increase yield per acre, and reduce the cost of production.

Innovative cultural practices developed at GENEVA enable New York State farmers to reduce the cost of production, improve yields, and increase market share with higher quality crops.

APPLES

♦ Orchard production systems developed at GENEVA combine the best new varieties with dwarfing rootstocks and cultural practices that maximize yield and improve fruit quality. Traditional orchards had almost no yield through the seventh year and did not reach maximum yields until after the fifteenth year. Today's high-density orchards average 500 to 600 trees per acre, produce yields of around 500 bushels per acre by the fifth year and up to 1,000 bushels per acre by the eighth year.

♦ Research on water and nutrient management in orchards at GENEVA is providing growers with new technologies to maximize the growth and yield of newly planted orchards. In addition, research on trickle irrigation at GENEVA demonstrates to growers how to improve fruit size and quality during dry growing seasons.

VEGETABLES

♦ Improved crop rotation and cover-cropping strategies have been developed for better pest control and soil conservation.

♦ Plant populations for snap beans have been optimized for improved plant yield and reduced seed costs.

♦ Uniform stand establishment of snap beans, sweet corn and table beets have resulted in improved yield and more efficient harvesting.

"IN SNAP BEAN PRODUCTION, WE USED TO THINK TWO TONS PER ACRE WAS A GOOD YIELD. WITH GENEVA'S HELP, WE ARE ACHIEVING YIELDS OF 4 TONS PER ACRE AND ARE DISAPPOINTED IF WE DON'T GET IT."

DALE HEMMINGER, HEMDALE FARMS, SENECA CASTLE, NY

GRAPES

♦ The GENEVA Double Curtain Training System for trellising grapes maximizes light interception and increases quality and yield for grapes by at least 50% on the same acreage.

♦ Studies at GENEVA of the relationship of pruning level, vine vigor, and fruit load to yield and juice quality, have led to improved management practices for mechanically pruning and shoot-positioning Concord grapes that are widely adopted by grape growers.



♦ PROVIDED NYS FARM WINERIES WITH THE VARIETIES, ROOTSTOCKS AND MANAGEMENT INFORMATION THEY NEED TO PRODUCE CLASSIC, EUROPEAN GRAPE VARIETIES IN NEW YORK'S CHALLENGING WINTER AND SUMMER CLIMATE (SHAULIS AND POOL).

♦ HELPED TRANSFER THE GENES CONTROLLING MALE STERILITY IN THE BRASSICA FAMILY USING BIOTECHNOLOGY METHODS AND RELEASED IT TO COMMERCIAL SEED COMPANIES FOR USE IN THE DEVELOPMENT OF HYBRIDS (EARLE AND DICKSON).

♦ DEVELOPED GUIDELINES FOR THE EXPANDED USE OF HORTICULTURAL SPRAY OIL TO CONTROL MITES IN APPLE TREES. ALLOWS BIOLOGICAL CONTROL AND POSES MINIMAL HAZARD TO THE APPLICATOR AND THE ENVIRONMENT (REISSIG AND AGNELLO).

♦ DEVELOPED CULTURAL PRACTICES THAT MINIMIZE WHITE AND GREY MOLDS ON STORAGE CABBAGE GROWN IN NEW YORK, AND REDUCED THE NEED FOR FUNGICIDAL CONTROL OF THESE DISEASES (DILLARD).

GROWING *Healthy Crops*

GENEVA scientists are reducing pesticide use,

decreasing production costs, and increasing profitability for New York farmers, nursery operators, greenhouse operators, and turf managers by pioneering programs in Integrated Pest Management (IPM).

Organized formally at GENEVA in 1973, IPM minimizes health and environmental risks by developing tactics in biological, cultural, physical, and chemical control. Through educational outreach with Cornell Cooperative Extension, scientists promote new advances in practices like crop rotation, tillage, the use of resistant cultivars, the adjustment of planting and harvest dates, the conservation of natural parasites and predators, and the use of spot pesticide treatments to produce healthy crops for New York.

◆ GENEVA researchers have discovered sources of pest resistance in crop varieties and their wild relatives from around the world and used them to develop virus-resistant beans, peas, tomatoes, squash, melons, and lettuce.

◆ Under the IR-4 program at GENEVA, a variety of commodities are analyzed for a broad range of pesticide residues by USDA- and EPA-approved methods.

"THE STAFF AND FACULTY AT GENEVA HAVE LONG BEEN VALUABLE RESOURCES FOR NEW YORK STATE VEGETABLE GROWERS. THEY HAVE ALWAYS BEEN WILLING TO HELP WITH PRODUCTION AND PEST MANAGEMENT PROBLEMS. GENEVA IS ONE OF OUR BEST KNOWLEDGEABLE SOURCES OF INFORMATION AND ASSISTANCE."

JEAN WARHOLIC, EXEC. SEC.,
NYS VEGETABLE
GROWERS' ASSOC.

◆ GENEVA has identified biological control agents that are active against some of the most important diseases of major New York crops, including apples, grapes, sweet corn, and turf.

◆ GENEVA entomologists have made fundamental discoveries about the identification and synthesis of sex attractants called pheromones from more than 100 insect pests, resulting in the development of biorational controls which, in many instances, are viable alternatives to chemical pesticides.

◆ Researchers at GENEVA have provided apple growers with new simplified sampling techniques and selective pesticides, and have developed and implemented biological control strategies for aphids, mites, and leafrollers, thereby reducing production costs.

◆ IPM strategies such as vineyard scouting for insect pests, middle-row weed management, and monitoring programs for diseases have resulted in increased yields. If these strategies were implemented over all 33,000 acres of vineyards in the state, overall savings to New York grape growers could be as high as \$6 million.



◆ DEVELOPED DISEASE-RESISTANT APPLES LIKE LIBERTY AND FREEDOM WHICH REQUIRE REDUCED LEVELS OF PESTICIDES, THEREBY DECREASING PRODUCTION COSTS AND REDUCING THE ENVIRONMENTAL IMPACT (LAMB AND ALDWINCKLE).

◆ DEVELOPED AN IPM PROGRAM FOR NEW YORK STATE SWEET CORN PROCESSORS THAT HAS RESULTED IN A 70% REDUCTION IN INSECTICIDES AND SAVINGS OF \$500,000/YEAR (SHELTON AND IPM STAFF).

◆ DEVELOPED AN IPM PROGRAM FOR NEW YORK STATE CABBAGE GROWERS THAT HAS ACHIEVED 75% ADOPTION AND IS REDUCING PESTICIDE INPUT BY ABOUT 50% (IPM STAFF).

◆ DEVELOPED A PROGRAM FOR CONTROLLING MAJOR DISEASES OF APPLE THAT REQUIRES FEWER SPRAYS WITH FUNGICIDES. THE PROGRAM IS NOW WIDELY USED IN NEW YORK ORCHARDS (WILCOX).

MAINTAINING A *Healthy Environment*

The development of the Integrated Pest Management (IPM) program at GENEVA has resulted in a 30 to 80% reduction in pesticides on crops in New York. Pest and weather forecasting, disease and insect monitoring, action thresholds, and biological controls lead to more effective and economical control of diseases, weeds, insects, and mites of fruit and vegetable crops.

Integrated crop management systems strive to prevent pathogens, crop nutrients, sediments, pesticides, and other contaminants from entering the water supply. GENEVA scientists help protect New York's natural resources by developing water conservation and waste management systems for growers and processors.

♦ In New York State, over 2 million acres are covered with turfgrass, including more than 80,000 acres of intensively maintained golf courses that require huge inputs of fuel, fertilizer, pesticide, and water. Turfgrass research at GENEVA on environmentally safe pest control programs improves pest management strategies, water quality, and the environment, and allows turf managers to cut pesticide use by 54% annually.



"THROUGH THE USE OF INSECT TRAPS, PHEROMONE STRIPS, AND THE DEVELOPMENT OF HIGH, MEDIUM, AND LOW RISK ASSESSMENTS OF GRAPE BERRY MOTH INFESTATION OF VINEYARDS, GROWERS CAN NOW CONTROL THE INSECT MORE EFFICIENTLY AND ECONOMICALLY THROUGH BETTER TIMING AND TARGETING OF SPRAYS."

MELVIN NASS, VENTURE VINEYARDS, LODI, NY

♦ Breeding plants for resistance to diseases, insects, and nematodes reduces the quantity of synthetic pesticide that is required to produce quality products and allows growers to bring a more cost-competitive product to market. Reduced pesticide use also assists in the protection of New York's natural resources.

♦ By studying the energy requirements for food processors, GENEVA saves New York companies money through energy conservation measures.

♦ By improving food processing operations and looking for unique by-products in food processor waste streams, GENEVA continues to identify ways for food companies to produce new products, reduce waste, and protect the environment.

♦ At GENEVA, researchers applied the concept of trickle irrigation, resulting in the production of grapes and apples in younger plantings, higher and more consistent yields in times of drought, and reduced nitrate leaching.

♦ Cultural methods developed at GENEVA, like the use of cover crops and crop rotation, prevent soil erosion, reduce soil compaction, recycle nutrients, suppress root diseases, and enhance soil tilth. These methods are critical in managing soil, which is a non-renewable resource, and maintaining New York's \$250 million vegetable industry.

♦ DEVELOPED PEST CONTROL DECISION RULES FOR GRUBS INFESTING RESIDENTIAL LAWNS TO MINIMIZE INSECTICIDE APPLICATIONS (NYROP AND VILLANI).

♦ DEVELOPED PHEROMONE MONITORING TRAPS FOR PESTS OF ORNAMENTALS AND GOLF COURSE TURF (ROELOFS AND VILLANI).

♦ DEVELOPED THE LEADING PEA BREEDING PROGRAM AND PROVIDED COMMERCIAL SEED COMPANIES WITH GERMLASM FOR LEAFLESS PEA VARIETIES AND VIRUS RESISTANCE (MARX).

♦ DISCOVERED THAT FEMALE ONION MAGGOT FLIES LOCATE SEEDS FOR EGG LAYING IN RESPONSE TO MICROORGANISMS—NOT IN RESPONSE TO THE SEEDS THEMSELVES (ECKENRODE).

ENSURING A Safe Food Supply

Continuing to ensure a safe food supply requires the establishment of good growing, harvesting, storage, and processing practices, and the development of technologies that rapidly, accurately, and quantitatively detect disease-causing and spoilage organisms in food. Horticulturists and food scientists at GENEVA specialize in the detection, elimination, and/or control of harmful food agents.

"AREAS IN FOOD SCIENCE INCLUDING IMPROVED PROCESSING TECHNOLOGIES, MICROBIAL SPOILAGE AND FOOD SAFETY AND FLAVOR AND QUALITY RETENTION WILL REMAIN KEY ISSUES AS WE HEAD INTO THE NEXT CENTURY. THE DEPARTMENT OF FOOD SCIENCE AT GENEVA HAS THE EXPERTISE AND FACILITIES TO ADDRESS SUCH ISSUES."

C.R. BINKLEY,
KNOUSE FOODS,
PEACH GLEN, PA

♦ Toxicologists at GENEVA have worked collaboratively with fruit and vegetable breeders to ensure that new varieties of fruits and vegetables are safe for consumption.

♦ Phytochemicals that are either beneficial or potentially detrimental to health are being identified in various fruits and vegetables by researchers at GENEVA who are then able to make recommendations to industry and consumers that improve health and longevity through diet, nutrition, and fortified food processes.

♦ Food scientists at GENEVA conduct research on heat-resistant molds in an effort to help New York food companies become more aware of spoilage organisms that cause significant loss of product annually.

♦ New York companies are implementing processing procedures and appropriate techniques and methods recommended by GENEVA that focus on microbes like *E.coli* to improve food safety.

♦ Hazard Analysis and Critical Control Point (HACCP) techniques studied at GENEVA are bringing a broader understanding of this safety approach to food across the entire food chain, from farm to fork.

♦ Highly sensitive and rapid methods of detecting chemical and microbial contaminants in food are being developed at GENEVA. Liposome-amplified immuno-analytical and DNA-probe technologies are being applied to food safety challenges.



♦ USE CHEMICAL, HISTOLOGICAL AND ANIMAL FACILITIES AT THE TOXICOLOGY LABORATORY TO TEST FOODS FOR ADDITIVES, ANTI-NUTRIENTS, AND NATURAL AND ENVIRONMENTAL TOXICANTS (STOEWAND).

♦ ESTABLISHED A FOOD VENTURE CENTER THAT HELPS FOOD PROCESSORS DEVELOP PROPER, LICENSED SCALE-UP PROCEDURES TO BRING NEW PRODUCTS TO MARKET (DOWNING).

♦ HELPED NEW YORK FARMERS GROW HIGH QUALITY FRUITS AND VEGETABLES WHILE REDUCING THE AMOUNT AND FREQUENCY OF PESTICIDE APPLICATIONS (IPM STAFF).

♦ DEVELOPED LIPOSOME IMMUNOMIGRATION ASSAY FOR RAPID SCREENING OF SAMPLES FOR TOXICANTS AND PESTICIDE RESIDUES (DURST).

ASSURING *High Quality Foods*

Consumers perceive different foods and food products according to taste, mouth-feel, and smell. Food scientists at GENEVA have developed modern analytical methods to define and improve quality in fresh, stored, and processed foods by quantifying factors that influence the composition, appearance, flavor, and texture of fruits and vegetables.

"THE FOOD PROCESSING INDUSTRY IS CRITICAL FOR SUCCESSFUL GROWTH OF NEW YORK STATE'S ECONOMY AND THE RESOURCES OFFERED BY THE FS&T DEPARTMENT [AT GENEVA] ARE PART OF WHAT WE DEPEND UPON TO REMAIN COMPETITIVE."

ROBERT J. DRAGO,
BISON CANNING CO.,
ANGOLA, NY

◆ GENEVA scientists develop new varieties of fruits and vegetables with improved characteristics that affect texture, appearance, size, flavor, storage, processability, and shelf-life. Improvements in disease and pest resistance assure higher quality foods to consumers in the marketplace.

◆ Flavor research at GENEVA has led to significant improvements in the quality of New York State food products. In particular, advances have been made that benefit the concentrate and essence recovery industry.

◆ The study of microorganisms used in the production of fermented foods leads to better quality, new products, and improved methods of production for New York State wineries, breweries, and food processors.

◆ Research and extension programs at GENEVA have helped improve the quality of wines made in wineries from Lake Erie to Long Island. New York is now the second largest wine producing state in the country; output is over 25 million gallons; gross sales are well over \$300 million annually.

◆ GENEVA researchers improve storage and packaging techniques for fresh, processed, and lightly-processed produce. This gives New York growers and processors more control over quality and price, better market share in national and international markets, and new ways to capitalize on the trend toward "fresh" and "lightly processed" foods.



◆ DEVELOPED A METHOD OF PREPARING CONSISTENTLY HIGH-QUALITY STARTER CULTURES USED IN THE FERMENTATION PROCESS TO HELP THE STATE'S WINE-MAKERS PRODUCE BETTER CHARDONNAY AND RED WINES (HENICK-KLING).

◆ DEVELOPED METHODS FOR MEASURING AND CONTROLLING TEXTURE IN PROCESSED FOODS WHICH HAVE LED TO INNOVATIONS THAT IMPROVE QUALITY IN TRADITIONAL PROCESSES OF FOODS LIKE CANNED VEGETABLES (BOURNE).

◆ RESEARCHERS AT GENEVA DEVELOPED AN ARTIFICIAL MOUTH WHICH ALLOWS SCIENTISTS TO STUDY HOW SALIVA AND CHEWING CHANGES FOOD FLAVORS (ACREE AND ROBERTS).

◆ DEVELOPED A MODEL OF HAZE FORMATION THAT ACCOUNTS FOR MANY OF THE DIFFERENCES BETWEEN WINE, BEER, APPLE JUICE, AND GRAPE JUICE (SIEBERT).

APPLYING *Biotechnology*

Biotechnology is a broad group of modern techniques for understanding the biology of all living organisms. Biotechnology techniques like tissue culture, molecular biology, and genetic engineering are used to improve crop plants and help New York State growers compete in domestic and global markets.

♦ GENEVA scientists use biotechnology to understand how desirable characteristics like appearance, flavor, texture, nutritional qualities, and resistance to diseases and insects are measured and controlled genetically at the molecular level.

♦ Biotechnology at GENEVA is used to improve fruit and vegetable varieties by adding favorable genes and interfering with deleterious genes.

♦ Biotechnology is being used to improve natural enemies of pests and diseases so that they can be used more effectively in agriculture, and to design very precise biochemicals that will affect pests and diseases with zero effect on humans or the environment.

♦ GENEVA has developed field assays for rapid screening of food and agricultural samples for pesticide residues and natural toxicants. This will help ensure a safer food supply when fully implemented.

♦ GENEVA is developing microbiological risk assessment techniques to detect and diagnose the presence of low levels of food-borne microorganisms. This contributes to safer food processing techniques and a safer food supply for all consumers.

"RESEARCH COLLABORATION
WITH CORNELL UNIVERSITY
SCIENTISTS AT THE GENEVA
STATION HAS RESULTED IN
SEVERAL PATENT APPLICATIONS
AND ANALYTICAL DEVICES WITH
POTENTIAL APPLICATION TO
MEDICAL DIAGNOSTICS,
ENVIRONMENTAL MONITORING,
AND FOOD SAFETY."

RICHARD A. MONTAGNA,
INNOVATIVE
BIOTECHNOLOGIES, INC.,
NIAGARA FALLS, NY

♦ Biotechnology is used by GENEVA scientists to understand and control the biochemistry of plants and food processes in order to improve texture, storability, and flavor.

♦ Biotechnology techniques (monoclonal antibodies and DNA analyses) developed at GENEVA are being used to diagnose diseases and to accurately identify fruit varieties.



♦ IDENTIFIED THE GENE RESPONSIBLE FOR KNOCKDOWN RESISTANCE TO PYRETHROID INSECTICIDES (SODERLUND AND KNIPPLE).

♦ CHARACTERIZED THE BIOSYNTHESIS OF THE RASPBERRY KETONE, A KEY AROMA CONSTITUENT OF RASPBERRIES (HRAZDINA).

♦ DEVELOPED FREEDOM II SUMMER SQUASH IN CONJUNCTION WITH ASGROW. FREEDOM II IS THE FIRST VIRUS RESISTANT TRANSGENIC FOOD PLANT TO BE APPROVED BY FEDERAL AUTHORITIES (GONSALVES).

♦ A GENE TRANSFERRED TO AN APPLE ROOTSTOCK HAS INCREASED ITS RESISTANCE TO THE FIRE BLIGHT DISEASE (ALDWINCKLE, CUMMINS).

DEVELOPING *Value-Added Products and Processes*

GENEVA's competency in agricultural sciences

is a fountain of innovative technologies. GENEVA continues to provide business development opportunities in New York, in the United States, and around the world. In particular, GENEVA excels in the development of apple rootstocks, biorational pest control systems, viral resistant genes and transgenic plants, pheromone chemistry, fungal control systems, new fruit varieties, plant breeding tools, and new seed technologies.

"THE FOOD VENTURE CENTER
[AT GENEVA] WAS
EXTRAORDINARILY HELPFUL IN
GUIDING US IN THE PROPER
NOTATION OF OUR VINEGAR
PROCESS SO WE COULD GAIN
LICENSED APPROVAL FROM AG
AND MARKETS. IT IS AN
INCREDIBLE RESOURCE. WHEN THE
FDA CAME IN TO INSPECT A WEEK
AFTER WE WERE LICENSED, THEY
TOLD US WE EXCEEDED ALL
REQUIREMENTS FOR
COMMERCIAL PRODUCTION."

J. ALLEN STROTHER,
VICE PRESIDENT
ARGUS COMMUNITY'S NEW LEAF
PROGRAM, SOUTH BRONX, NY

◆ Since 1988, GENEVA's Food Venture Center has responded to more than 1,700 requests from companies throughout New York. The FVC helps new companies get started, helps established companies scale up and develop new products and processes, and helps them all navigate state and federal regulations.

◆ Synthetic sex pheromones developed at GENEVA are now being produced commercially and sold by agricultural distributors for environmentally safe pest control.

◆ Research into new methods and new technologies for beverage processing has led to new products in New York, such as ultrafiltered mead and fruit wines.

◆ IPM has created new opportunities for crop managers and pest monitors and scouts who are in demand by agricultural producers. In the past year, 657 consultants were taught IPM principles and practices in the Northeast.

◆ A technique developed at GENEVA for the identification of flavor-causing chemicals in foods has allowed New York companies to improve their products.

◆ Research in pest management has resulted in the development of many new products in the past decade, including weather monitors, beneficial microbes that control plant

diseases, pest forecasting software, pheromone twist ties, insect-trapping devices, and beneficial insects for controlling leafrollers, mites, and corn borers. New products mean new businesses and new jobs for New York.

◆ Researchers in GENEVA have helped launch many packaging innovations, including a fruit juice container that resists shrinkage during hot-fill operations.

◆ Scientists at GENEVA have determined the thresholds of key weather parameters and used this to develop software packages for commercial, disease-warning computers used to predict diseases of apple and grape.



◆ PRODUCED HIGHLY EFFECTIVE STRAINS OF *TRICHODERMA FUNGI*—THE FIRST BROAD-SPECTRUM BIO-CONTROL PRODUCT AVAILABLE FOR USE ON NUMEROUS CROPS (HARMAN).

◆ HONEY HELPS ENSURE COLOR AND FLAVOR OF FRUIT PRODUCTS. ITS USE IN FOOD PROCESSING WAS DISCOVERED AND DEVELOPED AT GENEVA (KIME, LEE, AND MCLELLAN).

◆ DEVELOPED THE SHERRY BAKING PROCESS FOR USE IN THE WINE INDUSTRY (TRESSLER).

◆ USED MOLDS TO FERMENT AND CREATE NEW FOODS, INCLUDING TEMPEH AND ONTJOM, WHICH ARE IMPORTANT ON THE INTERNATIONAL MARKET (STEINKRAUS).

SERVING *New Yorkers*

GENEVA offers testing services to a variety of clients.

Processing, analysis, experimental design, testing, and other analytical services are offered on a for-fee basis. GENEVA provides unbiased analysis of New York's food processes, foodstuffs, pesticides, seeds, and wines. These services complement Cornell Cooperative Extension. They ensure safe, high quality foods, safeguard the environment, and protect consumers' interests.

"AS A RESULT OF THE ADVICE
I HAVE RECEIVED [FROM GENEVA]
TO HELP IDENTIFY THE CAUSE OF
THE QUALITY DEFECT WE HAVE HAD
WITH APPLE JUICE, I HAVE BEEN ABLE
TO REDIRECT MY EFFORTS TO
PREVENT THIS PROBLEM FROM
RECURRING AT A POTENTIAL
SAVINGS OF \$40,000 PER YEAR."
DAVE MOORE, INDIAN SUMMER,
MEDINA, NY

- ♦ The New York State Seed Testing Laboratory prevents crop losses by providing unbiased purity and germination testing of seed lots and designing specialty tests for many New York State growers.
- ♦ The Rheological Testing Laboratory provides quantitative answers to many questions on the behavior and structure of food suspensions, food emulsions, gels, and liquids.
- ♦ The Sensory Analysis Laboratory provides taste-testing services and aroma analysis for fruit and vegetable products.



- ♦ The Wine Analysis Laboratory provides technical assistance and quality assurance for the New York State wine industry. Analysis for more than 25 components are offered.

- ♦ Communications Services distributes information by publishing bulletins, proceedings of major agricultural conferences, manuals, the *New York Fruit Quarterly*,

Scaffolds, and *Grape Research News*; creating teaching videos; and maintaining extensive insect, disease, and plant slide sets.

- ♦ The GENEVA Library's journals, books, and on-line information services are open to the public for research. A bulletin and resource room is also open to the public.

- ♦ The Food Processing Pilot Plant is used by companies on a contractual or grant basis to document various fruit and vegetable processing operations according to Good Laboratory Practices as required by various state and federal regulators.

- ♦ The IR-4 Northeast Regional Laboratory at GENEVA, which is federally funded, is operated as part of the Cornell Analytical Chemistry Laboratories to assist in the registration of minor-use pesticides.

- ♦ GENEVA serves as the quarantine entry point for grape varieties from abroad to ensure that no alien viruses are introduced into New York and the U.S. At the recently established Research and Evaluation Quarantine Block, imported varieties will be evaluated for usefulness in the U.S. before costly procedures to diagnose and eliminate viruses are applied.

♦ THE FLAVOR CHEMISTRY LABORATORY USES CHARMANALYSIS, A GAS CHROMATOGRAPHY-OLFACTOMETRY SYSTEM, TO MEASURE ODOR ACTIVITY IN FOODS AND BEVERAGES FOR FOOD PROCESSING COMPANIES (ACREE).

♦ CHEMICAL AND MICROBIOLOGICAL ANALYSES ARE PERFORMED IN MODERN RESEARCH AND ANALYTICAL FACILITIES TO HELP FOOD VENTURE START-UPS DEVELOP NEW PRODUCTS AND MARKETS (FOOD VENTURE CENTER).

♦ GENEVA ESTABLISHED A WINE RESEARCH AND EXTENSION PROGRAM AND WINE ANALYSIS LAB TO HELP 87 NEW YORK WINERIES GET ESTABLISHED AFTER PASSAGE OF THE 1976 FARM WINERY ACT (HENICK-KLING ET AL).

♦ TO ENSURE THE QUALITY OF AGRICULTURAL PRODUCTS FOR NEW YORK GROWERS, GENEVA ESTABLISHED A SEED TESTING LAB, AS WELL AS A CHEMICAL ANALYSIS LABORATORY TO EVALUATE THE QUALITY OF FERTILIZERS, FEEDS, SOILS, MILK, AND WATER.

REACHING *Out*

At GENEVA, research results are applied in conjunction with Cornell

Cooperative Extension, and in partnership with growers and processors in fields, orchards, vineyards, and processing plants. Scientists educate consumers, schoolchildren, and local community groups as well as industry. In today's Information Age, GENEVA is on-line. Outreach education is the bread and butter of the GENEVA mission.

Short Courses

- ♦ NYS Wine Industry Workshops
- ♦ Better Process Control Schools
- ♦ Juice Technology Workshops
- ♦ Processed Apple Products Workshops

Field Days

- ♦ The GENEVA Tree Fruit Field Day is attended by growers from New York as well as the Northeast, the Midwest, and Canada.
- ♦ Annual in-depth Fruit Schools and Vegetable Variety Trials demonstrate the recent advances in production technology. They are attended by growers, extension agents, industry representatives, and field staff.

Demonstration Plantings

- ♦ Apple, grape, small fruit, and vegetable plantings are maintained at commercial sites throughout the state as well as at GENEVA and the Highland and Fredonia branch stations.

Distance Learning

- ♦ GENEVA's World Wide Web site is used by growers, researchers, and consumers to access timely information quickly. The on-line address is <<http://www.nysaes.cornell.edu>>
- ♦ GENEVA is a regional conference and video site used by many outside agricultural groups for regional meetings.

"WE CAN'T AFFORD TO
EXPERIMENT WITH
TECHNOLOGY THAT HAS ALREADY
BEEN DISCARDED SOMEWHERE
ELSE. WE NEED GENEVA TO GIVE
US THE LATEST INFORMATION
ABOUT NEW VARIETIES, CULTURAL
PRACTICES, AND ECONOMIC
ANALYSIS FROM CONTACTS THEY
HAVE DEVELOPED REGIONALLY,
NATIONALLY, EVEN INTERNATION-
ALLY. THAT INFORMATION
USUALLY COMES THROUGH
EXTENSION STAFF."

JIM BITTNER
SINGER FARMS, APPLETON, NY

Education

- ♦ Over 90 graduate students pursue advanced degrees with GENEVA faculty.
- ♦ GENEVA scientists collaborate regularly with visiting scientists.
- ♦ Howard Hughes Scholars from local colleges intern in laboratories at GENEVA.
- ♦ Researchers from GENEVA enrich science classes at local schools on a volunteer basis.
- ♦ GENEVA scientists participate in professional conferences on an international, national, regional, and state basis to share findings and keep informed of new research.
- ♦ GENEVA researchers participate in agricultural events like Empire Farm Days, the NYS Horticultural Show, the NYS Vegetable Conference, the NYS Fair, annual fruit and vegetable meetings, and local civic events.



♦ FACULTY WORK WITH GROWERS AND PROCESSORS AND PARTICIPATE IN TRAINING PROGRAMS AROUND THE STATE TO HELP IMPROVE THE WAYS FRUITS AND VEGETABLES ARE GROWN AND PROCESSED.

♦ GENEVA DEVELOPS KNOWLEDGE AND TECHNOLOGIES THROUGH RESEARCH AND DEVELOPMENT, AND SPREADS THAT KNOWLEDGE WITH PUBLICATIONS, VIDEOS, SEMINARS, FIELD DAYS, AND TOURS.

♦ DEMONSTRATION PLOTS ARE CONDUCTED AT 25 SITES AROUND THE STATE TO HELP APPLE GROWERS LEARN MORE EFFICIENT CULTIVATION PRACTICES (ROBINSON).

♦ ON-THE-FARM DEMONSTRATIONS TO NEW YORK STATE ONION PRODUCERS HELPED THEM REDUCE FUNGICIDE APPLICATIONS BY 44% AND INSECTICIDE APPLICATIONS BY 33% ANNUALLY (CORNELL COOPERATIVE EXTENSION AND IPM STAFF).

FOSTERING *Economic Development*

GENEVA is an economic development engine for agribusinesses.

GENEVA's unique core competence is based on science. Technology developed at GENEVA is actively transferred to the private sector for commercial development in collaboration with the Cornell Research Foundation (CRF).

"GENEVA IS A UNIQUE,
WORLD-CLASS RESOURCE
BECAUSE IT HAS PRODUCED
AND WILL CONTINUE TO
PRODUCE INNOVATIONS THAT
ARE THE SEED CORN OF
BUSINESS DEVELOPMENT."

RICHARD S. CAHOON,
CORNELL RESEARCH
FOUNDATION

New Technologies Create New Products

- ♦ Gene Gun
- ♦ Transgenic squash
- ♦ CharmAnalysis™
- ♦ The "artificial mouth"
- ♦ Honey-derived products
- ♦ Biocontrol methods

Since 1990, 172 distinct GENEVA discoveries or inventions have become the focus of GENEVA patents that have business development potential. Income generated by the patents from technologies developed at GENEVA is returned to Cornell, the Experiment Station, and the inventor. Commercialization is actively pursued to produce jobs, new products, new ventures, and generate royalties.

Technology Transfer

- ♦ Cornell Cooperative Extension
- ♦ Food Venture Center

Commercial Licensees and Start-Ups

- ♦ TGT Inc.
- ♦ Innovative Biotechnologies Inc.
- ♦ Sanford Scientific Inc.
- ♦ DATU Inc.
- ♦ Cummins Nursery

Commercial Development Projects with International Collaborators

- ♦ Papaya transformation
- ♦ Coffee plant transformation
- ♦ Chili pepper transformation



RECENT LICENSEES OF STATION TECHNOLOGY

ALLEN PLANT CO.
AMBERG'S NURSERY
AMES ORCHARD
ANFIC
APPLEWOOD ORCHARDS
ARNESON NURSERY
ASGROW
BAILEY NURSERIES
BARHAM SEEDS

BAYER NURSERIES
BOYERS NURSERY
BRITTINGHAM FARMS
BUCKLEY NURSERY
BUTLER
NURSERY
C&O NURSERY
CAHOON FARMS
CONGDON & WALLER

CUMMINS NURSERY
DAISY FARMS
COOLEY FARMS
DATU INC.
DOWELANCO
DUPONT
ECOGEN
EMPIRE NURSERY
FLEMINGS NURSERY

FOUR MILE NURSERY
FOWLER BROS.
HARRIS MORAN
HILLTOP NURSERIES
INNOVATIVE BIOTECH-
NOLOGIES INC.
KROHNE FARMS
LAKEWOOD VINEYARDS
LEWIS NURSERY

MARTIN FARMS
MAYER BROS.
MCGRATH/WAIMEA NURSERY
MEADOW LAKE NURSERY
NORCAL NURSERY
NOURSE FARMS
PROTREE
SAPO
SANFORD SCIENTIFIC INC.

STARK BROS.
STIMSON LANE
TGT INC.
TRECO, INC.
U.S. TOBACCO
VAN WELL NURSERY
VINIFERA
WAFER FARMS
ZANZI VIVAI

QUALITY PEOPLE *Generate Quality Results*

Providing answers to today's complex problems in agribusiness requires the efforts of highly creative individuals and multi-disciplinary teams. History records the names of those who make "break-throughs," and GENEVA has had its share. More often, scientists make a series of valuable, incremental contributions during long careers. Facilities, staff, and access to new technologies are crucial in fostering new ideas.

For progress to be steady and cumulative, support must be consistent.

"IT IS A PLEASURE TO PRESENT THE WOLF FOUNDATION PRIZE TO PROFESSOR ROELOFS FOR HIS OUTSTANDING CONTRIBUTIONS TO FUNDAMENTAL KNOWLEDGE OF INSECT PHEROMONES AND THEIR POTENTIAL VALUE IN CONTROLLING PEST INSECTS."

CHAIM HERZOG,

PRESIDENT OF THE STATE OF ISRAEL, 1982

Wendell Roelofs pioneered



discoveries about sex attractants from more than 100 insect pests.

Use of these attractants is one of the founding principles of Integrated Pest Management. Roelofs has been awarded the Wolf Prize, the National Medal of Science, and been inducted into the National Academy of Sciences.

Helene Dillard's appoint-



ment at GENEVA is 50% extension and 50% research with emphasis on

biology, ecology, and control of fungal and bacterial pathogens of vegetables. She received a special citation from the New York Assoc. of County Agricultural Agents as well as the 1992 Extension Award from the American Phytopathological Society.

Roger Way, Robert Lamb, Susan Brown, and others in



GENEVA's apple breeding program have developed and released many outstanding

New York cultivars, including Empire, Jonagold, Jonamac, and Fortune apples. Jonagold and Empire received the prestigious Outstanding Fruit Cultivar Award from the American Society for Horticulture Sciences.

John Sanford developed



the gene gun, a technology that streamlines traditional plant breeding by injecting

genes into plant tissues. The technique has revolutionized genetic engineering in many fields throughout the world.

Jim Cummins and Herb Aldwinckle have developed



many notable apple rootstocks to be used in orchards in New York, the nation, and around the world. For his work, Cummins received the Wilder Silver Medal from the



American Pomological Society in 1994.

Andy Rao is a world-class



Food Engineer who specializes in the physical properties of foods. He was

awarded two Fulbright-Hayes Senior Scholar Awards for his significant contributions to science.

Tony Shelton was the



recipient of the National Entomology Society of America award for

Excellence in Integrated Pest Management in North America in 1995.

Malcolm Bourne is world-



renowned for his expertise in food texture and post-harvest technology. He

received the Institute of Food Technologists International Award in recognition for his international efforts in food science.

Up & Coming: Graduate students at GENEVA consistently win awards for research papers, posters and scholarship. They compete on a national and international level with their peers.

GENEVA Means Business

Future Challenges and Opportunities

SINCE 1882, **GENEVA** HAS CONTRIBUTED TO THE ECONOMIC VITALITY OF NEW YORK ♦ **GENEVA'S** CORE COMPETENCE IN THE VARIOUS SCIENCES OF FOOD AND AGRICULTURE CONTINUES TO BE AN EXTREMELY VALUABLE PLATFORM FROM WHICH TO LAUNCH FUTURE STRATEGIC INITIATIVES ♦ CHALLENGES AND OPPORTUNITIES ARISE DAILY AND THESE PROVIDE THE BASIS FOR NEW PRODUCTS, NEW VENTURES, AND NEW JOBS. **GENEVA** HELPS:

Improve Crop Varieties

Develop better apple varieties and rootstocks for New York ♦ Develop grape varieties and rootstocks adapted to New York conditions ♦ Support development of the farm winery industry ♦ Strengthen the New York strawberry and raspberry industry ♦ Improve onion and crucifer varieties ♦ Diversify orchard business for New York.

Grow Crops Competitively

Apply practical tools to seed science ♦ Develop and demonstrate improved apple cultivation systems ♦ Improve the efficiency of producing grapes.

Grow Healthy Crops/Maintain a Healthy Environment

Identify new control technologies for plant pests ♦ Develop molecular tools to assess insect resistance ♦ Develop control procedures for new diseases ♦ Develop methods for growers to make pest management decisions ♦ Prevent or delay microbial resistance to approved chemicals ♦ Address need for new control agents ♦ Develop techniques to produce disease-free planting material ♦ Develop biological controls for certain diseases and insects.

Apply Biotechnology

Identify novel gene products to control pests ♦ Transfer genes to improve quality of fruits and vegetables ♦ Prevent softening of apple by inhibiting gene expression ♦ Enhance methods to assure food safety ♦ Enhance enzyme-based food processing technologies ♦ Develop improved separation and purification technologies.



Assure High Quality Foods

Develop minimal process technologies for fruit products ♦ Improve separation systems for juice products ♦ Develop low-sugar edible gels ♦ Better understand and control haze formation in beverages ♦ Understand how granule size affects starch thickening properties ♦ Increase quality of harvested produce by improving pest control and growing systems.

Ensure a Safe Food Supply

Solve problem of unique heat-resistant microorganisms found in fruit juices ♦ Develop rapid assay for detecting pesticides and drugs in food ♦ Establish microbiological risk assessment techniques ♦ Reduce use of chemical pesticides in fruit and vegetable production.

Develop Value-Added Products & Processes

Develop new processes to produce firm-textured processed vegetables ♦ Help New York State winemakers produce unique wines ♦ Reduce waste material resulting from processing plant-based foods.

Increase Businesses and Markets

Expand and diversify domestic and global markets for New York State produce ♦ Meet multi-cultural demands for new produce and manufactured foods ♦ Expand small food processor market share ♦ Encourage vertical integration of farm-processing operations for greater economic stability ♦ Assist companies with start-ups and development of new products, services, and technologies.





A brief history

The Agricultural Experiment Station in Geneva was established by an act of the New York State Legislature in 1880 "to promote agriculture in New York through scientific investigations." The doors were officially opened on March 1, 1882, under Director E. Lewis Sturtevant.

In its early days, GENEVA researchers concentrated their efforts on dairy, horticulture, and the evaluation of varieties of vegetables and field crops. The program was broadened to include work on beef cattle, swine, and evaluation of fruit varieties. Still later, activities were added in the fields of bacteriology, dairy science, fruit horticulture and chemistry. In 1923, the Station became part of Cornell University's College of Agriculture. At the end of World War II, all research on animals was moved to Ithaca, and GENEVA became essentially a horticultural and food science research institute.

Today, the Station is recognized around the world for horticultural research conducted in the four departments of Horticultural Sciences, Entomology, Plant Pathology, and Food Science and Technology. Important collaboration occurs between GENEVA and the New York State Integrated Pest Management Program (IPM) and the USDA-ARS Plant Genetic Resources Unit whose operations are housed on the GENEVA campus. There are two outlying branch stations: Highland concentrates on tree fruits and sweet corn, and Fredonia specializes in grapes. Overall, research and extension activities are conducted on more than 100 different projects on 800 acres of land by 48 faculty members, 90 graduate students, and 230 staff. These activities benefit all New York citizens from eastern Long Island to the New York-Pennsylvania border west of Buffalo.

FOR MORE Information



<http://www.nysaes.cornell.edu>

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ASGROW
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 BARHAM SEEDS
 BAYER NURSERIES
 BRITTINGHAM FARMS
 BUCKLEY NURSERY
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 CONGDON & WALLER
 COOLEY FARMS
 DAISY FARMS
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