

DFID

**a united effort
against
a global pest**



*helping poor farmers reduce crop losses and
grow more food in a sustainable way*

Introduction

Whiteflies cause severe damage to a wide range of crops in tropical and sub-tropical regions. In these areas, where most of the world's poor live, economic losses from these insects and the plant viruses they transmit result in real hardship for affected farmers. Substantial yield losses in subsistence crops, such as cassava and sweet potato in Sub-Saharan Africa, and common beans in Latin America, have serious implications for food security. In Latin America and Asia, extensive damage to cash crops such as tomato and pepper results in reduced cash earnings for farmers. This means families have less money to spend on basic requirements such as schooling for children, medicines and the type of food that will provide a balanced diet. Invariably, women and children are the most vulnerable in this situation.

The whitefly problem has worsened considerably over the past two decades. Insecticides are used as the main control measure, but these become less effective as the insect develops resistance to them. Farmers usually respond by spraying more frequently, thereby creating environmental and health hazards. They also create new pest problems by killing off beneficial organisms such as spiders and wasps, thus making possible outbreaks of insects that were previously kept under control by these natural enemies.

Another reason for the increased importance of whiteflies is that new forms of both insect and viruses have emerged in recent years. Some of the new forms of whitefly can infest a wider range of crops and weeds. They can often multiply more rapidly and spread viral diseases more efficiently than the indigenous whitefly species. The so-called B biotype is a prime example of this phenomenon and is causing much concern as it spreads to new areas. The B biotype was recently recorded in Africa, making it imperative for agricultural researchers to help farmers respond to this threat.

The United Kingdom's Department for International Development (DFID) supports research in the sustainable management of natural resources that aims at improving the livelihoods of poor people in developing countries. DFID has funded commodity-based research on whiteflies and whitefly-transmitted viruses, primarily in Africa, for nearly a decade through its centrally funded Crop Protection Programme (CPP). It is now aiming to build on this support by helping to create a global framework that will allow different whitefly research projects and activities to coordinate their efforts more effectively and produce research outputs which have positive and sustainable impacts on poor peoples' livelihoods.

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Whiteflies as vectors of cassava and sweet potato viruses in Africa

Bemisia tabaci transmits viruses that cause cassava mosaic and sweet potato virus disease, the main production problems of these crops in Africa



Yield losses pose a major threat to food security, thus making the development of effective IPM approaches essential



We are combining existing host-plant resistance with novel biocontrol and crop management strategies in a sustainable IPM strategy



Whiteflies as cassava pests in South America

Host plant resistance to whiteflies in cultivated crops is rare



Resistance to a major whitefly pest of cassava, *Aleurotrachelus socialis*, has been identified in an Ecuadorian clone

This resistance is now being transferred to other cassava cultivars in the hope of controlling whitefly pests of this crop in the tropics



Characterization and control of sweet potato viruses in East Africa

Sweet potato virus disease is caused by a virus complex transmitted by the whitefly, *Bemisia tabaci*, and aphids



These viruses compound each other's effects in infected crops, reducing yields to less than half of those of virus-free crops

IPM practices, including the use of resistant varieties, can effectively control sweet potato virus disease



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Whiteflies as pests and virus vectors in tropical America

The whitefly, *Bemisia tabaci*, attacks food and industrial crops throughout the lowlands and mid-altitude valleys of tropical America



Whitefly-transmitted viruses have ruined millions of small farmers who had attempted to diversify their traditional crops without technical assistance

Selected IPM measures contribute to sustainable food production and effective management of whitefly / geminivirus problems in mixed-cropping systems



Whiteflies as virus vectors in eastern and southern Africa

Poor farmers in eastern and southern Africa are increasingly adopting horticultural crops as an important source of income



Unfortunately, whitefly-borne viruses attack these crops, inducing severe yield losses and widespread pesticide abuse

The implementation of IPM practices against *Bemisia tabaci* is expected to increase productivity and reduce pesticide abuse



Whiteflies as virus vectors in South-East Asian mixed-cropping systems



Vegetables, particularly tomatoes and peppers, are important food crops that are now under attack by whitefly-borne viruses in South East Asia

The development of geminivirus-resistant vegetables in South East Asia is critical to increasing productivity and improving rural livelihoods



Sustainable management of the whitefly-borne *Tomato leaf curl virus* in India

Tomatoes are an important source of income for Indian farmers. *Tomato leaf curl virus* causes devastating yield losses, frequently leading to crops being abandoned



Bemisia tabaci biotype B causes widespread tomato leaf curl epidemics and irregular ripening of the fruit

Developing virus-resistant tomato varieties is a sustainable and environmentally friendly control measure that is readily accepted by farmers



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Whiteflies as pests in the Andean highlands



The whitefly, *Trialeurodes vaporariorum*, attacks crops at higher altitudes (>1000 m) where *Bemisia tabaci* cannot thrive

Widespread pesticide abuse in cropping systems affected by *Trialeurodes vaporariorum* is causing the emergence of pesticide-resistant whitefly populations



IPM measures constitute a sustainable way of managing the whitefly problem and reducing pesticide use

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Diminishing support for food production research and lack of technical assistance to small-scale farmers have greatly increased pesticide abuse, thus causing severe environmental degradation and human health hazards in rural and urban communities throughout the tropics.

The DFID Crop Protection Programme operates in those regions of the world that are affected by whiteflies and whitefly-borne viruses. It promotes the development and exchange of sustainable IPM methodologies to control these globally important pests.



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R 7460 Bemisia tabaci and tomato leaf curl virus disease management
R 8041 Whitefly Initiative Phase II - CGIAR System-wide Whitefly IPM Project
R 8222 Strategic modelling to minimise threats to production systems by begomoviruses