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EFFECT OF SEED PRIMING WITH POTASSIUM SALT AND POTASSIUM LEVELS ON GROWTH AND YIELD OF DIRECT SEEDED SUMMER RICE (Oryza sastiva L.) UNDER RAINFED UPLAND CONDITION

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ABSTRACT

Field experiments were conducted in direct seeded Summer rice with three seed priming treatments (dry seed, water soaked and 4% murate of potash soaked) and four levels of K (0,10,20 and 40 kg K2 O/ha) revealed that pre sowing seed hardening with 4 % muriate of potash along with 40 kg. K2O/ha recorded the highest rain yield (22.29q/ha) which was at par with the K level 20 kg. K2O/ha in respect of grain yield (20.90 q/ha). Similar effective tillers/m and filled grains/penicle were recorded with the treatment presowing seed hardening with 4% muriate of potash accompanied by 40 kg. K2O/ha.

INTRODUCTION

Rice (Oryza sativa L.) is the most important staple food of about 50 per cent of the world's population and grown under different land and climatic conditions. In Assam, direct seeded Summer rice is grown under rainfed upland condition often suffers from frequent drought conditions, high incidence of pest and disease due to warm and humid climate and profuse weed growth resulting is very low yield. But there are some areas where every year flood occurs and Kharif rice is as rice is the staple food of the people of the state. The nutrient potassium supports the crop for both tolerance and avoidance of drought by stimulating root growth, raising roots to shoot ration and water absorbing capacity (Viets, 1962, Lal et al., 1968). Balasubramanian (1987) revealed that drought tolerance of crops improved with higher potassium levels because of the effect of potassium of the morphological, physical, biochemical and biophysical bases of the crop adaptation to water stress. Seed priming with 1% muriate of potash before sowing provide superior over dry and water soaked seeds in respects of grain yield of wheat (Paul et al, 1998). The present investigation was therefore, undertaken to study the effect of seed priming with potassium salts and potassium levels on growth and yield of direct seeded summer rice under rainfed upland condition.

MATERIALS AND METHODS

Experiments were conducted during Kharif seasons of 1997,1998 and 1999 at Regional Agricultural Research Station, AAU, Gossaigaon, Assam with twelve treatment combination of three presowing seed treatments viz., dry seed (DS), water soaked (WS) and 4 % murate of potash soaked (KCLS) and four potassium levels viz. 0, 10, 20 and 40 kg. K2O/ha in randomized block design replicated thrice. The soil of the experimental site was light textured (loam to sandy loam), acidic I reaction (pH 5.0), high total N, low available P and medium available K. the individual plots received an uniform application of N as urea (½ basal + ½ at active tillering stage) and P full as basal in the form of single superphosphate @ 20 and 10 kg/ha respectively. The seeds of Summer rice variety Banglami were sown @ 75 kg/ha in line 20 cm apart on 12.2.97, 15.2.98 and 11.2.99 and the crops were harvested on 9.6.97, 11.6.98 and 7.6.99 respectively. Before sowing, the required quantity of seeds were soaked in appropriate solutions for 18

hours and died in shade to bring to almost the original weight and used for sowing. Other cultural operations were followed as per recommended package of practices.

RESULTS AND DISCUSSION

The results of the experiments are presented in table 1 and 2. Pooled analysis of three years of experimentation revealed that plant height was significant due to treatment and environment recording the highest plant height (104.46 cm) due to the effect of the treatment. T11 i.e. KCL soaked seed accompanied by 20 kg. K2 O/ha. In case of effective tillers/m. it was non-significant due to the treatment but was influenced by the environment with the highest effective tiller (95.30) due to the effect of the treatment T12i.e. KCL soaked seed accompanied by 40 kg K2o/ha (table 1)from the pooled analysis it was revealed that the filled grains/ penicle and grain yield was significant both for treatment and environment, but straw yield was significantly influenced only by the effect of the environment. The highest filled grains/penicle (113.89) and grain yield (22.29)q/ha) was observed with the treatment T12 i.e. KCL soaked seed accompanied by 40 kg K2O/ha. The highest grain yield was obtained with 40 kg. K2O/ha which was mainly due to increased in number of panicle with 40 kg. K2O/ha which was mainly due to increased in number of panicle/m2 (Sarmah and Baruah, 1997). Paul et. al.(1998) revealed that the seeds treated with 1 % muriate of potash before sowing proved superior over dry and water soaked seed in respect of grain yield of wheat. The highest straw yield (33.68 q/ha) was observed with the treatment T4 i.e. dry seed accompanied by 40 kg. K2O/ha.

Thus the results indicated that seed hardening with 4 % muriate of potash (KCL) and application of K @ kg. K2O/ha was found to be optimum for the higher grain yield of direct seeded summer rice under rainfed conditions in the Kokrajar district of the lower Brahmputra Valley agroclimatic conditions of Assam.

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Table 1 Effect of seed priming and K-levels on growth and yield attributes a\of direct seeded *Summer* rice (var. *Banglami*)

Treatment	Plant height (cm)				Number of effective tillers/m				Number of filled grain/penicle			
	1997	1998	1999	Pooled Mean	1997	1998	1999	Pooled Mean	1997	1998	1999	Pooled Mean
T_1=DS-K_0	103.07	100.08	100.08	101.08	96.00	78.89	73.89	82.93	69.33	71.37	71.50	70.73
T_2=DS-K_{10}	104.73	101.13	100.87	102.24	97.33	79.56	76.22	85.04	86.00	83.63	82.00	83.88
T_3=DS-K_{20}	106.67	101.67	101.33	103.22	103.00	84.11	75.89	87.67	81.67	85.83	83.13	83.54
T_4=DS-K_{40}	106.40	102.37	101.37	103.38	107.00	84.00	77.33	89.44	106.67	105.37	102.17	104.74
T_5=WS-K_0	103.00	100.83	100.33	101.39	101.00	81.33	73.89	85.41	68.67	71.70	72.33	70.90
T_6=WS-K_{10}	105.67	101.70	102.00	103.12	104.67	81.20	75.89	87.25	86.33	85.00	81.37	84.23
T_7=WS-K_{20}	106.40	102.07	102.50	103.66	104.67	85.33	76.11	88.70	92.33	86.20	83.30	87.28
T_8=WS-K_{40}	106.00	102.80	102.67	103.82	108.00	89.50	76.22	91.24	112.00	105.30	102.63	106.64
T_9=KCLS-K_0	102.80	101.87	101.17	101.95	103.33	79.33	74.33	85.66	71.33	84.03	83.97	79.78
T_{10}=KCLS-K_{10}	104.40	102.30	102.83	103.18	105.67	85.33	76.89	89.30	99.33	102.17	88.53	96.68
T_{11}=KCLS-K_{20}	108.13	102.07	103.17	104.46	112.33	85.87	76.55	91.58	119.67	105.33	101.50	108.83
T_{12}=KCLS-K_{40}	106.47	102.47	103.00	103.98	117.33	90.00	78.56	95.30	124.00	112.17	115.50	113.89
CD (P=0.05) for												
Treatment	NS	NS	1.16	2.94	NS	5.91	NS	NS	5. 75	1.92	3.16	3.73
Environment	-	-	-	1.47	-	-	-	3.59	-	-	-	1.87

NS = Not significant
DS=dry seed
WS=water soaked seed
KCLS = 4 % muriate of potash soaked seed

K0=0 kgK_2O/ha
K10=10 kgK_2O/ha
K20=20kg_2O/ha
K40=40 kgK_2O/ha

Table 2 Effect of seed priming and K-levels on grain and straw yield of direct seeded Summer rice (var. Banglami)

Treatment	Grain yield (q/ha)				Straw yield (q/ha)			
	1997	1998	1999	Pooled Mean	1997	1998	1999	Pooled Mean
T_1=DS-K_0	16.50	14.58	12.83	14.64	28.00	30.00	27.90	28.64
T_2=DS-K_{10}	20.11	16.94	14.25	17.10	32.33	30.83	28.38	30.51
T_3=DS-K_{20}	21.78	16.95	14.88	17.87	29.67	30.17	28.63	29.49
T_4=DS-K_{40}	23.03	21.25	18.62	20.97	39.67	32.00	29.37	33.68
T_5=WS-K_0	15.68	14.92	12.70	14.43	34.17	31.67	28.03	31.27
T_6=WS-K_{10}	22.04	18.74	14.80	18.53	37.67	31.92	28.17	32.59
T_7=WS-K_{20}	22.28	20.34	15.33	19.32	37.00	31.87	28.88	32.58
T_8=WS-K_{40}	24.01	21.96	18.72	21.56	35.33	32.16	29.55	32.35
T_9=KCLS-K_0	16.68	15.53	12.95	15.05	25.67	30.00	28.33	28.00
T_{10}=KCLS-K_{10}	21.90	19.08	14.95	18.64	33.00	31.17	28.27	30.81
T_{11}=KCLS-K_{20}	23.68	21.95	17.08	20.90	32.50	31.33	29.75	31.19
T_{12}=KCLS-K_{40}	24.85	22.78	19.25	22.29	36.00	32.000	29.88	32.63
CD (P=0.05) for								
Treatment	2.17	1.30	1.07	1.48	7.58	NS	1.09	NS
Environment	-	-	-	0.74	-	-	-	3.13

NS = Not significant
DS=dry seed
WS=water soaked seed
KCLS = 4 % muriate of potash soaked seed

K_0=0 kgK_2O/ha
K_{10}=10 kgK_2O/ha
K_{20}=20kg$_2O$/ha
K_{40}=40 kgK_2O/ha