

EMBRAPA

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RESEARCH BEING CONDUCTED AT THE AGRICULTURAL

RESEARCH CENTER FOR SEMI-ARID TROPICS

Petrolina, PE - Juazeiro, BA

March 1976

Research being conducted at
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Sub-project: Soil survey and mapping of the Northeastern region.

Description: The soil map at the exploratory - reconnaissance level for all the States will be drawn up. The working scale will be 1:400.000 or 1:1.000.000 depending upon the area. This work includes referencial analysis of the region, maps and critical analysis of the cartographic materials.

Sub-Project: Water balance in the agricultural soils of the Northeastern Region.

Description: The objectives of this research are:

- a) Agricultural zoning though mathematical models considering the crop response to climatic irregularities.
- b) Studies of crop feasibility.
- c) Production prediction of crops.
This work will take into account all water soil, plant and climate variables through simulation modelling.

Sub-Project: Water resource development of the Northeastern Region for Agricultural purposes.

Description: This work will be conducted to quantify and to qualify the water resources for agricultural use through the study of representative watersheds. A sizable number of information will come out of this study which will permit:

- a) To establish soil and water conservation practices
- b) To establish criterias for supporting water laws, and
- c) To establish mathematical models for testing other watersheds.

Sub-Project: Planning for the water resources usage and establishment of a water law for the Northeastern Region.

Description: This research has following objectives

- a) To qualify and quantify the water resources of the Northeastern Region
- b) To determine the actual and future use of the water resources
- c) To determine the physical and legal problems facing the resource use, and
- d) To establish priorities for the rational use in order to get an harmonic economical development.

Sub-Project: Forestry research in the Northeastern Region.

Description: To promote and establish studies and research with native and exotic species with the main objective of gathering information which will orientate the forestry activities for the best economical use on a conservationist basis.

Sub-Project: Basic studies for the protein use of plants from the Northeastern region.

Description: This work constitutes an inventory of the protein content of seeds and leaf sap from plants of the Northeastern Region. Others parameters to be determined are aminoacid content, protein digestibility and toxic agents.

Sub-Project: Studies of oil producing plants.

Description: The identification and mapping of oil producing plants as well as the plant constituent isolation and identification will be done in the Northeastern Region.

A. PLANT BREEDING AND SEED PRODUCTION

- Sub-Project : Population trials of onion.

Description : This reasearch will be conducted at both Bebedouro and Mandacaru Experimental Stations with the purpose of evaluating onion populations with several cycles of mass selection.

- ✓ Sub-Project : Stratified mass selection in the cultivars "Baia Precoce do Cedo and Composto Baia, and seed production.

Description : The main objectives are:

- a) To obtain a cultivar from Baia Perifome which presents good yield and bulb conservation characteristics,
- b) To find a cultivar well adapted to the Northeastersⁿ climatic conditions, and,
- c) To promove seed production of good quality and in sufficient amount to cover the regional demand.

- Sub-Project : Bean competition of wide genetical base coming from the ten best strains of the crossing between Costa Rica x L3 - 0 - 50.

Description : This research will be conducted at Jatinã and Bebedouro Experimental Stations with the purpose of evaluating the genetical material F₁₂ from the crossing between Costa Rica x L3-0 - 50 and generations RC₄ and R₅; backcrossing product of Costa Rica x L3 - 0 - 50.

- Sub-Project : Production of new cultivars of industrial tomatoes with multiple resistance to nematodes and acarous.

Description : The research aim is obtaining new cultivars of tomatoes for industrial proccessing adapted to the region and having resistance to both nematodes, and acarous of the Tetranychus group.

- Sub-Project : Production of new cultivars of industrial tomatoes with resistance to nematodes and fructification capacity under high temperature conditions.

Description : This research will be conducted at the Jatinã Experimental Station with the purpose of obtaining new cultivars of tomatoes with resistance to nematodes and high fructification under extreme temperatures. Using generations F_2 and F_3 , an evaluation for nematode resistance will be made at the seedling stage.

- Sub-Project : Studies on the seed production feasibility of horticultural crops.

Description : Five experiments will be conducted at Jatinã (3) and Bebedouro (2) Experimental Stations with the purpose of determining the yield and problems facing the seed production of horticultural crops. Production fields of lettuce, snap beans, melon, water melon and suckinii will be setted up.

Sub-Project : Competition of new strains of different crossing of bean cultivars.

Description : Behavioural comparisons of the best strains coming out of crossings between Costa Rica x L3 - 0 - 50, Rico 23 x Gordo and Costa Rica x Gordo.

Sub-Project : Compositional and Combinational studies of multiple strains of Phaseolus Vulgaris, L. from Costa Rica x L3 - 0 - 50 (F_{12}) crossings.

Description : Behavioural comparisons of multiple strains F_{12} from the crossing between Costa Rica x L3 - 0 - 50 obtained at Jatinã Experimental Station.

Sub-Project : Selection between and within half-brother families of corn varieties.

Description : This is a research to be conducted in five places in the Northeastern Region aiming to obtain corn varieties which present low ear insertion.

In this research some dwarf varieties will be used to obtain the desired characteristics.

Sub-Project : Re-establish and evaluation of grapevine varieties.

Description : This research is aiming the re-establishment of a collection of fifty two varieties of grapevines with the purpose of :

- a) Evaluating the productivity and quality of the fruits, and
- b) Selecting the best adapted varieties (20) for competition trials.

Sub-Project : Grapefruit collection varieties.

Description : This collection of grapefruit varieties will be implanted at the Bebedouro Experimental Station with the following objectives:

- a) To determine the production characteristics, and
- b) To obtain adapted varieties for the region and the fruit quality.

WATER USAGE AND MANAGEMENT

Sub project: Determination of evapotranspiration for the main crops in the Middle San Francisco Region.

Description: This research has the following objectives:

- a) To determine the consumptive use of crops through the water balance method.
- b) To establish plant factors and climate coefficients to estimate evapotranspiration from empirical formulae, and
- c) To obtain information about amount and frequency irrigations.

Sub-Project: Comparative studies of the technical and economical feasibilities of irrigation methods.

Description: Drip irrigation is being compared to the traditional methods in the region. Production and water economy will be compared in grapevines, melon, tomato and sugar cane.

Sub-Project: Studies of the technical feasibility of irrigation methods for onions in the San Francisco Valley.

Description: Comparative studies of irrigation methods in onions through the evaluation of yield, bulb quality, water use, and sanitary aspects. The irrigation methods to be compared will be:

- a) Simple Borders
- b) Borders with furrows
- c) Furrows, and
- d) Sprinkler irrigation

Sub-Project: Interaction studies between water, fertilizers and plant density variables.

Description: This research is mainly focussed on the nitrogen economy, balance, residual effects and plant response, through interaction studies with water and plant density.

The crops being used in these studies are tomato, onions, melon, water melon, sugar cane and corn.

Crop yield function will be derived from the results with the aim of introducing better crop culture practices for obtaining maximum yield.

This research is formed by 8 experiments distributed at both Bebedouro and Mandacaru Experimental Stations and at the Middle San Francisco Experimental Farm.

C. SOIL FERTILITY AND FERTILIZER USE

Sub-Project: Relationship between the extracted phosphorus and corn yield

Description: Determination of the relationship between the soil extracted phosphorus by different methods and corn yield in the irrigated soils. The P extraction methods to be used will be Bray N° 1, Bray n° 2, Mechlich and Olsen.

Besides the mentioned relations, this research would allow to determine the P economical levels to be used in latosols.

Two experiments will be carried out, one of them at Bebedouro and the other one at the Mandacaru Experimental Station.

Sub-Project: Fertilizer use effects on the Piranão Corn Variety when submitted to different plant spacing in some soils of the San Francisco Valley.

Description: Fertilizer application testing with the purpose of defining economical levels and response under different plant spacing, and irrigation regime. Three experiments will be conducted at Belém do São Francisco, Petrolina and Juazeiro.

Sub-Project: Economical level determination P_2O_5 and K_2O through diagnosis foliar and soil testing, using an onion crop.

Description: The main objective of this research is the determination of the optimum P and K levels for obtaining the maximum net income.

Three experiments will be carried out at Jatina, Bebedouro and Mandacaru Experimental Stations.

Sub-Project: Nitrogen application management in beans grown

in alluvial soils..

Description: The objectives of this research are :

- a) To determine best nutrient source and
- b) To establish best application timing.

This research will be undertaken at Jatinã and Middle San Francisco Experimental Stations (Two experiments.)

Sub-Project: Phosphorus application levels and residual effect on rice crop.

Description: This research is being conducted at the Mandacaru Experimental Station with the aim of determining the economical levels for P application and residual effect on a subsequent crop. This research is one of the most important due to the fact that rice is the main crop at the Mandacaru Irrigation Project.

Sub-Project: N P K level trials in green pepper crops.

Description: This research will be conducted at Bebedouro Experimental Station with the objectives of evaluating different levels of N, P and K, alone and combined on the green pepper production.

Sub-Project: Influence of NP levels on the fruit size and number per plant in melon and water melon crops.

Description: This research will be conducted in the three major soils of the Petrolina - Juazeiro Area. Increasing fruit size of the melon and water melons through fruit discard and other crop management practices in two periods of extreme temperatures. In total 12 experiments will be carried out at the three Experimental Stations.

Sub-Project: Influence of nitrogen, phosphorus and plant density on the rice production.

Description: Using a factorial design, the interaction between nitrogen and phosphorus levels and plant density will be studied with the purpose of defining the most efficient and economical levels. The defining parameters will be yield, protein content, and straw/seed ratio. This experiment is being conducted at the Mandacary Experimental Station.

Sub-Project: Organic matter and minor element effects on the tomato yield

Description: This experiment will be conducted at both Mandacaru and Bebedouro Experimental Stations with the following objectives:

- a) To study the addition of castor bean cake on the tomato yield, and
- b) To determine the effect of Zn, Fe, Mn and B on the tomato yield

Sub-Project: Studies of the interaction between Zinc and phosphorus on the nutrition of corn and tomato in calcareous soils.

Description: This experiment will be conducted in a greenhouse with the following objectives:

- a) To evaluate Zinc deficiencies in the vertisols of the San Francisco Valley.
- b) To determine the interaction effect between Zn and P applied in different levels, on the development of corn and tomato, and on the plant absorption of Zn, P, N, Ca, Mg and K, and
- c) To determine the relationship between the absorption of Zn and P by corn tomato, and the dry matter production.

Sub-Project: Application methods of nitrogen fertilizers in the tomato crop.

Description: This research will be conducted at both Bebedouro and Mandacaru Experimental Stations with the main purpose of determining the most efficient and practical way of applying the nitrogen fertilizer to tomatoes.

D. CROP MANAGEMENT

Sub-Project: Control of black rotting ("fundo preto") in tomatoes through foliar application of nutrients.

Description: This experiment will be conducted at the Bebedouro Experimental Station with the purpose of studying some control means for the black rotting in tomatoes. Calcium and Borum applications will be made under different soil water regimes through via foliar.

Sub-Project: Soil fertility versus plant spacing studies in cannig tomatoes.

Description: The main objectives of this research is the determination of the best spacing between rows using two levels of N, P and K in three different types of soils.

This experiment will be conducted at there places: Belem do São Francisco, Petrolina and Juazeiro.

Sub-Project: Herbicide use in rice crop.

Description: This research will be conducted at Jatina and Mandacaru Experimental Stations with the purpose of determinig herbicide efficiency and dosage for controlling weeds in the rice crop.

Sub-Project: Plant density trials using the corn cultivars Piranão and Centralmex.

Description: Determination of the influence of plant density on the yield of two corn cultivars: Piranão (small) and Centralmex (normal height).

This research will be conducted in two places Jatinã and Bebedouro Experimental Stations.

Sub-Project: Control of the fungal disease caused by Colletotrichum Gloeosporioides Penz on leaves of onion crops.

Description: This research is aimed for the control of the "Mal-das-Sete-Voltas" (Seven Turns) in onion crops. The objectives are to determine the efficiency and dosage of fungicides for controlling this disease.

Sub-Project: Testing of tomato cultivars with the aim of concentrating maturity for harvest.

Description: Cultivars adapted to the irrigated lands will be used to determine the maturity curve with the purpose of selecting material based upon concentrated maturity. .
Three experiments will be conducted in the main Experimental Station (Bebedouro, Mandacarú and Jatinã).

Sub-Project: Influence of plant hormones on the rooting development of grapevine rootstocks.

Description: This research will be conducted in the vertisols at the Mandacarú Experimental Station with the purpose of testing plant hormones to improve and to develop rooting in rootstocks.
Indolbutyric and naphthalene acetic acids will be used in concentrations of 50, 100, 200, 1000 and 2000 ppm using the variety Italy (Pirovano 65).

PROJECT: DEVELOPMENT OF PRODUCTION SYSTEMS FOR DRYLAND FARMING.

Sub-Project: Selection between and within families of half - brothers of corn.

Description: This research will be conducted at seven places in the Northeastern region with the purpose of obtaining varieties for high yield and good agronomic characteristics adapted to the different Northeastern ecological regions.

Sub-Project: Hybrid production trials of corn for the different Northeastern ecological regions.

Description: Inter-population hybrid corn will be used in nine different places in the Northeastern region with the purpose of obtaining varieties of highly desired agronomic characteristics such as productivity and adaptation to the region.

From this research will be taken some populations for diallelic combination.

Sub-Project: Selection between and within families of half - brothers in Flint Composed corn.

Description: This research will be conducted at seven places in the States of Paraíba, Pernambuco, Alagoas, Rio Grande do Norte and Ceará, with the main purpose of obtaining corn varieties with hard teeth and orange color, and presenting high productivity and adaptation to the climatic condition of the Northeastern region.

Sub-Project: Competitions of garlic cultivars.

Description: This research will be conducted in two places with very defined local conditions (microclimate) with the purpose of comparing the development and productivity of seven garlic cultivars.

Sub-Project: Development and resistance studies of carrots to Alternaria dauci (leaf burn)

Description: The objectives of this research are:

- a) To study the development of carrot cultivars Nantes, Tropical and Kuroda under determined micro climatic conditions.
- b) To study the resistance of the same carrot cultivars to leaf burn caused by Alternaria dauci. This research will be conducted at two places in the State of Pernambuco.

Sub-Project: Control studies of leaf burn (Alternaria dauci) in carrots using fungicides.

Descriptions: The objectives of this research are:

- a) To study the fungicides efficiency in controlling the leaf burn in carrots.
- b) To evaluate the application costs and returns. These experiments will be conducted at two places in the State of Pernambuco.

Sub-Project: Fertilizer use Calibration through soil testing for the corn crop in the Northeastern Region.

Description: This research covers all the Northeastern region including the States of Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, and Sergipe. Forty five experiments will be conducted throughout the region, with the main objectives of:

- a) Obtaining the response curve for N, P, and K.
- b) Determining the economical levels for fertilizer use, and
- c) Determining the best production area for corn in the Northeastern Region based upon the natural soil fertility.

PROJECT: DEVELOPMENT OF PRODUCTION SYSTEMS FOR RANGE MANAGEMENT

Sub-Project: Range management on conservationist basis for beef cattle production.

Description: This research will be conducted in Petrolina, State of Pernambuco, in the natural vegetation area known as "caatinga".

The objective of this research is the determination of management practices which will allow maximum production of desirable plant species and density, causing maximum soil water retention and minimum soil erosion, and high animal production.

This research will be conducted for ten years using different stocking rates and grazing systems

Sub-Project: Introduction of grass and legume plants for drylands.

Description: This research aims the improvement of the natural vegetation of the "caatinga" area.

Grass and legume species will be introduced from Australia and Africa to be tested in this region.

The development and adaptation of these plant species will be tested in situ.

Bromathologic analysis for nutrition will be done in all the species.

Mixing studies will be conducted using the natural vegetation and introduced plant species.

Sub-Project: Range management on conservationist basis for goat production.

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ADDITIONAL LISTING

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PROJECT: DEVELOPMENT OF PRODUCTION SYSTEMS FOR IRRIGATED LANDS

A: PLANT BREEDING AND SEED PRODUCTION

Sub-projects

1. Studies of green pepper cultivars
2. Influence of plant density on corn productivity of the varieties Piranão and Centralmex
3. Collection of cultivars of malting barley
4. Selection of sugar cane cultivars
5. Competition of upland cotton varieties under irrigation regime
6. Evaluation of potato cultivars in latosol soils
7. To obtain select "Centralmex Braquítico" cultivar
8. Introduction and study of wheat cultivars
9. Introduction and evaluation of orchard crops under irrigation regime
10. Competition of banana cultivars of the group Cavendish
11. Introduction, evaluation and multiplying of bean germ plasm

B. WATER USAGE AND MANAGEMENT

1. Studies of the technical-economical feasibility of irrigation methods and planting systems in water melon
2. Studies of the technical-economical feasibility of irrigation methods and planting systems in industrial tomatoes
3. Infiltration studies in a vertisol throughant the irrigation period
4. Influence of water levels on the banana productivity
5. Evaluation of salinity process in the Petrolandia soils
6. Irrigation parameters for soil and crop management
7. Determination of ideal period for irrigation suspension in grapevines
8. Influence of the phenological water deficits of the productivity of the main crops
9. Influence of irrigation levels on the productivity of the main crops
10. Physical and hydraulic characteristics of irrigated soils
11. Studies of conservation and maintenance of earth canals

C. SOIL FERTILITY AND FERTILIZER USE

1. Cloroses and leaf burn control in rice cultivated in the vertisols
2. Influence of organic matter on the onion production, and physical and chemical soil characteristics
3. NPK trials in banana Nanicão

4. Effect of source, levels and application period of nitrogen on the sugar cane production
5. Fixation and availability of phosphorus in the vertisols
6. Application methods of P fertilizers in industrial tomatoes
7. Plant nutrition and soil fertility management in the San Francisco Valley
8. Influence of P source and levels on sugar cane production
9. Fertility - spacing studies in industrial tomato during two seasons in the year

D. CROP MANAGEMENT

1. Determination of planting date of malting barley cultivars
2. Determination of management practices in grapevines
3. Survey of onion seed quality in the San Francisco Valley
4. Influence of management practices on the seed production and quality
5. Chemical control of weeds in irrigated crops
6. Fungicide use in the horticultural seed treatment
7. Influence of nematicides on nematode population, and melon yield
8. Control studies of the main diseases affecting melon foliage
9. Control studies of the main diseases affecting grapevines
10. Survey of nematodes associated to Crops in the major soils
11. Influence of weeds on the onion yield

12. Determination of the critical period in the competition between weeds and upland cotton
13. Spacing studies in banana var. Nanicão
14. Crop response to salinity
15. Physiological response of Tropical orchards under irrigation
16. Evaluation of production systems in grapevines
17. Relationship between nematode population and production loss in grapevines

PROJECT: "CAATINGA" MANAGEMENT

1. Comparative study between goat production systems
2. Study of native plants for forage using
3. Qualitative evaluation of exotic and native plants.