Pak. J. Weed Sci. Res. 18(1): 91-97, 2012

Parthenium hysterophorus: AN EMERGING THREAT FOR *Curcuma longa* FIELDS OF KASUR DISTRICT, PUNJAB, PAKISTAN

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ABSTRACT

Kasur district contributes more than 80% of Turmeric production in Pakistan. The fields of Curcuma longa L. along with the surroundings were surveyed and marked to study the distribution and development pattern of the alien invasive weed parthenium (Parthenium hysterophorus L.) into fields of Kasur district. For this purpose, fields of Curcuma longa L. in five villages of the district comprising of at least four hectares cultivated with this crop and five fields in each village where crop has been cultivated regularly for the last five years were marked for investigating weed development pattern. The farmers of the marked fields had a concept that weeds can not affect the Curcuma longa fields due to its medicinal nature. Parthenium development pattern inside the fields was observed at different stages of crop. The excessive parthenium growing adjacent to water channels had a maximum percentage of parthenium inside the fields with other major weeds; while its percentage was less inside those fields whose adjacent water channels were clean or having less parthenium incidence. Observations showed that canal water channels played critical role in the development of parthenium in the turmeric fields. Environmental conditions of Curcuma longa fields is favoring parthenium to invade and dominate, therefore there is a need for observation and an urgent parthenium management strategy for restricting further spread in the fields of Curcuma longa L. in future.

Key words: *Curcuma longa*, Kasur, *P. hysterophorus,* turmeric, weeds.

INTRODUCTION

Weeds deprive the desired crop species from the available resources by a number of ways (Rao, 1983). The negative influence upon the crops ultimately affects the welfare of human being as energy is diverted in unwanted direction. Competition for habitat

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resources, allelopathy, and facilities for alternate hosts for pathogens/ harmful organisms, seed contamination and many other characters are undesirable features of weeds (Putnam and Duke, 1978). *Parthenium hysterophorus* L., an annual invasive weed of family Asteraceae, is native to tropical America and has become widespread in North America, South America, the Caribbean, and many parts of Africa, Asia, and Australia (Navie *et al.,* 1996). It is thought to be accidentally introduced to our neighboring country India in the mid 1950s through imported food grains (Chandras and Vartak, 1970) and has since spread over to most parts of the Indian sub-continent, including Pakistan. The Parthenium weed is rapidly spreading in Pakistan and now it occurs widely along the roadsides, wastelands and sometimes in crop fields (Javaid and Anjum, 2005). *Parthenium hysterophorus* establishes only from seeds, which can germinate anytime of the year if given suitable moisture levels. Plants flower when they are 4-8 weeks old and may flower for several months (Dhawan and Dhawan, 1996). An individual plant may produce 15000 to 25000 seeds (Navie *et al.,* 1996).

Turmeric (*Curcuma longa* L.) is a medicinal plant extensively used in Ayurveda, Unani and Siddha medicine as a home remedy for various diseases (Ammon and Wahl, 1991; Eigner and Scholz*,* 1999). It is botanically related to ginger (Zingiberaceae family) and is a perennial plant having a short stem with large oblong leaves and bears ovate, pyriform or oblong rhizomes, which are often branched and brownish-yellow in colour. Turmeric is used as a food additive (spice), preservative and colouring agent in Asian countries, including China and South East Asia. It is also considered as auspicious and is a part of religious rituals. In old Hindu medicine, it is extensively used for the treatment of sprains and swelling caused by injury (Ammon and Wahl, 1991). In China, *C. longa* is used for diseases associated with abdominal pains (Araujo and Leon, 2001). In Pakistan it is mainly cultivated in Punjab in the districts of Sialkot, Mandi Bahaudin, Lahore and Kasur. The district Kasur contributes more than eighty percent of the country production with 30569 metric tons annual production from 3157 ha (MINFA, 2006). The present surveys and investigations were therefore undertaken to study the distribution and development pattern of Parthenium in the fields of *Curcuma longa* L. in the district of Kasur.

MATERIALS AND METHODS

Description of sampling site

District Kasur is located at latitude 31.12 N and longitude 74.44 E. at 55 km southeast of Lahore. The general height of the area is from 150 to 200 meters above the sea level. Its total area is 3,995 km^2 having extremes of climate; the summer season begins from April through September, and June is the hottest month of the summer. Mean maximum and minimum temperatures for June are

about 40 and 27 degree Celsius, respectively. The winter season lasts from November to March, January being the coldest month. The mean maximum and minimum temperatures for the coldest month are 20 and 6 degree Celsius, respectively. Towards the end of June, monsoon conditions appear and during the following two and a half months the rainy season alternates with sultry weather. The winter rain falls during January-March ranging from 23 to 31 millimetres.

Phyto-sociological study

Five villages were selected in surroundings of the district Kasur viz. Dhoop Sadi, Phulliani, Hanjurwall, Chak No. 33 and Chak No. 32 during May 2009 to January 2010. The distance between the two adjacent sampling sites was 2–4 km. At each of the five selected sites, four hectares area was demarcated, surveyed and investigated from sowing till harvesting. Mostly *CLL 317* and *Kesari* (medium duration) varieties, matured in 8 months are cultivated in marked area. The area was selected and marked on different descriptions mentionedinTable-1.

Table-1. Description of Different marked Sites

Site	Location (Area= 1 Hectare)	Mode of irrigation	Site position at water channel	Type of water channel	Farm history
Site-1	Dhoop Sadi village, Kasur	Canal + Tube well	Mid	Lined	Exhaustive Field
Site-2	Dhoop Sadi village, Kasur	Canal + Tube well	Tail	Lined	Vegetable field
Site-3	Dhoop Sadi village, Kasur	Canal + Tube well	Head	Lined	Exhaustive field
Site-4	Phulliani, village, Kasur	Canal	Mid	Lined	Vegetable field
Site-5	Phulliani village, Kasur	Canal + Tube well	Tail	Unlined	Fallow Field
Site-6	Phulliani village, Kasur	Canal+ Tube well	Head	Lined	Exhaustive field
Site-7	Hanjurwall village, Kasur	Canal + Tube well	Head	Lined	Restorative field
Site-8	Hanjurwall village, Kasur	Canal+ Tube well	Tail	Lined	Fallow Field
Site-9	Hanjurwall village, Kasur	Canal+ Tube well	Mid	Lined	Vegetable field
Site-10	Chak No.33 village, Kasur	Canal+ Tube well	Tail	Lined	Fallow Field
Site-11	Chak No.33 village, Kasur	Canal+ Tube well	Mid	Lined	Restorative field
Site-12	Chak No.33 village, Kasur	Canal	Head	Lined	Exhaustive field
Site-13	Chak No.32 village, Kasur	Canal+ Tube well	Head	Unlined	Restorative field
Site-14	Chak No.32 village, Kasur	Canal	Tail	Unlined	Plane land
Site-15	Chak No.32 village, Kasur	Canal	Mid	Unlined	Plane land

Farmers cultivating Turmeric in the marked sites do not use herbicides because they have a concept that there is no need of herbicides due to the medicinal importance of Turmeric crop. This concept was a plus point to investigate the development pattern of Parthenium in the fields of Turmeric. Sampling was done with a 1 m^2 quadrate. Ten quadrates were randomly thrown at each sampling site. Data regarding percentage of target weed *P. hysterophorous* were compiled by applying following formulae:

$$\text{Percentage (\%)} = \frac{\text{No. of Individual Species}}{\text{No. of total Species}} \times 100$$

Statistical Analysis

Standard errors of investigation were determined by using computer software Microsoft Excel. All the results were subjected to analysis for the significant differences through ANOVA Test (Steel and Torrie, 1980) using computer software COSTAT.

RESULTS AND DISCUSSION

The development pattern of *P. hysterophorous* inside the field was investigated throughout the cropping time i.e. May, 2009 to January, 2010 in turmeric marked fields of Kasur villages viz; Dhoop Sadi, Phulliani, Hanjurwall, Chak No. 33 and Chak No. 32. It was observed that *P. hysterophorous* percentage was highest at Site- 2, Site-5, Site-8, Site-11 and Site-14 at different villages with 3.8 %, 4.3%, 3.8%, 2.8% and 5.1%, respectively (Table-1). These marked fields are mostly irrigated through canal unlined water channels and are situated at the tail of water channels. As we observed that mostly canal water channels have widely *P. hysterophorous* at their banks so it is clear from the results that canal water channels play a critical role in the development of *P. hysterophorus* inside the agriculture fields. The *P. hysterophorous* percentage at Site-1, Site-4, Site-7, Site-10 and Site-13 was comparatively lower in different villages with 2.1%, 2.4%, 2.4%, 2.6% and 2.9%, respectively. These sites are either in the mid or at the head of lined water channels. The other marked sites e.g. Site-3, Site-6, Site-9, Site-12 and Site-15 are irrigated mostly through tube-wells or present at the head of water channels and *P. hysterophorus* percentages were 2.2%, 1.9%, 2.8%, 1.8% and 3.5%, respectively. Our observations showed that there is significantly higher population of parthenium in those fields that are present at the tail of water channels. Javaid and Anjum (2005) observed that very few plants of *P. hysterophorus* were found growing in the fields of *Trifolium alexandrinum*.

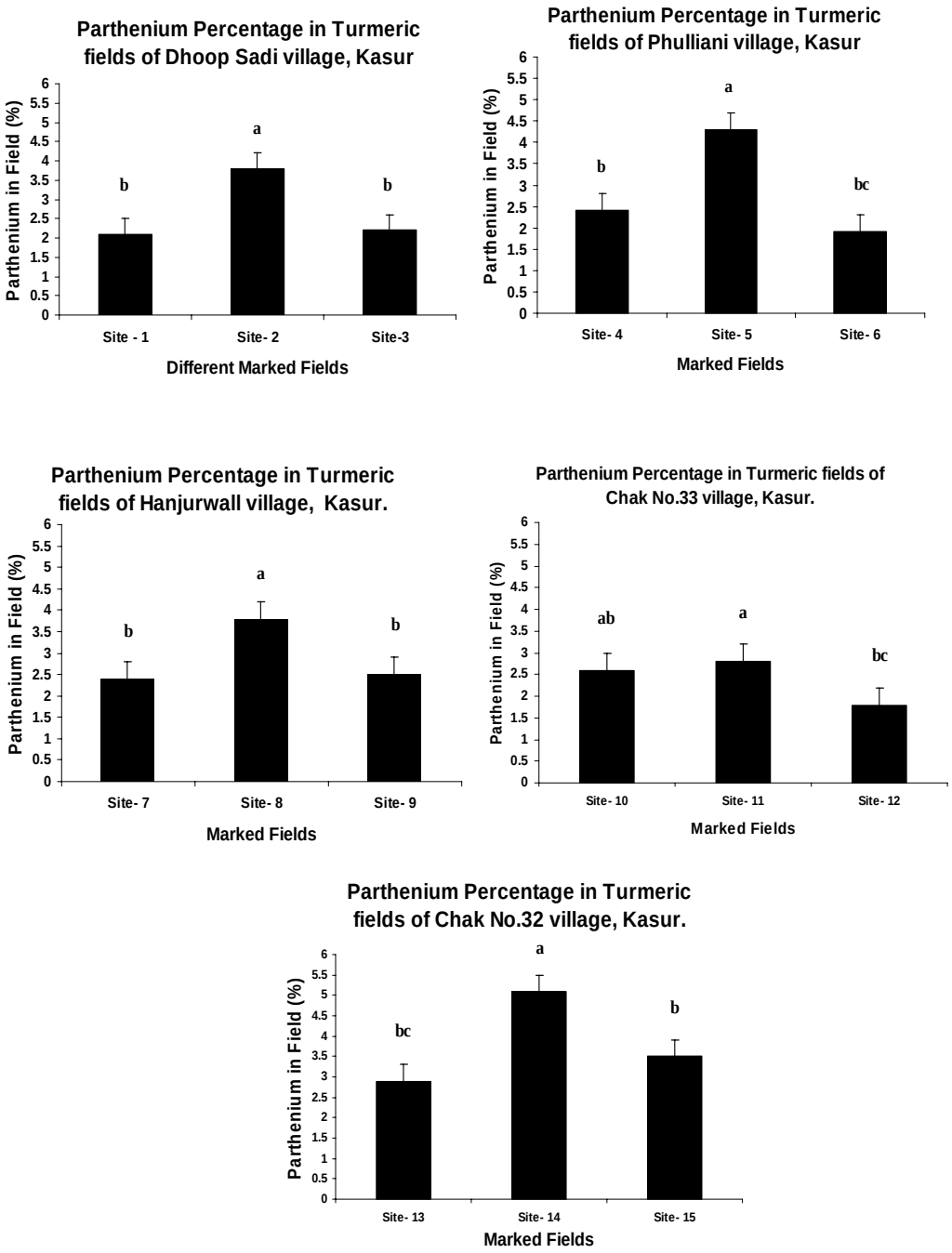

Figure 1. Parthenium percentage in turmeric fields at different sites in district Kasur, Pakistan.

There are reports that this weed has become a problem in agricultural fields in India (Evans, 1997). Oudhia (2000) reported *P. hysterophorus* in rice fields from different districts of India. This showed that *P. hysterophorus* is a serious threat to agriculture fields of Sub-continent and it is mostly entering through irrigation system; therefore there is a need for observation and an urgent *P. hysterophorous* management strategy for restricting further spread in agriculture fields.

CONCLUSION

According to the local farmers weeds generally can not significantly affect the *Curcuma longa* fields because of its medicinal nature; however, Parthenium infestation was there in fields at all stages of the crop. The infestation in the *C. longa* fields was less where the adjacent water channels were clean or having less parthenium incidence. Canal water channels had a basic role in the increase in Parthenium infestation in the Turmeric fields. Moreover, the environmental conditions of *C. longa* fields favor Parthenium dominance which warrants an immediate management strategy to restrict its spread in future.

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