

A photograph of three men in a field. The man on the left is wearing a striped short-sleeved shirt and grey trousers, leaning over to examine a plant. The man in the middle is wearing a white long-sleeved tunic and is looking down at the same plant. The man on the right is wearing a white long-sleeved tunic and is looking towards the camera. The background shows a field with various green plants and trees under a clear sky.

SECTION TWO

**Whiteflies as Pests and Vectors of
Viruses in Vegetable and
Legume Mixed Cropping Systems in
Eastern and Southern Africa**

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CHAPTER 2.1

Introduction

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In some parts of Africa such as in the Sudan and Tanzania the countryside resembles a graveyard, not through the ravages of civil war or natural disaster but because of one pest, the whitefly *Bemisia tabaci* (Gennadius), which is sucking the life out of Africa's crops. *Bemisia*, which was originally only a problem in industrial crops such as tobacco (*Nicotiana tabacum* L.) and cotton (*Gossypium hirsutum* L.) is now much more widespread and despite all efforts to control this pest, it has stayed one step ahead of man's actions against it. *Bemisia* has done this not only by developing resistance to many of the chemicals commonly used but also by diversifying its tastes and its habitat to a much wider range of staple crops such as cassava (*Manihot esculenta* Crantz) and common bean (*Phaseolus vulgaris* L.) to high-value horticultural crops such as tomato (*Lycopersicon esculentum* Mill.) and melon (*Cucumis melo* L.). On-farm surveys in the region have shown that the number of producers who have abandoned their crops because of tomato leaf curl diseases is on a sharp increase. In the Sudan especially, whiteflies have forced entire areas out of production, depriving producers of food and cash income.

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Selection of Target Crops and Target Countries

Tomato is one of the most widely cultivated vegetable crops in the region, predominantly grown by small-scale producers for fresh consumption (GTZ, 1995). National scientists have ranked *B. tabaci* as the most important pest/vector in tomato in Tanzania and Kenya, and the second most important in Malawi after red spider mite (Varela and Pekke, 1995). In the Sudan, *B. tabaci* is considered the crop pest of highest economic importance (Eveleens, 1983; Ahmed et al., 1987).

Knowledge Available on Whitefly-Related Problems

Despite these opinions, no quantitative documentation was available on the economic importance of whiteflies as pests and/or vectors in vegetable cropping systems in the countries of this sub-project prior to its commencement. There was no clear map of the areas affected in these countries and related information on insecticide use and the cost of control in the affected areas. Knowledge on whitefly-transmitted viruses in vegetables, the host range and natural enemies was also lacking in most partner countries before this project began. Information on the status of whitefly resistance to insecticides was

available only from the Sudan (see Chapter 2.2).

Although the history of whitefly research in the Sudan goes back to the 1930s (Kirkpatrick, 1931), a substantial collection of grey literature on whitefly and whitefly-transmitted viruses from local stations/project reports in the Sudan revealed that the research has focused almost entirely on whitefly-related problems in cotton production. Whitefly-related problems in vegetable production appear more recent, for example, *Tomato yellow leaf curl virus* (TYLCV) was first identified in 1965 (Yassin and Nour, 1965). Nevertheless, research on whitefly-related problems in vegetable crops has been limited.

In Tanzania, TYLCV was first identified in 1990 (Czosnek et al., 1990). Later, Chiang et al. (1997) identified a different virus, named ToLCV-Tz, which has complicated the scenario in Tanzania. No further documentation on whitefly-related problems in vegetable crops is available from this country. In Kenya and Malawi, documentation on whitefly-related problems is only available on citrus (*Citrus* spp. L.) and cassava.

Planning and Co-ordination

In order to form the basis for the diagnostic activities for the first phase, a planning and methodology workshop was held, with the participation of scientists from the national teams, at the International Center of Insect Physiology and Ecology (ICIPE) in April 1997. A detailed work plan for the first phase of the project was developed, methodologies were discussed and views and experiences were shared among the participants.

A progress meeting held at the ICIPE followed this up in June 1998. Progress of the two African sub-projects was presented, experiences shared and priority research areas for Phase 2 were considered. The participating co-ordinators and national teams made 10 presentations on whitefly research.

Finally, a research agenda for Phase 2 was outlined at a joint planning workshop held at the ICIPE in September 1999. Research priorities were thoroughly discussed and priority setting was carried out with full participation of all national scientists of Sub-Project 4, co-ordinators and collaborators from advanced research institutions.

Continent-Wide Appeal

Additionally, the formation of an African Whitefly and Geminivirus Network was spearheaded by the sub-project at the 12th Meeting of the African Association of Insect Scientists held in June 1997 in Stellenbosch, South Africa. Thirty-two researchers from 12 countries in Africa participated and expressed interest in participation in a regional information exchange network led by ICIPE.

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