

UNIVERSITY OF FLORIDA
AGRICULTURAL EXPERIMENT STATIONS
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The Lake Emerald Grape

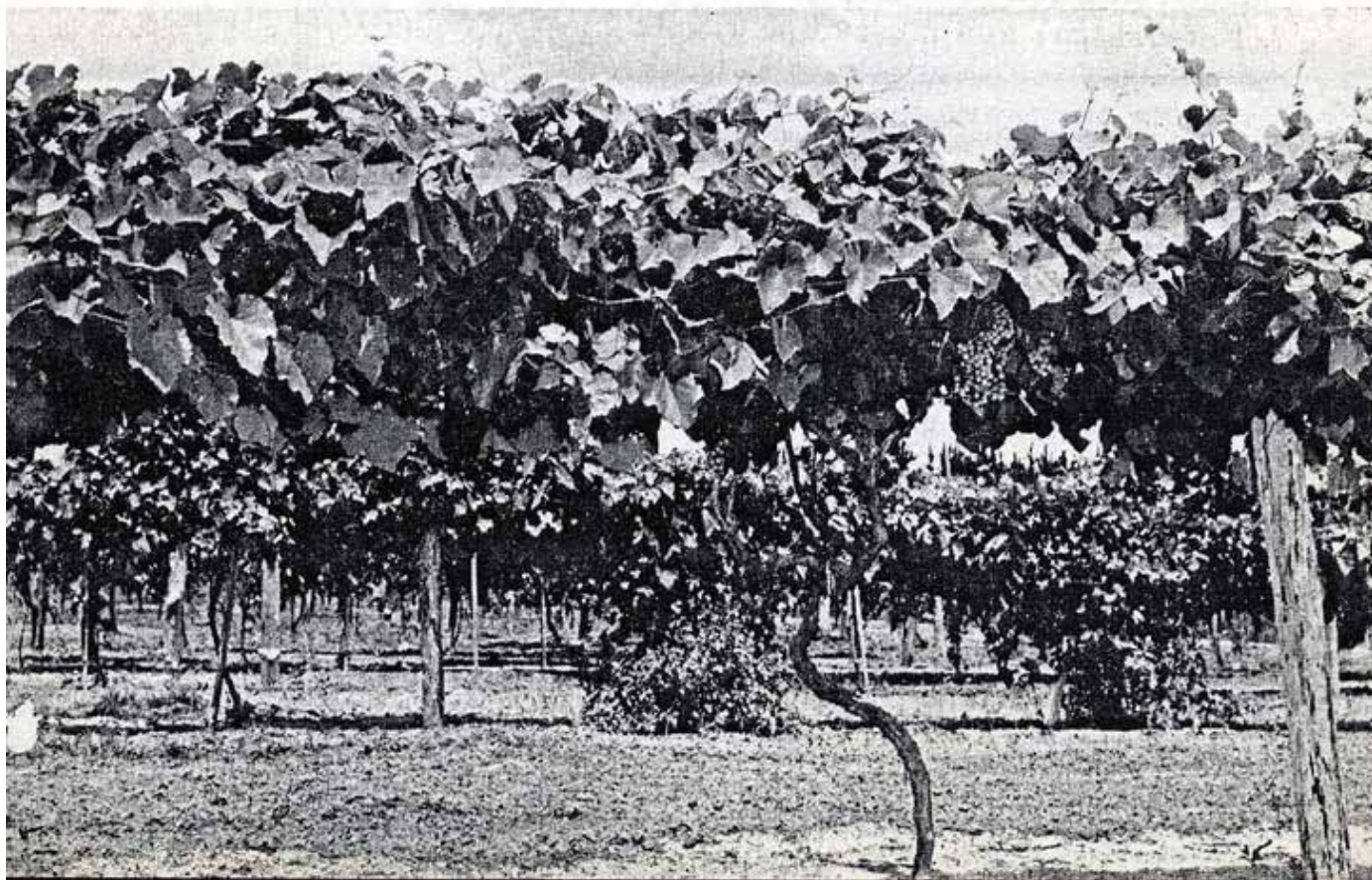
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Introduction

The Lake Emerald grape (Fig. 3) was developed at the University of Florida Agricultural Experiment Station's Watermelon and Grape Investigations Laboratory at Leesburg. This new variety was produced by crossing a native white-fruited grape known as Pixiola with the cultivated yellow-fruited va-

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Fig. 1.—The original Lake Emerald seedling vine when six years old.



riety Golden Muscat. This cross was made in 1944 in an attempt to combine the vigor and hardiness of native grapes with the desirable fruit characteristics of domesticated grapes.

Practically all attempts to grow named varieties of bunch grapes in Florida have failed because of a condition known popularly as degeneration, die-back or decline. Stoner² recently has attributed this condition to Pierce's disease, a virus infection. No symptoms of degeneration have been found in any Lake Emerald vines.

History of Florida's Viticulture

For centuries interested people from many parts of the world have attempted to grow their favorite varieties of grapes in Florida. French, Spanish and English colonists made importations of European varieties of *Vitis vinifera* L. with the idea of establishing them here. All these attempts failed.

Beginning about 1880 immigrants to Florida from the northwestern and midwestern United States brought with them their favorite varieties of *Vitis labrusca* L. because of the success of these varieties in those areas. By 1894 there was a rather extensive grape acreage in the state (500 acres in Orange County alone). Among the varieties tried were Concord, Niagara, Worden and Ives. By 1900 many of these plantings were dead and by 1907 attempts to grow varieties of *V. labrusca* commercially were ended.

In 1899 the United States Department of Agriculture began an extensive trial of grapes at Earlton, east of Gainesville. A large collection of European (*V. vinifera*), native bunch grapes (*V. labrusca*) and muscadine grapes (*Vitis rotundifolia* Michx.) were tested to determine whether any of them might be grown successfully in Florida. None of the European or American bunch grapes proved long-lived enough to warrant recommendation.

Grapes were not grown extensively in Florida again until about 1920. At that time the T. V. Munson post-oak hybrids (Carman, Armalaga, R. W. Munson and many others) were sold in large numbers by nurseries. About 1923 the variety Florida Beacon, which was later found to be identical with Munson's variety Extra, was introduced.³ It was more hardy and fruit-

² Stoner, W. N. Leafhopper transmission of a degeneration of grape in Florida and its relation to Pierce's disease. *Phytopath.* 43: 611-615. 1953.

³ Florida Beacon is the name by which this grape has been known in Florida for many years and will be used henceforth in this publication.

ful than any variety previously tried in Florida. Extensive plantings of this variety were made in Lake, Orange and Putnam counties in central Florida and in some sections of northwestern Florida. About 4,000 acres of vineyards were under cultivation during the peak years for Florida Beacon and the other post-oak hybrids.

Degeneration occurred in post-oak vineyards as early as 1930. It became increasingly severe, so that by 1938 there were few vineyards of the post-oak hybrids left in Florida and no additional large plantings were being made.

The grape research program at the Watermelon and Grape Investigations Laboratory was directed at that time toward the solution of the grape degeneration problem. Loucks⁴ collected a number of selections of native grape species for use in the grape breeding program. Among these was the white-fruited selection of *Vitis simpsoni* Munson that was later named Pixiola (Fig. 2). It was collected near Leesburg from a wild vine that appeared to be at least 20 years old.

Origin of the Lake Emerald

Wood of Pixiola that was collected originally in 1942 was lost in storage. It was collected again from the woods in 1943

⁴Loucks, K. W., formerly Assistant Plant Pathologist, Watermelon and Grape Investigations Laboratory, now Plant Pathologist, Florida Citrus Commission.

Fig. 2.—A 10-year-old vine of Pixiola (*Vitis simpsoni*), the female parent of Lake Emerald, started from a below-ground graft.



and established as a below-ground graft on roots of the variety Florida Beacon at the Laboratory farm at Whitney. This vine continues to grow vigorously, although all of the Florida Beacon vines around it have since died.

Pixiola is a native form of *V. simpsoni* that produces small, very sweet, good flavored, greenish-white, mid-season fruits. It differs from most forms of this species both in its fruit color, which is emerald green in contrast to the usual dark blue of *V. simpsoni*, and in its unusually high sugar content. Pixiola was named after the location near Picceola Island where it was discovered growing wild in woodlands on sloping Eustis fine sand. Pixiola is the female parent of Lake Emerald.

Golden Muscat, the male parent, is a product of the cross Diamond x Muscat Hamburg (*V. vinifera*). Diamond was derived from the cross Concord (*V. labrusca*) x Iona (*V. labrusca* x *V. vinifera*).

Lake Emerald (Fig. 1) was one of 20 seedlings that resulted from the first cross of Pixiola x Golden Muscat. This same cross was made on several subsequent occasions but none of the resulting progeny has equaled Lake Emerald in promise.

Description of Lake Emerald

Plant Characteristics.—Lake Emerald produces a medium-sized vine with medium-diameter canes and a well-rounded trunk. At seven years the circumference of the original seedling was 6½ inches at 2 inches above the ground and 5½ inches at a height of 30 inches.

Canes are medium in all respects. A typical three-year-old vine bears three to six long canes, varying from 15 to 25 feet in length, and several other shorter primary canes. Lateral growth occurs at nearly all nodes and forms a dense, wide canopy. Most canes are round, with flattened or "bull-cane" type of growth occurring rarely. Low-growing canes from ground sprouts are not numerous.

Leaves from the seedling vine average about 4½ inches wide by about 5 inches long. Grafts and vigorously growing cut back vines sometimes make larger leaves than the original seedling. The leaf is thick and firm to the touch, not fragile.

Buds are large and rise from prominent nodes. Cane internodes average about 5 inches long. Dormant wood is a light chocolate color, with a pith of medium diameter.

Flower and Fruit Characteristics.—The flowers are self-fertile, with short, erect stamens. The flower clusters are large, strong, fairly loose, often shouldered or compound. Peduncles have a healthy, reddish tint and are long, making harvest easy.

Young fruiting canes often set four flower clusters and thinning to not more than two clusters per cane is recommended. Lake Emerald produces well on short renewal canes or two and three eye spurs on a single cordon design similar to some European methods for the *V. vinifera* group.

Mature berries measure from 7/16 to 10/16 inch in diameter. There are exceptionally few “shot” or unfertilized fruits. Berries borne beneath foliage develop a translucent emerald green color; in diffused sunlight they become light green to light golden. Berries very rarely crowd enough to square. They adhere to the stem well and there is little shelling or cracking. The skin of the berry is fairly tough. The pulp is soft, agreeably-flavored, and sweet (22 percent total soluble solids as determined by a hand refractometer) when thoroughly ripe, with a fragrant, rather unique aroma. Seeds are medium in size and usually two to four in number.

A typical cluster of Lake Emerald grapes is shown in Fig. 3. Flowering and maturity dates at Leesburg are listed below:

Year	Flowering Date	Maturity Date
1949	April 10	July 15-30
1950	March 25	July 1-15
1951	March 28	July 1-15
1952	April 14	July 5-20
1953	March 30	July 1-15

Yields of Lake Emerald

The yield record of the original Lake Emerald vine, which was started from seed in the spring of 1945, follows:

Year	Number of Bunches
1949	20
1950	28
1951	44
1952	24
1953	32

Vegetatively propagated vines also have produced heavy yields at Leesburg. Vines grafted on domestic rootstocks produced as much as two lugs per vine in 1952 (Fig. 4). Comparable vines of Florida Beacon were either dead or in various stages of degeneration, so that comparative yield data were not ob-

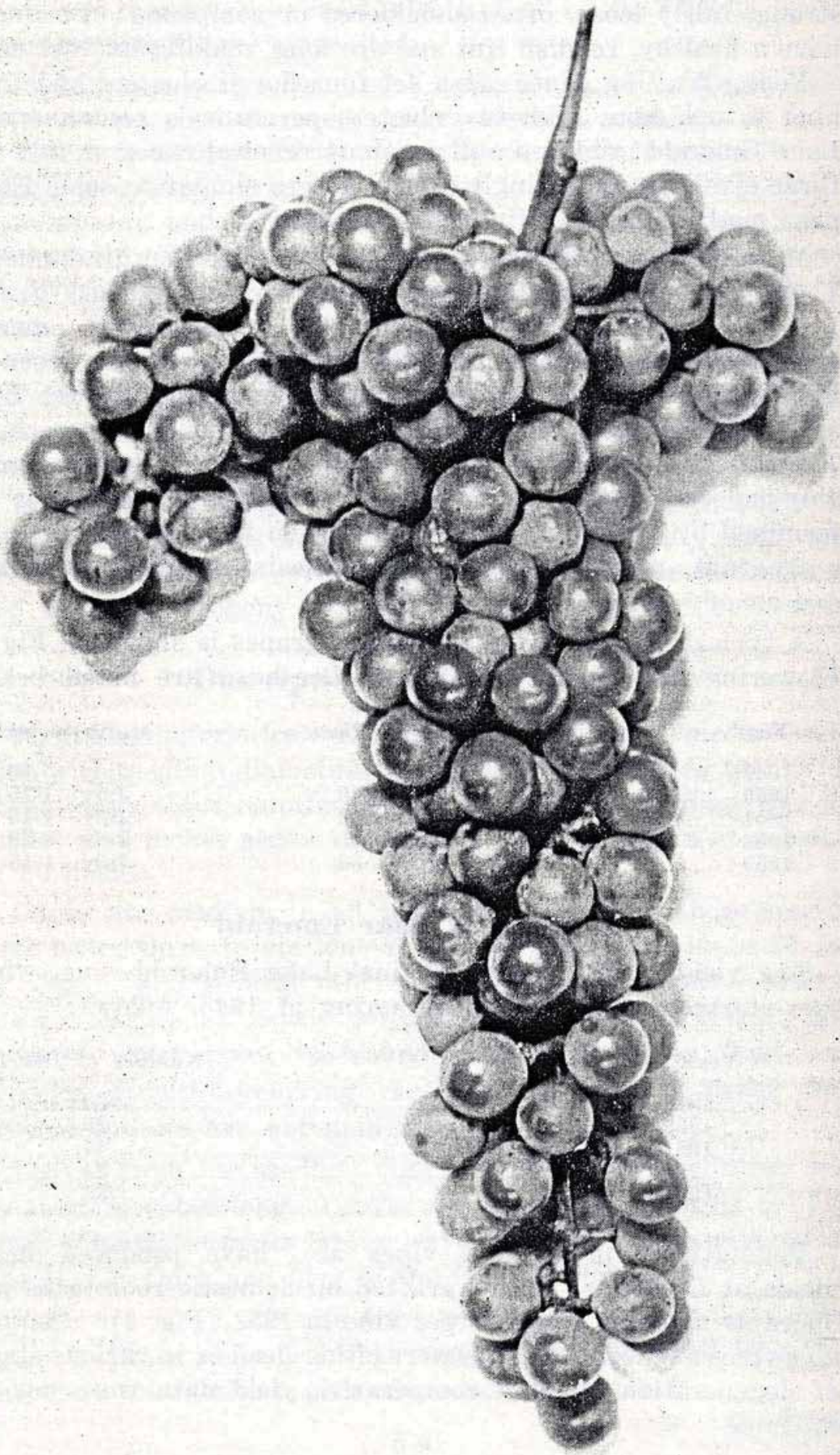


Fig. 3.—A typical Lake Emerald cluster (x $\frac{2}{3}$).

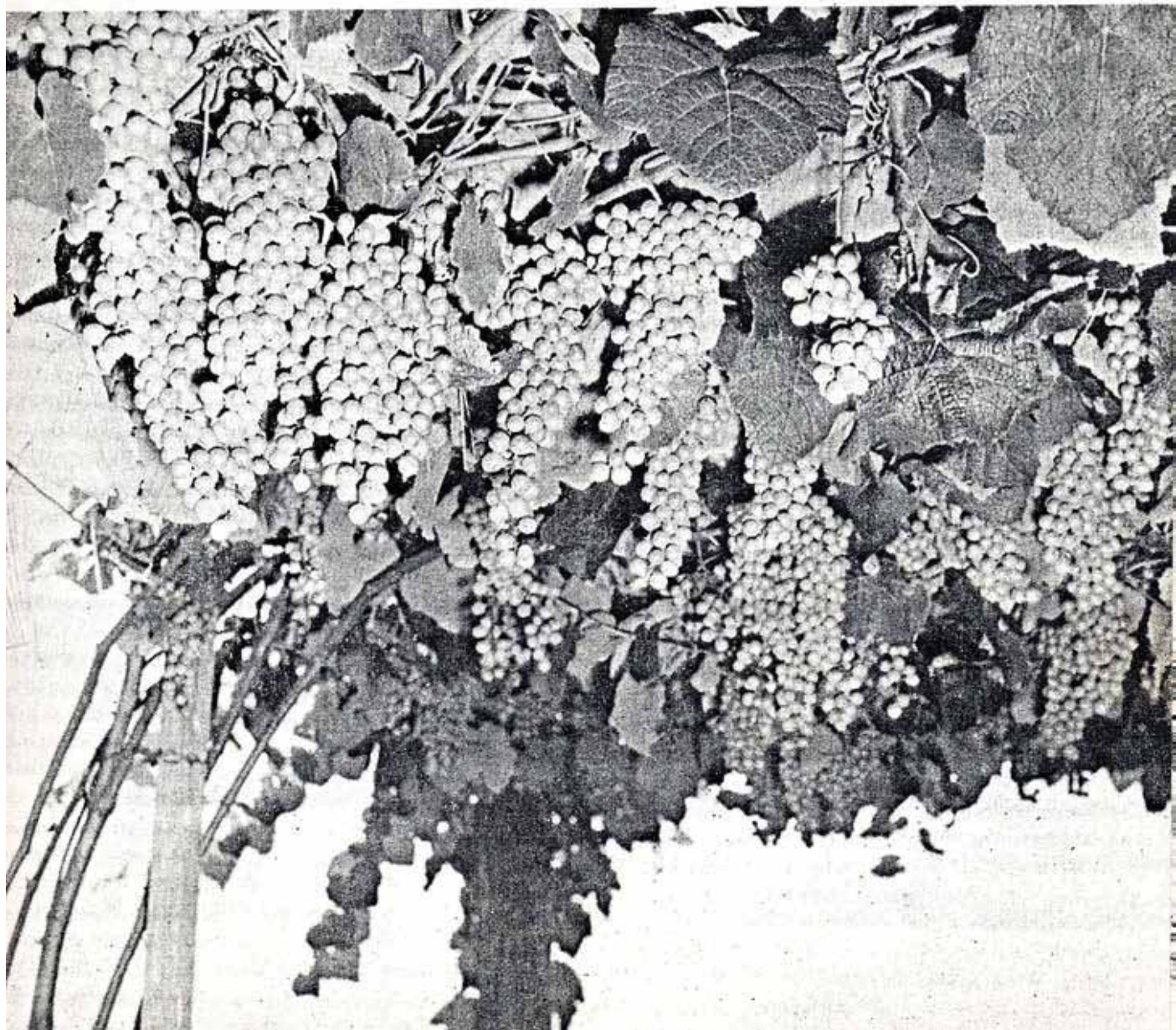
tained. Eighteen-month-old vines of Lake Emerald bore 15 to 20 pounds of marketable fruit per vine at Leesburg in 1953. This is an outstanding yield for vines of this age in Florida.

Yield records were obtained from one vine each of Lake Emerald and Florida Beacon planted as rooted cuttings in 1950 at the Sub-Tropical Experiment Station at Homestead.⁵ In 1952 yields were: Lake Emerald, a few bunches only; Florida Beacon, 39 bunches. In 1953 yields were: Lake Emerald, 108 bunches weighing 23 pounds; Florida Beacon, 77 bunches, none of which were harvested because of losses from birds and black rot.

Yields of Lake Emerald vines replanted where other varieties failed have been unusually good. Thirty-month-old replants of Lake Emerald produced a commercial crop at Leesburg in 1953.

⁵ Thanks are expressed to Dr. R. Bruce Ledin for this information.

Fig. 4.—Lake Emerald grafted on Black Spanish rootstock in January 1951. Over 40 pounds of fruit were harvested from this vine in July 1952.



In contrast, Florida Beacon vines seldom produce any fruit as replants.

Resistance to Degeneration in Lake Emerald

The cross Pixiola x Golden Muscat was made originally in 1945. Twenty vigorous seedlings from this cross were set in 1946 near a vineyard where grapes had repeatedly failed from degeneration. Young Florida Beacon vines were set a year later to serve as checks. All of the seedlings with Pixiola parentage were very vigorous for the first few years. Certain of them, however, developed symptoms of degeneration in later years, but 8 of the 20 seedlings have shown no symptoms seven years after planting. In contrast, all of the Florida Beacon vines have developed definite symptoms of degeneration.

No symptoms of degeneration have been found in Lake Emerald or in its vegetative offspring. Included in this group of plants is the original Lake Emerald seedling (seven years old), six three-year-old vines into which diseased wood was grafted on two different occasions, 138 two-year-old vines from cuttings and 750 one-year-old vines from cuttings.

Twelve vines of Lake Emerald, set in locations at which other varieties had failed, bore commercial crops (6 pounds or more) in 1953 at the age of 30 months. No other case is known of reset vines of cultivated varieties producing commercial amounts of fruit in Florida.

Plantings of Lake Emerald were made in Florida as far north as Gainesville and Hastings, as far west as Jay, and as far south as Belle Glade and Homestead to determine if the plants would survive. In none of these plantings have symptoms of grape degeneration been observed.

From observational evidence, Lake Emerald appears more resistant to black rot (*Guignardia bidwelli* [Ell.] Viala and Ravaz) and downy mildew (*Plasmopara viticola* [Berk. and Curt.] Berl. and DeT.) than the post-oak hybrids. It also appears to be more resistant to attacks by the leaf folder (*Desmia funeralis* Hbn.) and leaf skeletonizer (*Harrisina americana* Guer.) than these other varieties.

Uses and Limitations

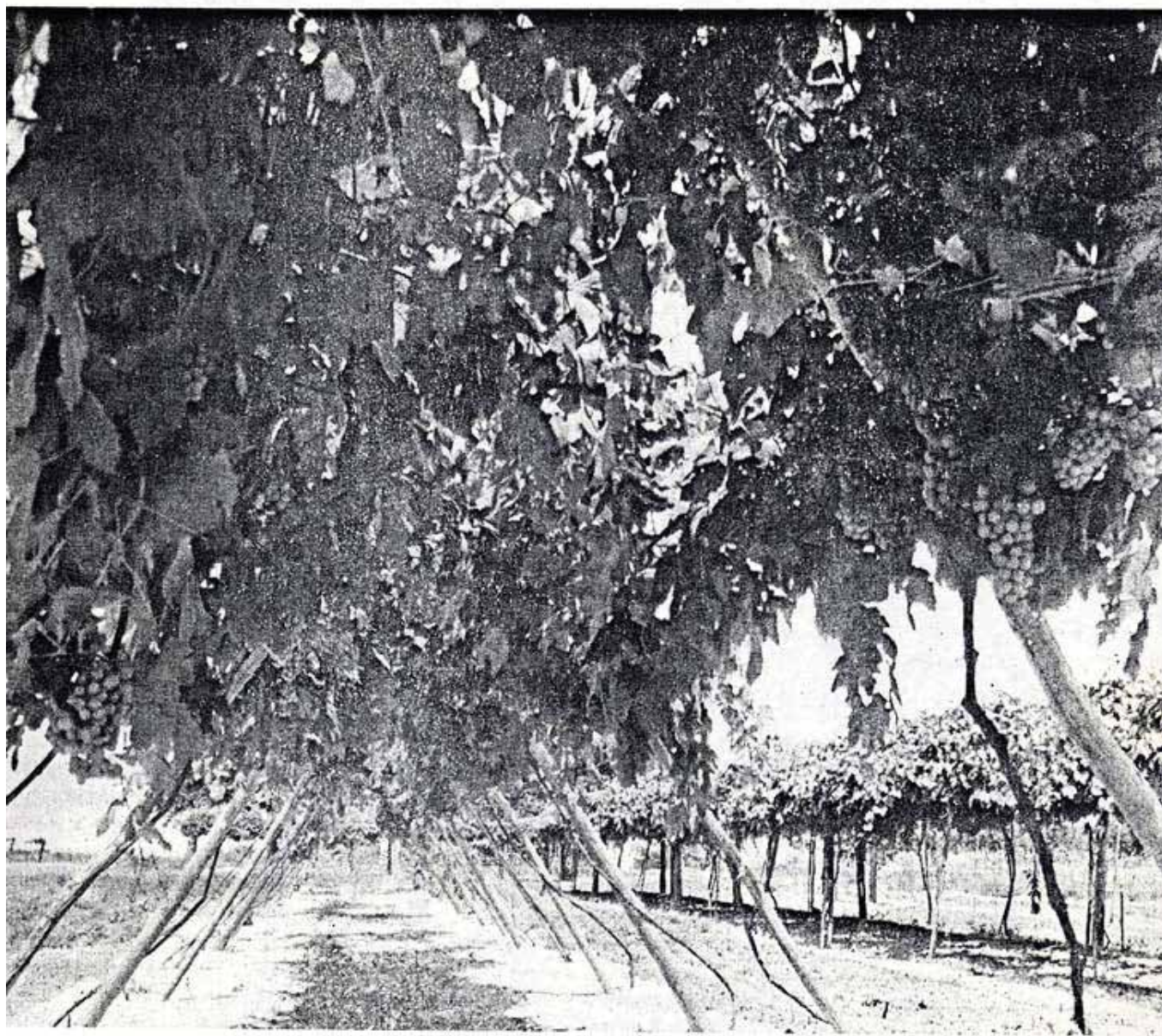
Lake Emerald is regarded primarily as a home-garden or arbor grape. Berries grown in diffused sunlight develop a light golden color when ripe and may be acceptable as local market

grapes. The berries are slightly smaller than desirable for commercial table grapes. Clusters and berries wilt more readily than Florida Beacon or Carman, for which reason Lake Emerald is not regarded as a shipping variety. Lake Emerald is at its best when picked ripe from the vine.

Juice of Lake Emerald is sweet, aromatic, agreeably-flavored and light in color. Because of its light colored juice, Lake Emerald is not considered an ideal source for commercially processed sweet juice or concentrate. It might well be used in this manner, however, blended with darker juices. Its high sugar content makes the juice particularly desirable for sweet juice processing. The potentialities of Lake Emerald as a wine grape are undetermined.

As the breeding programs at this station and elsewhere develop, grape varieties superior to Lake Emerald in many ways should become available. Because of its resistance to degeneration, Lake Emerald may prove a very valuable rootstock.

Fig. 5.—The wigwam type arbor has proved economical, strong and adapted for trellising Lake Emerald.



Recommended Cultural Practices for Growing the Lake Emerald Grape

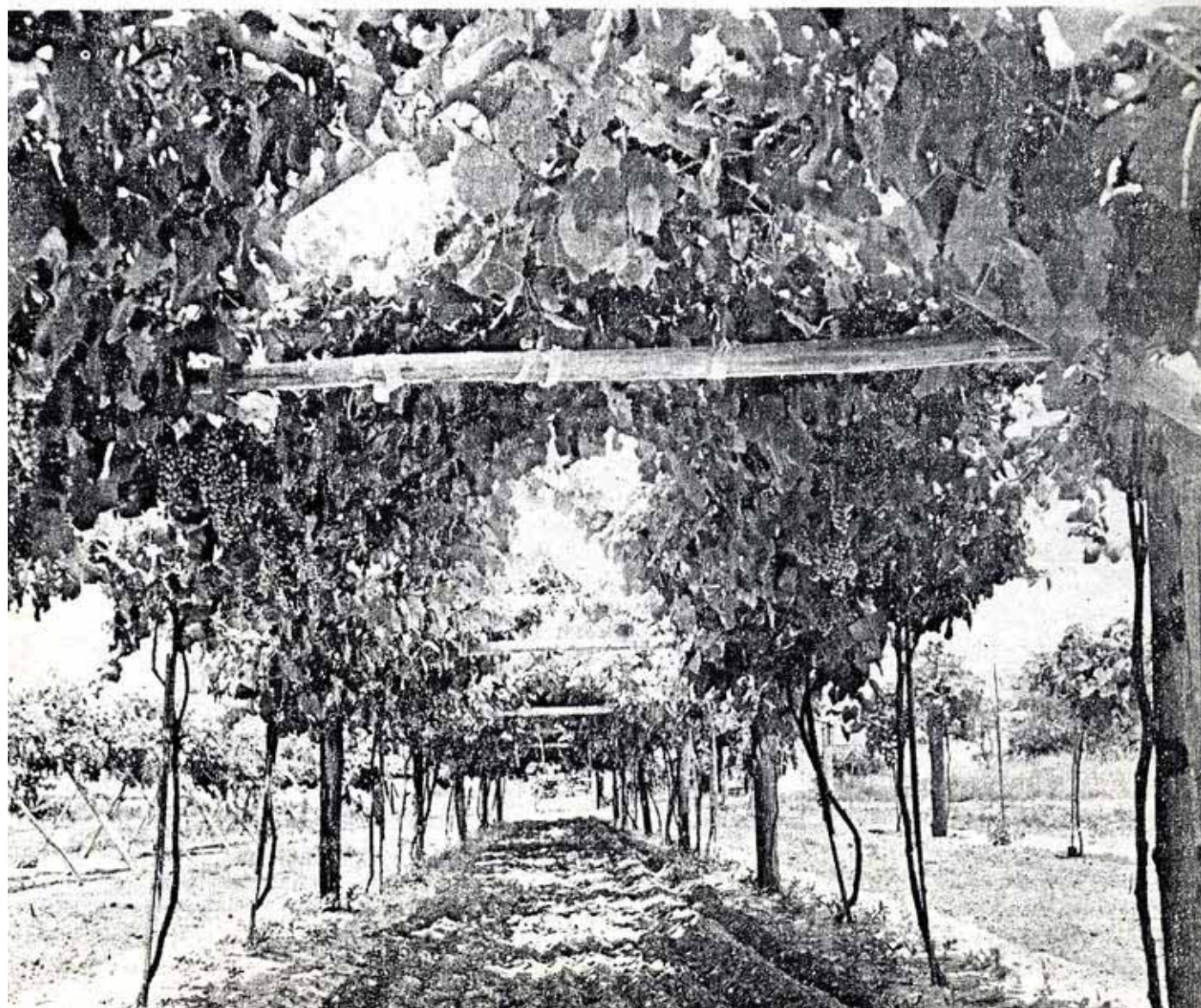
Based on experience at the Watermelon and Grape Investigations Laboratory and observations on successful practices in commercial vineyards, certain cultural practices are recommended for use in growing the Lake Emerald grape.

Arbors and Yard Plantings

This type of planting should be established in an open, sunlit area away from competition with trees and shrubs. Vines should be spaced eight or nine feet apart. Figs. 5 and 6 will guide the grower in planning arbor-type trellises.

Other cultural practices are similar for both home garden and commercial plantings.

Fig. 6.—The conventional overhead arbor is especially well adapted for home plantings.



Commercial Vineyard Plantings

Land.—The soil range to which the Lake Emerald grape is adapted has not yet been established. It is known to thrive on intermediate, sloping, well-drained sandy loams where clay subsoils are two feet or more below the surface.

Trellis.—Vineyard plantings of Lake Emerald for commercial production can be trellised with the Munson canopy post system, with a 30-inch cross-arm at a height of five feet and three supporting wires, one at the center and two at the ends of the cross-arms.

The standard three-wire Kniffin trellis, with rows laid out east and west, is also well adapted for the Lake Emerald grape. The growing vines should be thrown over the south side of the trellis to aid in shading. This trellis is cheaper than overhead arbors and results in the production of lighter colored fruits.

The most promising over-head trellis is the two-row wigwam or "A" type (see Fig. 5). In trials at Leesburg it has proved efficient and inexpensive.

Fertilizer Practices.—At present only general fertilizer recommendations can be made. Young vines should be set with extreme care, using only a small amount of castor pomace or well-rotted compost. A suggested schedule of fertilizer applications for the establishment of a new vineyard follows:

First Year (Young Plants):

- ¼ lb. castor pomace or well-rotted compost per vine, at time of planting.
- ¼ lb. nitrate of potash in February.
- ¼ lb. nitrate of potash in April.
- 1 lb. 4-7-5 with 30 percent natural organic nitrogen when summer rains begin; scatter fertilizer thinly and evenly, at least a foot from vines at setting, and farther from vine at later intervals, since roots attain length rapidly; to get best results from fertilizer first year, it is advisable to clean-cultivate until winter.

Second Year:

- 1½ lb. 4-7-5 with 30 percent natural organic nitrogen February 1.
- ½ lb. nitrate of potash April 15.
- 1½ lb. 4-7-5 with 30 percent natural organic nitrogen when summer rains begin.
- 1 lb. castor pomace or milorganite December 1 (before shallow plowing).

Third Year:

- 1½ lb. 4-7-5 with 30 percent natural organic nitrogen February 1.
- ½ lb. nitrate of potash April 15.
- 1½-2 lbs. 4-7-5 with 30 percent natural organic nitrogen when summer rains begin.
- 1-1½ lbs. castor pomace or milorganite December 1.
(before shallow plowing).

The third-year program can be followed in later years, or slightly increased amounts of fertilizers may be used.

Cultivation.—The feeder roots of grapes are located near the soil surface. Therefore, shallow cultivation with a disk harrow or acme harrow is recommended from February 15 until time of harvest. Hoes and rakes are satisfactory for cultivation in arbors.

In young vineyards clean cultivation throughout the year is recommended. In established vineyards no cultivation is needed from fruit harvest to December, during which period a cover crop is desirable. Hairy indigo (*Indigofera hirsuta* L.) is satisfactory in central Florida. In late fall the planting should be disked or plowed for cleaning up and as a safeguard against fire.

Pruning.—The pruning method generally used with the varieties Florida Beacon and Carman is satisfactory for Lake Emerald, except that fruiting canes of new wood can be pruned shorter. Mature plants should be pruned to a bearing framework of three or four canes of new wood with a total of 30 to 40 buds. More three-eye spurs (six is not too many) may be left with Lake Emerald than is desirable with Florida Beacon. Thirty buds on canes and 12 buds on spurs are ample for a strong vine. Dormant pruning in central Florida should be done in January.

Spraying for Disease and Insect Control.—Lake Emerald appears somewhat more resistant than the post-oak hybrids and other imported grape varieties to some fungus diseases and insect attacks. In spite of this apparent resistance, a spraying program is advisable to minimize fruit losses to diseases and insects. Spraying should be begun in the spring when buds are about two inches long and be continued at intervals of 10 days to two weeks until berries have attained maximum size.

Zineb at 1½ pounds to 100 gallons of water is used as a grape fungicidal spray at this Laboratory. If applied less than five weeks before harvest it may result in stained fruits. Lindane at 1 pound per 100 gallons is added to the spray if insect control is needed. Trials of other fungicidal sprays for grapes are currently in progress.