

Effect of Gibberellic acid and *Trichoderma* SPP efficiency on seeds germination, speed Percentage, the activity of Peroxidase and Amylase enzyme of two eggplant (*Solanum melongena*) Hybrids

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Abstract

The experiment was implemented in the laboratory of Department of Biology, Faculty of Education. To detect the ability of *Trichoderma* as bio-fertilizer and Gibberellic acid (GA3) at concentration of (5 and 10) mg.l⁻¹ to improve seeds germination of two eggplants hybrids (*Solanum melongena*) (A) French origin and (B) Syrian origin which were treated with (GA3) at concentration of (5,10) mg.l⁻¹ and *Trichoderma* as biofertilizer in addition to distilled water as control treatment for (15min) of period. Seeds germination percentage and speeds rate, plus Peroxidase and Amylase enzyme activity as parameters were recorded. Completely randomized design (C.R.D.) was used and Data analysis performed using GenStat program software. 3 replicates (plates) with 20 seeds in each plate. Means were compared based on Least Significant Differences (L.S.D.) at $P \leq 0.05$ level. The results revealed that (B) hybrid was superior in seeds germination percentage and Peroxidase activity which reached (94.4%, 50.5 U/ml) as compare with (A) hybrid which was superior to give highest seeds germination speed 13.1 day. Moreover, treated seeds with 10 mg.l⁻¹ of Gibberellic acid affected significantly on seeds speed, germination percentage and activity of amylase enzyme which reached (92.5%, 8.6 day and 57.4 U/ml) with reduction in Peroxidase activity percentage reached (23.2 U/ml) as compare with control treatment.

Keywords: Gibberellic acid, *Trichoderma* SPP efficiency etc.

Introduction

Eggplant (*Solanum melongena* L.) considered as one of the most important crop among Solanaceae family, due to its nutritional and medicinal value, its contain phenolic compounds, macro and micronutrients (Luthria, 2009). Concerning to its therapeutic effects, eggplant controlling clostrin changes and lowers its activity in liver [Sarhan et al, 2011].

Trichoderma SPP. Is a fungal genus found in many region of the world widely used because of the multiple beneficial effects on plant growth and disease resistance on the other word its widely used as biofertilizers and biopesticides [Akladios and Abbas, 2012; Tucci .et .al 2011; Adams .et .al. 2007; Bais .et .al. 2006; Benítez .et .al. 2004]. Also *Trichoderma* has an efficient, economical as its effective role in improving plant growth as its produce some of growth hormones such as gibberellins, auxins which responsible positively on most bioprocesses in plants. Regarding to its activity against pathogens, its might be due to its ability to induce defense enzymes e.g. peroxidase and phenylalanine-ammonia lyase [Fotoohiyani, .et .al, 2015]

There are many factors responsible for the germination processes efficiency of eggplant seeds. Among these factors poor germination due to the long term bad storage of seeds, to overcome seed germination problems some treatment were found. e.g. Plants hormone Gibberellin which has many functions in plants but the main role in related to promotion of seed germination.

Recently the researches focused on bio-fertilizer as an acceptable strategy to reduce low germination of chilli pepper seeds [Asaduzzama et.al.2010] and improve plant growth and yield in Tomato [Ramakrishnan and. Selvakumar, 2012] and Maiz [Mohammed, 2012] beside, the use of bio-fertilizer is very important for economical production [Sarhan et al 2011]. So the present study conducted to examine *Trichoderma* and Gibberellin with different treatments to improve some characteristics in two seeds hybrids of eggplant.

Materials and Methods

Seeds of two eggplants hybrids (A) Black Beauty French origin and (B) Syrian local variety were treated with some treatment as below:

T0: distilled water as control treatment for (15 min).
 T1: soaking seeds with the biofertilizer (trichoderma).
 T2: soaking seeds with (5 mg.l⁻¹) of GA₃ for (15 min).
 T3: soaking seeds with (10 mg.l⁻¹) of GA₃ for (15 min).

Completely randomized design (C.R.D.) was used and Data analysis performed using GenStat program software. Treated seeds were placed in Petri plates with moistened Whatman filter paper . 3 replicates (plates) of 20 seed in each plate per treatment. Means compared based on Least Significant Differences (L.S.D.) at P ≤ 0.05 level. Seed speed and germination percentage in addition to the Peroxidase and Amylase enzyme activity as parameters were recorded. Peroxidase activity was measured according to [Whitaker,1972] while amylase were estimated according to [Kwon.et al, 2007].

Results and Discussion

Seed germination percentage

The results in (Table 1) revealed that (B) hybrid was superior as compare to (A) hybrid in seeds germination percentage parameter which reached (94.4, 76.4%) respectively with high germination percentage reached 23.5%. Moreover, differences among the promoting germination treatments and T2 was affected significantly on germination percentage Which reached (92.5, 77.9%) respectively. The interaction analysis between the treatments and hybrids showed significant differences in related to germination percentage which recorded highest rate reached 100% for (B) hybrid in T2 treatment, whereas less germination percentage was achieved for (A) hybrid in T0 treatment reached 66.5%.

Table 1: Effect of Gibberellin and Trycoderma treatments on seeds germination percentage of two eggplants hybrids

Treatments	Hybrids		Mean
	A	B	
T0	66.5	89.3	77.9
T1	76.5	95.8	86.1
T2	85.0	100.0	92.5
T3	77.5	92.5	85.0
Mean	76.4	94.4	
L .S.D (0.05) Hybrids 5.7 Interaction 11.5 Treatments 8.2			

Regarding to speed germination, the results in (Table 2) revealed superiority of (A) hybrid as compare with (B) hybrid reached (13.1,9.6) with increment percentage reached 36.4%. T2 treatment affected significantly and recorded (8.6) day as compare to control (T0) which gave (14.6) day. Moreover, T2 gave high germination speed for (A) hybrid reached (7.1) day as compare to (16.7) day for (B) hybrid.

Table 2: Effect of Gibberellin and Trycoderma treatments on seeds germination speed of two eggplant hybrids

Treatments	Hybrids		Mean
	A	B	
T0	12.5	16.7	14.6
T1	10.3	12.5	11.4
T2	7.1	10.2	8.6
T3	9.6	13.1	11.3
Mean	9.8	13.1	
L .S.D (0.05) Hybrids 1.6 Interaction 2.9 Treatments 5.4			

Peroxidase and amylase enzymes analysis table (3 and 4) showed that (A) hybrid was superior to give highest activity for peroxidase enzyme as compare with (B) hybrid reached (30.4,21.6) U/ml respectively with (40.7%) an increment percentage, unlike (B) hybrid data in table (4) showed highest response for amylase activity reached (50.5) U/ml as compare with (47.6) U/ml for (A) hybrid with an increment percentage reached (6.09%)0 .Furthermore, among all treatments, T0 treatment (distilled water as control treatment) affected positively on Peroxidase activity as compare with T2 (10 mg.l⁻¹) treatment. On the other hand, T2 (10 mg.l⁻¹) treatment affected positively on amylase enzyme, for the interaction between treatments and both hybrids, data in table (3,4).

Table 3: Effect of Gibberellin and Trycoderma treatments on Peroxidase activity U/ml of two eggplants hybrids

Treatments	Hybrids		Mean
	A	B	
T0	34.3	22.1	28.7
T1	30.9	21.3	26.1
T2	26.4	20.0	23.2
T3	29.9	22.1	26.6
Mean	30.4	21.6	
L .S.D (0.05) Hybrids 0.9 Interaction 4.9 Treatments 2.1			

Table 4: Effect of Gibberellin and Trycoderma treatments on Amylase activity U/ml of two eggplants hybrids

Treatments	Hybrids		Mean
	A	B	
T0	40.1	46.8	43.4
T1	47.5	49.5	48.5
T2	55.0	59.9	57.4
T3	47.9	45.7	46.8
Mean	47.6	50.5	
L .S.D (0.05) Hybrids 1.4 Interaction 9.3 Treatments 6.2			

Discussion

There is a fact that many researches have been focused on the positive role of *Trichoderma* .spp. in enhancement of some growth regulators such as zeatin and gibberellin GA3 or GA3-related [Asaduzzama, et al, 2010].Gibrillic acid has been used for a long time in

many aspects .e.g. breaking seed dormancy in some species, stimulate stem elongation and regulate of gene expression [Bezuidenhout, *et al*, 2012]. In case of seeds germination, Gibberellic acid improved its ability to speed up the seeds germination rate of some economic crops. Our results remarked the ability of *Trichoderma* either alone or in interaction with gibberellins in improving seeds germination of eggplant hybrids. These results are in agreement with [Bezuidenhout, *et al*, 2012] who explain that *Trichoderma* spp increase the rate of seeds germination.

Further investigations are required to study the effect of *Trichoderma* on morphological, physiological and yield characteristics of eggplants hybrids

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