

A Note on the Cultivation of Sweet Potato with Special Reference to Northern Circars

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Introduction: In sweet potato (*Ipomæa Batatas*) one finds an effective combination of high nutritive value and ease in production under varied conditions of soil and climate. Added to this its heavy yield makes its cultivation an attractive proposition. It is a dual purpose crop in that the tubers are used as food and vegetable and the green vine forms a palatable and nutritious fodder for cattle.

The crop is a native of West Indies and Central America and is known to thrive best in a tropical climate. It is widely cultivated in this country and in Madras, special mention has to be made of Northern circars, West Coast, Tinnevely, Coimbatore and Madura where its cultivation is well known. A Plea to increase its production and widen its use is warranted in view of the deficiency of food in our province. In what follows is embodied information on its cultivation and use as a food crop with special reference to its cultural methods in Northern Circars.

Botanical description: Sweet Potato (*Ipomæa Batatas*, Poir.) belongs to the family Convolvulaceæ. It is an annual rootcrop with a prostrate creeping stem which roots at the nodes. The adventitious roots produced at the nodes get modified into tubers. The leaves are alternate, cordate, glossy and dark green. Flowers are large, axillary solitary or cymose. Sepals are elliptic and glabrous. Corolla is about two inches long and purple in colour. Capsules are very rarely produced, four-celled and contain smooth velvety seeds. Seed production is extremely rare.

Soils and Climate: Sweet Potato is cosmopolitan in respect of its requirements of soil and climate. A tropical climate as that of our province is most favourable. The crop is adaptable to a wide range of soils but shows marked preference to sandy and clay loams of medium fertility and friable texture. In soils of high fertility the crop runs to leaf at the expense of tuber production. A poor well-drained soil enriched with organic manure viz., farm yard manure would yield best results

Season and Crop rotation: The main season during which the crop is raised in Circars is September — October to January — February, though it is possible to raise a crop during summer (February — May) and also the rainy season from (June to September). But high cost of production of a crop during summer, and low tuber yields from a rainy season crop, discourage farmers from attempting its culture. The only season of its culture in the Circars is the *pyru* season (September — October to January — February). Sweet potato is known to be a heavy feeder and as such a wide rotation (once in 3 years) is ordinarily adopted to avert serious depletion of the nutrient reserve of the soil. In crop rotation on garden-land it follows gingelly, ganti, or maize and is succeeded by a vegetable crop like ribbed gourd and brinjals. In wet lands it takes the place of a *pyru* crop like gingelly, ragi or a pulse crop like black-gram or green-gram.

Preparatory cultivation: After the removal of the previous crop preparatory cultivation commences with a thorough ploughing of the land with country plough. The desirable tilth is secured with three to four ploughings. Farm yard manure is then uniformly spread and incorporated into the soil by another ploughing. The field is then thrown into beds of 5 ft. x 5 ft. Irrigation channels are formed between every set of two beds. Ridging of the land 3 ft. apart with a double mouldboard plough and planting the seed vines across the ridge at 12" distance, as is common in the Bombay Presidency is practically unknown in the Circars. But an introduction of this practice is desirable as it is likely to economise in irrigation and land preparation.

Manures and Manuring: Ten to fifteen cartloads of farmyard manure per acre is all that is given as manure to the crop. In soils where a previous crop is heavily manured the crop is raised without the addition of any manure.

Seed material and planting: Vegetative propagation being the rule, the semi-mature portions of previous crop serve the purpose of seed vines of the next crop. But if a long period is to intervene between the harvest of a crop and the planting of a new area, sufficient seed vine material should be propagated in a nursery set apart for the purpose. In localities where the crop is a new introduction and on certain occasions when the seed stock has to be improved, vines should be prepared by planting tubers. These have to be sown in a well-prepared and manured plot 3 to 4 months before planting. Vine cuttings of moderately mature portions of 9" to 12" length are used by

growers in the Circars as seed material. The apical portions of the vine are rejected. In Bombay also this practice is reported to be common. But Philippine agriculturists claim a quicker growth and a heavier yield by the use of tender apical cuttings of the vine. The advantages claimed in respect of this practice, however, remain to be tested. Cuttings taken out of a plot of 8 to 10 cents in area are ordinarily sufficient to plant an acre of the field. The leaves from the cuttings are removed before planting. The land is first irrigated and planting of the sets follow. Sets are planted at a distance of $1\frac{1}{2}$ to 2 feet between rows and 9" within the row. Planting is commonly done by thrusting the middle of the set deep into the wet soil and covering it with mud-leaving the two ends outside. 20,000 sets are required to plant an acre. Planting the bottom most node into the ground leaving the two apical nodes outside is also widely practised in the locality.

Irrigation: The crop is usually raised in garden land commanded by a well and occasionally supplemented by flow irrigation from a channel. Pure rainfed crops are rare. Irrigation at frequent intervals, once in ten days is necessary in the early stages. Later the crop can be maintained with the rainfall received and in the absence of rain two more irrigations would bring the crop to maturity. On the whole during the crop period six irrigations are necessary. But crops raised during the summer period require as many as ten irrigations.

After care: The vine begins to take root in about a week to ten days after planting. One weeding after a week followed by a hand hoeing is sufficient as when the vines cover up the ground weeds will be very few and also hoeing becomes difficult. Another necessary operation is that of turning the vines so as to prevent rooting of the nodes through coming in contact with the soil. This has to be done one month after planting and repeated afterwards at an interval of two to three weeks. Neglect of this operation would seriously affect the size of tubers.

Harvest and yield: The crop comes to harvest in about 100 to 105 days from the date of planting. The maturity of the crop is indicated by some of the older leaves turning yellow and beginning to drop off. The ripeness of the crop is tested by breaking a few of the fresh tubers dug out from the field. If the milk on the broken end on exposure remains white it is ripe but if it turns dark, tuber is still immature. The harvest of the crop commences with the removal of the vines. An interval of a week

between the harvest of the vines and tubers is believed to improve the taste of the tubers, as a portion of the starch is converted to sugar. If the crop is left in the field for a longer time a yellowing of the tubers sets in imparting to them a bitter taste. The soil is dug out with hand hoes carefully to minimise damage to tubers and the crop gathered. Harvest with digging forks would both minimise the damage to tubers and quicken the operation.

The yield of the crop is varying and is conditioned by the season, the soil, and the care with which the crop is nurtured. Sweet potato being essentially a cold weather crop maximum yields are secured when it is raised during September-October to January-February. High cost of production and lower yields are weighty reasons with the growers against its cultivation during summer. During the rainy season the crop is not productive as excessive vine growth results in little or no tuber formation. Ten to twelve thousand pounds of tubers and five to six thousand pounds of the green vines per acre are reckoned to be normal yields although higher yields are not uncommon.

Varieties: There are two varieties under cultivation distinguished by the colour of tubers, the red and the white. The white is considered to be less sweet and more fibrous than the red one. The Department of Agriculture, Bombay, introduced into Bombay, a Ceylon variety which tends to form clustered tubers. Certain varieties in Java are reported to have attained the weight of 50 lbs. per tuber. *Ipomæa crysorhyza*, a variety popular in New Zealand is known to give tubers of 9 to 10 lbs. each. A trial of such varieties in the province with a view to select the best among them is desirable.

Pests and Diseases: A widely distributed pest of this plant is the sweet potato weevil (*Cylas formicarius* F.) an ant-like insect in red and blue. The grub of the weevil tunnels through the vine and in bad cases number of them breed inside killing the vines. It also attacks the tubers when stored in godowns. The use of healthy cuttings for propagation, rotation with other crops and destruction of early infested vines are the chief measures in the field. In godowns cleanliness and prompt destruction of affected tubers keep the pest under control. In some countries outside India the crop is not grown for a fairly long period so as to starve out the pest. Among other pests affecting the crop are some leaf-eating beetles and caterpillars such as Tortoise beetles (*Aspidomorpha miliaria* F.)

the Sphinx moth (*Herse Convolvuli*) the hairy caterpillar (*Diacrisia obliqua*), but these seldom cause any appreciable damage and if and when they do so, arsenical dustings have to be resorted to.

Food and Fodder value: Dr. W. R. Aykroyd in Health Bulletin No. 23 published by the Government of India gives the percentage composition of the tubers as below. The difference between the red and white varieties is, however, not known.

Moisture	....	66.5	Carbohydrate	....	31.0
Protein	....	1.2	Calcium	....	0.02
Fat	....	0.3	Phosphorus	....	0.05
Mineral matter	....	1.0	Iron	....	0.8
Calorific value per 100 grams	....	132			
Vitamin A per 100 grams	....	10			
Vitamin C per 100 grams	....	24			
Calories per ounce	....	37			

The actual food value compares favourably with that of a crop of rice or millets obtained from the same area. It is eaten either raw, fried, roasted or boiled. That it is a delicious vegetable needs no special mention. Sun-dried slices of the tubers can be ground into flour. Such flour can be baked into cakes or used in a variety of ways. It is mixed with other kinds of flour in the preparation of bread and biscuits. It is reported that in Bombay the flour is taken on fast days. In America and Japan it is reckoned to be a good food. Sweet potato yields a fine quality starch possessing a high commercial value. In America a delicious syrup is prepared from the tubers. The vines or the haulms in the green state form a palatable and nourishing fodder for cattle. It is believed in the Circars that it increases milk yield when fed to milch animals. In the Madras Agricultural Journal, Volume 31, August, 1945 Subbiah Mudaliar V. T. reported the composition of the vines as below:—

Original moisture	....	86.42 per cent
Crude protein	....	2.58 "
Fat	....	0.32 "
Carbohydrate	....	4.65 "

Young succulent vines contain 2.58 per cent of proteins equivalent to 19.0 per cent on a dry basis. 20 lbs. of green vines a day would supply as much protein as one pound of groundnut cake or 3 lbs. of cotton seed. The vines have a tendency to

loosen the bowels of animals when fed in large quantities and cannot, therefore, replace concentrates entirely. Dairy animals at the Agricultural College, Coimbatore are fed with sweet potato vines up to 50 lbs. a day especially in summer when other green feeds are scarce, without any ill effects on the animals.

Economics of Cultivation: The cost of cultivation as detailed below comes to Rs. 152—8—0. Calculating the average yield of the crop at 10,000 lbs. of tubers per acre valued at Rs. 0—0—6 per lb. the gross income from an acre will be Rs. 312—8—0 and the net gain Rs. 160—0—0.

Cost of Cultivation for Acre—Details.

Preparatory cultivation	Rs.	25—0—0
15 cart load of farm yard manure and spreading the same	Rs.	30—0—0
Seed material 20,000 sets preparation of sets and planting	Rs.	30—0—0
Five irrigations	Rs.	25—0—0
After care weeding and hoeing lifting vines occasionally	Rs.	10—0—0
Harvesting and cleaning	Rs.	30—0—0
Assessment	Rs.	2—0—0
Total cost of cultivation	Rs.	152—8—0
10,000 lbs of tubers valued at Re. 0—0—6 per lb.,	Rs.	312—8—0
Net gain per acre	Rs.	160—0—0

The cost of cultivation may occasion surprise but the growers hardly spend 30 per cent of the amount as cash expenditure. Further, individual holdings scarcely exceed an acre and are easily managed by the farmer and his family labour. To farmers with small holdings (50—60 cents) the entire gross income is regarded as profit, since the farmer and his family manage the cultivation of the crop till harvest.

Conclusion: The profitable nature of the cultivation of this root crop is widely known among the farmers in Circars. Its production at present meets with the local demand. An extensive demand coupled with the provision of storage facilities for the tuber would induce cultivators to increase its production.

Under an increasing awareness of the dangers of food deficiency verging on famine, the importance of this crop to supplement the staple food - rice can hardly be over-estimated. To give wide publicity of this important crop and to extend its use among the public in a variety of ways as in other countries are the objects of this note and if these objectives have been in any measure attained, the writer will feel amply compensated for the effort made.

References.

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2. The Rhodesia Agricultural Journal — August 1942.
3. Sweet Potato — An Emergency crop — Guha Roy — Indian Farming May, 1944.

