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TOWARDS AN EXPERIMENTAL NETWORK FOR YAMS IN THE CARIBBEAN

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ABSTRACT

The cultivation of yams in the Caribbean area confronts problems which are fairly common to many situations. Among the less costly paths for solving these, are adapted varieties. The Plant Breeding laboratory of INRA, based in Guadeloupe, is organizing a network of yam variety experimentation with the cooperation of different institutions (CARDI, Ministries of Agriculture). Two cultivars of **D. alata** tolerant to anthracnose have been sent and were experimented on in 1985. The results of this cooperation are encouraging.

RESUME

La culture des ignames dans la région caraïbe recontre des problèmes largement communs à beaucoup de situations. Une des voies les moins coûteuses pour y répondre est l'utilisation de variétés adaptées. Le laboratoire INRA d(Amélioration des Plantes basé a la Guadeloupe entreprend, avec le concours de différents organismes (CARDI, Minsitères de l'Agriculture), la mise en oeuvre d'un réseau d'espérimentation variétale. Deux cultivars de **D. alata** tolérants à l'anthracnose ont été diffusés et expérimentés en 1985. Les premiers résultats de cette coopération incitent à la développer.

INTRODUCTION

Two relatively recent workshops provided an overview of the position of yams in our area. The first was held in Jamaica in April 1983, the second in Guadeloupe in July 1985 (Dolly, 1994; CIAT, 1987). Both support the following features:

- Yams are still a major food crop in the area.
- Production is mostly in small farming systems, including mixed cropping, but also in large scale farming admitting some mechanical inputs.
- A steady or growing demand for export is unsatisfied, foreign market suffering from competition with low cost imports production from South America and Africa.
- Local production is still impeded by low technological inputs, among which unadapted cultivars and traditional cultivation practices (unchecked fertilization, staking, heavy seed setts, frequent hand weeding) are evident hindrances conducive to a low price market.

- The action of several institutions (Ministries of Agriculture, Regional and International Research Centres) needs coordination to be more efficient, specially for varietal improvement.

THE SPECIES AND VARIETAL SITUATION AND THE PART OF SEED PRODUCTION

Two species dominate production: **Dioscorea alata** and **D. cayenensis-rotundata** (this last complex is regarded as two species by some authors). In some countries, **D. trifida** holds a high position (Guyana, Dominica). **D. esculenta** is known here and there. **D. bulbifera**, widely dispersed, remains secondary. **D. transversa** is only very locally known in the French West Indies.

In recent years (from about 1976-77) the most popular and choice cultivars of **D. alata** have regressed, due to devastating epidemies of anthracnose (**Colletotrichum gloeosporioides**, Toribio et al. 1980, Mignucci et al., 1985). The importance of **D. cayenensis-rotundata** has consequently risen everywhere. But its associated staking pratice, its seemingly higher susceptibility to nematodes and its lower abilities for conservation and seed piece management, hindes its exapnsion and it is less versatile in cooking. As for **D. trifida**, its high susceptibility to virus, nematodes and soil degradation, has induced a drastic reduction of its production over the area, except in the Guyanas.

From the important work done by USDA in Mayaguez (Martin, 1974a, b, c; Martin and Sadik, 1977, Martin and Degras, 1978) and by INRA Plant Breeding Station in Guadeloupe (Degrass, 1985, Degras et al., 1974, 1983) some progress has been made by using new cultivars and developing higher seed multiplication techniques (Mathurin and Degras, 1985). The application of the mini-sett technique developed in Nigeria is also relevant to the necessary progress in our region (Okoli et al., 1985).

BASIS FOR AN EXPERIMENTAL NETWORK FOR YAM VARIETIES

Though since 1974, with **D. alata** cv. Belep (introduced by INRA), and from 1978 with other **D. alata** introduced by F. W. Martin), several cultivars highly tolerant to anthracnose, of fair quality and yield performances, are known, their impact on regional production remains limited. This could be due either to non-adaptation to some agro-ecological niches, to culinary quality, or non-adaptation of experimental designs. Progress cannot be assessed without a coordinated evaluation of these cultivars over the area in comparison with local varieties.

Since 1983, a programme lead by INRA has been funded by EEC for the establishment of an experimental network for varieties of yams in the Caribbean area. In 1984, INRA offered CARDI and the Ministries of Agriculture of Dominica, Barbados, Trinidad, Guyana, the opportunity to join this network which was already established in Guadeloupe, Martinique and French Guyana.

Tentatively, in 1985, a scheme of observation for two cultivars of **D. alata**, Belep (from New Caledonia) and Kinabayo (from the Philippines) was proposed, these cultivars serving as controls in trials with local cultivars. Seed was provided by INRA. This first step aimed essentially

at the exchange of information on common material, at making the available local standards, and, if successful, at discussing a second phase for seed production techniques and more precise designs for varietal experimentation.

DATA ON THE FIRST YEAR OF EXPERIMENTATION

All results from the 1985-86 cropping season have not yet been provided by the participants, which were:

CARDI Farming System Research	Dominica
CARDI Farming System Research	Saint-Lucia
CARDI Farming System Research	Grenada
Ministry of Agriculture Food and Consumers Affairs	Barbados
National Agriucultural Research Institute	Guyana
Chambre d'Agriculture (SUAD)	Guyana Francaise
Chambre d'Agriculture (SUAD) and IRAT	Martinique
Institut National de la Recherche Agronomique	Guadeloupe

About 216 kg of seed yams were dispatched to these cooperators, along with general instructions and descriptions of the cultivars.

As indicated in the instruction form, no rigorous design was recommended at this stage, and through visits at the end of November and the beginning of December 1985 to Dominica, Saint Lucia and Barbados, some aspects of the experimental system adopted could be seen. In Saint Lucia a classical on-station design with appropriate experimental techniques has been used whereas in Dominica several semiexperimental plots had been stablished on small farms with traditional techniques, and in Barbados simple ridges had been used in an experimental field at the Graeme Hall Agronomy Station.

In some places delays in planting depressed the yields of controls more than the local cultivars.

However, it appears that in all conditions the balance between low susceptibility to foliar diseases, yield level and culinary quantity results in a great interest in the cultivar Belep, specially in Saint Lucia (Rao and George, 1986). Final conclusions will proceed form an analysis of all the data required by the form presented in Table 1.

Except for CARDI, a meeting of cooperators could not be held before or at the beginning of the cropping season 1986-87, but we hope that this first step towards a regional experimental network for yam cultivars Will be followed by other advances, and that this CFCS meeting will provide a new opportunity in this direction.

PROSPECTS FOR THE DEVELOPMENT OF THE NETWORK

Development can proceed from several points of view.

First, obviously, more statistically comparative designs must emerge as we produce more seed material, so that results and experiences of the participants can be exchanged.

Table 1. The data recording form used

DATA FOR THE STUDY OF YAM VARIETIES IN THE CARIBBEAN NETWORK

COUNTRY **TOWN** **Place**

Altitude (m): Rainfall/crop duration: mm Plot surface: m2

Soil: Preceding crop:

Soil preparation: date(s):
technic(s):

Fertilization

Species: **Cultivar** Plantation (date)

SEED Origine: Age: Stage:
Piece weight (g) Pieces/unit of surface:
Phytosanitary treatment(s):

Field Germination (dates): onset: 50%: Final percentage:

STAKING Date: Height: m

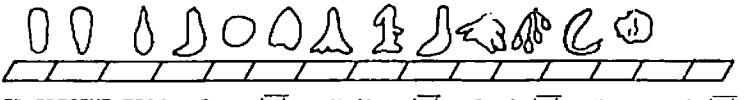
WEEDING Manual (dates):
Chemical: Ingredient, commercial name(s) (1) (2)
Date(s):

ACCIDENTS DURING VEGETATION Date(s) Effect(s)
Foliar /stem disease(s):
Insect(s) attacks
Nematode(s) attack
% Excessive drought
% Excessive rainfall

FUNGICIDE TREATMENT(S): Ingredient, commercial name(s):
Date(s):

END OF AERIAL CYCLE: First yellowing (date): First drying (date):

HARVEST Date: Technic:
Number of plants harvested/N plants established same surface: ___/___
Means plots weight (kilo): Equivalent metric ton/ha:
Number of tubers/plot: N tubers/plant:
Tuber individual weight: TUBER SHAPE:



TUBER PRESENTATION: Poor ☐ Medium ☐ Good ☐ Very good ☐

CULINARY EVALUATION Bad ☐

Peeling: easiness Medium ☐ Peel % total weight:
Good ☐

Colour at peeling: underskin:
flesh:

Colour after cooking:

Flesh grain (texture): smooth ☐ medium ☐ rough ☐

consistency: soft ☐ medium ☐ hard ☐

Taste: poor ☐ medium ☐ fine ☐

GENERAL REMARKS AND PROPOSALS

Secondly, new cultivars will emerge for wider comparisons either by dispatching successful cultivars from one country to others in the network, or from introductions and breeding activities by INRA and other institutions. For instance, a new cultivar of **D. alata** named "PLIMBITE" and selected among introductions from Haiti, is now under high rate multiplications procedures (in vitro techniques, stem cuttings, mini-setts), at INRA, for release in 1987. Also expected to be proposed by INRA in 1987 or 1988 are clones of **D. cayenensis-rotundata** selected from sexual progenies obtained from IITA polycross (Degras, 1985).

Thirdly, as expected, first results lead to the need for fast multiplication techniques for the best performing cultivars in the network. Not every technique is of uniform application to any cultivar. So a minimal of experimentation should be linked to the network activities, under defined agro-ecologies and economic conditions.

Finally, as has emerged between INRA and CARDI[1/], bilateral official agreements for the exchange of information, of materials and of visits, could be devised between the cooperators, which will surely permit more governmental involvement and ensure more reliable means for the continuous activity of the network beyond the term of the EEC project (1987).

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1/ The memorandum is still under procedure of signature due of change in the by-law of INRA during the year 1985-86.

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ANNEXE 1

INRA-CARDI COOPERATIVE AGREEMENT IN YAM RESEARCH (A PROJECT)

1. OBJECTIVES

In reference to the EEC Programm entitled Selection and Seed Production of Root crop for the Caribbean area, a cooperation between INRA and CARDI is proposed in the fields of Yam improvement and varietal testing.

2. PLACES

This cooperation in relation with the current area of scientific and agronomic work of the two Institutes could be of concern in the following islands : Windward islands (Dominica, Grenada, St. Lucia, St. Vincent), Leeward islands (Antigua, Montserrat, St. Kitts and Nevis.

3. PLANT SPECIES OF CONCERN

The cooperation work will begun in 85-86 with *D. alata*, then go on in next years with *D. cayenensis-rotundata* and *D. trifida*.

4. EXPERIMENTAL DESIGN

Experimental design could be elaborated on special basis for each case, but, the recommanded approach is comprising two controls from INRA and several local cultivars. Replication should be more indicated but simple plots with good technical practice could be used.

The minimum size of experimental plots is betwen 90 and 100 plants at plantation (either in replication or not).

5. OBSERVATIONS

Minimum but precise observations are to be done

1 - between plantation and two months to assess the uniformity of intallation

2- on the disease (s), accident (s), pest (s) a.s.on

3- on yield, evaluated in weight and number of tubers, the number of plant, at harvest being noted.

4- culinary local appreciation.

If possible percentage of dry matter sample of tubers could be added.

6. TREATMENT OF OBSERVATIONS

All observations will be sent to INRA and dispatch on its primary form completed eventually by remarks and interpretation to all participants.

7. USE OF THE RESULTS

Results should be used only in accordance with the general rules of both Institutes.

This project has been elaborated in Guadeloupe by M.M. RAO, (CARDI) and L.M. DEGRAS, (INRA, Leader of the EEC quoted Programme).