

Eradication of quarantine weed, *Ambrosia psilostachya*

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Perennial Ragweed, *Ambrosia psilostachya* DC (Family: Asteraceae) is an invasive weed of quarantine importance to India and was detected in Turuvekere taluk, Tumkur district, Karnataka, India (Ramachandra Prasad *et al.* 2012). This weed is native of northern America (USA, Canada, Mexico) and has the history of spread to South America, Europe, Asia (Kazakhstan, Russia, Taiwan, Japan), Africa (Mauritius) and Australia (Eardley 1944, Auld and Medd, 1987). The weed being invasive, affects bio-diversity and it also interferes with animal husbandry activities. The pollens of the weed pose risk to human health by causing allergies and hay fever. The Government of India has taken lead to eradicate this alien weed through National Institute of Plant Health Management, Department of Agriculture & Cooperation, Hyderabad. The eradication efforts were initiated from July 2013. The weed spread was delimited (Sathyanarayana *et al.* 2014) and a project was formulated with a lead role of NIPHM in association with stake-holding organisations, viz. Directorate of PPQS, Karnataka State Agriculture Department, University of Agriculture Sciences, Bangalore and Weed Science Research Institute, Jabalpur. A similar attempt was successfully made by limiting the infestation of *A. psilostachya* to 1160 ha in Russia (Moskalenko 2001).

METHODOLOGY

A project plan was prepared for effective eradication of *Ambrosia psilostachya* and following methodology was adopted for the same.

1. Delimiting the area of invasion and creation of buffer zone: The weed detection was systematically gauged and mapped using various techniques ranging from awareness creation and passive reports, active surveillance and use of GPS. The delimiting surveillance mapped the exact spread of the weed. It was found that the weed has spread to an area of about 400 acres in between the coordinates, N 13.11189° to 13.18656° and E 76.40759° to 76.42426° in Turuvekere taluk (Sathyanarayana *et al.* 2014).

2. Awareness creation and capacity building: Wide spread awareness was created in order to stop the spread of the weed outside the delimited zone and buffer area. This was achieved by intensive door to door campaign, wall posters, wall paintings, distribution of pamphlets in local language, sensitization of stake-holding organizations by way of holding joint meetings and workshops, conduct of training programmes and Field Days and regular visits to the area concerned.

3. Stakeholder sensitization, consultations and involvement: NIPHM under its aegis organised workshops and meeting and sensitized the stake holding organizations i.e. Karnataka State Department/s of Forests, Irrigation, Animal Husbandry, Horticulture, Revenue, Local Self Governments & Banks and the collaborating partners viz. Weed Science research Institute, Jabalpur, Department of Agriculture, Karnataka, University of Agricultural Sciences,

Bangalore and Directorate of Plant Protection, Quarantine & Storage, Faridabad. Further, the role of collaborating organizations was identified and agreed upon by the concerned stakeholders to facilitate the systematic and concerted eradication efforts. The print and electronic media were also put to use to create wide spread awareness.

The farmers of the affected area i.e. Turuvekere Taluk in Tumkur District of Karnataka, India were encouraged to form an association so as to involve them as Local Partners. The association was formed and named as “Ambrosia affected Farmers’ Welfare Association, Muniyur”. The Local Partners are doing well beyond the expectations and are actively involved in spreading the awareness by wall posters, door-to-door campaign, distribution of pamphlets and also the actual control operations including monitoring the eradication efforts at micro-level.

4. Stopping the spread of the weed to new areas: It was observed that primary reason for the spread of the weed in affected area was of passive nature. The seeds of the weed are not viable under local conditions. The practice of plantation farmers to transport soil from forest and/or public lands where the weed was present has helped the weed in spreading its tentacles to nearby villages. The use of manure where the weed was found present in the mother pit also caused havoc. The use of tractors, agricultural implements etc. also aided the weed spread to newer areas. The weed being propagated by runners, even a fraction of the root if transferred to a new area would germinate to produce shoots. The cultivation practices, mechanical weeding, uprooting and all such unmindful of activities had led to the spread of the weed.

To curb the spread, therefore, a ban was imposed on transport of soil from affected area. To legalise the ban, recommendations have been made to the Government of India & Government of Karnataka for notifying and promulgating respectively, the area as under domestic quarantine. Meanwhile extensive awareness creation and the vigilance of Local Partners has helped to stop the further spread of the weed. The sensitization of farmers on use of agriculture equipments was also undertaken.

5. Control Operations: The periodical chemical sprays were employed using herbicides, glyphosate at 2.05 kg/ha and 2,4-D sodium salt 80 WP at 1.0 kg/ha in cropped lands, bunds, plantations, roadsides, public places, manure pits, forest, revenue lands and irrigation channels. Most of the affected area has come under at least three numbers of sprays. As the weed propagation is by runners (runner stretch even to a length of 1 m), the spraying of herbicides gave only a top kill for certain period of time and new sprouts emerged due to rains or irrigations after 2-3 months. The repeated sprays are therefore continued in affected area. The intensive spraying has reduced the weed density to some extent. Further, it was observed that a local strain of a fungus was naturally killing the stems of this weed. Hence, the fungus was

isolated and was found to be *Phoma* spp. The fungus is now mass multiplied and sprayed on targeted weed coverage to aid the eradication efforts.

6. Surveillance: The systematic surveillance efforts are planned and executed by surveys, monitoring, random filed visits, interviews and enquiries to ensure that the weed is not spread to other areas and that the control operations are on track. The data on efficiency of spraying is being recorded at pre-selected locations at regular intervals and at periodical pre and post spraying stages and the photographic evidences are being gathered on the weed suppression and habitat regeneration.

RESULTS

The extensive awareness creation, stakeholder sensitization and intensive herbicide sprays have resulted in stopping the weed spread to new areas and in suppressing the weed population in infested areas. The degree of suppression however varies at present depending upon the type of area affected, farming practices and spraying efficiency. The weed density is gradually decreasing, indicating the success of the programme. The weed suppression can also be gauged from the fact that the replaced weed flora is re-emerging in habitats once completely replaced by *Ambrosia psilostachya*. The prominent re-

Table 1. Spray locations and reduction in weed density

Name of the village	No. of farmers	Percent infestation	Area infested and sprayed (ha)	Number of periodical sprays with herbicides	% reduction in the density of the weed
Muniyur	69	25 – 100	43.3	4	50
M. Bevinahally	8	50 – 100	7.6	6	75
Sirampura & Gottikere	41	50 – 100	19.2	3	30
Madihally	37	50 – 100	17.5	6	60
Aralikere	19	25 – 100	4.0	4	40
Arisinadahally	15	50 – 100	5.0	3	50
Dwaranahally	4	25 – 100	2.0	3	60
Pura	1	05	0.5	3	75
Chendur	1	05	0.1	3	75
Public land	NA	25– 100	40.0	3	50 – 75
Total	195	05– 100	99.2	3-6	30 – 75

appearance being *Hyptis suaveolens* (L.) Poit., *Borreria stricta* (L.F.) DC., *Ageratum conyzoides* L., *Physalis minima* L., *Sida acuta* Burm. f., *Tridax procumbens* L., *Digitaria sanguinalis* (L.) Scop., *Dinebra retroflexa* (Vahl) Panzer, and *Cynodon dactylon* (L.) Pers. The details of the spraying locations and weed suppression are provided in Table 1.

CONCLUSION

Ambrosia psilostachya is an invasive weed of quarantine importance to India and the invasion of this weed appears to be in control and amenable to eradication. A delimiting survey showed spread of the weed between N 13.11189° to 13.18656° and E 76.40759° to 76.42426° in Turuvekere area of Karnataka. The weed has been eradicated in some small and isolated infested patches due to awareness programme, which has prevented further spread. However, the complete eradication can be achieved in all infested areas in about 3-4 years. The co-ordination and cooperation of all stakeholders will help in reducing the time frame for complete eradication of the weed.

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