

R E P O R T
MEETING OF WORKING GROUP ON POSTHARVEST QUARANTINE
TREATMENTS FOR CITRUS AND TROPICAL FRUITS

MIAMI, FLORIDA, MARCH 22 TO 23, 1984

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I. INTRODUCTION AND BACKGROUND

The Plant Protection Program of the Inter-American Institute for Cooperation on Agriculture convened a meeting of research experts from Latin American countries and United States Federal Agencies to consider the impacts of recent U.S. restrictions on the use of the pesticide Ethylene Dibromide (EDB) on citrus and tropical fruits and to outline recommendations for research plans to develop alternative quarantine treatment methods to the use of EDB. Experts from the Institute, from Brazil, Costa Rica, Guatemala, Jamaica, Mexico, Panama, St. Lucia and Trinidad and Tobago and from the U.S. Environmental Protection Agency, U.S. Department of Agriculture and U.S. Agency for International Development participated in the meeting.

Mr. Federico Dao, Director of IICA's Plant Protection Program in San Jose, Costa Rica opened the meeting which was chaired by Doctor Chelston W.D. Brathwaite of IICA's Office in Trinidad and Tobago. The Institute agreed to provide the results of this report of the expert meeting to all interested countries, agencies and international organizations to assist in developing understanding of alternative postharvest quarantine treatment for citrus and tropical fruits.

II. EPA STATEMENT OF THE SITUATION

Mr. Richard Johnson outlined recent EPA actions on EDB. He said in response to mounting evidence of the chronic hazards to man posed by long-term exposures to EDB residues occurring in foods, the U.S. Environmental Protection Agency (EPA) is completing a series of regulatory actions to eliminate EDB entirely from the diet of U.S. citizens. These chronic hazards to man include cancer, adverse reproductive disorders, and heritable genetic damage. These health risks were the basis for EPA's initiating this series of regulatory actions in 1977. Evidence of these health risks has continued to mount, since initiating these regulatory actions, and have resulted in EPA's recent decisions to eliminate all residues of EDB from U.S. foods supplies as rapidly as possible.

Those dietary components which have been shown to be contaminated by residues of EDB, the pesticidal uses of EDB responsible, and the regulatory actions to eliminate EDB residues from those dietary components and action dates are summarized below:

<u>Dietary Component</u>	<u>Sources of Contamination</u>	<u>Regulatory Actions</u>
Drinking Water	Soil Fumigation Use	Emergency Suspension (10/11/83)
Grain-Based Food Supplies	Fumigation of Stored Grain and Spot Fumigation of Grain Milling Equipment	Emergency Suspension of Uses (2/3/84) Proposed Interim * Tolerances (2/22/84) Final Interim tolerances by 4-10-84

* Tolerances of 900 parts per billion (ppb) for raw grains, 150 ppb for intermediate products requiring cooking, and 30 ppb for ready-to-eat products. Tolerances of no detectable residues will be established at the time all previously fumigated grains have cleared commerce, probably 3 to 5 years.

<u>Dietary Component</u>	<u>Sources of Contamination</u>	<u>Regulatory Actions</u>
Citrus & Papayas	Post-harvest Quarantine Fumigation	Halting uses for U.S. consumption (9/1/84) Proposed tolerances (3/6/84)* Final tolerances expected (4/20/84)
Mangoes and other fruits & vegetables	Post-harvest Quarantine Fumigation	Decision on Tolerances expected by 4/10/84

* Interim tolerances of 250 ppb for the whole fruit of which no greater than 30 ppb permitted for the edible pulp in effect until 9/1/84. Tolerances of no detectable residues after 9/1/84.

III. APHIS STATEMENT OF QUARANTINE REQUIREMENTS

Mr. Tom Lanier discussed the Plant Protection Quarantine (PPQ) responsibility for protecting U.S. agriculture from exotic plant pests and the legal authority under which it operates to carry out its mission.

Lists of fruits and vegetables and the conditions under which they can be imported into the U.S. were provided to representatives from Costa Rica, Mexico, Jamaica, St. Lucia, Trinidad and Tobago, and Brazil. Lists will be sent to the other countries represented.

It was emphasized that any research performed for the purpose of certifying fruits to the U.S. should meet the Agency's research requirements. Research proposals and results should be submitted to the Animal Plant Health Inspection Service (APHIS) and the Agricultural Research Service (ARS) for evaluation of data and treatment protocols.

Since the Fruits and Vegetables Quarantine (7 CFR 319.56) is specific, any change in treatments will require a regulatory change and publishing in the Federal Register.

IV. U.S. DEPARTMENT OF AGRICULTURE AGRICULTURAL RESEARCH SERVICE STATEMENT

Dr. Spaulding of the ARS Miami Subtropical Horticultural Research Station reviewed the current status of EDB alternatives. Major research areas at the station include methyl bromide and phosphine fumigation techniques. Also work on two stage heat treatment (hot water dip "double dip") system. Mr. Amyx of APHIS discussed a heat treatment (49 °C, 20 minute) plus a cold treatment (8.5 °C, 10 days) being developed by USDA/ARS in Hawaii.

During the evening session specific research proposals aimed at finding alternatives to EDB and/or to substantially reduce levels of EDB were discussed. For mango, the following treatment alternatives are considered to offer the best short term possibilities:

- Double hot water dip
- Single hot water dip + methyl bromide
- Single hot water dip + phosphine
- Single hot water dip + reduced levels of EDB
- Single hot water dip, without fumigant treatment.

All of the above treatment methods would require careful evaluation of methodology to assure that fruits to be treated are less than some predetermined degree of ripeness. This would require evaluation of instrumental colorimetric techniques such as use of a Hunter B Colorimeter.

There was some discussion of the possible use of pest management techniques involving statistical methodologies (e.g , use of field infestation indices) as aids in assessing how intensive regulation quarantine requirement must be.

There was considerable discussion of the real need for quarantine of products coming from the Caribbean, since there is some evidence in the published literature that insects considered to be of quarantine significance in the Caribbean are already present in Florida, and have ~~not~~, to date, caused problems with local citrus and tropical fruits.

The Protocol indicating future research planning needs (Section VII) recommended that countries assist USDA/APHIS in re-evaluating its regulatory documents to ensure they were up-to-date. USDA has already initiated a re-evaluation of its information.

For papaya, a short term alternative to fumigation is already available in Hawaii and will presumably be approved for use by September 1, 1984. Since the insects of concern in Hawaii are the same as exist in Central America and the type and size of papaya are similar in Hawaii and Central America, APHIS has indicated that the same methodology could probably be used in Central America. This would of course be conditional on proper quality control safeguards and maintenance of proper treatment parameters (colorimetric, pH of fruit, careful control of treatment temperatures, control of maximum interval between harvest and treatment) and the like.

Considerable discussion was devoted to selection of adequate research sites. Costa Rica was proposed as a suitable site based on availability of infested fruits, chemical laboratory facilities, insect rearing capability, availability of fumigation chambers and existing capacity for hot water dips.

Since there is not enough money available in the budget to set up a duplicate research site in the Caribbean, it has been proposed that AID emphasize to USDA/APHIS the necessity of reaching an early decision on APHIS' re-evaluation of the quarantine significance of Caribbean insects. If the USDA rules that quarantine requirements, indeed, cannot be eliminated, it has been suggested that USDA/ARS send a researcher to Puerto Rico to determine the possibility of developing EDB alternative treatment methods in Costa Rica for use in the Caribbean.

V. U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT-AID STATEMENT

Dr. Collier said concern on the part of the Department of State and Agency for International Development (AID) of the effect on other countries, particularly those of the Caribbean Basin Initiative, of a minimal tolerance followed by a suspension of EDB as a fumigant for citrus and tropical fruits led to the establishment of a 3 member fact finding team. Two of the team members were from the Consortium for International Crop Protection and the third was from the Post Harvest Institute of Perishables. AID provided funding for the team.

The fact finding team's report with its conclusions and recommendations has been submitted to AID for consideration. Basically, the team concluded, that although the total dollar value of affected exports of tropical fruits to the United States was not large in terms of dollar value, and the total U.S. market, the impact on the GNP of several small Caribbean Basin Initiative (CBI) nations would be significant. Also, that in anticipation of the benefits to accrue to the Caribbean Basin Initiative, producers in a number of nations had made sizeable investments in tropical fruit culture with an eye to expanding exports to the U.S. market. As examples: the Dominican Republic anticipated shipping 500 thousand Kgs., of mangoes to the United States this year, and increasing to 2 million Kgs. by 1986.

Likewise PINDECO (Pineapple Development Corporation of Costa Rica) was prepared to ship a total of 10 million pounds of papaya to the U. S. beginning in April and 100,000 p. daily of mangoes between April and June. These are but two examples. The fact finding team was made aware of similar plans in several other CBI countries and a member of Latin American Nations that are outside the CBI.

Based on the fact finding team's conclusions and recommendations, certain actions have been initiated. A cooperative study is underway between AID and USDA, APHIS and ARS and IICA to develop decline curves of EDB in mangoes and papayas to determine in the short term if EDB fumigated mangoes and papayas can through modified procedures meet the temporary tolerances established by EPA.

IICA's current meeting is an additional example. Through cooperative efforts by EPA, AID and IICA, the meeting's purpose is:

1. to inform participants in attendance of the necessity for the action taken by EPA and
2. to develop plans for the accomplishment of short, medium and long term research in order to develop feasible alternatives to EDB for tropical fruit fumigation to meet, regulatory needs, and to distribute this information to all affected countries.

Research presently underway or planned by USDA is aimed primarily at the export of U.S. products and the internal movement between U.S. states.

Short term research on the EDB problem is mainly directed to determining methods for reducing EDB residue tolerances on papayas to the levels proposed by EPA until September 1, 1984 and to establish methods for achieving the lowest practical levels of EDB on mangoes under fumigation conditions as practiced in the CBI area. To accomplish this AID, through the Consortium for International Crop Protection, is furnishing an additional laboratory technician to the USDA-ARS Subtropical Horticultural Research Stations. In addition, USAID Missions in conjunction with local USDA/APHIS Inspectors in Haiti and Jamaica would be of assistance in fumigating mangoes and papayas from the respective Caribbean Nations.

VI. STATEMENTS BY COUNTRY REPRESENTATIVES

BRAZIL. Dr. Alvin said Brazil has been exporting small quantities of mangoes and papayas to the U.S. Fumigation with EDB has been conducted in New York and New Jersey. Brazil recently completed an EDB Fumigation Facility at Campinas Airport near Sao Paulo. One test shipment of papaya was made to California. A suspension of EDB will force Brazil to redirect its exports to European and Canadian markets. However, it is very doubtful that the total production for export can be absorbed in these markets. Heat treatment, if it is approved for papaya, will not solve Brazil's problems. Papaya production is in Northern Brazil near Belem. Since there are no direct air flights from Belem to the United States, papayas must be trucked South to Rio de Janeiro or Sao Paulo. This time interval may make heat treatment impractical and Brazil will have to look to other alternatives in order to maintain its U.S. market.

COSTA RICA. Dr. May said Costa Rica had great expectations of exporting tropical fruit, particularly papaya and mango, to the U.S. under the Caribbean Basin Initiative. The Costa Rican Government obtained loans to build EDB fumigation chambers and encouraged private industry to participate through the granting of tax incentives. Costa Rica is concerned that the initiative developed will be lost without the quick development of feasible alternatives to EDB fumigation.

JAMAICA. Dr. van Whervin, the Jamaican representative, said his country places high priority on increasing exports, among them citrus and tropical fruits. The Jamaican Government is working with U.S. AID and the World Bank in this effort. Jamaica is now improving its quarantine system. Working with AID, it is upgrading its fumigation and heat treatment facilities at export locations. The restriction on use of EDB poses an immediate problem to Jamaica. As a USDA representative is now in residence in Jamaica and alternatives to EDB are now under consideration, it is hoped that Jamaica will be able to adjust to the EDB decision.

Mango export will not be a problem for Jamaica. There is no mango weevil in Jamaica. Jamaica is now seeking to clarify with USDA, which lists the weevil as existing in Jamaica, the status of the weevil there. Methyl bromide can be used on the yam in Jamaica.

MEXICO. Dr. Ramos Landey of Mexico said his country is faced with a marketing loss in its citrus and mango foreign exchange earnings of about US\$50 million yearly if short and longer term alternatives to EDB are not developed quickly. The local fresh fruit market and processed food market cannot absorb this loss. The long term investment of the growers and producers will also be lost. These agricultural investment and facilities are large. Mexico is hopeful that jointly USDA and the Mexican Secretariat of Agriculture can develop in Northern Mexico a program of fly free zones to allow shipment to the U.S. on the basis of freedom from infestation. This would ease but not eliminate Mexico's problem. Thus Mexico is looking to other short term solutions such as fumigation with methyl bromide.

GUATEMALA. Dr. Fumagalli said as yet Guatemala has been unable to fully assess the impact a suspension of EDB will have on its present and projected agriculture. Guatemala had high hopes of developing markets for its tropical fruit production in the U.S. under the Caribbean Basin Initiative. Guatemala will follow the lead of the U.S. with respect to a ban on the use of EDB. This action will not only affect its potential U.S. market but will also affect its trade with its traditional trading partners in Central America and Mexico. It will also affect its internal or domestic quarantine needs in the prevention of spread of Mediterranean fruit fly within Guatemala.

PANAMA. Dr. Concha said Panama does not believe that the EPA action with respect to EDB will have a major impact on its agricultural export market. EDB is not presently used in Panama. Citrus is exported only as juice and concentrate. However, Panama has high hopes of developing an export market for papaya and mangoes, particularly to the U.S. The stimulus for developing such markets is expected to come through the Caribbean Basin Initiative. These plans will have to be delayed or discarded entirely if suitable alternatives are not developed quickly.

SAINT LUCIA. Dr. Michel said for various reasons, EDB is not used now in Saint Lucia for fumigation against insects or as a liquid drench. Bananas, the major export crop, does not require EDB treatment.

Exports from St. Lucia are denominated by those of agricultural products and only relatively small amounts of any products other than bananas contribute to the foreign exchange gained from agricultural exports.

In the last five years the basis for diversification and for avoiding total dependence on a single crop has been established. The Tree Crop Program has had two phases involving the establishment of several hundred acres of fruit tree crops. Thus, farmers are about to start reaping the benefits of diversification and it is expected that fruits from this program will reach European and U.S. markets. The Program is to be expanded even further, and a new phase is likely to commence soon. It will include planting, apart from citrus, mango and avocado, some other exotic fruits like sapodilla, chemis and apricots to be marketed locally and abroad.

With this expected increase in production of tree crops, the need may arise to have the fruits treated before export. St. Lucia is, so far, free of the fruit-fly, he said.

The country is therefore very interested and concerned about the EDB problem and the findings of alternatives for its use.

TRINIDAD AND TOBAGO. Dr. Barrow said that currently there is no trade in fruits between Trinidad and Tobago and the U.S. But Trinidad and Tobago were hoping to take advantage of the Caribbean Basin Initiative to export fruit. Fumigation facilities are currently being built for EDB fumigation. EDB is only used in Trinidad in flour mills and this use will be discontinued.

Trinidad does not have the Mediterranean fruit fly and no fruit flies have been found on citrus or mango. It would be helpful at this time if a review of the quarantine requirements for entry of citrus and mango into the United States from Trinidad and Tobago was carried out.

The major concern of the Government of Trinidad and Tobago is the residues of EDB in products, especially grains imported from the U.S.

VII. PROTOCOL OF THE MEETING

A meeting convened by the Plant Protection Program of the Inter-American Institute for Cooperation on Agriculture (IICA) was attended by representatives of the U.S. Environmental Protection Agency (EPA); Agricultural Research Service (ARS) and the Animal and Plant Health Inspection Service (APHIS) of the U.S.D.A.; U.S. Agency for International Development and the representatives of the Government of Brazil, Costa Rica, Guatemala, Jamaica, Mexico, Panama, Saint Lucia and Trinidad and Tobago held in Miami, Florida on the 22nd and 23rd of March, 1984, to consider the current status of ethylene dibromide as a postharvest fumigant and to evaluate alternatives to its use in the short, medium and long term and recommends as follows:

1. That all efforts should be taken to terminate the use of EDB as a postharvest fumigant at the earliest possible opportunity. Except that in the case of mangoes, research be considered on low level dosages of EDB in combination with hot water dips as a short term alternative until other alternative treatment can be developed. This exception recognizes that EDB may not be permitted for use on mangoes entering the U.S. after September 1, 1984, or shortly thereafter.

2. Short Term Actions for Alternatives

- 2.1 That the double hot water dip be used instead of EDB to treat papaya destined for the United States from Medfly infested areas provided that papaya varieties, Solo, and no other fruit fly is involved, and that the variety is Solo, and fruits are approximately one pound or less in weight. APHIS will determine if this technology, now being developed in Hawaii, can be transferred to the Central American nations without additional research.
- 2.2 That an evaluation be made of hot water dips (single and double) and phosphine and methyl bromide solely and in combination with hot water dips for the treatment of mango from fruit fly-infested areas.
- 2.3 That APHIS expeditiously re-evaluate currently enforced quarantine restrictions on fruits and vegetables from the Caribbean in the light of the recent AID fact finding team's observations which suggest that APHIS quarantine requirements for tropical fruits imported into

the continental United States from the Caribbean Island nations need re-evaluating. Where necessary individual nations should support this effort by providing appropriate surveys and documentation.

- 2.4 That a study of the economic and technical feasibility of the use of irradiation of fruits as an alternative strategy be carried out and if it is feasible that actions be undertaken to provide such a facility for Caribbean and Latin American nations.
 - 2.5 That a study be conducted of the pest status of the West-Indian fruitfly (Anastrepha obliqua) and an evaluation be made of alternative quarantine treatment. The study could be carried out in Puerto Rico. The meeting urges that USDA-ARS commit its resources to this activity since it is a recognized need in the U.S. Caribbean possessions. The technology developed could be transferable to the Caribbean island nations.
 - 2.6 That a study be carried out on the control of Medfly and other fruitflies in Costa Rica using hot water treatment and other fumigants as in 2.2.
 - 2.7 That a research study on the South American fruitfly, (Anastrepha fraterculus) be carried out possible in Brazil to determine whether this pest can be controlled by hot water treatment or other alternatives.
 - 2.8 That studies be conducted to determine the stage of ripeness at which mango and papaya fruits become susceptible to infestation by fruitflies and appropriate mechanical methods be developed for determining the ripeness of these fruits.
3. Long Term Actions for Alternatives
- 3.1 Carry out pest management studies with a view to maintain fruit fly populations in the field at acceptably low levels during the fruit development through the harvest.
 - 3.2 Conduct a feasibility study to determine the applicability of the future of ionizing radiation as a quarantine treatment. This study should consider the possibility of establishing regional as well as national facilities.

- 3.3 Encourage marketing studies to determine the feasibility of exporting processed tropical fruit from Latin America and the Caribbean.

4. Conditions of Research

- 4.1 Any research project which should be carried out under this protocol should have the following conditions:
 - a. Be carried out at reputable institution.
 - b. Be subject to verification and reproduction in more than one location.
 - c. Be carried out by reputable scientists.
 - d. After peer review, be published in a reputable scientific journal.

5. Request to IICA

- 5.1 Cooperation in implementing the previous recommendations and actions if additional resources are provided.
- 5.2 IICA's Plant Protection Specialists, in the Central and Caribbean Areas be given the responsibility for the follow-up actions if 5.1 is implemented.
- 5.3 Inform the countries of the research to be done on the short- and long-term alternatives for EDB.
- 5.4 Promote research in the area of fruit flies.
- 5.5 Encourage appropriate sources to provide assistance, to effect the recommendations of this protocol.

6. Agency Actions for the Future

We recommend that in seeking to effect these recommendations:

- 6.1 EPA consider providing appropriate technical backstop for residue analysis.
- 6.2 USAID consider providing some financial assistance, to the recommendations of the protocol.

- 6.3 APHIS consider evaluating the research data generated by the recommendations of the protocol.
- 6.4 USDA/ARS consider contributing research and evaluating research data relating to this protocol.

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