Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; SP1: 3283-3285

Devendra Kumar Jaiswal
Department of Biological Sciences, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Md. Abdul Basith
Department of Biological Sciences, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

K Prasada Rao
Department of Biological Sciences, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Nadiya Hasan
Department of Biological Sciences, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Correspondence
Md. Abdul Basith
Department of Biological Sciences, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh, India

Impact of PGR'S on growth and yield status of seven genotypes of Wheat *(Triticum aestivum and Triticum durum*) under late sown condition

Devendra Kumar Jaiswal, Md. Abdul Basith, K Prasada Rao and Nadiya Hasan

Abstract
A field experiment was conducted at the Central field SHIATS, Allahabad during *Rabi,* to study the Impact of plant growth regulators on growth and yield of elite Wheat *(Triticum aestivum* and *Triticum durum*) genotypes under late sown condition. The experiment was laid out in randomized block design with 7 genotypes in three replications four level of plant growth regulators Control (o), Gibberellic acid (250mg/liter water), Triacontenol (0.5ml/liter water) and Kinetin (0.5ml/liter water). results indicated that the application Gibberellic acid (250mg/liter water) recorded significantly plant height (103cm.) with genotype NIDW-295, leaves per plant 60 DAT.(8.4), tillers per plant 30 DAT. (11.2), spike per plant (12.8), grain per spike (42.4), spike length(14.2cm.), test weight (43.6) grain yield (410g./m^2), straw yield (555g./m^2) with genotype RAJ-6560.

Keywords: Gibberellic acid, Kinetin, Triacontenol, Wheat

Introduction
Wheat (*Triticum aestivum* and *Triticum durum* L.) is one of the important cereal crop for the majority of world's populations. During 2012-13 and 2013-14, the world production and trade have increased by 9 percent (from 655 million MT to 713 million MT) (International Grains Council). The major wheat producing states in India are Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan, Bihar, Maharashtra, Gujarat, Karnataka, West Bengal, Uttarakhand, Himachal Pradesh and Jammu & Kashmir.The wheat requirement by 2020 would be between 105-109 million tones. More of this increase in the production will have to come from increase productivity as the land area under wheat is expected to decrease, (Johnson, 2005) [5].

The word hormone is derived from Greek, meaning *set in motion*. Plant hormones affect gene expression and transcription levels, cellular division, and growth. The processes of photosynthesis and photorespiration are maintained in a balance way by treatment with TRIA as increased uptake of CO2 (photosynthesis) and inhibition of O2 (photorespiration) enhanced cell number and chlorophyll contents after 4 and 3 days, respectively (Haugstad *et al*., 1983) [3]. Gibberellic acid is an important growth regulator that may have many uses to modify the growth, yield and yield contributing characters of plant (Rafeekher *et al.,* 2002) [6]. The response of plants to gibberellic acid, especially in stem elongation, induction of flowering, fruit set and increasing fruit size are well known in field crops (Arora *et al.,* 1985) [1]. Cytokinins regulate cell division and differentiation in certain plant tissues and participate in many developmental processes e.g. senescence, photosynthesis, flower formation and photosynthate partitioning etc. (Frakenberger and Arshad, 1995) [2].

Materials and methods
The experiment was carried out during Rabi season, Central field SHIATS, Allahabad (U.P.) which is located at 25o 24' 42" N latitude, 81o 50' 56" E longitude and 98 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna by the side of Allahabad Rewa Road about 5 km away from Allahabad city. The field experiment comprise of 4 treatment combinations involving 7 Wheat genotypes and the design followed is randomized block design with factorial concept having three replications. The plot size adopted as follows. Genotypes-K-9495, NIDW-295, HUW-658, RAJ-6560, HD-2367, HD-2894, PWD-300 and 4 treatments T_0- Control, T_1-Triacontenol@0.5ml/liter water, T_2-Kinetin@0.5ml/lit**er** water, T_3 - Gibberellic acid@250mg/liter water.

Results and discussion

1. Plant height (cm.)

The data on plant height of wheat at different growth stages as influenced by Triacontenol, Kinetin, Gibberellic acid with 7 genotypes, are presented in the plant height (Table no.1) at differed significantly due to different treatments. Significantly higher plant height (103cm.) with genotype NIDW-295 was recorded in T_3 (Gibberellic acid @ 250gm/liter water compared to Triacontenol @ 0.5ml/liter water (T_1: 85.2 cm) with genotype PWD-300 (Islam *et al.,* 2014) [4] for GA3 application

2. Leaves per plant

The data on leaves per plant of wheat at different growth stages as influenced by Triacontenol, Kinetin, Gibberellic acid with 7 genotypes are presented in the leaves per plant (Table no.1) at differed significantly due to different treatments. Significantly higher leaves per plant 60 DAT. (8.4) with genotype RAJ-6560 was recorded in T_3 (Gibberellic acid @ 250gm/liter water compared to Triacontenol @ 0.5ml/liter water (T_1: 5.7) with genotype HUW-658 (Zekeriya, 2009) [9] for GA3 application.

3. Tillers per plant

The data on tillers per plant of wheat at different growth stages as influenced by Triacontenol, Kinetin, Gibberellic acid with 7 genotypes, are presented in the tillers per plant (Table no.1) at differed significantly due to different treatments. Significantly higher tillers per plant 30 DAT. (11.2) with genotype RAJ-6560 was recorded in T_3 (Gibberellic acid @ ras250gm/liter water compared to Triacontenol @ 0.5ml/liter water (T_1: 5.4) with genotype HD-2894 (Islam *et al.,* 2014) [4] for GA3 application

4. Spike per plant

The data on spike per plant of wheat at different growth stages as influenced by Triacontenol, Kinetin, Gibberellic acid with 7 genotypes, are presented in the spike per plant(Table no.2) at differed significantly due to different treatments. Significantly higher spike per plant (12.8) with genotype RAJ-6560 was recorded in T_3 (Gibberellic acid @ ras250gm/liter water compared to Triacontenol @ 0.5ml/liter water (T_1: 5.4) with genotype HUW-658 (Islam *et al.,* 2014) [4] for GA3 application

5. Grain per spike

The data on grain per plant of wheat at different growth stages as influenced by Triacontenol, Kinetin, Gibberellic acid with 7 genotypes, are presented in the grain per plant (Table no.2) at differed significantly due to different treatments. Significantly higher grain per plant (42.4) with genotype RAJ-6560 was recorded in T_3 (Gibberellic acid @ ras250gm/liter water compared to Triacontenol @ 0.5ml/liter water (T_1: 28.2) with genotype NIDW-295 (Islam *et al.,* 2014) [4] for GA3 application

6. Spike length (cm.)

The data on spike length of wheat at different growth stages as influenced by Triacontenol, Kinetin, Gibberellic acid with 7 genotypes, are presented in the spike length (Table no.2) at differed significantly due to different treatments. Significantly higher spike length (14.2) with genotype RAJ-6560 was recorded in T_3 (Gibberellic acid @ ras250gm/liter water compared to Triacontenol @ 0.5ml/liter water (T_1: 9.4) with genotype HUW-658 (Islam *et al.,* 2014) [4] for GA3 application

7. Test weight (1000 seeds weight)

The data on test weight of wheat at different growth stages as influenced by Triacontenol, Kinetin, Gibberellic acid with 7 genotypes, are presented in the test weight (Table no.3) at differed significantly due to different treatments. Significantly higher test weight (43.6) with genotype RAJ-6560 was recorded in T_3 (Gibberellic acid @ ras250gm/liter water compared to Triacontenol @ 0.5ml/liter water (T_1: 35.6) with genotype PWD-300 (Islam *et al.,* 2014) [4] for GA3 application.

8. Grain yield (g. /m^2)

The data on grain yield of wheat at different growth stages as influenced by Triacontenol, Kinetin, Gibberellic acid with 7 genotypes, are presented in the grain yield (Table no.3) at differed significantly due to different treatments. Significantly higher grain yield (410 g. /m^2) with genotype RAJ-6560 was recorded in T_3 (Gibberellic acid @ 250gm/liter water compared to Triacontenol @ 0.5ml/liter water (T_1: 290 g. /m^2) with genotype HD-2367 (Islam *et al.,* 2014) [4] for GA3 application.

9. Straw yield (g. /m^2)

The data on straw yield of wheat at different growth stages as influenced by Triacontenol, Kinetin, Gibberellic acid with 7 genotypes, are presented in the straw yield (Table no.3) at differed significantly due to different treatments. Significantly higher straw yield (555 g. /m^2) with genotype RAJ-6560 was recorded in T_3 (Gibberellic acid @ ras250gm/liter water compared to Triacontenol @ 0.5ml/liter water (T_1: 375 g./m^2) with genotype HD-2367 (Islam *et al.,* 2014) [4] for GA3 application.

Table 1: Impact of PGR's on plant height, no. of leaves per plant and no. of tillers per plant of Wheat (Triticum *aestivum* and *Triticum durum*) genotypes under late sown condition.

Genotypes	Plant height 90 DAT.				No. of leaves per plant 60 DAT.				No. of tillers per plant 30 DAT.			
	T_0	T_1	T_2	T_3	T_0	T_1	T_2	T_3	T_0	T_1	T_2	T_3
T.aestivum K-9495	87.8	88.2	89.8	92.6	6.7	6.9	7.3	7.7	6.2	6.4	7.2	10.2
NIDW-295	90.8	92.8	96.4	103.2	6.5	6.4	6.8	7.2	5.8	6.2	6.8	9.4
HUW-658	84.2	85.6	87.2	88.6	5.7	5.9	6.2	6.2	5.6	6.2	6.6	8.8
RAJ-6560	86.6	90.2	93.8	96.2	6.2	7.4	7.9	8.4	6.4	6.6	8.4	11.2
T. durum HD-2367	84.4	85.6	87.2	89.8	5.8	6.2	6.4	6.8	4.8	5.6	6.4	9.2
HD-2894	86.2	87.2	88.8	90.2	6.2	6.2	6.4	6.4	4.8	5.4	7.2	8.6
PWD-300	84.6	85.2	86.4	88.8	6.4	6.6	6.8	7.4	4.2	5.8	6.8	9.8
F- test	S	S	S	S	S	S	S	S	S	S	S	S
S. Ed. (±)	0.665	0.059	0.91	0.535	0.136	0.136	0.023	0.052	0.087	0.17	0.23	0.163
C. D. (P = 0.05)	1.411	0.125	1.93	1.134	0.289	0.289	0.05	0.11	0.185	0.36	0.488	0.345

T_0 - control, T_1-Triacontenol, T_2 -Kinetin, T3 - Gibberellic acid (GA_3), DAT. - Days after treatment

Table 2: Impact of PGR's on no. of spike per plant, no. of grain per spike and spike length of Wheat (*Triticum aestivum* and *Triticum durum*) genotypes under late sown condition.

Genotypes	No. of spike per plant				No. of grain per spike				Length of spike (cm.)			
	T_0	T_1	T_2	T_3	T_0	T_1	T_2	T_3	T_0	T_1	T_2	T_3
T.aestivum K-9495	5.2	5.6	7.8	10.2	29.0	29.2	34.8	37.6	9.8	10.4	11.6	13.4
NIDW-295	4.6	4.8	6.	8.2	28.0	28.2	29.2	30.4	9.6	9.8	10.8	11.8
HUW-658	4.8	5.0	6.2	8.4	28.6	29.0	30.2	31.0	9.2	9.4	10.4	12.6
RAJ-6560	5.4	6.2	9.4	12.8	29.8	30.2	36.2	42.4	10.2	10.8	12.2	14.2
T. durum HD-2367	4.8	5.2	5.8	8.8	28.4	28.6	29.8	30.8	9.2	9.6	10.6	11.8
HD-2894	4.6	5.2	6.8	8.6	28.2	28.4	29.6	30.8	9.6	9.8	10.8	12.2
PWD-300	5.2	5.4	6.4	9.2	28.8	29.0	30.4	31.6	9.4	10.2	11.4	12.8
F- test	S	S	S	S	S	S	S	S	S	S	S	S
S. Ed. (±)	0.207	0.078	0.011	0.009	0.384	0.317	0.768	0.606	0.133	0.327	0.051	0.322
C. D. (P = 0.05)	0.438	0.166	0.023	0.019	0.813	0.672	1.627	1.285	0.282	0.693	0.108	0.682

T_0 - control, T_1-Triacontenol, T_2 -Kinetin, T3 - Gibberellic acid (GA_3)

Table 3: Effect of PGR's on test weight, grain yield and straw yield Wheat (*Triticum aestivum* and *Triticum durum*) genotypes under late sown condition.

Genotypes	Test weight (1000 seeds)				Grain yield (g./m^2)				Straw yield (g./m^2)			
	T_0	T_1	T_2	T_3	T_0	T_1	T_2	T_3	T_0	T_1	T_2	T_3
T. aestivum K-9495	38.	38.6	40.2	40.8	310	330	360	390	405	435	480	525
NIDW-295	36.	36.4	37.8	39.6	280.	310	325	371	360	405	427	496
HUW-658	35.	36.4	37.2	39.2	283	315	335	365	364	408	442	487
RAJ-6560	38.	38.8	42.2	43.6	326.	345	392	410	429	457	528	555
T. durum HD-2367	37.2	37.8	38.2	38.8	275	290	315	370	352	375	412	495
HD-2894	38.	38.4	38.8	39.8	295	320	365	378	382	420	487	505
PWD-300	35.2	35.6	39.8	40.2	295	322	348	383	382	423	462	514
F- test	S	S	S	S	S	S	S	S	S	S	S	S
S. Ed. (±)	0.502	0.611	0.768	0.322	0.870	1.534	0.399	0.652	1.239	1.534	1.107	0.790
C. D. (P = 0.05)	1.063	1.296	1.627	0.682	1.845	3.253	0.845	1.381	2.627	3.253	2.347	1.674

T_0 - control, T_1-Triacontenol, T_2 -Kinetin, T3 - Gibberellic acid (GA_3),

Conclusion

From the present investigation it is concluded that the GA_3 (250 mg) significantly increased the growth and yield of Wheat in comparison to Triacontenol (0.5ml), Kinetin (0.5ml) and genotype RAJ-6560 was observed as a best wheat genotype in this investigation significantly followed by K-9495 and NIDW-295 genotype at 0.05% level.

References

1. Arora SK, Pandita ML, Baswana KS. Effect of growth regulators on flowering and fruiting of bottle gourd. Haryana Agril. Univ. J Res. 1985; 25(1):36-41.
2. Frankenberger Jr, WT, Arshad M. Phytohormones in Soil: Microbial Production and Function. Marcel Dekker, New York, 1995.
3. Haugstad M, Ulsaker LK, Ruppel A, Nilsen S. The effect of triacontanol on growth, photosynthesis and photorespiration in *Chlamydomonas reinhardtii* and *Anacystis nidulans*. Physiol. Plant. 1983; 58:451-456.
4. Islam S, Chakrabortty, Sudip, Uddin MJ, Mehraj H, Jamal Uddin AFM. Growth and Yield of Wheat as Influenced by GA3 Concentrations. Int. J Bus. Soc. Sci. Res. 2014; 2(1):74-78.
5. Johansson E, Prieto-Linde ML, Svensson G. Influence of nitrogen application rate and timing on grain protein composition and gluten strength in wheat cultivars. J Plant Nutr Soil Sci. 2005; 167:345-350
6. Rafeeker M, Nair SA, Sorte PN, Hatwal GP, Chandhan PN. Effect of growth regulators on growth and yield of summer cucumber. J Soils Crops. 2002; 12(1):108-110.
7. Zahir ZA, Asghar HN, Arshad M. Cytokinin and its precursors for improving growth and yield of rice. Soil Biol. Biochem. 2001; 33:405-408.
8. Zahir ZA, Iqbal M, Arshad M, Naveed M, Khalid M. Effectiveness of IAA, GA3 and Kinetin blended with recycled organic waste for improving growth and yield of Wheat (*Triticum aestivum*) Pak. J Bot. 2007; 39(3):761-768.
9. Zekeriya Akman. Effect of Plant Growth Regulators on Nutrient Content of Young Wheat and Barley Plant under saline Conditions Medwell Journals. 2009; 8(8):2018-20.