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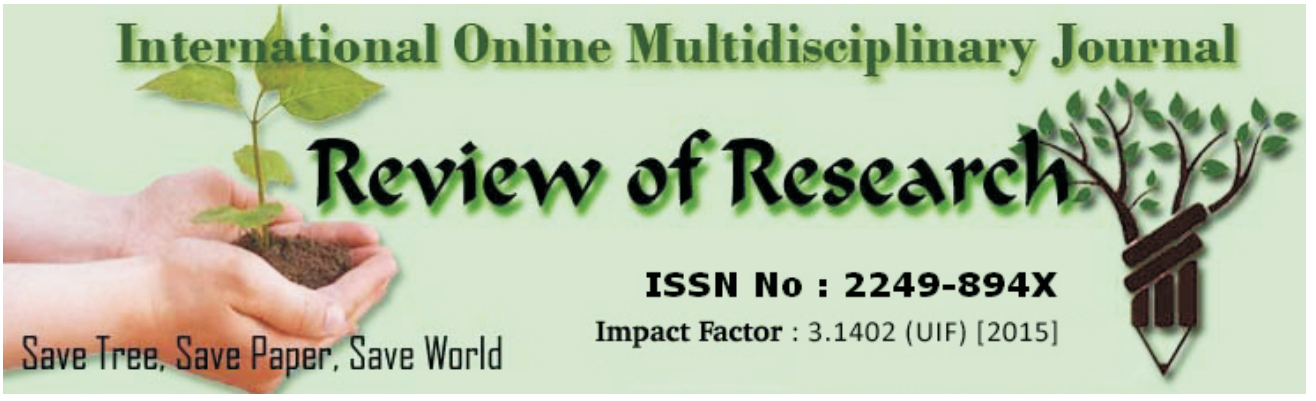

Review Of Research

PHYSIOLOGICAL EEECTS OF SEED TREATMENTS WITH GA ON SEEDING GROWTH UNDER LABORATORY AND FIELD CONDITIONS IN GREEN GRAM

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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 germina ting 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 Green gram on percentage germination and seedling growth interms of shoot and root lengths and dry weight distribution.Under Laboratory and Field conditions.

KEY WORDS:*seed germination,seedling growth,GA, Green gram.*

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 Green gram crops recommended for intensive cultivation . The results obtained are discussed below.

MATERIALS AND METHODS

The seeds of greengram (Kopergaon) were studied for theirphysiological performance under the effect of 10^{-4} to 10^{-7} Mconcentration of gibberellic acid (GA) .

The seeds were soaked in different concentrations ofPGRs for the optimum period was 4 hrs for green gram.Two sets of experiments were laid : (I) laboratory studies and(II) field studies.

The results reported in Tables are means of at leastthreereplications and were analyzed statistically .

I) Laboratory studies

In all these studies, uniformly selected seeds weregerminated in sterilized petridishes lined with filter paperand treated with 8 ml DW. The seeds were also treated withmercuric chloride to avoid fungal contamination as described in Chapter II. The percent germination, lengths of shoot androot were measured after 5 days. The petridisheswere 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 optimumdrying period.They were then air dried to bring to theirinitial weight. The pre-soaked and dried seeds were grown inrows made in field plots (30 m2) for 30, 60 and 90 days. Thefollowing 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 green gram for 4 hours in different concentrations of GA on % germination and seedling growth.

Plant Growth Regulators (Hrs)	% Germi-nation	ROOT			SHOOT			LEAF	
		LN	FW	DW	LN	FW	DW	FW	DW
				GA_3					
GA 0	73	7.87	113	12	13.87	109	14	108	12
GA 10^{-4}	93	18.80	117	17	15.87	116	18	106	17
GA 10^{-5}	70	15.80	113	12	11.27	108	14	104	14
GA 10^{-6}	53	14.30	111	13	10.67	106	12	103	12
GA 10^{-7}	43	13.23	110	11	10.20	104	11	101	11
S.E. C.D. (P=0.05)	3.93 8.75	0.05 0.11	0.46 1.02	0.35 0.77	0.03 0.06	0.53 1.18	0.33 0.73	0.27 0.60	0.39 0.86

Table 2. Effect of presoaking green gram for 4 hours in different concentration GA after air drying on % germination and seedling growth.

Plant Growth Regulators (Hrs)	% Germi-nation	ROOT			SHOOT			LEAF	
		LN	FW	DW	LN	FW	DW	FW	DW
GA 0	73	6.53	113	12	15.83	111	14	108	12
GA 10-4	96	9.83	117	14	17.17	118	17	109	16
GA 10^{-5}	76	9.40	112	12	16.80	109	15	108	13
GA 10^{-6}	50	8.67	110	11	15.90	107	13	105	13
GA 10^{-7}	43	7.33	109	10	13.80	104	10	102	11
S.E. C.D. (P=0.05)	3.19 7.10	0.05 0.11	0.58 1.29	0.22 0.49	0.04 0.08	0.37 0.82	0.31 0.69	0.12 0.26	0.35 0.77

Table 3. Physiological performance of seedlings from presoaked (air dried) seeds of green gram 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	41.23	3.10	2.03	0.08	12	0.00	41.33	46.00	100
10^{-4}	53.70	4.60	2.90	0.09	14	0.00	43.33	48.67	100
10^{-5}	53.23	4.40	2.40	0.09	12	0.00	43.00	37.67	100
10^{-6}	52.67	3.73	1.70	0.08	10	0.00	40.33	35.67	100
10^{-7}	51.07	2.73	1.20	0.08	8	0.00	36.00	33.00	100
S.E. C.D.	0.04 0.08	0.07 0.15	0.04 0.08	0.58 1.38	0.28 0.62		0.62 1.33	0.51 1.13	0.50 1.12
60 days									
Control	42.33	2.87	2.13	0.09	12	0.00	38.67	41.67	100
10^{-4}	65.27	4.77	3.10	0.11	17	0.00	44.67	50.00	100
10^{-5}	65.33	4.17	2.70	0.07	15	0.00	44.33	45.67	100
10^{-6}	64.23	3.90	1.47	0.10	13	0.00	39.00	43.33	100
10^{-7}	64.20	2.10	1.27	0.10	11	0.00	36.00	40.33	100
S.E. C.D.	0.04 0.08	0.05 0.11	0.08 0.17	0.009 0.02	- -	0.84 1.87	0.28 0.62	0.63 1.34	0.52 0.32
75 days									
Control	53.10	2.90	2.30	0.10	14	-	42.00	43.00	100
10^{-4}	68.53	4.70	3.20	0.12	19	-	47.67	48.67	100
10^{-5}	67.77	4.43	2.87	0.11	17	-	45.67	37.00	100
10^{-6}	66.37	4.10	1.30	0.10	14	-	44.67	35.33	100
10^{-7}	66.07	3.10	1.07	0.10	11	-	40.67	31.67	100
S.E. C.D.	0.62 1.38	0.05 0.11	0.03 0.06	0.38 0.84	0.84 1.87	- -	0.47 1.04	0.83 1.84	0.03 0.06

RESULT AND DISCUSSION

Laboratory studies on green gram

Table 1summarises the results obtained on pre-soakedgreen gram seeds. Percent germination declined with lowerconcentrations of PGRs. The percent germination in all thetreatments ranged from 43 to 93. The root length was maximumwith GA whereas the shoot length was more or less the samewith all the three PGRs. The former ranged from 4.8 to 18..8,cm first and latter from 10 to 16.8 cms with the best result seenat 10-4 PGR concentration. The dry weight of roots wasmaximum GA,the former ranged from 10 to 17 mgm and latter from 10 to 18 mgm for the 5 day old seedlings, The dry weight accumulation in the leaf was more or less the same (11 to 17 mg) with GA. Ingeneral, green gram showed much better growth and development

Table 2 shows the results on airdriedgreen gramseeds. The percent germination withthis PGRswasnot significantly higher than that in pre-soaked seeds (Table 2) and ranged from 43 to 9-16%. The root length was maximum (10.5cms). The corresponding values for shoot length were 12.8 to 17.1 cms with the this PGR.From 10 to 15 mgmdry matter accumulated in the root and from 10.3 to 21 mgm in shoots in 5 days in PGRs – treated green gram seeds. The dry matteraccumulation in leaf was from 10 to 16 mgm with this PGR, the difference within the treatment being statisticallyinsignificant even at 5% level of significance .accumulation in leaf was from 10 to 16 mgm with this PGR, the difference within the treatment being statisticallyinsignificant even at 5% level of significance.

FIELD STUDIES ON GREEN GRAM

The data in Tables 3 show that GA hadstimulatory effect and the seedlings grew very fast due to the application of GA up to 30 days. The plant height due toapplication of GA 10-4was significantly higher (Table 3).Theplant height varied from 42.3 to 65.0 at 60 days and from 53.1 to 65.3 cms at 90 days with the this PGRs. The leaf number for green gram was considerablyhigher varied from 11to 20 after 60 days growth. The stem and root dry weight at30 days were maximum with GA with theplant showing the best response at 10- 4 concentration.

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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