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RESEARCH ARTICLE

INHIBITORY EFFECT OF WILD ONION (*ASPHODELUS TENUIFOLIUS* CAV.) ON THE SEEDLING GROWTH OF *ZEAMAYS* L.

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Abstract

Allelopathy is a mechanism in which allelo-chemicals produced by plants may inhibit or enhance the associated plant growth. In the present investigation it is observed that the higher concentration of shoot and seed extracts of *Asphodelus tenuifolius* Cav. have shown the inhibitory effect on germination of the tested crop, *Zea mays* L. Further, different concentrations of shoot and seed extracts of *A. tenuifolius* Cav. have shown significant inhibitory effect on germination of seedlings and growth attributes of *Zea mays* L. Plants, which were not treated with any extracts (control) showed maximum germination and growth pattern. Whereas at lower concentrations of shoot and seed extracts of *A. tenuifolius* Cav., significant growth was observed in shoot and root length of *Zea mays* L.

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Introduction:-

Allelopathy is a mechanism, in which specific chemical substances released by live or dead/decaying plants cause interference with associated plant community (Harper, 1977) including bacteria and fungi. These chemical substances are called as allelochemicals which may impart inhibitory or rarely stimulatory effects on the germination and growth parameters of associated plants. Allelopathy is a wide research area which has been conducted in various fields of agricultural and allied sciences. It is an emerging science and potential area of research for future sustainable agriculture. It is eco-friendly, can save the available resources and also may mitigate the serious problems raised by synthetic agrochemicals. The allelochemicals produced by plants are basically the byproducts of primary metabolic processes. Current research in this area is focused on the effects of weeds on crops and crops on weeds (Jabeen *et al.*, 2011).

Weeds are invasive plants which are not only consume the soil nutrients, available moisture but also compete for space and sunlight with economically important plants, thereby causing yield reduction of valuable crops. In addition, weeds decrease the quality and quantity of agricultural products and consequently reduce their market value (Hanif *et al.*, 2004; Pervaiz & Quazi, 1999). *Asphodelus tenuifolius* Cavase also called as wild onion is a native to the Mediterranean region and Macaronesia, but now it is widespread through the Arabian Peninsula to the Indian Subcontinent. It is also spreading in Malaysia, Australia, Chile, New Zealand, Mexico and United States of America (Nasir & Ali, 1989). Wild weed (*Asphodelus tenuifolius* Cav.) is declared as noxious weed in several countries and can be easily seen in sand soils of Indo-Pak sub-continent. Its control is a desired and the major component of management in the production system (Norris, 1982; Young *et al.*, 1996). In present investigation

attempts were made to explore the allelopathic effect of *Asphodelus tenuifolius* Cav. on the germination and growth attributes of *Zea mays* L.

Materials and methods:-

Collection of test weed

Healthy plants of *A. tenuifolius* were selected to prepare tested solutions and collected from agricultural farms of Dayalbagh, Agra. Plant samples were washed and then allowed them to dry at room temperature (27⁰ C) in shade.

Extract preparation of test weed

To prepare extract of tested weed plants, the plants materials i.e., shoot and seeds were crushed and allowed to decay in distilled water for 24 hrs in the ratio of 1:10 (plant material: water). Extraction of leachates was done by using the sieve (2 mm mesh) to make its different concentration (25 %, 50%, 75%, & 100%).

Sterilization

Glass wares were sterilized before their use in experiment at 121⁰C, 15 lb/cm³ pressure for 15 min. and seeds of the selected crop were surface sterilized by HgCl₂ (mercuric chloride) before conducting experimentation.

Bioassay

Bioassay was done to identify effective concentrations of tested weed extract for its allelopathic activity on germination and growth parameters of *Zea mays* L. *In vivo* study was conducted under field conditions with the prepared extracts. 10 seeds of maize (*Zea mays*) were soaked in each concentrations of extract for 24 hours. The soaked seeds were transferred in pots filled with soil. 25 ml of extract has been poured in soil at the day of seed transfer. 5 ml of extract was sprayed on germinated plants at alternate days. The germination of seed, root length, shoot length and dry weight of plants was recorded at 15th day after sowing *in vivo*.

Experimental design and statistical Analysis

Experiments in triplicates by following randomized block design were conducted. Growth parameters i.e., germination, root length, shoot length were recorded at 15 days after sowing (DAS). Collected data was tabulated and analyzed statistically.

Results and Discussion:-

Germination effect:

The table-1, shows that in shoot extract of *A. tenuifolius* Cav. the shoot length and germination percentage of maize were decreased significantly. Further, among the applied extract concentrations the maximum germination found in control and minimum germination was found in pure extract i.e. 100%, which showed significant negative effect. The shoot extract exhibited the inhibition of shoot length 2.96%, 9.67%, 10.63% and 11.03% as percentage change over from its control in the different concentrations. The similar pattern was obtained in case of root length where in the root length of maize inhibited 4.31%, 9.31%, 16.62% and 22.55% in the different extract concentrations of *Asphodelous tenuifolious* Cav. over control respectively.

By perusal of the table-2 growth in shoot length and root length found decreased as the increase in concentration of seed extract of *Asphodelous tenuifolious* cav. respectively. Shoot length showed 9.63, 22.43, 29.21 and 34.82% change over control and similar trend in root length also observed. It clearly shows that there is inverse relationship between root, shoot length and concentration of seed extract of *A. tenuifolious* Cav. where in the root length of maize inhibited 9.15%, 29%, 33.43% and 54.30% in the different extract concentrations of *Asphodelous tenuifolious* Cav. over the control respectively.

Fresh weight /dry weight:

The table -1 further reveals that shoot extract of *A. tenuifolious* Cav. inhibited fresh weight of *Zea mays* L. by 11.98%, 17.39%, 23.10% and 29.10% over control . The inhibitory effect increased with dose or vice versa. The inhibitory effect of shoot extract on the dry weight was 17.5%, 32%, 37.5% and 44% over control in the extracts respectively. Fresh Weight / Dry Weight ratio was found significant increase with the different concentrations of shoot extract.

Seed extract of *Asphodelous tenuifolious* Cav. Inhibited fresh weight of *Zea mays* L. by 23.15%, 33.05%, 53.47% and 61.05% over control. The inhibitory effect increased with dose or vice versa. The inhibitory effect of shoot extract on the dry weight was 7.36%, 16.84%, 38.94% and 48.12% over control in the extracts respectively. Fresh Weight / Dry Weight ratio significantly decreases with the concentration of extract. (Table-2)

Present finding is in the conformity of the earlier findings of Mishra *et. al.* (2001), Babar *et. al.*, (2009), Nasira *et. al.*, (2009) and Gautam and Satsangi obtained in their studies.

Conclusion:-

Thus, it can be concluded that both the shoot and seed extracts of *A. tenuifolious* Cav. bears direct inhibitory allelopathic effect over germination and seedling growth of *Zea mays* L. So more emphasis should be given to eradicate the *A. tenuifolious* Cav. weed from the maize crop fields.

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Table 1:-Germination, Shoot Length and Root Length of *Zea mays* L. seeds sprayed in shoot extract of *Asphodelous tenuifolious* Cav. as on 15 DAS.

Concentration	Germination (%)	Shoot Length (cm)	% Change Over Control	Root Length (cm)	% Change Over Control	Fresh Weight (gms)	% Change Over Control	Dry Weight (gms)	% Change Over Control	FW/DW
0	95%	19.94±3.01	-	18.89±0.07	-	6.84±1.55	-	2.02±1.13	-	3.38
25	90%	19.35±1.14	-2.96	18.03±0.92	-4.31	6.02±2.12	-11.98	1.65±0.21	-17.5	3.64
50	85%	18.01±0.14	-9.67	17.13±1.86	-9.31	5.65±0.77	-17.39	1.36±0.08	-32	4.15
75	85%	17.82±1.57	-10.63	15.75±0.17	-16.62	5.26±0.98	-23.10	1.25±0.07	-37.5	4.20
100	75%	17.74±3.64	-11.03	14.63±1.07	-22.55	4.85±0.28	-29.10	1.12±0.09	-44	4.33

Table 2:-Germination, Shoot Length and Root Length of *Zea mays* L. in seed extract of *Asphodelous tenuifolious* Cav. on 15 DAS.

Concentration	Germination (%)	Shoot Length (cm)	% Change Over Control	Root Length (cm)	% Change Over Control	Fresh Weight (gms)	% Change Over Control	Dry Weight (gms)	% Change Over Control	FW/DW
0	85%	22.11±1.74	-	21.95±1.41	-	4.75±0.28	-	0.95±0.07	-	5.00
25	60%	19.98±2.75	-9.63	19.94±3.01	-9.15	3.65±0.35	-23.15	0.88±0.21	-7.36	4.14
50	45%	17.15±2.57	-22.43	15.58±2.20	-29.00	3.18±0.48	-33.05	0.79±0.49	-16.84	4.02
75	30%	15.65±0.17	-29.21	14.61±0.70	-33.43	2.21±0.21	-53.47	0.58±0.35	-38.94	3.82
100	25%	14.41±1.71	-34.82	10.03±0.70	-54.30	1.45±0.07	-61.05	0.49±0.07	-48.12	3.77



Plate 1:-Shoot Length and Root Length of *Zea mays* L. in shoot extract of *Asphodelous tenuifolius* Cav. on 15 DAS

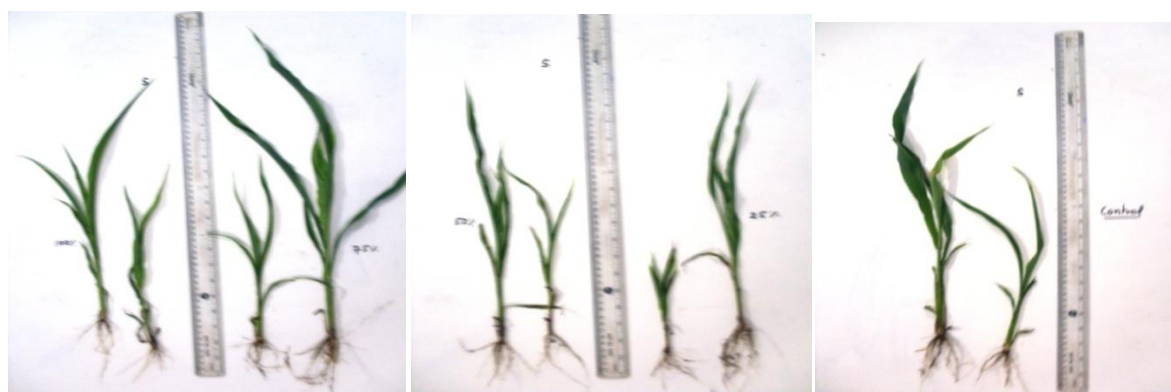


Plate 2:- Shoot Length and Root Length of *Zea mays* L. in seed extract of *Asphodelous tenuifolius* Cav. on 15 DAS

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