Effect of Pesticide (Triazole) on Biochemical Parameters and Different Antioxidants Parameters of Soybean (*"Glycine max. L. Merril"*)

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Abstract
This review represents a systematic and integrated picture of pesticide exposure to plant and its effect on biochemical and Physiology parameters. Pesticides, remains a common practice especially in tropical regions and South countries. Cheap compounds, i.e DDT, HCH, and Lindane that are environmentally persistent are today banned from agriculture use in developed countries but remain popular in developing countries. Here our experment was conducted to determine the effect of different concentration (100ppm, 200ppm, and 400ppm) of Pesticides (Triazole) on the biochemical parameter, reactive oxygen species (ROS) ,and antioxidants (enzymatic and non-enzymatic scavenger) parameter such as catalase (CAT), Superoxide Dismutase (SOD), Ascorbic acid (ASA) and Proline parameter of "*Glycine max.(L). Merril"*. This work may be helpful in biochemical Parameters and different enzymatic and non-enzymatic antioxidants, which ultimately affect the yield and resulted in residues in plant, vegetables, and fruits.

Keywords: Soybean *(Glycine max. (L.) Merril)*, Pesticides (Triazole), Biochemical parameters, Reactive oxygen species (ROS) & Antioxidants.

Introduction

Glycine max (Soybean) belongs to family Fabaceae is a fast-growing plant that produces high biomass. Hence, the present study was aimed to understand the effects of Pesticides toxicity on metabolic homeostasis and changes of SOD, GPOD, CAT and GR activity of *invitro* cultured *Glycine max* seedlings treated with different concentration of Pesticides to better understand the defensive mechanisms under different pH levels. All pesticides are designed to kill or control specific plants or animals, so a great deal is known about the acute biological effects of these chemicals on their target organism. The use of agrochemicals entails both benefits and potential risks. Pesticides control or kill plants through a variety of mechanism, including the inhibition of biological processes i.e photosynthesis, mitosis, cell division, enzyme function, root growth, or leaf formation with the synthesis of pigments, proteins or DNA destruction of cell membranes, i.e(William et *al*., 1995).

Pesticide can effect the plant growth from at the time of generation. Seedling to alteration in biochemical, physiological and different enzymatic and non-enzymatic antioxidants that ultimately affect the yield and resulted in residues in the plant, vegetables, fruits, and different non-target organisms. ROS are detected in all intracellular organelles, as well as at the plasma membrane and, extra-cellularly, in the apoplast. Environmental stresses also including intense light, UV, temperature stress, heat/cold treatments, drought, and herbicides have all been demonstrated to increase ROS production (Suzuki et *al.*,2012). ROS are not the only reactive molecules

generated as by-products of enzymatic reactions. Recently a new study has been paid to reactive nitrogen species (RNS) produced by a group of enzymes called nitric oxide (NO) synthases. As with ROS, the RNS cause biological damages because of their reactivity. Here, I will focus on ROS only. One of the large production quantities of reactive oxygen species (ROS), react with lipids, proteins, pigments,and nucleic acids and cause lipid peroxidation,membrane damage, and inactivation of enzymes and affecting cell viability (Schutzendubel and Polle 2002).

The deleterious impact resulting from the cellular oxidative state may be alleviat by enzymatic and nonenzymatic antioxidant machinery of the plant that varies at various cellular and subcellular levels in different plants. SOD is a key enzyme in protecting cells against oxidative stress and dismutase superoxide radical ($O_2^{\cdot}$-) to H_2O_2 and oxygen (Alscher et *al.,* 2002). Plants use a diverse array of enzymes as well as low molecular weight antioxidants to scavenge different types of reactive ROS, thereby protecting potential cell injury against tissue disfunction (Halliwell 1987).

Material and Methodology

All the experiments were conduct in the research laboratory of the Department of Biochemistry, Sir Syed Faculty of Science, Mohammad Ali Jauhar University, Rampur, India, during January-June, 2016. Here, Seeds of "*Glycine max. (L). Merrill"* (Soybean) was sterilize with 1% $Hgcl_2$ for 10 min, then washed several times with distilled water, and seeds were placed on the floating plastic net, and germinationprocess were record after 3days. After germination, young seedlings were transfer to pots containing 3 kg soil with 1/4 strength modified with Hoagland nutrient solution (Pickering et *al.,* 2000).Seedlings were grown at 24°C, with a light intensity of 300µmol $m^{-2}S^{-1}$ and a 14-h photoperiod. After ten days identify the growth (four true leaves), they were treated with 100ppm, 200ppm, and 400 ppm solution of pesticides (triazole). After ten days of the treatments indicated above, the shoots of seedlings were harvested and immediately frozen and stored in an -80°C freezer. In our experiment determined the effect of Pesticides (Triazole) on biochemical parameters such as (fresh and dry mass and chlorophyll). The estimation of total chlorophyll was done in the Soyabean leaf by spectrophotometer using the method of (Arnon and Stout 1949) andprotein was estimate by (Lowry et *al.,* 1951).Lipid peroxidation was measure as described by (Hedges et *al.,* 1999).Ascorbic acid (ASA) was estimate as described by (AOAC 1984).Proline was estimate by (Bates et *al.,* 1978). The method of Catalase (CAT) followed was given by (Hosetti and Frost 1994). The superoxide dismutase activity (SOD) was measure according to (Bauchamp and Fridovich 1971).

Statistical Analysis

Statistical analysis was carry out according to a completely randomized design.The data were expressed in the mean±S.D of three replicates.

Results and Disscutions

The present work has been reveal a significant influence of pesticides on the functioning of cells when they enter at gradually increasing concentration. It was examine that the oxidative defense system in *Glycine max. (L.) Merrill.* Leaves during expose to (100ppm, 200ppm , and 400ppm) of pesticides by assaying the enzymatic ROS scavengers viz. SOD, CAT ,and non- enzymatic ROS scavengers such as ascorbic acid, Proline ,and with some growth ,and Biochemical parameters response.

Biochemical Parameters

Dry weight and fresh weight

Pesticides showed decrement in the Dry weight at different concentrations, i.e, 100ppm, 200ppm, and 400ppm in the leaves of "*Glycine max. (L.) Merrill*." (Fig.a). Similarly, The whole plant dry weight decreased with propiconazole and ABA treatment as compare with control. Propiconazole and ABA treatment in soybean plant also decrease the whole fresh weight to a large Extent, similar results were reporte in PBZ treated Catharanthus plants under salt stress (Jaleel et *al.,* 2007). Propiconazole and ABA treatment decrease the dry weight considerably in soybean plants compared to control the plants.

Protein

The present study showed that Protein activity has increased with the increasing concentration (100ppm, 200ppm and 400ppm) of pesticides. The maximum

increment reported at 400ppm levels as compared to 100ppm and 200ppm in plants (Fig.b).Our result suggested that Triadimefon treatment parts of increased the protein content in *Raphanus sativus* (Muthukumarasamy et *al.,* 1997). Triadimefon treatments also increased the protein content in the roots of *Catharanthus.*

Chlorophyll

Our experiment showed that the total chlorophyll content of leaves was increase with the age of plants in different concentration treatment (100ppm, 200ppm ,and 400ppm) of pesticides (Fig.c).Our results also confirmed these finding thatPaclobutrazole treatment increased the chlorophyll a, b and carotenoid pigments in the leaf of tomato (Berova et *al.,* 2000), wheat (Berova et *al*, 2002) and barley seedling (Sunitha et *al.,* 2004).(Pinhero and Fletcher 1994) observed an increase in chlorophyll and carotenoid pigment after treatment with the triazole compound .

Lipid Peroxidation (LPO)

Our results showed that the different concentrations (100pm, 200ppm, and 400ppm) of pesticide increased the level of Lipid peroxidation in the leaves of "*Glycine max. (L.) Merrill*." The maximum increment reported at 400ppm levels as compared to 100ppm and 200ppm in plants (Fig.d).Similar to present observation, Lipid peroxidation (LPO) may be the first step of cellular membrane damage by organophosphates (Hazarika et *al.,*2003). Based on the results of this study that Lipid peroxidation increased in chlorpyrifos-exposed seedlings than that of the untreated seedlings. Exposure of *Glycine max. L*. to insecticide deltamethrin or other pesticide treatment increased in lipid peroxidation in leaves and root (Bashir et *al.,*2007b; Song et *al.,* 2007).

Enzymatic Antioxidants

Catalase (CAT)

Catalase activity increased in Pesticides (Triazole) treatments (100ppm, 200ppm and 400ppm) as compared with control (Fig.e). Based on the result of this study the Enzyme activity of PPO, and CAT increased in roots, leaves and stems. Similar results was found in *Lotus cuniculus* (Borsani et *al*., 2001) and rice (Wang et *al*., 2005). Catalase activity increased in drought stress and with TDM treatments compared with control. Changes in catalase activity depend on the intensity and duration of stress and can induce new isozymes (Jaleel et *al*., 2007).

Super oxide dismutase (SOD)

To investigate the role of SOD in leaves of soybean "*(Glycine max. (L.) Merrill.)"* Under short term pesticide treatment, the maximum activity of SOD was recorde at the maximum concentration (100ppm, 200ppm, and 400ppm) of pesticide (Fig.f). SOD activity increased in pesticides treatment when compared to control. Similarly, Triazoles increased the antioxidant potential in oxidatively stressed plants under treatment when compared to control (Sankar et *al.,* 2007). Furthermore, it was observed that spraying PBZ or 6-BA could increase super oxide dismutase (SOD) (Shenggang Pan et *al.,* 2013).

Non-Enzymatic Antioxidants

Proline (Pro)

Proline is high in all treated seedling with triazole under control condition at various treatment levels (100ppm, 200ppm and 400ppm) of pesticides.The maximum increment reported at 400ppm levels as compared to 100ppm and 200ppm in plants (Fig.g). Based on the results of this study, The TDM (Triadimefon) treatment also increased the proline content in the leaves. Similar results in *Catharanthus roseus* has been reported by (Jaleel et *al.,* 2008). Similarly in *Abelmoschus esculentus*L. Drought stress caused increased accumulation of proline content at all stages of growth. The similar results observed in wheat (Nayyar 2006), soybean (Heerden and Kruger 2002).

Ascorbic acid (ASA)

Ascorbic acid content was Observe in leaves of '*Glycine max. (L.) Merrill."* at treatment level increases as per pesticide doses with the concentration values at 100ppm, 200ppm and 400ppm (Fig.h). Similarly, bioavailability of vitamin C is increase by co-presence with bioflavonoids.In fact, although natural and synthetic Vitamin C is chemically identical, the ascorbate in the citrus extract was found to be more bioavailable in human subjects (Vinson et *al.,* 1988).

Conclusion

In our experiment all biochemical parameters increased as increasing concentrations (100ppm, 200ppm, and 400ppm) of pesticides (triazole). Excessive use of pesticides may lead to the destruction of biodiversity. These factors suggest that cereal- and legume-based foods could contain important dietary antioxidants and therefore warrant further research to determine whether these antioxidants could be beneficial to human health.

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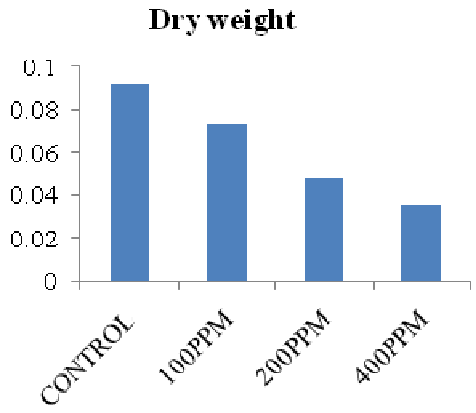

Fig.a

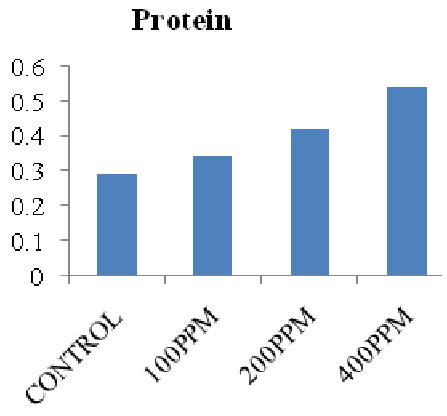

Fig.b

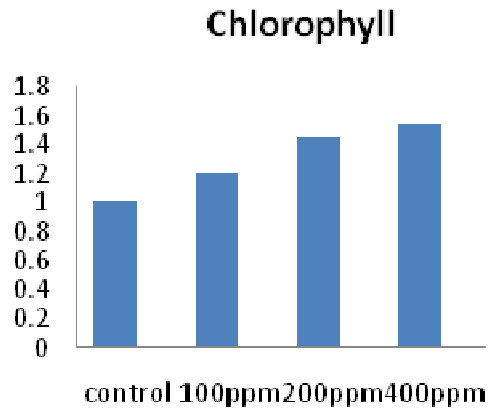

Fig.c

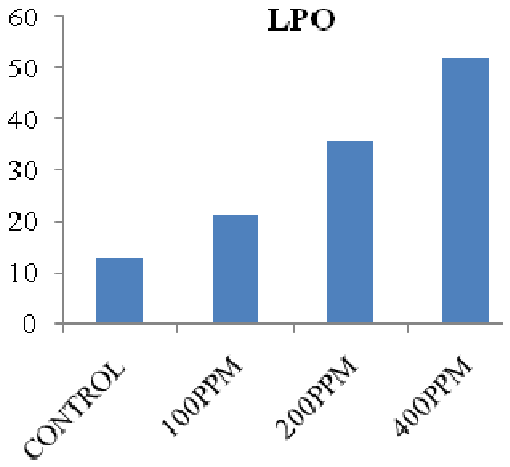

Fig.d

Effect of Triazole on Biochemical parameters and Lipid peroxidation (LPO) of soybean (“*Glycine max. (L.) Merril*”).

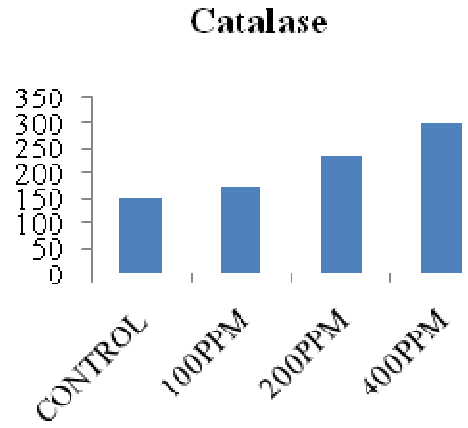

Fig.e

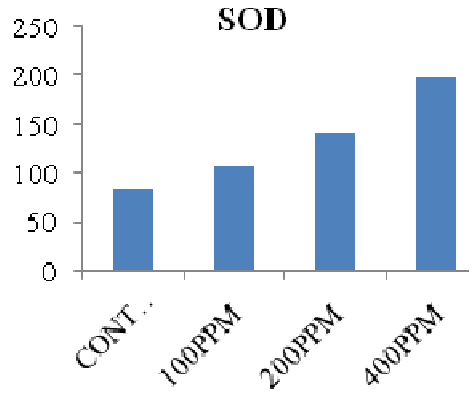

Fig.f

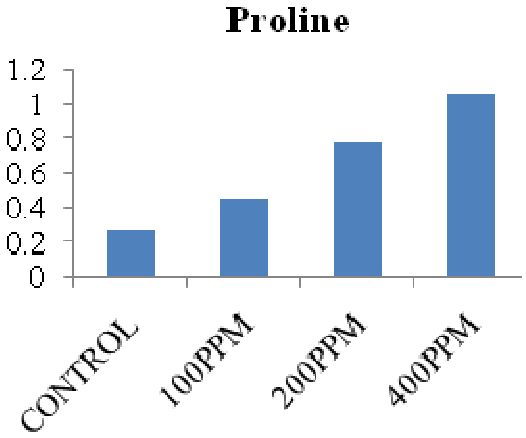

Fig.g

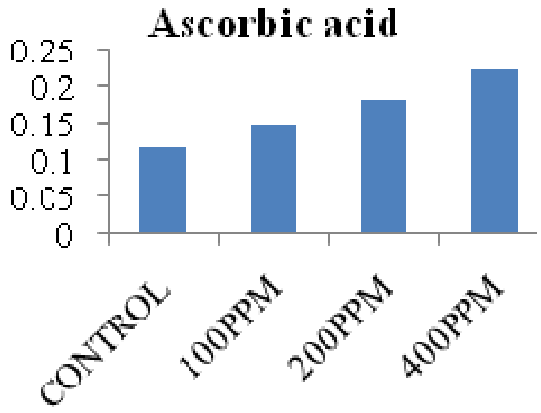

Fig.h

Effect of Trizole on Enzymatic and Non- Enzymatic parameters of soybean ("*Glycine max. (L.) Merril*").

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