

# Analysis of Ecofriendly Integrated Weed Management of Congress Grass

## Abstract

Field experiments were conducted to evaluate the integrated effect of aqueous extracts of selected botanical agents and paraquat on chlorophyll disintegration and percentage mortality of *Parthenium hysterophorus* L. treatments having  $\frac{1}{2}$  and  $\frac{1}{4}$  dose of paraquat along with 10% aqueous extract of *S.cordifolia* was found most effective in lowering the amount of chlorophyll 'a', 'b' carotenoids and pigments mg/g after 7 days of first and second spraying.

**Keywords:** Paraquat, *Sida cordifolia*, *Parthenium hysterophorus* L, Proliferation.

## Introduction

Regweed *Parthenium hysterophorus* L an exotic weed of family Asteraceae has achieved the status of biological pollutant all over the world. Being allelopathic in nature this weed has been considered as the greatest threat to the biodiversity in most parts of the world (Fensham, 1999 and Evans 1997) This invasive weed exerts an adverse impact on the structure and composition of nativeeco-system integrity (Pimentel et al, 2001). Chemical herbicides are no doubt very effective and provide very fast control yet risks of environmental pollution and health are involved in their usage. Nowadays there is much emphasis to search for alternative methods of weed control which are safe for the environment. Integrated Weed Management (IWM) is a strategy that uses synergism between biological, chemical and or culture methods to reduce weed population below an economic threshold (Till et al. 1991, Bhan and Singh 1993 and Zwerger 1996). Keeping this view in mind an effort has beenmade in this investigation to search out an appropriate formulation of extracts of selected botanical agents along with lower dose of paraquat a weedicide for effective and environment friendly management of *Parthenium*.

## Aim of the Study

The study revealed the effectiveness of lower dose of chemical integrated with *S. cordifolia* extract in controlling this noxious weed.

## Methods and Materials

Regular field surveys were made for selection of suitable botanical agents which can be used as biopesticides. Plants growing in the vicinity of *Parthenium* Plants in heavily infested *Parthenium* fields were selected to test their potential in suppressing this weed. Ten gram fresh leaves of selected plants viz. *Abutilon indicum*, *Cassia occidentalis*, *C. uniflora*, *Sida Cordifolia* and *Amaranthus spinosus* were collected and washed thoroughly with distilled water. After washing they were ground separately with 100ml of distilled water to prepare 10% leaf extracts.

The experiment was laid out in Randomized block design (R.B.D.) having 17 treatments including control ( $T_0$ ). All the treatments were replicated thrice at *Parthenium* infested field, Steel Department of Botany, K.S.Saket P.G. College Ayodhya, Faizabad. Plot size measured  $1m^2$  having 15 plants in each plots. Two sprays of different treatment combinations were given at vegetative and flowering stage at the interval of 7 days. After 7 days of first and second spraying percentage mortality was recorded and leaf sample were analyzed for chlorophyll disintegration. Chlorophyll estimation was done by Arnon's Method (1949). The treatments were as follows: treatment  $T_1$  contained full dose of paraquat alone ic 8ml/l, in treatment  $T_4$ ,  $T_7$ ,  $T_{10}$ ,  $T_{13}$  and  $T_{16}$  10% foliar extracts of *A. indicum* *C. occidentalis*, *C.uniflora*, *S.cordifolia* and *A.spinosisus* were sprayed respectively. Treatment  $T_2$ ,  $T_5$ ,  $T_8$   $T_{11}$  and  $T_{14}$  involved the  $\frac{1}{2}$  dose of paraquat ic 4ml/l in combination with 10% foliar extracts of *A.indicum* *C.occidentalis*, *C.uniflora*, *S.cordifolia* and *A.spinosisus* respectively. In treatments  $T_3$ ,  $T_6$ ,  $T_9$ ,  $T_{12}$  and  $T_{15}$   $\frac{1}{4}$  dose of paraquat ie

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2ml/l and 10% foliar extracts of selected botanical agents were sprayed in control (T<sub>0</sub>) no spraying was done.

#### Observation and Result

The data presented in the table 1 clearly showed that all the prepared formulation had pronounced effects on chlorophyll content and

found to be most effective in lowering the amount of chlorophyll 'a', 'b' carotenoids and pigment mg/g. A minimum of 0.6, 0.4 and 4 mg/g values were recorded for above mentioned parameters respectively. Others treatment combination were also found superior over treatment having full dose of paraquat alone (T<sub>1</sub>) as in this treatment 2.3, 1.9, 1.0, and 13.5 mag/g alues

Treatment	After 1 <sup>st</sup> Spray					After 2 <sup>nd</sup> Spray				
	Chl 'a'	Chl 'b'	Carotenoids	Pigmg/g	Mortality(%)	Chl 'a'	Chl 'b'	Carotenoids	Pigmg/g	Mortality(%)
T1 (Full dose e.e. 8ml/l Paraquat)	3.4	2.5	1.2	17.9	50.0	2.3	1.9	1.0	13.5	92.0
T2 (1/2 dose of Paraquat+10% A. indicum)	3.0	2.1	1.1	16.0	48.0	1.6	1.3	0.9	9.9	96.0
T3 (1/4 dose of Paraquat +10% A. Indicum)	3.2	2.4	1.4	19.6	46.0	1.8	1.5	1.0	11.3	95.5
T4 (10% Indicum)	3.9	3.0	1.5	21.5	-	3.8	3.0	1.2	19.3	-
T5 (1/2 dose of Paraquat +10% C. Occidentalls)	1.8	1.5	0.8	10.4	49.0	1.9	1.5	0.8	10.7	96.8
T6 (1/4 dose of Paraquat +10% C. Occidentalls)	1.4	1.4	0.8	9.1	47.0	0.7	0.5	0.4	4.1	98.8
T7 (10% Coccidentalls)	3.2	2.9	1.1	18.4	-	3.1	2.4	1.0	16.7	-
T8 (1/2 dose of Paraquat +10% C. uniflora)	1.5	1.1	0.8	8.9	47.0	1.2	0.7	0.4	6.2	99.0
T9 (1/4 dose of Paraquat +10% C. uniflora)	2.1	1.8	1.2	13.3	43.0	1.6	1.4	0.8	10.0	88.0
T10 (10% flora)	3.4	3.0	1.2	19.4	-	3.3	3.0	1.2	19.0	-
T11 (1/2 dose of Paraquat +10% S. cordiflora)	2.2	1.8	1.2	13.3	43.0	1.6	1.4	0.8	10.0	88.0
T12 (1/4 dose of Paraquat +10% cordiflora)	0.8	0.7	0.6	5.4	41.0	0.6	0.4	0.21	4.0	99.6
T13 (10% cordiflora)	3.0	2.6	1.1	16.9	-	2.8	2.5	1.1	16.3	-
T14 (1/2 DOSE OF Paraquat+10% Spinosus)	2.1	1.0	1.9	10.5	45.0	1.8	0.9	0.7	9.1	99.0
T15 (1/4 dose of Paraquat+ 10% Spinosus)	2.0	1.1	1.0	10.9	41.0	1.9	1.0	0.9	9.9	97.6
T16 (10% Spinosus)	3.8	3.2	1.1	20.8	-	3.6	3.1	1.0	20.1	-
T0 Control	4.7	3.5	1.8	25.4	-	4.8	3.5	1.8	25.9	-
CD at 5%	0.6 99	0.7 97	0.177	4.169	6.092	0.6 80	0.5 79	0.182	3.280	7.9772

Table-1 Effects of Paraquat alone and in combination with extracts of selected Botanical Agents o Chlorophyll Contents and Percentage Martality of *P. hysterophorus* L.

percentage mortality in comparison to the treatment T<sub>1</sub> having spray of full dose of paraquat alone. Treatments having spray of foliar extracts of selected plants alone was also reduced the chlorophyll content but to a lesser extent. This may be attributed to the allelopathic effects of selected botanical agents on *Parthenium* weed

Treatment T<sub>12</sub> in which ¼ dose of paraquat in combination with *S.cordifolia* leaf extract was sprayed

Chemical control methods were applied by several workers and satisfactory results were obtained regarding the control of this weed (Dhanraj and Mitra, 1976, Mahadevappa, 1996, Balyan 1997, Brahman 2003, Sharma 2003 and Singh et ai. 2004) Although herbicides are quite effective in providing

were obtained for chlorophyll 'a', 'b' carotenoids and pigments mg/g respectively. Maximum plants mortality ie 99.6% was also recorded in treatment T<sub>12</sub>, followed by other treatment combinations after 7 days of second spray. Full dose of paraquat alone caused 92% mortality. In plots where plants extracts were used alone no mortality was observed.

immediate control but their repeated use linked with toxicological concerns to human and environmental hazards. Natural plants products and other plants based formulations were also tried by some workers and showed promising result in controlling this weed (Joshi 1991, Evans 1997, Kholi et al. 1998). Dass et

al. 2006 performed laboratory experiments for testing the efficacy of foliar extracts of selected botanical agents on Seed germination and seedling mortality in Parthenium and found that the foliar extract of Amaranthus viridis was most effective by causing 100% mortality of Parthenium seedlings. Knox et al. 2006 evaluated the synergistic effects of aqueous extract of cassia uniflora and Atrazine on chlorophyll disintegration and percentage mortality and recommended the use of lower dose of weedicide in combination with selected botanical agent. Several workers had tried different methods of Parthenium control such as use of zygogramma beetle (Dhiman and Bhargava 2005 and Gautam et al. 2005 use of Alternaria Solani and Sclerotium rolfsii (Singh and Saxena, 2003 and Shukla and Pandey, 2006), integration fungus and herbicides (Dass et al. 2005) and allelopathic effects of plants (swain et al. 2005) all these biological agents have ability to control Parthenium. Result revealed the effectiveness of prepared formulations and provide better management practice to control this weed as lower dose of chemicals will result in lesser environmental pollution. This approach of Parthenium control will provide safe and quick eradication.

#### Conclusion

Mechanical, chemical and biological control strategies have been proved fertile individually to curb proliferation of Parthenium. So integrated approaches are wanted to restrict the invasion of this weed to address this problem, public awareness has to be developed and participatory approach to control the invasive weed should be adapted.

There is the need to encourage the research on the utilization potential of this weed on the evaluate its efficacy on field trials. The target of "Control through utilization" can be achieved through joint efforts of research discovery of the uses of the weed also could pay the way for indirect eradication of the weed at present although Parthenium is considered a weed its new uses are coming to the forefront. Nanomedicine biopesticide, green manure. Potential, agent for bioremediation of toxic metals and dyes, herbicides, cheap substrate for enzyme production and source of biogas are some of the recently discovered implications of Parthenium.

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