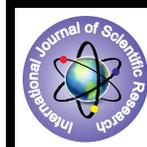


Disturibution and Effect of *Parthenium Hysterophorus L.* in Mehari Sub-Watershed of Rajouri Forest Range, J&K



Environment

KEYWORDS : Weeds, parthenium, distribution, prevalence etc.

Dalip Kumar

Department of Environmental Sciences, University of Jammu, India-180006

Junaid Ahmed

Department of Environmental Sciences, University of Jammu, India-180006

Surat Singh

M.A.M. PG College, Jammu, India

ABSTRACT

Present study was conducted to know the distribution and effect *Parthenium hysterophorus L.* in Mehari sub-watershed of Rajouri Forest Range, J&K. In the study area eight species were recorded among them *Parthenium hysterophorus L.* has shown maximum density and importance value index which have been introduced unintentionally, pose a significant threat to economic development and ecological integrity. These weeds rapidly invade new surroundings often replace the indigenous species and pose a serious threat to biodiversity, reducing pasture productivity and hence reduce fodder supply. This weed is also considered to be a cause of allergic respiratory problems, contact dermatitis, mutagenicity in human and livestock.

1. Introduction

Biological invasions produce severe, often irreversible impacts on agriculture, recreation, and natural resources. Invasive species are a real threat to our environment and economy. These non-native plant and animal species harm or endanger native plants and animals or other aspects of biodiversity (Shabbir and Bajawa, 2006). *Parthenium hysterophorus L.* is an upright annual herb of 30-150 cm of family Asteraceae. It is considered as a noxious plant and one of the most invasive species in the world (Timsina et al., 2011). *P. hysterophorus* is native to subtropics of North and South America (Adkins et al., 1996) and was accidentally introduced in subcontinent in 1955 through imported food grains. The weed has been rapidly spread in last twenty years and now it occurs widely along the roadsides, wastelands and sometimes in crop fields. In some areas, outbreaks have been of almost epidemic proportions, affecting crop production, livestock and human health. It can trigger allergies and is a common cause of pollen allergy.

In India, it is locally known as Gajar Ghans. It was first introduced due to contaminated PL-480 wheat imported from the United States, and is also called as 'Congress Grass' due to the Congress government which imported the wheat. This weed is said to have entered Jammu and Kashmir somewhere in 1963 from Madhopur in Punjab, across river 'Ravi', all along the national highway. In contrast, this weed made fast entry with the extension of railway track to Jammu from Punjab. Subsequently colonisation occurred throughout vacant places and then it spread in all directions along man-disturbed habitats covering many hundred kilometres of road distance upto Poonch and Kashmir, the north-western border adjoining Pakistan. Current situation in the state is quite alarming as the weed has engulfed vast area into the interior of forests and all vacant lands in the vicinity and outskirts of inhabited places.

Since introduction this weed has significantly reduced native plant biodiversity, caused significant reductions in fodder yields and has reduced the cattle-carrying capacity of certain regions (McFadyen, 1992; Nguyen et al., 2010 and Belgeri et al., 2011). *Parthenium hysterophorus* has also been reported to have significant negative impacts upon human and animal health and in many countries has become a significant crop weed (Tamado and Milberg, 2004; Singh and Beck, 2006; Adkins et al., 2010). The present survey was main objectives of this study were to collect phytosociological data of weeds in Mehari sub-watershed, with special reference to *parthenium* weed invasion, to study the threats posed by *P. hysterophorus* to the native flora including its effect on human and cattle

2. Materials and Method

The study area i.e., Mehari sub-watershed, selected for present investigation lies in Doongi block of district Rajouri, Jammu and Kashmir. It is located between 330 50' to 330 30, N latitude and

740 to 740 10'E longitudes with altitude range of 800m asl to 1000m asl. It is located in foot hills of Pir Panjal Range and is surrounded by high mountain peaks. Physio-graphically most of the area is mountainous and rugged consisting of low lying undulating hills with steep slopes and valleys with east and west aspects. The Climate of study area is sub-tropical and somewhat cooler than rest of the areas. Summers are short and mostly pleasant. The average annual rainfall is 1150 mm and average temperature varies from 7.42 0C to 37.4 0C.

A phytosociological survey was carried out in the Mehari sub-watershed of Rajouri Forest Range, Jammu and Kashmir. Surveys of different area of the watershed were undertaken during the years 2011-2012 to study the distribution of *P. hysterophorus* in forest, along the roadsides and inside the fields of various agricultural crops. During the survey, all wild species growing along different wastelands and roadsides of watershed collected and identified by referring to Flora of Udampur and Flora of Jammu. In each quadrat, all species were recorded, and their percentage cover was estimated. In order to study the impact of *P. hysterophorus* on the distribution of native weeds, data was collected from undisturbed localities using 1mx1m quadrat. Data regarding Prevalence (P), Relative Frequency (RF) and Relative Density of *P. hysterophorus* and other weed species was estimated by applying the following formulas as outlined by Riaz and Javaid (2009)

$$P(\%) = \frac{\text{No. of sites in which species occurs}}{\text{Total no. of sites}} \times 100$$

$$RF(\%) = \frac{\text{Absolute frequency value for a species}}{\text{Total absolute frequency values for all species}} \times 100$$

$$RA(\%) = \frac{\text{Total number of individuals of a species in all quadrates}}{\text{Total number of quadrates}} \times 100$$

$$RD(\%) = \frac{\text{Absolute density for species}}{\text{Total absolute density for all species}} \times 100$$

3. Result and Discussion

Biological invasion by alien invasive species is now recognized as one of the major threats to native species and ecosystems (Shabbir and Bajawa, 2006). Invasive plants can have a range of impacts including, loss of biodiversity, loss of economy and ecological imbalance due to frequency and magnitude of their introduction creates by their tremendous ability to grow and proliferate (Khan et al., 2010) The phytosociological survey of study area revealed a total of 8 weed species to be associated with *P. hysterophorus* (Table 1) belonging to four families. Almost all the selected areas of watershed had a heavy infestation of *P. hysterophorus*.

Parthenium was found in all the five studied sites exhibiting 100 percent prevalence. Among other 7 species, *Medicago polymorpha* and *Calyptocarpus vialis* showed 64 percent and 60 percent prevalence respectively. The other species exhibited comparatively low prevalence i.e., 28 percent which included *Trifolium repens* (28%), *Dicliptera bupleuroides* (20%), *Cannabis sativa* (16%), *Xanthium strumarium* (16%) and *Taraxacum officinale* (12%) (Fig 1).

Most of the range lands were found colonized by *P. hysterophorus*. Data collected from various localities in study area reveals that this weed was dominating the local flora with highest frequency of 92 percent. The highest relative frequency (RF) of 36.54 percent was exhibited by *P. hysterophorus* followed by *Cannabis sativa* (25.23%). The rest of the weed species exhibited less than 12.15 percent Relative Frequency (Table 1).

The survey also showed a high relative frequency, relative density, and importance value of *P. hysterophorus*, however, the relative frequency of associated weed in these areas was less than 25.23 percent (Table 1). The population of many grasses and medicinal plants growing in the Mehari watershed might be rapidly declining because of the aggressive colonization by *P. hysterophorus*. The increasing infestation of this weed in study areas also poses a serious threat to the health of the inhabitants (Javaid and Anjum, 2005).

The relative density (RD) of *P. hysterophorus* was 62.75 percent which was also highest and other weed species exhibited relative density less than 14.51 percent (Table 1). The domination and rapid spread of *P. hysterophorus* in grazing lands with gradual reduction of local flora could be attributed to its invasive capacity, allelopathic properties, high growth rate, short growth cycle and large number of seed production (Javaid and Anjum, 2005; Ayele, 2007; Dogra et al., 2011). This noxious weed can affect crop production, animal husbandry, human health and biodiversity (Shabbir, and Bajwa, 2006). The adverse effects of this weed on human beings, livestock, crop production, and biodiversity are well-documented. (Lakshmi and Srinivas, 2007; Worku, 2010).

Earlier, it was not considered a weed of orchards and forests but now it has spread rapidly into these areas (Kumar, 2012). *Parthenium* weed grows luxuriantly in forest due to lack of weeding practices in such ecosystems. In study area, *parthenium* weed has invaded the majority of pine forest in the lower elevations. The invasion of *parthenium* weed was reported in forest and grazing lands with little or no growth of any other species which results threatening of local biodiversity (Kumar, 2012). In many forests, National Parks and plantation forests, the occurrence of this weed has been widely noticed. Similar invasions of *Parthenium* had been reported by Evans (1997) in National Wildlife Park in Southern India.

Heavy infestation of *P. hysterophorus* was found along the boundaries of the agriculture fields. However, *P. hysterophorus* was not found in the agricultural fields due agricultural practices and crop competition generally eliminates it from the fields (Javaid and Anjum, 2005). Furthermore, it is unable to cope with the agricultural practices and generally grows outside the agricultural fields. During surveys of various grazing pastures, it was found that cows, buffalos and sheep do not graze *P. hysterophorus*. Similar findings have also been reported earlier from India (Narasimhan et al., 1977).

The spreading of *Parthenium hysterophorus* weed over the pasture land for last few years has sharply increased, due to this economy of local residents has greatly affected. The people of the area are mainly dependent on the agriculture and its allied activities, especially rearing of cattle is quite common. They obtained milk from cattle's and used it as food or for trade purpose, but due to decreasing of grass year by year due to *Parthenium* spreading. The carrying capacity of cattles decreasing which has directly or indirectly affected the economy of local resident.

Table 1: Relative Frequency (RF), Relative Abundance (RA) and Relative Density (RD) of *P. hysterophorus* and other weeds in Mehari sub-watershed.

| S. No | Weed Species | P (%) | RF (%) | RA (%) | RD (%) | IVI |
|-------|--|-------|--------|--------|--------|--------|
| 1 | <i>Parthenium hysterophorus</i> L. | 100 | 30.26 | 36.54 | 62.75 | 129.56 |
| 2 | <i>Medicago polymorpha</i> L. | 64 | 21.05 | 07.10 | 08.48 | 036.64 |
| 3 | <i>Calyptocarpus vialis</i> Less. | 60 | 21.05 | 12.15 | 14.51 | 047.72 |
| 4 | <i>Trifolium repens</i> L. | 28 | 07.89 | 07.35 | 03.29 | 018.54 |
| 5 | <i>Taraxacum officinale</i> Weber ex Wiggers | 012 | 03.94 | 03.48 | 00.78 | 008.21 |
| 6 | <i>Dicliptera bupleuroides</i> Nees | 020 | 06.57 | 05.38 | 02.01 | 013.97 |
| 7 | <i>Cannabis sativa</i> L. | 016 | 05.26 | 25.23 | 07.53 | 038.03 |
| 8 | <i>Xanthium strumarium</i> L. | 016 | 03.94 | 02.74 | 00.61 | 007.30 |
| | Total | - | - | - | - | 300 |

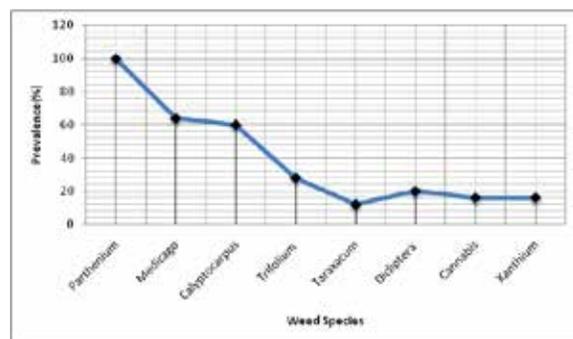


Fig: 1 Prevalence (%) of collected weeds in study area

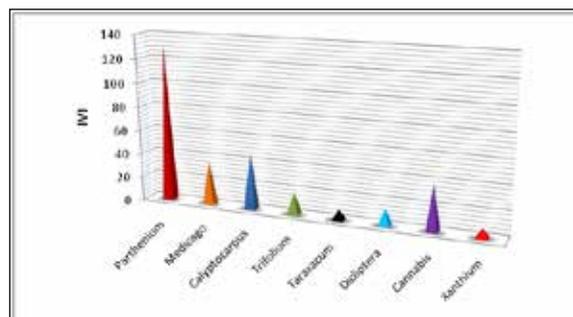


Fig: 2 Importance value Index of collected weeds in study area.

Conclusion:

The domination and rapid spread of *P. hysterophorus* in grazing lands with gradual reduction of local flora could be attributed to its invasive capacity, allelopathic properties, high growth rate, short growth cycle and large number of seed production. It is also responsible for creating various health problems in human and animals. Thus, *Parthenium* weed pose significant threat to the local ecosystem unless action is taken to mitigate the threat. Biological control is one tool that forms part of an integrated management program for large-scale scattered and dense infestations. The leaf beetle *Zygogramma bicolorata* and the stem moth *Epiblema strenuana* cause the most damage. The beetle emerges in late spring and is active until autumn. Ploughing the weed in before plants reach flowering stage and then establishing pasture may be effective.

REFERENCE

- Adkins, S. W., O'Donnell, C., Khan N., Nguyen, T., Shabbir, A., Dhileepan, K., George, D. and Navi, S. (2010). *Parthenium weed (Parthenium hysterophorus)* research in Australia: new management possibilities. Proceedings of the 17th Australasian Weeds Conference, Council of Australasian Weed Societies. pp120-123. | Adkins, S.W., Navie, S.C. and McFadyen, R.E. (1996). Control of Parthenium weed (*Parthenium hysterophorus* L.): A centre for tropical pest management team effort. Eleventh Australian Weeds Conference Proceedings, Weed Science Society of America. pp573-578. | Ayele, S. (2007). The Impact of Parthenium (*Parthenium hysterophorus* L.) on the Range Ecosystem Dynamics of the Jijiga Rangelands Ethiopia. M.Sc. Thesis, Department of animal sciences. Haramaya University, Ethiopia. | Belgeri A. B., Navie S. C and Adkins S.W. (2011). Effect of parthenium weed (*Parthenium hysterophorus*) on grazed plant communities during a period of concerted management. Proceedings of the 23rd Asian Pacific Weed Science Society Conference, The Sebel, Cairns, Australia. pp42. | Dhileepan, K. and Senaratne, K. A. D. W. (2009). How widespread is *Parthenium hysterophorus* and its biological control agent *Zygodactylus bicoloratus* in South Asia? *Weed Research*, 49 (6): 557-562. | Dogra, K. S., Sood, S. K. and Sharma, R. (2011). Distribution, Biology and Ecology of *Parthenium hysterophorus* L. (Congress Grass) an invasive species in the North-Western Indian Himalaya (Himachal Pradesh). *African Journal of Plant Science*. 5(11): 682-687. | Evans, H.C. (1997). *Parthenium hysterophorus*: a review of its weed status and the possibilities for its control. *Biocontrol News and Information*, 18(3), 89-98. | Javaid, A. and Anjum, T. (2005). *Parthenium hysterophorus* L. - A noxious alien weed. *Pakistan journal Weed Science Resesearch*, 11(3-4): 81 - 87. | Khan, M. A., Qureshi, R. A., Gillani, S.A., Ghufan, M. A., Batool1, A. and Sultana, K.N. (2010). Invasive species of federal capital area Islamabad, Pakistan. *Pakistan Journal Botany*, 42(3): 1529-1534. | Kumar, D. (2012). Current spread, impact and management of *Parthenium* weed in India. *International Parthenium News. Tropical and Sub-Tropical Weed Research Unit, The University of Queensland, Australia.* | Lakshmi ,C and Srinivas, C. R. (2007). *Parthenium*: A wide angle view. *Indian J. Venereol. Leprol*, 73(5): 296-306. | McConnachie, A. J., Strathie, L. W., Mersie, W., Gebrehiwot, L., Zewdie, K Abdurehim, A., Babrha, B., Araya, T., Asaregew, F., Assefa., F., Gebre-Tsadik, R., Nigatu., L Tadesse, B. and Tana, T. (2011). Current and potential geographical distribution of the invasive plant *Parthenium hysterophorus* (Asteraceae) in eastern and southern Africa. *Weed Research*, 51(1): 71-84. | McFadyen, R.E. (1992). Biological control against parthenium weed in Australia. *Crop Protection*, 11(5): 400-407. | Narasimhan, T. R., Ananth, M., Swamy, M. N. and Rao, P.V.S. (1977). Toxicity of *Parthenium hysterophorus* L. *Current Science*, 46: 15-16. | Nguyen, T. L., Navie S. C. and Adkins S. W. (2010). The effect of parthenium weed (*Parthenium hysterophorus*) on plant diversity in pastures in Queensland, Australia. Proceedings of the 17th Australasian Weeds Conference, Council of Australasian Weed Societies, pp138. | Riaz, T. and A. Javaid, A. (2009). Invasion of hostile alien weed *Parthenium hysterophorus* L. in Wah cantt, Pakistan. *The Journal of Animal & Plant Sciences*, 19(1): 26-29. | Shabbier, A. and Bajwa, R. (2006). Distribution of parthenium weed (*Parthenium hysterophorus* L.), an alien invasive weed species threatening the biodiversity of Islamabad. *Weed Biology and Management*, 6(2): 89-95. | Singh, M. N. and Beck, M. H. (2006). *Parthenium* contact sensitivity travels to the U.K. *British Journal of Dermatology*, 155 (4):847-848. | Tamado T. and Milberg, P. (2004). Control of parthenium (*Parthenium hysterophorus*) in grain sorghum (*Sorghum bicolor* L.) in the smallholder farming system in eastern Ethiopia. *Weed Technology*, 18(1): 100-105. | Timsina, B., Shrestha. B. B., Rokaya, M. B. and Münzbergová, Z. (2011). Impact of *Parthenium hysterophorus* L. invasion on plant species composition and soil properties of grassland communities in Nepal. *Flora*, 206 (3) 233-240. | Worku, M. (2010). Prevalence and distribution survey of an invasive alien weed (*Parthenium hysterophorus* L.) in Sheka zone, Southwestern Ethiopia. *African Journal of Agricultural Research*, 5(9): 922-927.