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Physiological effects of seed treatments with kinetin on seeding growth under laboratory and field conditions in red 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.
Kinetin enhanced the germination ability of the seed under high temperature conditions (McCoy and Harrington, 1970) as well as under drought stress conditions (Kaufman and Ross, 1970).
Interest in the use of growth regulators in crop production arises from the beliefs of plant physiologists that maximum levels of plant productivity Kinetin promote seed germination. Kinetin has several form. kin 10-1, kin 10-2, kin 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 kinetin in Wheat on percentage germination and seedling growth in terms of shoot and root lengths and dry weight distribution. Under Laboratory and Field conditions.

Keywords: seed germination, seedling growth, KIN, Red gram

1. Introduction
Germination and seedling growth are regulated by the interplay between germination and growth promoters and inhibitors. The amounts of these is changing within the germinating seeds as a result of a number of factors both external and internal. KIN was reported to stimulate the germination of lettuce seeds through sensitization of the seeds to light
From the -foregoing review the impacts of seed pretreatments with Kinetin. In improving yields in a variety of plants is apparent. Kinetin 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 kinetin, on the Red gram crops recommended for intensive cultivation. The results obtained are discussed below.

2. Materials and Methods
The seeds of Red gram (local) were studied for their physiological performance under the effect of 10^{-4} to 10^{-7} M concentration of Kinetin (Kin).
The seeds were soaked in different concentrations of PGRs for the optimum period was 4 hrs for Red gram. 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.

2.1 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 as described in Chapter II. The percent germination, lengths of shoot and root were measured after 5 days. The petridishes were kept at 28 ^{0}C ± 2 ^{0}C and under normal light condition. Fresh and dry weight (mgm per organ) was recorded after drying the samples in an oven at 80 ^{0}C.

2.2 Field studies

Seeds of Red gram 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 m^2) 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.

3. Observation & Observation Table

Table 1: Effect of presoaking red gram for 4 hours in different concentration of plant growth regulators on % germination and seedling growth.

Plant Growth Regulators (Hrs)	% Germi- nation	Root			Shoot			Leaf	
		LN	FW	DW	LN	FW	DW	FW	DW
KIN									
KIN 0	73	9.4	114	11	7.1	110	13	108	11
KIN 10^{-4}	93	11.3	122	16	8.0	116	19	111	14
KIN 10^{-5}	76	10.6	119	13	6.3	113	16	109	12
KIN 10^{-6}	63	10.0	115	11	6.0	108	14	106	11
KIN 10^{-7}	56	9.5	111	10	5.1	110	11	103	11
S.E.	2.98	0.05	0.42	0.37	0.05	0.37	0.34	0.32	0.35
C.D.	6.63	0.11	0.93	0.77	0.11	0.82	0.75	0.71	0.77
(P=0.05)									

Table 2: Effect of presoaking of red gram for 4 hours in different PGRs 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
KIN 0	66	9.7	116	12	7.2	111	11	108	11
KIN 10-4	93	10.4	123	19	7.8	117	17	113	16
KIN 10^{-5}	76	10.0	119	15	7.3	114	13	112	15
KIN 10^{-6}	56	9.3	113	12	6.3	111	12	106	12
KIN 10^{-7}	46	4.6	110	10	5.4	110	11	101	11
S.E.	2.76	0.08	1.09	0.41	0.12	0.37	0.57	0.45	0.61
C.D.	6.14	0.17	2.42	0.91	0.24	0.16	1.26	1.00	1.35
(P=0.05)									

Table 3: Physiological performance of seedlings from presoaked (air dried) seeds of Red gram in KIN (10-4 to 10-7) under field condition at 30, 60, 75 days.

Treatment	Plant Height	Leaf Length	Leaf Width	Leaf Area	Stem Dry wt.	Root Dry wt.	Total Plant wt.
30 days							
Control	28.70	0.57	0.37	0.08	34.67	39.67	333
10^{-4}	31.67	0.73	0.53	0.09	48.00	62.00	414
10^{-5}	30.27	0.57	0.27	0.08	46.00	54.33	336
10^{-6}	28.77	0.53	0.20	0.08	42.33	52.67	335
10^{-7}	26.27	0.37	0.20	0.07	40.33	52.00	325
S.E.	0.95	0.50	0.78	0.39	0.02	0.01	0.03
C.D.	2.11	1.11	1.73	0.86	0.04	0.02	0.04
60 days							
Control	47.37	0.67	0.39	0.10	40.00	81.33	336
10^{-4}	55.53	0.79	0.60	0.12	49.33	86.00	419
10^{-5}	53.47	0.59	0.30	0.11	48.00	73.00	361
10^{-6}	53.13	0.58	0.30	0.12	44.00	62.33	341
10^{-7}	51.53	0.47	0.30	0.10	42.33	61.00	340
S.E.	0.08	0.45	0.71	0.44	0.39	0.03	0.08
C.D.	0.17	1.00	1.58	0.98	0.84	0.60	0.17
75 days							
Control	53.80	2.50	2.60	0.15	48.00	85.00	358
10^{-4}	66.13	5.40	3.17	0.19	50.33	91.67	434
10^{-5}	65.70	4.87	2.80	0.14	52.00	88.67	380
10^{-6}	65.33	4.77	2.47	0.18	52.33	87.33	364
10^{-7}	65.13	4.10	2.03	0.12	58.67	86.33	356
S.E.	0.03	0.02	0.08	0.37	0.63	0.40	0.58
C.D.	0.06	0.04	0.16	0.82	1.40	0.89	1.29

4. Result and Discussion

4.1 Laboratory studies on red gram

The results on red gram seeds pre-soaked (Lot A) and air-dried (Lot B) are given in Tables 1and 2 respectively. The percent germination in both these lots ranged from 43 to 100 and the best results were recorded as 10-4 PGR concentration. The root length was maximum with KIN, whereas for shoot length the best result for presoaked seeds was obtained with KIN. On an average, the root length in both the lots ranged from 4.6 to 11.3 cms and shoot length 5.1 to 15.5 cms with maximum lengths at 10- 4 concentrations. It is interesting to note that dry weight of root was more with KIN and shoot

with IAA in pre-soaked seeds (Table 2). The root length and shoot length were maximum with KIN respectively in air dried seeds. As far as leaf dry weight was concerned the best result was obtained for both pre-soaked and air dried with KIN. The dry weight accumulation in 5 days in leaf was from 10 to 23 mgm in both lots.

4.2 Field studies on Red gram

Red gram gave poorest response. Whatever little response was true, it was maximum when seeds were treated with 10-4 PGR concentration. The plant height ranged from (in cms) 25.9 to 32.7 at 30 days, 30.0 and 48.1 at 60 days and 36.5 to 58.0 at 90 days with the KIN PGR. The leaf length, leaf width and leaf area fluctuated within narrow limit (Tables 3). No tillering of the crop was noticed even after 75 days. There was hardly any difference between PGRs so far as dry matter accumulation stem and root was concerned. The dry weight of root was significantly higher than that of stem at 30 and 60 days. However the difference in stem and root dry weight at 75 days was very small with all the PGRs (Table 3).

KIN was effective for lateral growth. It is the critical balance between exogenous and endogenous. KIN levels which will decide growth in one particular direction.

5. Conclusion

KIN was effective for lateral growth. It is the critical balance between exogenous and endogenous. KIN levels which will decide growth in one particular direction.

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