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Study of Phytotoxicity of Extracts of *Ipomoea carnea* Jacq. Against *Sida rhombifolia* Mast

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In present study, the allelopathic effect of *Ipomoea carnea* on its associate species *e.g*., *Sida rhombifolia* is studied. The growth of plant species was markedly influenced by the extracts of different parts roots, shoot and leaves of *Ipomoea carnea*.

Key Words: Allelopathic, Phytotoxicity, *Ipomoea carnea*, *Sida rhombifolia*.

INTRODUCTION

A number of organic compounds found in plant extracts cause varying degrees of inhibition[1]. Among compounds frequently mentioned are organic acids[2], essential oils[3], glucosides[4], aldehydes[5], amino acids[2], alkaloids[6], antibiotics[7] and ammonia[8]. The effect of plant leachates or aqueous extracts may help to explain some replant problems[1,9] and soil conditions commonly referred to as "soil sickness".

The observed success of *Ipomoea carnea* in field, often at the cost of other species, also is a pointer to the aggressive nature of the species. Possible reasons for the success of the species could lie in better rate of growth in the comparison with other species and its inhibitory effect on others. The second possibility is verified through experiments set up to check allelopathic behaviour of *Ipomoea carnea*.

EXPERIMENTAL

Seeds of plant species common to ruderal habitats in the city *Sida rhombifolia* were collected after monsoon, dried and stored for 6 months. Sufficient numbers of seeds of the aforesaid plant species were germinated to obtain suitable numbers of seedlings for planned experiments. Healthy seedlings from these seeds were transplanted in plastic pots containing mixture of soil and organic matter in 3:1 proportion. Five plants were maintained per pot and allowed to establish well.

Aqueous extracts of roots, shoots and leaves of *Ipomoea carnea* were prepared in the following manner. Fresh shoots and leaves were crushed separately and extracted as juices to be used as stocks. Distilled water was used for preparing dilutions containing 5, 10, 15 and 20 % of the original juice. 500 mL of each of these solutions was added to each pot of the established seedlings. (Treatment was started from 6th day of establishment). The extracts were prepared fresh every day. Root length, shoot length and shoot dry weights were selected as parameters of growth of test plants.

RESULTS AND DISCUSSION

Growth of plant species was markedly influenced by the extracts of *Ipomoea carnea* (Table-1 and Fig. 1). With increasing concentrations of root extract, progressively adverse effect was visible on seedlings of test plants. Extract of leaves produced more effect than that by shoot extract.

Effect of extracts on *Sida rhombifolia*: This species was maximum affected by roots, shoots and leaf extracts with increasing concentrations of extracts, there is a continuous decrease in the values of shoot dry weight, shoot length and root length (Table-1).

Root extract: Effect of root extract was more acute and showed maximum damage to dry weight of shoot, followed by root length and shoot length. The dry matter production per shoot was highest in the control plants and other parameters showed a reduction as follows- 38.36 % in 5 % extract, 51.22 % in 10 % extract, 60.76 % in 15 % extract and 74.28 % reduction in 20 % extract.

Root length showed decrease with increasing concentrations of extracts. The value were-36.6 % in 5 % extract, 53.93 % in 10 % extract, 66.7 % in 15 % extract and 72.22 % reduction was observed in 20 % extract. Height of shoot per plant also showed a trend similar to the one exhibited by the root length.

Shoot extract: When plants of *Sida rhombifolia* were subjected to different concentrations of shoot extract, they showed different levels of effects on all the parameters studied. Severity of effects was maximum in plants treated with root extracts and minimum in those treated with shoot extracts.

TABLE-1
PHYTOTOXICITY OF AQUEOUS EXTRACTS OF ROOTS, SHOOT AND LEAVES OF *Ipomoea carnea* ON THE GROWTH OF *Sida rhombifolia* MAST

Parts used for extract	Concentration of extract (%)	Root length (cm)	Reduction (%)	Shoot length (cm)	Reduction (%)	Shoot dry weight (g)	Reduction (%)
Control	(No extract)	13.36±0.08	–	25.49±0.08	–	4.51±0.07	–
Root	5	8.49±0.05	36.60	17.53±0.06	31.23	2.78±0.03	38.36
Root	10	6.17±0.05	53.93	16.46±0.05	35.43	2.20±0.51	51.22
Root	15	4.46±0.05	66.70	14.28±0.03	44.00	1.77±0.02	60.76
Root	20	3.72±0.02	72.22	12.64±0.04	50.42	1.16±0.02	74.28
Shoot	5	11.36±0.06	15.17	23.22±0.03	8.91	3.9±0.01	13.53
Shoot	10	10.19±0.04	23.90	22.91±0.01	10.13	3.3±0.03	26.83
Shoot	15	9.22±0.04	31.15	21.89±0.01	14.13	2.92±0.01	35.48
Shoot	20	7.79±0.05	41.83	20.79±0.02	18.48	2.16±0.03	52.11
Leaf	5	10.35±0.04	22.71	21.58±0.03	15.34	3.38±0.02	25.06
Leaf	10	9.84±0.01	26.52	20.15±0.01	20.95	2.83±0.01	37.26
Leaf	15	8.27±0.02	38.24	19.33±0.03	24.17	2.10±0.03	53.44
Leaf	20	7.37±0.03	44.96	16.42±0.02	35.59	1.88±0.01	58.32

(Mean of 15 observations ± SEM).

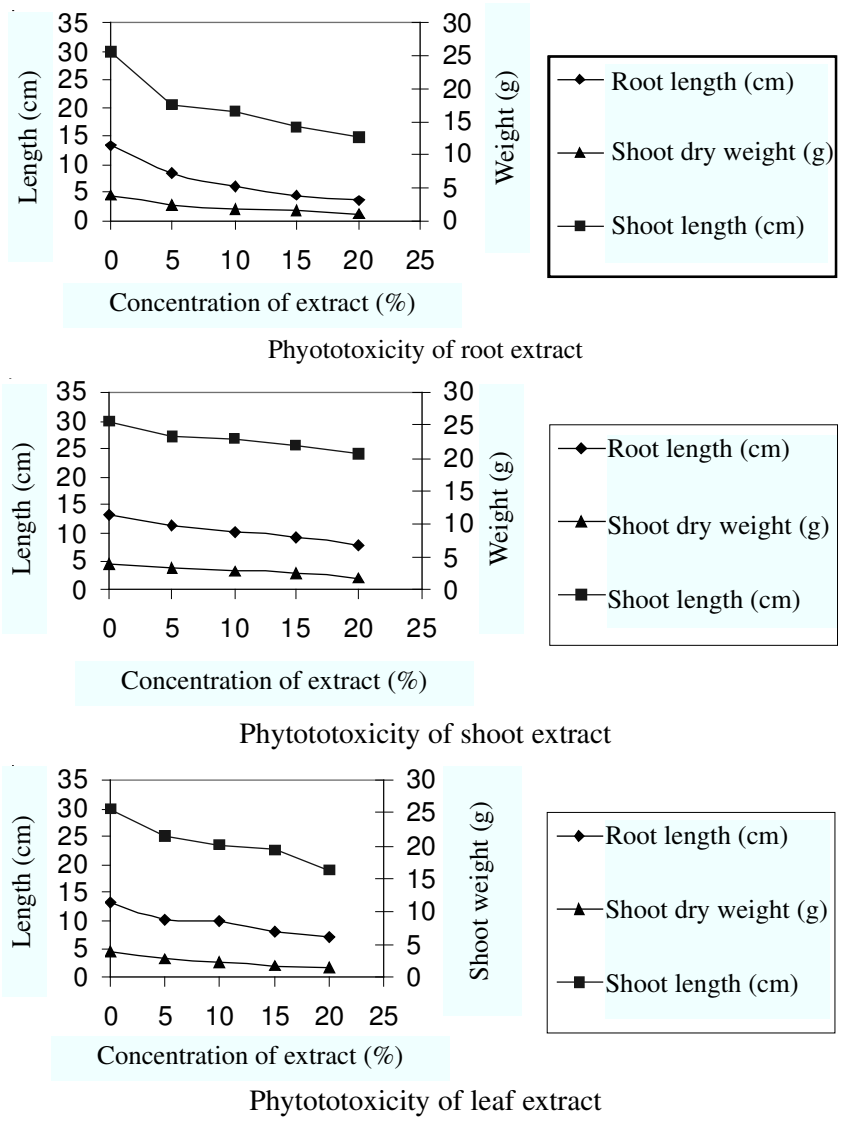

Fig. 1. Phytotoxicity of aqueous extracts of roots, shoot and leaves of *Ipomoea carnea* on the growth of *Sida rhombifolia* mast

Reduction in shot dry weight noticed was as follows-5 % extract showed 13.53 % reduction, 10 % extract caused 26.83 % reduction, 35.48 % reduction was in 15 % extract and 20 % extract resulted in 52.11 % reduction. Root length was highest in control plants. The reduction in the root length over control was as follows-15.17 % reduction in 5 % extract, 23.9 % reduction in 10 % extract, 31.15 % reduction in 15 % extract and 41.83 % reduction in 20 % extract. Similar trend was observed for shoot length.

Leaf extract: Effect of leaf extract was moderate as compared to that in root extract. The effect on shoot dry weight was intense, followed by that on root length and shoot length. The shoot mass was highest in the control plants, whereas in further concentrations the shoot mass showed lower values as follows: In 5 % extract, reduction was 25.06 %, in 10 % extract it was 37.26 %, in 15 % extract the reduction was 53.44 % and it was 58.32 % in 20 % extract.

The root length was maximum in control plants; increasing concentrations showed further reduction in the length of roots. The values were-13.39 cm in control, 10.35 cm in 5 % extract, 9.84 cm in 10 % extract, 8.27 cm in 15 % extract and 7.37 cm in 20 % extract.

The shoot length was highest in control and decreased in further concentration. Vegetation of *Ipomoea carnea* would seem to possess some factor which inhibits growth of its associate plant species. The effect of growth inhibiting factor was more evident in higher concentrations of extracts. Carley and Watson reported[1] that aqueous extracts of residues from 23 plant species inhibited the germination of clover, lettuce, radish and wheat seeds. Similar observations were made by Pandya[10] who studied allelopathic potentials of *Celosia argentea* on *Pennisetum typhoids*. Aqueous extracts of fresh leaves, stems and roots caused inhibition which was more at higher concentrations. He also observed a trend towards recovery at lower concentrations of *Celosia* extract. Root and leaf extracts proved more toxic than the shoot extract. Aqueous extract of root and shoot of *Digera arvensis* had a strong allelopathic potential on bajara crop[11]. In the present investigation also, the effect of growth inhibiting factor becomes more evident in higher concentrations of the extracts of *Ipomoea carnea*.

Conclusion

Results of allelopathic studies presented in this paper indicate the possibility that other species, due to their reduced growth, may not stand competition and ultimately lose their position in the stand. This explains occurrence of almost pure stands of *Ipomoea carnea* in numerous urban habitats. Plant can be considered for green belt development in and around an urban area.

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