

Effect of Aqueous Extract of Sunflower on Morphological, Biochemical Attributes and Antioxidant Enzymes Activities of Wheat (*Triticum aestivum* L.)

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ABSTRACT

Wheat is the most important agronomic crop to feed the major portion of the world population and grown about one sixth portion of the world's arable land. The sunflower is world famous due to its bioactive potential. A pot experiment was conducted to investigate the allelopathic effects of Sunflower on different morpho-physiological and biochemical attributes of wheat. The aqueous extracts of different concentrations (control, 1%, 3%, 5%, 7% and 9%) of sunflower were applied on wheat plants through root zone after 10 days of germination. The plants were harvested after 60 days and morphological (Plant height, length of shoot and root, fresh and dry weight and total number of leaves) and biochemical features (Chlorophyll a, b, carotenoids, proline, phenolic contents, flavonoids contents) and antioxidant enzymes (CAT, POD, SOD) were investigated. The statistical analysis of the data showed that sunflower enhanced the morphological and biochemical parameters at 5 mM and 7 mM extract, while at 3 mM and at higher doses 9 mM the growth of wheat plants was reduced. The present studies showed that sunflower extract at 5 mM and 7 mM can be used in future to enhance the growth of wheat plants. This research suggested further work under field conditions as well as isolation and characterization of pure compounds for plant growth promotion.

Keywords: Allelopathic effect, Allelochemicals, CAT, Helianthus annuus, POD, Proline, SOD.

INTRODUCTION

Wheat is the member of Poaceae family, Wheat is the most important agronomic crop to feed the major portion of the world population and grown about one sixth portion of the world's arable land (Khan *et al.*, 2020). The allelopathic plants present in the fields where wheat is cultivated influence the growth and yield of the valuable crops. The sunflower is world famous due to its bioactive potential. Allelopathy is a mechanism of interference in plant growth and development facilitated by the addition of plant-produced secondary products (allelochemicals) to the environment, especially soil rhizosphere (Rewald *et al.*, 2018). Allelochemicals are present in the plants tissues including bar, buds, stem, root, flowers and fruits and derived compounds. Leaves are most reliant producers of all these allelochemicals (Salahuddin *et al.*, 2016). It could be released either direct or indirect and can be beneficial or harmful and effect the growth and development (Chandra *et al.*, 2012). It becomes more exciting for promoting the agriculture, when the allelochemicals act as a growth regulators and natural herbicides (Cheng and Cheng, 2015) but their influence dependent on nature, time of exposure and concentrations of allelochemicals (Yang *et al.*, 2018). This study was conducted with the aim to investigate the allelopathic effects of Helianthus annuus on wheat (*Triticum aestivum* L.).

OBJECTIVES

The research was conducted to investigate the influence of aqueous extract of sunflower on morphology, Biochemical attributes and antioxidant enzymes activities of wheat.

METHODOLOGY

A pot experiment was conducted to investigate the allelopathic effects of Sunflower on different morpho-physiological and biochemical attributes of wheat. The aqueous extracts of different concentrations (control, 1%, 3%, 5%, 7% and 9%) of sunflower were applied on wheat plants through roots zones after 10days of germination. The plants were harvested after 60 days and morphological (Plant height, length of shoot and root, fresh and dry weight and total number of leaves) and biochemical features (Chlorophyll a, b, carotenoids, Proline, phenolic contents, flavonoids contents) and antioxidant enzymes (CAT, POD, SOD) were investigated. For the statistical analysis (ANOVA) computerized software Statistic 8.1 were used.

RESULTS

The root and shoot length and fresh weight were significantly promoted as compared to the control while at higher concentration the extract significantly reduced the root, shoot growth and fresh weight. The biochemical parameters including chlorophyll a, b and total chlorophyll, Carotenoids contents, Proline, phenolics and flavonoids contents were significantly increased at 5mM and 7 mM concentration but at lower concentrations of 3 mM and also at higher concentration (9mM) significant reduction was found. The antioxidants enzymes (CAT, POD & SOD) were also significantly affected at higher doses of extracts. The findings showed that CAT, POD and SOD activities were significantly higher at higher doses of 5-7 mM but at lower doses (1-3mM) the reduction was found. The statistical analysis of the data showed that sunflower enhanced the morphological and biochemical parameters at 7 mM and 9 mM extract, while at 3 mM the growth of wheat plants was reduced. The present studies showed that sunflower extract at 5mM and 7mM can be used in future to enhance the growth of wheat plants.

CONCLUSION

This research project indicates the presence of a variety of allelochemicals with diverse effect on different growth, biochemical parameters and on antioxidant enzymes activities. Which suggested further work under field conditions as well as isolation and characterization of pure compounds for plant growth promotion.

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