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Full length Research paper

Influence of Plant Growth Regulators and Botanicals on Growth Yield and Yield Attributing Traits of Wheat

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The present study was carried out at Field experimentation, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, Uttar Pradesh during rabi season of (2020-2021). The Experiment was carried to study the influence of various growth regulators and botanicals on growth and yield of wheat. Experiment was laid out in Randomized Block Design (RBD) with Thirteen treatments consists of IAA, GA3, Neem leaf extract, Tulasi leaf extract. Here maximum field emergence percentage (87.17), plant height (84.31), days to 50% flowering (52.67), number of tillers per plant (13.03), dry weight of plant (44.57), seed yield per plant (15.6), biological yield (42.97) harvest index (94) were observed in T7 (GA3 100 ppm 12 hrs). Whereas minimum was recorded in T0 (Control) in comparison with other treatments.

Key words: IAA, GA3, Neem leaf extract, Tulasi leaf extra

INTRODUCTION

Wheat is one of the most important cereal crops of world and staple food for about one-third of the world's population (Hussain and shah ,2001). The major calorie intake because of its dietary components and development in the production has lead to the economic increase in agriculture and food cereal grain production. Growth Regulators have capacity of increasing metabolism and yield attributes of plants (Example: IAA, GA3) affects various attributes of respective plant growth and than 300 varieties of wheat(Bread), 49 varieties in durum wheat, 05 varieties in dicoccum wheat, 03 in triticale(Till now).

Wheat is an source of carbohydrates. Globally the leading source of vegetable protein in human food and the protein content is13% which is higher than other cereal but poor in protein quality for providing essential amino acids. The protein gluten which is major in wheat can help in triggering coeliac disease, noncoeliac gluten sensitivity, gluten ataxia and dermatitis herpetiformis. Today, India is able to exporting sufficient quantities of all types of wheat and the extensive research are improving its research in development.

Wheat is grown in India in an area of about 31.36 million ha. With a production of 107.86 million metric tonnes and yield 3.44 metric tons per ha. The total world area, production and yield are about 221.82 million metric tonnes and yield 3.50 metric tons per ha (Foreign Agricultural Service / USDA, World Agricultural Production, 2021). India developed more

the advance ways for more varieties and grain output.

Application of plant growth regulator opens a new dimension of investigation to enhance the yield and quality of crops. Plant growth regulators (PGRs) have capable to modifying growth and metabolism of plants. PGRs actively promotes plant growth and development under normal and stressful conditions. Although PGRs endogenously produce by plants but plants having well response to exogenous application. Growth regulator having capable to improve metabolism and yield attributes of plants. Indole acetic acid and gibberellic acid significantly affects various attributes of plant growth and development **(**Gherroucha *et al*. 2011). It is well known that the degree of leaf senescence is inversely proportional to cytokinin content, and exogenous application of kinetin helpful in increasing chlorophyll content as well (Sanaa *et al*. 2006). Therefore, present piece of work was carried out to ascertain the yield and

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quality responses of wheat cultivar to exogenously applied PGRs with their various concentrations.

Objectives:

1. To study the effect of plant growth regulators and botanicals on growth, yield, characters of wheat seeds.
2. To identify the suitable treatment for wheat

MATERIALS AND METHODS

Description of Research area

The present study was conducted using completely randomized block design at the department of Genetics and Plant Breeding, Sam Higginbottom university of Agriculture Technology and Sciences in Prayagraj, Uttar Pradesh. This region is subtropical climate with extreme winter and summer.

The temperatures fall to 5-10^{0}c during winter season especially in the month of December and January. Each plot is 1 m^2 containing 13 rows and leaving 0.5 m^2 in the middle of each replication.

Treatment Details

The genetically pure seeds of wheat variety HD2967 was used for the study. HD2967 seeds are double dwarf variety. Grains are amber, medium bold, hard and lustrous and were subjected to pre-sowing various seed treatments like

1. T0- control,
2. T1-IAA@50ppm (12 Hours),
3. T2-IAA@50ppm (6 Hours),
4. T3-IAA@100ppm (12 Hours),
5. T4- IAA@100ppm (6 Hours),
6. T5-GA3@50ppm (12 Hours),
7. T6- GA3@50ppm (6 Hours),
8. T7- GA3@100ppm (12 Hours),
9. T8- GA3@100ppm (6 Hours),
10. T9-Neem Leaf extract@5% (12 Hours),
11. T10c- Neem Leaf Extract@5% (6 Hours),
12. T11-Tulasi Leaf Extract@5% (12 Hours),
13. T12- Tulasi Leaf Extract@ 5% (6 Hours).

The observations for various field emergence, plant height(cm), number of tillers per plant, test weight(gm), seed yield per plant(gm), seed yield per plot(gm), seed yield q/ha, biological yield q/ha, Harvest index (%) were recorded.

For the preparation of solution 50ppm of IAA were taken in a beaker and 1000 ml of distilled water were taken by continuous stirring same as follows for 100ppm of IAA, 50ppm of GA3, 100ppm of GA3, 5% of Neem leaf Extract, 5% of Tulasi leaf extract.

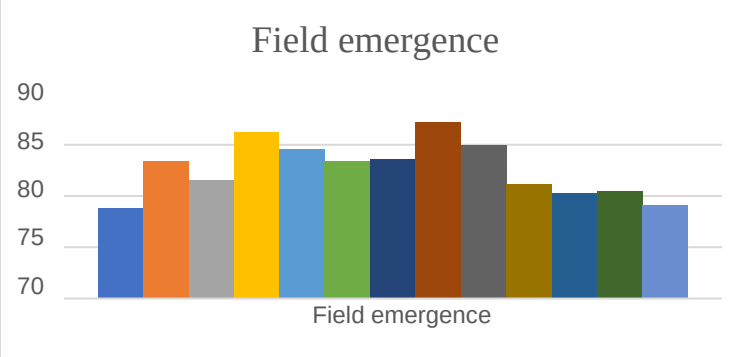
After preparation of solution wheat seeds were soaked in required solution for 12 hours and 6 hours respectively at 25^{0}c temperature.

After completion of soaking the solution were drained out from the beaker and the soaked seeds were air dried to original weight under shady sunlight in controlled condition. Then the seeds are directly sown in the prepared seed bed plots to record further field observations.

RESULTS AND DISCUSSION

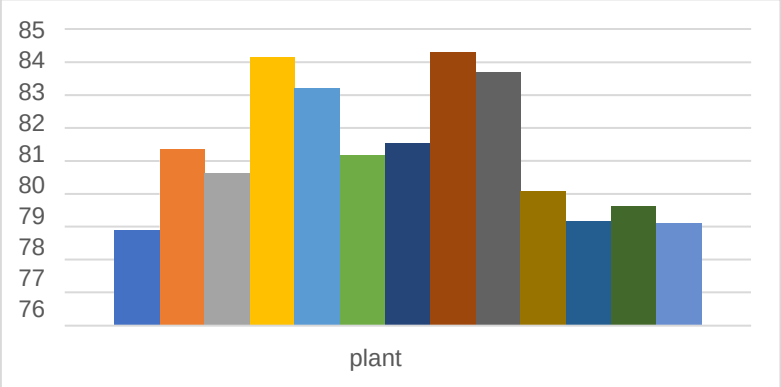
All the treatments were significantly different from each other.

Field emergence: The maximum field emergence percent (87.17) was recorded with (T7) GA3 100ppm for 12 hours followed by (T3) IAA 100 ppm for 12 hours (86.23). And were found at par. Whereas minimum field emergence recorded in (control) T0 (78.8). This experiment provided information that field emergence increased when treated with GA3 100 ppm in comparison with other treatments.

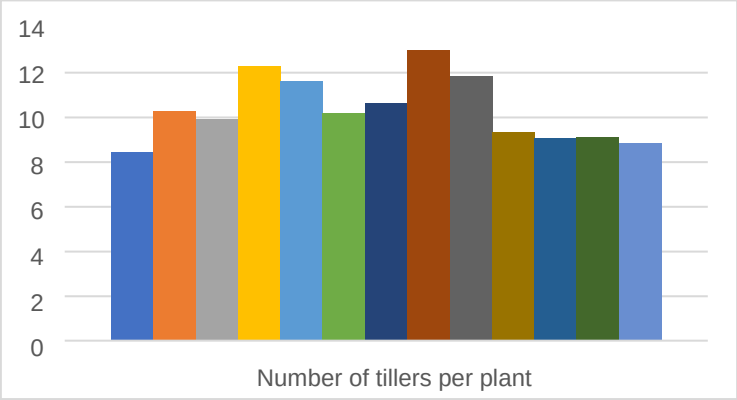


Plant height(cm): The maximum Plant heigh percent (84.31) was recorded with (T7) GA3 100ppm for 12 hours followed by (T3) IAA 100 ppm for 12 hours (84.15). And were found at par. Whereas minimum field emergence recorded in (control) T0 (78.9).

This experiment provided information about plant height increased when treated with GA3 100 ppm in comparison with other treatments.

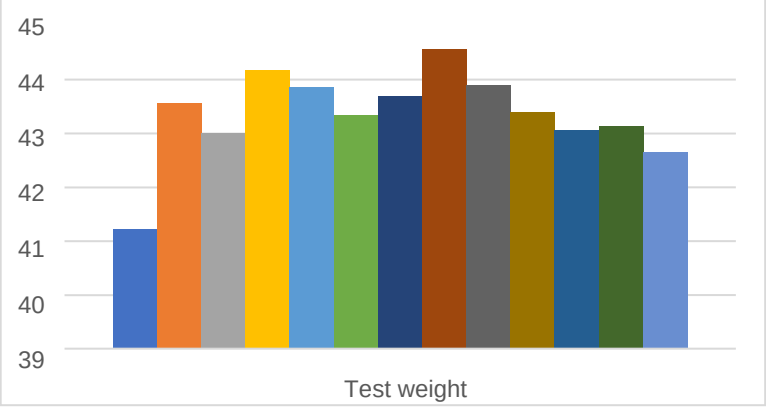


Number of tillers per plant: The maximum number of tillers per plant (13.03) was recorded with (T7) GA3 100ppm for 12 hours followed by (T3) IAA 100 ppm for 12 hours (12.28). And were found at par. Whereas minimum field emergence recorded in (control) T0 (8.42). This experiment provided information about number of tillers per plant increased when treated with GA3 100 ppm in comparison with other treatments.

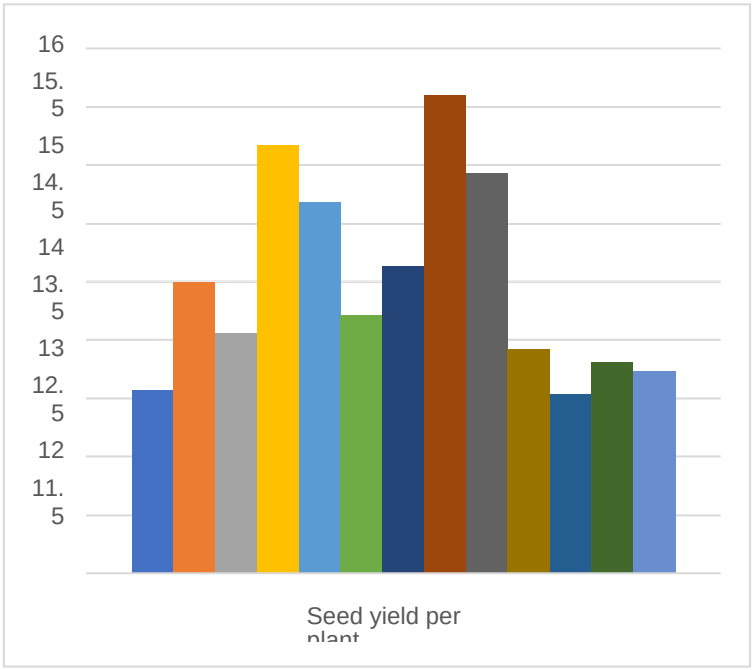


Test weight: The maximum Test weight (44.57) was recorded with (T7) GA3 100ppm for 12 hours followed by (T3) IAA 100 ppm for 12 hours (44.17).

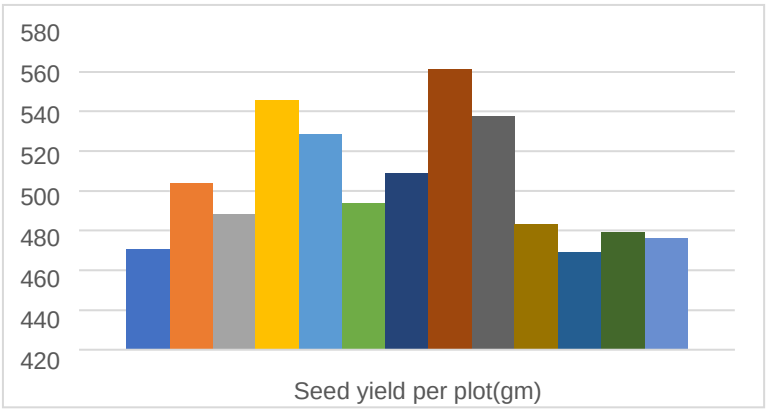
And were found at par. Whereas minimum field emergence recorded in (control) T0 (41.21). This experiment provided information about test weight increased when treated with GA3 100 ppm in comparison with other treatments



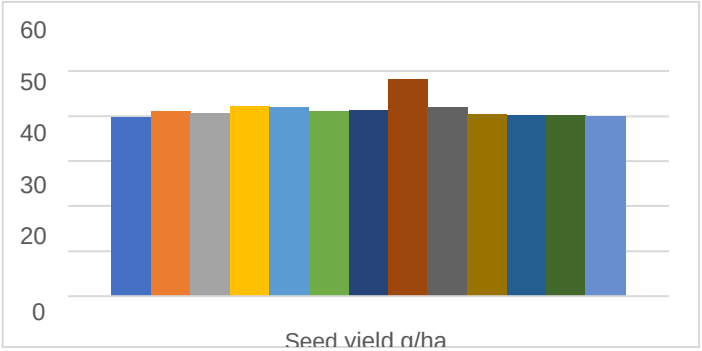
Seed yield per plant(gm): The maximum Seed yield per plant (15.6) was recorded with (T7) GA3 100ppm for 12 hours followed by (T3) IAA 100 ppm for 12 hours (15.17). And were found at par. Whereas minimum seed yield per plant recorded in (control) T0 (13.0). This experiment provided information about seed yield per plant increased when treated with GA3 100 ppm in comparison with other treatments.



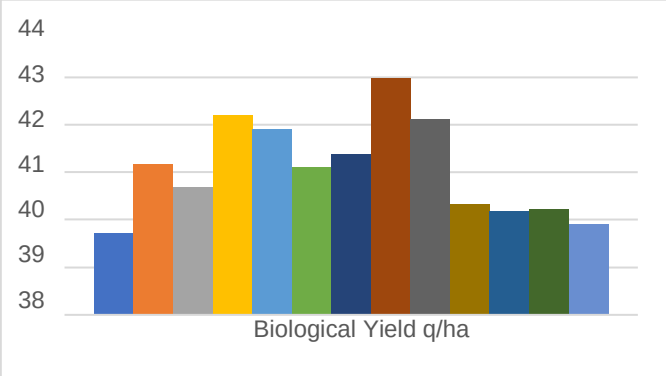
Seed yield per plot(gm): The maximum Seed yield per plot (561.6) was recorded with (T7) GA3 100ppm for 12 hours followed by (T8) GA3 100 ppm for 6 hours (537.6). Whereas minimum seed yield per plant recorded in (control) T0 (470.54). This experiment provided information about seed yield per plot will be increased when it will be treated with GA3 100 ppm of wheat seeds than other treatments.



Seed yield q/ha: The maximum Seed yield q/ha (48.13) was recorded with (T7) GA3 100ppm for 12 hours followed by (T3) IAA 100 ppm for 12 hours (42.20). Whereas minimum seed yield per plant recorded in (control) T0 (39.72). This experiment provided information about seed yield q/ha will be increased when it will be treated with GA3 100 ppm of wheat seeds than other treatments.



Biological yield q/ha: The maximum biological yield q/ha (42.97) was recorded with (T7) GA3 100ppm for 12 hours followed by (T3) IAA 100 ppm for 12 hours (42.2). Whereas minimum seed yield per plant recorded in (control) T0 (39.72). This experiment provided information about biological yield will be increased when it will be treated with GA3 100 ppm of wheat seeds than other treatments.



Harvest index (%): The maximum harvest index (94) was recorded with (T7) GA3 100ppm for 12 hours followed by (T3) IAA 100 ppm for 12 hours (92.33). Whereas minimum seed yield per plant recorded in (control) T0 (86.92). This experiment provided information about harvest will be increased when it will be treated with GA3 100 ppm of wheat seeds than other treatments.

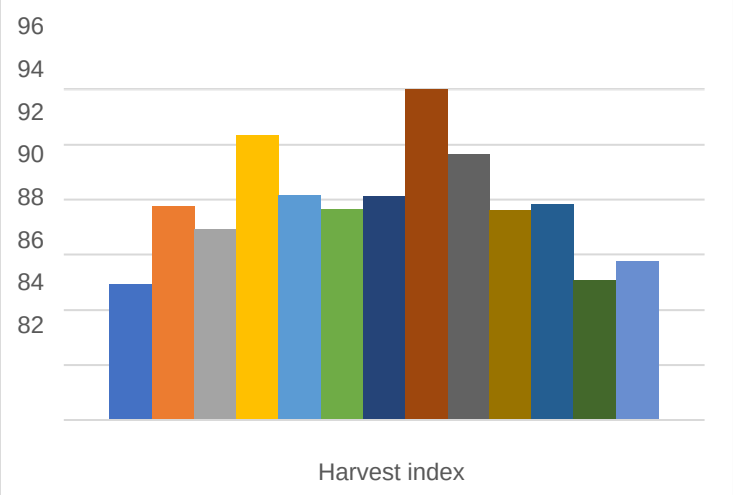


Table. 1 Analysis of variance of Wheat (Variety HD2967)

Characters	Mean sum of square Replication (d.f=2)	Treatment (d.f=12)	Error (d.f=24)
Field emergence	4.936	1.418*	1.899
Plant height. (cm)	6.39	11.64**	3.32
Number of tillers per plant	1.29	6.33*	1.30
Test Weight (gm)	1.81	2.05*	2.83
Seed yield per plant. (g)	0.84	2.19**	0.33
Seed yield per plot (gm)	1083.76	2836.35*	429.84
Seed yield q/ha	0.25	3.05*	1.23
Biological yield	2.06	12.07**	15.08
Harvest index.	11.14	15.50*	4.77

& Significance at 1% and 5% level of Significance**

Table: 2 Mean performance of Wheat for 9 Field Characters

Treatments	Field emergence	Plant height. (cm)	Number of tillers per plant	Test Weight (gm)	Seed yield per plant. (g)	Seed yield per plot(gm)	Seed yield q/ha	Biological yield q/ha	Harvest index (%)
T0- Control	78.8	78.9	8.42	41.21	13.0	470.54	39.72	39.72	86.92
T1- IAA (50 ppm 12 hrs)	83.43	81.35	10.31	43.56	14	503.84	41.17	41.17	89.73
T2- IAA (50 ppm 6 hrs)	81.56	80.63	9.93	43	13.56	488.16	40.67	40.67	88.94
T3- IAA (100 ppm 12 hrs)	86.23	84.15	12.28	44.17	15.17	546	42.20	42.2	92.33
T4- IAA (100 ppm 6 hrs)	84.59	83.2	11.62	43.87	14.68	528.6	41.89	41.89	90.15
T5- GA3 (50 ppm 12 hrs)	83.35	81.18	10.16	43.35	13.72	493.8	41.10	41.1	89.65
T6- GA3 (50 ppm 6 hrs)	83.55	81.52	10.66	43.7	14.13	508.8	41.37	41.37	90.12
T7- GA3 (100 ppm 12 hrs)	**87.17**	**84.31**	**13.03**	**44.57**	**15.6**	**561.6**	**48.13**	**42.97**	**94**
T8- GA3 (100 ppm 6 hrs)	84.98	83.67	11.84	43.9	14.93	537.6	42.12	42.12	91.66
T9- Neem leaf extract (5% 12 hrs)	81.16	80.07	9.32	43.39	13.42	483.24	40.32	40.32	89.6
T10- Neem leaf extract (5% 6 hrs)	80.27	79.15	9.07	43.06	13.03	469.2	40.18	40.18	89.83
T11- Tulasi leaf extract (5% 12 hrs)	80.48	79.6	9.12	43.14	13.31	479.16	40.21	40.21	87.09
T12- Tulasi leaf extract (5% 6 hrs)	79.09	79.09	8.84	42.66	13.23	476.16	39.90	39.9	87.76
Mean	82.67	81.29	10.35	43.35	13.99	503.59	41.46	41.06	89.83
SED	2.75	2.38	1.28	1.14	1.23	3.69	1.05	1.49	2.43
CD at 5%	5.68	4.92	2.64	2.36	2.54	7.61	2.18	3.08	5.02
CD at 1%	7.70	6.67	3.58	3.20	3.45	10.31	3.03	4.17	6.81
CV	1.67	2.24	11.00	3.88	4.12	4.12	3.10	2.70	4.32
Max	87.17	84.31	13.03	44.57	15.60	561.60	48.13	42.97	94.00
Min	78.80	78.90	8.42	41.21	13.03	469.20	39.72	39.72	86.92
F- test	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**

DISCUSSION

The observations from this research work showed that, GA3 shown superior in growth and yield parameters. Here, Plant growth regulators place a major role in growth and yield of wheat were compared to botanicals. Wheat seeds which are treated with GA3 shown good effects in the aspect of field emergence, plant height, number of tillers per plant, test weight, seed yield per plot, seed yield per plot, seed yield q/ha, biological yield q/ha, harvest index. Seeds are treated with botanicals also shown moderate results. By pre-soaking of wheat seeds helps to decrease the time necessary for germination and emergence. It also helps to extent the temperature range at which a seed can germinate.

CONCULSION

It is concluded from the present investigation that the different concentration of priming treatment showed significant influence of plant growth regulators and botanicals on growth, yield and yield attributing traits of wheat seeds pre- sowing treatments with GA3 (100ppm) increased the plant height of wheat.

Gibberellic acid showed maximum increase in germinability and vigour and showed maximum increase in field parameter. Pre-sowing treatment in the wheat seeds for 12 hours enhanced, field emergence, plant height, number of tillers per plant, test weight, seed yield, biological yield q/ha and harvest index (%).

Pre-sowing seed treatment with GA3 improved significantly the germination and seedling growth of crops. Priming alleviated the inhibitory effect stress on germination. It is eco-friendly techniques with environment and useful to exploit seed potential in arid and desert regions.

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REFERENCES

Amarnath BH, AK Chaurasia, Arvind Kumar, Niranjana Chaurasia, Vivekanad V, Ashish Kumar Singh. (2015). Effect of priming with botanicals and animal waste on germination and seedling vigour in sorghum (*Sorghum bicolor* L.*)* seeds Department of Genetics and Plant Breeding, Sam Higginbotham Institute ofAgriculture, Technology and Sciences, Allahabad, (U.P.), *India.Advances in Applied Science Research,* 2015, 6(10):73- 77.

Basra SMA, Pannu IA, Afzal I (2003). 'Evaluation of seedling Vigor of Hydro and Matriprimed Wheat (*Triticum aestivum* L.)Seeds.' *International Journal of Agriculture and Biology* 2, (5) 121- 123

Bushuk W, Rasper VF (1994). 'Wheat Production, Properties and Quality.'Chapman and Hall. Glasgow.

Chavan NG, Bhujbal GB, Manjare MR (2014). Effect of seed priming on field performance and seed yield of soybean [Glycine max (l.) merill] varieties.The Bioscan. 9(1): 111-114

Chaven JK, SS Kadam (1989)."Nutritional improvement of cereals by fermentation."CRC Critical Reviews in Food Science and Technology28(5): 349.

Colmer TD, Flowers TJ, Munns R (2006) 'Use of wild relatives to improve salt tolerance in wheat.'*Jornal of Experimental Botany* 1-20

Curtis BC, Rajaram S, Macpherson HG (2002). 'Bread Wheat Improvement and Production.'Food and Agriculture Organization of the United Nations, Rome.92, 5, 104809-6.

Eliasson AC, K Larsson (1993). Cereals in Breadmaking. New York, Marcel Dekker, Inc., 376 pp.

Harmeet Singh, Rupinder Kaur J, JS Kang, SS Sandhu, Harrajdeep Kang, Kamaljit Grewal (2015). *Seed priming techniques in field crops* Agriculture Review, 36 (4) 2015 : 251-264

Hussian I, Ahmad R, Farooq M, Rehman A, Amin M, Bakar MA (2014). Seed priming: a tool to invigorate the seeds. Scientia Agriculturae, 7 (3):122-128.

Jayaraj T, Sasikala K (2004). Seed treatment techniques for quality seed production of rice cv. CR1009 in semi dry condition. *Seed Research.*, 31: 69-72.

Mala Trivedi, Rajesh K, Tiwari (2016). Method of enhancing seed germination in *Chlorophytum* sp. International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 03 Issue: 05 | May-2016 www.irjet.net p-ISSN: 2395-0072 © 2016, IRJET | Impact Factor value: 4.45 | ISO 9001:2008 Certified Journal |

Manoj Kumar (2014). Influence of Seed Priming with Urine, Phosphorus and Zinc on Maize (*Zea mays* L.) Yield in an Acid Soil of Northeast India. *Indian Journal of Hill Farming* 27**(1):***78-80.*