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Allelopathic effect of weed (*Phalaris minor* Retz.) extract on seed germination, growth & vigour of wheat (*Triticum aestivum* L.) var. "vidisha"

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Abstract- Weeds are plants which grow elsewhere and are generally unwanted in the crop fields. In the wheat fields of Kosi region in Bihar, weeds are found growing luxuriantly and affect wheat crop in many ways. The present paper is based on experiment conducted to examine the Allelopathic effect of weed (*Phalaris minor* Retz.) extract on wheat (*Triticum aestivum* L.) var. "Vidisha". Various concentrations of weed (*Phalaris minor* Retz.) extracts i.e., 5%, 10%, 15%, 20% were prepared in distilled water and used for the treatment of seeds of wheat (*Triticum aestivum* L.) var. "Vidisha" in triplicate for seven days. The said concentrations were applied to examine per cent seed germination, growth and vigour of the seedlings. It was found that weed extracts reduced the percent seed germination over control (0%), while growth of the seedlings showed increased root and shoot lengths.

Key words: Weeds, Allelopathy, Allelochemicals, Seed Germination

INTRODUCTION

Weeds are plants which grow elsewhere and are unwanted in the crop fields. They interfere with seed germination, growth and yield of crop plants. Allelopathic effects of weeds may be inhibitory or stimulatory. Saraswat (1987)¹ reported beneficial effect on wheat growth. Earlier, it was reported that root and shoot length increased by the aqueous extract of weed (*Phalaris minor* Retz.) extract. Bhatia *et al.* (1982)² also found beneficial effect on the growth and vigour of wheat by the allelopathic effect of extract of *Phalaris minor* Retz.

Weeds are an important factor in the management of lands and water resources but their effect is greatest on agriculture.^{3,4} In North Bihar, particularly in Kosi region wheat fields are infested with varieties of weed species

which affect the productivity adversely. As a result, every year wheat yield decreases considerably. The loss in wheat productivity due to presence of weed species in the wheat field had estimated up to 25%.⁵ Weeds not only compete with crop plants for water, sunlight and nutrients but also produce some chemicals called "Allelochemicals" and their effect is called as Allelopathy.⁶ *Phalaris minor* Retz. is an annual grass weed which is most troublesome in the wheat fields in Kosi region of North Bihar.

Keeping in view of the above mention facts the present paper is based on the examination of allelopathic effect of various concentrations of weed (*Phalaris minor* Retz.) extracts on the seed germination, growth and vigour of the wheat (*Triticum aestivum* L.) var. "Vidisha"

MATERIAL & METHODS

Wheat seed var. "Vidisha" was procured from local seed seller and weed species (*Phalaris minor* Retz.) was

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collected from wheat field lying around B.N.M.U. North Campus, Madhepura.

Stem and leaves of weed (*Phalaris minor* Retz.) were dried in oven at 75°C for 24 hours. Stem and leaves of weed plants were separated and chopped into small pieces for the preparation of extracts. 10 g of these plant organs were crushed in grinder adding 100 ml distilled water. The mixture was kept for 72 hours at room temperature. Aqueous extracts thus obtained were filtered with Whatman filter paper no 1 and the filtrate was made up to 100 ml with addition of distilled water. In this way pure extract so obtained was stored in refrigerator. Different concentrations i.e., 5%, 10%, 15%, 20% were prepared from the pure extract by diluting it with distilled water as required. Before subjecting wheat seeds to the treatment with various concentrations of the extract solution, seeds were treated with 0.01% Hg₂C₁₂ for few minutes. Seeds were then taken for each treatment in Petri dishes (10 cm diam.) with filter

paper soaked with 10 ml of extract solution of different concentrations. For the control pure distilled water was used. Each treatment was carried out in triplicate. Seeds were allowed to germinate under room temperature (26°C±1°C) for seven days.

For the observation of per cent seed germination daily records of seed germination were maintained. For seedling establishment, 5 seedlings of seven days old were taken out from the Petri dishes from each concentration and planted in earthen pots containing soil and manure in the ratio 4:1. Pots were irrigated with water. Establishment of seedlings were recorded only after a fortnight. Growth and vigour of the seedlings were studied by measuring the linear length of the root and shoot after seven days of seed germination and seedling emergence. The data of various observations obtained were analyzed statistically according to Snedecor & Cochran (1967)⁷.

OBSERVATION

Table 1- Effect of aqueous extracts of weed (*Phalaris minor* Retz.) on the seed germination, growth and vigour (In terms of length of root and shoot) of wheat (*Triticum aestivum* L.) var. "Vidisha"

Plant species	Concentration (%)	Germination (%)	Linear growth (cm)	
			Root	Shoot
Wheat (<i>Triticum aestivum</i> L.) Var.Vidisha	Control-0% (pure distilled water)	80±0.48	5.00±1.50	2.50±1.20
	5%	32.00±0.48	6.00±0.90	6.50±0.75
	10%	38.5±0.50	7.25±1.25	6.40±0.56
	15%	10.00±0.30	7.00±1.20	7.50±0.15
	20%	38.50±0.50	5.60±0.80	6.30±0.45

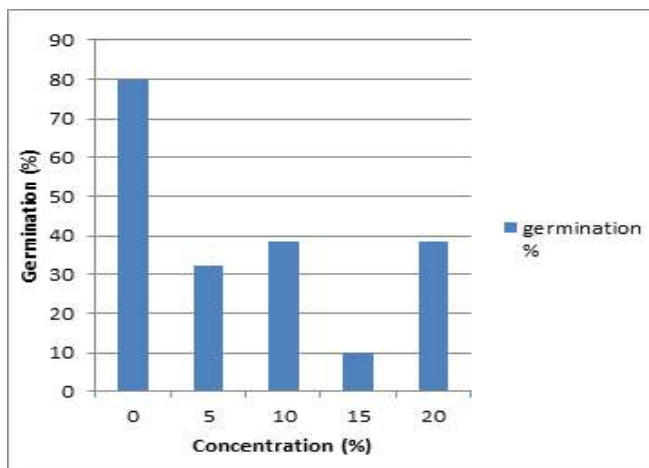


Fig. 1- Graphical representation of per cent seed germination of wheat (*T.aestivum* L.) in various concentrations of weed (*P.minor* Retz.) extracts.

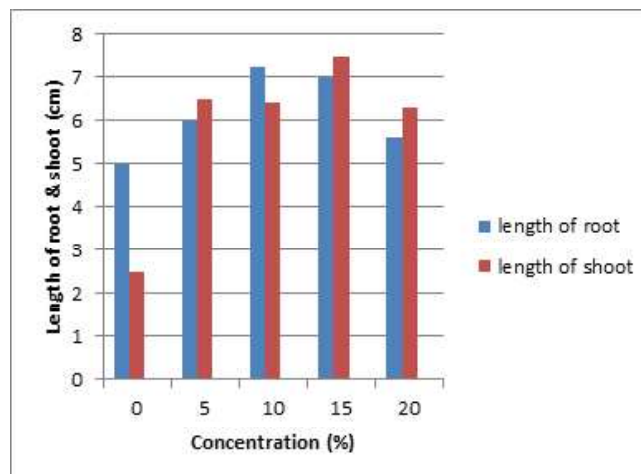


Fig. 2- Graphical representation of root and shoot length of wheat (*T.aestivum* L.) seedling in various concentrations of weed (*P.minor* Retz.)

RESULTS & DISCUSSION

The aqueous extracts of weed (*Phalaris minor* Retz.) showed inhibitory effect on wheat seed germination while, the effect on root and shoot length were found to be stimulatory.

The weed extracts inhibit per cent seed germination of wheat (*Triticum aestivum* L.) var. "Vidisha". The results obtained shown that maximum per cent of seed germination i.e., 80% was found in control (pure distilled water-0%) and the minimum per cent of seed germination was found in 15% aq. extract concentration corresponding to 10% germination. While the value of other treatments- 5%, 10%, 20% corresponded to 32%, 38.5%, 38.5% of seed germination respectively.

Regarding the growth and vigour of the seedlings, the linear lengths of root and shoot were found to be increased showing stimulatory effects in different concentrations of weed extract.

The linear length of root and shoot were maximum under 10% and 15% concentrations of weed extract corresponding to 7.25 and 7.50 cm respectively. The minimum length of root and shoot were recorded as 5.00 and 2.50 cm respectively in 0% concentration of control (pure water). The result obtained clearly indicated inhibitory effects on seed germination and stimulatory effect on growths and vigour of the seedling.

Wheat seed germination in various concentrations was inhibited. In the weed extract concentration of 15%, it was inhibited up to 90% germination, while in 5%, 10% and 20% seed germination inhibited upto 68%, 61.5%, 61.5% respectively.

These results are supported by previous works of Le taurneau *et al.* (1956)⁸. Gupta and Mittal (2012)⁹ also found reduction in the per cent seed germination of wheat after treatment with leaf extract of *Phalaris minor* Retz.

REFERENCES

1. **Saraswat V. N. 1987.** Current status of weed research in India In:Advances in weed science (Shad, R.A.ed.): 5-17 Proceeding Pak –India U.S. Weed control workshop NARC, Islamabad
2. **Bhatia R. K., H. S. Gill & S. P. Mehra 1982.** Allelopathic potential of some weeds on wheat. *Indian Journal of Weed Science* 14(2),108-114

3. **Rao V. S. 1992.** Principles of weed science oxford and IBH Publ. house, New Delhi. PP. 504.
4. **Rao P. B. 2000.** Allelopathic effects with particular reference to weeds and growth and yield of crops In Advances in crop physiology in relation to crop production (ed RD Mishra) pp.23-31
5. **Nayyar M. M, M. Shaf, M. L. Shah and T. Mahmood 1994.** Weed eradication studies in wheat. Abstract 4thPakistan weed science conference U.A.E.
6. **Rice E. L. 1984.** Allelopathy, New York Academic Press, New Delhi. PP. 422.
7. **Snedecor G. W. & Cochran W. G. 1967.** Statistical methods, New Delhi, Oxford & IBH Publ. Copp. 593
8. **Le Tourneau, D. D. Failes, H. G. Heggeness. 1956.** The effect of aqueous extract of plant tissue on germination of seeds and growth of seedling. *Weeds.* 4:363-368
9. **Gupta A. & C. Mittal. 2012.** Effect of allelopathic leaf extract of some selected weed flora of Ajmer district on seed germination of (*Triticum aestivum* L.). *Science Research Reporter.* 2(3): 313-315

ADDITIONAL REFERENCES

10. **Batish D. R., K. Lavanya, H. P Singh and R. K. Kohli. 2007.** Root mediated allelopathic interference of Nettle – leaved Goosefoot(*Chenopodium murule*)on wheat(*Triticum aestivum* L.) *J. Agron. Crop Sci.* 193:37-44
11. **Gagoi B., Das K. & Baruah K. K. 2000.** Effect of allelochemicals on germination and seedling growth of rice (*Oryza sativa* L.) cultivars. *Allelopathy J.* 7(2): 279-283
12. **Kaur A., Pant A. K. & Rao P. B. 1999.** Allelopathic effect of four agro forestry tree species on seed germination and seedling growth of certain varieties of Wheat Indian. *J. Ecol.* 26(2): 125-135
13. **Khosla S. N. and Sobti S. N. 1981.** Parthenium- A promising root inhibitors from *Parthenium hysterophorus*. *Ind J. Forestry.* 4(1): 56-60
14. **Khohli R. K. and Daizy R. Batish 1994.** Exhibition in Allelopathy by *Parthenium hysterophorus* L. in Agroecosystem. *Trop. Ecol.* 35(2): 259-307

Biospectra : Vol. 18(1), March, 2023

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15. **Mall L. P. and Dagar J. C. 1979.** Effect of *Parthenium hysterophorus* extract on the germination and early seedling growth of three crops. *J. Bot. Soc.* **58**:40-43
16. **Oudhia P. 2000.** Allelopathic effect of *Parthenium hysterophorus* and *Ageratum conyzoides* on wheat var. Sujata *Crop. Res. Hisar.* **20(3)**: 563-568.
17. **Puttam A. R. and Duke W. B. 1978.** Allelopathic potential of Agroecosystems. *Ann. Rev. Phytopathol.* **16**:431-451.
18. **Sarma K. K. V., Giri G. S. & Subrahmanyam K. 1976.** Allelopathic Potential of *Parthenium hysterophorus* L. on seed germination and dry neather production in *Arachis hypogea* wild, *Crotalaria juncea* and *Phaseolus mungo* Linn.
19. **Tesfay A., Sharma J. J. and Kassahun Z. 2014.** Effect of weed control methods on weeds and wheat (*Triticum aestivum* L.) field. *World Journal of Agricultural Research.* **2**:124-128