

The Strawberry Variety Situation in Eastern United States

D. H. SCOTT

Beltsville, Maryland

The major commercial strawberry-growing regions of the United States are roughly outlined on the map in Fig. 1. These regions were established by the performance of different varieties after many years' trial and reflect largely the effects of daylength, temperature (both high and low), and rest period on strawberry plants. Variety tests in different regions have shown that varieties in one region are generally more satisfactory in that region than in others, especially at considerable distance North or South. With that thought in mind, growers can lim-

it their trials of new varieties to kinds originated in their region or adjacent regions.

The ten principal varieties of the United States are listed in Table 1, according to the total acreage grown in 1954. Varieties introduced in the past four years that are of interest at this time include Empire, Eden, Plentiful, Florida-90, Albritton, Dixieland, Pocahontas and Stelemaster. Empire and Eden, originated at the Geneva Experiment Station, appear to be adapted to areas where Howard 17 and Catskill are grown. Empire, a

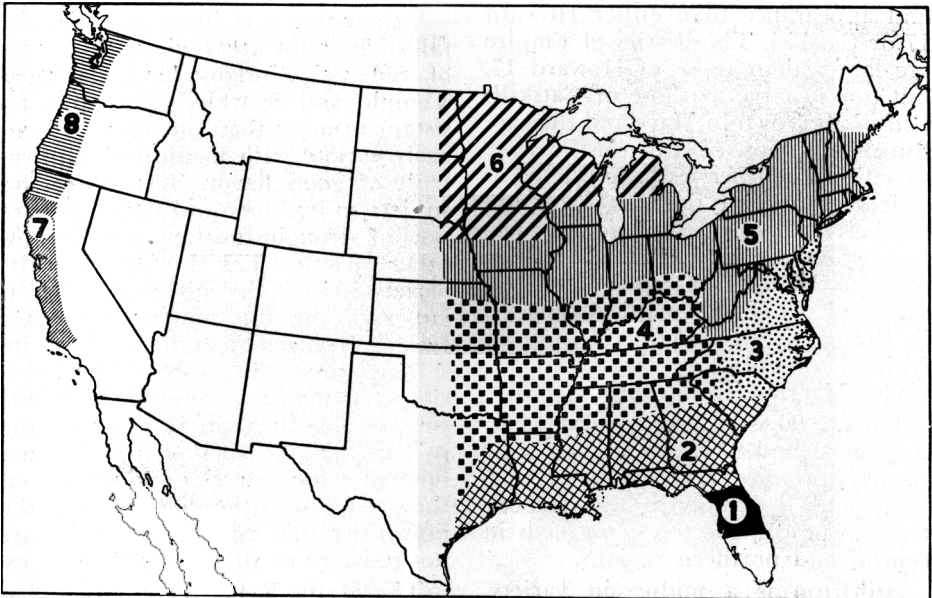


FIG. 1. Outline map of United States, showing principal commercial strawberry-growing regions (based on performance of varieties). Region 1—Missionary; Region 2—Klonmore; Region 3—Massey, Blakemore; Region 4—Blakemore; Region 5—Howard 17 (Premier), Robinson, Catskill; Region 6—Dunlap; Region 7—Shasta and Lassen; and Region 8—Marshall, Northwest.

TABLE 1. The 10 principal varieties of strawberries in the United States as estimated by 1954 acreage¹.

Variety	Per cent of total acreage	Region ²
Blakemore	24	3, 4
Marshall	20	5
Howard 17 (Premier)	9	5
Shasta	8	7
Robinson	7	5
Klonmore	7	2
Northwest	5	8
Catskill	3	5
Sparkle	3	5
Tennessee Beauty	3	4

¹Acreage reported by Agricultural Marketing Service, U. S. Dept. of Agriculture, Oct., 1954.

²See Fig. 1.

midseason variety, has fruit more attractive in color, glossiness, and general appearance than either Howard 17 or Catskill. The berries of Empire are larger than those of Howard 17, but not so large as those of Catskill; and when grown in Maryland they are firmer than those of either of the older varieties. Eden berries have fine color in frozen pack, but the flesh is soft and the berries become small as the picking season advances. Plants of Eden seem to be very susceptible to leaf spot and scorch. Plentiful, originated in Illinois, is very productive, but its fruit is too soft for commercial use under Maryland conditions.

Florida-90 is primarily adapted to Regions 1 and 2. It is a very prolific runner producer, surpassing Blakemore and Robinson in this respect, and it would make too dense beds in central and northern regions.

Albritton is a midseason variety, originated in North Carolina, and appears to be adapted mainly to Region 3. In North Carolina it is replacing Massey rapidly because of the firmness, tough skin, smoothness, and attractive

appearance of its fruit. Although Albritton produces primarily fresh-market berries, the fully ripened fruit makes an attractive frozen pack.

Dixieland, Pocahontas and Stelemaster originated in Maryland. Dixieland is early ripening and seems to be adapted to about the same areas as Blakemore. Its fruit is as firm as Blakemore. It is larger, slightly darker red and somewhat smoother than Blakemore and is comparable in quality.

Pocahontas is a midseason variety rather widely adapted throughout south central United States. It has large, robust plants and produces runners freely so that it usually makes good beds. The fruit is firm, bright red, with tough skin, large average size and moderately tart taste. Both Dixieland and Pocahontas are acceptable for frozen pack.

Stelemaster was introduced in the fall of 1954 for areas where new races of red stele fungus have damaged Temple and Sparkle, since it is resistant to more than one race. It is an early variety with medium-sized, firm fruit of good flavor. The leaves are subject to leaf spot and the plants are not so drought-resistant as those of other varieties. The chief merit of the variety is its high resistance to different races of the red stele root-rot fungus. The red stele disease is an insidious trouble because a light infection that may not be detected at the time of planting can ruin a planting in one season when conditions are favorable for infection by the causal fungus. Growers should be alert to the possibility that resistant varieties are not resistant to all races of the fungus.

The Maine Experiment Station has introduced the Monmouth, Orland, and Maine-55 varieties primarily for home use. We have not seen them in fruit in sufficient number of places to judge them. In Maryland their fruit

is too soft to have commercial possibilities. All are reported resistant to the common race of red stele.

Varieties introduced about 1950 that have been rather extensively tested are Armore, Tennessean and Vermilion. Armore was introduced by the Missouri Station as a replacement for Aroma in the western part of Region 4. It ripens in late-midseason and has large rather irregularly shaped fruit with good flavor and bright color. The fruit is not satisfactory in frozen pack. The plants are very productive, but the leaves are very susceptible to leaf spot and mildew. Tennessean is an early variety with fruit too small and too soft to compete with Blakemore and Dixieland for commercial use. Vermilion appears adapted to the upper parts of Regions 3 and 4 and through Region 5. Its vigorous plants are resistant to red stele and are very productive. The fruit is dark red, of about the same degree of firmness as Sparkle, large and with fair to good flavor.

Strawberry Viruses

Productiveness of varieties depends on a two-fold condition: (1) inherent ability of plants to produce fruit and (2) the formation of full plant beds. The latter condition is dependent on the fertility of the soil, favorable climate, and thriftiness of the planting stock. Recent investigations have shown that viruses present in strawberries seriously weaken the plants and result in thin stands of plants and a light crop of fruit. Since virus infection seems to be a universal trouble in strawberry stocks in eastern United States, it is a problem of concern to most growers as well as nurserymen.

The first information that eastern varieties of strawberry were virus-infected was supplied by J. B. De-

maree, now retired, from work begun by the United States Department of Agriculture nine years ago, and first reported in December, 1951. He found in his early work that it was difficult to detect virus symptoms in the leaves because of the absence of mottling or yellowing of the leaf margins. Virus-infected plants may be dwarfed and may produce few runners, both responses being associated with poor growing conditions. Thus, it is almost impossible to diagnose virus diseases from the appearance of plants of most varieties. To determine whether a strawberry plant is virus-infected, it is necessary to index it on a virus-sensitive indicator. The indexing is done by grafting a runner of any particular variety to a runner of *Fragaria vesca*, a wild species of strawberry that is very sensitive to viruses, and expresses their presence by characteristic leaf symptoms and growth patterns. In four to six weeks from the time of grafting, The *F. vesca* plant will indicate whether the indexed plant is infected. Plants from many different places were indexed and it was found that viruses were widespread in strawberry stocks.

The next step was to search for virus-free plants of the different varieties, and, as a result of indexing many hundreds of plants, a few virus-free plants of most of the important varieties were found. These were propagated in an isolated field at Beltsville where aphids, the disease carriers, were controlled. Virus-free stocks were then distributed to a limited number of nurseries. In the past two years nurserymen were successful in producing substantially virus-free stocks, and these were made available to growers in the spring of 1954 for the first time. Varieties that have been propagated under virus-free conditions from indexed stocks, and will be available to eastern growers in the spring of 1955 are as follows:

Albritton	Midland
Armora	Missionary
Aroma	New York
Bellmar	Pocahontas
Blakemore	Redstar
Catskill	Robinson
Dixieland	Sparkle
Dunlap	Stelemaster
Fairfax	Tennessean
Howard 17	Tennessee Beauty
Klondike	Tennessee Shipper
Klonmore	Vermilion
Massey	

Additional varieties that should be available in 1956 are Empire, Florida-90 and Gem.

Up to the present, all these stocks have been distributed without certification of their virus status, since none of the eastern states had regulations to label stock as virus-free until the fall of 1954.

There is no information at present on how rapidly or how severely strawberry stocks degenerate from virus infections. Varieties differ in their tolerances to viruses. Those grown in the eastern United States that seem to be more sensitive to viruses than others include Catskill, Midland, Fairpeake and Redstar. Varieties that appear to moderately tolerant are Blakemore, Howard 17 and Dunlap. No varieties are known to be immune.

There are recent developments that will be helpful in the production of improved stocks of strawberries. Research workers in England, Oregon, Michigan and Arkansas have found that strawberry plants can be freed of viruses by keeping them at 98° F. for eight to 14 days. This treatment weakens the plants too severely for use as a general practice with nursery stock, but it is a means of obtaining clean plants for further propagation. Heat treatments are now in progress to produce virus-free stocks of Temple, Fairland, Fairpeake and other varieties now entirely infected with virus.

The Tennessee State Department of Agriculture has just established a virus-free certification system for strawberry plants, the first in eastern United States. In this system there are two kinds of plants, foundation stock and general, certified nursery stock. Foundation stock must be used every second year in the propagation of general stock for it to qualify for certification.

The use of high quality planting stock should be a major consideration of every strawberry grower at present. Now that it is known that strawberry stocks can "run out" as a result of virus and nematode infections, growers should seek the best stocks possible. By using adapted varieties and high quality stocks, a grower can reduce some of the risks that he might encounter in growing strawberries.



Variety Study of the Macadamia Nut

C. A. Schroeder reports that the University of California at Los Angeles, in cooperation with the California Avocado Society, has initiated a study in which 10 seedling varieties of the Macadamia nut from Hawaii and five from Australia are being evaluated for their possible use as a commercial crop in California. Two species are involved in this test group of varieties, namely, *Macadamia ternifolia*, which produces rough-shelled nuts, and *Macadamia integrifolia*, which produces smooth-shelled nuts.

The observers are hoping to find varieties that will give good yields of large sized nuts with high quality, thin shells and high oil content.

Very favorable consumer acceptance of the shelled nuts and the expansion of Macadamia plantings in Hawaii have stimulated considerable interest in this nut for California.