

## SWEET POTATO RESEARCH IN PUERTO RICO

— by —

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The sweet potato (*Ipomoea batatas*), has always been a secondary crop in Puerto Rico, overshadowed by the leading cash crops such as sugar-cane, coffee and tobacco. However, at present the role of these crops is declining. This is due, among other factors, to the very low wages paid to farm labourers in Puerto Rico as compared with relatively high factory wages; the exodus of Puerto Rican farm hands from the Island to the mainland during the harvest season, and the resultant scarcity of farm labour; and competition with other sugar, coffee and tobacco producing countries. It has been often more economically feasible for us to import some commodities from other countries in which the cost of production is very low as compared to the high cost of cultivation in Puerto Rico.

On the other hand, while production of these other important cash crops in Puerto Rico has been declining during recent years, the production of root crops, especially the sweet potato, has remained rather stable. In some areas there has even been a noticeable increase in production. This is due to the fact that root crops have always been, and will in all probability continue to be, an important staple food in the daily diet of the Puerto Rican people.

When Columbus came to Puerto Rico in 1493, sweet potatoes were being cultivated by the Borinquen Indians as a supplement to their diet based mostly on fish and meat. The Indians cultivated five known varieties of sweet potatoes. The early Spanish settlers continued the cultivation of sweet potatoes as practised by the Indians; and through the succeeding centuries the number of edible varieties was gradually increased through selection. At the present time the Agricultural Experiment Station of the University of Puerto Rico is carrying out an active programme of sweet potato research and the scientific development of new and better varieties. There are written records of this project dating from the year 1929 to the present.

The growing of sweet potatoes at the Agricultural Experiment Station in Rio Piedras, Puerto Rico apparently began about 1923. During that year and the following year several varieties were tested for yield and quality. In 1925—26 there were 224 varieties grown and tested, and out of these varieties, 93 were selected for further experimentation.

From then up to the present time the Agricultural Experiment Station has continued introducing and testing new varieties for high yield. However, it was not until 1948 that real emphasis was given to our sweet potato research programme. At that time there was a possibility of establishing sweet potato canneries on the Island. By 1952 two canneries were processing sweet potatoes in Puerto Rico. During those years the author was in charge of the sweet potato research programme at the Experiment Station.

During this period the Station invited Dr. Julian C. Miller, a leading authority on breeding techniques of sweet potatoes from Louisiana State

University, to help us in setting up this new research programme at the Station. His advice and assistance were very valuable to us in improving our techniques and in getting the programme started.

One of the objects of this work was to develop high yielding yellow type sweet potatoes which would surpass the standard U.P.R. 3 variety and also be suitable for canning purposes. Tests made in our Food Technology Laboratory showed that a new variety selected from this programme and named "La Cobre" surpassed in quality all other varieties tested for canning purposes. From 1949 through 1955 the work was intensified and literally thousands of varieties of sweet potatoes were tested. The author introduced hundreds of varieties from Louisiana, Georgia, Florida and all the other sweet potato producing states of the Union. A survey of all the native varieties was made and a new programme with a larger collection initiated. Breeding plots were established in an effort to select better varieties for fresh market consumption and for industrial purposes. In addition about 5000 new seedlings were produced each year by breeding and from open-pollinated seed from selected plants.

In addition to the "La Cobre" variety which is outstanding as to yield, palatability and keeping qualities for canning purposes, two other outstanding yellow varieties were selected.

These are also high in carotene content, as is the "La Cobre," and are highly resistant to drought and poor soil conditions. However, these two varieties, the "Canola" and the "Rico," do not peel quite as easily and consequently are not as suitable for canning purposes as the "La Cobre." Nevertheless, these two varieties were considered to be excellent for the fresh market.

While testing these yellow varieties a valuable mutation was found. While harvesting U.P.R. number 3 yellow type sweet potatoes, the author found four good size, well formed, *white* sweet potatoes on a string of yellow ones. These four white sweet potatoes were planted and on maturity, produced a high yield of the same white type. From this mutation was obtained the "Blanquita" variety which is excellent for the local fresh market. Actually, the native Puerto Ricans, particularly the rural people, prefer to eat the white type sweet potato rather than the more nutritious yellow type. This is of course, a matter of food habit.

Through a large number of regional tests conducted during 1949 to 1955 the best time of planting for sweet potatoes in Puerto Rico was established. In a series of tests, planting the sweet potatoes every month and subsequently harvesting every month, it was observed that the high yielding varieties produced a lower yield at certain times of the year. In addition it was observed that all the varieties followed the same pattern, producing proportionately more or less at certain times of the year. Continuing these monthly tests throughout the Island the author was able to establish that the best time of planting for sweet potatoes in Puerto Rico was from September to December.

In the past the farmers had always planted sweet potatoes after the sugar-cane harvest, which extends from January to June, and after the tobacco harvest in January. They thought that in this way they would be utilizing residual fertilizer from the tobacco fields. Also, late in the spring, i.e., toward the end of the sugar harvest, there was less work in the cane fields and consequently more

labourers were available to plant sweet potatoes. You may be surprised to hear that this malpractice resulted in approximately a fifty per cent reduction in yield.

During the course of these experiments new planting techniques for sweet potatoes in the Tropics were developed. Contrary to the established practices, many of our farmers always planted sweet potatoes on flat land without digging trenches or making ridges. Others prepared trenches and ridges, but instead of planting the sweet potatoes on the ridges or hills, they always planted them down in the trenches. Naturally, with our heavy rains, the sweet potatoes often became water-soaked and many would rot. They were also difficult to harvest. The farmers were shown how to plant the sweet potatoes on the hills or ridges where they could develop well, without too much danger of moisture damage, and where they would also be easier to harvest. It was very difficult in some cases to convince these farmers to change their ways. In some communities I had to work through a well known and popular individual farmer. By setting up the experiment on the field of a leading farmer, and planting the sweet potatoes on the ridges, the benefits of this system were convincingly demonstrated at harvest time. In this way the adoption of ridge planting soon followed.

Along with these experiments, the Plant Pathology and Entomology Departments of the Station also did research on diseases and insect pests attacking sweet potatoes. They concentrated on the sweet potato weevil (*Cylas formicarius*), which was causing great damage to our plantations. This was soon controlled after a series of tests with insecticides. At that time, Aldrin, which was then new on the market, was found to be very effective. Naturally, the Station has continued testing the newer insecticides as they have appeared on the market; but with the use of Aldrin alone the sweet potato weevil has practically disappeared from our sweet potato plantations in Puerto Rico.

In 1955 the author published a technical paper concerning all the experimental work which we had done with sweet potatoes up to that time, in order to aid our Island farmers. This was the first bulletin on sweet potato cultivation ever published by the Agricultural Experiment Station of the University of Puerto Rico.

Unfortunately, after developing all this research and new interest in the sweet potato as an industrial crop in Puerto Rico, the two canning plants which had been established failed, due to economic reasons. They could not compete with the mainland canneries; and also the native population was not accustomed to eating the canned product. Nevertheless, as stated before, since the sweet potato is a basic staple in the Puerto Rican diet, cultivation of the crop, particularly the white varieties, has continued at a stable rate and has even increased. From time to time the Island exports sweet potatoes to the continental United States; but on a limited basis. Our production is mainly to supply the local fresh market demands. Our Agricultural Extension Service has been attempting to educate the rural people as to the higher nutritive value of the yellow type sweet potatoes. Housewives in the larger towns and cities apparently are becoming more conscious of the vitamin content and nutritive values of foods and there is a greater demand for the yellow type sweet potatoes in the urban supermarkets. Gradually the consumption of the yellow type is increasing. In spite of this the white type is still preferred by the majority of the population.

The Agricultural Experiment Station of the University of Puerto Rico still

maintains its programme of sweet potato research. In recent years there has been increased interest in, and greater demand for all root crops in Puerto Rico; sweet potatoes, yams, tannias, cassava, dasheen and others. More attention will be given to starchy crops research in the future.

Although there are no sweet potato canning factories operating in Puerto Rico at present, the future outlook seems to be quite favourable for the increase of sweet potato production on the Island. The export market for shipping Puerto Rican sweet potatoes to the United States can be developed if the desirable standards for an export crop can be maintained.

However, an overall educational and advisory programme must be carried out to aid the farmers who still cling to outdated agricultural practices. Continued co-operation among the various government agencies; the education of the farmer, and his acceptance of modern techniques of production and harvesting; the prospect of a continental United States market for the fresh product; the continued increase in demand for sweet potatoes for local consumption; and the development of a more efficient storage and marketing system are all important factors that can make the sweet potato a crop of importance in our economy.

The sweet potato will always be a dependable subsistence crop for the daily diet of our people. During critical times, such as hurricanes, shipping strikes, wars, and other crises, when foods imported from the continental United States could not be shipped regularly on time, the sweet potato, a native Puerto Rico food, has always been seen on the tables of rich and poor alike.

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