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Effect of biologicals and chemicals seed treatments on growth, yield and yield attributing traits in maize (*Zea mays* L.)

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Abstract
The present investigation was carried out with variety of maize SIRI- 4527 conducted in RBD having three replications in the Central field of Department of Genetics and Plant Breeding, Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad during 2015-16. The growth, yield and yield attributing traits of maize variety SIRI 4527 were studied. The growth, yield and yield attributing parameters of maize variety were studied by seeds treated with T0= control, T1= thiram @3g/kg, T2= neem oil @8ml/200g, T3= deltamethrin @2g/kg, T4= *Trichoderma viride* @5g/kg, T5= seed soaked in distilled water for 12 hrs. Among the all seed treatments T_3 deltamethrin was identified as the best treatment for the yield attributing parameters viz. number of cobs plnt^{-1}, number of grain row cob^{-1}, number of grain cob^{-1}, seed index (g), garin yield plot^{-1} (kg).

Keywords: Treatments, field emergence, grain yield, yield attributing, chemicals, identified etc.

Introduction
Maize (*Zea mays* L.) is the queen of cereal crops and extensively cultivated cereal crops on earth. Most important cereal crop in world agriculture economy both as food for men and feed for animals. It ranks the third in world production following wheat and rice for the area and production. It is also the main crop in northern China, where the climate is a combination of temperate and semiarid monsoon. Maize (*Zea mays* L.) have chromosome 2n =20 is a domesticated grass of tropical Mexican origin belongs to family of Poaceae. It has high yield potential, there is no crop on earth which has so immense potentiality and that's why it is called queen of cereals. Already, this crop has been developed into a multi dollar business in foreign Countries (Thailand, Taiwan, Singapore, Malaysia, USA, Canada and Germany) because of its potential as a value added product for export and a good food substitute (Mugalkhod *et al.*, 2011) [8].

The area and production of maize in India is 8.49 mha. And 21.28 mt. respectively with productivity ranging about 2507 kg ha^{-1}. In Uttar Pradesh, the area and production duri- ng 2011-12 was 0.71 m ha and 1.04 mt. respecttively with productivity of 1465 kg ha^{-1}). Maize is grown worldwide on an approxi- mately 161 mha. Annually with a production of 685 million metrictons^{-1} (Anonymous 2012) [1].

Maize is grown in temperatures between 18^{0}C and 27^{0}C during the day and around 14^{0}C during the night. But the most important factor is the 40 frost-free days. The crop is very susceptible to frost there for its cultivation in temperate latitudes is limited. Maize is grown mostly in regions having annual rainfall between 60cm to 110cm. But is also grown in areas having rainfall of about 40cm. Maize grown in wide range of soils ranging from temperate podozls to the leached red soil of the tropics. But the best suitable soil for maize is deep, rich soils of the sub-tropics, where there is a abundant nitrogen. The plain regions are most suitable for maize cultivation, because this helps in use of machines. Although, maize is also cultivated on undulating lands as well as on lower slopes of hills.

Maize is also as a major crop of shifting cultivation. Unlike other crops maize can be cultivated with small capital. Uses of machines have reduced the labour requirements. Most of the maize grown is utilized within the country, although its limited international trade is also there. Jackson (1983) [5] reported that plant materials contain naturally occurring phytochemical that are biodegradable, non- toxic to plants and animals. The seed-borne and early season diseases and insects create highly destructive unpleasant if not managed timely. Seed treatment refers to the exposing of the seeds to certain agents like physical, chemical and biological which are not employed to make the seeds, pest or disease free only but treated to provide the

possibility of pest and disease control also, when needed during seedling germination and emergence of young plant and early growth of the plant (Forsberg *et al.*, 2003) [3]. Seed treatments have helped to improve the yields of many different crops by providing the protection from pre and post-emergent insects and diseases and insurance of a uniform stand across a wide variety of soil types, cultural practices and environmental conditions.

Seed treatment with beneficial micro-organ isms including fungi and bacteria (species of *Pseudomonas, Trichoderma, Bacillus, Rhiz-obia* etc.) to overcome a wide variety of bio-tic, abiotic, and physiological stresses to seed and seedlings (Mastouri *et al*., 2010) [6].

Inoculation of seeds with such biological agents in combination with priming (Biopri-ming) potentially able to promote rapid and more uniform seed germination and plants growth (Moeinzadeh *et al*., 2010) [7] and in several cases, has been reported to enhance and stabilize the efficacy of biological agents (Harman *et al*., 1989).

This experiment approach surrounds the germinating seed with protection from the managing pest, disease causing fungi and soil born pathogens. Treatments encourage the healthy root system, improve the affiancy of food, feed and fiber production and provide for more comfortable living. But all pesticides must be treated as that may endanger people, livestock, plants and the environment. They should be used when appropriate, applied correctly, stored safely and disposed of properly.

Materials and Methods

Description of the study area

This experiment was conducted in Central field Department of Genetics and Plant Breeding Allahabad School of Agriculture Sam Higginbottom Institute of Agriculture, Technology & Sciences (deemed-to-be university) (formerly Allahabad Agricultural Institute) Allahabad (UP) is located in the Northern Nation Nationalities and people regional state, the average annual rain fall was 700 mm and average temperature of the area was 27-32 ^{0}C.

The experiment was laid out in randomized block design (RBD) with three replication. Maize hybrid variety named SIRI4527 was planted in 27.495 m^{-2} with the row to row spacing 60 cm and plant to plant spacing 20 cm. coating the seed by thiram, deltamethrin and *Tricoderma viride* of recommended dose one by one after then maize seed were put in the 60% neem oil and 40% distilled water solution pot taken 8 hours, hydro-priming soaked the seed in water in 12 hours before seed sowing. The significant differences among the means were tested using least significant difference (RBD) at 5% significant level.

Result and Discussion

Pre-harvest observation

Field emergence

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on field emergence of maize. The maximum field emergence was recorded with seeds treated with thiram (82.05) while neem oil showed minimum effect (42.31) of maize seeds (Table 1). The similar findings were reported by Gebremedhn Yohannes (2013) [4] in maize.

Number of leaves plant^{-1}

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on number of leaves plant^{-1} of maize on 25, 50 and 75 respectively. At 25 DAS the maximum number of leaves plant^{-1}was recorded with seeds treated with thiram (7.27) while neem oil showed minimum effect (4.60). At 50 DAS thiram was recorded maximum effect (11.53) and minimum with *Tricoderma viride* (10.20). At 50 DAS thiram was recorded maximum effect (11.53) and minimum with *Trycoderma viride* (10.20). At 75 DAS thiram was recorded maximum effect (13.27) and minimum with *Tricoderma viride* (11.40) of maize seeds showed in table 1)

Plant height (cm)

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on plant height of maize on 25, 50 and 75 respectively. At 25 DAS the maximum number of leaves plant^{-1} was recorded with seeds treated with thiram (59.31) while control showed minimum effect (54.58). At 50 DAS thiram was recorded maximum effect (170.85) and minimum with *Trycoderma viride* (10.20). At 50 DAS thiram was recorded maximum effect (11.53) and minimum with control (154.39). At 75 DAS thiram was recorded maximum effect (206.00) and minimum with control (179.27) of maize seeds showed in Table 1

Days to 50% flowering

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on Days to 50% flowering of maize. The maximum Days to 50% flowering was recorded with seeds treated with thiram (57.67) while control showed minimum effect (52.67) of maize seeds (Table 2). The similar findings were reported by Tain *et al*., (2014) [9].

Days to 50% silking

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on days to 50% Silking of maize. The maximum days to 50% Silking was recorded with seeds treated with thiram (57.67) while hydro-priming showed minimum effect (53.67) of maize seeds (Table 2). Tain *et al.,* (2014) [9].

Days to maturity

There was significant differen1ce ($p > 0.05$) between chemical, biological and untreated seeds on days to maturity of maize. The maximum Days to Maturity was recorded with seeds treated with deltamethrin (84.00) while *Trichoderma viride* showed minimum effect (88.00) of maize seeds (Table 2).

Post - harvest Observations

Number of cobs plant^{-1}

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on Number of cobs plant^{-1} of maize. The maximum Number of cobs plant^{-1} was recorded with seeds treated with deltameth- -rin (1.80) while control showed minimum effect (1.00) of maize seeds (Table 2).

Cob length (cm)

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on cob length of maize. The maximum cob length was recorded with seeds treated with deltamethrin (16.7) while control showed minimum effect (15.39) of maize seeds (Table 2).

Cob girth

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on Cob girth of maize. The maximum Cob girth was recorded with seeds treated with

Deltamethrin (12.29) while control showed minimum effect (11. 49) of maize seeds (Table 2).

Number of grain rows cob^{-1}

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on number of grain rows cob^{-1} of maize. The maximum number of grain rows cob^{-1} was recorded with seeds treated with deltamethrin (14.13) while control showed minimum effect (12.40) of maize seeds (Table 3). The similar findings were reported by Tian, *et. al.,* (2014) [9].

Number of grain rows cob^{-1}

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on number of grains rows cob^{-1} of maize. The maximum number of grains rows cob^{-1} was recorded with seeds treated with deltamethrin (35.53) while control showed minimum effect (28.60) of maize seeds (Table 3). The similar findings was reported by Fallon (2012).

Seed index (g)

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on seed index of maize. The maximum seed index was recorded with seeds treated with deltamethrin (30.30) while control showed minimum effect (23.14) of maize seeds (Table 3).

Grain yield per plot (kg)

There was significant difference ($p > 0.05$) between chemical, biological and untreated seeds on grain yield of maize. The maximum grain yield was recorded with seeds treated with deltamethrin (3.50) while control showed minimum effect (1.75) of maize seeds (Table 3). The similar findings were reported by Tian *et al.,* (2014) [9] in maize (*Zea mays* L.). Garba and Oyinlola (2014) in maize.

In the present study, finding revealed that pre-sowing fungicides seed treatment of thiram showed significant effect on improving seedling height, average leaf number, plant height**,** flowering, silking. In days to maturity delta- methrin and in field emergence water soaked showed better effect on maize throughout the experiment on to different parameters collected. Chemical seed treatment deltamethrin showed better effect on in Number of cobs plant^{-1}, cob length, cob girth, number of grain rows cob^{-1}, number of grains rows cob^{-1}, seed index and grain yield.

Generally, the experiment was showed a clear importance of pre sowing fungicide seed treatment for small scale farmer's crop production. The treated seed result in higher in pre-harvest and pro-harvest of maize compare to control. As a conclusion farmers could use thiram and deltamethrin fungicide as s pre-sowing seed treatments to enhance the germination of their maize seed and seedling vigour.

Conclusion

The present study concluded that in biological and chemical seed treatments, T_3 (deltamethrin) significantly dominated on five treatment combinations. The chemical seed treatment T_3 (deltamethrin) is suitable for earliar maturity, cob length, cob girth, number of cobs plant^{-1}, number of grain rows cob^{-1}, number of grains row^{-1}, seed index, grain yield kg plot^{-1}, the chemical seed treatment T_3 (deltamethrin) of maize (*Zea mays* L.) to suit the environmental conditions of Allahabad region.

Table 1: Mean performance of 13 characteristics in different seed treatment in maize.

Treatm - ents	Field emergence	No. of leaves plant^{-1} (days)			Plant height (cm) (days)		
		25 DAS	50 DAS	75 DAS	25 DAS	50 DAS	75 DAS
T0	62.98	6.67	11.00	12.07	54.58	154.39	179.27
T1	82.05	7.27	11.53	13.27	59.31	170.85	206.00
T2	42.31	4.60	11.13	11.87	54.77	157.53	190.60
T3	75.64	7.20	11.51	13.00	57.14	165.95	195.82
T4	65.38	6.87	10.80	11.40	55.11	161.53	194.67
T5	87.19	6.93	11.20	12.07	54.79	158.36	181.73
Mean	58.76	5.47	9.36	10.26	46.85	135.70	161.47
F-test	S	S	S	S	NS	S	S
S.ED. (±)	0.843	0.079	0.035	0.157	3.440	3.454	4.410
C.D. (P=0.05)	1.741	0.163	0.073	0.325	7.101	7.129	9.103

Table 2: Mean performance of 13 characteristics in different seed treatment in maize.

Treatments	Days to 50% flowering	Days to 50% silking	Days of maturity	Cob length (cm)	Cob girth (cm)	No. of cobs plant^{-1}
T0	52.67	57.33	87.33	15.39	11.81	1.20
T1	57.67	59.67	85.00	16.71	12.25	1.67
T2	53.00	57.00	86.00	15.75	11.49	1.00
T3	57.33	59.33	84.00	16.39	12.29	1.80
T4	53.33	58.00	88.00	15.70	11.73	1.27
T5	53.00	55.67	87.00	16.28	12.18	1.47
Mean	45.72	48.27	86.22	16.03	11.95	1.40
F-test	S	S	S	S	S	S
S.ED. (±)	1.422	1.164	0.803	0.303	0.132	0.067
C.D. (P=0.05)	2.935	2.403	1.657	0.626	0.272	0.138

Table 3: Mean performance of 13 characteristics in different seed treatment in maize.

Treatments	No. of rows cob^{-1}	No. of grains row^{-1}	Seed index (g)	Yield plot^{-1} (kg)
T0	12.40	28.60	23.17	2.18
T1	13.60	33.13	24.83	3.03
T2	13.20	30.27	23.83	2.70
T3	14.13	35.53	30.30	3.50

T4	13.33	29.47	23.37	2.00
T5	13.47	32.53	23.14	1.75
Mean	13.35	31.58	24.77	2.52
F-test	S	S	S	S
S.ED. (±)	0.376	1.689	1.584	0.330
C.D. (P=0.05)	0.775	3.486	3.270	0.680

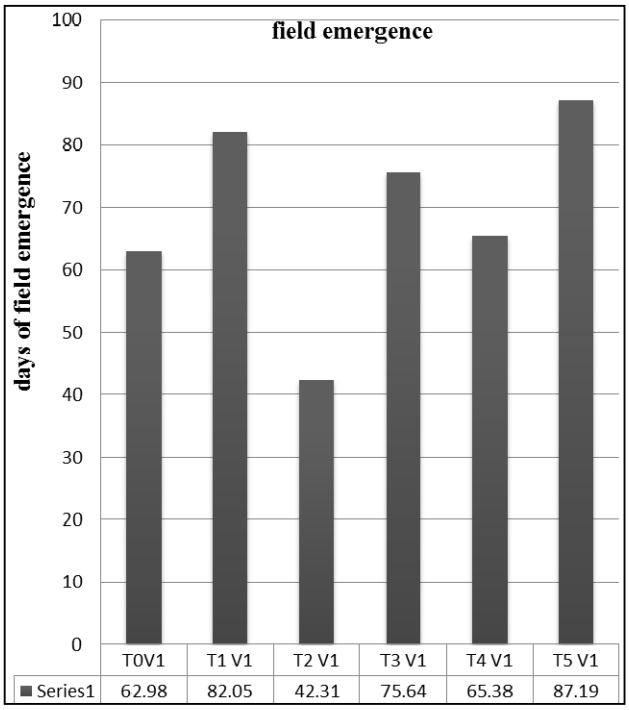

Fig 1: Effect of biological and chemical seed treatment on field emergence in maize.

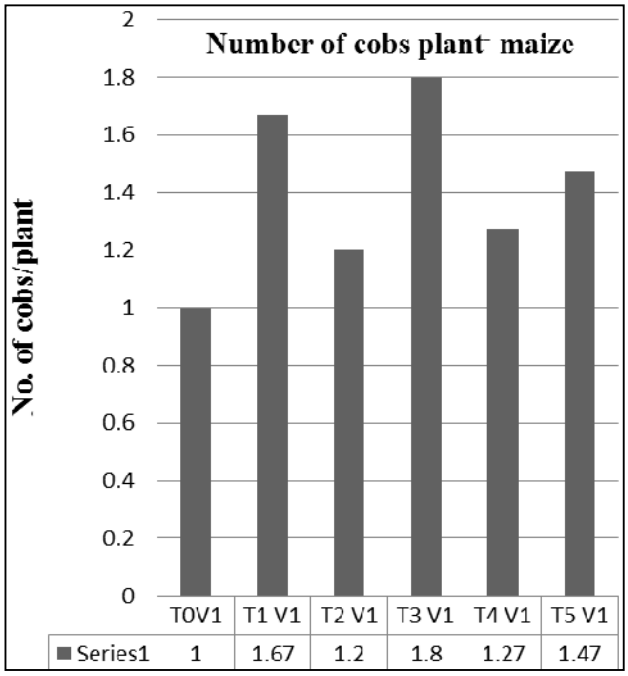

Fig 2: Effect of biological and chemical seed treatment on number of cobs plant^{-1} in maize.

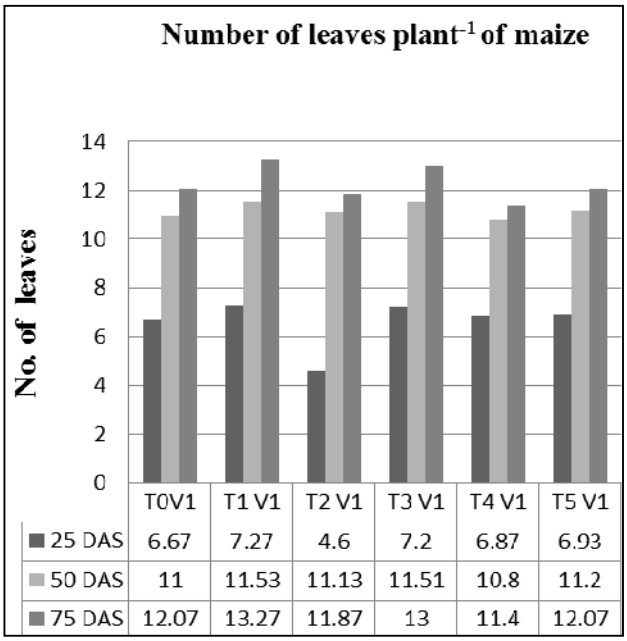

Fig 3: Effect of biological and chemical seed treatment on number of leaves on 25, 50 and 75 DAS in maize.

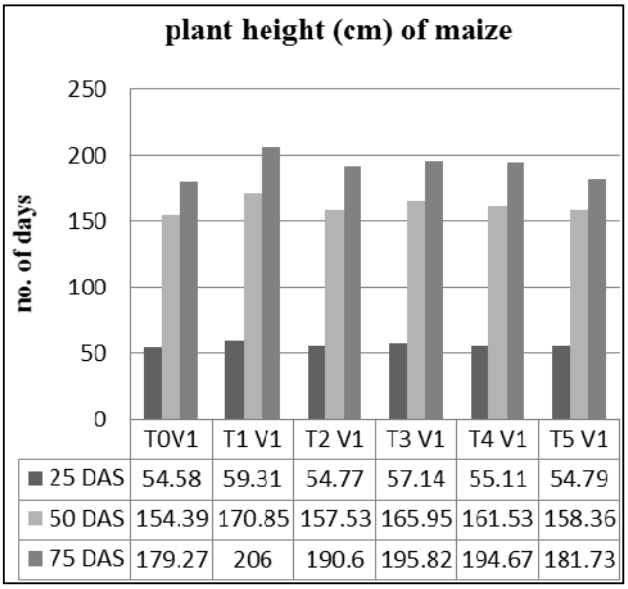

Fig 4: Effect of biological and chemical seed treatment on plant height on 25, 50 and 75 DAS in maize.

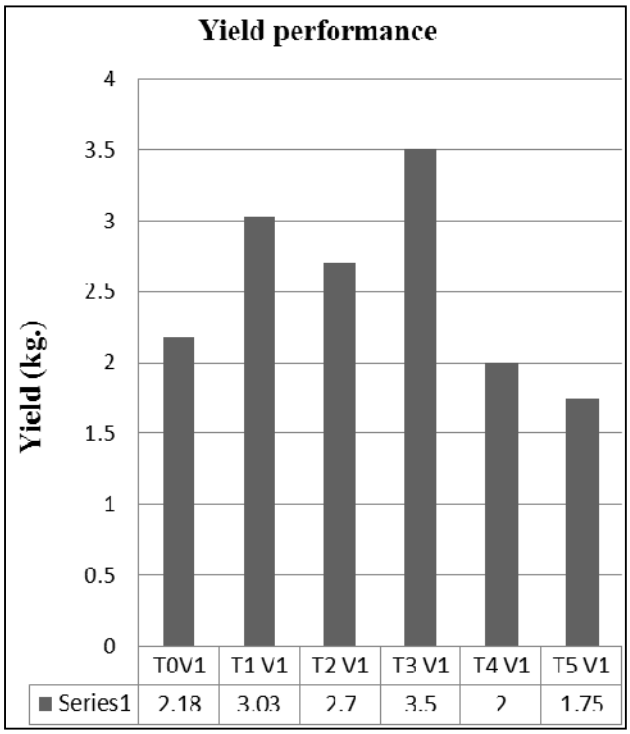

Fig 5: Effect of biological and chemical seed treatment on yield in maize.

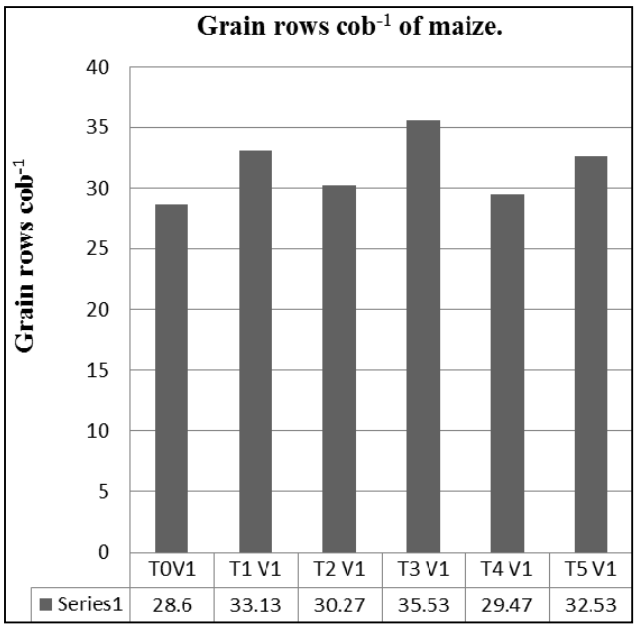

Fig 6: Effect of biological and chemical seed treatment on grain rows cob^{-1} in maize.

Reference

1. Anonymous. Agricultural statistics at glance. Directorate of Economics and Statistics, New Delhi, 2012.
2. Falloon RE. Fungicide seed treatment of maize to improve establishment and control seedling pathogens New Zealand Journal of Experimental Agriculture. 1982; 10:2, 197-202.
3. Forsberg G, Kristensen L, Eibel P, Titone P, Haiti W. Sensitivity of cereal seeds to short duration treatment with hot, humid air. Journal of Plant Disease and Protection. 2003; 110(1):1-16.
4. Gebremedhn Yohannes, Berhnu Abraha. The role of seed primimg in improving seed germination and seedling growth of maize (*Zea mays* L.) under salt stress at laboratory condition. Agrican Journal of Biotechnology. 2013; 12(46):46.
5. Jackson M. Control of stored product insects with phytochemicals. Paper presented at the 3rd international working conference on stored products. Entomology Kansas state university, 1983.
6. Mastouri F, Bjorkman T, Harman GE. Seed treatment with *Trichoderma harzianum* alleviates biotic, abiotic and physiological stresses in germi- nating seeds and seedlings. Phytopa- thology. 2010; 100(11):1213-1221.
7. Moeinzadeh A, Sharif-Zadeh F, Ahmadzadeh M, Tajabadi FH. Biopriming of sunflower (*Helianthus annuus* L.) seed with *Pseudomonas fluorescens* for improvement of seed invigoration and seedling growth. AJCS. 2010; 4(7):564-570.
8. Mugalkhod AS, Shivamurthy D, Kumar A, Biradar MS. Yield components of baby corn (*Zea mays* L.) as affected by planting method and irrigation schedule under drip. Plant Achives. 2011; 11(1):379-381.
9. Tian Yu, Guan Bo, Daowei Z, Yu J, Guangdi Li, Lou Y. Responses of seed germination, Seedling growth and seed yield traits to Seed pre-treatment in maize (*Zea mays* L.). The Scientific. World Journal, Article ID 834630, 2014, 8.