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Ecology and Invasion dynamics of the Giant Sensitive Weed complex in the Western Ghats

The South American Giant Sensitive Weeds viz., *Mimosa diplotricha* var. *diplotricha* (thorny) and *M. diplotricha* var. *inermis* (thorn-less), native to South America, are widely distributed in the Western Ghats of India. This plant significantly influences the animal movement and other ecological functions in the precious Western Ghats and productive agricultural field throughout the country. This study was planned to gather information on the following aspects and to develop a Decision Support System to prioritize and manage the Giant Sensitive Weed complex in the Western Ghats. 1. Current and prospective spread of Giant Sensitive Weed complex (GSW) 2. Ecological impact of *Mimosa diplotricha* var. *diplotricha* on native community structure 3. Assessment of natural enemy complex of *Mimosa diplotricha* var. *diplotricha* 4. Development of a Decision support system for prioritization of management of the Giant Sensitive Weed complex in the Western Ghats.

The survey conducted in the Kerala part of the Western Ghats showed that the thorny variety is a major menace in agricultural systems, forest plantations, natural forests and wetlands in the state. Its distribution was mainly recorded from low and midland areas where the ecosystems were more disturbed. The results indicate a discontinuous distribution of the thorny variety in the state. For example, the lowest infestation was found in the northern and southern districts indicating that infestation initially occurred in central Kerala and then spread towards the extremities. The species distribution model showed that aggressive invasion of the thorny variety was in low and mid-lands of Kerala apparently due to high disturbance to the various ecosystems but the thorn-less was aggressive mainly in hill regions to high altitude areas. In summary, both the varieties can severely impact the entire state in the future.

The ecological impact of *Mimosa diplotricha* var. *diplotricha* describes biomass of native plants in the invaded plots declined significantly from 80 to120 days of sampling indicating the impact of the invasive species on the productivity of native plants. Likewise, there was a significant increase in species richness of native plants in the uninvaded plots after 80 days of sampling. These results suggest *Mimosa diplotricha* var. *diplotricha* reduces species diversity of indigenous plants and subsequently alters the community characteristics in invaded areas.

Also, the natural enemy complex in both the native and exotic regions was compared in the light of the enemy release hypothesis. The natural enemies showed very low impact on the GSW complex in the exotic range compared to the native range. None of the species were

common to both the ranges. Overall, it is apparent that the taxonomic isolation of the weed and the resultant phytochemical isolation reduced the insect herbivore fauna on the thorny variety in the exotic range promoting its invasion. Attempts were also done for developing a decision support system model for prioritizing invasive species management. The model was divided into two sections; 1) area prioritization and 2) prioritization of the management strategy. In area prioritization, species distribution layer, endemic layer, forest layer and ecological sensitive zone layer were used for developing the model.