

### **The Cover**

**On this year's cover is Professor Larry K. Jackson and students in a citrus culture class at the University of Florida, Gainesville 32611.**

**At the suggestion of the Editor, approval by the Board, the cover of the proceedings this year has been redesigned in color and is carrying a key message. This is more expensive than the standard cover in the past. Is the idea worth continuing? If so, is there a chance someone in industry would be willing to sponsor this type cover, with due credit, in 1990? If interested, please contact the Editor (904-392-1753). (This cover is courtesy of the Editor.)**

PROCEEDINGS  
OF THE  
ONE HUNDRED FIRST ANNUAL MEETING  
of the  
**FLORIDA STATE  
HORTICULTURAL SOCIETY**

Library of Congress Catalogue No. 9-1702\*\*

held at  
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November 1-3, 1988

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# *Proceedings* of the **FLORIDA STATE** *Horticultural Society* **1988**

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# AWARDS OF THE SOCIETY

## Presidential Gold Medal Award

### W. B. Sherman

Award granted to W. B. Sherman, University of Florida, Gainesville, for having contributed most to Florida horticulture through work published in the Proceedings of the Florida State Horticultural Society over the preceding six-year period in the Krome Section.



## Awards for Outstanding Papers

Awards for outstanding papers in Volume 100 of the Proceedings of the Florida State Horticultural Society presented at the annual meeting of the Society (November 2, 1988) by President T. T. Hatton.

#### *Citrus Section*

E. A. Graser, and L. H. Allen, Jr., "Water Management for Citrus Production in the Florida Flatwoods."

#### *Garden and Landscape Section*

Derek Burch, E. W. Demmy, and H. Donselman, "Gingers for Florida Gardens."

#### *Handling and Processing Section*

B. S. Buslig, C. J. Wagner, Jr., and R. E. Berry, "A General Purpose Tristimulus Colorimeter for the Measurement of Orange Juice Color."

Since 1892, one of the major roles of the Society has been providing, through its Proceedings, a medium for disseminating new and needed information among Florida horticulturists. Because Florida horticulture is often so different from that of the rest of the country, the Proceedings

#### *Krome Memorial Section*

C. A. Campbell, D. J. Huber and K. E. Koch, "Postharvest Response of Carambolas to Storage at Low Temperatures"

#### *Ornamental Section*

M. E. Kane, T. J. Sheehan and N. L. Philman, "A Micropropagation Protocol Using Fraser Photinia for Mutation Induction and New Cultivar Selection."

#### *Vegetable Section*

W. M. Stall, S. R. Kostewicz, and R. L. Brown, "Reduction in the Control of Common Nightshade (*Solanum Americanum*) by Paraquat Due to Copper Fungicides."

#### *President's Industry Award*

W. I. Wenda and J. L. Kelly, "Bridging the Technology Gap Between Research and Fresh Citrus Packing."

#### *Council Memorial Tomato Research Award*

J. W. Scott, R. B. Volin, H. H. Bryan and S. M. Olson, "Use of Hybrids to Develop Heat Tolerant Tomato Cultivars."

often provide the only workable channel for such information. In 1968, the Presidential Gold Medal Award was instituted to honor authors notable for continued and useful contributions to these Proceedings. Since then, gold medal winners have been:

R. C. J. Koo	W. Grierson	C. A. Conover	J. F. Morton	W. S. Castle	J. F. Price
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J. R. Orsenigo	T. W. Young	J. O. Whiteside	C. A. Conover	R. M. Craig	A. G. Smajstrla
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## Presidents of the Florida State Horticultural Society from 1888 to Present

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1952	Frank L. Holland	1970	F. E. Gardner	1988	T. T. Hatton

## HONORARY MEMBERS\*

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Beckenbach, J. R.	1967	Henrickson, H. C.	1939	Reed, R. R.	1970
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Berger, E. W.	1940	Holland, Spessard L.	1945	Reitz, J. Wayne	1955
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Blackmon, G. H.	1964	Holt, R. D.	1914	Rolfs, P. H.	1921
Bosanquet, L. P.	1924	Hubbard, E. S.	1922	Rolfs, Mrs. P. H.	1921
Brown, Arthur C.	1952	Hume, H. Harold	1927	Ruehle, George D.	1958
Burgis, Donald S.	1980	Jamison, F. S.	1962	Sharpe, Ralph H.	1974
Camp, A. F.	1956	Johnson, Warren O.	1965	Shaw, Miss Eleanor G.	1927
Campbell, C. W.	1988	Koo, R. C. J.	1978	Showalter, Robert K.	1984
Carlton, R. A.	1962	Krezdorn, A. H.	1979	Singleton, Gary	1962
Chase, J. C.	1939	Krome, William H.	1973	Skinner, L. B.	1931
Chase, S. O.	1939	Krome, William J.	1927	Sloan, G. Dexter	1964
Clayton, H. G.	1956	Krome, Mrs. Isabelle B.	1960	Smith, Paul F.	1972
Colburn, Burt	1970	Lawrence, Fred P.	1973	Smoot, John J.	1986
Commander, C. C.	1952	Lipsey, L. W.	1924	Spencer, E. L.	1962
Cooper, W. C.	1981	Logan, J. H.	1965	Steffani, C. H.	1958
Dickey, R. D.	1968	Lynch, S. John	1975	Stevens, H. B.	1934
Edsal, R. S.	1967	MacDowell, Louis G.	1968	Swingle, W. T.	1941
Everett, Paul H.	1986	Magie, Robert O.	1977	Taber, George L.	1914
Fairchild, David	1922	Mathias, A. F.	1972	Tait, W. L.	1962
Fifield, Willard M.	1955	Mayo, Nathan	1940	Talbott, George M.	1980
Flagler, H. M.	1903	McCornack, A. A.	1986	Tenny, Lloyd S.	1956
Floyd, Bayard F.	1944	Menninger, Edwin A.	1964	Thompson, Ralph P.	1962
Floyd, W. L.	1939	Miller, Leon W.	1972	Thompson, W. L.	1962
Ford, Harry	1985	Miller, Ralph L.	1972	Thullbery, Howard A.	1962
Forsee, W. T., Jr.	1973	Montelaro, James	1985	Veldhuis, M. K.	1972
Gaitskill, S. H.	1909	Mounts, M. V.	1958	Ward, W. F.	1962
Gardner, Frank E.	1967	Mowry, Harold	1950	Webber, H. J.	1941
Garrett, Charles A.	1957	Murdock, Del I.	1984	Wedgworth, Ruth S.	1965
Goldweber, Seymour	1984	Newell, Wilmon	1940	Wenzel, F. W.	1973
Grierson, William	1979	Norman, Gerald G.	1967	Wilson, Lorenzo A.	1934
Guzman, Victor L.	1987	Norris, Robert E.	1962	Wiltbank, William J.	1987
Harding, Paul L.	1968	O'Byrne, Frank M.	1962	Winston, J. R.	1960
Hart, W. S.	1909	Overman, A. J.	1988	Wolfe, H. S.	1964
Hastings, H. G.	1939	Painter, E. O.	1909	Young, T. W.	1978
Hatton, Thurman T.	1987	Peterson, J. Hardin	1950	Yothers, W. W.	1955
Hayden, Mrs. Florence P.	1934	Pratt, J. B.	1980	Ziegler, L. W.	1976

\*Date year award made.

## AWARD OF HONORARY MEMBERSHIP



**Mrs. A. J. Overman**

Professor Amegda J. Overman, a native of Florida, was born and raised in Tampa. After graduating from Plant High, she entered the University of Tampa and received her B.S. degree in 1942. She was awarded a M.S. degree from the University of Florida in 1951. Mrs. Overman started at the Gulf Coast Research and Education Center

as a laboratory technician in 1945. She was promoted to an Assistant in Soil Chemistry in 1951, an Assistant Professor in 1956, an Associate Professor in 1968, and to Professor of Nematology in 1973.

Professor Overman is an author of 217 publications, 58 published in the Proceedings of the Florida State Horticulture Society. Six have been winners of Best Paper Awards in two sections, Ornamentals and Vegetables. She has received many other awards and honors, including the Council Memorial Tomato Research Award twice, the Soil and Crop Science Society of Florida Outstanding Paper Award, the National Agricultural Plastic Assn. Best Paper Award, The Society of Nematology Ciba-Geigy Award, the Organization of Tropical American Nematologists (OTAN) Presidential Award, the Florida Ornamental Growers Association Award, and the Florida Fruit and Vegetable Assn. Research Award. Professor Overman has served the Florida State Horticulture Society as the Ornamental Section Vice-President and as a member of the Public Relations Committee. She also has served as President of OTAN and of the Soil and Crop Science Society of Florida.

Professor Overman co-authored the first paper in Florida on lawn nematode control and the first paper on the use of *Trichoderma* for the ecological management of soil-borne pathogens. Mrs. Overman was instrumental in the development of a low cost soil pH-fertilizer-contact nematicide system for vegetable and ornamental production which is used extensively in nondeveloped countries. Her research was an essential component for the development of the plastic mulch-fumigation-high analysis fertilizer system used in Florida and throughout the world for vegetable and ornamental crop production. She helped develop a multicrop system that permitted the first economic production of corn and sorghum silage in Florida and the Tropics. Mrs. Overman provided the leadership in the early development of trickle irrigation systems and she developed the technology to permit the application of pesticides through these irrigation systems.

Professor Overman has spent over 40 years successfully solving major nematode-related, crop production problems and in keeping nematode management systems abreast of cultural changes. It is fitting that she should be elected an Honorary Member of the Florida State Horticulture Society.

## AWARD OF HONORARY MEMBERSHIP



**Carl W. Campbell**

Dr. Carl W. Campbell, Professor (Horticulturist), University of Florida, Fruit Crops Department, Tropical Research and Education Center, Homestead, was born and reared in Illinois. He received the A.A. degree at Black-

burn College, the B.S. Ed. at Illinois State University, the M.S. at Kansas State University, and the Ph.D. at Purdue University. He is married to Beverly "Becky" and they have 5 children.

Carl came to Florida in 1957 as Research Plant Physiologist on post harvest physiology studies of tropical fruits with the USDA in Miami. He changed employment to the Tropical Fruit Research and Education Station in 1960 as a tropical fruit scientist until his retirement in 1988. He still remains in his office there as Professor Emeritis.

Carl has a long history of service to Florida horticulture. While at Homestead he has conducted research on introduction of new tropical fruits, selection of superior cultivars adapted to local environments, methods of propagation for commercial production, plant water and nutritional requirements, methods of pruning and tree care, and commercial production systems for tropical fruits. He has also been involved as an extension specialist since 1980, training county agents, commercial growers and home gardeners in production of tropical fruits. He has been active in professional regional, national and international horticultural societies and is an internationally recognized authority on tropical fruit production. He has traveled abroad as a lecturer, and a consultant on tropical fruits in over 20 countries and is continuing in this capacity. He has been active in community service activities such as Dade County AgriCouncil, Florida and National Audubon Societies, Florida Native Plant Society, Nature Conservancy and the Rare Fruit Council International.

Carl Campbell has a long history of service to the Florida State Horticultural Society. He has been an active member since 1957, publishing over 50 papers in the Proceedings, served on numerous committees, was Vice President Krome Section in 1963, received the Presidential Gold Medal in 1982 and served as President in 1984.

In view of his meritorious service to Florida horticulture, to the Florida State Horticultural Society, to mankind, and to his horticulturally oriented and supporting family, it is fitting to honor him with Honorary Membership. Dr. Carl W. Campbell is a scholar, a gentleman, and a servant.



**T. T. HATTON, JR.**  
**Orlando**  
PRESIDENT OF THE SOCIETY—1988

## PRESIDENTIAL ADDRESS

T. T. HATTON, JR.  
U. S. Department of Agriculture, ARS  
Horticultural Research Laboratory  
Orlando, FL 32803

Fellow members and guests: welcome to the 101st Annual Meeting of the Florida State Horticultural Society.

Many of you know that our Society is not only the oldest continuous state horticultural society in the nation, but its membership is by far the largest. At the present, we have a membership of approximately 1,800. In my foreign travels, I am always proud to see our Proceedings in various libraries as well as the offices of scientists. For Volume 100, which is the latest Proceedings, over 50 colleges and libraries were subscribers. There were also 138 foreign subscribers representing 42 different countries. This is most gratifying and complimentary of your efforts, which are recognized worldwide.

Now I would like to give you a few current production figures concerning three \$1 billion horticultural industries in Florida: fruit, vegetable and ornamental. Some emphasis will be made on postharvest aspects of these industries.

Florida ranks first in the production of citrus fruits in the U.S., accounting for 66% of the oranges and 80% of the grapefruit. The greatest postharvest processing impact came shortly after World War II when citrus concentrate became a reality. Today, the Florida citrus-processing industry is enormous, using 92% of the oranges and 60% of the grapefruit produced in Florida. The wholesale value of Florida citrus products exceeds \$3 billion.

The annual value of processed citrus product exports amount to more than \$100 million. The value of fresh grapefruit exports also amounts to more than \$100 million. These exports are especially important today as they increase the U.S. balance of payments and help to reduce the U.S. international trade debt.

Fresh Florida citrus fruits, like most horticultural commodities, undergo a number of postharvest treatments that add value to the products being marketed. Ethylene is used to degreen early fruit, fungicides are effectively employed to reduce decay, and wax is applied to replace natural wax removed during washing of the fruit. Handling in the packinghouse, including packaging, is an added cost. Quarantine treatments are often used for export. Transportation and refrigeration continue throughout the distribution system, until ultimately the fruit reaches the consumer. All of these steps add value to the initial product.

The unique tropical fruit industry of South Florida is becoming increasingly more important. We lead the nation in the production of mangos and 'Tahiti' limes and we are second in avocado production. Avocados are worth \$10, limes \$20, and mangos \$4.5 million on 11,300, 7,200, and 2,700 acres, respectively. In the case of avocados and mangos, cultivars have been selected over the years that are not only adapted to south Florida but have special quality and production traits for commercial use elsewhere. Many of these cultivars have been planted and adapted throughout the tropical world.

Recently, exotic kinds of tropical fruits, such as carambola, atemoya and mamey sapote, have become popular and are being shipped to distant markets. Although these

fruits have been planted as backyard trees for years, a sudden commercial expansion is taking place due to the influx of more immigrants into South Florida who are heavy consumers of these fruits, as well as the rising sophisticated market in the U.S. Combined acreage of these fruits, including papayas and lychees, is 1,200 acres with a value of \$5.5 million. Remember, the banana was not known to U.S. markets until its introduction at the St. Louis World's Fair around the turn of the century.

Successful mechanical harvesting operations have resulted in a dramatic expansion of pecan and blueberry acreage in northern Florida. Over 15,000 acres of pecans and 1,200 acres of blueberries are worth \$6 and \$4 million, respectively. Florida also has 12,000 acres of grapes worth \$2 million annually.

The winter vegetable industry in Florida is enormous. Florida is truly the salad bowl of the nation in winter vegetable production, especially among the warm-season crops. The growing season begins in north Florida in late summer and progresses southward during the fall, with winter crops being grown in south Florida. As spring and summer approach, production gradually returns northward through the state.

Florida is the leading state in the production of several fresh market vegetables, including tomatoes, peppers, eggplant, sweet corn, snap beans, and watermelons. More than 40% of all fresh market tomatoes are grown in Florida, with a f.o.b. value of over \$465 million. Approximately 30% of all fresh market sweet corn is produced here, with a value of \$71 million. Green peppers, eggplant, snap beans, and watermelons have an annual value of \$137, \$9, \$49 and \$70 million, respectively.

The Florida ornamental industry has soared in production and value in recent years with turf and woody plants leading the list, followed by foliage plants, floriculture, cut fern, and cut foliage. Florida bedding plant growers produce more than 8 million 4-inch bedding plants annually, and this figure is rising rapidly. Florida has exceeded Michigan, the traditional bedding-plant state in the U.S., in production of 4-inch bedding plants. Florida also produces 90% of the world's supply of caladiums, grown on more than 2,000 acres.

Florida is overwhelmingly the major producer of cut cultivated greens with 91% of the national production. The single most important ornamental crop exported from the U.S. is a Florida product—leatherleaf fern. Florida continues to be the predominant foliage-producing state, accounting for 58% of the national value and is also the main exporter to European markets.

Losses incurred by fresh horticultural products during operations after harvest amount to somewhere between 15 and 40%, depending on commodity. For example, a study in New York City showed 16.6 million pounds of U.S. oranges were lost at the retail and consumer level in one year. The Third-World countries have even higher postharvest losses. Estimates show that a 20% loss in commodity results in a 25% waste in energy expended for production. This does not take into consideration packaging, refrigeration, and transportation.

A large proportion of horticultural losses results from the interaction of several factors: improper temperature

and humidity levels, improper packaging and handling, slow product movement, and the inherent short product life of many produce items.

The list of postharvest treatments for horticultural commodities is extensive and continues to change as technology advances. Researchers are developing the latest technologies for the 21st Century, and industry needs to be aware of technology transfers in order to be up to date. Improvements, which include packaging, cooling, palletiz-

ing, and transporting, are needed in handling fresh products to compete with domestic and foreign competition in order to supply a product that meets consumer demands. Consideration should be given to the use of metric weights and measures to benefit our export posture.

In conclusion, I thank you for allowing me to be your President, and I wish you continued success in leading our state and country into new and productive endeavors to meet the horticultural challenges of the future.

## PRINCIPAL ADDRESS

### Maintaining the Strength of Horticulture

DR. ORVILLE G. BENTLEY  
*Assistant Secretary for Science and Education  
United States Department of Agriculture  
Washington, D.C.*

There's an old business axiom that the Florida horticultural industry has apparently taken to heart: "If you don't make dust, you eat dust." For many years, you have been national leaders in the industry. In his Presidential Address, Dr. Hatton outlined some of the many areas of Florida's pre-eminence. You can, and should, be proud of your record.

Florida's mild, uniform climate is ideal for growing many crops. But climate alone can't sustain an industry as diverse or as economically viable as yours. You have invested a tremendous amount of time, energy, money, and brainpower into making Florida horticulture a major international force.

Last year, gross farm receipts in Florida topped 5 billion dollars for the first time ever. The lion's share of this income was in horticultural crops. Florida is one of the nation's leaders in production of many crops important in both domestic and foreign markets. You have expanded production of winter vegetables and ornamental crops significantly, while maintaining your preeminent position in citrus production. But the hardest part of being on top is staying there.

The questions you should be asking yourself are, "How can we stay strong?" "How can we get stronger?" Again, Dr. Hatton raised these questions earlier. It is clear that you are not willing to rest on your laurels.

So today, let's try to anticipate some of the coming trends in agriculture. And let's discuss three of these trends in a little more depth.

#### *Three Current Problems*

To begin, there are three major segments of your industry in Florida—citrus, vegetables, and ornamental plants. What are some of the problems that we are all dealing with now? How can the public and private sectors cooperate to beat the problems, and not the other way around?

The first of these problems is the potential threat to the citrus industry posed by the worldwide proliferation of exotic strains of the Tristeza virus. Some mild strains of this virus already exist here, but they are not a major problem. So far, the very effective quarantine program in the United States has been able to keep out the more virulent strains. But there are no guarantees that we will be able to keep them out indefinitely.

The two options open to citrus breeders appear to be: *First*, to develop methods of controlling the virus, or *second*, to develop Tristeza-tolerant varieties. Agricultural Research Service scientists at Beltsville, Maryland, have the more virulent Tristeza strains under quarantine. Florida citrus trees have already been inoculated against Tristeza. This is the kind of long-range thinking you will need to engage in to ensure a bright future for the industry.

Another problem associated with citrus production is cold. ARS scientists at Orlando and scientists at the University of Florida are working independently to develop cold-tolerant varieties, using wild citrus varieties for breeding purposes. I understand that they are closer to developing cold tolerance in the trees themselves than they are to equalling the quality of your traditional Florida oranges and grapefruits. But we do appear to be getting closer to the day when trees will be able to withstand the colder winters of mid-Florida and produce superior fruit as well.

Turning to the vegetable and ornamental industries, the sweet potato white fly appears to be an increasing problem. To counteract the sweet potato fruit fly, ARS recently provided funding for a cooperative research project at the University of Florida Agricultural Research and Extension Center at Apopka. In this project, the university scientists are looking at biological means of controlling the fly.

A major problem in the ornamental industry is the increasing cost of labor. The growing of container, bedding, greenhouse, and foliage plants is highly labor-intensive. And of course, this adds to the cost of the product. There is an urgent need to find ways to mechanize the handling of plant materials as a means of reducing costs.

In response to this need, ARS has set up a workshop for next week in West Palm Beach on mechanized handling of plant materials. This will be a fairly small gathering of invited growers, government researchers, and equipment manufacturers. It is an attempt to start getting a real handle on this problem.

#### *Coming Trends*

Now, let's try looking a little farther out on the horizon. Talking about the future is a risky prospect. If you guess right, nobody remembers. But if you guess wrong, nobody forgets.

Still, we can get a fair sense of the future in a couple of ways. One of these is the Congressional budget process. When Congress appropriates "new" funds for research—especially now, when resources are scarce and budgets are tight—that sends a clear signal.

Fiscal year 1989 funding for both ARS and the Cooperative State Research Service—which grants funds to the State Agricultural Experiment Stations for research—is pretty much at last year's level, with a few notable exceptions. Those agencies have received additional funding for research on food safety, water quality, pesticide application, and ozone depletion. These are all issues of direct impact on Florida and the horticultural industry here—indeed, to the whole nation.

A second barometer of what's likely to be important in the future are those issues that keep surfacing. From time to time, as you know, an issue pops up and brightens up the sky, but then it flames out and you never hear about it again. But what about those issues that have staying power? There are three current issues that I believe we have to concern ourselves with if we want to be responsive to the needs of the public:

\* *Sustainable agriculture*, the ensuring of the continuing capacity of natural resources to produce food, feed, and fiber. This issue includes such diverse needs and concerns as soil erosion control, minimal use of purchased farm inputs, tolerance of crops to stresses such as drought, and the growing role of small farms as a source of products for local markets. Can we maintain or improve the basic infrastructure of our farm production base—our soil and water and the farmers on whom we all depend?

\* *New and alternative crops*, such as kenaf (which is a source of fiber for newsprint and containers) and cuphea, lesquerella, crambe, and Meadowfoam (which are sources of oils used in the manufacture of detergents and lubricants). One could also include the burgeoning Florida tropical fruit industry under this banner. Are we exploring all potential avenues for such crops?

\* *International competitiveness* will remain an issue as long as the national balance of trade is not in our favor. Most experts seem to believe that worldwide demand for food will rise sharply in the next few years. Will we be able to take advantage of these new markets?

At this point, I really should stop to congratulate you on your significant contributions to our national balance of trade. Exports of citrus in particular have been on the plus side of the trade ledger for years. University of Florida scientists helped test-market small icebox watermelons in Europe, possibly opening up a market there. And your production of winter vegetables has helped us reduce our dependence on imported produce.

### *Three Major Issues*

But of all the emerging issues, three stand out to my mind as perhaps more important than the others: Biological pest control, food quality, and ground water quality. These are issues that directly affect Florida horticulture. They are issues on which you are in the forefront. And they are issues that likely will drive future public research budgets—both at the federal and state levels.

*First, let's look at this issue of biological pest control.* As you undoubtedly know, one of the major reasons for the emergence of biocontrol research and development is the growing uneasiness among all segments of the public about the safety of pesticide use. We shall leave aside for now the question of how real a threat pesticides pose to human health. Suffice it to say that scientists are far from unanimously convinced that we would be better off without pesticides than with them.

Clearly, however, because the public is concerned, Congress and the state legislatures are concerned. Use of some pesticides is being questioned on grounds of public health and safety. Registration of some pesticides for some uses is being pulled, leaving producers with a dilemma. One solution is going to come from research on biological pest control.

Luther Burbank once said, "Men should stop fighting wars and start fighting insects." The future is going to see less reliance on chemicals and more reliance on techniques such as the one being developed at the ARS station in Gainesville. Researchers there have used recombinant DNA technology to promulgate sterility in male tobacco budworms. Potentially, this development could lead to savings of half a billion dollars a year to the tobacco and cotton

industries. And scientists may be able to build on this knowledge to produce similar results with other pests as well.

The Joint Council on Food and Agricultural Sciences is charged with improving the planning and coordination of the food and agricultural science and education system. The Council has prepared a report for release later this year. As USDA's assistant secretary for Science and Education and co-chair of the Council, I have a personal involvement in this report. In listing the accomplishments in the federal-state research system, the report highlights:

- \* Use of recombinant DNA technology to transform crop plants for defense against viruses;

- \* Use of micro-organisms such as *Bacillus thuringiensis*, which are toxic to a number of insect pests;

- \* Enhancing the insect-resisting characteristics of plants themselves;

- \* Identifying and characterizing specific genes responsible for defensive reactions by plants to potential bacterial and fungal pathogens;

- \* Enhancing the ability of plant-associated microbes to help protect plants from diseases, insects, and stresses. The so-called "ice-minus" bacteria used to help protect crops is maybe the best-known example.

*The second issue is food quality.* American consumers are showing an increasing interest in nutrition and a lifestyle directed toward wellness. There is growing awareness of potential relationships among diet, nutrition, and health. Continuing changes in lifestyles—such as the growth of two-earner households—have increased the demand for convenience in food preparation. Consumers want foods with less fat, more polyunsaturated or monounsaturated fatty acids, more dietary fiber, less cholesterol, more omega-3 fatty acids, and similar qualities.

This past summer, Secretary Lyng convened an important national meeting on food quality. At that meeting, experts discussed not only ways to meet the quality needs of American consumers, but also the special needs of those foreign countries that import American farm goods. The quality of our exports—not the price—is often the major reason why our products do or do not sell well in international trade.

Part of the growing awareness of diet and nutrition is reflected in higher consumer demand for fruits and vegetables. Nutrition researchers are proving what Mom kept telling us—that fruits and vegetables are good for us. They are loaded with complex carbohydrates, including fiber. Every time you turn around, another restaurant or super-market is opening up a salad bar. I foresee nothing but continued increases in the demand for high-quality fruits and vegetables.

Florida has been referred to as the "nation's salad bowl." To keep that designation, you need to be concerned about how you market as well as grow your crops. Consumers are more sophisticated than ever. Often, their main concerns are freshness, appearance, diversity, and convenience—not price. Those qualities should be the concern of the breeder and the grower, not just of the retailer.

*The third significant issue that I want to discuss today is ground water quality.* Without mincing words, this issue is really about the increasing contamination of ground water

supplies by agricultural chemicals—both pesticides and fertilizers. Again, we aren't sure of the real threat to health posed by these chemicals, but we are sure that the public is concerned and that there will be restrictions on their use.

Yet viable alternatives to use of synthetic chemicals do not yet exist. Despite their great and real promise, biocontrols have not yet been proven to work on a broad scale. Low-input agriculture has not yet convinced American producers that it is the way to go. We know that most of the chemicals commonly used in agriculture are demonstrably safe when used properly. We know that abrupt discontinuation of chemical use on our farms would most likely lead to lower productivity, higher consumer prices, and economic stress on our farmers.

Nobody at USDA wants to get into a pocket where we have no options left but regulatory ones. If there's a better way to go, we have to develop that better way. Here are some of the actions that USDA has taken recently:

- \* Last November, Secretary Lyng issued a comprehensive Departmental regulation on ground water quality;

- \* ARS, universities, and other federal agencies are cooperating in a research effort in the Corn Belt aimed at understanding why sample tests of ground water vary, in terms of pesticide contamination, over space and time;

- \* We have formed a USDA Working Group on Agricultural Chemicals and the Environment to develop our strategies for dealing with pollution of both surface and ground water; and

- \* ARS and CSRS, through funding of projects in universities, are conducting and supporting many projects on safe and effective use, application, and effects of pesticides.

#### *Conclusion*

It is a credit to you here in Florida that you really don't know what dust tastes like. You have been, are, and likely will remain at the head of the pack in American horticulture. I wish you the best of success.