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Mikania Weed: A Challenge for Conservationists

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Abstract
The varied bioclimatic conditions of Nepal favour the introduction of different invasive alien weeds. *Mikania micrantha* (L.) Kunth is one of the well established invasive alien weeds in the tropical part of eastern and central Nepal. The weed has been caused serious problems in the forests, grasslands, fallow lands, croplands and wetlands of the Koshi Tappu Wildlife Reserve and its buffer zone. It kills other plants by blocking sunlight and smothering them. The Reserve has initiated to manage the weed with local community in the buffer zone. The paper attempts to highlight the problem of *Mikania* in the Koshi Tappu area and the efforts of community to manage the weed.

Keywords: *Mikania micrantha*, invasive alien weed, Koshi Tappu, Nepal

Introduction

A biological species introduced in an ecosystem other than its natural home is called alien or exotic species. Many introduced species have been naturalized in a new environment and form a part of existing landscapes and ecosystems. Several alien species form a basic source of livelihoods and behave like native species and could be manageable, such alien species are not turned into invasive. However, many other alien species colonize unmanageably out competing native species. The colonizer and introduced species are known as invasive alien species, if they are weeds then known as invasive alien weeds (IAW). The weeds are capable to alter habitats and likely to cause significant harm to environment, economic systems and human health. The diverse bioclimatic zones of Nepal range tropical to alpine favour the introduction of several alien weed species. The country has a list of over 166 species of naturalized alien plant species (Tiwari *et al.* 2005).Among them, several species have been spreading aggressively by colonizing several landscapes and ecosystems displacing the native species.

Mikania micrantha (L.) Kunth is a fast growing, perennial Central and South American climber, commonly called mile-a-minute weed, because of its vigorous and rampant growth habit. It has been reported to grow to 27 mm a day (www.issg.org/database). The plant is one of the major IAW in many tropical moist forest regions of Asia including Nepal and is still invading new areas, such as Northern Australia (www.cabi.org). The weed has been rapidly invading the different tropical ecosystems of Nepal (forest, cropland, grassland, and wetland) distributed Mechi to Lumbini zones (Ilam/ Jhapa to Rupandehi districts). The neotropical vine smother other plants and significantly reduces biodiversity by swamping vegetation and out competing native plants. However, it is

rarely a weed in its native range in the Central and South America where natural enemies are seen to exert a significant pressure on the occurrence and abundance of the species (www.cabi.org). It is not reported west to Rupandehi. It is known by the various local dialects in different parts and community of Nepal, such as Pani lahara, Bire lahara, Tite lahara, Bakhre lahara, Pyangri lahara, Banlude jhar, Bahra mase, Lahara banmara (Tiwari *et al*., 2005). The weed was first collected from the Jogmai-Ragapani area of Ilam district of east Nepal in 1963 by a Japanese team, and scientifically reported in 1966 in the Flora of Eastern Nepal (Tiwari *et al*., 2005). Ilam is famous for tea gardening and Assam (north east India) is the main centre for supplying the tea saplings or seeds to Ilam. So, it can be guessed that Mikania introduced to Nepal via north east India (Assam) and has been spreading towards west. The weed has been creating a serious threat in the protected areas too such as the Chitwan National Park and the Koshi Tappu Wildlife Reserve by suppressing the growth of native plants and preventing the regenerations of other plants due to its high dispersal ability and adaptability to colonize in new habitat and difficult to control if once established. An attempt has been made to assess the status of *Mikania* in the Koshi Tappu Wildlife Reserve and its buffer zone of east Nepal including the community perception on its distribution and incidence.

Materials and methods

A rapid survey was conducted at the buffer zone and core areas of eastern part of the Koshi Tappu Wildlife Reserve particularly in and around the eastern embankment. The site was divided as core area (between the eastern side of the Saptakoshi River and western side of embankment, 100-150 m wide); buffer zone community forest area (east of the western part of embankment and west of the seepage, 20-25 m wide) and buffer zone cropland (east of the seepage about 400 m wide). Information on the Mikania weed was collected interacting with local people and field observation. Questions were asked to the local people to know whether Mikania causes problems, if so, what types of activities they do to manage and how much cost occurs. Previous literature related to the Mikania was also consulted. A visual estimation was made for the abundance/ coverage of the weed.

Results and discussion

The Mikania weed has been proliferated rapidly in forest trees, grasslands and wetland areas of the Koshi Tappu Wildlife Reserve which was more seriously invaded in the eastern side (Sunsari district) than the western side (Saptari and Udaypur districts). Heavy invasion of the weed observed in the core area (50-80%) followed by buffer zone community forest (20-50%) and the cropland covered (about 10%). The core area was undisturbed where human pressure was minimal, so it has got opportunity to spread rapidly covering a large area, whereas, in the buffer zone community forest area people started to clean the weed once or twice a year. Similarly, the weed in the cropland has been regularly removed by the farmers so the weed in the area also disturbed due to the human intervention. Wetlands in seepage areas were both perennial (southern part) and seasonal (northern part) types. The wetlands of buffer zone are under the private ownership and several ponds are constructed as fishponds. Major weeds in the wetlands were

Eichhornia crassipes, Pistia stratiotes, Ipomoea aquatica, Ipomoea carnea ssp. *fistulosa* along with some native species (*Typha elephantina, Cyperus* spp., etc.) in the perennial ponds, marshes, etc., and *Ipomoea carnea* ssp. *fistulosa* and *Saccharum-Phragmites* grasses were dominant in the seasonal wetlands. The Mikania has commonly occurred in both types of wetlands but not heavily invaded as in the forest. The cropland was also feebly invaded by the Mikania than the other ecosystems due to regular intervention of farmers.

A collaborative effort between the community and the Reserve authority was realized to protect the crops from wild animals and biodiversity of the Reserve from the Mikania. So, the eastern embankment (much seriously invaded area in the Reserve) to seepage is handed over to community by the Reserve during 2005 after making different Forest User Groups (about 18 groups) to manage the Mikania. The User Groups include all kinds of people (castes and economic status) inhabited in a village adjoining the embankment up to about 500m east. Community members informed that the community forest area was once seriously invaded by the Mikania and cutting out sunlight and smothering all vegetation, presently its invasion has been decreasing due to regular cleaning the Mikania weed in the community forest area. However, a heavy invasion of the weed in the core area observed.

The land size of the community forest is not uniform for different User Groups (ranges about 2-10 ha). The community people were aware that after the invasion of the Mikania the grasses in the Reserve area have been reduced so that the wild animals (wild buffalo, wild boar, etc.) damage the crops. People are interested to manage the community forest to meet their daily requirements of grasses, thatches, fire woods, timber, etc. They also erected a fence at the margin of their land to protect the crops raiding from wild animals. The User Groups had cleaned the Mikania and planted the tree saplings; the cleaning was practised once or twice a year (September-October and April-May). Now they have started to take benefits from the community forest by collecting grasses and thatch grass, fire woods, even timber for the domestic purposes after paying some nominal charges to the community. The income has been used to strengthen the fence erected at the eastern side of the community forest to protect crops from wild animals. Some User Groups also have started to plant the medicinal herbs in the community forest area

The User Groups members have been participated to clean the Mikania from the community forest area. They informed that a large amount of expenses occurred during this process. For example, the Saptakoshi Buffer Zone Community Forest spent about Nepalese rupees 1, 20,000.00 to clean the Mikania in 4 ha of land for the first time and has been cleaning twice a year by spending about Rs 60,000.00 (pers. comm. Tika Ram Raut, a member of the User Group). The expenses were covered by the voluntarily support of the User Group members and some supports collected from the different conservation organizations working in the Koshi Tappu area.

Now, the forest trees have become taller and dense, the User Group members are comfortable to visit the embankment and adjoining core area, army patrolling is also minimized, the locals are also utilizing some resources (grass, thatch grass, fire wood,

ferns, drift wood, etc.) of the Reserve. The conflict between the park and community has been reduced as the crop damage from wild animals has decreased. Some community members have been showing the interest to clean the Mikania of the adjoining core area, but they wanted to use the herbicides which may not environmentally friendly and sustainable as well as against the rules of the protected area.

However, it seems that the manual cleaning is a never ending task because if a year is left to clean then the introduction of the weed by seeds or plant parts rapidly occurred in the site from the adjoining area. The single plant can releases as many as 40,000 viable seeds in every year and even the tiniest stem fragment is capable to grow a new plant in a moist area (Tiwari *et al*., 2005). The best way to minimize the impact is to proper utilization of the species. The fresh Mikania plant has been used in the area to feed their goat and cattle, whereas, the dried plant used to burn. The local people informed that the Mikania is not a good feed for the cattle; it reduces milk of cow/buffalo and causes abdominal disorder to them. So, they usually feed by mixing other grasses.

The observation shows that the abundance of the alien species can be reduced in a small area after a continuous effort of manual cleaning (high labors and cost) but it is not feasible and sustainable in large areas. Even in a smaller area also community will not always remain active in lack of outside support. They loose their interest if they do not get any visible benefit, which was observed in the Dharahara Buffer zone Community Forest User Group of the area.

It is realized that IAW are the serious global threat to biological diversity after habitat destruction; therefore, the control of invasive alien species including the Mikania became a great challenge to the conservationists of around the world. In this regards, a biologist noted that the impact of IAW as “Extinction by habitat destruction is like death in an automobile accident: easy to see and assess. Extinction by invasion of exotic species is like death by disease: gradual, insidious, requiring scientific methods to diagnose" (Wilson E.O. cited in Schmitz and Simberloff, 1997).

To combat the impact of the Mikania various studies have been conducted around the world and realized that classical biological method is the most safe, effective and sustainable measure to control the Mikania weed. An insect (*Liothrips mikaniae*) was selected as a pathogen to control the weed but failed in field condition. Currently, scientists of Centre for Agricultural Bioscience International (CABI) were identified a rust fungus (*Puccinia spegazzinii*) as a potential pathogen to control the Mikania. The pathogen is collected from the neotropical countries (Argentina, Brazil, Costa Rica, Ecuador, Peru and Trinidad) and is a very damaging in nature. It infects all aerial parts of the weed leading to cankering and killing the whole plant (www.cabi.org). The pathogen released in the Kerala state of India in 2006. China is also in process to release the pathogen. But to see the impact of the pathogen on the weed at field condition, we need to wait for 5-10 years. Attention should be given that the biological control agent is also an introduced species and sometime may attack the non target organisms.

It is suggested that prevention of introduction of alien species in a new locality is the first and most cost effective approach which can be applied everywhere. Still, the western Terai is safe from the invasion of the Mikania weed. Therefore, regular field monitoring is very necessary for the early detection of introduction of the Mikania species in a new locality and rapid response (removal of species) but people should be educated and aware about the alien species.

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