Research Paper Botany

Effect Of Malathion and an Effluent on Plant Dry Weight and the Number of Pods Per Plant in two Soybean (Glycine Max L.) Varieties

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ABSTRACT

Agricultural chemicals are being extensively used by the farmers for obtaining high crop yields by controlling pests and diseases and eliminating weeds. But the Indian farmers do not realize that their indiscriminate use may have adverse effect on crop plants as well as other non target organisms.

This investigation deals with the effect of one pesticide (Malathion) and Effluent of a Sugar Industry on plant dry weight and number of pods per plant on two varieties of Soybean (Glycine max L.) namely Bragg and Birsa-1.

The normal concentration used during crop cultivation under field conditions was used as medium dose for Malathion. Effluent was diluted to 10%, 25% and 50% with distilled water and filtered after proper shaking. Seeds of two varieties of Soybean (Glycine max L.) namely Bragg and Birsa-1 were presoaked in distilled water. 100 seeds were then treated with three concentrations namely 0.10%, 0.20% and 0.40% for Malathion and 10%, 25% and 50% for Effluent for two hours and then sown in experimental field in two replications along with the control after thorough washing.

The plant dry weight showed marked reduction in all the treatment doses of both the varieties as compared to the control; being lowest in their high concentration. Dose dependent inverse relationship was observed in both the varieties in Malathion. However, no definite correlation were observed for Effluent.

For observation on number of pods per plant in variety Bragg a decreasing trend with increase in concentration was observed for both Malathion and Effluent showing significant reduction in their medium and high concentration as compared to that of control. In variety Birsa-1, inverse relationship between treatment doses and number of pods per plant was observed in Malathion treatment whereas in Effluent all the treatment doses showed a very narrow range of variation.

Differential response to various treatments were observed in the two varieties of Soybean. Variety Birsa-1 seems to be more prone to adverse effect of these treatments than variety Bragg, which could be due to their different genetic makeup. It is therefore important to use pesticides very judiciously. The only available remedy, thus is to go in for bio-pesticides and organic farming.

KEYWORDS Birsa1, Bio-pesticides ,Bragg, , Effluent, Malathion Treatment , Number of pods per plant, Plant Dry Weight ,Soybean.

Introduction

Agricultural chemicals are being used extensively by the farmers for obtaining high crop yields by controlling pests and diseases and eliminating weeds. But the Indian farmers do not realize that their indiscriminate use may have adverse effect on the crop plants as well as other non target organism.

Materials and methods

The present investigation deals with the effect of pesticide (**malathion**) and a **sugar factory effluent** on plant dry weight and numbers of pods per plant on two varieties of soybean (Glycine max L.) namely **Bragg** and **Birsa-1** .The normal concentration used in controlling weeds during crop cultivation under field conditions was used as medium dose for **malathion** .The **Effluent** was diluted to 10%, 25% and 50% with distilled water and filtered with proper shaking

Fresh soybean plant and seeds Infected soybean plant

Table showing concentration used for treatments. (Table: 1)

S.NO	CHEMICALS	HIGH CONC.	MEDIUM CONC.	LOW CONC.
1	Malathion	0.40%	0.20%	0.10%
2	Effluent	50%	25%	10%

Results

In the variety **Bragg,** the plant dry weight showed a large variation from 22.0g with **malathion** high concentration to 36.10g with **effluent** medium concentration. The dry weight for control was 36.90g for both the chemicals. The plant dry weight in variety Birsa**-1** varied from 24.20g in **malathion** high concentration to 35.75g in **effluent** medium concentration

Mean values of plant dry weight under Malathion/Effluent treatments in Soybean varieties Bragg and Birsa-I (Table: 2 a)

TREATMENT		PLANT DRY WEIGHT(g) (BRAGG)	PLANT DRY WEIGHT(g) (BIRSA -I)
CONTROL		36.90	40.00
MALATHION	Low	28.90	34.00
	Med	26.80*	30.50*
	High	22.00*	24.20*
Mean		25.90	29.56
EFFLUENT	Low	29.80	34.80
	Med	36.10	35.75
	High	27.60*	32.30
Mean		31.16	34.28

Number of pods per plant in variety **Bragg** ranged from 34.10 in **malathion** high concentration to 57.60 in **malathion** low concentration.The number of pods per plant in control was 58.20. In variety **Birsa-1**, the number of pods per plant in control was 69.40. It ranged from 48.75 in **malathion** high concentration to 64.90 in **effluent** low concentration

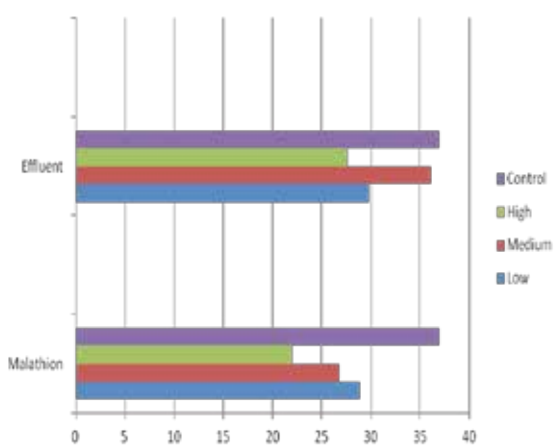
Mean values of number of pods per plant under Malathion/Effluent treatments in Soybean varieties Bragg and Birsa-I (Table 2 b)

TREATMENT	NUMBER OF PODS PER PLANT (BRAGG)	NUMBER OF PODS PER PLANT (BIRSA -I)
CONTROL	58.20	69.40
MALATHION		
Low	57.60	57.10
Med	46.90*	52.60*
High	34.10*	48.75*
Mean	46.20	52.81
EFFLUENT		
Low	50.20	64.90
Med	46.20*	61.30
High	39.70*	62.30
Mean	45.36	62.83

Discussion

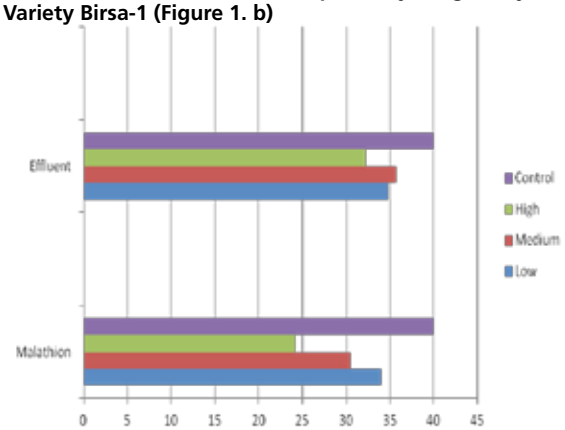
A gradual decrease in the plant dry weight with increase in concentration was observed in **Bragg** variety for **malathion** while for **effluen**t, the decrease was not dose dependent. Although for medium concentration plant dry weight was greater than low and high concentration yet it was lower than that of control

Effect of Malathion/Effluent on plant dry weight Soybean variety Bragg (Figure 1. a)



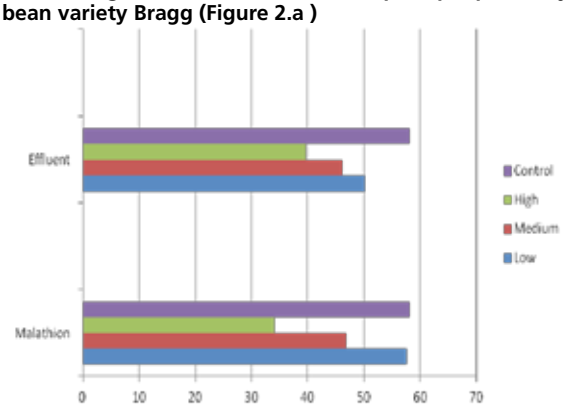
For **Birsa-1**, **malathion** showed steep decrease in plant dry weight. **Effluent** here also showed a varied response. Although its medium concentration was high yet it was lower than that of control

Effect of Malathion/Effluent on plant dry weight Soybean Variety Birsa-1 (Figure 1. b)



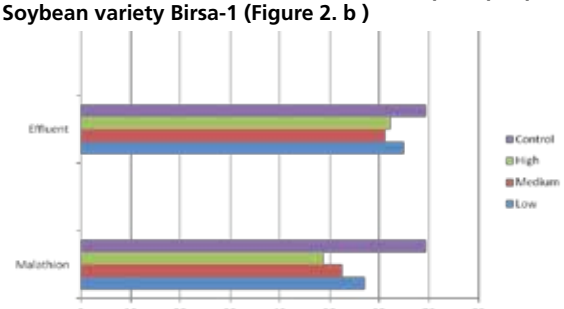
These observations are similar to the effect of varying concentration of certain herbicides and radiations on **pigeon pea** made by **Bertholet & Clark (1985)** and on **groundnut** by **Pahwa & Prakash(1992)** ,where the increasing concentration of herbicide treatments reduced the fresh and dry weight of plants as compared to their respective controls. In variety **Bragg**, inverse relationship between treatment doses and number of pods per plant was observed in both **malathion** and **effluent.** The reduction being significant in their medium and high concentrations as compared to that of control.

Effect of Agrochemicals on number of pods per plant Soybean variety Bragg (Figure 2.a)



Similar effects have been observed on the effect of agricultural chemicals and irradiations on various plants also viz., **Bari (1971)** on **Flax** , **Baijukya and Semu** (1998) on ***Phaseolus vulgaris***, **Wang and Zhou (2006)** on **wheat** and **Amaregouda *et al.* (2013)** on **Soybean.**The results were a bit different for the variety **Birsa1**.While for **malathion** the reduction in the number of pods per plant was dose dependent showing significant decrease in medium and high concentration as compared to the control. But for **effluent**, the reduction in the number of pods per plant showed a narrow range of variation

Effect of Malathion/Effluent on number of pods per plant Soybean variety Birsa-1 (Figure 2. b)



CONCLUSION

Malathion showed more adverse results on both the varieties for both characteristics (plant dry weight and number of pods per plant).The results due to **effluent** were quite variable and not regular. This may be due to the difference in genetic makeup of both the varieties of soybean. Indiscriminate use of **pesticides** not only allow the parasitic organisms to develop immunity affecting the crops even more, but also produce unwanted adverse effects on non-target organisms .They also create health hazards to the farmers who stay in close contact with these agrochemicals during field operation

It is therefore, important to use pesticides very judiciously, if at all there is a compulsion to use them. The only suggested available remedy is to go in for **bio-pesticides** and **organic farming** and reduce progressive dependence on harmful pesticides and chemical fertilizers

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