SHORT COMMUNICATION

Response of *Malva neglecta* Wallr to Phenoxy Formulations at Different Growth Stages

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ABSTRACT

Mallow showed no response to 2, 4-D sodium salt (2,4-Dichlorophonoxy acetic acid) formulation in wheat (*Tritcum aestivum*) fields at NARC, Islamabad, and suspected tolerance was tested in laboratory under controlled conditions. Two formulations of phenoxy herbicides each applied at two rates and five different growth stages of the mallow depicted that all treatments developed apinasty, leading to chlorosis and necrosis. DMA-6 (2,4-D Dimethylamine) gave relatively rapid plant kill and pronounced biomass reduction, irrespective of growth stage. It was hypothesised that it was not the genetic tolerance induced in the plant that escaped the herbicide treatment rather the environmental factors probably the lower temperature which caused barier to absorption of the 2,4-D sodium salt formulation to a concentration not enough to kill the plant.

INTRODUCTION

Malvaneglecta (wallr.) common mallow is a round-leaved, commonly found in barnyards, gardens waste places and in the cultivated fields. It is an annual or biennial reporting when present in cultivated land. It puts up strong competition to annual crops. Its prolific seed has a hard coat and can remain dormant in the soil. It ranks among tough weeds because of long tap root, rich source of carbohydrates, resembling it with perrenials. Semiprostrate stem radiates from the tap root (Nebraska weeds 1979, Stewart 1972). Like most broad-leaved weeds, malva is supposed to be killed with folier applied sodium salt formulated 2,4-D (2, 4-Dichlorophenoxy acetic acid) (Herbicide Hand-book 1979). Mallow weed was observed escaping 2,4-D-sodium salt in the wheat fields at National Agricultural Research Centre (NARC), Islamabad. This tract of the country has rainfed agriculture and receives an average of 1000 mm precipitation, annually. Escape of mallow weed from 2,4-D sodium salt operation may be attributed to the following possibilities—

(i) The rate of herbicide was sublethal.
(ii) Weed growth stage was mature enough to nullify the toxic effects of the herbicide.
(iii) The weed strain of this region could be tolerant to this particular formulation.

To answer the aforementioned questions, greenhouse/laboratory study was recommended.

MATERIALS AND METHODS

PLANT CULTURE

Mallow seeds were planted in 500 ml plastic pots containing soil obtained from NARC field area. This soil had organic matter less than 1% and pH ranging from 7.8-8. On germination, mallow seedlings were thinned to one per plant. The experiment was split into 4 portions, based on

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leaf growth stage variables: 3,4-5, 7-9 and 9-11 fully expanded leaf grown when the herbicide treatments were applied. Two phenoxy herbicide formulations 2,4-D-Sodium salt and DMA-6 (2,4-D Dimethylamine salt), dissolved in water as diluent carrier, were foliarly applied at two rates 1.87,3.75 kg ae/ha and 1.25 and 2.5 kg ae/ha respectively. (Each lower rate corresponds to the recommended dose). Herbicides were delivered with a mannual Knap sack sprayer equipped with a flat fan nozzel. Pots were kept on a laboratory bench near the window where ventilation was frequent and daylight was ample. However,plants were exposed to sun under the bare sky for three hours every day to acclimatise with the natural conditions. Plants received hoagland solution at half strength once a week and irrigation whenever necessary. Treatments were replicted four times in a split split plot design with complete randomization. Main plot herbicide had two sub plots, rate of herbicide and stage of herbicide application. Plant tops were harvested and weighed for dry and fresh biomass. Data was subjected to statistical analysis and means were separated by Duncan's Multiple Range Test at 0.01 level.

RESULTS AND DISCUSSION

All treatments at each growth stage developed epinasty, a typical characteristic of phenoxy herbicides. Later, the plants attained yellow tops, following chlorosis and necrosis. Both rates of either herbicide supressed the growth. However, DMA-6 gave rapid plant kill and a significant reduction in biomass was noticed. Consequently, a drastic decline in shoot weight appeared, irrespective of growth stage. Figures within the horizontal columns reflected that higher the growth, more difficult to achieve complete plant kill (Table-1).

2,4-D sodium salt being old introduced herbicide, is very famous in every market and is available on relatively cheaper price. Of course, its efficacy on broad spectrum broad-leaved weed species is a recognised fact. However, degree of effectiveness is very much dependent upon the

Table 1 Shoot weight of *Malva neglecta* as affected by the application of post emergence phenoxy formulations at different growth stages at NARC, 1984

Treatment	Rate (kg a.i./A)	Leaf Stages							
		3L		4-5		7-9		9-11	
		Fresh	*Dry*	Fresh	Dry	Fresh	Dry	Fresh	Dry
2,4-D-Na	0.75	2.1a	0.4a	2.5a	0.6a	10.8a	1.9a	17.6a	3.0a
2,4-D-Na	1.50	1.9bc	0.3ab	2.0b	0.4b	8.5b	1.8b	15.8b	2.9ab
DMA-6	0.50	1.2d	0.2d	2.2c	0.3bc	9.0c	1.9a	13.8c	2.8b
DMA-6	1.0	0.6e	0.2b	1.9d	0.2c	6.5b	1.4c	13.4d	1.8c
(Check)	None	5.4f	0.8c	5.8e	0.9d	15.8e	2.2d	22.9e	3.8d

Means within the columns followed by common letters are not significantly different according to Duncan's New multiple rang test at 1% level

environmental conditions such as temperature, relative humidity, type of formulation, etc. It is documented to be more effective on young weed seedlings at 50-90 F° temperature. These factors determine the absorption and translocation of the spray to the site of action. Wheat receives post-emergence treatment in late December or January when both wheat and weeds are at proper stage but average regional temperature is very low, ranging between 36-51 F° and 34-50 F°, respectively.

Our studies indicate that it is not the biochemical tolerance, rather a physical barrier on plant which limit the absorption of 2,4-D sodium salt formulation to the concentration which could be lethal to plants. Translocation of 2,4-D sodium salt products is otherwise very limited. Craft (1966) reported that translocation of radio-labelled 2,4-DB out of the treated leaf was limited in soybeans and other leguminous plants. In contrast, dimethylated 2,4 D has relatively easy penetration and translocation into the plant system and hence, could succeeded to the target site. It is hypothesised that it was probably the lower temperature of the region which limited the absorption of the appropriate concentration of 2,4-D sodium salt formulation.

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