CONSERVATION TILLAGE
New life for Ohio soils
We celebrate this year as the 100th anniversary of the Hatch Act, legislation passed by U.S. Congress in 1887 to establish a national network of state agricultural experiment stations.

Progress by the agricultural industry of this nation—fueled by successful research at all state experiment stations, often in cooperation—has been unequaled by any other industry, thanks largely to this legislation.

Over the years, much agricultural research emphasized the maximization of commodity production. For example, 100 years ago the state’s 10-year wheat yield average was just under 17 bushels per acre. The comparable figure today is 46 bushels per acre. The new Cardinal variety recently released by the Ohio Agricultural Research and Development Center, Ohio’s experiment station, has produced an average of 66 bushels per acre over several years and 100 bushels per acre in ideal growing seasons.

Examples such as this abound in Ohio agriculture. But today’s research also has an additional emphasis—maximizing quality and economic efficiency in ways to enhance the lives not only for Ohioans but all human beings. This is illustrated by new research in biotechnology, human nutrition and farm crisis management.

Research in agriculture has helped bring adequate supplies of food, clothing and shelter taken for granted by most people in this country. But, a severe problem continues with distribution of our surplus commodity products to those who sorely need them. We must respond by improving that distribution on a global scale.

The challenge for us scientists at OARDC and for persons putting research to work on farms and in industries is that together we must be obsessed with advancing human well-being and quality of life for all.

The College of Agriculture, the Ohio Cooperative Extension Service, and OARDC ask for your continued enthusiasm and interest—a partnership in more successes as OARDC proceeds through the next 100 years.

Kirklyn M. Kerr

Dr. Kerr began duties in June as director of the Ohio Agricultural Research and Development Center, which include administering more than 300 research projects. Kerr comes from Louisiana State University, Baton Rouge, where he was assistant dean of the School of Veterinary Medicine.

He also held the simultaneous positions of head of the Department of Veterinary Science in the School of Veterinary Medicine, and head and professor of the Department of Veterinary Science of the Louisiana Agricultural Experiment Station.

His four degrees were earned from Ohio State, West Virginia University, and Texas A&M.

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EDITOR: Jacqueline M. Ullery
ASSOCIATE EDITOR: Tom Storey
DESIGN DIRECTOR: Scott F. Kelly
PHOTOGRAPHERS: Kenneth D. Chamberlain, Malcolm W. Emmons, Margaret A. Latta
ARTISTS: Scott F. Kelly, John K. Victor
CIRCULATION: Justin F. Besancon, Sandra A. Murray
EDITORIAL ADVISORY BOARD: Frederick E. Hutchinson, Vice President for Agricultural Administration and Dean, College of Agriculture, and chairman; Kenneth W. Reisch, Associate Dean, J. Michael Sprott, Director, OCES; Kirklyn M. Kerr, Director, OARDC; Lena M. Bailey, Dean, College of Home Economics; Harold D. Bauman, Assistant Dean; Shirley A. Brooks, Assistant to the Vice President; Craig B. Davis, Director, School of Natural Resources, and Associate Dean, College of Agriculture; Dan D. Garrison, Director, Agricultural Technical Institute and Associate Dean, College of Agriculture; Larry R. Whiting, Head, Section of Information and Applied Communications; William A. Jensen, Dean, College of Biological Sciences; and Ronald A. Wright, Dean, College of Veterinary Medicine

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Franklin R. Hall tests an electrostatic nozzle for possible pesticide application. He says this is an old technique used for spray painting automobiles.
A team of Ohio scientists are target shooting—but not the bow-and-arrow kind.

Their bull’s-eyes are pests, usually insects, that defy control without sprays. Fair game means controlling the pest with minimal spray, regardless of whether the spray is a conventional, hormonal or biological preparation.

Franklin R. Hall, entomologist and head of the Laboratory for Pest Control Application Technology at the Ohio Agricultural Research and Development Center, explains the heart of LPCAT this way.

“When an orchard owner sprays an apple tree with a common air blast sprayer, only 60 percent of the spray may land on a part of the tree, if that owner is lucky.

“Then, add on losses from rain, evaporation or a series of other factors that can take away active ingredients before the pest contacts it or is influenced by it. And, we end up with inefficient delivery of these chemicals to the plant surfaces.”

Efficient management and placement of these sprays is the problem for Hall and other LPCAT researchers, who include OARDC and USDA scientists working from a variety of perspectives. The LPCAT team, the only known such multidisciplinary group in the United States, is comprised not only of entomologists but plant pathologists, weed and crop scientists, horticulturists and agricultural engineers. The group also includes visiting scientists and students from several foreign countries.

Hall says the effort, which began in 1982, has brought biologists and research engineers together on this problem of pesticide delivery research, which across the nation has suffered a 40 percent decrease in federal funding in recent years. Renovation of OARDC facilities for this project is almost complete.

Current studies of the LPCAT group range from advanced physics of particle movement to applied research on new sprayer systems being developed. Crops used include corn, soybeans, fruits, field and greenhouse vegetables, and turf. In addition to insecticides, they’ve tested fungicides, nematocides and herbicides.

Overall, the idea of the project is the use of chemical tools in a wise and rational manner, Hall says. The scientists’ words for it are dose targeting.

“This is a match between the target characteristics and the spray system designed to deliver that dose efficiently and effectively,” he says. “Dose targeting can reduce the buildup of pest resistance to a substance as well as reduce costs and risks from unnecessary environmental and human exposure.”

At first, making this match sounds simple. But start to follow one spray droplet and then groups of them, as the LPCAT scientists do, and the problem soon calls for mathematical and computer models, wind tunnels, a scanning electron microscope and more.

They examine droplet sizes for the various substances used with specific equipment. Some drops can be eight times the size of others, and this wide variation in atomization can be part of the inefficiency problem.

Hall explains the liquid atomization of particles as a dynamic process. He summarizes the basic steps monitored with droplets as atomization, transport to target, impaction, deposit formation, movement in and on the plant, and then the biological effect.

At each of these steps physical properties, operating conditions, atmospheric conditions, and spray and surface properties also are recorded and studied. Additional secondary effects such as drift, evaporation, reflection, spreading properties and weathering get special attention at some of the various stages.

Along with better pest control, Hall says the target goal behind the effort is better understanding for: minimizing chemical drift in the environment, reducing chemicals in ground water, controlling pest resistance to a pesticide, and—the top priority—ensuring human safety.
Famous scientist Albert Einstein couldn’t convince his friend about an idea he considered important in the early 1900s, so he took that friend to the zoo.

Together they leaned over a railing and peered down into a deep narrow pit where bears lumbered among bushes, caves and rocks. Einstein pointed out to his friend that, left undistracted, the bears seldom looked up and out.

Helping people in this country and others do a better job looking up, out, and beyond familiar barnyards, schools, states and continents is what The Ohio State University College of Agriculture’s international activities do. While the college has a long history of international involvement, recent global changes suggest even more energy, enthusiasm and resources be put into the effort.

“We’ve got to get our students, faculty and our publics more involved and interested in international activities—the United States and its position with the rest of the world have changed drastically in recent years and we’ve got to face up to that,” says Frederick E. Hutch-
In most rice-producing areas of the world, women harvest rice. But in the Philippines, Ohio State faculty and students find men at the task.

Hutchinson, who has traveled in some 26 countries, most recently returned from a trip to Colombia, South America, where he was elected chairman-elect of the board of trustees of the International Center for Tropical Agriculture, another on his long list of current and former international activities.

"We have to export between a third and a half of our production if we're going to market all we produce, and that's a relatively recent idea—in the last 20 years," he says.

"Back a bit, Russia was the big news. But all that has changed. All of us in the U.S. agriculture system have to ask ourselves what current changes mean. It says to me we've got to pay more attention to people in developing countries. They are the ones who are going to buy our agricultural products.

"We used to have a fellow in Bingham, Maine, near where I grew up. To him people lived in two places—Bingham or away. When we speak of the world anymore as 'away,' that's not enough. Now we've got to identify the area, the culture, the economic system—we must learn it all. That's true whether we're talking about farm organizations or whether it's us training young people in agriculture.

"Very simply, unless the United States is successful in improving its export position for a great many agricultural products and services, we will continue to have huge surpluses and that will mean continued attrition of growers. I don't see any other conclusion that can be drawn.

"During the 1970s when we went hedgerow to hedgerow and produced for export, I didn't hear people raise a lot of questions. Exports were booming during that period. Problems didn't really become an issue until the 1980s when we experienced the decrease in the export market after debt limits tightened in the Third World.

"That says to me our producers are not philosophically opposed to this. They're caught in financial circumstances—it's turned their world upside down. They say, 'Why is this happening? Who's to blame? What can we do?'

"Unfortunately, there are no easy answers.

"I feel we need international involvement and it will happen if there's enough interest. They can come through our College of Agriculture and its interrelated units of research, extension, and instruction or other means. But let's face it. We work through organizations in our U.S. system. Organizations can be cooperatives, commercial shippers, you name it. But leadership comes through these organizations.

"One way a given university college of agriculture can make a difference in the long run is to identify a few countries, or sometimes just one, and focus in. Get to know the country and its people.

Gaybriel Kiwuwa, animal scientist at Makerere University, Kampala, Uganda, had multiple questions at a recent OSU/OARDC crops field day near Custar, Ohio.
"We've been looking at what we want a strong college of agriculture to look like in 10 years, and one of those things is a strong international dimension—no doubt about that.

"If we don't, we won't be a leader. "I see much greater recognition of the international dimension across the subject matter we teach. I hope to see the time come when foreign language training becomes a broader foreign social training. It's just too simple to say our students need foreign language training, but the fact is, we've got to start somewhere.

"I think we'll have many more courses that will make students more comfortable with foreign cultures. I'm guessing that a third of our young people graduating from college next June will spend some time of their lives working in a foreign country. Though we are getting more cosmopolitan among our regions, these students go through cultural shock right here in this country.

"Until people travel abroad, they have no idea of the difference in the freedom to do and act—and that's a big one. Ohioans in our college's Leadership, Education And Development (LEAD) program could tell the deep sense of difference when they went behind the Iron Curtain. That can only be learned by being in the area.

"I find, with the immensity and isolation of our country, that we Americans really uniquely do not understand other people. We could say that's true of everybody but I don't believe that. Europeans are far more cosmopolitan. Germans' pride is high but they are very understanding of others who live in Europe or even Africa.

"Another thing is that the United States has not really had colonization like most other major developed countries. Take Africa. There's a whole section of Africa that's French speaking and tied to France. Another section of Africa has been influenced heavily by Germany and England. As I've gone to those cultures, it took me a long time to catch up with some of them because I didn't come out of that colonial background."

Frederick J. Hitzhusen, acting director for the International Programs in Agriculture office at Ohio State, has learned from his international experiences, too.

"While doing a lecture assignment in Egypt, I had to cancel giving one talk," he says. "They had people whose full-time job was to just keep ringing the phone. When they finally got through for me in two days, the message landed where it belonged—only eight miles away.

"There's an incredible difference in information flow within a country and from country to country. And that's just one difference affecting how people operate on a daily basis."

While Americans commonly note such examples, Hitzhusen, who has traveled in some 20 countries, also says the action works in reverse.

"Some of my most exciting times in the past 10 years have been involved in conferences to look at natural resources and rural development programs," he says. "I've been in a room full of people from the Netherlands who have been involved with reclaiming the sea. You get people from England, who for hundreds of years have worked with land rights and developing walking trails everywhere.

"Sometimes we think certain things are impossible and then we discover others have been doing them for 400 years. What could be more on the cutting edge than finding countries who have preceded us in resolving issues that we haven't?"

Poverty, natural resource degradation and land scarcity are pressures indigenous to the Ocoa River watershed area in the Dominican Republic.

At press time, David O. Hansen had been named Director of International Programs in Agriculture.
"We’re becoming increasingly interdependent with our countries. Electricity generated in Ohio may have influence in parts of Canada. Ocean dumping in one country may have impacts on another. Killer bees are moving from one country to another. There’s deforestation and carbon dioxide issues and the global warming effect. We also have a cultural dependence that we’re only beginning to recognize."

Few faculty, students, or others take part in international activities long before they see new views and other sides to pending questions. Few answers come easily. International activity produces controversy on a wide variety of issues. Not everything is pristine, either, for Ohio State faculty to take overseas assignments. They’re pressured by questions that need answers here. Or the educational system sometimes does not directly credit, particularly younger faculty, with international work. Balances must be maintained for issues here with those abroad. Many factors enter the picture.

Hitzhusen says that in recent years the College of Agriculture has been working in two main ways in the international arena. One is getting to know two or three countries well. The other is to become a world authority in such areas as ag finance, soil erosion, and cropping systems. That expertise is then shared with many countries.

"In the last 10 years we have turned a lot of our energy to the Dominican Republic, becoming almost a sister country," Hitzhusen says. "We’ve learned a lot about that country and it about us. We consciously chose the DR because there were mutual benefits to be gained. They needed our help and that country has become a Third World laboratory nearby for our students."

"The DR has had the largest participation of any country in terms of people from our college and the number of departments involved in the last five years.

"Our largest single contract is with Uganda, where our focus is manpower development. This project is helping the agricultural experiment station there, particularly with plant science and crop research.

"People on that project work with everything from getting broken windows replaced to helping faculty members who haven’t been able to buy a book or travel for 15 years to get up to speed in their disciplines.

Across the Irrawaddy River to the city of Sagaing in Burma, a Buddhist monastery appears on the mountainscape. Buddhism, a major influence on Burmese life, impacts technical assistance as well.
That goes slowly. You don't see much action right away. Our work with Uganda, and Burma too, focuses on one fairly narrow task, while efforts in the DR include many.

"I'm concerned that we focus on subject areas and in climate areas similar to ours where we get a maximum of complementary material. There's a big payoff for Ohio when that happens.

"This idea probably comes from the Chinese, originally. For example, we have an agreement with mainland China. Some of their institutions literally got a map out and decided what U.S. institutions lined up at the same geographical latitudes as their needs.

"And, when the rural population in China exceeds the total population of the developed world I don't know how we can ignore those people."

Hitzhusen describes the Ohio State ag college activities with these priorities, not necessarily in order: technical assistance, training and education, student-faculty exchange, trade and market development, and communication.

"We've given much attention, and are giving new kinds of consideration, to what we do in curriculum and education here," he says. "We need to focus on training students where we have contracts and where we have longer term payoffs as well as increased understanding. We also need to increase short-term technical training opportunities. Some countries just don't have the time or money to send their students here for full degrees. Some just want to learn to operate a generator. Others ask, 'Can you teach us to split a gene in three weeks?'

"Foreign students pay tuition twice the price as our students. But it's still a bargain for them. Some of these students go back to run their countries.

"Our involvement also rests on the idea that people can't buy anything if they remain poor. When our college offers technical assistance, we are really trying to raise incomes. In some cases a country might eventually produce something in competition with us. But as their development continues they are able to buy more from us. Our data shows that for every one percent in increased income we get in a country, we get a 1.4 percent increase in imports of agricultural products.

"Their demand for food and food products increases faster than they can produce. So they end up buying some products from a country that can do it more efficiently than they can. Then they sell what they do best. Agriculture in the United States gains from this.

"Also, some of these countries get heavily locked into debt at times of high interest rates and are unable to serve their debt. They stop buying because they can't pay. We can't sit here and say that's their problem—because as a result of excessive debt they may stop importing feedgrains, for example. We pay even when we don't take a humanitarian approach."

Ultimately, Hitzhusen and Hutchinson have the same message. As with Einstein's bears, people in Ohio and the U.S. do need to look up and beyond familiar surroundings. Their futures depend on it.

Some Facts about International programs

Did you know this about The Ohio State University College of Agriculture's international activities?

Ohio State is recognized as the world center for the analysis of rural financial markets in low income countries and for the design of related programs and policies.

Current major College of Agriculture projects are in the Dominican Republic, Burma, Uganda, the Philippines, Bangladesh, and Niger.

Often called a program of excellence is maize virus research by Ohio Agricultural Research and Development Center scientists cooperating with researchers in Mexico and Costa Rica attempting to discover how the three principal diseases of maize spread in Mexico, Central America and northern South America.

Last spring quarter, 236 students from 54 countries were enrolled in College of Agriculture programs.

Some 60-70 faculty travel to other countries each year, usually on funds from outside the university, to provide short term consulting, present papers, attend international conferences, teach short courses, or to learn methods.

Without the long-time sharing of plant material from various countries through the OARDC and other similar organizations, the diets of Ohioans and other North Americans would be limited to cranberries, blueberries, strawberries, pecans and sunflower seeds. Without continued sharing, both in plants and livestock, production agriculture would be hampered severely.
Sharing the Ethic

With two hurricanes the catalyst, the Dominican Republic and Ohio State teamed for new programs in natural resource conservation

By Judy Kauffeld

Sometimes it takes a disaster to call attention to a problem that's been escalating for years.

Imagine yourself a hillside farmer, raising crops on steep slopes. Each year you lose soil to the valley below. But the crops are your livelihood and your family's food, so you continue to plant. Then it begins to rain—hard. You sit helplessly as the soil washes into the sea, leaving nothing—no food, no income.

In 1979, the Dominican Republic, a mountainous Caribbean island country, was ravaged by back-to-back hurricanes that dropped 21 inches of rain in three days. The first hurricane saturated the soil; the second washed it into the valleys and out to the ocean.

As destructive as the hurricanes were, they had one positive aspect: they pushed the country's major agricultural problem—soil erosion from hillside farming—into the spotlight and ignited a crusade to alleviate it.

Today, many hillsides in the Dominican Republic are covered with lush green crops, a startling contrast to the barren moonscape eight years ago. And attempts to conserve topsoil throughout the country are well underway.

Much of the credit for the turnaround goes to the Natural Resources Management project. Funded by the Dominican Republic government and U.S. Agency for International Development, the NARMA project informs citizens and farmers about environmental conservation and sound farming techniques. Ohio State University is a subcontractor with Michigan State University for two components of the project. The agronomy component is headed by Ohio State professors Terry Logan and Douglas Southgate, the environmental education element by Robert E. Roth, professor of natural resources.

"The Dominican Republic's natural resource base was deteriorating at an alarming rate," says Roth, director of international programs for the School of Natural Resources at Ohio State.

"We're attempting to instill an environmental ethic in the people of the Dominican Republic. We're not there to teach them just how to prevent erosion but to introduce a new set of environmental concepts, attitudes and actions to reverse forever the effects of erosion."

Less than a century ago, erosion wasn't a problem. The mountain hillsides were 100 percent forested, and the slopes retained topsoil through periods of frequent rain and occasional hurricanes. But a growing population forced a change in land use, and forests were slowly replaced with food crops.

Slash-and-burn farming and slopes as steep as 17-45 degrees caused severe soil erosion and runoff in the island nation's main agricultural areas. By 1980, Dominican farmers were losing 12 inches of topsoil and subsoil annually. That's 240,000 pounds of soil per acre per year. In comparison, in the hilly area of south-
Julio Perez, second from left, returned to the Dominican Republic Ministry of Agriculture after completing a master's degree in natural resources at Ohio State.

east Ohio using no-till farming, soil loss is only 65 pounds per acre per year.

Agricultural practices farmers used were largely to blame, Roth says. They resulted in high erosion, low productivity—and ultimately, local poverty. But the hillside farmers, called campesinos, were trapped in a vicious circle for survival. They depended on their hillside farms for the little food and income they generated. Unless broken, the circle promised increased soil destruction and escalating suffering for the hillside poor.

NARMA personnel educate rural hillside farmers on proper agronomic techniques to reduce topsoil loss. The goal is to provide farmers with advice for improving production practices and to introduce terracing, composting, and ways to increase soil fertility.

But the effort goes beyond the campesinos since the lives of all the people are at stake. Four other audiences are targeted: agricultural technicians, community leaders, teachers and students.

Since the project began, more than 1,500 one-day workshops have been held. NARMA staff have helped the Dominican Republic Ministry of Agriculture develop trained professionals in environmental education and communications. Thirty staff members have received hands-on training in radio programming, design and production of printed materials, and videography from the staff of Ohio State's Section of Information and Applied Communications. The staff of the Dominican environmental education office has been trained in the use of $25,000 worth of new communications equipment. Such tools and skills are essential to stimulate national interest in conservation practices.

Also, the NARMA project made possible long-term training in environmental education and communications of three staff members of the Subsecretary for Natural Resources from the Ministry of Agriculture. While working on graduate degrees in Ohio State's School of Natural Resources, Alfredo Mor-

NARMA personnel demonstrate to hillside farmers that conservation is production.

rillo, Luisa Valdez, and Julio Perez provided valuative data on various pieces of the NARMA environmental education component.

“These Dominicans benefitted from the extremely rich learning environment at Ohio State,” Roth says. “They had rigorous course work and have not only learned strategies to improve the environment in their native country, but they’ve immersed themselves in the cultural life of the U.S. heartland. And our natural resources students gained a much greater international understanding of concerns and aspirations from individuals of the developing world. The whole experience was one of global education.”

Morrillo, director of environmental education for the Ministry of Agriculture, completed his master’s degree last winter and returned to the Dominican Republic to continue efforts of the NARMA project with local environmental officials. Morrillo researched the effectiveness of workshops held for campesinos.

“What the research revealed was a positive attitude shift as well as adoption of agronomic practices among workshop participants,” says Roth, Morrillo’s advisor at Ohio State. “Among those campesinos who adopted our suggested farming practices, soil erosion was reduced
by 80 percent. Soil moisture doubled, as did the amount of crop coming off the field. These campesinos were able to pay off their crop loans within the first growing cycle instead of waiting until the end of the second growing season.”

However, Roth says, only 15 percent of the campesinos adopted environmentally sound farming practices. While this is not enough, Roth says it is not unusual considering the short time period.

“It’s always difficult to sell conservation to production-minded people,” Roth says. “We face the same obstacles here in the U.S. But we’ve managed to show the Dominicans that conservation is production. NARMA evidence indicates that farmers can increase their net income and at the same time significantly reduce erosion and downstream sedimentation if they will apply the labor-intensive conservation practices the project recommends. The key now is to let everyone know that.”

In the Dominican Republic, 99 percent of the population listens to the country’s Catholic radio stations. A study by Valdez evaluated the effectiveness of programs featuring conservation messages aired regularly on those stations. She found an increase in knowledge about environmental issues and local practices among listeners and concluded that radio is an effective communication medium in a developing country such as the Dominican Republic. After five years of broadcasting conservation messages, at least 15 letters requesting printed material still arrive at the stations each week.

Environmental knowledge and beliefs were assessed by Perez in a study of 12th grade students. He found a significant increase in knowledge and a positive attitude shift in environmental concepts among students sampled throughout the country.

Changes not visible in the island hillsides also have occurred as a result of the project. The Ministry of Agriculture has incorporated conservation topics into its traditionally production-related activities. Eleven environmental laws, the first of their kind in the country’s history, have been passed, including one that mandates the teaching of environmental education in the country’s schools. There is a proliferation of private conservation organizations and clubs and more cooperation among agencies than ever before.

“All of these changes,” Roth says, “reflect the growth of an environmental ethic in the Dominican Republic. We’ve provided technical assistance and shared essential communications techniques, but the Dominicans deserve the credit for turning their country around. They’re on the road to saving the natural resources of their country and improving the quality of their lives.”

Dominicans are learning that conserving natural resources can improve the quality of their lives.
Volunteers with computer experience help young 4-H'ers understand new technology and new communication tools. 4-H'ers use computer skills with 4-H projects such as money management or marketing.
THE 'LIFE'BLOOD'

19,000 volunteers are vital to Ohio 4-H

BY SCOTT TURNER

Ohio State University has more than 19,000 people on its teaching staff who never get a paycheck. Their rewards come from working with young people.

"These Ohio 4-H volunteers are the lifeblood of 4-H," says Charles W. Lifer, state 4-H leader and assistant director of the Ohio Cooperative Extension Service.

Youth in every Ohio county participate in 4-H, America's largest, out-of-classroom, educational program. Administered by agents and staff of the Ohio Cooperative Extension Service, Ohio 4-H's financial support comes from a partnership of public and private funding.

The professional 4-H faculty act as teachers, program leaders, managers and resources. Adult and teen volunteers lead, organize and assist 4-H's myriad of educational projects. Youth work on these projects in club meetings, at home or in school.

Although volunteers may have children in the program or been former 4-H'ers, they all share a common interest: a willingness to share time and knowledge with youngsters and take leadership responsibilities.

4-H began in Ohio in 1902 in Springfield as an informal after-school program conducted by volunteers. As the organization evolved, the role of volunteers grew steadily.

Today, Ohio has 19,200 4-H volunteers, the second highest number in the United States. Their time commitments to 4-H range from one hour to 1,000 hours a year. A 1982 study by Ohio 4-H estimated volunteer contributions totaled $35 million annually.

Ohio 4-H volunteers are called advisors, a title the state 4-H administration thinks clearly reflects how the volunteers help youth, ages 9-19, with life's choices and options.

The 4-H budget, like those of some other government-funded programs, faces an uncertain future. In the past 10 years decreases in county, state, or federal funding allocations have led to periodic reductions in staff. Effective use of volunteers multiplies the effort of the paid faculty.

"As little as five years ago, we looked for a volunteer who could give 5-10 hours a week to 4-H," says Allen J. Ulrich, state 4-H specialist in charge of volunteer leader development. "Times have changed. In many families, both parents work. Ten percent more people volunteer than 10 years ago but 500 percent more organizations are looking for volunteers. People have less time and more choice."

"Yet, our volunteers stick with us. According to a 1986 study, 35 percent of Ohio 4-H volunteers were with the organization more than five years and nearly 24 percent were in their first year."

"A volunteer's most important role is someone a youngster can confide in," says Barbara Ditmer, a Shelby County 4-H volunteer for 27 years. "Self-expression and self-confidence are two of the most important skills kids need as they get older. Our job is to help them develop those skills."

Many advisors teach youth "learn by doing" projects such as computer programming or environmental protection and conservation. Ohio youth can choose from more than 180 projects. And individual projects may come in different varieties and sizes.

Although local leadership is the traditional volunteer role, volun-
Volunteers help 4-H on the state, district and county levels, too. For example, county program coordinators are advisors who coordinate a county’s participation in the 4-H/Japanese youth exchange program or organize parents to help erect a home economics display booth at the county fair.

Volunteers form the majority of advisory committees that oversee each level of 4-H operation, as well as the program development committees that help Extension faculty determine county 4-H program needs and directions.

A volunteer may coordinate, train and review the activities of other county volunteers. The volunteer works closely with the county 4-H agent and may work with the county 4-H advisory committee and program development committee.

“An advisor’s hands-on experience and enthusiasm makes them effective recruiters, too,” says Thomas M. Archer, Shelby County 4-H agent. Archer estimates that advisors in his county supply three times as many new volunteers as he does.

“Basically, volunteers act as middle managers with specific duties,” Archer says. “Many opportunities do not call for a large time commitment and appeal to those who don’t want to conduct projects or have little time to give. Last year, for example, an adult volunteer assisted overnight operations at 4-H camp and returned home in time to milk his cows.

“4-H volunteers also help county extension offices temporarily short-handed. When our office had one secretary, 4-H volunteers helped answer phones and organize events.”

Volunteers are bankers, homemakers, lawyers, teachers and factory workers; anyone with a bit of time and an interest in young people. Some advisors were in 4-H as youths and want to give something back to the program.

One such volunteer is Judge Frederick D. Pepple of the Auglaize County Court of Common Pleas. A member of the State 4-H Advisory Committee, he frequently speaks to county and state representatives on 4-H’s behalf.

“The skills I learned in the Ohio 4-H health and safety speaking program helped me decide to go to law school,” Pepple says. “Who knew I could speak in such a setting? 4-H helped me develop a sense of direction and self-esteem.”

4-H uses a business-like approach to appeal to potential volunteers. Information is provided about the 4-H organization, specific tasks and time commitment. Written information often takes the form of a job description or contract.

“Volunteers and prospective volunteers appreciate the direction we provide,” Ulrich says. “We’re also flexible. A county will coordinate a one-hour workshop for youngsters involved in a photography project if a local photography expert has one hour to give.”

And up-to-date youth projects attract volunteers who want to share their unique skills and concerns with interested youth. Examples include:

- The new Teenpreneurs project teaches youth about starting a small business. “Volunteers with business experience act as mentors,” Ulrich says.

- Ohio 4-H Sea Camp participants study Lake Erie with aquatic specialists and instructors from marine businesses and associations.
The design-your-own-steer project builds on a traditional livestock feeding project through the use of computer programs. "Youth learn how to vary the ratio of feed to bring a steer to its optimum weight by a certain date," Ulrich says. This project attracts volunteers interested in marketing and commodities.

"Blue Sky Below My Feet—Adventures in Space Technology" is a new project that appeals to youth and volunteers through high technology. Designed for 4-H clubs, youth groups and schools, its three 30-minute shows use space shuttle footage to explain gravity, clothing and fabrics, and food and nutrition. It's supplemented by written materials but takes advantage of the growing use of VCRs.

Ohio 4-H is currently redesigning its youth project guides. Designed to make the relationship between agent, advisor and youngster more effective, the first of the updated guides will become available this fall. "Step-by-step instructions help volunteers start new programs and direct member's learning," says Robert Horton, state 4-H specialist in curriculum development.

"It makes the advisor's role more push-button and eliminates the need to be trained for a project by agents," Horton says. "This should attract and retain volunteers, especially if funding restricts the number of 4-H agents."

Ohio 4-H believes a more informed volunteer does a better job. "Advisors have access to the traditional 4-H resource base: extension agents, district and state 4-H faculty, subject matter specialists, and other state staff in administration and communications," Ulrich says. "Advisors are provided with, or have access to written, audio or video support materials.

"Training sessions on the county, district and state levels including topics taught by both staff and volunteers, range from volunteer leadership to the introduction of new food and nutrition projects."

Every two years, an advisor's forum in Columbus offers workshops on new and innovative ideas on working with young people. Topics at this year's forum included "Keep Older Youth Interested," "Being a Good Teacher," and "New Natural Resources Materials."

Between forums, two or three statewide conferences are conducted where advisors share ideas and listen to tips on youth leadership.

Advisor education efforts even employ space-age technology. Last April 6, Ohio 4-H presented a nationwide satellite program on the role of camp counselors. The show was broadcast by satellite from Ohio State.

An award system recognizes volunteer service in many ways with corporate and individual support. Outstanding volunteers are inducted into the Ohio 4-H Hall of Fame, established in 1977 in the Ohio 4-H Center on the Ohio State campus.

Every March, an Ohio 4-H volunteer attends the "Salute to Excellence" program at the National 4-H Center in Chevy Chase, Md. There, workshops help volunteers sharpen their skills in areas such as communications and group dynamics. Volunteers meet members of Congress, and each volunteer is awarded $1,000 for 4-H programming in their county, district or state. The program is supported by a $200,000 grant from RJR Nabisco, Inc.

"4-H is responding to a challenge," Horton says. "Once, we prided ourselves on a personal touch: An agent would travel the county, recruit volunteers and guide them through their tasks. But that's history. We have less paid faculty and need to use our resources more efficiently."

Dave Dawson of Portage County, a 15-year advisor and member of the 4-H Hall of Fame, says "I've stayed in 4-H because I get opportunities to give my skills and develop new ones.

"I've been able to contribute from the county committee level to meeting with legislators in Washington, D.C. This reflects why 4-H works efficiently: you're given the time and place to air your views. If you have a good idea, they'll do it your way. "I believe extension represents the evolving agricultural world, which is under close scrutiny. A fine-tuned 4-H is a wise investment in our youth and our future."
The Last Fur

Countering tradition with the bottom line, researchers take to the field with conservation tillage
Plowboy

After the last red sunset glimmer,
Black on the line of a low hill rise,
Formed into moving shadows, I saw
A plowboy and two horses lined against the gray,
Plowing in the dusk the last furrow.
The turf had a gleam of brown,
And smell of soil was in the air,
And, cool and moist, a haze of April.
I shall remember you long,
Plowboy and horses against the sky in shadow.
I shall remember you and the picture
You made for me,
Turning the turf in the dusk
And haze of an April gloaming.

Carl Sandburg

BY TOM STOREY

It's March, and Bill Goettemoeller is restless.
Old Man Winter has held him prisoner for five months. Now, he's ready to escape to his 400 acres of Darke County soil.

"I'd rather plow than do any other job," says Goettemoeller, a Versailles, Ohio, farmer.

"After lying around all winter, you want to do something. And there's nothing more enjoyable than plowing."

Goettemoeller is not alone. Plowing has long been a labor of love for farmers. There's something special about plowing—the smell of freshly turned earth, the warmth of spring sunshine, the power of a big tractor, the satisfaction of turning a field of crop stubble into a glistening haven.
Yet this beloved chore is becoming a thing of the past. Each year, more Ohio farmers park their moldboard plows, the farm implement that breaks and turns the soil. Crop production requiring little or no plowing is taking hold. It's called conservation tillage.

The reasons are many; conservation tillage is less erosive, less time consuming, less costly, and in most cases, more profitable. But despite these advantages, the switch to conservation tillage has occurred slowly.

"There's a romance to plowing," says Berlie L. Schmidt, professor of agronomy at Ohio State University. "Plowing is to the farmer what flying is to the pilot: freedom, escape, power, accomplishment. Adopting conservation tillage often requires overcoming the emotional attachment to plowing."

Only within the last few years, as conservation tillage became too economical to pass up, have many farmers been able to part with plowing. Jeff Corum, a Pataskala, Ohio, farmer is one of them. When Corum grew up, plowing was his favorite chore.

"There's not much not to like about plowing—seeing the ground turn over, the clean field," he says. But today his four-wheel-drive tractor sits, and his moldboard plow has been sold. He found conservation tillage financially rewarding; it trimmed production costs without reducing yields. And in today's depressed farm economy where prices are low, costs must be cut.

"When there's good reason to change, you change no matter how difficult," he says.

Many Ohio farmers appear to agree with Corum. Last year, the number of commercial farmers using conservation tillage in Ohio doubled compared with 1983. More than one-half of the corn and about one-third of the soybean acreage were in conservation tillage—both were records. More than 4 million acres, or about 43 percent of all Ohio crop land, were under conservation tillage—another record. And more acreage is expected to be converted to conservation tillage this year.

Schmidt watches this move with a bit of professional pride. He and other Ohio State agronomists have touted the virtues of conservation tillage for some 20 years, mostly to uninterested farmers.

"We knew conservation tillage would dramatically cut costs and reduce soil erosion," Schmidt says. "But, back then not plowing was sacrilegious. Farmers listened politely—some not so politely—to our ideas, but very few were interested."

Now, as more farmers adopt conservation tillage, research will accelerate. Last year, Ohio State scientists formed the Conservation Tillage Systems Program, a multidisciplinary effort designed to intensify research and education efforts.

"Ohio State has been involved with conservation tillage for 30 years, and we've gathered a large knowledge base," Schmidt says. "But we don't have all of the answers."

Among the areas targeted for intensive study are:

- **Pest management.** Crop cover left on the soil, which is vitally important in lessening erosion, dramatically changes the field environment. The residue may harbor insects, weeds and disease organisms that may require different control techniques from conventional plow-based production systems.

- **Environmental impact.** Although soil erosion is decreased substantially, opponents claim conservation tillage's dependence on chemicals for pest control damages the environment. Schmidt and other Ohio State agronomists believe the environmental threat is minimal, but they agree that studies are needed to determine conservation tillage's long-term impact on the environment.

- **Fertilizer placement and planting equipment.** Research to fine-tune fertilizer placement and planting equipment is needed to obtain more effective growth and seed placement. Currently, many nutrients from fertilizer fail to reach the plant, and seeds can be planted too deep or too shallow, hindering germination.

- **Drainage.** Using conservation tillage on poorly drained soils can reduce yields by as much as 15 percent. Research is needed to determine why.

Much work has already been done. A conservation tillage re-
search program has been in place at the Ohio Agricultural Research and Development Center in Wooster since 1960. In fact, OARDC has some of the longest running no-till plots in the country. Pioneering research by Glover Triplett and David Van Doren, emeriti professors of agronomy at OARDC, helped establish conservation tillage as a reliable production system. Their results showed the decrease in erosion, soils best suited to conservation tillage, and effective crop rotation combinations.

But in the past, research was largely isolated by academic department, and scientists rarely crossed those lines. The conservation tillage program aims to pull the effort together and use the expanded capabilities of team research to secure increased funding.

“We want to enhance and increase collaboration, spot areas where resources can be shared and attack conservation tillage problems in a multidisciplinary fashion,” says Schmidt, who leads the effort.

“For conservation tillage to work, a blending of disciplines is demanded. Engineers must design the equipment, plant pathologists must solve the disease problems, entomologists must understand the insect ramifications, agronomists must control the soil and weed obstacles, natural resource people must determine the environmental impact, economists must know the financial effects, and sociologists must pinpoint the adoption barriers. Without collaboration, the system breaks down and fails.”

So far, Schmidt has formed two committees: a 15-member steering committee of faculty from eight departments, and an advisory committee of farmers, industry officials and environmental representatives. These committees will meet twice a year to suggest program needs and directions.

In addition, the program will periodically sponsor conferences and seminars to attract attention and support for conservation tillage. A tillage and water quality conference is planned for November in Columbus. Last year, the program co-sponsored a slug control conference in Wooster. Corn and soybeans experience more slug problems with conservation tillage.

During the past year, scientists participating in the program received funding of $45,000 from the Regents' Challenge Program to study the “Effect of Conservation Tillage on the Fate of Pesticides in the Soil.” They also received a seed grant from the new Ohio State University Center for Mapping to study the “Use of Remote Sensing to Measure Crop Residue Cover on Conservation Tillage Practices.” Other research proposals are being prepared to determine ecological and environmental effects of conservation tillage.

“Ohio State is nationally known for its research in conservation tillage thanks to the contributions of outstanding scientists,” Schmidt says. “This program intends to establish Ohio State University as an international center of excellence in conservation tillage.”

The task is sizable, but it's attainable and important, he says. Schmidt and fellow scientists believe conservation tillage will eventually be the major production system. And to fulfill their historical mission of agricultural research, education and extension, land-grant universities must lead the way, according to Schmidt.

But will farmers like Bill Goette-moeller ever put their plows to rest? Only they will decide.
CONSERVATION TILLAGE

Methods and benefits are gaining popularity

It was labeled “dirty” farming. First users were scorned as sloppy farmers. They defied traditional, well-accepted production techniques.

Conservation tillage has come a long way since its rocky beginnings. Many of the barriers to adoption are gone, and its popularity with farmers grows as the economic and environmental benefits continue to increase.

But what is conservation tillage?

Traditionally, farmers plowed to bury vegetation and crop stubble, leaving narrow, 10-inch-high grooves in the soil called furrows. To level the furrows and obtain a flat seedbed, farmers crossed the field repeatedly with a disc harrow. Once the ground was flat and a rich brown color, it was ready for planting.

The plow-based production system effectively kills weeds and provides a clean, flat seedbed, but it’s expensive. Plowing requires a high-horsepower tractor, which consumes a lot of fuel. Smoothing the soil for planting, which can require as many as three trips across the field, also is expensive in terms of fuel consumption.

Conservation tillage means fewer trips over the farm field, says Donald J. Eckert, associate professor of agronomy at Ohio State University. The plow is parked, and extensive seedbed preparation is eliminated. Technically, it’s any tillage system that leaves at least 30 percent crop residue cover on the soil surface at planting. It can be broken into four basic methods:

- No-till. In no-till, the soil isn’t turned at all and weeds are killed solely with chemicals. No-till reduces wind and water erosion and eliminates the need to cross a field repeatedly with various implements to prepare the seedbed.

- Ridge till. In contrast to conventional systems that use a flat seedbed, ridge tillage uses 5- to 8-inch-high soil ridges as a seedbed. Crops are planted on top of the ridges. Crop residue remains on the soil surface until spring planting. Then, a planter removes the top 1-2 inches of the ridge, pushing crop residue into row middles. Ridges remain in the same place each year.

- Minimum tillage. Minimum, or reduced, tillage simply means less working of the land. Ground is usually broken with a disc, field cultivator or a chisel plow, rather than a moldboard plow.

- Mulch till. All other conservation tillage systems are referred to as mulch till. In mulch till, a farmer simply leaves a significant amount of residue on the soil.

Conservation tillage research began in the 1930s when the Dust Bowl created concern about topsoil losses. By 1960, many states had conservation tillage research programs in place. Conservation tillage became practical in the early 1970s, when herbicides and planting equipment designed for conservation tillage were introduced, Eckert says.

Research at Ohio State has shown many benefits to conservation tillage. Among them are:

- Erosion control. An estimated 5 billion tons of topsoil—the upper layer of soil that is richer and more productive than subsoil—from U.S. farms is lost each year to erosion. And taxpayers pay an estimated $3 billion to filter the lost sediment from road ditches, rivers and lake basins. Conservation tillage can cut that erosion by more than half because crop residue protects the soil and holds it in place.

- Cost savings. Although the greatest advantage of conservation tillage is topsoil preservation, there are economic rewards. Fuel costs decrease. Conservation tillage requires 1-5 trips across the field, whereas plow-based systems can mean as many as 8-10 field trips. Another savings is equipment overhead. Machinery, such as plows, disc harrows and large tractors, is not needed. Equipment that is needed is smaller and more economical to operate. Also, equipment is used much less and in less stressful ways,
CONSERVATION TILLAGE

reducing repair expenses. Still another savings is time. Seedbed preparation time under conservation tillage is cut by more than 50 percent, allowing earlier planting.

“Earlier planting usually means higher yields,” Eckert says. “The crop has more time to develop, and when stressful periods arrive, the crop is stronger and more resistant.”

Improved soil. Leaving the surface untilled and covered saves considerable soil water. Water from rains penetrates the soil more easily, rather than running off. Crop yields often increase.

“Soil becomes firmer and tolerates spring rains better,” Eckert says. “Research shows more earthworm activity in conservation tillage soils, which benefits soil structure.”

Yields. On well-drained, light-colored soils, conservation tillage provides 15 percent higher yields than plow-based systems, says Eckert, citing Ohio State research results. On dark, poorly-drained soils, yields should be the same as plow-based systems with adequate drainage and crop rotation practices. Yields could drop, however, if either is missing.

With all of these advantages, why have farmers been slow at adopting conservation tillage?

Conservation tillage requires a new attitude, Eckert says. Not only is intensive plowing eliminated, clean fields, traditionally a source of pride among farmers, disappear. Farmers must accept crop residue on the soil surface; in the past, it was a sign of unprofessional farming.

Also, farmers have to learn the new production system, which requires more meticulous planting, fertilizing and pest control than plow-based systems.

“Conservation tillage requires careful management,” Eckert says. “You can’t just plant in the spring and harvest in the fall. You have to plan more carefully and pay more attention to all operations at first, until you learn the system. It is less forgiving. If you make a mistake, it often costs you more.”

The knock against conservation tillage is its chemical use. Since it relies heavily on chemicals for pest control, conservation tillage has been labeled by some as a polluter. The concern is that chemical compounds move off the farm field to surface or ground water.

Terry Logan, an Ohio State soil chemist, says the threat of environmental contamination from conservation tillage is minimal. He has monitored water quality for 11 years at the state’s Hoytville research branch where conservation tillage work has been done since 1962.

“The effect is minimal if there is any effect at all,” Logan says about pollution from conservation tillage. “Rarely do conditions occur that allow dangerous amounts of chemicals to reach ground or surface water. And with some precautions, farmers can apply chemicals in ways that will make the potential for contamination even less likely.”

Logan says today’s agricultural chemicals break down quickly or firmly attach to soil particles, which restricts chemical movement. They are targeted for specific field problems and are less likely to hurt non-target organisms. But, they are more water soluble and therefore more likely to move into surface or ground water through leaching. There is evidence, however, that improper washing of tanks and disposal of containers may cause as much surface and ground water contamination as normal application practices.

Farmers are probably doing a better job applying chemicals today than 20 years ago, but modern technology can detect extremely low concentrations of chemicals, Logan says.

“I would guess that chemicals were in the environment and in higher concentrations 20 years ago—we just didn’t know it.”

Eckert says that the pollution charge may have started in the mid-1970s when a large number of farmers first began adopting conservation tillage.

“Farmers were working with a new system and may have overapplied chemicals to ensure few problems with insects and weeds,” he says. “If farmers follow label directions, calibrate equipment accurately, and measure chemical concentrates and dilutants carefully, conservation tillage uses little or no more chemicals than other crop systems.”

Don Eckert
In the Honey

ATI's bee program gets global attention

Bees are bees—or are they? “True, the bees here and in Africa and South America aren’t exactly alike, but the basic biological and technical needs are the same,” says James E. Tew, extension apiculturist and head of the beekeeping program at the Agricultural Technical Institute in Wooster.

Honey bees pollinate crops the world over. But even with some geographical differences, beekeeping principles are fairly transferable.

That’s the reasoning behind Ohio State’s international beekeeping efforts. Tew says Ohio is a good training ground for beekeepers around the world.

“We have the advantage of advanced technology and more research and can compensate for the differences,” Tew says.

Basics are the key to Tew’s International Seminar on Beekeeping. The two-week session, each summer at the ATI, attracts students from around the globe and helps recruit students for ATI’s two-year beekeeping program.

Students in the seminar cover advanced technical topics such as queen production, disease diagnosis and establishing sales cooperatives. During the second week they discuss current topics and work with special guest speakers. Tew says students from different parts of the world lecture about their local problems and teach specialized techniques.

One current topic is Africanized bees. These crossbred bees are a problem in South and Central America and are expected to migrate north. Africanized bees are extremely aggressive and will sting intruders repeatedly. Their swarming tendencies also reduce honey harvests for beekeepers.

Tew’s interest in the problem led to research in Venezuela. He took Chris Finneran, videographer in the Section of Information and Applied Communications, on one trip and came back with footage for features on Africanized bees. The video became part of a live teleconference during the International Conference on Africanized Honey Bees and Bee Mites at Ohio State last March. The broadcast featured a panel of international experts answering phone questions from across the country.

“These Africanized bees are the key issue facing the American bee industry right now,” Tew says. “They’re coming and we’re not sure how to deal with that.

“It’s partially our not knowing what to expect. When we get students at our International Seminar from parts of the world where these bees are already a problem, they act as if it’s just another fact of life. Someday, I expect we’ll be that way in sections of the United States too.”
A NEW LIGHT

A mix of tradition and business brings a 40-percent enrollment jump for the College of Home Economics

Every month, George Tanchevski, 23, orders more than $12,000 of supplies for the hotel restaurant he manages. He oversees a $10,000 monthly payroll budget and supervises 40 staff members.

Lori Wagner writes use and care books for a $1 billion consumer products corporation. She works with engineering and marketing personnel on product evaluation, and she suggests design changes and promotional strategies.

Tanchevski and Wagner are recent graduates of Ohio State University’s College of Home Economics. To many people, that’s surprising considering their business-oriented jobs.

“We’re still needlepoint and brownies in many people’s minds,” admits Vivian Harvey, assistant dean of the college. “Today, home economics is much more than that. We haven’t forgotten our traditional role, but we’ve broadened our efforts. We’ve moved into new areas in response to trends in society.”

A new College of Home Economics is emerging. It has the traditional areas of nutrition, fashion and home management, but it has added or restructured programs with a distinct business tone.

“One of our major thrusts is applying economics and business to everyday consumer problems and family living,” Harvey says.

Today, more than half of the home economic students are in programs leading to a business profession. They are just as likely to study marketing and management as they are clothes construction and food science. They take courses in economics, statistics and finance. And they land well-paying jobs as managers, executives and administrators.

The refocusing has helped push enrollment to 1,036, a 40 percent increase since 1984. It also has attracted more males, who now make up 15 percent of the college’s enrollment.

Hospitality management and consumer services, the programs from which Tanchevski and Wagner graduated, are examples of new emphasis in home economics.

Hospitality management started in 1984. It focuses on educating students to manage lodging, food service and travel facilities, and it was born from an industry demand for well-educated, highly-trained managers.

“With more two-income families, the restaurant, travel and tourism businesses are booming,” says Frank Pauze, director of the program. “That created a shortage of quality person-
nel in the industry.”

Someone had to fill the need. And since food and nutrition courses and a restaurant management sequence were already in home economics, it was only logical to put the new effort there.

The move has not been a mistake. In its short, two-year life, the program has enjoyed tremendous success. Student enrollment has jumped past 225 and is growing at a 50 percent annual clip. Industry support is strong; industry officials provide sites for a highly-structured student internship program and sit on an advisory board to help guide the program.

Most importantly, graduates are finding multiple career opportunities; they often have three or more offers from which to choose.

“Ohio State University is the perfect location for this program,” Pauze says. “Columbus is the 13th largest conference/convention center in the United States, it has more than 2,500 restaurants and more than 13,000 hotel rooms, and it is headquarters for 14 food and lodging corporations.”

Pauze sees enrollment topping 400 by 1988, but he doesn’t want the program getting too big. “Four hundred students is the most the program could handle without jeopardizing quality,” he says. “And we won’t sacrifice educational excellence. In the next decade, we want this program to be a national leader in hospitality education.”

The consumer services option began in 1974 and today has become a popular program in home economics. Its goal is to produce consumer affairs specialists who understand problems families and consumers face in the marketplace.

Government and non-profit agencies hire these graduates to provide reliable information to consumers, to serve as a liaison between consumers and producers, and to help families make good spending decisions. Businesses use consumer services people to more effectively design and target their products to consumer needs.

“Many changes in society and in the economic system created a need for consumer services,” says Jean Bowers, professor of family resource management who was instrumental in developing the program. “As the marketplace became more depersonalized and the use of credit more acceptable, as technology became more complex and advertising more sophisticated, households were often ill-prepared to make important and far-reaching decisions about their spending patterns.

“Consumer affairs professionals who understand families and their needs, and who understand the economic systems and the role of marketing can provide the needed information and education to consumers. They also can help businesses understand consumer concerns and needs.”

A program in the planning stages that also links economics and family life is family financial planning and counseling. The family resource management department is exploring ways to prepare students for careers in this area.

“Financial planning is a rapidly growing career area and is expected to continue expanding,” says Sherman D. Hanna, chairman of the family resource management department. “Financial planning services used to be strictly for wealthy people, but now many two-income families need help effectively managing their money.”

But, Hanna says, while many of today’s planners are strong in investment analysis and tax laws, they are not well-versed in fundamentals of family decision-making.

“Financial planners have told me they need to understand how families plan and set goals. Without knowing what’s important to a family and why, it is difficult to recommend appropriate investment and financial management strategies.”

These consumer- and business-oriented programs often surprise students who still associate home economics with nutrition, clothing and child care.

“Often students have said to me that they didn’t realize all of these programs were available here,” Harvey says. “People need to know that we’ve changed as the times have changed.”
E ven George Washington worked on his semblance of an experimental farm at Mount Vernon to diversify crops conserve soil, and improve his sheep and mules.

Fifty years before him during the early 1700s, Georgia settlers hired a botanist to establish an experimental garden and to collect plants from the West Indies and Central America. And, of course a hundred years earlier at Jamestown and Plymouth, every school kid knows about the settlers learning to grow maize from the Indians.

These early efforts were fruitful but disjointed. And that's how agricultural research in this country remained until 1887 when President Cleveland signed the Hatch Act, federal legislation that changed agricultural research in America forever.

William Henry Hatch was a U.S. Congressman from Missouri who served as a spokesman for the farmer. He fought hard in Congress for funds to supply pure strains of seeds and plants at a time when weakened strains and inferior crops were resulting when seed was saved from previous crops or swapped with neighbors.

His legislation created a federal-state partnership in agricultural research that resulted in experiment stations at land-grant institutions. Each was appropriated $15,000 annually.

Purpose of these experiment stations was spelled out clearly. Personnel were to study the physiology of plants and animals, crop rotation advantages, chemical composition of plants at different stages of growth, analysis of soil and water, chemical composition of manures, digestibility of different kinds of foods for animals, and scientific and economic questions about the production of butter and cheese. The act also indicated the need for publishing bulletins or progress reports.

Ohio was one of the few states that had already established agricultural research at its land-grant institution prior to the Hatch Act. Ohio's efforts, however, were faltering. The Ohio Agricultural and Mechanical College, named The Ohio State University in 1878, had been created following passage of the Morrill Act with the purchase of the 331-acre Neil Farm north of Columbus. This land was to serve as the site of Ohio's land-grant institution...
where agriculture and mechanical arts were to be taught. Research in these academic fields was deemed necessary to provide a continual flow of new knowledge into the classrooms as well as to improve the technology of the state's farmers.

Without sufficient funding or personnel and with a heavy teaching load, Norton S. Townshend, professor of agriculture, was assigned a portion of the college farm to conduct field tests and to maintain records. Results of the experiments were meager and uncertain.

The Hatch Act, however, made possible the hiring of Charles E. Thorne, the first full-time experiment station director. With full-time leadership, agricultural research blossomed.

Under the Hatch Act reorganization, the university trustees turned over the tillable portion of the university farm to the station. But, within three years, impending urbanization in Columbus resulted in the search for a new home for the experiment station. The station headquarters was moved from Columbus to Wooster in September 1892. Known as the Ohio Agricultural Experiment Station for many years, the name was changed to the Ohio Agricultural Research and Development Center in 1965.

The Hatch Act provided the scientific foundation for the nation's industrial base as well as providing continued development and training of personnel devoted to scientific investigations for agriculture. Then, as now, research has provided American agriculture with a competitive edge in world markets and the best quality food at reasonable prices.

Over the years, Hatch Act funds have helped allow OARDC scientists to remain at the cutting edge of a great number of agricultural research projects. A few include: crop breeding, field and horticultural crop production, soil conservation, animal nutrition and genetics, agricultural building design, agricultural pest and disease control, marketing of crop and livestock, and human development.

OARDC researchers received more than $4.5 million from Hatch Act funds in fiscal year 1987, allowing them to begin study in some new and exciting areas as well as to continue others that are part of multi-year projects.

Currently, funded projects range from the genetic impact of embryo transfer in beef cattle and strategies for managing orchard pests to rearing northern pike in Lake Erie and developing strategies to mediate farm crisis impacts on families and communities.

However diverse the topics of Hatch Act funded research are, an underlying common thread that ties them together is an attempt to understand the world so lives will ultimately be enriched.
Twenty-five years have gone into planning the 1987 Farm Science Review.

September 22-24 marks the silver anniversary for “Ohio’s Showcase of Agriculture.” And, according to the man now in charge, this major event developed from a uniquely simple mission.

“Our founders were smart enough 25 years ago to make the mission of the Farm Science Review flexible enough that we can still live with it today,” R. Craig Fendrick says. “That mission has not changed. We’ve done some new things over the years, but they’ve all been within the guidelines of our original purpose.”

On Oct. 15, 1962, the Ohio State Farm Science Review was officially born to “exhibit and demonstrate the latest advancements in farm power machinery and equipment with emphasis on methods of harvesting, drying, storing and handling field crops; to illustrate current scientific and practical findings in the field of farm crop production and management, and other educational demonstrations; to present through educational exhibits the latest developments in science and technology within the various departments and divisions of the College and the Research Center.”

The first Review was Sept. 25-27, 1963, at Ohio State’s Don Scott Airfield in Columbus. Some 18,000 visitors paid 50 cents each to visit with 116 commercial exhibitors, watch machinery demonstrations, and see the revolutionary new method of planting corn without tilling the ground.

In contrast, the 1986 Farm Science Review was staged on the 993-acre Molly Caren Agricultural Center, 30 miles west of Columbus near London, Ohio. Nearly 120,000 visitors paid up to $4 each to see 506 exhibitors and more than $50 million worth of farm equipment.

The Review has survived bad weather, poor farm economics and a 40-mile move. But Fendrick says it’s grown from a dream into the highest quality agricultural equipment show in North America.

“We borrowed the best from similar shows that existed in 1963 and built the Review idea from there,” Fendrick says. “The difference is we’ve kept growing. We have a permanent site, full-time management, and can guarantee exhibitors at least 100,000 visitors.”

Indeed, “Ohio’s Showcase of Agriculture” offers something for everyone. The 1987 silver anniversary celebration features a look back at the early years and honors the Review’s founding fathers. The National Plowing Match will be held during the Review. Eighty acres will house more than 500 commercial and educational exhibits. Millions of dollars of farm machinery will strut its stuff on 650 acres of crops.

And as Farm Science Review participants remember the last 25 years, its organizers are looking forward to the next 25.

“We change along with our audience,” Fendrick says. “Now that we have a permanent site we can do more. Watch us.”
The Bottom Line

OARDC computer program speaks a language farmers understand

“CASH gets right down to dollars and cents.”

“This program is a good example of where excellent agricultural software needs to be going.”

“It’s so easy, my kids can do it.”

These are comments from early users of the new Market Model computer software. It is the first in a series of software being developed for agricultural growers in the Computerized Advisory Service for Horticulture program funded by Ohio State University and the W.K. Kellogg Foundation.

The CASH computerized decision support system originally was developed for horticultural businesses but is now adaptable to other agricultural enterprises as well.

Franklin R. Hall, Ohio State entomologist at the Ohio Agricultural Research and Development Center and one of the CASH developers, says the program was initiated because orchard owners and other horticultural crops growers were asking for help with management decisions.

Hall says the program “helps growers see what’s making money and what’s not pulling its weight in their operations. It helps them find inputs that are not cost effective as well as identifying inputs that act as ‘insurance’ or simply make the job easier for the manager.”

Market Model, with its colorful graphics, allows growers to work with “what if” scenarios, plugging in numbers from their operations. If they don’t have the figures or don’t want to take the time to enter specific enterprise data, the program has backup information to help the grower with management decisions.

The CASH program focuses on simple relationships such as production-price-revenue, Hall says. For example, a strawberry grower may ask which is more profitable—to market berries in the retail market or in the pick-your-own market.

In this scenario, pick-your-own and retail each get probable packing, marketing and labor costs. Tag a 60-cent-per-pound price on the pick-your-own and an 89-cent-per-pound price on the retail. Probable profits for the crop under the grower’s conditions are obtained within minutes.

Another scenario that might interest an apple grower is this: Should field run Rome apples be sold directly at 13 cents a pound or be packed and stored to be sold wholesale at a later date? Prices can be plugged in for extra fancy, fancy or juice sale, depending on the month of sale market demand. The program also allows for variables such as shortage of storage capacity. Results again appear in a few minutes.

“The program always talks bottom line,” Hall says. “You can see differences when one factor at a time is changed, or when many are changed. You can compare varieties or compare enterprises such as apples and popcorn. And the program is applicable to any size operation.”

Market Model has a database of more than 30 agricultural enterprises ranging from tree fruit crops to processing vegetables and grain crops. The program is available by writing to Hall at OARDC, Wooster, Ohio 44691.

Alternative Income

Piketon Center will explore non-traditional agriculture

The new Piketon Agricultural Research and Extension Center, expected to be completed and staffed sometime in 1989, will impact more than the state’s farm community.

Ted Jones, assistant OCES director and head of the Piketon center steering committee, says the new facility “takes a non-traditional approach in areas of tremendous importance to all of Ohio.”

Non-traditional crops, greenhouse horticulture, aquaculture, wood drying and processing, water management and non-agricultural economic development will be emphasized. Other research is planned to determine the impact of farm and industrial practices on the Teays Valley aquifer. Jones says the center will include both research and extension faculty.

“Piketon will be researching things not covered at our other research centers,” Jones says. “Research there will help economically depressed areas develop alternative income sources compatible with the environment in that part of the state.”

The center is two miles southeast of Piketon in Seal Township and bounded by Ohio Route 124 and Shyville and Schuster roads. The state legislature appropriated $4.1 million last year to build the center. One hundred and sixty acres has been purchased.
New Grain Varieties
One is the first U.S. developed spelt

Three new Ohio State-developed grain varieties—one each for wheat, barley and the first U.S.-developed spelt—have been released recently for the first time to commercial growers. Howard N. Lafever, Ohio State University agronomist at the Ohio Agricultural Research and Development Center and key developer with that work, summarizes the high producing trio:

► Cardinal wheat. The combination of producing excellent, stable yields and having no major weaknesses made this selection a winner among many lines tested, according to Lafever. He dubs it a variety without an Achilles’ heel because select varieties often have at least one major drawback. Cardinal has excellent straw strength, high test weight, excellent disease resistance and excellent tolerance to acid soils.

The researcher says Cardinal and Becker, a variety released last year, are the only two varieties he’s tested that averaged more than 100 bushels per acre in three Ohio locations during ideal years. Cardinal averaged 66 bushels per acre in 31 replicated tests at three to seven locations in Ohio each year from 1981-86. It topped the previous high yielders of Becker, Tyler, Hart and Titan. Ohio’s average soft winter wheat yield for the past decade is 46 bushels per acre.

► Ray barley. Tests results showed this barley not only outyielded all others, it also is especially suited for a newer management practice—double cropping with soybeans.

“Compared with using winter wheat as a double crop option with soybeans, farmers can seed Ray and harvest it earlier than wheat and then seed soybeans sooner,” Lafever says. He says Ray has good lodging and disease resistance and shows good winter hardiness.

Yields were exceptionally high in the Ohio State tests, conducted from 1980-86. In those tests, Ray’s 81.3 bushel per acre yield average topped the commonly used varieties with bushel-per-acre yields of Maury at 76, Barsoy at 65.7 and Pennrad at 63.5. Lodging for Ray averaged only 3 percent, compared with the other three at 8, 19 and 24 percent, respectively.

Ray is named in honor of the late Dale A. Ray, oat and barley breeder at OARDC from 1956-81.

► Champ spelt. This new spelt variety, the first developed in the United States, has been tested in 17 yield trials over six years in comparison with the highest yielding spelt line selected from dozens of spelt samples collected on Ohio farms in the early 1970s. According to Lafever, Champ outyielded the top line by 25 percent. It also has greatly improved straw strength and leaf rust resistance.

Although considered a minor crop, spelt production in Ohio in recent years has exceeded 100,000 acres, more than any other state. Spelt is grown as a feed grain and seldom moves from the farm where it is grown. It is often considered by farmers as a winter substitute crop for oats.
Here are four extension programs popular with Ohioans. Taking part is as close as a phone call.

Business Retention and Expansion Program is not even a year old yet but has 16 counties already participating. R&E's basic purpose is to help existing businesses in small to medium-sized communities grow.

Co-sponsored by the Ohio Cooperative Extension Service and the Ohio Department of Development, R&E is operated locally by task forces and volunteer visitors. Each task force has 10 members, including a county commissioner, the mayor, a banker, an extension agent, a vocational school representative, and a Chamber of Commerce member. Each task force has a team of volunteer visitors—usually 25 key business personnel. The task force provides local guidance and makes a final recommendation based on the data compiled by Ohio State University extension economists. Although there are several different approaches to retention and expansion, volunteers visiting firms and conducting surveys is the first step.

Managing for the Future, designed to help Ohio farm families develop, organize and attain both short- and long-term goals, was offered statewide in the spring of 1986. By fall, programming began with an instant response of nearly 500 individuals.

Managing for the Future is a four-session workshop helping Ohioans put their future in focus. Part I introduces a family to goals and goal-directed management while offering self-assessment questions. After a candid, honest look at their wants and needs, they identify goals for farm and family, Part II. Part III takes the family one step further—into action. Through goal analysis and evaluation, families make judgments, setting priorities on those goals. Part IV utilizes the FINPACK (Financial Project and Analysis Package) business plan, assisting the family in developing a management plan based on their goals.

The Expanded Food and Nutrition Education Program (EFNEP), a federally implemented program conducted nationwide by extension, has an 18-year history in Ohio. EFNEP improves the diets and health of low-income, disadvantaged Ohio families. Graduates of the EFNEP program receive up to one year of instruction. They learn food buying, selection, preparation, storage, safety, and sanitation, while increasing their basic nutrition knowledge and building an awareness of how good food relates to good health.

Teaching is intensive. On a one-to-one or small group basis, nutrition aides assisted by volunteers reached 5,600 adults and 21,000 youth in 1986. The number continues to grow. EFNEP networks with other state and federally funded programs such as Food Stamps, Head Start, and the Women Infant Children program to find families that need help.

Pesticide Applicator Recertification Schools, held annually in cooperation with the Ohio Department of Agriculture, are scheduled for Dec. 10, 11, 15, and 16, 1987, and the yearly February schools for new applicators are scheduled Feb. 24 and 25, 1988.

Each year the schools reach 2,500 to 3,000 commercial and private pesticide applicators, offering them updated information concerning pest control and the safe, effective use of pesticides. Attendance qualifies applicators for recertification.

Extension specialists also provide pesticide training at statewide and regional meetings of farm producers and agribusiness organizations. Private applicators and agricultural producers usually attend training conducted by county agents, however, they may attend the December Recertification Schools or the February school for new applicators certified in Ohio. Ohio's certified pesticide applicators pass a written examination conducted by the Ohio Department of Agriculture, and, for recertification, applicators attend approved training or retake the exams.

Anyone interested in these Ohio extension programs should contact the local county extension agent or:

R & E—George Morse, 326 Agricultural Administration Building, 2120 Fyffe Road, Columbus, Ohio 43210-1044, or phone (614) 292-7922;

Managing for the Future—Judith Wessel, 166G Campbell Hall, 1787 Neil Avenue, Columbus, Ohio 43210-1295, phone (614) 292-0858;

EFNEP—Alma Saddam, 265D Campbell Hall, 1787 Neil Avenue, Columbus, Ohio 43210-1295, phone (614) 292-0827;

Pesticide Applicator School—David Miskell, 30 Agricultural Administration Building, 2120 Fyffe Road, Columbus, Ohio 43210-1044, phone (614) 292-4077.
**UPDATE**

**WASTE TO WORTH**

Akron uses an OARDC process to convert sewage sludge to beneficial compost

The city of Akron turns a costly waste product—sewage sludge—into a useful compost product, thanks to teamwork by Ohio Agricultural Research and Development Center scientists, Ohio business people, and Akron community leaders.

H.A.J. Hoitink, project leader and Ohio State University plant pathologist at OARDC, doesn't even need to say anything as he sniffs the air at the new Akron Composting Facility. His facial expression shows approval.

Other than a slight odor of bark mulch, the air surrounding the plant doesn't smell like a sewage sludge unit. When the balances are right, Hoitink says it doesn't smell at all.

Hoitink and others at OARDC have worked a long time perfecting the process for converting municipal sludge into an environmentally safe and useful compost product. But they've done it, and the Akron plant, which opened the doors to its new business earlier this year, holds the proof.

The process combines tree bark and sawdust with sewage sludge that has had most of its moisture removed. A trip through the Akron plant reveals a belt filter press room, where rollers and canvas squeeze water from the sludge.

The mixture then is moved to long bins on a porous metal floor where it is stacked about 10 feet high. Air is forced through the mass for a week to get certain reactions that yield mostly carbon dioxide and water. The air also cools the compost to enhance activity by certain microorganisms. After 2-3 weeks, the mass becomes a dry powder.

The dried product then is mixed with tree bark and peat. The result: A good growing medium for many ornamental plants.

While that explanation is over-simplified, the process is rather uncomplicated, according to Hoitink. What was complex was figuring a way to destroy human fecal pathogens while keeping alive the helpful microorganisms that naturally fight plant diseases in soil.

A key to solving the problem by Hoitink and several former OARDC associates was the discovery that the sludge did not need to reach the high temperatures once thought. In addition, the mixture composed for the process eliminates the need for wood chips commonly used in such operations and requiring costly screening processes.

One more realization was that pile sizes were too big in many plants, causing imbalances important to the process. The process is also shorter. What at one time took 42 days and caused odors now needs only three weeks. And, Hoitink says the time required soon will be shortened to two weeks, cutting construction and operating costs even further.

Development of this process by OARDC has helped Ohio emerge as a leader in converting a waste product into a compost Hoitink and his colleagues describe as especially suitable for reclaiming strip mine areas, for use in plant nurseries, or for replacing soil removed at sod farms.

People across this country and in Europe now ask Hoitink about the process. Apparently, more than Akronites want to know how to sell municipal waste. But Hoitink is quick to add that the new Akron business took much more than his efforts.

"The Akron plant is a good example of how researchers at OARDC, several business representatives, community leaders, and the new plant workers teamed up to get a job done," Hoitink says.
A Powerful Punch

Fat supplement kicks milk output into high gear

Some dairy producers are mixing a new granulated fat product into the diets of high producing cattle—and they’re getting even more milk.

Donald L. Palmquist, Ohio State University dairy researcher, developed the fat product that makes this possible.

He and other dairy scientists have known for some time that cattle have the genetic potential to produce milk beyond their ability to eat enough to support that production. The problem was, by the time cows were fed enough grain to keep production high, they could not eat enough forage to maintain other critical balances in their systems.

Palmquist learned he could increase energy by adding fat to the diet. But he had to work through two problems—not all fats worked the same way in the cow, and most fats were too messy to manage in a barn.

After testing many fats to find the optimum combination, he developed a calcium salt, sometimes called soaps of fatty acids, that does not interfere with fiber-digesting microbes in the cow’s rumen.

Palmquist recommends feeding it to high producing cows such as Holsteins averaging more than 80 pounds of milk per day, at the rate of about 3 percent of the dry matter in the ration. With excellent feed management, some producers get economical results with 5 percent, he says.

Church & Dwight Co. Inc. began manufacturing the product in May under the trade name Megalac at its plant in Old Fort, Ohio.