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CHEMICAL CONTROL OF NOXIOUS WEED *PARTHENIUM HYSTEROPHORUS* L.

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ABSTRACT

A pot experiment was conducted to evaluate the herbicidal potential of Chwastox and Buctril Super against noxious weed *Parthenium hysterophorus* L. The recommended doses (R) of Chwastox (4 ml L^{-1}) and Buctril Super (2.5 ml L^{-1}) as well as dilutions @ ¾ R, ½ R and ¼ R were sprayed on pot grown *P. hysterophorus* plants after 2, 5 and 10 weeks of sowing corresponding to early vegetative, pre-flowering and maturity stages, respectively. All the employed dosages of Buctril Super killed the target weed at all the three growth stages within 2 days of spray. Chwastox, however, was found to be a slow active herbicide in this case and effective control was delayed up to 7 days.

Key-words: Chemical control, herbicides, *Parthenium hysterophorus*, weed.

INTRODUCTION

Parthenium hysterophorus L. (hereafter referred to as *Parthenium*), is an annual invasive weed growing in wastelands all the year round in Pakistan. Originally a native of subtropical America, is now naturalized in many parts of Asia, Africa and Australia. In Pakistan it can be seen growing luxuriantly in open spaces, grassland, wastelands, around the agricultural fields and sometimes in less competitive field crops. It is spreading very rapidly especially in rain fed districts of northern Punjab (Javaid and Anjum, 2005a). In India and Australia it has also become a pest in agricultural fields (McFadyen, 1992; Kohli and Rani, 1994). However, in Pakistan it has yet failed to establish in agricultural fields possibly because of salinity problems in southern Punjab and wetland rice cultivation in northern Punjab (personal observations). It is known to cause a number of environmental and agricultural problems such as fodder scarcity, biodiversity depletion, loss of crop productivity, and health problems for human beings and livestock (Ahmad *et al*., 1988; Evans, 1997). The successful establishment of *Parthenium* in variety ecosystems is attributed to its adaptive nature, fast growing rate, high productive potential, and interference by resource depletion and allelopathy (Navie, *et al*., 1996; Singh *et al*., 2005). Being an exotic weed, no fungal pathogen or insect pest except *Zygogramma bicolorata* Pallister as biological control agent of *Parthenium* in Pakistan is known so far (Javaid *et al*., 2005a). The present study was, therefore, conducted to evaluate the effectiveness of lower concentrations of two chemical herbicides namely Chwastox and Buctril Super for the control of *Parthenium.*

MATERIALS AND METHODS

Parthenium seeds were sown in earthen pots containing sandy loam soil. Two chemical herbicides viz. Chwastox and Buctril Super were selected to evaluate their herbicidal potential to control *Parthenium.* Recommended doses of Chwastox and Buctril Super are 4 ml L^{-1} and 2.5 ml L^{-1}, respectively. The recommended (R) as well as lower doses i.e. ¾R, ½R and ¼R of each of the two chemical herbicides were sprayed on 2, 5 and 10 weeks old *Parthenium* plants corresponding to early vegetative, pre-flowering and maturity stages, respectively. Efficacy of herbicides was monitored for seven days.

RESULTS AND DISCUSSION

The effect of different concentrations of Chwastox and Buctril Super on *Parthenium* after 2 days of spray is shown in Fig. **1 & 2**. Plants sprayed with Chwastox started getting pale from the next day of spray. However, complete mortality of the weed was achieved. All the employed concentrations of the herbicide were effective in controlling the target weed. Buctril Super proved more effective than Chwastox in controlling *Parthenium* as it killed the target weed within 2 days of spray. The lowest concentration of this herbicide i.e. ¼R was as effective as recommended dose (R). There is a possibility that concentrations lower than ¼R may also be effective in controlling *Parthenium.* Earlier Kanchan and Jayachandra (1977) found that bromocil, diuron and terbacil @ 1.5 kg ha^{-1} were very effective against *Parthenium.* Similarly Dhanraj and Mitra (1976) have reported that diquat @ 0.5 kg ha^{-1} in

500 L spray can effectively control *Parthenium* at all growth stages. Mishra and Bhan (1994) have recommended the sulphonyl urea herbicides like chlorimuron ethyl and metasulfuron methyl to control *Parthenium* in non-cropped areas. Spraying of 2 kg, 2, 4-D sodium salt or 2L MCPA in 400 L of water controlled the growth of *Parthenium* seedlings. Likewise, MSMA @ 1L 100 ml^{-1} of water successfully controlled fully grown *Parthenium* (Mahaderappa, 1996). Several well known herbicides such as paraquat, trifluralin, diphenamid, napropamide, acetanilides, alachlor, metolachlor and propachlor have been shown to be ineffective against *Parthenium* weed (Labrada, 1990; Njoroge, 1991). It is clear that *Parthenium* can only be managed effectively by developing integrated approach involving many options in combination like little use of very effective herbicides, biological control agents and cultural practices.

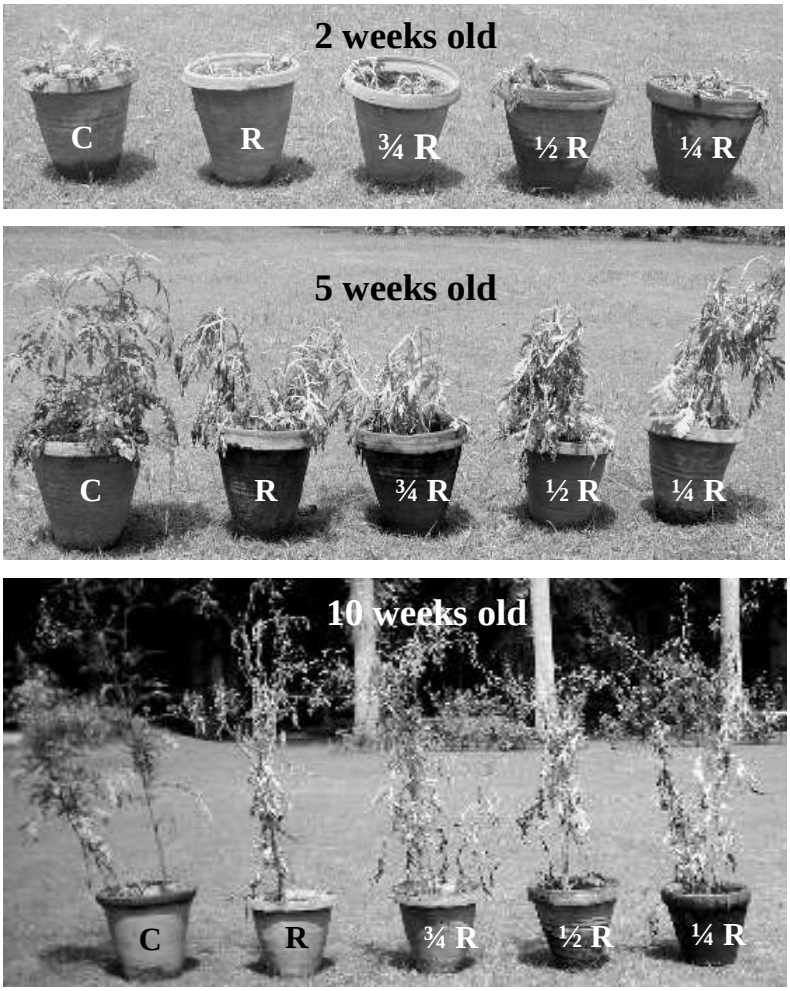

Fig. 1. Effect of different concentrations of Chwastox on *Parthenium hysterophorus* at different growth stages. **C**: Control, **R:** Recommended dose.

Because of absence of any well known biological control agent in Pakistan and unavailability of natural product based herbicides in the market to control *Parthenium*, limited use of Buctril Super is recommended to contain the rapid spread of this noxious weed, as lower concentrations of this chemical herbicide are also effective. Meanwhile we are also trying to identify some natural compounds for the control of this weed. Some preliminary studies in this regard, using aqueous extracts of allelopathic grasses and trees, have shown very encouraging results (Anjum *et al.*, 2005; Javaid *et al.*, 2005b; Javaid and Anjum, 2005b; Shafique *et al.*, 2005). Studies regarding the investigations of herbicidal potential of allelopathic weeds and crops, and medicinal plants against the *Parthenium* are in progress. Apart from these phytochemical herbicidal studies, recently we have found that insect *Zygogramma bicolorata* has great potential to be used as a biological control agent in Pakistan (Javaid *et al.*, 2005a).

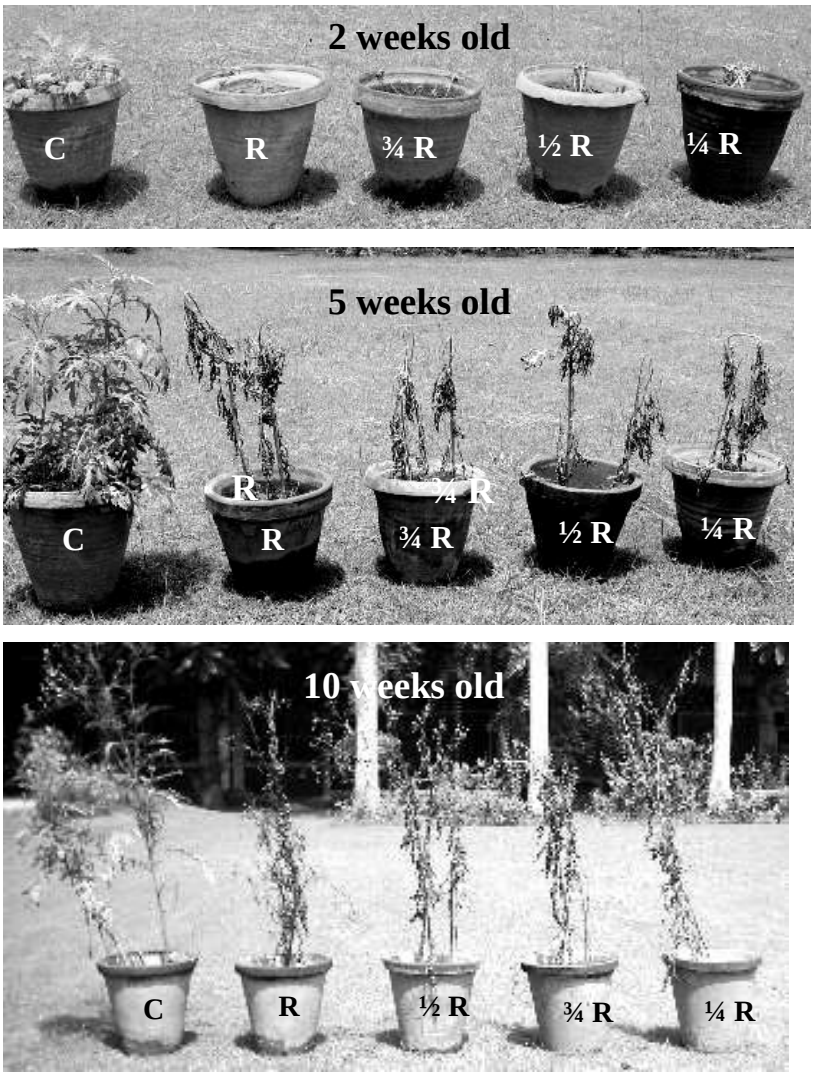

Fig. 2. Effect of different concentrations of Buctril Super on *Parthenium hysterophorus* at different growth stages. **C**: Control, **R:** Recommended dose.

REFERENCES

Ahmad, M.N., P.R.S Rao, M. Mahender and A.S. Moorthy (1988). A study on changes in blood chemistry in *Parthenium* toxicity in buffalo calves. *Cherion*. 17: 57-60.

Anjum, T., R. Bajwa and A. Javaid (2005). Biological Control of *Parthenium* I: Effect of *Imperata cylindrica* on distribution, germination and seedling growth of *Parthenium hysterophorus* L. *Int. J. Agric. Biol.*, 7: 448-450.

Dhanraj, R. E. and M. K. Mitra (1976). Control of *Parthenium hysterophorus* L. with diquat. *PANS*, 22: 269-272.

Evans, H.C. (1997). *Parthenium hysterophorus:* a review of its weed status and the possibilities for biological control. *Biocontrol/News and Information*, 18: 89-98.

Javaid, R. and T. Anjum (2005a). *Parthenium hysterophorus* L. – A noxious alien weed. *Pak. J. Weed. Sci. Res*., 11: 1-6.

Javaid, A. and T. Anjum (2005b). Biological control of *Parthenium.* III: Control of *Parthenium hysterophorus* L. by aqueous extracts of allelopathic grasses. *Pak. J. Bot.,* (accepted).

Javaid, A., T. Anjum and R. Bajwa (2005a). Biological control of *Parthenium* II: Allelopathic effect of *Desmostachya bipinnata* on distribution and early seedling growth of *Parthenium hysterophorus* L. *Int. J. Biol. Biotech.*, 2: 459-463.

Javaid A, R. Bajwa, S. Shafique and S. Shafique (2005b). Prospects of biological control of *Parthenium hysterophorus* L. by *Zygogramma bicolorata* Pallister in Pakistan. *Bio. Control,* (submitted).

Kanchan, S. D. and Jayachandra (1977). Post-emergent chemical control of congress grass. *Pesticides*, 11: 55-56.

Kohli, R. K. and D. Rani (1994). *Parthenium hysterophorus* – a review. *Res. Bull. (Sci.) PunjabUniv.,* 44: 105-149.

Labrada, R. (1990). El manejo de malezas en areas de hortalizas y frijol en Cuba. *X Congreso ALAM, LA Habana,* Abril 1-14, Vol. II: 1-16.

Mahaderappa, M. (1996). *Parthenium,* Prasaranga, University of Mysore, Mysore, p.66.

McFadyen, R.E. (1992). Biolical control against *Parthenium* weed in Australia. *Crop Protection,* 11: 400-407.

Mishra, J. S. and V. M. Bhan (1994). Efficacy of sulphonyl urea herbicides against *Parthenium hysterophorus. Weed News*, 1: 16.

Navie, S.C., R.E. McFadyen, F.D. Panetta and S.W. Adkins (1996). The biology of Australian weeds 27. *Parthenium hysterophorus* L. *Plant protection Quarterly*, 11: 76-88.

Njoroge, J. M. (1991). Tolerance of *Bidens pilosa* L. and *Parthenium hysterophorus* L. to paraquate (Gramoxone) in Kenya. *Kenya Coffee,* 56: 999-1001.

Shafique, S., R. Bajwa, A. Javaid and S. Shafique (2005). Biological control of *Parthenium* IV: Suppressive ability of aqueous leaf extracts of some allelopathic trees against germination and early seedling growth of *Parthenium hysterophorus* L. *Pak. J. Weed. Sci. Res*., 11: 69-75.

Singh, H. P., D. R. Batish; J.K. Pandher and R. K. Kohli (2005). Phytotoxic effects of *Parthenium hysterophorus* residues on three *Brassica* species. *Weed Biol. Manag.*, 5: 105-109.

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