

## THE DEVELOPMENT AND EXAMINATION OF A CITRUS FRUIT.\*

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The lemon, orange, grapefruit and lime are all members of the genus *Citrus*. There are a number of varieties from each of these different species and each presents a marked difference in appearance, composition and taste. Although grown in a tropical or sub-tropical climate, the fruits are transported to all parts of the world. Their consumption in this and most other countries has been increasing rapidly for many years, and the public has come to think of them as indispensable to their needs.

Since the characteristics, composition and structure of the lemon and the grapefruit as well as other recognized species of the *Citrus* group are well known it was deemed of interest to investigate: *first*, the fruits produced by crossing the lemon with the grapefruit, and *second*, by selection of the best cuttings from their grafting to improve upon the fruits first developed.

The investigation has been carried on since 1923 at which time a lemon-grapefruit graft was obtained from a Seattle floral garden. The young plant was about eighteen inches high and was placed in the University of Washington green house. One fruit was borne in 1924, three in 1925 and two in 1926, after which the plant ceased to bear fruit. Several cuttings were taken from a fruiting branch in 1925. All grew vigorously but only one mature fruit was produced.

A cutting was obtained from a fruiting branch in 1926. The first fully developed and ripened fruit from this plant was obtained in 1929 at which time the cutting was eight inches above ground. Two more were obtained in 1930 and the height of the young tree fifteen inches. At the present time it stands twenty-three inches above ground.

The mature and ripened fruit has a characteristic lemon-grapefruit color, but instead of being oval as the lemon or globose as the grapefruit it is distinctly pear-shaped. It is devoid of the pointed nipple-shaped summit of the former, but has the characteristic rounded base of the pomelo. The average weight of the fruit is between one and one and one-half pounds. The texture of the fully developed, ripe product is firm and solid, much more so than the grapefruit.

The fruit is a hesperidium with from ten to twelve locules and about four or five seeds in each of these segments. The rind is rough, thick and leathery, the surface being of a deep yellow color. Like the other members of the citrus group it consists of epicarp, hypoderm and outer mesocarp.

The epicarp cells range from fifteen to twenty mm. in diameter and are fairly thick-walled. The oil cavities in the outer layers are small, most of them less than one millimeter in diameter and are more numerous than in most lemons or grapefruits. The hypoderm cells present a heavy outline and vary from forty to sixty mm. in diameter, while the spongy parenchyma of the mesocarp are large cells with numerous intercellular spaces. The endocarp surrounding each locule is tough and membranous and becomes parchment-like on drying.

The citric acid content of the juice varied from 2.69% to 2.95% which is less than average for the lemon but more than for that of the grapefruit. The total acidity ran considerably higher but was due to other acidous components besides

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the citric acid. The juice when sweetened and diluted has a pleasing flavor, quite a different taste from the two fruits closely related to it.

A comparison of the fruit obtained from the original graft, between the years 1924 and 1926, and those from cuttings from this graft (1929-1930), show marked development. *First*, an improvement in the texture was observed. The pulp was not so hard and firm and the club-shaped vesicles of the segments were softer and more succulent. The pulp of the fruit gave a greater yield of juice. *Second*, the product from the more recently developed plant produced a thinner covering for the fruit, although the outer yellow rind appeared to be just as thick and heavy. It may, therefore, be concluded, since the juice and outer rind constitute the most important components of the citrus fruits, progress has been made in improving the character of this more recently developed fruit.

It is hoped and expected that continued improvement will be noted from work in progress and from experimentation of the products from selected cuttings.



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#### CHARLES S. SARGENT MEMORIAL.

In honor of the late Charles S. Sargent, for many years director of the Arnold Arboretum, Harvard University, a memorial arch will be erected across Center St., Jamaica Plain, near the Arboretum.

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