

Basic Crop Research and Development Program: Northeast Brazil

I. Introduction

A program in agricultural productivity is proposed, with applied research as its primary approach, and focussed on two commodities, manioc and grain sorghum. The proposed program content includes plant breeding, varietal testing, soils analysis, training of extension leaders, market development and may include other related activities following preliminary study by consultants. The program will be carried out by the Ministry of Agriculture, State Secretaries of Agriculture, and cooperating agricultural universities in the Northeast.

The productivity program is intended to complement ongoing and other proposed AID programs, including agricultural marketing, research, education, rural roads, seed improvement, and others. Consideration of the expanded Escritório de Pesquisas e Experimentação (EPE) research program accounts for the commodity focus on manioc and grain sorghum; the EPE program is focussed on rice, corn, beans, and forages. The EPE program includes attention to grain sorghum as an alternate to corn in some sections. The proposed productivity program seeks to exploit potentials of this essentially "new" crop through the transfer and application of existing technology, while the EPE program will seek to build a new technological system on a strong research base, looking toward higher productivity levels than may be experienced initially.

Both the feasibility and specific content of manioc and grain sorghum programs require study and specification by consultant experts. Therefore, the initial planned step is to bring to Brazil on a short-term basis widely experienced study teams to study these commodities and topics.

II. Description of Problem

Low productivity of land and labor in the agricultural sector is the major cause of the widespread poverty in the Northeast. The land tenure situation is another basic cause; many persons believing problems of land tenure and low productivity are closely interwoven. Gross agricultural output does appear to have risen faster than population, but gains in productivity per worker, per hectare, or per animal unit are insignificant.

SUDENE estimates that the aggregate output has increased at the rate of 4.7 percent annually, between 1956 and 1967. ^{1/} Most agriculturists characterize the increase in agricultural output in the Northeast as extensive rather than intensive. New land has been incorporated into farm units along the frontier as well as in other areas. The land in crops on existing units also has tended to increase. This increase in cropland accounts for most of the increased crop production.

^{1/} SUDENE, Fourth Master Plan.

Crop yields have remained stagnant over the years at levels substantially below those realized in the rest of Brazil (see figure 1). The low income of those engaged in agriculture reflects this stagnation. The high rate of out migration is another indication of conditions in the interior. Stagnant, low yields also reflect a generally poor combination of technology, management, and/or productive resources. This situation detracts from the economic feasibility of irrigation projects or other development schemes that emphasize a single new input. Irrigation, being capital intensive, is especially vulnerable to inadequacies in the level of associated technology and management.

Crop yields are determined by a variety of factors only some of which are under human control. Climate and basic soil conditions are extremely difficult to influence. Production technology, is however, within the sphere of human influence. Technology in this connection should be defined to include both the level of application of modern inputs and the level of management of all inputs and operations. Timing of operations and general care in cultivation, planting, and harvest operations are critical management features generally overlooked in studies of technology.

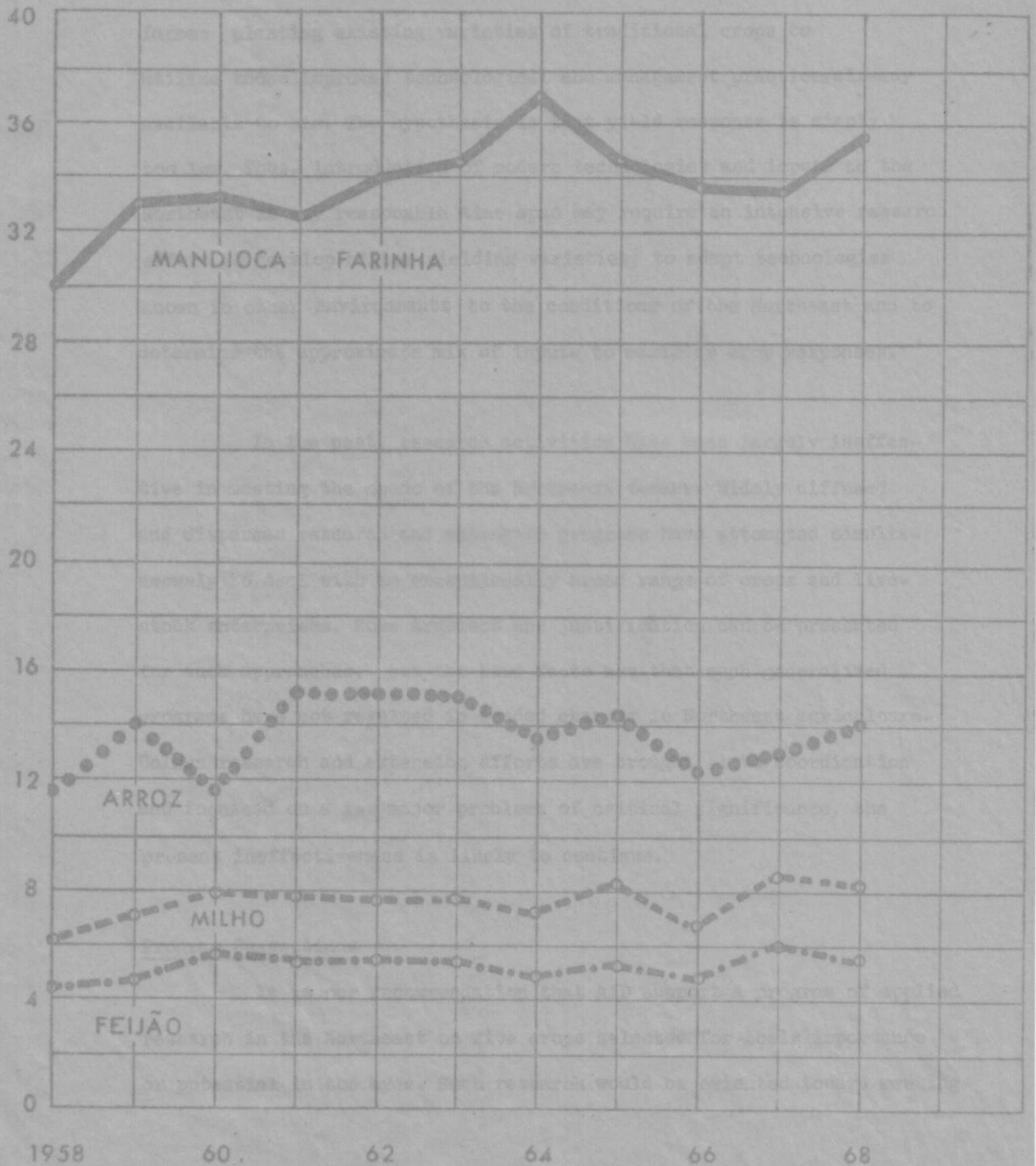
The application of fertilizer on crops other than sugarcane is practically nonexistent. Interplanting, the use of low quality seeds, and the absence of fertility management tend to maintain yields at the

FIGURE I

PRODUÇÃO DAS PRINCIPAIS CULTURAS ALIMENTÍCIAS
NO NORDESTE BRASILEIRO

(CEM KG)

[Quilogramas Por Hectare]



same low levels year after year. An even more pessimistic view by many who have studied the Northeast is that it does not pay the farmer planting existing varieties of traditional crops to utilize those improved technological and management practices already available to him. The hypothesis is that yield response is simply too low. Thus, introduction of modern technologies and inputs to the Northeast in any reasonable time span may require an intensive research effort to develop higher yielding varieties, to adapt technologies known in other environments to the conditions of the Northeast and to determine the approximate mix of inputs to maximize crop responses.

In the past, research activities have been largely ineffective in meeting the needs of the Northeast farmer. Widely diffused and dispersed research and extension programs have attempted simultaneously to deal with an exceptionally broad range of crops and livestock enterprises. Some argument and justification can be presented for such approaches, but the hard facts are that such generalized programs have not resulted in needed changes in Northeast agriculture. Unless research and extension efforts are brought into coordination and focussed on a few major problems of critical significance, the present ineffectiveness is likely to continue.

Program Suggestions

It is our recommendation that AID support a program of applied research in the Northeast on five crops selected for their importance or potential in the area. Such research would be oriented toward meeting

specific needs of the Northeast farmer in the introduction of more modern farming technologies and inputs within the conditions of his environment. We do not minimize the risks and problems associated with mounting and implementing such a program. However, it clearly offers the best near-term hope for accelerating agricultural development in the Northeast.

In view of the production patterns, climate, and economic conditions of the Northeast, it is recommended that beans, rice, corn, manioc and grain sorghums should be selected for intensive research and development.

Action on the first three commodities, beans, rice and corn in the Northeast would be an integral part of the EPE loan. This loan provides an excellent opportunity to move forward with basic research and development on these commodities throughout Brazil. Through the EPE program, research at the national level can be directed towards the particular problems of Northeast farmers, practically all of whom raise at least two of these commodities. Programs of research and extension for these commodities as anticipated under the loan agreement would follow the general scheme outlined below for manioc and grain sorghums. This paper will not discuss beans, rice and corn further since action on those commodities is programmed separately under the EPE loan.

Concentrated action on grain sorghums is proposed because

of their potential for growth in the Northeast. This commodity has not been a traditional crop in the Northeast or elsewhere in Brazil. However, experience elsewhere with this crop suggests that it would fit remarkably well on the soil and water conditions of the Northeast. Grain sorghums and forage sorghums could be successfully grown by a large percentage of Northeast farmers as reserve animal feed for the dry season or to produce animals of a higher finish. Grain sorghum also is a potential new cash crop for many northeast farmers, to be used for feeding swine, laying hens, broilers, dairy cows, beef cattle in feedlots, for export, or for use as human food. While grain sorghum is widely used as food in certain countries, this does not appear likely to be a major prospective use in Brazil.

The program with grain sorghums could be pursued in collaboration with the TAB/W Purdue University Contract for improving the nutritional quality of grain sorghums and the allied work of the Ford Foundation whose research activities are principally centered in the State of Ceará. The program could include support for local research activities. Such research would be coordinated with work under the EPE loan, which considers grain sorghum as an alternate crop to corn where corn is poorly suited. Improved linkages between researchers and farmers through extension agents would be an integral objective. A program of two-way communications would be designed and established. Marketing would be given considerable attention, including storage, processing, need for price guarantees, need to publicize nutritional characteristics, etc. Demonstration/research plots would be used

extensively to facilitate communication of production techniques. Peace Corps personnel could be used to carry the word even further.

As mentioned in the introduction, the proposed separate Northeast program with grain sorghum seeks to introduce the "new" crop through the transfer and application of existing technology. Widespread variety tests, and tests with varied combinations of fertilizers, spacing, times of planting, etc. probably would indicate reasonably productive combinations for at least some localities. Meanwhile, parallel market development work probably would open up a significant market. These efforts might yield a level of technology comparable to that existing to varieties of "kaffir", "cane" and grain sorghum in the U.S. plains area of the 1930's. Meanwhile, the EPE program will seek on a longer term basis to build a new technological system on a strong research base, looking toward substantially higher productivity levels. The contrast of attainable yields largely resulting from different levels of technology may be illustrated with U.S. data, where grain sorghum yields in the 1960's have averaged more than three times those of the 1930's.

which would be complementary to the project recommended here.

It is proposed that the Ministry of Agriculture, through its EPE research station (IPEANE), coordinate the research and development work. The universities in the area (especially in Ceará) would be responsible for the training of technicians to work in the projects. The State Secretaries might also become involved in some aspects of the program such as varietal testing and dissemination of research

information. U.S. scientists would provide technical assistance and carry out actual research and training programs in all aspects of the sorghum project.

Since it is a traditional source of food, manioc is one of the priorities included in the National Commodity Plan for Brazil generally, and more specifically for the Northeast. It is widely grown and, like grain sorghums, is drought resistant. Production methods are primitive and significant productivity gains appear to be possible with improved varieties and modest inputs of known technology. A program of plant breeding, variety trials and other testing and demonstration is envisioned for this purpose. More basic research should be included if specific problems are identified. With proper changes in levels of productivity and necessary investments, manioc represents an excellent export opportunity as well as a livestock ration in Brazil. Since its major use probably will continue to be for food for some time, ways should continue to be sought to improve manioc nutritionally, or to fortify the product. AID (Food for Peace) presently has under serious consideration a program of this nature which would be complementary to the project recommended here.

It is anticipated that the Georgia University Contract with TAB/W would represent a source of assistance at least in developing a project, and possibly in its execution. The program would be implemented by the same GOB agencies and along the same line as the sorghum project.

Coordination with Other Programs

A seed production program is proposed as a sub-project to the Northeast productivity program. The production and distribution of improved seeds in the Northeast has been a key bottleneck in programs to raise agricultural production.

The Northeast has lagged behind the rest of the country in seed research, seed production for higher yielding varieties, and seed certification legislation. Increases in yields of beans, corn, and other major crops, even with already known varieties, will depend upon the availability of tested seed to the farmer.

The Ministry of Agriculture in collaboration with SUDENE is putting special emphasis on a new program of seed research and production in the Northeast. Several private companies have expressed interest in growing vegetable seeds year around.

Paralleling this, the Ministry of Agriculture has recently discussed a seed loan with IDB for the central-south. This loan which would cover seed research and production would include all the states from Minas Gerais south. In talks with Ministry of Agriculture officials, there is strong interest in a similar loan for the Northeast Zone.

The seed program, which would be complementary to the work in the EPE program and other work in this commodity productivity project would be broken down into two phases:

a) Research -

Work with University and Federal and State research stations. Technical assistance would be loan funded under a contract with Mississippi State University.

b) Agri-Industry -

Under the proposed agri-industry fund, separately proposed, funding would be made available to the private sector for the production, processing, and marketing of seeds.

The relationship of the proposed productivity program to the EPE program has been discussed. It will be recognized that the productivity (and EPE) program is and should be related to other AID programs. Several deserve mention, including the Northeast Marketing Program, Rural Roads, Seed Improvement, Proposed Northeast Agri-Industry Program, Cooperatives and Credit Technical assistance, and Agricultural Universities.

We propose a strategy of maximum area and commodity concentration for such related programs. We cannot specify the details of coordination at this time, but urge attention to such coordination especially by project administrators. We believe concentrated attention to a few commodities and perhaps concentration in a few areas is most likely to yield results. Total financial and manpower resources do not permit a more comprehensive or global program.

Expected Benefits

The suggested program has as its basic objective the improvement of yields on specific existing crops or, for grain sorghum, establishing an essentially new crop on a basis that will generate high returns. Such productivity increases will have the long run effects of increasing rural incomes in the areas directly affected. Consumers are also likely to benefit in the long run through increased food supplies and lower prices. The extent of global assistance to consumers is likely to be minute, however, within the scale of the projected program.

New jobs also will be provided in areas more intensively farmed, and there will be some effect on gross agricultural and industrial product of the Northeast, both in production itself and in transportation, handling, processing, and merchandising the increased product.

Activities under the proposed project will complement other development programs of the Government of Brazil, AID, and other governments and agencies. For example, projects to improve marketing will be aided by productivity gains. Work which may be conducted at the Universities of Ceará and Pernambuco would have the additional effect of strengthening the research and training capabilities of those institutions. The work would bring extension and research into a close working relationship aimed toward the practical solution of the immediate problem of low-productivity in

the Northeast. The proposed productivity program will be similar to the much larger and national EPE program in regard to benefitting the agricultural universities.

The Recommended Action

Present efforts to get underway the work anticipated under the EPE loan for corn, beans and rice should be continued and expedited. At the same time, actions should be taken to secure the services of U.S. specialists to examine the feasibility and recommend detailed plans of special applied research/extension programs in manioc and grain sorghum as outlined above. In this regard, documentation has been prepared to enable early commencement of feasibility studies by U.S. universities.

A team consisting of a Mission agricultural economist and a member of the Mississippi State Contract team should survey the seed sub-project and make specific recommendations.

The proposed teams should be asked to advise both about the practical feasibility of actions in the fields described and if a probable payoff appears to exist, to outline and recommend programs. The survey teams should be asked to be thoroughly objective concerning feasibility. We prefer to reject a project with a low chance of success, or low probable benefits.

When programs have been approved in principle, specific action programs should be designed, necessary documentation prepared, and action implemented.

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