

# A History of the Department of Horticulture

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Special Report 363  
University of Missouri-Columbia  
College of Agriculture

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JULY 1988

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1840  
1863  
Early citizens in Missouri were interested deeply in horticulture, leading to the formation of the Missouri Fruit Growers Association in 1859. Prof. George C. Swallow of the University of Missouri served as temporary chairman, and Norman J. Colman, a St. Louis county horticulturist, was elected as the first president. In 1862, the name of the organization was changed to the Missouri State Horticultural Society. During this same year, the Morrill Act, which provided federal support for the establishment of colleges of agricultural and mechanical arts, was passed by the U.S. Congress.

This activity resulted in eight years of political turbulence over the location and affiliation of the new institution of higher learning. Initially, the Horticulture Society leaders wanted the new college of agriculture to be an independent institution separate from the University, but Professor Swallow, an active member, influenced his fellow horticulturists to support the establishment of the College of Agriculture as a part of the University of Missouri at Columbia in 1870. As part of the compromise, the College of Mechanical Arts was established as a separate institution as the School of Mines and Metallurgy at Rolla.

Prof. George C. Swallow was a colorful and multi-talented person. He had been educated at Bowdin College in Maine before coming to the University as a professor of natural sciences. In 1853, he had resigned to become Missouri's first state geologist, but shortly thereafter he returned to the University. In 1859, he was given the title, Professor of Natural Sciences as Applied to Agriculture and the Mechanic Arts. In 1870, he was titled Professor of Agriculture.

His own special interests were in horticulture, particularly grapes. Since the research farm was supposed to pay its own way, the grapes went to an obvious use. Viles notes in his *The University of Missouri — A Centennial History*: "The grapes were made into wine, which before it ceased fermenting, was stored in the basement of Academic Hall. The pervasive and unmistakable aroma had the effect to be expected on enterprising young men. The raids apparently failed and the faculty finally forgave the culprits."

Norman J. Colman was appointed United States Commissioner of Agriculture in 1885, and when the position was elevated to cabinet rank in 1889, he became the first Secretary of Agriculture. During his administration as commissioner and secretary, Congress passed the Hatch Act which supported agricultural experiment stations. Colman later organized the Association of American Colleges and Experiment Stations and the Office of Experiment Stations. Through his efforts, the various sections of the Department of Agriculture were reorganized and strengthened with well-qualified men, some from Missouri and surrounding states.

# Establishment and Administration

Horticultural instruction by Prof. Swallow and his assistants began immediately after the College of Agriculture was established. An experimental orchard of many kinds and varieties of fruit trees, grapes, and small fruits was planted in 1871, covering about 20 acres of the area now occupied by the white campus east of Hitt Street. The report of the Board of Curators to the governor in 1873 indicated that 113 students were enrolled in studies in general agriculture and 25 in horticulture. The course of study in horticulture included horticultural botany, pruning, propagating and transplanting, kitchen gardens, economic botany, fruit culture, and landscape gardening. The Department of Horticulture was established in 1878, with George Hussmann, one of the charter members of the Missouri State Horticultural Society, as professor and chairman. Prof. Hussmann's specialty was grape growing and wine making, and he is now remembered as the person who helped save the world wine industry during the middle 1870s by shipping native American species grape roots to France and to California in the fight against the grape phylloxera. Three years later in 1881, Prof. Hussmann traveled to California to expand his rootstock exportation activities and decided to remain there permanently.

During the term of the second chairman, S. M. Tracy, the experimental plantings were expanded to about 40 acres, including many of the newest and most promising varieties. There were 58 varieties of apples, 17 peaches, 42 pears, 5 cherries, 12 raspberries, 36 strawberries, and 76 cultivars of grapes.

Several men (S. M. Tracy, 1881-1884; L. R. Taft, 1884-1888; J. W. Clark, 1888-1892; and Charles H. Keffer, 1892-1894) served for short terms as chairman of horticulture until 1894 when Dr. J. C. Whitten was appointed. Dr. Whitten was originally from the East and had received his doctorate from the University of Heidelberg in Germany. He remained until 1918 and was replaced by Dr. Victor R. Gardner, who resigned in 1922 to go to Michigan State. He was succeeded by Professor Thomas J. Talbert until 1950, and by Dr. Raymond A. Schroeder until 1977. Therefore, these three men (Whitten, Talbert, and Schroeder) provided long-term leadership for the department—79 years out of its first 100. They were succeeded by Dr. Donald Hegwood (1977-1982), Dr. Delbert D. Hemphill (1982-1983), Dr. Ray R. Rothenberger (1983-1986), and Dr. Nicholas J. Natarella (1986-1987).

Prof. Talbert was noted for his skills in dealing with people; he was a politician in the best sense of the term. He was able to get people to work together and to cooperate in programs that would be mutually

beneficial. By gathering and organizing support from some of the grassroots horticultural organizations in the state, he was able to gain recognition for the needs of horticulture and put together financial support and backing for a developing department.

He always made it a point to speak to the students at the first meeting of the horticulture club each fall, but his speech was always the same. The substance of it went something like this:

“In all my years working with students and watching their progress in the *real* world after they complete their studies here in the Department of Horticulture, I have rarely seen one fail because he/she did not know enough about horticulture. The ones that did not succeed may have been expert horticulturists, but *they did not know how to get along with folks.*”

He always preached on the importance of this characteristic.

Dr. Schroeder's tenure as chairman covered a period of many problems, but he worked long and hard to enhance the position of our department. He organized the search for and acquisition of the New Franklin Outdoor Research Laboratory so that our research efforts could be consolidated and made more efficient economically. Under the leadership and direction of Dr. Aubrey D. Hibbard, the hilly farm was reshaped into a terraced and contoured model of good soil and water management. Lakes were located in such a way that hardly any water that fell on the farm ever ran off to the nearby Missouri River. These lakes then served as sources of water that could be used for irrigation of plots anywhere on the farm.

Two other important developments occurred during these years. One was the major reorganization of our teaching program—general curricular outline, as well as individual courses. Subject matter was reorganized in formats different than had been used previously, which made our teaching much more efficient and comprehensive. During the same period, Dr. Schroeder and his faculty was busy doing the detailed planning for our segment of the new College of Agriculture building and for new research greenhouses. This was a rare opportunity for us to have input on the layout and organization of facilities that would be used for many years.

One of the most memorable aspects of Dr. Schroeder's period as chairman was his philosophy of organization and governance of a public institution such as the College of Agriculture or the University of Missouri. He was a great proponent of “participatory decision making” and went to great lengths to keep his faculty informed of developments occurring anywhere in the university system that could bear on their decisions and plans for their teaching, research, and extension activities. He held regular, information-packed faculty meetings at which the

entire faculty contributed their ideas about what we should do to meet the challenges of the day.

One of his greatest contributions as a faculty member and administrator was to the University as a whole. For many years he was either a member or chairman of the campus-wide staff benefits committee. Under his leadership and guidance, this group was able to develop and get approval for implementation of the excellent staff benefits package—medical and dental insurance plans, disability insurance, retirement benefits, etc.—enjoyed presently by the entire University of Missouri.

Dr. Donald Hegwood came as chairman of the department in 1977 from Mississippi State University for a five-year period of service, before moving on to the University of Maryland as associate dean for instruction. He was chairman during the celebration of our first centennial in 1978. One of the major developments during this period was the more clear-cut division of our curriculum into emphasis areas.

During the year that Dr. Delbert D. Hemphill served as interim chairman and the following years during Dr. Ray R. Rothenberger's leadership, our department was approached by Mrs. Marjorie Powell Allen, of Overland Park, Ks. to develop the Powell Horticultural and Natural Resources Center, now called the Powell Gardens. The Powell Family Foundation made \$1.25 million available as seed money to get the project underway, with hope and anticipation that we would be able to secure additional sources of financial support to maintain operations.

The gardens are located on what was once the Powell Dairy Farm at Elm, Mo., along U.S. Highway 50 about 30 miles east of Kansas City. Before being converted to this use, the 580-acre farm had served for many years as the Powell Boy Scout Reservation.

**The gardens were created to promote the science of horticulture, the art of gardening, and the appreciation of nature. It was the hope of the grantors that it would help youth, particularly from urban areas, understand the origin and production of the food that we eat. These goals are to be achieved by research, education and display.**

The Powell Gardens are actively engaged in testing and evaluating both ornamental and edible horticultural plants. It is an official trial garden for the All-American vegetable selections. Classes and workshops in horticulture and outdoor education are offered year round to both adults and youth. The Gardens sponsor summer internships for high school and college students. Many special displays are featured: an annual flower garden, a perennial garden, a prairie garden containing native grasses and forbes suited to home landscape use, a hemerocallis garden, an international vegetable garden, the vegetable test garden,

and an integrated pest management garden that demonstrates ways of gardening without a significant use of pesticides or synthetic fertilizers.

Initially, David A. Vismara, who came from the Missouri Botanical Garden in St. Louis, acted as supervisor for the facility (1984-1986), but then he resigned to accept a similar position at the Chicago Botanical Garden. Dr. Barry R. Yinger from the National Arboretum in Washington, D.C., was hired in 1987 as the director of Powell Gardens.

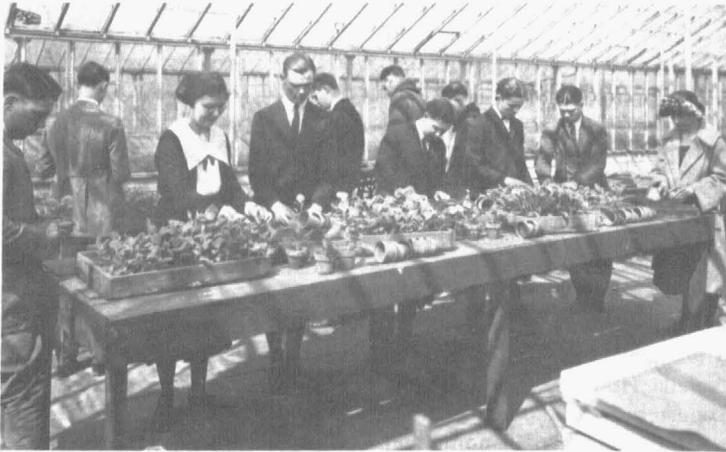
A new visitor's center has been completed near the entrance, and a special open house celebration was held in September 1987. A great deal of the early input and planning for the Gardens was carried out by Profs. Leon Snyder, Ronald Taven, Michele Warmund, and David Minner, and two of our former undergraduate students, Joe Hobson and Natalia Howard, have been involved with the on-site development. Long-term development plans for the Gardens have been prepared by the Environmental Planning and Design firm from Pittsburgh, Pa.

## Development of Facilities

The first greenhouse was constructed in 1878, and a second one was added in 1882. Both greenhouses were destroyed by a severe windstorm in 1890. The new department did not have a permanent home until the completion of a new building in 1903, which horticulture shared with the Department of Entomology and the Department of Botany. It was the first university structure built of the native limestone quarried at the southeast corner of the campus near Stadium Drive and Rock Quarry Road. In 1922, it was given its official name, Whitten Hall, in memory of Dr. Whitten, who had served as chairman of the department for more than 20 years, and was the first of many additional limestone buildings to be constructed later on the white campus. Initially, two greenhouses used for teaching and research purposes were attached directly to the east side of the building, and connected to each other by a conservatory. After a few years, these greenhouses were moved to a location a few hundred yards to the south and east and added to a new and more extensive area of greenhouse facilities for the department. Additional greenhouse space was added to this area during the 1920s, and additional units were erected in 1939-1940.

During the early years, research programs were very much field oriented. The small initial orchard on the campus quickly became inadequate in space, and in 1911, the 85-acre Turner Station orchard, six miles southwest of Columbia, was purchased. It provided the outdoor

Freshmen  
horticulture  
students of 1923  
pot young  
greenhouse  
plants.



research space needed for about 25 years until it was outgrown. At this time (1938), the Midway farm, 7 miles west of Columbia, was purchased and used for studies related to orchard moisture management and pest control.

At about this same time, it was decided to establish outlying research fields near the commercial horticultural industry in the state. Prof. Talbert had a long-held conviction that for research to be most effective, it should be done near the major areas of production of the commodities concerned. His skill in the political arena finally led to a special line-item appropriation for the creation of a series of experiment fields.

The new horticulture experiment fields were established at Campbell (peaches and vegetables); Charleston (watermelons, cantaloupes, and sweet potatoes); Monett (strawberries, grapes, and tomatoes); Orrick (potatoes); and St. Joseph (apples). In 1937, Dr. Aubrey D. Hibbard was appointed Experiment Field Supervisor, and the line-item system of legislative support for special projects continued until 1953, when it was forbidden by the University administration.

One noteworthy benefit from the Campbell Experiment Field was the initiation of the peach industry in southeastern Missouri. When the Campbell Field was established in 1937, there were fewer than five acres of peaches in the Crowley Ridge area. By 1953, this had increased to 2,000 acres, and since then, to more than 3,000 acres.

Our activities at the Campbell Field resulted in another important benefit for the College of Agriculture and the University of Missouri. Mrs. Margaret Marsh and her daughter, Mrs. Matilda Cavanagh, had observed our success with vegetable crops at Campbell, and began to grow vegetables and strawberries commercially on their farms at



A gardening class in July 1942 transplants and thins strawberry runner plants under the supervision of Professor T. J. Talbert.

Portageville. This eventually led to an agreement in the mid-1950s in which they willed their farms to the University of Missouri for the establishment of the Southeast Missouri College of Agriculture research and extension facility. This facility still continues to be actively engaged in activities involving several departments of the college.

In the early 1950s, financial stresses within the department made it necessary to consolidate research operations. A new 240-acre farm on top of the first set of river hills with deep, wind-blown, brown loess soil near New Franklin was purchased in 1953, and shortly thereafter an adjoining 73-acre lake that had formerly been owned by the MK & T railroad was purchased by the Missouri State Horticultural Society. It was given immediately to the Department of Horticulture to provide a source of irrigation water for the new farm. Simultaneously, all the other land holdings were disposed of, and all our outdoor research activities were once again concentrated in one near-campus location. This new site, however, was very similar in topography, soil type, and air drainage characteristics to the major commercial fruit producing areas of the state, and has continued to serve as an excellent outdoor research laboratory and experimental orchard.

In the late 1950s, a period of extensive new building construction on the UMC campus led to the completion of the present Agriculture Building and a modest area of new research greenhouse space (located on Ashland Gravel Road). These new facilities were occupied by the department in the summer of 1960. This new and expanded research laboratory space, specialized teaching areas, and floriculture research greenhouse space had been planned by members of the department for our future use, and represented a distinct step forward in physical facilities.

# General Program Development

Initial teaching and research programs were practical and applicable in nature, since very little in the way of controlled scientific research in an applied science, as is horticulture, had been carried out. Most of the early faculty members were interested in the production or utilization of the food crops segment of horticulture and were general horticulturists by background, interest and training. Some of those early pomologists were Prof. W. L. Howard, who began work in 1902; Dr. William H. Chandler (1907); Dr. C. C. Wiggans (1911); Prof. Harold G. Swartwout (1919); Dr. H. D. Hooker (1920); Dr. F. C. Bradford (1921); Dr. Andrew E. Murneek (1925); Dr. Frank Horsfall and Dr. Aubrey D. Hibbard (1934). Dr. Jake A. Hopfinger (1978-1982) worked in the area of nutrition and post-harvest physiology of apples, and Dr. Jerry M. Williams (1979-1983) worked with small fruits and southern peas. Dr. Michele Warmund, our present pomologist, began work for the department in 1983.

Prof. Harold G. Swartwout spent 40 years working in the area of applied horticultural pest control. He bridged the era in which inorganic pesticides such as lead arsenate and sulfur gave way to organic pesticides like ferbam, DDT, and the organic phosphates. For years, he provided midwestern horticulturists with one of their best sources of information in this crucial management area.

In 1911, Prof. Horace Major, a specialist in landscape gardening, came from Cornell University to join our faculty, and for over 30 years, he directed the teaching program in that area. He was succeeded in 1950 by Prof. Harold E. Mosher, in 1959 by Prof. Willard Summers, in 1960 by Prof. Ronald Taven, and in 1967 by Prof. Leon Snyder, our present landscape architect.

The first faculty member specializing in vegetable production appears to have been Dr. Joseph T. Rosa, who joined our faculty in 1918. During the period 1918 to 1932, Prof. J. T. Quinn was responsible for the vegetable crops teaching and research. Prof. Earl Allen served in that capacity from 1932 to 1934, followed by Dr. Raymond Schroeder in 1935, and by Dr. Victor Lambeth from 1950 until the present.

Prof. James E. Smith, Jr. was hired in 1939 as our first specialist in the area of floriculture and greenhouse flower crops production and marketing. With the political support of the Federated Garden Clubs of Missouri, a small line-item appropriation (\$15,000 per biennium) had been secured to support a teaching, extension, and research position in the area of greenhouse and nursery management and to fund the building of a 25 x 100 ft. greenhouse with a small attached headhouse.



The fruit judging team of 1913 pose with their first-prize trophy from the American Pomological Society.

For the next 20 years, this served as the center for both teaching and research in this area. Prof. Smith was joined in 1951 by Dr. Marlin N. Rogers for teaching and research in floriculture, and upon his retirement in 1977, was succeeded by Dr. David Trinklein.

Woody ornamentals and nursery crop production was given more prominent support in 1958, when Prof. Ronald Taven was hired to head up that segment. Additional teaching and research effort was added to the area in 1979, when Dr. Christopher J. Starbuck came to us from Oregon State University. Finally, our specialization in teaching and research in turf management problems began in the mid-to-late 1960s when Prof. William Lobenstein was hired in 1966 and Dr. John Dunn began his work in 1968. Dr. David Minner came in 1984.

## Horticulture Club

Open to all students who have an interest in horticulture, the horticulture club has, for at least the past 70 years, been an important arm of the department's program. Its founding predates the memories of all present faculty members of the department. However, the *Savitar* for 1917 lists horticulture club among the activities of a number of the graduates. The Horticultural Seminar Society is listed as an extracurricular activity for some students in the 1914 *Savitar*. We conclude, therefore, that the horticulture club grew out of this earlier organization at about this time.

During the 1930s and 1940s, the horticulture club was actively engaged in events such as Farmer's Fair in the spring and Farm and

Home Week during the fall semester. The students set up displays and educational exhibits for the latter and staged a horticulture show each year as part of the program. In the spring, they prepared floats for entry in the Farmer's Fair parade. Meetings were held twice monthly at which interesting programs were presented, and the club's business was transacted. More recently, the horticulture club has become more service-oriented in its activities. Its members have been deeply involved with the development of the Woodland and Floral Garden. Along with the forestry club, they underwrote the planting of new shade trees along the front of the Agriculture Building, and the rebuilding of its front lawn. Funds have also been given to the department to help renovate and modernize some of our teaching greenhouses.

## Horticulturists As Propagators

Since our founding, the Department of Horticulture has budded and produced several new offspring. In 1936, it was renamed to become the Department of Horticulture and Forestry, and for a number of years offered a two-year program in the area of forestry. In 1947, the forestry personnel were separated into a new department, the Department of Forestry (later the School of Forestry, and now known as the School of Forestry, Fisheries, and Wildlife). At that time, our department again became the Department of Horticulture.

In 1967, four other horticulture faculty members (Dr. Robert N. Goodman, Dr. Daniel Millikan, Dr. James Ross, and Dr. Billy Tweedy), four research specialists, two post-doctoral students, and seven graduate students were separated from horticulture and transferred to the newly formed Department of Plant Pathology. At the same time, Dr. Marion Fields, one research specialist, and two graduate students were transferred to the new Department of Food Science and Nutrition being formed.

While still members of the Department of Horticulture, all of the contingent that were moved to plant pathology had become recognized internationally for their excellent research contributions. Dr. Goodman had started his research career by pioneering the use of antibiotics like Agrimycin for the control of fireblight of apples and pears, caused by the bacterial pathogen, *Erwinia amylovora*, and has since gone on to become one of the world's authorities on bacterial diseases of horticultural crops. In cooperation with the Missouri State Department of Agriculture, Dr. Millikan worked closely with Stark Brothers Nursery for about 20 years in developing and implementing a system of virus indexing of their foundation block mother trees, which produced the scion wood

and buds used for propagation of the thousands of peach trees they produce every year. Since that work, peach yellows has essentially disappeared as a disease of importance in commercial peach orchards planted with virus-indexed trees. Drs. Tweedy and Ross had worked closely together upon the biochemical and physiological effects of chemical pesticides in the orchard and were later lured away into commercial activity by CIBA-Geigy.

Dr. Fields, who moved to the Department of Food Science and Nutrition, had started his research on high-temperature-resistant food spoilage organisms in our laboratories. He has continued his work in this important area in Food Science and Nutrition, and like the plant pathologists, has achieved international recognition for his excellent work.

## Notable Horticulturists

During the past century, many notable horticulturists who passed through our department as students or as members of our faculty went on to positions of prominence in other areas of our country. Prof. W. L. Howard carried out significant early studies on winter rest and dormancy in fruit crops, and published his results in the first horticultural research bulletin from the Missouri Agricultural Experiment Station in 1910. It was entitled *An Experimental Study of the Rest Period in Plants—The Winter Rest*.

Dr. Arthur J. Heinicke, who in 1921 became head of the Department of Pomology at Cornell University, had secured his B.S. and M.S. degrees in our department before World War I. His research expertise was in the area of plant physiology relating to fruit plants, and he was very active in scientific organizations: American Association for the Advancement of Science, president and fellow of the American Society for Horticultural Science, and a member of the Botanical Society of America, and the American Society of Plant Physiologists.

Dr. William H. Chandler, who completed his Ph.D. here in 1914, later went to California by way of Cornell. He was president of the American Society for Horticultural Science in 1921, and was a noted authority in the areas of propagation, physiology of fruiting, and cold injury to fruit trees. *Deciduous Orchards* and *Evergreen Orchards* chronicled the results of his life work.

Drs. Victor R. Gardner, H. D. Hooker and F. C. Bradford, who were all members of our faculty immediately following World War I, summarized their basic research in horticulture in the textbook, *Fundamentals of Fruit Production* in 1922, and for the next 30 years in later editions, it was used nationwide.

Dr. Andrew E. Murneek, who had come to Missouri from Oregon State, and earlier as a young man from Latvia, was a noted physiologist, and was especially interested in the physiology of plant reproduction and plant growth hormones. One of his major contributions was his translation from Russian to English of Maximov's *Plant Physiology*. He was a contributor to and editor of the book *Vernalization and Photoperiodism* published by Chronica Botanica in 1948, which is still a fundamental reference in this field. He also teamed up with T. J. Talbert to write *Fruit Crops Production*. He served a term as president of the American Society of Plant Physiologists.

Dr. Carl G. Vinson, a skilled protein biochemist, was very much involved with the purification and isolation of tobacco mosaic virus, a feat for which Dr. W. M. Stanley from the University of California, was awarded the Nobel prize in 1946. Dr. Vinson had been able to show that if a healthy plant was inoculated with a purified protein fraction from the juice of a TMV-diseased plant, the inoculated plant became diseased and was stimulated to produce more of the living virus protein.

Dr. Hudson T. Hartmann, who went to the University of California after completing his graduate work here, is a well-known authority in the area of plant propagation, and the co-author of the standard plant propagation textbook, *Principles of Plant Propagation*.

Dr. Norman F. Childers, who completed his B.S. and M.S. degrees with us in the early 1930s, later went on to become professor and chairman of the Department of Horticulture and Forestry at Rutgers University. His textbook, *Modern Fruit Science* was first published in 1961, and is now in its seventh edition.

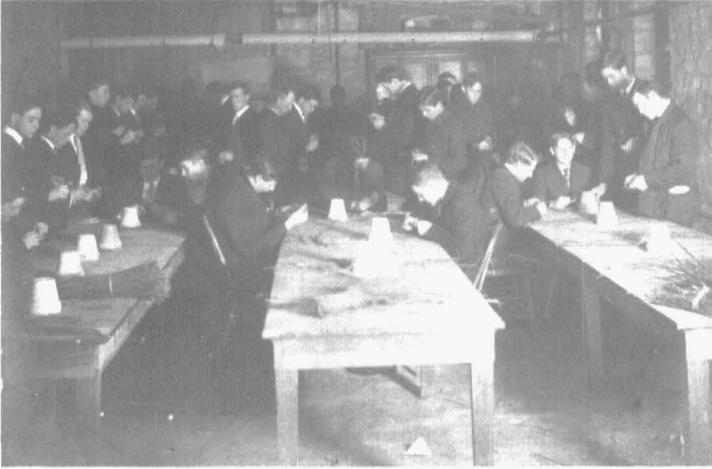
Dr. Sylvan H. Wittwer, (Ph.D. 1943), became director of the Michigan Agricultural Experiment Station in 1965. He has had a distinguished career as horticulturist, administrator, and international authority in the area of world-wide food production.

Dr. Joe J. Hanan, who completed his B.S. degree here in 1952, has become well known for his research at Colorado State University in environmental control and manipulation in greenhouses, and has also published two important recent books: *Greenhouse Management* and *Plant Environmental Measurement*.

The above listing is not intended to be all inclusive and does many other equally meritorious alumni a grave injustice by their omission.

## Teaching Activities

Horticultural teaching started immediately with the establishment of the College of Agriculture and was carried out initially by Prof. Swallow, who had been an active member of the state horticultural



A horticulture class of 1907 practices grafting in the basement laboratory of Whitten Hall.

society, and his assistants even before a department of horticulture was formally organized with a professor and chairman. Some of the early courses taught included horticultural botany, propagating, transplanting, pruning, kitchen gardens, fruit culture, and landscape gardening. Later on, instruction included course work in other basic sciences such as mathematics, chemistry, entomology, plant pathology, and plant physiology in addition to the applied courses in horticulture.

From the beginning, a great emphasis was placed on the *fundamentals*—how plants grow; why they respond as they do to stimuli around them. The students received a high quality education, because many of them went on to further study at other prestigious institutions, and have filled important and influential posts in academia, government, and public service.

In the early 1960s, the College of Agriculture made major adjustments in its existing B.S. degree curriculum, and at the same time, the Department of Horticulture made a major reorganization of the courses offered. The purpose of these changes was to reduce duplication, and at the same time, make our teaching efforts more efficient and comprehensive. We developed a set of core courses that were required of all horticulture students—courses such as horticultural plants, plant propagation, plant environments, plant protection, plant nutrition, and plant origin and development. At the same time, we reorganized the course content of our production-oriented courses, expanded our offerings in the area of landscape horticulture, added a number of new graduate level courses, and updated and restructured the previously existing ones.

At present, some revisionary changes are again occurring at the college level in the basic B.S. curriculum. There is to be a greater emphasis on communications skills, with each student now being required to complete at least two writing-intensive courses, one of which must be in the College of Agriculture. These courses are regular courses in various disciplines which require the preparation of a significant amount of finished and revised written material. There is also to be an additional mathematics course required for all students to enhance their problem-solving skills.

We have also made some changes in our departmental requirements for students in the different interest areas in horticulture to keep our offerings current. Minors programs are now available in the College of Agriculture for the first time, and each department that wished to participate (which we have done) has developed a listing of courses that would meet the minimum requirement for such a program.

For the 38 years he was a member of our faculty, Prof. James E. Smith, Jr. regularly taught two or three courses each semester. He sometimes caused dismay among his students, because he was an early riser and liked to schedule his first lecture for 7:30 a.m. which did not always suit the schedules of the sleepy heads. For 20 years, he instructed over 1,000 students in flower arrangement. He also taught classes in floral design and flower store management for students interested in the area of retail floriculture.

At the same time, he had good mechanical skills and taught an excellent course in plant forcing structures—greenhouse construction and maintenance. His plants for interior design course (plants for use in malls, offices, etc.) is believed to have been the first such course offered at a United States university.

Since shortly after his arrival, Dr. David Trinklein has served as the department's director of undergraduate programs and has been actively involved with the curricular changes that have occurred. He has represented us on all the major committees involved with these changes: courses and curriculum committee, honors council, and the College of Agriculture policy committee.

Prof. Ronald E. Taven is on a full-time teaching appointment and covers the areas of basic home horticulture, and identification and maintenance of horticultural plants in the landscape. His special talent for putting together multi-media, slide-tape presentations has gained him national acclaim, and he has more invitations to make such presentations than time to accept them.

For the past several years, he has been the faculty member in charge of our Woodland and Floral Garden. This area near the Agriculture building had earlier been used by Prof. Smith as a garden



A gardening class of 1908 takes to the fields.

flowers teaching garden. Its potential inspired a dream in three landscaping students (Kevin Gerard, Kevin Karel, and William Ruppert). They developed a design and took their proposal to the University's Student Fee Capital Improvements Committee in November 1977. Approval and funding came in February 1978. For the next year or so, horticulture student volunteers from the landscaping and floriculture areas of the department donated their time and labor to carry out the plan. The Woodland and Floral Garden was dedicated in a formal ceremony by Chancellor Barbara Uehling on April 18, 1980. Since that time, the garden has served as the place where new and unusual plants can be planted, observed and studied by students in the department, and a place where the general public can come and enjoy peace and quiet in the center of a bustling campus.

Professor Leon C. Snyder, Jr., also on a full-time teaching appointment, is in charge of the landscape design segment of our curriculum. He has implemented many new and creative ideas in his teaching activities. One way some students enter the design curriculum is through the micro-environmental design course. This is a three-dimensional design course in which students develop miniature landscape compositions in the form of tray-gardens in a series of projects that combine the characteristics of Japanese bonsai in an American interpretation. In this course, all the basic design principles can be taught, but in a way that most students find much more stimulating than if they were placed at a drawing table with pencil and paper. Prof. Snyder has developed the concept of micro-environments in great detail and has received many invitations, both from this country and from

Floriculture  
classmates, from  
left, Ralph  
Dobbs, Tom  
Westpheling,  
Robert Bock and  
Arthur Epstein,  
transport  
evergreens in  
1943.



abroad, to lecture and demonstrate his techniques in symposia and workshops.

Prof. Snyder was also in on the ground floor when computer graphics came on the scene and has moved quickly to give his students the skills they need to use them. He was able to secure the equipment needed for his own research in this area through a grant proposal to Campus Computing Services and has exhibited his work by invitation in the Stanley Hall gallery. All his students now leave with hands-on experience in the area of computer-assisted design and graphics.

Undergraduate education has had an interesting history during the past 10-15 years. Throughout the entire United States (in fact, this has been a world-wide phenomenon), starting about 1970, the numbers of students requesting admission to horticulture departments everywhere began to escalate rapidly. From 1970 to 1977, our enrollment of students in two of our core courses, plant environments and plant protection, increased about 10-fold (Figure 1, page 28). Classes that normally had 10-15 students suddenly had 100-120 clamoring to get in. Courses for which we had been teaching a single laboratory suddenly required four lab sections. This sudden surge in enrollment appears to have been related to the trend of the times—it was a time when there

was great interest among young people in the back-to-nature movement—a period of great environmental concerns. This was a period of considerable stress for the faculty and staff of a small department such as ours, since the students were in their seats waiting to be taught, and we were unable to expand our staff in proportion to their numbers. As a result nearly all of us spent many more hours than we had before in the classroom—it was not uncommon for those with the heavier teaching loads to be in class for 20-25 hours per week. Class preparations and grading were things we did while we were resting. As a consequence, many of us had much less time than we had formerly for research-related activities, and our output in that area suffered considerably.

As far as we can determine, the first Ph.D. granted by the department was in 1914, and many M.S. degree studies were being carried out at about the same time. In 1972, our M.S. without thesis program was instituted for students who could benefit from taking additional course work, rather than completing a research project which would culminate in a formal thesis. This was normally considered to be a terminal degree. Students planning to proceed toward the Ph.D. later were expected to complete an M.S. research project and write up the results in the form of a thesis.

## Research Accomplishments

Up until the 1940s, most of the research carried out by the department was pomological in nature. The early physiological research of W. L. Howard, W. H. Chandler, and A. E. Murneek were classics. The results of a six-year study of rest periods in plants was reported in five research bulletins from the Agricultural Experiment Station. These reports formed springboards for later important discoveries at Missouri and elsewhere. From 1904 to 1913, extensive studies were carried out in the area of low temperature injury to plants, using laboratory-oriented procedures for the first time.

During succeeding years, Missouri horticulturists continued to make notable research discoveries in many areas: physiology of fruit set and fruitfulness; photoperiodism; plant breeding and variety evaluation; spray compatibilities and the development of spray schedules; spray residues and their removal; use of chemical growth regulators for control of growth, setting fruit, thinning blossoms, and reducing fruit drop; and chemical weed control.

Dr. Delbert D. Hemphill joined our faculty in 1948 with an interest and expertise in the area of chemical growth regulators. He worked on many problems in this area, for example: the development of

parthenocarpic fruit in greenhouse tomatoes where natural pollination was difficult; the use of chemical growth regulators for thinning blossoms on apples; the stop-drop hormone sprays for apples; and later on, the use of chemical growth regulators as herbicides and weed control materials.

During the 1960s, there was an increasing interest and concern about the effects of trace substances in our environment—air, water, and food—upon human health and epidemiology. Through studies that he was doing with residues of organochlorine, organophosphate, and carbamate pesticides on horticultural products, Dr. Hemphill became involved in this area of research, and in 1965, accepted a half-time appointment from the UMC Trace Substances Research Center. In 1967, he chaired the committee that planned the first annual conference on Trace Substances in Environmental Health on this campus, and later edited the proceedings of the meeting. He has continued to do this each year until now. Again, this program has led to world-wide recognition and countless invitations to speak abroad at conferences and symposia on this subject.

In addition, Missouri horticulturists have helped advance our knowledge in the area of plant nutrition: the effects of C/N ratio on fruitfulness; the concept of nutrient element balance; colloidal clay technique as a research tool; the use of soil and plant tissue analyses as bases for fertilizer recommendations; and nutritional studies, particularly trace elements, on soilless plant growing media.

**Plant breeding and genetics as applied to horticulture** were also important research areas for our research personnel. Numerous cultivars of apples, plums, grapes, strawberries, watermelons and tomatoes have been developed by Missouri horticulturists. Missouri scientists (Tucker, Schroeder, and Lambeth) played a major role in transferring field-immunity to *Fusarium oxysporum* (race 1) to garden, greenhouse and field tomato cultivars.

The tomato breeding program is one of our department's main claims to fame at the international level. The program began as a cooperative effort in the 1930s between Dr. Schroeder and Dr. C. Mitchell Tucker, a plant pathologist in the Department of Botany. Dr. Lewis Stadler, the UMC geneticist, provided advisory input. A species tomato from Peru, *Lycopersicon pimpinellifolium*, had been accessioned by the USDA, and it was supposed to be resistant to diseases. Since *Fusarium* wilt was the most limiting factor in tomato production in Missouri, Drs. Schroeder and Tucker decided to see if the new accession was resistant to this fungus and if it might be of use in a plant breeding program. Because the fruit produced by this species was only  $\frac{1}{4}$  to  $\frac{1}{2}$ -inch across, a long-term effort was in prospect to get the size and

horticultural qualities that were needed for commercial useage if it were resistant.

Following Stadler's advice, they began making their crosses and developing inbred lines that could serve later as parents of F<sub>1</sub>-hybrids for garden and greenhouse use. Dr. Tucker passed away about the same time Dr. Schroeder became department chairman in 1950, just as Dr. Victor L. Lambeth was coming to our faculty to do teaching and research on vegetable crops. The tomato breeding program was transferred to him and has continued under his guidance. The first named Missouri hybrid, Surprise, was introduced in 1955 and has been followed in regular succession with more than 30 other named cultivars and breeding lines. One of the most difficult jobs for Dr. Lambeth has been thinking up appropriate names for all his "offspring". In addition to disease resistance, other desirable characteristics such as crack resistance, even ripening, firm-fleshed fruits and good post-harvest quality have gradually been incorporated into the varieties coming out of the program.

Even though all these new varieties have been important to Missouri horticulture, of even greater importance at the international level has been the collection of these different heritable characteristics in the inbred breeding lines. Many of the new tomatoes coming out of breeding programs all over the world owe some of their key characteristics to genes that came from the Missouri genetics and breeding program.

Dr. Lambeth has developed world-wide recognition among tomato geneticists and has been invited to participate in symposia, seminars and scientific visits to most of the continents of the world.

Starting about 1950, with the addition of Dr. Marlin N. Rogers in the area of floriculture, research resulted of value to florists: year round cropping of snapdragons, improved systems of stock plant culture for geraniums, carbon dioxide enrichment of greenhouse atmospheres, identification of self-generated ethylene gas as an important air pollution problem in polyethylene-covered greenhouses, use of chemical growth regulators for growth control of flower crops, tissue culture propagation of specialized floral crops, and improved post-harvest care of cut flowers and potted plants. His work with ethylene and in the post-harvest area has generated great interest here and abroad.

Since Dr. Chris Starbuck came to work with woody ornamentals and nursery crops (1979), many problems related to these areas have been studied. Techniques were devised to enhance the development of new roots and subsequent survival of bare-root, transplanted nursery stock. These included the application of growth regulators and water-holding gels to roots and the holding of roots in aerated water prior to transplanting. Low-cost systems for winter protection of container-

grown stock were also developed.

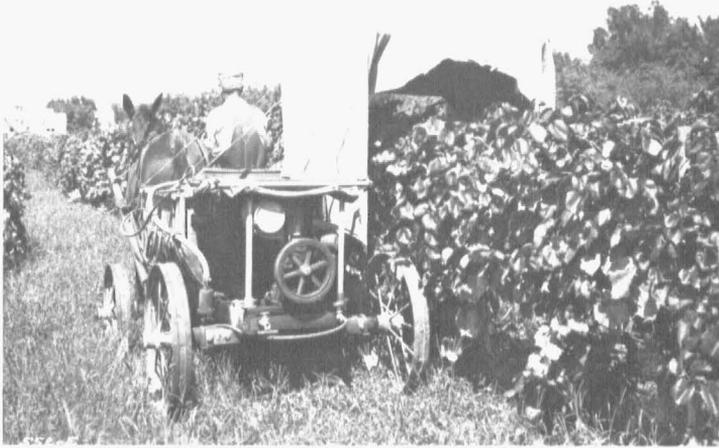
Dr. John Dunn was employed in 1968 to teach and do research in the area of turf. For many years he did both, and at the same time, he carried on an active extension program with commercial turf interests in Missouri and surrounding states. He was joined in 1984 by Dr. David Minner, who was assigned to research and extension activity.

The major emphasis of the turf research program from its inception has been the evaluation and development of cultivars and species of grasses well adapted to Missouri's borderline climatic conditions. We are located at the southern edge of adaptability for cool season grasses and at the northern edge of adaptability for warm season grasses. We are also at the pivot point for moisture—between the dry lands of the West and the more moist climates of the East. In addition to the work with species and cultivars of grasses, many physiological and nutritional investigations have been carried out to enhance the lawn performance of the best cultivars we have available.

Dr. David Minner, who works 25 percent of his time in turf research with Dr. Dunn, came from Colorado State University, where he had carried out basic research in the area of water relations and drought resistance in grasses. He continues this work here and would like to introduce methods of turf maintenance that would conserve scarce natural resources, particularly water, but at the same time produce an aesthetically acceptable turf.

## Extension Activities

Federal legislation establishing agricultural extension programs became law with the passage of the Smith-Lever Act in 1914. However, extension-type activities had been carried out much earlier by our faculty. This writer can recall Prof. Talbert reminiscing about the "good old days" when faculty from the Department of Horticulture along with their peers from other departments in the College of Agriculture would travel as a group by train to different towns and county seats over the state, particularly during the winter months. They would stop a day or so at each location and give lectures, demonstrations, and short courses about the newest ideas in improved farming methods in each of their respective fields to the farmers of the area. The travelling professors heard each other's lectures so many times that on occasion, to break the monotony the dairyman would give the horticultural lecture and the horticulturist would trade off with someone else. As early as 1881, S. M. Tracy was employed by the Department of Horticulture for short course teaching.



In 1944, a covered hood was used when grapes were sprayed with insecticide.

The first person hired specifically as an extension horticulturist was a pomologist, Fred W. Faurot, who began work in 1917. Later, he went on to become director of the Mountain Grove Fruit Experiment Station. His son, Don Faurot, later completed his master's degree research on a grape pruning problem in our department before later becoming the long-term coach of the Missouri Tigers football team. A number of others, H. A. Cardinell, Ashley P. Boles, and E. A. Bierbaum, followed in the area of fruit extension until 1929, when William R. Martin, Jr. came into the post and served until 1965. His present successor is Dr. Arthur E. Gaus.

Prof. Martin began his work at a challenging time for fruit extension. The entire country was entering the period of the Great Depression. The severe droughts of the 1930s devastated most of the agriculture and horticulture of the Midwest. Following the big increases in fruit production that had peaked during the previous decade or so, insect and disease problems had become so severe that it was difficult to produce saleable quality products. The federal government also had begun enforcing strict tolerances upon the residues of lead and arsenic on the finished product.

Prof. Martin not only assisted the growers with their production problems, but also took an active interest in marketing. Through his guidance, the growers succeeded in getting legislation passed for the compulsory contribution of each grower to a fund for the promotion of Missouri apples. After careful study, he determined that Missouri growers should concentrate on the production of high quality apples

which could be distributed to areas south and west of the state immediately upon harvest, thus avoiding the serious competition from western and northern grown fruit. That basic marketing philosophy continues. Very few Missouri apples are held in cold storage for sale later during the winter; they had been before Prof. Martin's arrival.

Vegetable crops extension began in 1921, with Prof. E. M. Page, followed by J. W. C. Anderson, Clyde R. Cunningham, and Allan Purdy. Dr. Arthur E. Gaus assumed responsibility for vegetable extension from 1954 to 1987.

When Dr. Gaus began work as state specialist for vegetable crops extension, he did not spend many nights at home during the January-to-March period. Annual vegetable extension meetings, which were directed primarily toward home gardeners, were scheduled in nearly every county of the state—usually at the rate of two per day—one in the afternoon in one county and the next in the evening in another county. Missouri has 114 counties and the city of St. Louis. The state vegetable extension specialist had to be a man of unbelievable endurance at that time.

**In the ensuing 30 years many changes have occurred. Home horticulture extension is now carried out using other techniques, but extension to our commercial clientele is still pretty much a one-on-one kind of activity. However, we have been able to add five or six area extension horticulturists, one in each of the key production areas of the state, who extend the efforts of the state extension specialist.**

One advance that occurred during this period was the development of the *Grounds for Gardening* guide sheets—short discussions of the most common horticultural problems encountered by home gardeners. This series of 60 to 70 concise publications have been prepared and revised by members of our extension staff.

Formal extension work in floriculture began much later than the activities in the fruit and vegetable area. Prof. Smith did, however, spend a significant amount of time on extension-type functions, even though he had been hired to do primarily teaching and research. He participated actively in short courses and flower show judging schools sponsored by the Federated Garden Clubs of Missouri, the group that earlier had given us so much help. He worked closely with the Missouri State Florists Association and the St. Louis Flower Growers Association in organizing annual short courses and grower schools. He served for many years as secretary-treasurer of the MSFA, and as editor of the *Missouri State Florist News* until the University administration ruled that this was no longer an appropriate and proper activity for members of our faculty.

Eventually, a group of leaders from the Missouri State Florist's

Association organized a self-assessment program and pledged enough money to underwrite the costs of a new extension position for three years, after which Dean C. Brice Ratchford promised to pick up financial support of the program. The first person hired for this position was Dr. David E. Hartley (1964-1974), and he was followed by Dr. David Koranski (1975-1978) and Dr. Nicholas Natarella (1978-present).

Dr. Hartley quickly established his mode of operation with the commercial flower growers of the state. He concentrated his efforts with the industry leaders and with various established floral organizations, for example, the St. Louis Flower Growers Association and the Missouri State Florists Association. He also brought back to campus difficult problems he found in the greenhouses for research study. He was instrumental in establishing a new series of extension publications called *Research and Information Reports*, which he used to share the results of his research and important current information from other sources with his clientele.

Dr. Koranski followed similar procedures when he moved into the position. He had excellent contracts with outstate research and extension centers, and often drew on these resources to help him solve particularly difficult problems. He also drew on these outside contacts to assist in placing undergraduate students in summer internships in many exciting and progressive national commercial firms. He had a special knack for matching up students and internship employers in especially compatible combinations, which greatly enhanced the benefits of the programs to both student and the commercial cooperators.

After leaving us, Dr. Hartley joined the Department of Horticulture at Colorado State University for several years before moving into commercial floricultural activity. He became, and still serves, as the director of research and development for Paul Ecke, Inc., the world's major source of poinsettia propagational material. Dr. Koranski moved briefly to the University of Minnesota and has since transferred to Iowa State University, where he has become the foremost researcher in the United States on the production of bedding plant transplants in the form of plugs—seeded mechanically as single seeds in individual cells in plastic compartmented trays. This technique promises to change completely the production system we have used for bedding plant production since horticulture began.

Dr. Natarella's approach to extension was somewhat different from his predecessors. He tended to concentrate his efforts, where possible, upon the novice growers and new entrants into the commercial floricultural industry of the state. One of his most successful tools in this area was the establishment of a series of week-long short courses given every other summer in which these new growers were provided

with the basic information they needed to grow and market successfully and profitably a wide range of floricultural crops. He also established a monthly extension newsletter, which was available to anyone who requested it, that brought timely and pertinent information to his florist audience.

Extension assistance for people interested in woody ornamentals and nursery crops started in 1965 with Prof. Charles Sacamano, followed by Dr. Gary G. Long (1971-present). Prof. Sacamano's first major effort was to make a comprehensive economic survey of the size and nature of the commercial nursery industry in Missouri.

Dr. Gary Long's extension activities are concentrated with commercial nurserymen and garden center operators in Missouri. For many years, he was deeply involved with extension's pesticide certification training program for commercial horticulturists, spending about half his working time for the first three months of each year on this program. He has often received special praise from individuals who were just entering the nursery business and who had called upon him for counsel and advice. He has a special gift for being able to lay out the important pros and cons of different courses of action and to alert these novice businesspersons of the pitfalls to avoid.

**Our initial extension home horticulturist is still with us—Dr. Ray R. Rothenberger (1968-present).** With several million potential students, Dr. Rothenberger has utilized mass media techniques from the very start. He prepares a weekly gardening column, which is syndicated to newspapers all over the state and also sends out tapes weekly to radio stations. He appears regularly on television and radio talk shows.

Perhaps his best developments has been the production of a series of slide presentations covering all phases of horticulture. These can be obtained by mail by county extension personnel, 4-H and FFA leaders, for use with gardening and horticulture groups. He has also supplied a great deal of the leadership to organize and develop the *Grounds for Gardening* guidesheets.

Extension activities for professionals and homeowners with turf production and maintenance problems have been carried out by Dr. William Lobenstein (1968-1976) and by Dr. David D. Minner (1984-present).

Dr. Minner works 75 percent in extension and 25 percent in research. His basic function is to provide turfgrass information and education to area horticultural specialists, commercial businessmen and the general public. He coordinates the annual turfgrass conference, develops field demonstrations and participates in field day and, to some extent, visits clients with problems.

In cooperation with the Missouri State Department of Agriculture,

the Department of Horticulture employed Prof. Bruce W. Zoecklin as Extension oenologist and Prof. Larry Lockshin as Extension viticulturist in 1981 to assist in the development of the expanding wine and grape industry in Missouri. Prof. Zoecklin had been employed for one year by the Department of Agriculture before coming to the University. We provided him secretarial services, and office and laboratory space in our department. Initially, the State Department of Agriculture provided an annual grant to support the activities of these two new extension personnel with the hope that their support would later be taken over by the College of Agriculture and the Agricultural Extension Service.

Subsequently, the legislature passed a law to tax all wine sold in Missouri to provide funds for the wine and grape program. In 1985, however, both men resigned to accept positions elsewhere. Prof. Zoecklin went to Virginia State University and Polytechnic Institute to fill a similar position, and Prof. Lockshin went to Ohio where he became director of the wine and grape program of the Ohio State Department of Agriculture. The College of Agriculture did not provide monetary support for the program, and neither Zoecklin nor Lockshin were replaced. Later, the program was transferred to Southwest Missouri State University and the Mountain Grove Experiment Station, where it is now administered.

## Present Departmental Faculty

Raymond A. Schroeder, 1934-1982, Professor Emeritus  
James E. Smith, Jr., 1938-1979, Professor Emeritus  
Delbert D. Hemphill, 1948-1984, Professor Emeritus  
Victor N. Lambeth, 1950-present, Professor  
Marlin N. Rogers, 1951-1986, Professor Emeritus  
Arthur E. Gaus, 1954-present, Professor Emeritus  
Ronald E. Taven, 1958-present, Professor  
Leon C. Snyder, Jr., 1967-present, Assoc. Professor  
John H. Dunn, 1968-present, Professor  
Ray R. Rothenberger, 1968-present, Professor  
Gary G. Long, 1971-present, Assoc. Professor  
David H. Trinklein, 1977-present, Assoc. Professor  
Nicholas J. Natarrella, 1978-1987, Assoc. Professor  
Christopher J. Starbuck, 1979-present, Assoc. Professor  
Michele R. Warmund, 1983-present, Asst. Professor  
David D. Minner, 1984-present, Asst. Professor  
Robert E. Sharp, 1986-present, Asst. Professor  
Milon F. George, 1986-present, Adjunct Professor  
Dyremple B. Marsh, 1986-present, Adjunct Professor

# Long-Tenured Staff Personnel

The Department of Horticulture has been fortunate to have had the services of many long-term staff employees during the past 75 years. Much of what we have accomplished must be credited to their long and faithful service. Without them we would never have been able to reach our goals.

Following is a listing that gives, insofar as we are able to determine from the records available to us, the names and lengths of service of some of these staff members.

Ernest Roberts, farm superintendent	1912-54	42 years
Hazel I. Williams, secretary	1951-87	36 years
R. Lucille Roberts, secretary	1949-83	34 years
Herbert L. Biesemeyer, farm superintendent	1953-83	30 years
Robert E. Lee, farm superintendent	1938-54	
greenhouse manager	1964-75	27 years
Cecil Grant, farm superintendent	1930-53	23 years
Barbara R. Long, senior accounting clerk	1965-87	22 years
Ralph L. Baumgartner, research specialist	1965-86	21 years
Wayne C. Bryson, ag. equip. oper.-mechanic	1967-87	20 years
Paul Jones, laboratory mechanic	1954-72	18 years
Randy H. Thiesen, farm worker	1971-87	16 years
James B. Curtis, sr. laboratory mechanic	1972-87	15 years

## Future Outlook

The past 10 years have been particularly difficult times for our department, especially in the financial area. Teaching appropriations have always been meager. Funding for research and extension from both state and federal levels has held about constant, or in some cases has actually declined. With varying levels of inflation present, it meant we had fewer and fewer real dollars with which to work.

In some areas of agriculture, where research activities were more basic, faculty members were able to supplement the funding they received from state and federal government sources with outside soft money for sponsored research projects and were thus able to develop their own outside financial backing. In horticulture, where more applied kinds of research have been more typical over the years, it was more difficult for us to secure grant funds for research. The horticulture industry supports research to a certain extent, but the total amount of dollars involved is generally minimal.

The total university has also experienced financial stress, and to make their limited funds cover all their needs, the administration has been forced to practice internal reallocation of funds for many years. This means taking funds from certain low priority areas and moving them to other higher priority areas. When a position is vacated by retirement or transfer of the occupant to another institution, the low priority department is not permitted to refill the position, and it is lost. This has occurred with several positions in horticulture during the past 10 years—both faculty and staff positions.

As we look to the future, we are attempting to place greater emphasis on more basic research, which will permit us greater opportunities in securing outside grant-research funds. Our newest faculty member, Dr. Robert E. Sharp, is a well-trained plant physiologist from the University of Lancaster in England via the University of Illinois and the University of California, Davis as a post-doctoral student. He is interested in stress physiology and has been successful in securing USDA grant research for over \$100,000 for the next two years to begin studies in this area.

Our current pomologist, Dr. Michele Warmund, has a dual interest in the areas of cold hardiness of fruit crops and in the enhanced use of chemical herbicides in horticulture. She likewise has been able to secure outside funding to support her work and her graduate students in these two areas. Much of her chemical weed control research for woody ornamentals and nursery crops has been carried out cooperatively with some of the state's larger commercial nurseries, in which she applies her treatments to blocks of plants. In this way, she does not have to cover the expense of planting and maintaining the crops, but at the same time, is able to gather the research data needed for publication.

To tie in more closely with others working in this same area, the department has granted the title adjunct professor of horticulture to Dr. Milton F. George, who is also associate professor of forestry. Dr. George and Dr. Warmund have been able to work cooperatively on cold-hardiness projects to their mutual benefit and to the benefit of our total departmental research effort.

Another potential financial resource available to us is support from the Food for the 21st Century program, which is one of the newly designated programs of excellence located in the College of Agriculture. These programs are the recipients of some of the internal reallocations and specially earmarked funds in the University-wide budget. Presently we feel that these programs represent our best hope for additional funding in the years ahead, and we are attempting to aim our efforts in that direction.

The non-food segments of horticulture, the area represented by the

ornamental horticulturists, will have to look toward other areas for future funding. In the past few years, there has been some additional support for research from private funding sources that have been set up by commercial interests. The American Floral Endowment will invest about \$500,000 in research during 1987-1988 at different institutions across the country. The Horticultural Research Institute, the Fred C. Gloeckner Foundation, Bedding Plants, Inc., and other similar organizations all support research to a limited extent, and it will be necessary for us to do a better job of searching in these areas.

