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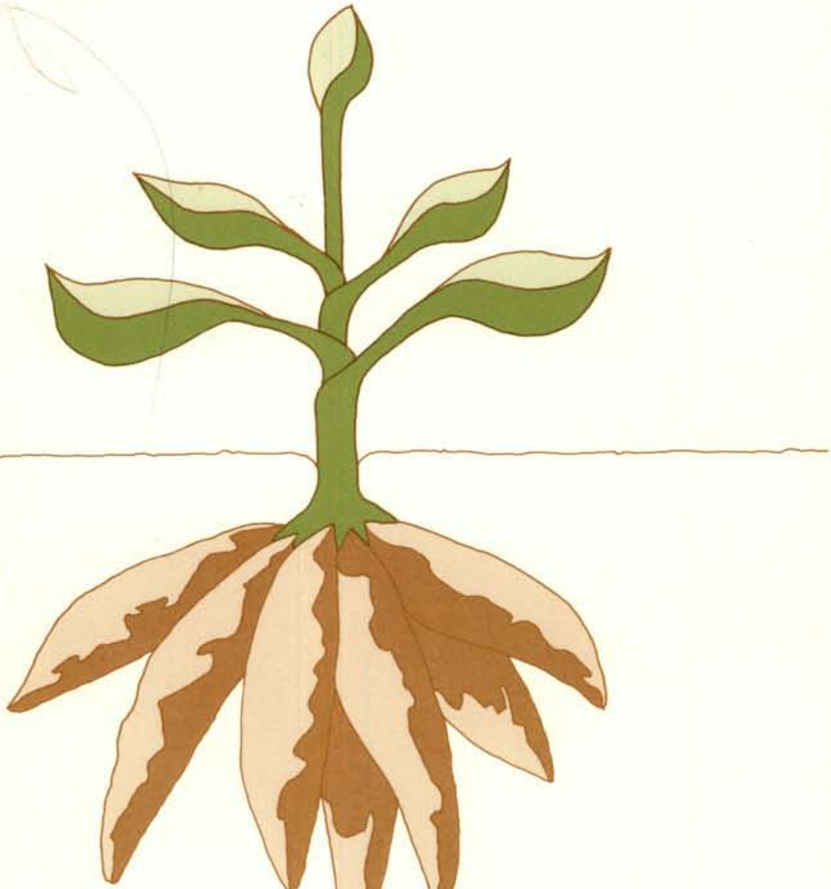
...edings of the Fourth Symposium of the ...ational Society for Tropical Root Crops

Held at CIAT, Cali, Colombia, 1-7 August 1976

Edited by James Cock, Reginald MacIntyre, and Michael Graham



The International Society for Tropical Root Crops in collaboration with
Centro Internacional de Agricultura Tropical
International Development Research Centre
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FOURTH SYMPOSIUM

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CONTENTS

Weeding

Weeds are controlled with the use of herbicides such as diphenamid and dacthal. Once the vines close in, weeds are no longer a problem.

Insect Control

The insects that most commonly attack sweet potato are: weevils, stem borers, and red spider mites. There are two types of weevils. One is a small, grayish type known as the West Indian sweet potato weevil (*Euscepes postfaciatus* Furm) and the other is a larger metallic blue-coloured weevil, with an orange-coloured thorax called Cylas sweet potato weevil (*Cylas formicarius elegantus* Sum). Control of the weevils is by dipping the cuttings in diazinon before planting, by rotation of the crop, and by spraying with diazinon. Stem borers are controlled by spraying with diazinon and mites by sulfur dusts or sprays.

Disease

Diseases of sweet potato are usually not serious in Hawaii because most of the plantings are done by disease-free tip cuttings. In some areas, leaf scab caused by *Sphaceloma batatas* has caused abandonment of sweet potato plantings. No control of this disease is known.

Harvesting

Sweet potatoes are ready for harvesting 4–6 months after planting. The vines are usually cut at the base and either removed or rolled over into the aisles before digging, usually with a middlebuster (double moldboard plow) or, on a smaller scale, with a spading fork or 4- to 6-pronged potato hoe.

Factors Contributing to Increased Yield

Cultivar Improvements

Introduction and the polycross method of breeding have been used successfully in Hawaii. The primary objectives of the breeding program are high yield, early maturity, red skin colour, and minimal vine growth. Recently, high carotene has become another goal.

Cultural Practices

Aside from the use of improved cultivars, the adoption of improved cultural practices has played a significant role in the steady increase of sweet potato yield. These are: (1) better use of fertilizer; (2) timely irrigation in nonirrigated fields; and (3) better control of the sweet potato weevils (*Cylas formicarius elegantus* Sum and *Euscepes postfaciatus* Furm). Further improvements in yield may be attained through: (1) reducing the growth period of 5–6 months to 4–4.5 months (the incorporation of early maturity with other horticultural characteristics is one of the goals of the breeding program); and (2) mechanization of most production phases (because of increased costs and shortage of labour).

Joint efforts among plant breeders, phytopathologists, entomologists, agricultural engineers, and economists are necessary to ensure the progress of sweet potato production in Hawaii.

IBPGR and FAO Programs for the Collection of Crop Germ Plasm and its Long-Term Conservation

J. T. Sykes[1]

FAO's program in genetic resources started in 1961. Advised by the FAO Panel of Experts on Plant Exploration and Introduction, standards and procedures for long-term conservation of base collections were proposed in 1975 that included recommended condition for storage of "orthodox" seeds. Institutions that maintain "base" or "active" collections were determined by an FAO survey. Many of these institutions are willing to provide space for international storage. However, regions that have few stores of base collection standard include Africa, South and Southeast Asia, and Meso-America. Ideally, "orthodox" seed, stored ac-

[1]Crop Ecology and Genetic Resources Service, Plant Production and Protection Division, FAO, Rome, Italy.

cording to a prescribed "preferred" standard, reduces the need for frequent regeneration of accessions. Capital and operating costs of stores at sub-zero temperature, thought to be not excessive, need to be quantified and further refined.

The International Board for Plant Genetic Resources (IBPGR) was established in 1974. Its basic objective is to promote an international network of genetic resources activities. Free exchange of material and information related to it, the deposition of duplicate collections in their country of origin, and the duplication of "base" collections are three basic principles that the Board has adopted.

IBPGR has established two dimensions of crops and regions as a matrix for its priorities. Cassava, potato, sweet potato, and yam are among the tropical root and tuber crops to which priorities have been assigned in 10 of the 14 designated regions. The IBPGR is promoting germ plasm collections of tuber and root crops, grain legumes, millet, and rice in West Africa; cereals in North Africa, India, and Pakistan; rice in Southeast Asia; and potato, tropical forage legumes and grasses, maize, and groundnuts in Latin America.

Summary of Discussions

Basic Productivity

Rapporteur: James Cock

Discussion Leaders: James Cock, Brown Enyi, and Bede Okigbo

The similarity between tropical and temperate root crops is tremendous, and much of the sophisticated work done in temperate regions can form a base for tropical root crop investigation. The root crops, unlike the cereals and many other crops that have their sexual organs as the usable parts, produce the source and fill their sink at the same time. This means that there is always a balance between production of source and filling of the sink, and any increase in source size will be made at the expense of the sink.

This situation means that optimum leaf area indices for root and tuber crop yields may not be very high (i.e. 3–4) and hence leaf angle and canopy structure may not be important. Work on cassava and sweet potato support this hypothesis but in *Tania* higher yields are related to greater leaf area durations. The primary productivity of the crop may not be as important as the partitioning in tropical root and tubers crops; this agrees with Dr Loomis' thinking in the case of sugar beet. In the root crops, very high plant populations tend to increase primary productivity but decrease partitioning to the roots and decrease yield.

The ideal would seem to be a crop that has a very rapid leaf area index build up and once this is formed it should be maintained by a long leaf life with nearly all new production of dry matter being used in the production of roots and tubers. This may be very difficult as types in which leaf growth is dominant at the early growth stages maintain this dominance throughout the whole cycle.

Various attempts to correlate yield with net assimilations rate and photosynthesis are dangerous and often invalid. A plant that has medium LAI will have a higher yield, due to better dry matter distribution, than a very high LAI crop in many cases. The medium LAI crop will also have a higher net assimilation rate and hence a spurious correlation between yield and net assimilation rate. Similarly, trying to relate yield to photosynthetic rate of sink limited crops, as has been tried in corn and soya, is obviously futile.

Frequently, workers are exhorted to produce high protein root and tuber crops, but there is found to be negative effect on yield due to the extra energy needed to produce protein when compared with starch. When starch is stored, it should be