

Effect of spray application of glyphosate on morphological characters of *Hibiscus cannabinus* Linn

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ABSTRACT

In present study, the herbicidal activities of glyphosate on *Hibiscus cannabinus* Linn. have been studied. The Morphological responses might produce some light on the manner by which this compound affected on plants. The plants were sprayed with aqueous solution of different concentrations of herbicide from 100 to 5000 ppm. Glyphosate was efficient in killing the weed. The lethal dose of glyphosate was 1200 ppm.

Key words: Herbicide, Glyphosate, Spray application, Morphological characters and *Hibiscus cannabinus* Linn.

INTRODUCTION

Plants of *Hibiscus cannabinus* were raised from seeds collected from naturally growing plants of different places in Nagpur and its environs. They were allowed to grow till they attained the flowering and at this stage plants were sprayed with different concentrations of glyphosate.

The aqueous solution of herbicide ranging from 100 to 5000 ppm was prepared. Ten pots for each concentrations (100 to 2000 ppm) containing 2 to 3 plants were sprayed. If 2000 ppm was found higher; the lower concentrations were tried to determined lethal dose. Asppe- poly sprayer of one litter capacity did spraying. A small quantity of sodium lauryl sulphate as a surfactant added in the herbicide solution. The Spraying was started in month of October 1996 and same experiments were repeated next year also. Spraying was done twice in an hour to make it more effective in the evening hours, when the wind was slow and temperature comparatively lower than that of the day. This help in less evaporation and more absorption of herbicide

solution by the leaves. To avoid contamination of different concentrations of herbicide, cardboard was used at the time of spraying application. Six pots were sprayed with water used as control. Field trials were conducted on naturally growing plants in randomly designed plots of size approximately 3 O3 feet's.

The fresh and dry weights of shoots and roots of control as well as treated plants were taken to determined desiccation of plants. Morphological changes were observed daily till the death of plants.

RESULTS

The plants sprayed with this herbicide showed yellowed spots on the leaves after 48 hours of treatment at all concentrations. It was gradually preceded towards upper leaves at and above 200 ppm. The chlorosis of leaves was followed by burning effect at higher concentrations. On third day, yellow spots spread all over the leaves and yellowing of leaves firstly started from margin and gradually increased towards midrib. Later on, at 1000 ppm

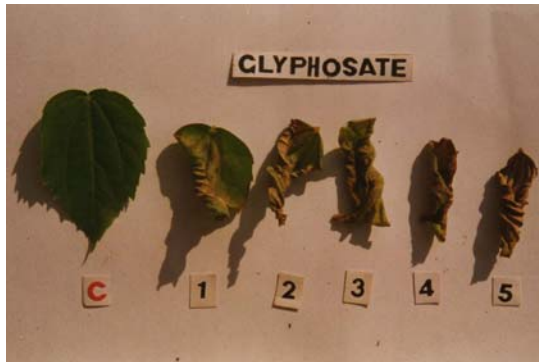


Fig. 1: C- Control, 1 to 5- Showing rolling effects of leaves at 400, 600, 800, 1000 and 1200 ppm of glyphosate, respectively

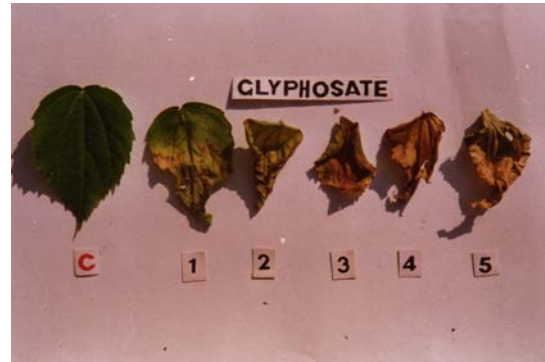


Fig. 2: C- Control, 1 to 5- Showing necrosis of leaves at 400, 600, 800, 1000 and 1200 ppm of glyphosate, respectively



Fig. 3: C- Control, 1 to 5- Showing chlorosis of stem at 200, 400, 600, 800, 1000 and 1200 ppm of glyphosate, respectively.



Fig. 4: C- Control, 1 to 5- Showing necrosis on petiole at 200, 400, 600, 800, 1000 and 1200 ppm of glyphosate, respectively



Fig. 5- C- Control, 1 to 5- Showing progressive decreasing in the length in the length of root at 400, 600, 800, 1000 and 1200 ppm of glyphosate, respectively



Fig. 6- C- Control, 1 to 5- Plant after spray application 200, 400, 600, 800, 1000 and 1200 ppm of glyphosate, respectively

lamina showed burning effect (Fig. 1). The stem and petiole became pale green on fifth day after spraying. The inhibition of lateral growth of plants was observed at the concentrations of 200 ppm and above.

On sixth day, the younger leaves became brown in colors and crumpled upward and later they dried completely (Fig. 2). The terminal and axillary buds became dried and fell down. The stem and petiole became yellow and stems were swollen at upper internodes (Figs. 3 and 4). On eighth day, the entire root system became stunted in appearance and the growth of lateral roots reduced at and above

600 ppm concentrations (Fig. 5). The older leaves became brown and dried completely at 1000 ppm and above. The lamina of leaves was rolled upwards with burning effects at some places. On ninth day, all the plants dried at 1200 ppm. The terminals and axillary's buds deformed, the stem and the leaves became brown in colors and then dried off completely. Thus this concentration was considered as lethal dose. The field trials also showed similar results (Fig. 6).

Gradual decrease in fresh and dry weight of the shoots and roots was observed at all concentrations of herbicide. (Table 1).

Table 1: Effect of herbicide on fresh and dry weight of *Hibiscus cannabinus* Linn.

Herbicide	Concentration (ppm)	Weight of fresh plants		Weight of dry plants	
		Shoot (gm)	Root (gm)	Shoot (gm)	Root (gm)
Control	-	2.79	0.27	1.33	0.20
Glyphosate	200	2.47	0.23	0.88	0.20
	400	2.41	0.15	0.68	0.07
	600	2.34	0.40	0.64	0.06
	800	1.61	0.08	0.47	0.05
	1000	1.55	0.07	0.41	0.03
	1200	1.20	0.06	0.39	0.02

Note :- Average weight based on ten plants.

DISCUSSION

Glyphosate inhibited weed *Hibiscus cannabinus* Linn. by inducing some morphological changes. It showed scorching of leaves, necrosis and chlorosis of leaves. Hammerton (1975); Suwunnamek and Packer (1965) on *Cyperus rotundus*, reported malformation on leaves. Campbell *et.al.* (1976) on *Agropyron repense*, reported similar results. Similarly Zandstra and Nishimato (1977) on *Cyperus rotundus*, Fernander and Boyer (1977) on *Cynodon dactylon*, Hull *et.al.* (1977) on Mesquite, Segura *et.al.* (1977) on *Lolium multiflorum* and *Trifolium protense*, Abu Irmalish and Jordan (1978) on *Cyperus rotundus*, Hoagland and Poul (1978) on *Lemna gibba*, Marriage and Khan (1978) on *Pinus persica*, Lutman and

Richardson (1978) on *Solanum tuberosum*, Haderlie *et. al.* (1978) on *Glycin max*, Moosavi-nia and Dove (1979ab) on *Imperta cylindrica* and *Cyperus rotundus*, Scheltz and Burnside (1980) on *Apocynum cannabinus*, Hollender and Amrhein (1980) on *Fagopyrum esculumtum*, Lee (1981) on Soybean and Tobacco, O Sullivan and Kossatz (1982) on *Cirsium arvense*, Villanueva *et. al.* (1985) on *Cyperus esculentus*, Venkatesh *et al.* (1989) on *Oxalis aetosella*, Leif and Delke (1990) on *Sparganium eurycarpum*, Canal *et al.* (1990) on *Cyperus rotundus*, Tripathi *et. al.* (1992) on *Lantana camara*, Jain (1993) on *Chenopodium album*, Bobde (1993) on *Crotalaria juncea*, Suresh babu and Muniyappa (1994) on *Solanum elaeagnifolium*, Damodaran and Rao (1995) on *Parthenium hysterophorus* and *Rernonia cineria*, Josan (1995)

on *Sorghum halepense*, *Medicago spp.*, *Oxalis corniculata* and *Euphorbia microphylla* and Kulkarni (1998) on *Crotalaria medicaginea* var. *laxurians* reported chlorosis, necrosis on leaves due to application of glyphosate.

In present study, inhibition of apical growth of stem and injury like burning effect associated with chlorosis and necrosis was observed. Similar observations were reported by Marriage and Khan (1978) on *Pinus persica*, Abu Irmaleesh and Jordan (1978) on *Cyperus rotundus*, Lutman and Richardson (1978) on *Solanum tuberosum*, O Sullivan and Kossatz (1982) on *Cirsium arvense*, Boerboom and Wyse (1988ab) on *Cirsium arvense*, Tanhiphat and Appleby (1990) on *Arihenatherum elatius* var. *bulbosum*, Leif and Delke (1990) on *Sparganium eurycarpum*, Dawson (1990) on *Cuscuta compestris* and *Cuscuta indecora*, Jain (1993) on *Chenopodium album*, Bobde (1993) on *Crotalaria juncea*, Damodaran and Rao (1995) on *Parthenium hysterophorus* and *Rernonia cineria*, and Kulkarni (1998) on *Crotalaria medicaginea* var. *laxurians* reported suppression of apical growth of shoots with an increase in concentrations in above mentioned plants.

The roots were injured and root growth was inhibited by application of glyphosate. The inflorescences dried and inhibited flower bud formation after treatment of herbicide. Lutman and Richardson (1978) on *Solanum tuberosum*, Scheltz and Burnside (1980) on *Apocynum cannabinus*, Jain (1993) on *Chenopodium album*, Bobde (1993) on *Crotalaria juncea*, Mishra and Ban (1994) on *Parthenium hysterophorus*, Conn and Deck (1995) on *Hordenum fabatum*, and Kulkarni (1998) on *Crotalaria medicaginea* var. *laxurians* reported several injuries in roots and inhibition of flower formation.

There was gradual decrease in the dry and fresh weight as the concentrations of herbicide increased. Similar reports were reported by Marriage and Khan (1978) on *Pinus persica*, Tanhiphat and Appleby (1990) on *Arihenatherum elatius* var. *bulbosum*, Blackshaw (1991) on *Bromus tectorum*, Chaudhary and Pathak (1992) on *Oxalis martiana*, Jain (1993) on *Chenopodium album*, Bobde (1993) on *Crotalaria juncea*, Suresh babu and Muniyappa (1994) on *Solanum elaeagnifolium*, Mishra and Ban (1994) on *Parthenium hysterophorus*, and Kulkarni (1998) on *Crotalaria medicaginea* var. *laxurians*.

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