

Roselle.

By P. J. Wester.

Mr. President, Ladies and Gentlemen:

Of the smaller fruits that have been introduced into the State for a comparatively long time, none, with its seeming commercial possibilities, have been more neglected than roselle (*Hibiscus sabdariffa*), also known under the name of Jamaica sorrel. Even as a household plant, it is not, considering the ease with which it is cultivated, grown as widely as it deserves. At the Subtropical Laboratory we have paid particular attention to the cultivation of this plant for nearly four years, and on receiving an invitation from the President of the Society to deliver an address at this meeting, I selected this as a timely subject, so much the more as during the existence of the Society only once, in 1899, if I am rightly informed, has the attention of the members been called to the roselle. This paper is Farmers' Bulletin No. 307 condensed, where the subject is more fully treated, with such additional data as have been obtained since that bulletin was written.

As those of you who are acquainted with roselle know, the plant is an annual and resembles somewhat the cotton plant in habit, attaining a height of from five to seven feet, with about a like spread, under favorable conditions. Its large, red-eyed yellow flowers indicate its relationship to the okra, the various species of ornamental hibiscus and the

cotton plant. It is indigenous to the Old World tropics, but is now probably disseminated to all the tropical and subtropical countries. Some twenty or more years ago the roselle was introduced into Florida, the name Jamaica sorrel being probably an indication that the plant was introduced from Jamaica.

Keeping in mind that lands subjected to flooding and insufficiently drained lands should be avoided, as well as lands infested with the rootknot nematode (*Heterodera radicicola*) to which the plant is very much subject, the roselle seems to thrive on any of our Florida soils that are moderately rich or supplied with the necessary plant food in the form of commercial fertilizer. If stable manure is used it should be supplemented with phosphates and fertilizers that contain potash, as an excess of ammonia in the soil tends to the development of large plants at the expense of their productiveness.

The plants may be started in a seed-bed in the spring and planted out in the field similarly to tomatoes, or the seeds may be planted in the hills where they are to remain and thinned out to one plant to a hill. The rows should be from six to ten feet apart and the plants set out four to eight feet apart in the row according to the fertility of the land and the supply of moisture. In our experience a mixture similar to tomato

fertilizer has been found to be very satisfactory, applied at the rate of 1,000 to 2,000 pounds per acre. Where a few plants are set out for home use most fertilizers that are available would probably serve the purpose.

The greatest drain on the vitality of the plant is the ripening of the seed and if the calyces are picked as soon as they are full grown instead of allowing them to become more mature, the plant, in the effort to reproduce itself, sends out new flower-buds that set fruit continuously until cut down by frost if it is not injured by diseases or insect enemies.

In a report from the Porto Rico Experiment Station, 1906, the yield per plant is given as four pounds of fruit while some plants were estimated to yield double that amount. At the Sub-tropical Laboratory during the past few years we have been engaged in the breeding of a variety having larger calyces than the common kind and during the last fall and winter weighed the fruit from eight plants of this variety to ascertain the average yield. The data obtained, which are given in the following table, are quite interesting.

Nos. 1, 2, 3, 4, and 5 represent one plant each and No. 6 represents calyces from three plants weighed together. The yield from No. 1 was so markedly larger than from the rest of the plants that it was thought desirable to save the seed for breeding purposes, which explains the omissions in yield from January 6 to February 8, 1908, at which latter date part of the ripe calyces were saved and the remainder February 18. January 25 the calyces of all the plants except No. 1 (which was tented) were picked for fear that the plants might freeze down in an approaching cold wave.

Subsequently all the plants in this experiment died from the attack of rootknot nematodes, except No. 1, which was pruned back, has continued to bloom and is still in active growth and setting fruit. Two plants which were not included in

TABLE
Showing the average yield of Roselle,
variety "Victor."

Date of Picking	Weight of calyces set from first bloom.						Total Grams
	No. 1. Grams	No. 2. Grams	No. 3. Grams	No. 4. Grams	No. 5. Grams	No. 6. Grams	
November 15, 1907	1665	695	967	.....	.....	1818	5145
November 23, 1907	4055	2885	2050	1290	1465	4585	16380
November 30, 1907	1390	1510	1295	785	1940	6555	13475
December 7, 1907	35	170	1485	2335	1190	2800	8515
December 17, 1907	.....	.....	.....	825	280	585	1640
	7145	5260	5797	5785	4875	16298	45105

Weight of calyces from bloom induced by picking.							
December 28, 1907	115	145	15	.....	55	55	375
January 1, 1908.....	.....	315	205	.....	.....	700	1220
January 16, 1908.....	....	292	775	450	.....	1190	2707
January 23, 1908....	.....	.....	665	.....	545	.....	1210
January 25, 1908.....	.....	750	495	735	335	2880	5195
February 8, 1908....	430	....	.....	.....	.....	.....	430
February 18, 1908...	2110	.....	.....	.....	.....	.....	2110
March 6, 1908.....	75	....	.....	250	50	335	710
	2730	1492	2155	1435	965	5160	13957

Average yield of calyces per plant from first bloom.....	5638 gr. - 12.4 lbs.
Average yield of calyces plant from bloom induced to set by early and continuous picking	1744 gr. - 3.8 lbs.
Total average of calyces per plant	7382 gr. - 16.2 lbs.

the above mentioned test yielded together 46 lbs. or 23 lbs. of calyces per plant. It should be stated that we had no frost in Miami during the past winter. You will note the great difference in the yield as given by the report from

Porto Rico as compared with that obtained by the Subtropical Laboratory, due partly to continued breeding and selection, and probably in part to more favorable conditions and perhaps to better cultivation.

In Florida the plant has thus far been grown for home use only and the calyces used in making a sauce similar to that made of the cranberry, or in jelly making. Besides the two products already mentioned, the roselle yields a most excellent fruit syrup that can be used in the home in various ways. It can also be used as a flavoring extract at soda fountains.

When the calyces are used as a sauce the seedpods must of course necessarily be removed but last fall we found that this is not necessary in the making of jelly. In the manufacture of jelly on a commercial scale this is an important consideration, as the removal of the seedpod is at present a slow and tedious process.

Several years ago Mr. W. W. Tracy of the Bureau of Plant Industry, made jelly of the tender twigs and branches, but did not follow up his discovery to ascertain its commercial possibilities. Acting on this suggestion, during the past year the writer experimented with extracting the acid from the whole plant by boiling both the young stems and the leaves. The jelly obtained in this way was perhaps a little more difficult to make than that made from the calyces, but it is possible that some mistake in making it was the cause of this, for I understand that Mrs. P. H. Rolfs has made jelly from the stems and leaves that she considered fully equal to that made from the calyces of the plant. An excellent fruit syrup is also obtained from the

same source that may be used in the household or used as a flavoring extract in soda water fountains. Utilized in this way the plant can be grown in a large territory of the United States and the ease with which the plant is cultivated probably renders it a cheaper source for flavoring extract than any other plant.

The only disease that has so far been observed on roselle is a mildew that attacks all parts of the plant above ground and if the disease appears early it is apt to do considerable damage if it is allowed to spread unchecked. An experiment to ascertain the comparative value of dry sulphur, sulphuric acid diluted one part to 500, 1,000 and 2,000 parts of water, respectively, and liver of sulphur as a remedy for the disease was made last fall at the Subtropical Laboratory. Their comparative values as fungicides were found to be as in the order named. The sulphur should be applied early in the morning while the plants are still wet with dew.

In addition to the soft scale (*Coccus hesperidum*) another scale was noted on roselle last fall. Specimens were sent to Dr. L. O. Howard, Chief of the Bureau of Entomology, United States Department of Agriculture, who identified them as *Hemichionaspis aspidistrae*. It appears, however, to do very little damage as, while multiplying itself rapidly, the scale is followed by a parasite (*Aspidiotiphagus citrinus*) that seems to keep it well in check.

In Queensland the cultivation of the roselle has assumed a commercial aspect during the past few years and considerable quantities of roselle jam are yearly exported to Europe. In the United States, aside from the home use as a sauce, the most popular products would

probably be jelly, a fruit syrup for the table use, or diluted with water as a cooling drink and as a flavoring extract for cool drink stands. The writer ventures to express the opinion that when the manufactured products of roselle become

known to the public the roselle will furnish the basis for a considerable industry along these lines in the United States at no distant date, in which Florida, due to her geographical position, should have a large share.