



Re-Sprouting Ability Of Alien Weed – *Chromolaena odorata* (L.) R.M. King and H. Robinson Kumar Naik, A. H¹, Basavaraja Naik, T², and Umamaheswarappa, P³.

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Abstract

Chromolaena odorata is fast growing woody and much branched shrub attaining a height of three to eight meter and suppress young seedlings that are slow in growth and deprive them of a major share of nutrients, moisture and space due to its efficient tap root system and causing nuisance in farming community. A field study was planned under this content at Main Research Station, Hebbal, University of Agricultural Sciences, Bengaluru. On both existing and de-topped *Chromolaena*, application of glyphosate and paraquat sprayed plots, re-sprouting of *Chromolaena* was not observed at all concentrations. Whereas, re-sprouting of *Chromolaena* was observed in 2, 4-D Na salt sprayed plots particularly from 70th and 60th day onwards, It was to an extent of 8 to 13% and 5 to 10% by 90th day after spray at all concentrations respectively of *Chromolaena* with existing and de-topped plants. Application of Chlorimuron ethyl 10WP + metsulfuron methyl 10 WP caused slight initial sprouting up to 40th day and subsequently no growth was observed at all concentrations in existing plants. Whereas, in sprouted plants at all doses was able to cause 3 to 8% re-sprouting in *Chromolaena* on 90th day after spray.

Keywords: *Chromolaena odorata*, Re-sprouting, 2, 4-D Na salt, Chlorimuron ethyl 10WP + metsulfuron methyl 10 WP

I. INTRODUCTION

Chromolaena odorata (L.) R.M. King and H. Robinson (Asteraceae) commonly known as Communist weed /Siam weed is a native of South and Central America. It was previously included in the genus *Eupatorium*, now under the genus *Chromolaena* (King and Robinson, 1970a). The genus *Chromolaena* contains 129 species and all are found in the Neo-tropical world (South and Central America) (King and Robinson, 1970b). However, only *Chromolaena odorata* has spread to the old world like India (Mc Fayden and Cruttwell, 1991). In Karnataka *Chromolaena* plants flowers from October to January – February months, producing masses of pale lilac flowers and these turn a darker pink when matured. Within 8-10 weeks of flowering, masses of small brown seeds are produced rapidly, which is estimated to be 93,000- 1,60,000 tiny seeds/ plant, each seed has a tuft of white hairs allowing it to be carried by the wind and water. Seeds also have tiny barbs that stick to clothing, footwear, animals, vehicles and machinery. The weeds growth is rampant in heavy rainfall areas of Karnataka covering Hilly and Coastal zones and recently spreading towards dry zones all along the forest eco- system (Ramachandra Prasad *et al.*, 2004) and also implied that, above information on growth pattern in different agro- climatic zones of Southern Karnataka would perhaps helps in developing strategy for managing the weeds. The weed poses a grate threat to the fragile biodiversity of the Western Ghats, eco-tourism, forestry, watershed management and sustainable farm management, where it is competitively replacing the existing indigenous rich flora, thereby creating ecological imbalance. This weed has assumed much importance due to its alarmingly increasing intensity day by day. (Ramachandra Prasad *et al.*, 2003).

II. MATERIALS AND METHODS

The experiment was laid out with 18 treatments in a Randomised complete block design with three replications involving four herbicides with four concentrations viz., glyphosate 41 SL 0.4, 0.8, 1.2 and 1.6 kg a.i./ ha, paraquat 24 SL 0.4, 0.6, 0.8 and 1.0 kg a.i./ ha, chlorimuron ethyl 10WP + metsulfuron methyl 10 WP (Almix 20WP) 2.0, 3.0, 4.0 and 5.0 g /ha, 2, 4-D Na salt 80 WP 1.0, 1.5, 2.0 and 2.5 kg a.i. /ha. Each herbicide were sprayed separately with different concentrations using a hand operated knapsack sprayer fitted with flood jet nozzle WFN 72 on naturally grown *Chromolaena odorata* (4 ½ months old existing plants) during August -2013 and the same set of experiment was also laid out on sprouted *Chromolaena* (2 months old, de -topped old plants of *Chromolaena*) sprayed during November -2013, by using a spray volume of 500 litres per ha. The herbicides were sprayed uniformly covering all areas of the plots and the control treatment was sprayed with water. The efficiency of the each treatment was compared by noting the percentage of plants dried at every 10 days interval.

III. RESULTS AND DISCUSSION

Nature of symptom exhibited by *Chromolaena odorata* after spraying of herbicides

On 7th Day after spraying, post -emergence application of paraquat @ 0.40 to 1.0 kg ha⁻¹ caused complete drying of plants, while use of glyphosate @ 0.4 to 0.8 kg a.i. ha⁻¹ caused of leaf blotching and yellowing of leaves. At higher dose of glyphosate 1.2 to 1.6 kg a.i. ha⁻¹ *Chromolaena* plants showed hyponasty, leaf browning and yellowing causing partial drying of leaf here and there. Application of chlorimuron ethyl 10WP + metsulfuron methyl 10 WP 2 to 5 g ha⁻¹ caused epinasty, yellowing and leaf scorching, being higher at higher dosage. Application of 2, 4-D Na salt @1.0 to 2.5 kg a.i ha⁻¹ caused hyponasty, leaf scorching and drying of leaves and these symptoms were more specially at higher dosage@ 2.5 kg a.i ha⁻¹. There was no re -sprouting of plants which were chopped to the ground level manually. At 15 day after spraying, *Chromolaena* plants showed more drying of leaves and yellowing, especially at higher dosage of glyphosate @ 1.6 kg a.i. ha⁻¹. Complete drying of *Chromolaena* was observed even at this stage in the treatment receiving paraquat @ 0.4 to 1.0 kg ha⁻¹. Spraying of chlorimuron ethyl 10WP + metsulfuron methyl 10 WP caused leaf scorching and hyponasty symptoms specially 5 g ha⁻¹. In 2, 4-D Na salt sprayed plots, *Chromolaena* continued to show yellowing and drying of leaves especially at higher dosage. Manually cutting of *Chromolaena* did not cause any sprouting at this stage (Table 1). At 21st day after spraying, use of glyphosate @ 0.4 to 1.6 kg a.i. ha⁻¹ caused 50% drying of leaves. While, paraquat @ 0.4 to 1.0 kg ha⁻¹ caused complete drying of plants. Spraying of chlorimuron ethyl 10WP + metsulfuron methyl 10 WP caused epinasty in some plants and 25% of plants showed green leaves indicating recovery of dried portion of leaves. Application of 2, 4-D Na salt caused only scorching of leaves at all concentrations and there was no symptom of drying of plants. Manual cutting of *Chromolaena* caused sprouting in 10% of the plants (Table 1).The present results are in agreement with the findings of Mogali *et al.* (1989), Doddamani (1992), Abraham *et al.* (2008) and early studies at Bangalore (Anon., 2008)

Re -sprouting of *Chromolaena odorata* after spraying of herbicides

Re -sprouting of *Chromolaena* was observed in 2, 4-D Na salt sprayed plots particularly from 70th and 60th day onwards, It was to an extent of 8 to 13% and 5 to 10% by 90th day after spray at all concentrations respectively of *Chromolaena* with existing and de -topped plants. Application of Chlorimuron ethyl 10WP + metsulfuron methyl 10 WP caused slight initial sprouting up to 40th day and subsequently no growth was observed at all concentrations in existing plants. Whereas, in sprouted plants at all doses was able to cause 3 to 8% re-sprouting in *Chromolaena* on 90th day after spray. Whereas, glyphosate and paraquat application did not cause any re -sprouting in *Chromolaena* plants even at 90th day after spraying in both existing and de -topped *Chromolaena*. As observed in this study, *Chromolaena odorata* regeneration also occurred by sprouting of leaves from the plants subjected to partial drying as observed in earlier studies (Mummigatti, 1994 and Singh *et al.*, 1992) and similar indication was also observed in earlier study at southern Karnataka (Anon, 2008)

indicating its non –effectiveness in controlling *Chromolaena*. (Table 2). While 2, 4-D was less persistent. It was also pointed out that glyphosate is environmentally safe with no mammalian toxicity as compared to 2, 4-D, as observed by Mogali *et al.* (1989) confirming the present study.

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Table 1: Influence of herbicides on phytotoxic symptoms observed on *Chromolaena odorata* at different stages in existing old plants at GKVK, Bangalore.

After spraying of herbicides

Treatments		7 DASp	15 DASp	21 DASp
T 1	Glyphosate 41 SL 0.4 kg ai ha ⁻¹	Leaf bloching, yellowing of leaves-60%	Drying Leaf bloching, Yellowing of leaves	Drying 40%
T 2	Glyphosate 41 SL 0.8 kg ai ha ⁻¹	Leaf browning, yellowing, flowers browning	Epinasty, leaf browning,	Drying 43%
T 3	Glyphosate 41 SL 1.2 kg ai ha ⁻¹	Hyponasty 10-15%, leaf browning 60%, yellowing	Leaf browning, drying of leaf	Drying 49%
T 4	Glyphosate 41 SL 1.6 kg ai ha ⁻¹	Complete yellowing, no. of leaf decrease, drying	Epinasty, complete drying	Drying 50%
T 5	Paraquat 24 SL 0.4 kg ai ha ⁻¹	Complete drying- entire shoot dried 100%	Complete drying	Complete drying
T 6	Paraquat 24 SL 0.6 kg ai ha ⁻¹	Complete drying- No resprouting	Complete drying	Complete drying
T 7	Paraquat 24 SL 0.8 kg ai ha ⁻¹	Complete drying	Complete drying	Complete drying
T 8	Paraquat 24 SL 1.0 kg ai ha ⁻¹	Complete drying	Complete drying	Complete drying
T 9	CME + MSM 20 WP 2.0 g ha ⁻¹	Epinasty symptoms- 10-20%	Leaf scorching	Epinasty,(Top green)
T 10	CME + MSM 20 WP 3.0 g ha ⁻¹	Epinasty, yellowing- 20%	Leaf scorching	Top dry, middle portion green
T 11	CME + MSM 20 WP 4.0 g ha ⁻¹	Yellowing-30%	Leaf scorching	Top green 25%
T 12	CME + MSM 20 WP 5.0 g ha ⁻¹	Yellowing, leaf scorching-30%	Hyponasty ,	Top green 25%
T 13	2,4-D Na salt 80 WP 1.0 kg ai ha ⁻¹	Hyponasty 35%, leaf scorching-30%	Yellowing 30%	Scorching of leaves
T 14	2,4-D Na salt 80 WP 1.5 kg ai ha ⁻¹	Complete yellowing- 80% Epinasty,	Yellowing 35%	Scorching of leaves
T 15	2,4-D Na salt 80 WP 2.0 kg ai ha ⁻¹	Epinasty-15%, leaf drying	Scorching of leaves	Drying of leaves
T 16	2,4-D Na salt 80 WP 2.5 kg ai ha ⁻¹	Hyponasty-15%, Epinasty-50%, leaf dry-10%	Scorching of leaves	Drying of leaves
T 17	Manual Cutting	No adverse effect	No adverse effect	No adverse effect, sprouting-10%
T-18	Unsprayed control	No adverse effect	No adverse effect	No adverse effect

Note: CME + MSM 20 WP = Chlorimuron ethyl 10WP + metsulfuron methyl 10 WP

DASp = Days after spraying

Table 2. Influence of herbicides on number of *Chromolaena odorata* plants showing re-sprouting ability at different stages of growth on existing old plants and sprouted de-topped plants 10 days interval at GKVK, Bangalore.

After spraying of herbicides

Treatments		Old plants (DASp)									Sprouted plants (DASp)								
		10 DAS	20 DAS	30 DAS	40 DAS	50 DAS	60 DAS	70 DAS	80 DAS	90 DAS	10 DAS	20 DAS	30 DAS	40 DAS	50 DAS	60 DAS	70 DAS	80 DAS	90 DAS
T 1	Glyphosate 41 SL 0.4 kg ai ha ⁻¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T 2	Glyphosate 41 SL 0.8 kg ai ha ⁻¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T 3	Glyphosate 41 SL 1.2 kg ai ha ⁻¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T 4	Glyphosate 41 SL 1.6 kg ai ha ⁻¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T 5	Paraquat 24 SL 0.4 kg ai ha ⁻¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T 6	Paraquat 24 SL 0.6 kg ai ha ⁻¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T 7	Paraquat 24 SL 0.8 kg ai ha ⁻¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T 8	Paraquat 24 SL 1.0 kg ai ha ⁻¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T 9	CME + MSM 20 WP 2.0 g ha ⁻¹	0	1	2	2	0	0	0	0	0	0	4	6	8	8	8	8	8	8
T10	CME + MSM 20WP 3.0 g ha ⁻¹	0	2	3	3	0	0	0	0	0	0	2	3	5	5	5	5	5	5
T 11	CME + MSM 20WP 4.0 g ha ⁻¹	0	1	1	0	0	0	0	0	0	0	1	2	3	3	3	3	3	3
T 12	CME + MSM 20WP 5.0 g ha ⁻¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T 13	2,4-D Na salt 80 WP 1.0 kg ai ha ⁻¹	0	0	0	0	0	0	7	8	9	0	0	0	0	0	8	10	10	10
T 14	2,4-D Na salt 80 WP 1.5 kg ai ha ⁻¹	0	0	0	0	0	0	6	12	13	0	0	0	0	0	7	7	8	8
T 15	2,4-D Na salt 80 WP 2.0 kg ai ha ⁻¹	0	0	0	0	0	0	6	8	9	0	0	0	0	0	5	6	6	6
T 16	2,4-D Na salt 80 WP 2.5 kg ai ha ⁻¹	0	0	0	0	0	0	8	8	8	0	0	0	0	0	5	5	5	5
T 17	Manual Cutting	0	9	38	41	45	49	49	49	49	0	11	31	38	42	44	44	44	44
T18	Unsprayed control	0	0	0	0	4	6	7	12	15	0	0	0	0	0	4	6	9	10

Note: CME + MSM 20 WP = Chlorimuron ethyl 10WP + metsulfuron methyl 10 WP

DASp/DAS = Days after spraying