

RECOMMENDATIONS TO PREVENT THE ENTRANCE OF QUARANTINE PLANT DISEASES OF MAJOR ECONOMIC IMPORTANCE FOR BANANA AND PINEAPPLE

Aimed at: Employees of the major fruit producing and processing companies, representatives of agrochemical companies and NGOs, certification inspectors, and any other visitor to banana plantations in South East Asia and pineapple plantations in South America.

Among the major agricultural catastrophes are those caused by plant diseases. Two key illustrative examples are “Late Blight” of potatoes (*Phytophthora infestans*), responsible for the death of more than 1 million people in Ireland, and “Panama Disease” (*Fusarium oxysporum* f. sp. *cubense*), which forced the transformation of the world’s banana industry. Although the control of plant diseases has advanced considerably in the past decades, the best control method remains to be the exclusion, which means prevent the entrance of the pathogen. **This communication aims to alert travelers to prevent the introduction or the likelihood of introducing pathogens of bananas and pineapples into disease-free areas.**

There are several important banana diseases present in South East Asia, that if introduced and disseminated to the Tropical Americas, would seriously affect banana production. These pathogens are: a soil fungus known as “Tropical Race 4” of *Fusarium oxysporum* f. sp. *cubense*, the causal agent of “Panama Disease”, a virus disease known as “Banana Bunchy Top Virus” (BBTV), “Septoria Leaf Spot” caused by the fungus *Mycosphaerella eumusae*, and “Malayan Leaf Spot” caused by the fungus *Haplobasidium musae*.

Of these diseases, Tropical Race 4 of *Fusarium* is unquestionably the one that poses the most serious threat the banana industry and also small- growers in Latin America, the Caribbean and Africa, since most varieties of plantain and banana grown in these regions are susceptible.

Tropical Race 4 is present in the city of Davao, The Philippines, where the major fruit companies operate, and to where employees of these fruit companies and representatives of agrochemical companies frequently travel back and forth. This human traffic creates a high risk of inadvertently introducing this pathogen into the America’s.

The same risk occurs when travelers visit other countries where Tropical Race 4 is present including: Taiwan (Kaohiung), Australia (Northern Territory), Indonesia (Halmahera, Irian Jaya, Java, Sulawesi, Papua New Guinea, and Sumatra), Malaysia, and China (the Southern provinces).

In a similar way, “Pineapple Fusariosis” caused by the fungus *Fusarium guttiforme* could threaten pineapple cultivation, were the causal agent to be introduced into areas considered free from the pathogen. This disease is present in South Africa, Brazil and Bolivia (a similar pathogen exists in Argentina, Paraguay and Uruguay). Since this disease is present in Brazil where major fruit companies operate with frequent visits of employees and representatives from agrochemical companies, it is very important to take precautions to avoid accidental introduction of the disease into the pineapple production areas of Central and South American countries.

The following measures should be observed by any person visiting banana plantations in The Philippines and South East Asia and Pineapple plantations in South America (mainly Brazil). Especially the fruit company employees, representatives of agrochemical companies, NGO representatives, and certification inspectors:

- 1- Not visit farms where these diseases have been reported unless absolutely necessary.
- 2- If plantations in any of these countries are visited, even if not having registered the presence of the disease infections, it is recommended to bring or buy an additional full set of clothes and a pair of shoes to be used just in that country (or ask someone to lend you rubber boots). On leaving, the clothes and shoes used should be left behind in the country.
- 3- Never bring back the shoes that were used while visiting farms, packing facilities, or even the central offices when you return to your country.
- 4- At the very least, it is recommended that the clothes (including hats and caps) are washed before leaving the country being visited. The same applies to backpacks, camera bags, and other objects that have been taken to the field.
- 5- In the countries mentioned, do not collect, transport or bring soil or plants with soil, or any plant parts (root, fruit, leaf-samples, etc.) of any kind of plant genus. If for any reason samples are required for use within the country, this should to be done under the supervision of a specialist observing applicable and known quarantine regulations.
- 6- No soil, plants, or parts of plants, of any kind should be exported from the countries with the presence of these diseases to Latin America, Caribbean or Africa, where bananas and pineapples are grown.
- 7- If planting material of bananas or pineapples needs to be moved from any of these countries, it should only be done by using meristems and accompanied with all the phytosanitary certifications. The certificate should indicate explicitly that the material is free from *Fusarium oxysporum* f. sp. cubense, tropical race 4 (in the case of banana), and *Fusarium guttiforme* (in the case of pineapple). Preferably the meristem material should be analyzed, including by molecular tools such as polymerase chain reaction (PCR).
- 8- The movement of planting material of *Musa* has to comply with the Protocol of Safe Movement of Germplasm by means of the International Transit Centers that have been established for that purpose. Apart from obtaining the phytosanitary certificate from the country of origin, it is recommended to perform additional virus indexing when the plants arrive in the destination country by accredited laboratories. The plants should always remain properly in quarantine before they are transported and planted in the field.
- 9- Field tools to take soil samples or sample plant parts, or any tool or implement used in the field, should be left behind in the country visited. If for reasons of having to use expensive

specialized sampling equipment which can't be left behind, these need to be thoroughly disinfected before leaving the country, in the following way:

- a) All soil particles and plant debris should be removed with great care.
- b) Wash the device with running water three times.
- c) Immerse in a disinfectant solution of 5% sodium hypochlorite, or if not available with 70% alcohol, for 5 minutes and then one last time with water. Formalin (40%), if available, can also be used.

10- Return flights directly after visiting a plantation should not be taken. Personnel must bathe before leaving the country and comply with recommendations 2, 3 and 4.

11- No "souvenirs" should be bought and brought back home made from any type of vegetative material obtained from banana or pineapple plants.

It is necessary to strictly comply with the above stated recommendations. The sustainability of agricultural activity, especially Banana and Plantain and Pineapple in America, the Caribbean and Africa depends to a great extent on preventing the introduction of exotic plagues which could have a high economic impact like the ones mentioned.

These recommendations were elaborated by a group of scientists that work with Bananas and Pineapples in Latin America and the Caribbean in collaboration with The Plantain and Banana Research and Development Network for Latin America and the Caribbean (MUSALAC) and Bioversity International.

For more information, questions and suggestions, please contact the regional offices of *Commodities for Livelihoods* program of Bioversity International of your continent in the address below.

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