# The introduction and dispersal of whiteflies in the cassava production areas of Brazil

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## INTRODUCTION

Cassava (*Manihot esculenta*) has its original centre of production in Brazil, but is now cultivated in all tropical regions of the world. Cassava is the main food for thousands of people, being in fourth place just behind rice, sugar and corn (Carvalho *et al.*, 2000). Five countries (Brazil, the Democratic Republic of Congo, Indonesia, Nigeria and Thailand) are responsible for almost 70% of the world's cassava production. The Food and Agriculture Organisation (FAO) has estimated that future world production will reach 210 millions tonnes by 2005, associated with increasing yields of from 10 to 40 t/ha. In Brazil, up to the last decade, cassava was produced as a subsistence crop by small and poor farmers, mainly in northern and north-eastern regions. However, in response to an increase in food consumption, and demands from the textile and food industries, the cultivation patterns have changed, with the southern, south-eastern and western regions now responsible for more than 60% of the cassava production. Before the 1990s, insect pests (mainly whiteflies) caused little damage to cassava plants. However, the establishment of monoculture in some areas of the country, the movement of cassava plants between countries, domestic cultivation and the transit of pests associated with plant material have all contributed to the invasiveness and dispersal of economically important whiteflies.

## MATERIALS AND METHODS

A survey of whiteflies occurring in Brazilian cassava crops was conducted in 13 states: Alagoas, Bahia, Distrito Federal, Goiás, Ceará, Mato Grosso do Sul, Paraiba, Pernambuco, Piauí, Rio de Janeiro, Rio Grande do Norte, São Paulo and Tocantins.

All specimens collected were identified through morphological and molecular methods. In the latter case, five random primers were used in RAPD-PCR amplifications to analyze the genetic variability.

## RESULTS AND DISCUSSION

The whitefly species most commonly found in cassava crops were: *Aleurothrixus aepim*, *Bemisia tabaci* biotype B, *B. tuberculata* and *Trialeurodes variabilis* (Oliveira *et al.*, 2001).

*A. aepim* was found in the states of Alagoas, Bahia, Ceará, Minas Gerais, Paraíba, Piauí and Tocantins. In Bahia, this species (which is considered a secondary pest of cassava, but with occasional outbreaks) was the predominant species at the time of sampling. *T. variabilis*,

which was found in the Distrito Federal, Goiás, Rio de Janeiro and São Paulo, is of the same minor status.

Regarding the results obtained, the main concern was for *B. tabaci* biotype B and for *B. tuberculata*. *B. tabaci* biotype B, which was introduced to Brazil in the early 1990s, through the state of São Paulo, has now spread to 23 out of 26 states and also to the Federal District. It was found feeding on cassava plants (with up to 3 nymphs/cm$^2$) in the Federal District, Goiás and Rio Grande do Norte. However, to date, no damage to cassava plants has been reported. Intensive surveys of this biotype were conducted in other areas of Brazil, but fortunately this was not found feeding on cassava. The threat of new introductions of others biotypes of *B. tabaci* must be considered on cassava plants (especially from a quarantine point of view) because, in Africa, the *B. tabaci* species complex (as a vector of African cassava mosaic virus) is responsible for considerable losses (Fauquet *et al.*, 2000).

*B. tuberculata* is a usually a secondary pest in Brazil. However, after its appearance in the southern, south-eastern and western regions, its pest status has changed (probably associated with the huge extension of areas cultivated with cassava), and it is now becoming of great concern to farmers. In the state of Mato Grosso do Sul, in a cultivated cassava area of 12,500 ha, leaf samples collected in the years 2000 and 2004 revealed a population densities of 13.6 eggs/cm$^2$ & 30.8 nymphs/cm$^2$, and 44.7 eggs/cm$^2$ & 69.0 nymphs/cm$^2$, respectively. The spread of cassava to the southern and western states of the country, and the increase of cassava production for industrial purpose, has clearly favoured the introduction and establishment of this insect in these areas, where it is now causing significant damage and losses. Clouds of adults were observed everywhere in both years. Other crops, including okra, tomato and sweet potato, are also host of the pest in these areas.

The RAPD analyses revealed a difference in the molecular profiles among the populations of *B. tuberculata* collected in the 2000 from those collected in 2004, with just 66% similarity, suggesting a possible change in the genetic composition of this Brazilian species. The *B. tuberculata* molecular markers generated by RAPD can be used in monitoring programmes, and further investigations will be very important to support scientific research and integrated pest management of this important quarantine insect.

## REFERENCES


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