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Some aspects of root crops production on Nevis — Linnel M. Edwards

Nevis, a component of the state of St. Kitts-Nevis-Anguilla, enjoys a low mean annual rainfall of just over 40 inches, three quarters of which is experienced in only three months (August — September — October) of the year. As a result of this pattern, successful root crops cultivation is confined, especially on the lower slopes, to this short period of favourable rainfall; in the more humid regions, however, successful cultivation is permitted for over six months each year particularly when mulching and other simple water conservation measures are observed.

The soils on the lower slopes are heavy clay and respond only to heavy pen manuring or thorough tillage coupled with the application of artificial manures; whereas many of the conventionally high producing areas are characterised by a clay loam whose substance has helped to encourage a long and fruitful history of cultivation, in which intense cropping has resulted in severe erosion. These areas, though extremely stony, continue to flourish agriculturally because of their higher rainfall, the most important element of the ecology — determining also the periods of root crops production.

Ninety percent of the island's root crops production is the result of the activities of peasant farmers who constitute over 50% of the island's population which stands at about 16,000; but this large farming number is in no way indicative of total island yields, as hardly a farmer cultivates more than $\frac{3}{4}$ acre of root crops at any one time — a situation further antagonised by low husbandry standards inevitably resulting in poor yields.

The kinds of root crops grown in Nevis are those common to all Caribbean, and indeed most tropical countries; as are the methods of land preparation similar to those employed in the less humid parts of Jamaica; hence the important consideration of this paper is the problems of root crops production in Nevis.

YAMS: An island wide varietal collection would reveal that

White Statia)
Red Statia) Coconut Lisbon
Lisbon (white)
St. Kitts Red (or Water) yams
Horn
Potato

are commonly produced, whereas the Cush-cush enjoys only isolated cultivation due to limited planting material. The St. Kitts Red yam, or Water yam as it is sometimes called, resembles the White Lisbon in morphology, and enjoys popular cultivation only on the merits of easy and quick sprouting — a facility which allows for its planting in March and reaping around Christmas when yams are normally scarce — with obvious pecuniary advantages to the grower.

The White Statia variety enjoys ever increasing popularity due to its large size, smooth skin, regular shape (therefore easily handled by the

house-wife), and the ease of harvesting — due to the varietal peculiarity of auto-exposure on ripening.

The White Lisbon is next in popular cultivation, as the less digitate tubers fetch a higher price than comparable Statia; moreover, the Lisbon produces aerial „tubers” which are used by many farmers as “seed”, and are valuable also as pig feed.

Average island yields of yam are in the region of 4 tons per acre; but yields reach as high as 10 tons per acre in the more humid regions, on peasant plots.

SWEET POTATO: Sweet potato varieties number 20 — including 10 obtained from the R.R.C. (Food Crops) of the University of the West Indies. The local varieties were all evaluated and “Island Best” gave the highest yields (3 tons per acre with 18 inches of rainfall) in 16 weeks, whereas “Six months” or “White Vine” as it is sometimes called was the most prolific bearer (4 tons per acre with 21 inches of rainfall) in six months by which time most other varieties had badly suffered to pests or had sprouted. To the farmer, this “Six months” variety despite its relatively poor eating quality, has manifold advantages:

- (a) it establishes itself quickly and profusely enough to suppress weed growth — thus considerably minimising weeding costs;
- (b) it provides much planting material thus easily allowing for the establishment of other plots;
- (c) its excessive vine growth provides much relished feed for pigs, both during and at the end of the crop — especially important and welcome during a dry spell;
- (d) it exhibits fair tolerance to drought — an important characteristic if it is to survive six months of continuous cultivation;
- (e) it ensures an out of season potato crop with obvious advantages to the grower and consumer;
- (f) the “Maloney” which is a local strain of “Six months” exhibits some resistance to the Jacob Beetle.

The major difficulty in assessing the ten varieties from the R.R.C. was the lack of categorisation into 4-months maturing varieties and the 6-months maturing varieties. Evidenced by the consistent production of “picking” tubers by some varieties, indicative of late tuber inniation.

Consumer preference, however, stimulates wider cultivation of the carrot flesh (high carotene) varieties of which PR3 and possible a PR3 strain known locally as St. Kelly are in greatest demand — but scarcity of planting material considerably limits its potential ubiquity. Second to it in quality demand is the “Red man” (possible strain of B. 44), a very widely cultivated potato variety which has an extremely red skin and a firm deep-orange flesh on cooking; but yields tend to be discouraging, and its present popularity may be ascribed only to its

quality. Fine quality has also been associated with the "Southern yam" known sometimes as "Money-vine" which is apparently a relative of both the PR3 and the B. 44 (Red-man) and ranks high on the market.

One of the fundamental problems of assessment and improvement of sweet potato in the island of Nevis is colloquial nomenclature which may concede many names to a single variety, or the identical name to different varieties.

Many farmers adhere to the primitive and unscientific method of indiscriminately mixing the varieties at planting, invariably to discover that, on harvesting after five months, the four-month varieties are rendered unsaleable by the divers adversities akin to overripe tubers; while the six-months varieties are premature. In many instances also harvesting operations are effected after six-months with simultaneous loss of most of the four-month tubers.

OTHER ROOT CROPS: The *Colocasias* grown are Dasheen (white and red) Eddoes, and Seven-year or Giant-eddo the cultivation of which is restricted to localities continuously fed with water and/or shaded; cultivation is therefore limited and the resulting scarcity affords them a high selling price always.

The *Xanthosoma* (Tania) is less exigent in its moisture requirements, and commonly enjoys mixed cultivation with yams. It is sometimes treated as a perennial when it allows for continual harvesting of the cormels while the mother corm remains intact and is moulded up after each operation.

The cassava grown in the island falls into two distinct groups (based on the prussic acid content) viz: bitter and sweet—the latter being edible and used as a vegetable when cooked. Whereas there are two varieties of sweet cassava grown on the island, six bitter varieties are very widely cultivated without any seeming varietal pre-emption. Because of its ability to store whether in the soil or processed as starch or "cocoa" (known as farine in some countries) it easily forms, all year round, a part of the diet of the "self sufficient" farmer.

LAND PREPARATION: Despite the subsidised mechanical land preparation service offered by the Department of Agriculture, farmers adhere to the laborious use of hand implements, for the following major reasons:

- (a) The conventional and sometimes justifiable lack of faith in the mechanical services;
- (b) traditional tenacity to financial resources — more pronounced when available family labour tends to obviate the necessity for mechanical services;
- (c) excessive stoniness — a physical impediment which characterises much of the land-surface of Nevis.

In any event, the farmer uses hand implements to ensure adequate tillage, especially important in preparation for the combined culture

of yams and tancias — a system in which the yams occupy the mounds, and the tancias the intermittent "cross holes".

Manual land preparation, manuring and planting of yams are very costly, the writer having calculated that 96 man-days per acre are absorbed at the rate of \$2.36 per man-day, giving a total cost of \$226.56 per acre. This contrasts greatly with tractor cultivation at \$25.00 per acre for ploughing and banking, whereas 27 man-days are utilized in subsequent manual mounding, manuring and planting operations, giving a total cost of \$88.72 per acre. The cost is still further lessened when the system of long bank (tractor cultivated) is employed; and in an effort to ensure a satisfactory degree of tillage, by the tractor, harrowing may be included in the operations, bringing the cost of land preparation to \$30.00 per acre, and whereas planting absorbs 8 man-days per acre the entire operation will cost \$48.88 per acre. But the economics of land preparation referred to are totally meaningless and inapplicable to the majority of small farms which are for the most part stony and generally inaccessible. Where stoniness is the limiting factor, a stone clearing program might prove economically justifiable.

MANURING: Manuring of root crops is hardly a part of peasant farming, despite otherwise successful fertilizer demonstrations organized by the Department of Agriculture; and only in yam culture is pen manuring practised — as facilitated by mixed husbandry which is common to Nevis farming. The system of purchasing pen-manure and transporting it by truck to accessible farms, is in the incipient stages of adoption by the more progressive farmers desirous of cultivating a larger acreage than their own limited supplies of manure may dictate. The use of artificial manure is totally neglected, despite demonstrations by the writer, of the justifiably increased yields of yam achievable when used in conjunction with pen-manure — as shown below:

Art. Fert. & Pen-manure (staked)	—	13.0	tons per acre
Art. Fert. & Pen-manure (un-staked)	—	10.0	tons per acre
Pen-manure (staked)	—	10.75	" " "
Pen-manure (un-staked)	—	8.0	" " "
Control (staked)	—	6.5	" " "
Control (un-staked)	—	6.0	" " "

In the above experiment conducted during 41 inches of rainfall, a 13-13-20 ready-mixed fertilizer (pellets) was applied at the rate of 500 lbs per acre. It clearly illustrates the point made by Haynes and Spence that staking induces better nutrient uptake.

Contrasting greatly with the above results were those obtained in a similar experiment (conducted during 24 inches of rainfall) wherein the staked yam plots in every case gave considerably lower yields than the un-staked plots — the soil moisture being insufficient to mobilise the nutrients applied, for staking to be affective.

The cultivation of Tania involves incidental manuring only by virtue of its intercultivation with yams.

PESTS AND DISEASES: There are not many important diseases of root crops in Nevis where the writer recognised very few plots of

yam, in the lower rainfall areas, infected with *Collectotrichum*; but insect pests plague the sweet potato especially in the less humid areas and during the drier months of the year, when the crops suffer severe attacks of Megastes, Jacob-beetle, Red spider, stinkbug and to lesser extent defoliating insects. The Jacob-beetle seems to thrive despite treatment of both the soil and the vine cuttings just prior to planting, reducing the saleable tubers by as much as 45% — not differing greatly from the untreated plots.

The writer, however, conducted a demonstration during a period of 25 inches of rainfall on a clay-loam with the variety "Six-months", and recorded not a single incident of borer attack, when reaping was affected two weeks early.

Rodent damage is not uncommon, and may account for as much as 20% of the total loss of root crops; but a much greater menace is errant stock of all classes, which destroy not only the foliage at all stages of crop growth, but, with their hoofs do great physical damage to the tubers. Such damage to crops is certain to occur during the dry season when pasturage is inadequate; moreover, the animals display a definite predilection for sweet potato vines — the tubers usually escaping consumption except by pigs and fowls. Losses as high as 80% have been reported.

MAINTENANCE :

In small sea islands like Nevis, root crops (like most other crops) suffer severe damage by hurricane and sea (salt) blast which late last year destroyed 80% of the root crops on the lower slopes; and most prone were the staked yams plots, especially those weak plants derived from small (2 oz.) heads. These plants also succumb even to short periods of drought.

The cultivation of yams has been successful only on the upper slopes, because when tried on the flatter, low rainfall areas below 40 inches of rainfall, the yields hardly exceed 2.5 tons per acre. To ensure survival of the sprouts throughout unforeseen early dry spells, therefore, the seed-pieces must be about 8 ounces (never less than 6 ounces); and planting at a rate of 4.840 holes per acre, material amounts to about 2 tons per acre, thus allowing only a marginal profit, and in some cases an actual loss when hired labour is used. Many farmers attempt to widen the profit margin by using 4-ounce seed-pieces, but this practice results in weak plants which easily suffer the ill effects of drought and salt blast during the hurricane season — a possible explanation for the occurrence of dead holes. It would easily be possible with very heavy mulching to use 6-ounce seed-pieces, but during dry spells when the mulch is most essential, mulching material tends to be scarce, and the operation may considerably increase the cost of production.

Another possible explanation for the occurrence of dead holes of yam could be damaged buds on the seed-pieces. Also, it was observed on a 3-acre experimental plot (lower slopes) that 60% dead holes occurred as a result of damage done by hurricane to staked yams.

Bad weeding practices employed in root crops cultivation have resulted in heavy financial losses to farmers who fail to have the operation

effected timely (especially important for yams) and by adoption of the most suitable methods — as damage caused to tubers very seriously affects final yields, saleability and storage. In the case of yams, damaged tubers rot easily, and even when rotting is arrested by treatment, they tend to sprout more quickly — disadvantageous from the standpoint of storage.

HARVESTING : When during this exercise, actual digging and handling are not given warranted careful attention, heavy losses are incurred due to the fact that bruised or cut tubers are not marketable except at an extremely low price. Also, the low yields resulting from bad cultivation techniques often fail to allow even for replanting the identical acreage reaped.

It is the practice in Nevis to complete harvesting of any single plot of root crops in one day, as interrupted operations tend to encourage pilfering from the field. When complete harvesting is not achieved before night-fall, fear of praedial larceny has often compelled farmers to sleep in their yam plots particularly — a hazzard which may influence negative adjustments in volume of production.

MARKETING : The marketing of root crops does not enjoy the same high plane of organization as does that of cash crops. In fact, their marketing is at a level which is identifiable as the bottleneck of successful root crops production. Presently each farmer is expected to organize the storage, and the transportation of his crop over difficult terrain to the public highway where, governed by entente, a truck driver conveys the produce to the local public market, or to the pier to be taken by the Government motorised launch to St. Kitts; but high transport costs incurred on the bulky produce jack up the cost of production considerably, with a consequent influence on selling price.

The lack of organized and sure markets has resulted in a significant shrinkage in the acreage under production to the point where farmers will be certain to have no dead surpluses, — a wise action in view of the lack of storage facilities, and the storage inability of most root crops. There lies great hope for improvement in the potential absorptive capacity of a rapidly developing local, even Caribbean wide tourist industry ; but the problem of a perennial supply of edible roots must still be solved.

Lines of improvement must necessarily hinge around :

- (a) The organized development of markets (local and export) by an able marketing body — even as did the Department of Agriculture in 1932 when "cash crops" seemed destitute of viability, and export markets were successfully explored and exploited — peasants' produce having all been bought and handled by Government, who, via its extension services advised farmers on adjustments in quantity and time of production (as permissible) according to market requirements;
- (b) the establishment of cheap storage facilities whether in the form of chilling, freezing, dehydration or chemical preservation in the wide sense ;

- (c) the construction of access roads into the island's more productive areas. The present condition of these roads allows only for transportation afoot or by donkeys, neither of which system facilitates the farmers efforts to market his entire harvest concurrently (when advantageous) a factor which easily limits production ; and for this reason the more humid (mountainous) zones are now relatively sparsely cultivated, with a simultaneous shift to the lower and more accessible (and far less fertile) slopes.

Only to a minor extent does consumer preference tend to influence the quality of root crops production, for despite the housewife's expressed need for a small (one pound) yam, the farmer insists, to his delight and with great personal pride, on producing massive tubers which inevitably result form the heavy pen manuring of individual mounds. Unsuccessful attempts have, by the Department of Agriculture, been made both by demonstrations and oral communication, to induce farmers in the higher rainfall regions especially, to adopt the system of long banks and closer planting as an obvious compromise.

One of the reasons for the farmers' insistence on the production of massive yams (sometimes exceeding 20 pounds) is that the larger tubers are stored (continually desprouted by hand) until December when they are still of marketable weight, and fetch a higher price. This higher price more than compensates for the metabolic loss in weight during storage.

In the case of the sweet potato, the varieties preferred even at a higher price are the carotene-rich Red-man and PR3 which are attractive not only due to their colour when cooked, but to their excellent flavour. Only about 10% of the island's potato cultivation accedes to this aspect of consumer preference, for the simple reason that the cultivation of mixed varieties is the scheme of peasant farming ; moreover the other varieties are far higher yielders.