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(Final Report of the Research Project KFRI/283/97, August 1997-December 1999)

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ABSTRACT OF THE PROJECT PROPOSAL

1. Project No. : KFRI/283/97

2. Title of the project : Integrated management of the alien invasive weed *Mikania micrantha* in the Western Ghats

3. Objectives :
   i. To survey for the occurrence, spread and severity of incidence of mikania in the Western Ghats
   ii. To develop in the short term, chemical/biological methods for controlling mikania in forest plantations and agroforestry systems
   iii. To study the mycobiota of mikania to identify potential pathogens for the development of mycoherbicides against mikania
   iv. To understand the socio-economic impact of mikania in different production systems in the State of Kerala
   v. To explore the potential of classical biological control as a long term weed management strategy

4. Practical utility : The study will bring out a management plan involving chemical/ biological/cultural control methods tailored for particular landuse systems. This will result in :
   i. decreased interference of the weed in forest plantations and agro-forestry systems leading to increased yield from crops
   ii. decreased labour costs for weeding and harvesting and
   iii. conservation of biodiversity in natural forests

5. Date of commencement : August 1997

6. Scheduled date of completion : December 1999

7. Funding Agency : Department for International Development, U.K.

8. Project Team
   Principal Investigator : K.V. Sankaran

   Investigators : P.K. Muraleedharan
   V. Anitha

   Research Fellow : M.A. Sreenivasan

9. Study Area : Western Ghats

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ABSTRACT

A comprehensive survey for the occurrence, spread and severity of incidence of the alien invasive weed *Mikania micrantha* (mikania) was carried out in the Western Ghats. The survey revealed that mikania is widespread in the Kerala part of the Western Ghats with varying levels of infestation, posing serious threat to natural forests, forest plantations and agricultural/agroforestry systems. Of the 163 sites surveyed in Kerala, 111 (68%) showed some level of infestation by the weed. The infestation was most severe in the southern (82.5%) and central (75.5%) zones and relatively sparse in the northern zone (45.3%). None of the sites surveyed in Karnataka (57 sites) and Goa (29) were infested by mikania.

Mikania-invaded areas were more numerous in the moist deciduous forests (56%) compared to other forest types. Among the forest plantations, 75% of the teak plantations surveyed were infested followed by 70% miscellaneous and 58% eucalypt. Young teak plantations (1-3 yr-old) were the worst affected by the weed. In the agricultural production system, major crops susceptible to the weed were pineapple, plantain, cassava and ginger. Although 92% of the agricultural systems surveyed were infested, in general, severity of infestation by mikania was low in this system due to intensive weed management. Data from permanent sample plots in the State indicate that the infestation by the weed is on the increase in all the ecosystems surveyed. The spread of the weed is currently restricted to the northern banks of the Baliapatam (Valapattanam) river and southern bank of its tributary, the Koottupuzha river in Kannur district (northern zone).

The survey showed that i) mikania grows luxuriantly wherever the canopy is open in the forest areas; ii) invasion by the weed is generally low in high altitude areas (>1000 m asl); and iii) all the biotypes of mikania occuring in the Western Ghats represent only one species viz., *Mikania micrantha*.

Eight new pathogens were recorded on mikania in Kerala viz., *Alternaria alternata*, *Ascochyta* sp., *Corynespora cassiicola*, *Curvularia lunata*, *Fusarium solani*, *Myrothecium roridum*, *Pestalotiopsis* sp. and *Phoma* sp. However, as all these are opportunistic pathogens causing only negligible damage to the host, none of them have the potential as a biocontrol agent of the weed.

Herbicidal trials on mikania growth in forest plantations indicated that a combination of the herbicides triclopyr 300 g l^{-1} and picloram 100 g l^{-1} (commercial name Grazon DS) applied at the rate of 1750 ml ha^{-1} (as a high volume spray) was highly effective in controlling the weed. Triclopyr (600 g kg^{-1}-commercial name Garlon 600) at the rate of 500 ml ha^{-1} and glyphosate (Roundup) at the rate of 5 l ha^{-1} were also effective but less efficient than Grazon DS. Herbicidal control was less expensive than manual methods (sickle weeding, uprooting). Hence, application of any of these herbicides appears to be a short-term measure to control mikania in the forest plantations.

Studies on the socio-economic impact of the weed revealed that cost escalation was the most important economic impact of mikania in forest plantations and agricultural systems. In agricultural systems, due to intensive weed management, the negative impact of mikania on productivity and profitability was only moderate. However, in forest plantations where weeding is not carried out intensively and regularly, the productivity and profitability were reduced drastically. In moist deciduous forests, mikania infestation has made the harvesting of reeds, bamboos and other non-wood forest produces an onerous task.

Current control options for *Mikania micrantha* like manual weeding and use of herbicides are expensive, unacceptable and likely to be ineffective in the long run. Moreover, continuous use of herbicides is environmentally damaging since they cause toxicity problems when used in food crops. Classical biological control using natural enemies of the weed, which can offer an environmentally benign, cost effective, sustainable and safe method appears to be the best option to control mikania in the Western Ghats.