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Knowledge of Farmers Towards *Parthenium hysterophorus* L. in Saharsa District of Bihar : A case study

Ashutosh Singh, Amit Kumar Pandey* and Umesh Singh
Mandan Bharti Agriculture College, Agwanpur, Saharsa-852201, Bihar, India
***Corresponding Author Email :** amitpandeybau@gmail.com*

Abstract

Parthenium weed has been reported from all states of India. Parthenium weed is able to make its impact in various ecosystem in different climate of India. It has been found responsible for the reduction in crop productivity, deterioration of environment, loss of biodiversity and it is affecting the health of people and animals. In agriculture field, where only one crop is grown in a year, it grows profusely in the fallow period following the occurrence of mild rains. Ever since the weed become a menace, efforts have been being made to manage the weed by different methods. However, so far, no single method has been proven satisfactory as each method alone suffers from one or more limitations such as impracticability, environment safety, high cost etc. A study was conducted with 100 randomly selected farmers in Saharsa district of Bihar about the knowledge of farmers toward parthenium weed. The result revealed that 82 farmers were aware about the dispersion method of parthenium, 82 respondents have knowledge regarding the allelopathic effect of this weed on crop growth and 89 farmers were aware about the physical method of eradication of this invasive weed. Only 3 farmers have knowledge about the biological method of eradication which is eco-friendly. There is an urgent need of organized efforts from all the stakeholders namely farmers, government and non-government organization.

Key words : *Knowledge, awareness, impact, parthenium, farmers.*

Introduction

Parthenium (*Parthenium hysterophorus*) is a weed of particular global concern due to its aggressive and highly adaptable nature, establishing and expanding rapidly in a wide range of environmental of and climatic condition. In view of the threats posed by parthenium, this evidence note aim to provide evidence and recommendations of decision makers. It is an invasive species constitute one of the leading threats to natural ecosystem and recently it has been rated as the second biggest threat to biodiversity and these are such species whose introduction and spread threatens the environment, economy and society including human health (1). *Parthenium- hysterophorus* L. which is also known as congress grass, carrot weed is an annual herbaceous plants commonly found in road sides, along railways and in pastures, in seasonal flood plants, grasslands and in waste areas. It is believed to have been introduced into India as contaminants in PL 480 wheat imported from USA in 1950. Parthenium weed is widely prevalent in India and all the states of India have been infested with this weed. Parthenium has invaded 35 million hectares across the country including crop land, waste land and forest area according to DWSR. Initially the deadly weed occupied largely non crop area, now it has spread to cropping land at an alarming rate (2). It is extremely prolific, capable of producing upto 30,000 seeds per plant-a major attribute behind its invasive nature and a reason why it has spread and established in many parts of the world (3). These seeds are easily dispersed by wind, water, animals and even vehicles (4). The plant is also extremely durable, it germinates at a wide range of temperature and upto 50% of the seeds are still viable after 26 month in soil (5). (6) reported that approximately 35 m ha land in India has been affected by parthenium and was costing INR 300,000 m per annum in management alone since introduction. Parthenium can impact on crop yields through direct competition as well as by inhibiting germination of a wide range of food and vegetables crops. Manual uprooting of parthenium has proven to be effective in reducing the weed's population and its impact especially when under taken before flowering or seeding (7). Different chemicals with different active ingredients and mode of action have been used in the control of parthenium. Though glyphosate and isoproturon are both effective in eliminating parthenium, but the toxic effects, residual toxicity problems and environmental pollution have put a limit to its utilization (8). Biological control through pathogen is a practice in which the weeds can be control using the pathogen. Organisms such as fungi, bacteria and viruses are capable of producing toxins strong enough to kill plants (9, 10). The integrated management of parthenium is a technique to manage weed with the help of different technologies under the given agro ecosystem, it aims to improve the productivity of the crop at a minimal cost possible and to consider ecological and socio-economical constraints (11, 12).

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SattarKataiya block of Saharsa district in Bihar state was selected for the present study due to the presence of dense colonies of *Parthenium hysterophorus* in this region. There is a merge information available regarding the large scale survey conducted in Saharsa district to study the awareness and knowledge level of the farmers about parthenium weed, its adverse effect on the environment and preventive measures taken so far in the area.

Materials and Methods

Study site : The extensive survey was conducted in Sattar Kataiya block of Saharsa district, Bihar during March-April, 2017 to assess the occurrence and distribution pattern of *Parthenium hysterophorus* in the district. Saharsa district is located at 25°88''48'N latitude and 86°36''06'E longitude having hot moist sub-humid climate with an average annual rainfall of 1050 mm and mean maximum and minimum annual temperature 26°C and 18°C, respectively. It is situated near the eastern banks of the *Koshi* river. It has an area of 1687 sq. km and is 41 m above the sea level. Saharsa district comprises of 10 blocks namely; Kahra, Sattar Kataiya, Sour Bazar, Patarghat, Mahishi, Sonbarsa,Nauhatta, Salkhua, Banma Itehriand Simri Bakhtiarpur. It is the major producer of best quality of corn and makhana in India. Other crops is grown in Saharsa district includes rice, wheat, mustard, mango and bamboo.

Selection criteria of farmers : Ten villages were selected from the block Sattar Kataiya and from each identified village ten farmers were selected. Total one hundred farmers were selected for the study during the survey, farmers were identified mainly on the basis of willingness of the farmers for participation in survey. The entire survey was based on the interview and group discussion with the farmer's questionnaire was used during the survey for collection of the information regarding adverse effect of parthenium on human, animal and the eradication method of parthenium. The questionnaires were collected and response and observation of the farmers were summarized in the form of table.

Results and Discussion

Knowledge of farmers towards dispersion method of *Parthenium hysterophorus* L. : Weed dissemination is a silent, unseen, unidirectional or multidirectional travelling of the weed seeds from one place to another and therefore, weed are described as the silent traveller. Parthenium seeds are light, small and black in colour and they can spread with air, water and animals from one place to another (13). Majority of the respondents had no knowledge regarding the dispersion method of *Parthenium hysterophorus*. 82 per cent of the farmers reported that wind is responsible for the spread of this weed (Table-1). 80 per cent of the farmers reported that Parthenium weed has been introduced in their through water current and 29 per cent farmers reported that species of the parthenium weed dispersed through animals. Kushwaha and Maurya (2012) and Kaur*et al.,* 2014 also reported similar findings. A studyon the awareness of parthenium weed in Allahabad district of Uttar Pradesh and reported that only 79%, 81% and 20% farmers of Handia tehsil reported that parthenium has been introduced in their field through wind, water and animal, respectively.

Table-1 : Knowledge of the farmers regarding dispersion method of *Parthenium hysterophorus* L.

Sl. No.	Mode of Dispersion	Number of Farmers
1.	Wind	82
2.	Water current	80
3.	Animals	29

Table-2 : Knowledge of the farmers regarding the adverse effect of *Parthenium hysterophorus* L. on human, animals and biodiversity.

Sl. No.	Adverse Effect	Number of Farmers
1.	Allergic disease in human being	40
2.	Toxic to animal	27
3.	Exert strong allelopathic effect on different crops	82
4.	Adverse impact on biodiversity	58

Table-3 : Knowledge of farmers regarding the eradication method of *Parthenium hysterophorus* L.

Sl. No.	Mode of Eradication	Number of Farmers
1.	Physical	89
2.	Chemical	61
3.	Biological	3

Knowledge of the farmers regarding the adverse effect of *Parthenium hysterophorus* L. on human, animal and biodiversity : The data presented in Table-2 reveal that to present farmers were aware the allergic diseases like contact dermatitis, hay fever, asthma and bronchitis in human beings. 27 per cent farmers responded that parthenium weeds is toxic to animals causing mouth ulcers anorexia, acute illness and bittermilk. 58 per cent of the respondent know that parthenium plants contains toxic chemicals and due to presence of these chemicals the weed exert strong allelopathic effects on different crops causes a yield decline. Similarly, 58 per cent farmers said that parthenium weed causes total habitat change and adversely affect the ecosystem biodiversity. Similar findings were also reported by (13, 15). This weed has the

potential to disturb the natural ecosystem, as it can grow throughout the year in almost all drastic condition suppressing native vegetation. Owing to the absence of natural enemies, its allelopathic effect as well as photo insensitivity is a threat for natural biodiversity (16). This noxious weed suppresses the development of nearby plants by allelopathy. Leachate and extract of leaves and inflorescence prevent the germination and growth of associated economically important crops (17).

Parthenium is known to its inhibitory effect on growth and activity potential of different bacterial species related to nitrogen assimilation (18).

Parthenium weed is noxious of livestock, it can cause dermatitis and skin disorder in animals, mouth ulcers with extreme salivation and diarrhoea. If excess amount of this weed is eaten by the animals, it can cause death (19, 20). The milk and milk quality of cattle, buffalo and sheep deteriorate on consumption of this weeds (21).

Knowledge of farmers regarding the eradication method of *Parthenium hysterophorus* L. : The knowledge possessed by farmers regarding the eradication method of *Parthenium hysterophorus* (Table-3) revealed that 89% farmers adopted the physical method of eradication such as manual uprooting of parthenium before flowering and seed setting, ploughing the parthenium weed in rosette stage before it seeds and burning. Regarding chemical method of eradication, 61 per cent farmers adopted this method to control the weed meagre percentage (3%) of farmers have idea of biological control method to control the parthenium weed. Singh *et al.,* 2017 (22) that maximum number of the respondent (87.50%) had low level of knowledge regarding knowledge about scientific method of parthenium weed control. Similarly (23) reported that about the method of parthenium control 60.86% and 16.57% of the respondent adopted manual and chemical method, respectively. While working on parthenium weed in Surghja district of Chhatishgarh, (24) also reported that about the low level of respondent regarding scientific method of weed control. Therefore this study suggested that awareness creation campaign on the adverse effect of parthenium weed on agricultural production and its control should be undertaken urgently. Similarly, integrated control method should be adopted for effective management of parthenium weed (25, 26) also recommended a combination of multiple weed control measures for effective control of parthenium weed in Uganda.

Conclusions

The present study reveal that the farmers of Saharsa district had low the level of knowledge about the harmful effect, mode of dispersion and eradication method of parthenium weed. Therefore, these is a need for greater awareness among farmers through extension programme to become conscious of management of with the use of these methods which do not create hazards for the environment or jeopardize the health of soil, plants, animals, humans and ecosystem.

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