

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

DATE: 10/13/87

MEMORANDUM

TO: AID/PPC/CDIE/DI, room 209 SA-18
FROM: AID/SCI, Victoria Ose *VO*
SUBJECT: Transmittal of AID/SCI Progress Report(s)

Attached for permanent retention/proper disposition is the following:

AID/SCI Progress Report No. 5. 143 Rec'd 9/3/87

Attachment

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REGULATION OF CHILLING SENSITIVITY IN WARM-ZONE
CROPS - AID PROJECT 5. 143

PROGRESS REPORT

by

CHAIM FRENKEL
DEPARTMENT OF HORTICULTURE AND FORESTRY

I. PARTICIPANTS:

Chaim Frenkel, Rutgers University, Principal Investigator (PI)
Giselle Benjamin, University of Panama, Co-PI
Paulo Araujo, EMPARA/CNPFT, Brazil, Co-PI

II. CHARGE TO THE PARTICIPANTS:

Chaim Frenkel - Supervision of the project as it is handled in Panama and Brazil and research collaboration with the Co-PI's when at Rutgers University (one man-year each).

Giselle Benjamin and Paulo Araujo - To study the effect of low oxygen tensions (2%) obtained through hypobaric conditions or gas mixing techniques on the shelf life of chilling sensitive Panama and Brazil produced crops.

Both Co-PI's when arriving to Rutgers will conduct laboratory research on fundamental aspects of plant chilling sensitivity.

III. WORK IN PROGRESS:

1. Rutgers University

The Co-PI initiated work to examine if nitrous oxide (N_2O), an oxygen competitive gas, may be used to arrest the deleterious oxygen effect on chilled crops.

At 21% O_2 (standard atmospheric conditions) N_2O had little or no effect on tissues as evidenced by ripening in tomatoes.

In further experiments, N_2O will be applied in conjunction with reduced oxygen levels (5% and below).

Panama (Prepared by: Giselle Benjamin, a Co-PI University of Panama, Penonome, Panama, June 17, 1987):

A. Methodology:

We will use for the study several chilling sensitive crops including mangoes, avocados, plantains, chinese fruit star, and passion fruit (maracuya). These crops will be held at low O₂ concentration, in particular 2% O₂ at different temperatures, (0, 10 and 28 C). The methods of oxygen application will be:

(1.) Gas mixing of nitrogen and air (i.e. 90 ml N₂ in 10 ml air), to obtain a final O₂ concentration of 2%. Gas manometers are used to determine the rate of flow of the gases and to obtain the appropriate gas mixtures.

(2.) The other method will be through low pressure (hypobaric conditions) where air is kept at a pressure of 70-80 mm Hg to obtain oxygen partial pressures equivalent to 2% concentration of the gas at atmospheric conditions. Pressure cookers, which have been donated by SERVAL, Panama, are being reconstructed to serve as hypobaric chambers.

So far we are at the equipment set up level. When this stage will be completed crops will be held at different chilling regimes (as indicated above) and for varying periods.

After treatment, fruits will be transferred to respiration containers, from where gas samples will be withdrawn to monitor the respiration pattern (CO₂ evolution) and ethylene production as well as the disease incidence of the crops. Ethylene and CO₂ evolution will be measured by gas chromatographs (thermal conductivity and flame ionization) available at the main University campus in Panama City.

B. Work in progress

Several fruits, including mangoes (3 different varieties), chinese fruit star and plantains, have been placed at 0, 10, and 28 C, under normal atmospheric pressure, to study the effect of temperature on the shelf life of the crops, metabolic behavior (e.g., respiration and ethylene evolution) and disease incidence. This will serve as background information for observing the fruit post harvest longevity at room conditions and by comparison the deleterious chilling regimes.

C. Work in preparation

We are in the process of buying the nitrogen, air, O₂, CO₂, and ethylene gas tanks, as well as regulators, nipples and connecting tubes. The estimated cost of these is approx. \$900.00 to \$1000.00.

The ethylene will be donated by the Gorgas Hospital, (the only place in Panama to obtain this gas). The availability of gas mixtures is a major limitation, since sending for it to the States takes more than three months.

We are waiting to receive the gas tanks, the vacuum pump, to get started on the experiments. We hope to get all of it in the following weeks, hoping that by then, the political crisis will be resolved. At the moment, the University, and commercial companies are not functioning.

D. Financial statement

Of the \$7,450.00* received by Vicerrectoria de Investigacion y Postgrado, the University withdrew the established overhead fee, leaving \$6,323.19 to buy equipment and other materials.

| <u>EQUIPMENT</u> | <u>DISTRIBUTOR</u> | <u>PRICE</u> |
|--|--------------------|------------------|
| 2 refrigerators ** | ELGA | \$ 3,837.75 |
| 3 pressure cookers | SERVAL | (donated) |
| 6 10 gal. rectangular glass containers** | BUZO | \$ 219.74 |
| 6 glass covers or lids with openings for the septum | LA GARANTIA | \$ 24.89 |
| 1 vacuum pump plus 1 manifold** | AIRE FRIO | <u>\$ 704.76</u> |
| | | \$ 4,787.14 |
| <u>SERVICES</u> | | |
| 3 electrical outlets were installed in the labs, in order to connect the refrigerators and vacuum pump. | | \$ 44.18 |
| Transportation of the refrigerators and cookers from Panama to Penonome | | <u>\$ 50.00</u> |
| | | \$ 94.18 |
| Balance remaining*** | | \$ 1,441.87 |

*\$7,450.00 representing 25% of the Panama budget was advanced to the University of Panama as start up funds. Receipts (see above) will be used for reimbursement and for further expenditures.

**Receipts included.

***Will be used to obtain compressed and mixed gases.

Brazil:

A subcontract for the project joint work (an English version) was signed on April 10, 1987.

An identical Portuguese version (previously signed by Brazil) was forwarded to Rutgers was signed and returned to Brazil on June 11, 1987.

The work in Brazil will commence shortly.

\$6,500 for supplies plus \$1000 shipping cost were expended for Brazil.
(Please see section IV).

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IV. BUDGET

Dr. Frenkel Chaim
 International Agricultural & Food Program
 Aid-Warm Zone Crops
 BUDGET, EXPENSES & COMMITMENTS AS OF 7/20/87
 Account No. 4-28203

| ACCOUNT | CODE | BUDGET | ACTUAL | COMMITMENTS | BALANCE |
|---------------------|------|--------------|-------------|-------------|--------------|
| Salaries & Wages | 1000 | \$30,000.00 | | | \$30,000.00 |
| Fringe Benefits | 1710 | \$7,500.00 | | | \$7,500.00 |
| Mat. & Supplies | 2100 | \$21,000.00 | \$7,436.96* | \$96.72 | \$13,466.32 |
| Travel | 3500 | \$8,808.00 | \$1,857.75 | | \$6,950.25 |
| Sub Contract-Panama | 3700 | \$24,785.00 | \$7,450.00 | | \$17,335.00 |
| Sub Contract-Brazil | 3700 | \$24,380.00 | | | \$24,380.00 |
| Indirect Cost-25% | 8800 | \$16,827.00 | \$4,083.38 | | \$12,743.62 |
| ----- | | | | | |
| TOTAL | | \$133,300.00 | \$20,828.09 | \$96.72 | \$112,375.19 |

*6,500 for supplies plus \$800 shipping cost (pending) were used for Brazil. This amount will be deducted from the sub-contract-Brazil Budget (24,380 - 6,500 - 800).