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Genetic transformation of pigeon pea and sorghum: creation and field assessment of pest-resistant transgenic plants

The two projects developed with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and CIRAD were aimed at controlling insect pests of two important crops in semiarid tropical regions pigeon pea (legume) and sorghum (grass).

DD Visiting scientists

SORGHUM PROJECT

Nadoor Seetharama visited France for 4 months in 2001 and prepared molecular constructs for *Bacillus thuringiensis* gene transfer into sorghum.

Jean-Michel Vassal, Isabelle Pieretti and Monique Royer (CIRAD) visited ICRISAT for I week (August 2002) with CIRAD and ICRISAT support.

PIGEON PEA PROJECT

Lavanya Madakasira (ICRISAT) visited France for 6 months (September 2002 to February 2003) to construct the synthetic *cry2Aa* gene and prepare molecular constructs for pigeon pea genetic transformation.

Kiran Sharma (ICRISAT) visited France for 2 weeks (December 2003) to assess the project research progress and prospects.

Due to restructuring of ICRISAT during the project, all visits to France that had been planned for Indian researchers could not take place and some experiments thus had to be conducted at ICRISAT in India. orghum is a staple food for people living in semiarid tropical areas and this plant is especially susceptible to pest attacks. The lepidopteran *Chilo partellus*, whose infestation rate sometimes reaches 100%, is one of the most serious pests—destroying sorghum stems and thus keeping plants from reaching the flowering stage, along with many other grasses.

This stem borer is hard to control via pesticide treatments since it lives within the plant. There is no known resistance within the diverse range of sorghum varieties, so a transgenic approach would seem especially well adapted to controlling this pest. Pigeon peas are grown in many countries and represent an important dietary source of protein. *Helicoverpa armigera* is a polyphagous insect that is active year round and causes major damage to both pigeon pea and cotton crops. Intensive chemical treatments are conducted to control this pest, especially on cotton, but the treatment efficiency is gradually declining.

Misuse of pesticides eliminates natural enemies and gives rise to resistance mechanisms in the pest species. New control methods are being developed or investigated to deal with these problems. These integrated pest management

Pigeon pea



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Pigeon peas (*Cajanus cajan*) are being cropped to an increasing extend in some 50 countries on the Indian continent, Southeast Asia, East Africa (Kenya, Tanzania, Uganda, Malawi, etc.) and the West Indies (Dominican Republic, Puerto Rico, Guadeloupe).

This legume represents an important dietary source of protein (20-22% protein content in the peas and leaves). It is often cropped in rotation with cereals. It is also grown on tiny plots in subsistence farming conditions (Cape Verde, Benin). Moreover, it is often used as mulch and, more recently, as fodder. The total area under pigeon pea crops in India is over 4 million ha, but there can be substantial crop losses caused by the podinfesting *Helicoverpa armigera* pest.