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EFFECTS OF ALLELOPATHIC STRESS OF ALTERNANTHERA WEED ON SOME ENZYMES IN GRAM (*Cicer arietinum*)

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Abstract

Plants has to survive during stress period. Some enzymes provide this efficiency. Hyper activation of enzymes such as Peroxidase (E.C. 1.11.1.7), Polyphenol oxidase (EC 1.14.18.1) and Superoxide dismutase (EC 1.15.1.1) play important role for this survival. In Gram (*Cicer arietinum*) under control conditions, activity of all three enzymes was studied. Results showed that activity of enzymes increases as the concentration of treatment increased.

Keywords : Allelopathic stress, *Alternanthera*, POD, SOD, PPO.

INTRODUCTION :

Plants during their life cycle has to face different types of stress like water stress, salt stress, chemical stress etc. Such stresses are managed by increasing the Stress enzymes. These enzymes are helping plant to cope up with the side effects of stress like production of Reactive Oxygen Species (ROS). These enzymes are scavengers of these ROS, they efficiently scavenge these highly reactive molecules and protect plant from their dangerous effects. This phenomenon gives plant capacity to face the stress condition and survive this condition. The enzymes studied here are Peroxidase (E.C. 1.11.1.7), Polyphenol oxidase (EC 1.14.18.1) and Superoxide dismutase (EC 1.15.1.1). These enzymes are primary scavengers of these reactive oxygens and their products.

The studies on stimulatory or inhibitory effects of plant extracts, leachates and residues on the activities of various enzymes had been reported by many workers. Domingos and Osvaldo (2003) reported increased activities of peroxidase and phenyl alaline ammonia lyase (PAL) in soybean due to the influence of phenolic allelochemicals. Lin et al (2000) recorded stimulated activities of PAL in rice due to influence of allelochemicals.

Vidyasagar and Rajasab (2001), Bhalerao (2003) noted stimulation of polyphenol oxidase in mulberry, sorghum and strawberry due to foliar spraying of different concentrations of extracts of neem, *Parthenium*, Garlic and fern fronds.

2. MATERIALS AND METHODS

2.1 Collection of Material:

Crop seeds : Seeds of Gram var. Kabuli was collected from Agriculture College, Pune

Weed *Alternanthera tenella colla* Weeds was collected from campus of K.N.Bhise Arts, commerce and science college. Kurduwadi, Solapur

2.2 Preparation of Extract:

A 10% extract of *Alternanthera* leaves was prepared by crushing 10 gm leaf material in 100 ml distilled water. This was used as stock for preparation of different concentration of 2%, 4%, 6% and 8% as required for bioassay and treatment of crop plants.

2.3 Experimental design for pot cultures:

Seeds were sown in polythene bags after germination and development of seedlings, after 15 days these were arranged in triplicate for control (D.W), 2%, 4%, 6%, 8% and 10% treatments. Each bag contained 3 to 4 seedlings.

2.3a Application of extract:

Foliar application of extract was applied to potted plants after every 15 days up to flowering stage.

2.4 ENZYMOLOGICAL ANALYSIS:

2.4a Extraction and assay of enzyme Peroxidase (E.C. 1.11.1.7):

The enzyme activity was assayed by Vidyasekharan and Durairaj, (1973) method.

2.4b Extraction and assay of enzyme polyphenol oxidase (EC 1.14.18.1):

The enzyme activity was assayed by Vidyasekharan and Durairaj, (1973) method.

2.4c Extraction and assay of enzyme Superoxide dismutase (EC 1.15.1.1):

Superoxide dismutase activity was estimated according to the method of Dhindsa et al. (1981).

RESULTS AND DISCUSSION

Table 1 Effect of *Alternanthera* leaf extract on Enzymological parameters of potted Gram plants :

Treatments	Polyphenol Oxidase* OD min ⁻¹ mg ⁻¹	Superoxide Dismutase* OD min ⁻¹ mg ⁻¹	Peroxidase* OD min ⁻¹ mg ⁻¹
Control	09 ±0.63	143 ±10.01	66 ±4.62
2%	17 ±0.51	228 ±6.84	244 ±7.32
4%	32 ±1.60	343 ±17.15	270 ±13.50
6%	46 ±2.76	463 ±27.78	296 ±17.76
8%	64 ±2.56	572 ±22.88	368 ±14.72
10%	76 ±2.28	752 ±22.56	432 ±12.96

* indicates mean of three determinants

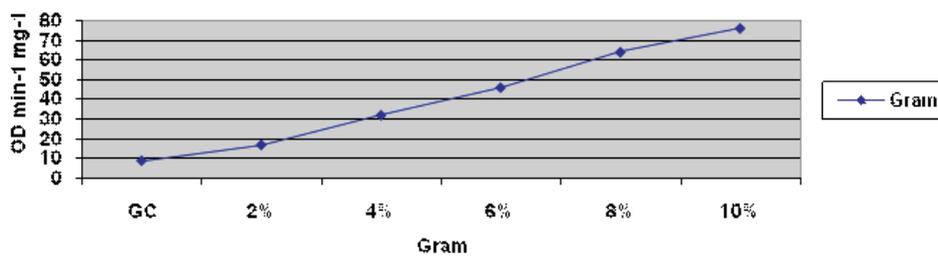
4.1 Effect of *Alternanthera* leaf extract on Enzymological parameters of potted GRAM plants:

According to the table 1 and graph 1a , there is continuous increase in activity of polyphenol oxidase with increase in concentration of treatment of plants. Maximum activity in 10% treatment.

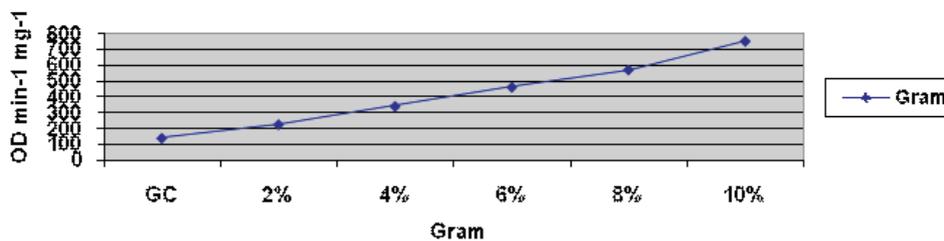
According to the table 1 and graph 1b, there is steep increase in all concentrations of treatment of plants. Maximum activity in 10% treatment.

According to the table 1 and graph 1c, there is about four times increase in activity of Peroxidase in 2%. While more increase is seen in 4% & 6% activity. From 6 to 8 % less difference is seen. Maximum activity is seen in 10% treated plants.

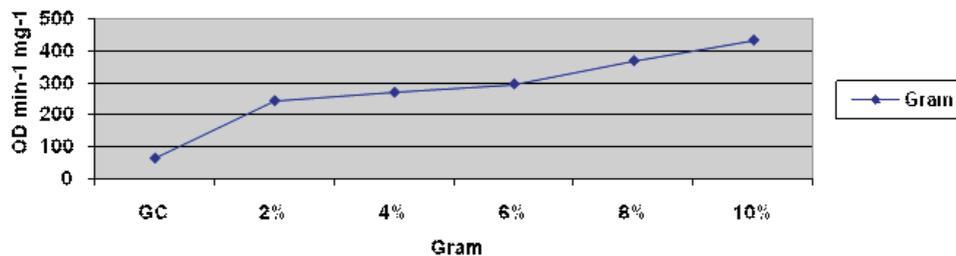
1a Gram Polyphenol Oxidase



1b Gram Superoxide Dismutase



1c Gram Peroxidase



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