

More than eight out of every ten farm families have vegetable gardens. Fruit is raised on a large number of farms, and flowers of some kind brighten up two out of every three farmsteads.

16. Growing Fruits, Vegetables, and Flowers

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WHEN IOWA'S FIRST FARMERS WERE THROWING UP LOG cabins along the streams and digging in for the winter, one might have thought that things horticultural were in the distant future. Traditionally, horticulture follows far behind pioneering, coming only when settlers have had time to establish themselves and to acquire the wealth and leisure to beautify their surroundings.

In Iowa, however, horticulture followed close on the pioneers' heels. Garden crops like beans and pumpkins were planted even before wheat, the traditional first crop of all settlers. Orchard crops like apples and grapes were planted almost immediately. Lack of trees on the open prairie caused shelterbelts and windbreaks to be planted at once. And flowers? The woods were full of wild geranium, columbine, violets, phlox, Solomon's seal, and wild orchids. The prairies were alive with asters, lobelia, goldenrod, sunflowers, butterfly weed, roses, Indian paintbrush, flax, and bergamot. Many of these so-called wild flowers are listed in present-day seed catalogs. By the time Iowa was admitted to statehood, many settlers of means had arrived and already were laying out grounds embellished with gardens and ornamental plants.

In spite of the fact that home gardening and home orcharding began so early in Iowa, the pioneer would hardly recognize the commercial horticulture of Iowa today, with its highly specialized nurseries covering hundreds of acres, its large orchards and vineyards, and its thousands of acres of vegetables. In 1945, vegetables grown for market and canning were worth from fifteen to eighteen million dollars, and fruits, flowers, and ornamental plants another eighteen million dollars.

The pioneer would be at home, however, and his wife's eyes would

shine with pride at the present record of the home gardens. A survey conducted by Iowa State College in 1943 indicated that between 83 and 88 per cent of all farm families, and more than half the urban families, had vegetable gardens worth an average of eighty-four dollars, or a total value for the state of forty-two million dollars. How much gardens, shade trees, and lawns add to real estate values and living pleasure cannot be computed, but certainly their economic importance is large and their esthetic value immeasurable.

About 150 local garden clubs meet monthly, and a state horticultural society, with nine affiliated societies, enrolls seven thousand members.

APPLES

Apple trees were planted in Iowa near Montrose by Louis Honore Tesson in 1799, thirty-four years before the territory was opened for settlement. In 1833, near the site of Davenport, Antoine Le Claire planted four hundred apple trees, some of which bore apples within three years. As late as 1883, fifty years after they were planted, eighty-three of Le Claire's original trees were still growing.

Orchards developed somewhat later in central and western Iowa and the pioneer period may be said to have lasted until about 1870. Early settlers brought with them from the East hundreds of varieties, which grew rapidly on the virgin and fertile land, bearing abundant crops without worm or blemish of any kind. Reports of a fruit growers' meeting held at Burlington in 1855 indicate that 276 varieties of apples and 200 varieties of pears were exhibited, "so wonderfully perfect that they were the admiration of all who saw them." A horticulturist from New York asked, "Who ever saw such apples and such pears as are here displayed? I never have in all my travels, either at home or abroad."

Enthusiasm soon turned to disappointment, however, for that very year cold weather killed or severely injured thousands of fruit trees. Many of the varieties brought from the East were not hardy enough to withstand periodic "test winters." A few varieties proved to be hardy, but they were inadequate to cover the season or requirements as to quality and color which were desired. Severe winters injuring apple trees have occurred more or less frequently. The first such recorded was in 1842. Others were experienced in 1855, 1865, 1872, 1882, 1883, 1893, 1898, 1916, 1917, 1935, and 1940.

Despite bitter winters and lack of hardy varieties, apple growing continued after the Civil War, pushing into western Iowa, particularly

southwestern Iowa, where deep wind-blown soils proved to be well adapted to apples. Labor costs were low in the nineties and the insect and disease problems were as yet of minor importance. I. M. Warren, farmer north of Glenwood, is said to have paid for two farms totaling 480 acres with a few seasons' production of a single orchard.

By 1910 southwestern Iowa had become the major apple-growing section of the state and one of the important regions of the United States. In that year Iowa ranked sixth among the states in apple production, exceeded only by New York, Michigan, Pennsylvania, Missouri, and Kentucky. Six counties—Mills, Pottawattamie, Freemont, Taylor, Page, and Harrison—had 12,700 acres in orchards. A survey in Mills County showed the principal varieties to be Jonathan, Ben Davis, Grimes, Winesap, Wealthy, and Duchess, and the average number of trees per acre to be eighty-seven. In addition to these six counties, twelve others in southern Iowa averaged from seventy to one hundred fifty thousand trees each. For the state as a whole nearly six million trees of bearing age and two million younger trees were reported. Total production for the state was six million seven hundred thousand bushels, with a value of three and a half million dollars.

In 1910 about 72 per cent of the state's farms had home apple orchards, ranging from one to five acres. Generally trees in such orchards were planted much too close together. This fact and rather general neglect led to the decline of home orchards. Several other factors contributed to the decline of commercial apple growing after 1910, especially poorly selected varieties, too many varieties, close planting, failure to control pests, and, beginning about 1908, an invasion of Illinois blister canker. Growers became discouraged and little or no replanting was done.

Apple acreages had been greatly reduced by 1920, and still more so by 1930. Indeed, the whole of the United States had been so overplanted that production exceeded demand. World War I prosperity brought good prices for a time, but falling prices soon after 1920, and especially after 1930, forced many fruitgrowers out of business. Some, however, made profits even during the depression. During the late thirties a strong new growth of apple orcharding occurred under the direction of competent growers. The crop of 1940 was large and of good quality, and brought profitable returns. Then occurred another unseasonable disaster. The morning of November 11, 1940, was comparatively warm, but by nightfall the temperature had dropped 50 degrees, down to temperatures varying from zero in the southeast part of the state to 15 below in the northwest. The cold spell lasted

four days, with below-zero temperatures on November 13, 14, and 15. Orchards throughout southern Iowa, west of Cedar Rapids, were severely damaged and many trees were killed outright. Only two sizable orchards in the west half of Iowa completely survived the 1940 freeze, one at Mitchellville and a twenty-acre experimental orchard at Iowa State College. Both of these had been developed by topworking desirable varieties of apples on hardy, winterproof stocks under the supervision of T. J. Maney, head of the Pomology Subsection from 1917 until his death in 1945. By use of this technique and new hardy varieties, orchards were being replanted as Iowa's first one hundred years drew to a close.

SMALL FRUIT

Small fruits, including strawberries, brambles, and grapes, are grown on farms in nearly every county in Iowa and in limited commercial quantities around the larger towns and cities. For many years Montrose has been regarded as the leading commercial center for strawberries, shipping out many carloads. In 1930 there were more than four thousand acres of strawberries growing on thirty-two thousand farms. The leading varieties over the years have been Dunlap and Premier. Recently Blakemore and Beaver have come into prominence.

Grapes have been raised with considerable success, both by farmers and by commercial growers. More than a thousand acres once grew on the hills of western Pottawattamie County. More than seven hundred acres remain with new plantings being added rapidly. Southeastern Iowa also boasts of some excellent large vineyards. Concord is the most popular variety for both home and commercial growing.

The prairies along the streams always have abounded with native plums which the pioneers used to advantage. Many large-fruited types of the native wild plums were selected for propagation and sale by nurserymen. They were planted all over Iowa and were used by fruit breeders in producing a long list of new plums, commonly referred to as the Jap hybrids. These crosses of native and Japanese plums produced varieties far superior to the native varieties and since 1920 have almost entirely replaced the natives.

Cherries, highly prized as a crop for home planting, are precarious commercially as they are rather short-lived and subject to winter injury. Only the red varieties, commonly called the "sour" cherries, are grown. The chief varieties are Early Richmond, Montmorency, and English Morello.

Although the fruit is not dependably hardy anywhere in Iowa, people always have planted peach trees in their back yards, and in mild winters the buds are undamaged and good crops are obtained. Since peach trees bear fruit three or four years after planting, crops are produced often enough to encourage the planting of some trees each year. In 1910 there were one million three hundred thousand trees in Iowa. The 1940 census showed over 350,000 trees, nearly all in the southern third of the state.

Iowa grows many pears in its back yards but has few commercial pear orchards, due to the prevalence of a bacterial disease called fire blight. In 1910, slightly more than three hundred thousand trees were reported in the census; but by 1940 there were less than ninety thousand trees on farms. A few small commercial plantings have done well in southern Iowa. The chief variety is Kieffer. Several new varieties of promise were introduced in the early twenties; but pears seem destined, as in pioneer days, to be relatively few in Iowa until hardier trees are introduced and a remedy is discovered for fire blight.

POTATOES

All through Iowa's history, potatoes have been its most important vegetable crop. Their production reached a peak toward the close of the last century with 170,000 acres planted. In later years, an increase of diseases caused a marked decline in acreage. In recent years the industry has become stabilized at approximately sixty thousand acres annually.

The first raising of potatoes on a commercial scale centered around Prairie City in Jasper County, where the Dowden potato digger was invented. Later the industry moved northward to Grundy County. During World War I, St. Ansgar in Mitchell County became an important center. About 1920, potato growing began to move from mineral soils to the newly-drained peat lands of northern Iowa, and since then commercial production of potatoes has been confined largely to the bog areas.

The shift to peat soils came because of greater yields of potatoes, and also onions, cabbage, and carrots. Because of the looseness of peat and muck, horse-drawn machinery could be used only in a limited way on small areas; tractors with power sufficient for operation on these loose soils, and especially rubber-tired tractors in the early thirties, greatly increased operations on peat lands. Two-row, high-speed potato planters and two-row potato diggers came into wider use in the thirties, as did larger, faster, sizing and grading machinery,

and brushers to permit a more attractive marketing appearance. Such machinery caused an increase in the size of operations, so that most potatoes moving into commercial channels now are grown by specialists. Another reason for the concentration in a few hands is the difficulty of controlling insects and disease without large spray machines which can cover twelve to twenty rows at a time.

From 1860 to 1870 principal varieties were Peachblow, Marshall, and Nashannock. The Early Ohio appears to have been introduced in the early seventies along with the Early Rose and the Beauty of Hebron. The Rural New Yorker, first tested at the Iowa Experiment Station in 1888, and the Early Ohio were the leading commercial varieties from the nineties until about 1920, when they were replaced generally by the Irish Cobbler.

ONIONS

The Pleasant Valley district in Scott County, north of Davenport, is the earliest commercial onion-producing area recorded in the state. Henry Schutter of this vicinity sowed the first crop of onions in 1856. Since the first crop was sown broadcast, cultivation was impossible and the land became foul with weeds, making growing of the crop unprofitable. Soon after, the hand drill for seeding was invented, making cultivation possible. More German settlers moved in and onion acreage increased and other crops decreased. In the early days river transportation was in its heyday and the bulk of the crop was shipped by boat to St. Louis and New Orleans. The Pleasant Valley growers were the first to develop and use machine planters. Hand planting sets required ten to twelve men per acre per day. Set planters operated by one man now can plant several acres per day.

CANNING CROPS

Growing of vegetables on a commercial scale for canning started in 1878, when Iowa's first cannery was opened in Marshalltown by A. T. Birchard, a Marshalltown druggist, and a Mr. Young. In 1879, at Vinton, another plant was started by Samuel H. Watson, a prominent business man of eastern Iowa. Watson made a trip to Maryland, at that time the center of the infant canning industry, and on his return established his own company, canning both sweet corn and tomatoes.

In these pioneer canneries all operations were performed by hand. According to early reports:

Women prepared the tomatoes, filled the cans, and stacked the cans in trays. The trays were carried by small boys to men, who soldered the tops on the cans

with hand soldering tools. The cans were made by hand. The tin was shipped to the cannery in sheets and a crew of men worked the year round making cans by hand. Losses from defective cans and poor processings were tremendous.

Watson rightly has been called the father of the Iowa canning industry, since men working for him established plants of their own and for others in Iowa and neighboring states. Henry B. Kelly, who was largely responsible for the successful operation of the Watson cannery from 1883 to 1892, established a second plant in Vinton known as the Kelly Canning Company. He left Vinton in 1901 for Waverly, where he erected and operated a large sweet corn cannery. J. W. Cuykendall, another pioneer, established a cannery at Atlantic in 1885 and continued in its active management until his death.

A gradual increase in the number of canning plants and acreage devoted to the growing of vegetable crops, especially sweet corn, took place until about 1920. In 1914 the first machines for removing husks from the corn mechanically were installed in the canning factories, speeding up operations and causing an increase in sweet corn acreage. During the decade from 1920 to 1930, Iowa led the nation in production of canned sweet corn. After the crash of 1929 both the acreage and the number of operating canneries declined. From 1930 to 1940, although sweet corn declined in acreage and amount packed, the tomato, pea, snap bean, and asparagus acreage increased, so that the total pack of canned vegetables was nearly as great as previously. During the war years, 1940-45, vegetable crops raised for canning increased tremendously.

In 1933 the first hybrid sweet corn was grown for the canneries. Open-pollinated varieties had been used exclusively. With the advent of hybrid sweet corn, the proportion of white to yellow sweet corn changed, so that at present more yellow sweet corn is grown and canned. Practically no open-pollinated varieties are grown for canning now. In 1941 the first mechanical picker for sweet corn was used. Not until 1945, however, was an efficient picker used which did not partially husk or bruise the ears. A dual machine which would harvest field corn as well as green sweet corn was invented by Edward J. Schaaf and Edwin F. Greedy, of Anderson, and Oliver Stevenson, of the Otoe Food Products Company. Two earlier pickers had been used to a limited extent, but did not prove satisfactory on short sweet corn.

VEGETABLES FOR SEED

The production of vegetables for seed, particularly tomatoes, peppers, and sweet corn, is an important horticultural industry of the

Muscatine Island. The J. E. Hoopes family, of Muscatine, pioneered in this field and grew their first crop of vegetable seed there over fifty years ago.

The Muscatine Island section is the only vegetable-growing area in the state where irrigation is a regular practice. Beginning with furrow irrigation, using water pumped from the inexhaustible supply only ten to sixteen feet below the surface of the sandy soil, growers have gradually adopted a portable overhead rotary sprinkler system which gives excellent results with melons and sweet potatoes. Ingenious but crude hotbeds for sprouting sweet potatoes, heated with fermenting cornstalks or manure, are gradually being replaced with electrically heated cables. Harvesting, a tedious hand job, has recently been facilitated by using a machine invented by Warren Seright, of Muscatine County, which cuts the vines before the roots are dug.

NURSERIES

Nurserymen have played a conspicuous part in Iowa horticulture from pioneer times. The first nurseries were usually parts of general farm or fruit-growing enterprises and their owners were the horticultural leaders of their day. They were largely responsible for promoting and directing the Iowa State Horticultural Society. They wrote articles on fruit growing for the newspapers and were the chief speakers on horticultural subjects at agricultural meetings. Their fruit trees stocked the early orchards and gardens of Iowa and their young willow, poplar, soft maple, walnut, and ash trees planted the shelterbelts, windbreaks, and woodlots. Their osage orange seedlings provided the uncounted miles of hedge which once fenced the farms of Iowa, and the millions of posts needed when barbed wire replaced the hedges.

Iowa's first nursery was established by Robert Avery near Burlington in 1836. In 1837, Henderson Luelling planted 35 varieties of apples, pears, cherries, peaches, plums, and small fruits in a nursery at Salem. Joined by his brother John in 1841, Luelling developed a prosperous business and in ten years became the leading citizen of his community.

It is a matter of the greatest horticultural significance, historically, that in 1847, ten years after planting his nursery, Henderson Luelling decided to move to Oregon. He loaded a wagon with seven hundred fruit trees and bushes, watered them en route and got about half of them safely to the Willamette Valley seven months later and seventeen hundred miles away from his Iowa home. With this stock he started the great Pacific Northwest fruit industry. A giant sweet cherry tree,

budded by Luelling in Salem, Iowa, was still standing about 4 miles from the city of Olympia, Washington, in 1941. It then had a circumference of nine feet.

Other pioneer nurserymen were D. W. Adams, of Waukon, Suel Foster, of Fountain Hill, H. A. Terry, of Crescent, and C. F. Gardner, of Osage. Gardner and C. G. Patten, who in 1860 started the nursery at Charles City now known as the Sherman Nursery, bridged a gap between the first pioneer nurserymen and the more specialized propagators of a later day. Between 1860 and 1900, many well-known nurseries were established. Captain C. L. Watrous established the Capital City Nurseries at Des Moines during this period; Lake's famous Shenandoah Nurseries were started by D. S. Lake in 1870. Elmer Reeves, of Waverly, began in 1883, and the great Mount Arbor Nurseries were established by E. S. Welch in Shenandoah in 1890. At Hampton S. W. Ferris began a nursery in 1869 which has grown to large proportions under the direction of three generations of the Ferris family. In 1856 Nathan Gould Platt founded a nursery at Oelwein in which the fourth generation of the Platt family is now engaged. At Hamburg the Sjulín brothers—Carl, Leslie, and David—and their mother have established in the last twenty-five years one of the great mail-order nursery businesses of the country, the Inter-State Nurseries.

The nursery industry of Iowa progressed steadily in national importance from its beginning. Today there are about two hundred retail, wholesale, and mail-order nurseries in Iowa. Their sales run around eight million dollars annually. The industry has its own organization, the Iowa Nurserymen's Association, an affiliate of the Iowa State Horticultural Society.

During the one hundred years of Iowa's history, the nursery industry has changed greatly in character. Pioneer nurserymen grew their own plants and sold them directly to their customers by personal solicitation and ever-present tree salesmen. Now, the bulk of Iowa nursery stock is sold throughout the country wholesale or by mail-order. Modern methods of merchandising by radio, catalog, and through established retail dealers and national mail-order and chain store connections, have largely replaced personal solicitation.

The type of plants produced by nurserymen has changed greatly with the growth of the state and the country and the increasing proportion of urban population. Pioneer nurseries grew mostly fruit trees, grapevines, and berry bushes, or trees for windbreaks, shelterbelts, and hedges. Now, ornamental shrubs in infinite variety, street and lawn trees, and perennial flowers make up the bulk of the nursery products.

The equipment of modern Iowa nurseries is far different from that of the first quarter-century of the state's history. Commonplace in Iowa nurseries today are elaborate greenhouses, acres of shaded beds, extensive overhead irrigation systems, tractors built to straddle rows of trees, mechanical tree diggers, cultivators, and high pressure sprayers, extensive storage houses for nursery stock, railroad switches into the shipping sheds, belt lines for assembling orders, machine bookkeeping, the employment of specialists in propagation, pest control, and soil management.

About ten thousand acres of land are constantly in nursery stock, but approximately twice as much is needed for rotation purposes and new plantings. Many Iowa nurseries maintain dairy, hog, or beef cattle farms as necessary sidelines to maintain fertility and rotation procedures in their business. The permanent labor force in Iowa nurseries is approximately three thousand people, many more in the shipping season.

FLOWERS

The flowers which the Iowa pioneers used to decorate their homes and churches, and for various ceremonials, grew in their gardens or wild on the prairies. But no matter how plentiful they were from April to October, they could not meet the demand for flowers in the winter months. Enterprising gardeners in the fifties started plants in glass-covered hotbeds, glass-enclosed porches, and kitchen windows. Presently greenhouses were being constructed and a glass house commercial flower business began.

Pioneers in the greenhouse business were a Mr. Harkett, of Dubuque, Andrew Bather, of Clinton, Joseph Bancroft, of Cedar Falls, Charles Page and J. S. Wilson, of Des Moines, Joseph Bock, of Burlington, J. C. Rennison, of Sioux City, John Franklin Wilcox, of Council Bluffs, W. E. Kemble, of Oskaloosa, and Ira Kemble, of Marshalltown. Most of the firms founded by these early florists are still operated by second and third generations of the families. All of these men and their successors furnished leadership and example on which has been built the present industry with annual sales of ten million dollars.

W. E. Kemble started one of the largest greenhouses in the state in Oskaloosa in 1866. Later he established additional greenhouses in Ottumwa and Cedar Rapids. His sons, W. R. and Roy, took over when their father retired in 1886. Ira Kemble, a brother of W. E. Kemble, also established a chain of greenhouses, at Marshalltown,

Boone, Dubuque, and Mason City. Thus the Kemble name for seventy-five years has been synonymous with flowers in Iowa. Beginning about 1867, L. A. Casper, of Council Bluffs, was operating a market garden and florist's establishment and growing plants in hotbeds and glass-covered frames. In 1880 John Franklin Wilcox, sixteen years old, began working with him, learned the business, became a partner in 1885, and later bought the concern and built what is still the largest range of greenhouses west of the Mississippi River. These houses, and others built later by the Lainsons and other firms, are uniquely located on the edge of the city, step above step on the sides of steep bluffs, sheltered from cold north winds and warmed by the southwest sun. Mr. Wilcox died in 1912, leaving five sons, all in the flower and nursery business.

Most of the greenhouse business in Iowa consists of growing cut flowers; but pot plants, vegetables and flowers for transplanting, and ranges operated for growing nursery stock also are economically important. The large Davis range at Davenport grows tomatoes, cucumbers, and occasionally other vegetables.

Amateur flower growing is of tremendous interest in Iowa. One of the writers once made a census of farm flower gardens by counting those which could be seen from the road, taking many ten-mile stretches of highway as samples. Flower borders, beds, rows of flowers in gardens, window boxes, and so forth were seen in two-thirds of the yards. Back yards in the towns are often bowers of flowers. Interest is so keen that 150 or so local garden clubs hold regular meetings and exhibits.

The state legislature designated the wild rose as the official state flower in 1897. Many volunteer beds of them are found along Iowa highways.

HORTICULTURAL SOCIETIES

Exhibits of apples, pears, potatoes, and other vegetables were shown at Iowa's first State Fair, held at Fairfield in October of 1854, and flowers were exhibited for the first time at the 1857 Fair. The first state-wide meeting of fruit growers probably was held in the First Presbyterian Church at Oskaloosa in 1858, when persons attending the State Fair there were called together. Similar evening fruit meetings were held at later fairs at least until 1861.

Even before this state-wide activity, several county or district horticultural societies had been organized. In 1866, after the Civil War, twenty-eight fruit growers met at Iowa City and formed the State

Horticultural Society, which met at the State Fair in Des Moines in 1868 and adopted a constitution. The Horticultural Society was the first specialized agricultural society organized in Iowa.

The state legislature appropriated eight hundred dollars to pay for educational work in fruit and tree planting for two years. In 1872 the legislature finally voted an annual appropriation of one thousand dollars. Two hundred dollars of this was to be used as premiums for the growing of forest trees.

Among the activities of the state society was promotion of local horticultural societies. Some of these, including one in northeast Iowa and one in Clinton County, had been formed before the state organization. Other early local societies were formed in Scott County, before 1874; Iowa County, 1874; Dubuque County, 1882; Delaware County, 1886; Union County, 1887.

As finally organized there were four district societies: Southeastern, in 1869, Southwestern, in 1874, Northeastern, in 1891, and Northwestern, in 1892. They received grants from the state society that rose gradually from \$50 to \$225 a year and then fell. For over a third of a century these societies met annually. However, with greater commercialization they gradually lost their effectiveness and were superseded by specialized organizations. The last district society was disbanded in 1924. To take the place of the general district societies, nine affiliates of the State Horticultural Society were formed between 1903 and 1931.

First of these was the Society of Iowa Florists, organized in 1903, and affiliated with the state society in 1918. The Iowa Fruit Growers' Association, organized to buy and sell orchard supplies and equipment for its members, was formed in 1912. A year later the Iowa State Vegetable Growers' Association was formed, primarily for educational purposes. Iowa nurserymen organized in 1920, the year these three latter organizations joined the state society. Other societies, with the dates of organization and of affiliation, are: Beekeepers' Association, 1915-23; Gladiolus Society, 1924-25; Rose Society, 1928; Federation of Garden Clubs, 1928-30; Greenkeepers' Association, 1931-38. All of these societies meet annually, some more often. The Federation of Garden Clubs is made up of more than one hundred local garden clubs, which usually meet monthly. They helped sponsor the Victory Garden program in World War II.

In 1917 the first of nine Midwest Horticultural Expositions was held in Des Moines. Management of all but the first two expositions, as well as much of the reorganization within the society since 1920,

was carried on by R. S. Herrick, who served as secretary of the State Horticultural Society for twenty-five years until he resigned in 1946.

RESEARCH

Research in horticulture began in Iowa with eighteen "experiment stations" sponsored by the state society. The stations studied hardiness and adaptability of plants brought from the East and began plant breeding and other studies taken over by the Iowa Agricultural Experiment Station when it was organized in 1882 at the Agricultural College.

Private research, especially in Iowa's early history, did much for Iowa horticulture. N. K. Fluke grew some noteworthy seedling dewberries on his farm near Davenport about 1860, and J. S. B. Thompson, of Grundy Center, produced a large collection of seedling apples. F. O. and Millard Harrington, of Williamsburg, compared the merits of a great number of varieties of the principal fruits, introduced the first outstanding variety of the native aster, Harrington's Pink, and experimented with nuts. H. A. Terry, of Crescent, seeking a replacement for plums subject to disease, introduced one hundred selections of native varieties, five or six of which are still listed by nurseries in the Great Plains. Charles F. Gardner, of Osage, introduced new plums, crosses between American and Japanese varieties rather than selections from native thickets. Gardner's outstanding contributions were the everbearing strawberries Red Gold and 909.

The two greats of the private research workers in Iowa were C. G. Patten, of Charles City, and Harlow Rockhill, of Conrad. Patten operated a large nursery and set aside seventeen acres for one of the state horticultural society's eighteen testing stations. In it he planted varieties of apples, pears, and plums from all over the world. He recognized winter-hardiness as the principal problem in apple and plum breeding and sought to develop it by hybridizing hardy and disease-resistant varieties with more desirable varieties. From his work came the hardy Patten Greening and Brilliant apples, Patten pear, and Patten plum. In 1917 his experimental area was purchased by the Iowa Agricultural Experiment Station, which continued work until remaining materials were removed to Ames in 1934 and the land sold. Rockhill introduced the everbearing strawberries Progressive and Rockhill, and a gladiolus much used by florists for forcing, the Cherry Red. His most useful work, however, was a demonstration of the wide crosses that could be made in the genus *Prunus* and the genus *Amygdalus*, the two most important in the family of trees that include peaches, cherries, and plums.

Since 1900, interest in ornamental gardening has grown and two flower hybridizers have come into prominence. They are Mrs. C. G. Whiting, of Mapleton, who has introduced several fine iris varieties, and Dr. Harry Knight, of Ames, who has done the same for gladiolus and dahlias.

Research at Iowa State College began under Professor J. L. Budd, first head of the Department of Horticulture, a nurseryman and fruit grower, and secretary of the State Horticultural Society for seventeen years. The society appropriated one hundred dollars in 1874 for importation of Russian scions. Four years later Budd imported two hundred varieties of apples from Moscow, together with cherries, pears, and plums. When the state legislature made its first appropriation for agricultural experiments, in 1881, half of the money helped finance a trip Budd made to Europe. He searched Russia for hardy fruits. From 1879 to 1885 no less than nineteen importations of apples were made from Russia, Poland, Germany, and Austria. The imports were propagated in college nurseries and no group of varieties was ever tested more thoroughly. Although importations proved disappointing, a few useful varieties were included and Budd's efforts led to a more systematic breeding program later.

H. C. Price, head of the college department from 1900 to 1905, began the first fruit storage experiments and directed construction of the first laboratory and greenhouses. When Professor S. A. Beach became head of the department in 1905, the new science of genetics was taking form. Eastern scientists had succeeded in originating numerous valuable grape varieties by hybridizing. Budd's success in originating plums by the same technique inspired fruit breeders. Beach recognized the need for good quality winter apples, blight-proof pears, and plums and peaches resistant to winter and brown rot. He at once began a program of fruit breeding supported by congressional appropriations. From this work originated such apples as Secor, Edgewood, Hawkeye Greening, Sharon, Joan, and Monona, the Polly Peach, and in co-operation with others, the Sungold peach. Beach directed the forming of a section of landscape gardening, the organizing of genetics into a separate department, the granting of a degree in forestry, and construction of the present Horticulture Building. Research on apple orchard soils was conducted near Council Bluffs; surveys were made of the orchard and onion industries of the state; and search was conducted for "yellows"-resistant cabbages and potatoes resistant to "hopper burn."

When Professor B. S. Pickett became head of the department in

1923, 157 acres of vegetable gardens, vineyards, small fruit plantings, orchards, and propagation areas were laid out. A horticultural farm was set up and greenhouses were turned from semi-commercial operation to largely teaching and research. From 1923, breeding of raspberries and strawberries was carried on extensively and orchard stocks work expanded under the leadership of T. J. Maney. Open-pollinated seedlings of about one hundred varieties of apples were compared for vigor, hardiness, uniformity and desirability for grafting stocks. Progress was made in dwarfing apple trees. An experiment in soil management of apple orchards was begun and a one hundred-acre farm in the hill area of Pottawattamie County was developed for study of Missouri Valley fruit-growing problems. As mentioned before, dramatic evidence of the value of research was exhibited in the 1940 November freeze, when a mature college orchard of eight hundred trees of nine varieties top-grafted on hardy stock survived, although an adjoining orchard of the same age on standard stock was killed.

Vegetable crops work has included improvement of sweet corn, development of a better canning pumpkin, use of sand and peat lands for vegetable crops, discovery of new potato and onion varieties, and many experiments on canning vegetables carried on under the direction of A. T. Erwin and E. S. Haber. Tests on vegetables are conducted at Fruitland and Crystal Lake, as well as at the college. In floriculture, research has covered variety comparisons, trial of soil mixtures, peat, sphagnum moss and solutions for greenhouse plants, comparison of soil types, study of root growth in pots, and comparison of United State and Dutch-grown tulip and narcissus bulbs in forcing. The College's rose test gardens rank at the top of eighteen or twenty such garden in the country.