Vol 5 Issue 7 Jan 2016

ISSN No :2231-5063

International Multidisciplinary Research Journal

Golden Research Thoughts

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RNI MAHMUL/2011/38595 **ISSN No.2231-5063**

Golden Research Thoughts Journal is a multidisciplinary research journal, published monthly in English, Hindi & Marathi Language. All research papers submitted to the journal will be double - blind peer reviewed referred by members of the editorial board.Readers will include investigator in universities, research institutes government and industry with research interest in the general subjects.

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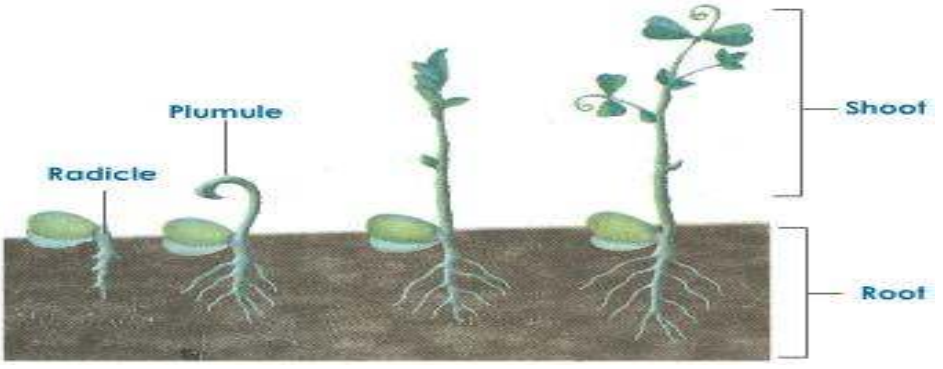
Golden Research Thoughts
International Recognition Multidisciplinary Research Journal

ISSN: 2231-5063 Impact Factor : 3.4052(UIF) Volume - 5 | Issue - 7 | Jan - 2016



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PHYSIOLOGICAL EFFECTS OF SEED TREATMENTS WITH GA ON SEEDING GROWTH UNDER LABORATORY AND FIELD CONDITIONS INWHEAT

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ABSTRACT

Immersion of seeds in solutions containing PGRs has been suggested by various workers to enhance seed germination and emergence potential, under adverse growing or environmental conditions, or alternatively under satisfactory conditions using seeds of impaired germinating quality. GA are used to increase alpha amylase activity in germinating Barley seeds . which is used for malt production in beer Industry. This hormone also stimulates hydrolysis and transport of stored food material from endosperm and cotyledons to the growing Root-Shoot axis specially in the cereals.
Interest in the use of growth regulators in crop production arises from the beliefs of plant physiologists that maximum levels of plant productivity GA promote seed germination .GA has several form .GA 10-1, GA 10-2, GA 10-3.....so on . All the Gibberellins are able to promote either stem elongation or cell division although their relative effectiveness may be different .

Studied for determining effect of different concentration of GA in Wheat on percentage germination and seedling growth in terms of shoot and root lengths and dry weight distribution. Under Laboratory and Field conditions.

KEY WORDS- seed germination, percent germination , seedling growth, GA, Wheat.

INTRODUCTION

PGRs (GA3) have been found quite effective when incorporated in partially aged seeds of soybean, with mustard and black gram and green gram (Saxena 1989). Lint index, seed index, ginning

%, boll numbers and weight of seed cotton per boll, PGR were increased in treated seeds. Pod numbers, pod weight per plant, yield of branches were higher in pretreated seeds of mustard.The number of pods per plant and 100 seed weight were higher in black gram and green gram. The cumulative effects of these treatments in increasing productivity of these crops were quite significant under field conditions (Saxena, 1989).

From the -foregoing review the impacts of seed pretreatments with GA . in improving yields in a variety of plants is apparent. PGRs are beneficial in increasing vegetative and reproductive growth under field conditions. Hence, it was thought worthwhile to investigate the effects of seed pretreatments with PGRs like GA, on the wheat crop recommended for intensive cultivation . The results obtained are discussed below.

MATERIALS AND METHODS

The seeds of wheat (147) , were studied for their physiological performance under the effect of 10-4 to 10- 7 M concentration of gibberellic acid (GA)

The seeds were soaked in different concentrations of PGR like GA for the optimum periods were 6 hrs for wheat . Two sets of experiments were laid : (I) laboratory studies and (II) field studies.

The results reported in Tables are means of at least three replications and were analyzed statistically .

(I) Laboratory studies

In all these studies, uniformly selected seeds were germinated in sterilized petridishes lined with filter paper and treated with 8 ml DW. The seeds were also treated with mercuric chloride to avoid fungal contamination . The percent germination, lengths of shoot and root were measured after 5 days. The petridishes were kept at 28°C +- 20C and under normal light condition. Fresh and dry weight (mgm per organ) was recorded after drying the samples in an oven at 80°C.

(II) Field studies

Seeds of four seeds were pre-soaked for their optimum drying period. They were then air dried to bring to their initial weight. The pre-soaked and dried seeds were grown in rows made in field plots (30 m2) for 30, 60 and 90 days. The following data were collected on the plants so cultivated (1) height, (2) leaf length, (3) leaf width, (4) leaf area, (5) leaf number, (6) tiller numbers, (7) stem dry weight, (8) root dry weight, (9) total plant weight.

OBSERVATION & OBSERVATION TABLE

Table 1. Effect of presoaking wheat for 6 hours in different concentrations GA on % germination and seedling growth.

Plant Growth Regulators (Hrs)	% Germi-nation	ROOT			SHOOT			LEAF	
		LN	FW	DW	LN	FW	DW	FW	DW
GA 0	43	4.40	116	13	5.10	108	13	103	12
GA 10-4	100	9.73	127	22	6.10	118	18	109	18
GA 10-5	87	9.03	120	20	5.63	113	17	95	16
GA 10-6	70	8.23	118	16	5.33	110	15	96	14
GA 10-7	53	8.03	112	14	4.27	108	13	96	12
S.E. C.D. (P=0.05)	3.52 7.84	0.017 0.037	0.5 1.11	0.72 1.60	0.01 0.02	0.69 1.53	0.42 0.93	1.02 2.27	0.37 0.82

Table 2. Effect of presoaking wheat for 6 hours in different concentration GA after air drying on % germination and seeding growth.

Plant Growth Regulators (Hrs)	% Germi-nation	ROOT			SHOOT			LEAF	
		LN	FW	DW	LN	FW	DW	FW	DW
GA 0	86	4.27	116	13	8.20	112	12	109	11
GA 10_{-4}	96	5.17	122	17	10.90	117	15	114	16
GA 10_{-5}	60	3.73	118	15	8.57	113	13	112	14
GA 10_{-6}	63	3.47	112	13	7.53	141	11	111	12
GA 10-7	53	3.30	110	11	7.17	110	10	110	10
S.E. C.D. (P=0.05)	3.00 7.84	0.12 0.26	0.55 1.22	0.42 0.93	0.14 0.31	0.59 1.31	0.38 0.84	0.24 0.53	0.41 0.93

Table 3. Physiological performance of seedlings from presoaked (air dried) seeds of wheat in GA (10-4 to 10-7) under field condition at 30, 60, 90 days

Treatment	Plant Height	Leaf Length	Leaf Width	Leaf Area	Leaf No.	Tiller No.	Stem Dry wt.	Root Dry wt.	Total Plant wt.
30 days									
Control	34.73	22.33	1.30	0.11	2	0.00	37.00	39.33	337
10^{-4}	43.37	27.33	1.73	0.12	4	0.00	46.33	58.00	408
10^{-5}	40.13	25.00	1.50	0.11	2	0.00	42.00	47.00	361
10^{-6}	37.50	21.00	1.20	0.11	2	0.00	38.00	43.33	332
10^{-7}	36.30	19.00	1.03	0.10	1	0.00	37.33	41.00	340
S.E. C.D. (P=0.05)	1.42 3.16	0.28 0.62	0.02 0.04	0.03 0.06	0.001 0.002	- -	0.33 0.73	0.27 0.60	0.39 0.86
60 days									
Control	43.67	23.00	1.43	0.11	2	0.00	40.00	46.67	358
10^{-4}	53.27	26.67	2.43	0.21	4	0.00	46.33	62.67	434
10^{-5}	50.30	23.67	2.23	0.21	2	0.00	46.00	62.00	380
10^{-6}	46.40	24.67	1.57	0.21	1	0.00	40.33	57.33	364
10^{-7}	45.40	21.67	1.03	0.20	1	0.00	38.67	56.33	356
S.E. C.D. (P=0.05)	5.14 11.45	0.65 1.40	0.52 1.20	0.35 0.77	0.56 0.78	- -	0.42 0.92	0.37 0.82	0.46 1.00
90 days									
Control	52.53	25.33	1.77	0.12	4	0.00	41.00	81.00	387
10^{-4}	90.70	30.00	3.63	0.22	7	0.00	56.00	91.67	597
10^{-5}	90.17	28.00	3.07	0.21	3	0.00	52.00	88.67	482
10^{-6}	90.07	25.33	2.33	0.21	3	0.00	50.67	87.67	428
10^{-7}	89.40	24.67	2.03	0.24	1	0.00	40.67	82.00	383
S.E. C.D. (P=0.05)	2.98 6.63	0.28 0.17	0.54 1.20	0.35 0.77	0.55 0.11	- -	0.41 0.91	0.37 0.82	0.45 1.00

RESULT AND DISCUSSION

Laboratory studies on wheat

Table I includes results obtained after pre-soaking and Table 2 after air drying wheat seeds on percent germination and seedling growth.

The results in Table 1 show that the best percentage germination and maximum shoot and root length were obtained when wheat seeds were soaked in 10-4 GA . The percent germination ranged

from 53 to 100 with GA. In control it ranged only for 43%. Germination percentage declined with higher concentrations of GA. Hence, GA and KIN were good for root growth with the optimum concentration being 10-4. The shoot length was more or less the same after 5 days of germination with GA. it ranged from 4.2 to 10.90 cms with GA .

The dry weight (mg) of roots ranged from 13.0 to 22.0 with GA. The Corresponding figures for shoot were 4.27 to 10.0 with GA . With regard to leaf dry matter the best result was at 10- 4 PGR concentration. The leaf weight ranged from 10 to 16 with GA.

Table 2 includes the results obtained after air drying of wheat seeds. The percent germination was maximum with GA 10-4. The maximum shoot length was 10.9 cms with 10-4 GA. In all the three PGR soaked seeds shoot length decreased as the concentration was lowered from 10-4 to10-7

Field studies on wheat seeds :

Tables 3 include results obtained on the growth of wheat seedlings after' 30, 60 and 90 days when treated with GA.

The plant height ranged from 34 to 43.6 cms, with the GA . There was decline in the plant height when the concentration of any one of the PGR was reduced from 10-4 to 10-7 often the control plots gave better- results than the lowest concentrations of PGRs.

As expected, there was a gradual increase in leaf length and leaf width with advancing age of the plant with best result seen at 10 -4 concentration of GA. The leaf length (cms) ranged from 19.6 to 30.0 at 30 days, 23.0 to 26.0 at 60 days and 24.3 to 30.6 after 90 days (Tables 3). The corresponding figures for leaf width (cms) were 1.03 to 1.7, 1.0 to 2.43 and 1.7 to 3.63 at 30, 60 and 90 days respectively.T h e leaf area varied within narrow limits of 0.10 to 0.24. There was no tillering with GA to 90 days. The leaf number ranged from 1 to 4 in 30 days, 1 to 7 in 60 days and 1 to 7in 90 days with the GA. At 30 days the dry weight of the stem was (39 to 46 gm) with the GA PGR. The root dry weight was (39 t0 58 gm) . More or less similar trend was noticed in dry weight of the stem taken at 60 and 90 days plant growth. The root dry weight was, however, maximum with GA.

CONCLUSION

GA was largely responsible for elongation of shoot . GA stimulate extensive growth in intact plants . They enhance elongation of intact stems much more than that of excised stem segments

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