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EFFECT OF IRRIGATION REGIMES AND SEED TREATMENT ON DRY SEEDED IRRIGATED SHORT DURATION *KHARIF* RICE *(KURUVAI)* IN THANJAVUR DELTA

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ABSTRACT

An experiment conducted to study the effect of pre flowering moisture stress and seed hardening in short duration *Kharif* rice revealed that moisture stress at vegetative stage affected the tillering and panicle production but not the grains panicle^{-1}, thousand grain weight, grain yield and harvest index. Seed hardening of rice cv.TKM.9 with succinic acid 100 ppm increased the root length, root dry matter, production of panicles, test weight of grain and increased the grain yield by 12.5 per cent over untreated seeds. Maintaining a dry seeded rice crop at weekly wetting with 40 mm of water upto 45 days from germination has registered a saving of 62 per cent of irrigation water compared to continuous wetting without sacrificing the grain yield.

KEYWORDS: Rice, Dry seeded, Irrigation regimes.

A cultivation technology which can help the Thanjavur delta farmer to sow a short duration rice crop *(Kuruvai)* in the middle of June in the double crop low lands without waiting for the late release of canal water in the river Cauvery is the need of the hour. Dry seeding of rice and maintaining the crop with irrigations using ground water resources till the receipt of water in the canals can be an approach. The entire growth period of rice is not equally sensitive to soil moisture stress as the crop shows differential tolerance both to the intensity and duration of soil moisture stress applied at different growth stages. A knowledge of the safe limits of duration of moisture stress for different growth stages will be greatly useful to economise irrigation water to dry seeded irrigated rice. A study was taken up to work out the safe limits of moisture stress before converting the dry seeded rice to low land submergence condition and to study the effect of seed hardening to induce drought resistance in stressed rice crop.

MATERIALS AND METHODS

An experiment was conducted at soil and Water Management Research Institute, Thanjavur during the first rice season *(Kuruvai)* of 1984

to 1985 in rice cv. TKM. 9 (105 days). The soil was sandy clay loam(Haplustalf) with pH 6.5 and available nutrient content of 176.4 kg.ha^{-1} N 9.6 ka ha^{-1} P and 106 kg ha^{-1} K Moisture at field capacity and permanent witting point were 17.4 and 8.6 per cent. Six treatments on duration of moisture stress consisting of three semi dry and three weekly wetting (with 40 mm water) upto 15, 30 and 45 days after the emergence of seedlings (DAE) along with a control (continuous wet) were studied in the main plots while three methods of seed hardening with succinic acid 100 ppm, ccc 100 ppm and water along with a control were studied in the sub plots in split plot design replicated thrice.

Seeds were drilled in lines 20 cm apart and irrigated applying 40 mm of water on the day of seeding and on the third day to all the treatments and at weekly intervals to the weekly wetting treatments upto the duration of stress. The treatment periods were succeeded by soil submergence to 5.0 cm depth after complete infiltration of ponded water as in control plot upto ten days prior to harvest. Measurement of irrigation water was made using a pre-fabricated parshall flume of 7.5 cm throat width delivering 4.67 l sec^{-1} at 10 cm of flow (Michael, 1978). Rice seeds were hardened by soaking the seeds either in water or 100 ppm chemical solution for 18 hours followed by incubation at room temperature until visible expression of germination is seen and then drying the seeds in ambient air to original weight. The crop was sown in the middle of June and harvested in 106 days. A total rainfall of 59.7 mm from 15 to 30 DAE in four days, 73.6 mm from 30 to 45 DAE in four days and 22.4 mm in two days during the rest of the cropping period was received.

RESULTS AND DISCUSSION

Irrigation Regimes

Semi dry condition beyond 15 DAE caused reduction in plant height and panicle production. Grain and straw yield were also reduced under semi dry condition upto 30 and 45 DAE as compared to continuous wet treatment. However, when the crop was maintained at weekly wettings with 40 mm of water, growth characters, yield attributes and grain yield could be maintained at comparable levels to continuous wet condition. Grain yields of direct seeded rice maintained at weekly wettings upto 15, 30 and 45 DAE were 5.47, 5.27 and 5.17 t ha^{-1}, respectively, as against 5.55 t ha^{-1}, under continuous wet (Table 1) . Moisture stress during early vegetative phase did not affect grain yield (Rao and Venkateswarulu 1983; Ingram and Yambaoe 1988). The requirement of irrigation water to maintain a dry seeded rice by weekly wettings upto 30 DAE and 45 DAE was only 240 and 360 mm, respectively, compared to 756 and 948 mm for continuous wet condition of same durations. Correspondingly total water requirement was also reduced in weekly wetting treatments.

Seed Hardening

Seed hardening with 100 ppm succinic acid has increased both root growth at 15, 30 and 45 DAE. Root dry matter was also significantly influenced at 15, 30 and 45 DAE by Succinic acid treatment followed by CCC treatment and water soaking. Influence of leaf area index was also of the same trend. Increased root length due to seed hardening with Succinic acid treatment increased the yield attributes like production of productive tillers and grain weight, closely followed by CCC (Table 2)

Succinic acid treatments registered the highest grain yield of 5.4 t ha^{-1} followed by CCC (5.1 t ha^{-1}) while the control recorded only 4.8 t ha^{-1}. (Table 2). Straw yield was also influenced by Succinic acid treatment followed by CCC treatment (3.93 t^{-1}). The increased grain yield by 12.5 per cent and straw yield by 22.0 percent by seed hardening with succinic acid over untreated control was due to its significant influence on growth characters and yield attributes. These

Table 1. Effect of irrigation regimes on growth characters, yield attributes, yield and irrigationwater reguirement of dry seeded irrigated rice.

Treatments	Plant height at maturity rity (cm)	Total tillers m^{-2}	panicles m^{-2}	Filled grains $panicle^{-1}$	Thousand grain weight (g)	Grain yield ($t.ha^{-1}$)	Straw yield ($t.ha^{-1}$)	Irrigation water(mm) Upto 30 DAE	Upto 45 DAE	Total
Semidry upto										
15 DAE	83.6	710	683	113	26.4	5.47	4.12	395	574	1291
30 DAE	81.7	630	575	93	26.1	4.51	3.43	120	307	1050
45 DAE	81.0	629	529	88	25.8	4.22	3.02	120	120	837
Weekly wetting										
upto 15 DAE	84.3	709	617	108	26.5	5.47	4.48	421	624	1441
30 DAE	83.1	650	566	99	26.3	5.27	3.91	240	432	1186
45 DAE	82.8	659	584	99	26.2	5.13	3.79	240	360	956
Control (conti-										
nious wet)	87.6	792	679	109	26.8	5.55	4.49	756	948	1717
CD (5%)	3.6	24	89	13	N.S.	0.48	0.59	13	42	46

DAE - Days after emergence of seedlings, N.S. - Not significant.

Table .2. Effect of seed hardening on growth characters and yield attributes of dry seed irrigated rice.

Treatment	Root length (cm)			Plant height (cm)			Maturity	Root dry matter (g.plant^{-1})			Leaf area index (LAI)
	15 DAE	30 DAE	45 DAE	15 DAE	30 DAE	45 DAE		15 DAE	30 DAE	45 DAE	
Control	5.3	11.0	17.0	12.4	25.1	40.8	83.6	0.012	0.112	0.572	5.04
Water	5.7	11.7	27.8	13.7	28.4	41.9	82.4	0.017	0.148	0.708	5.22
CCC 100ppm	6.2	11.8	18.8	14.2	29.6	44.3	84.0	0.018	0.176	0.787	5.52
Succinic acid 100ppm	6.8	13.7	20.4	15.1	31.1	47.5	88.8	0.025	0.201	0.889	5.84
L S D (0.05)	0.4	0.9	1.1	0.5	1.3	1.5	1.1	0.003	0.018	0.072	0.22

DAE - Days after emergence of seedlings, N.S. _ Not significant.

results agree with the findings of Singh and Chatterjee (1980) and Ramanathan (1980).

Thus, short duration rice crop can be dry seeded in the middle of June without losing the optimum season and can be maintained by giving soaking irrigations from ground water at weekly intervals during the vegetative stage upto the receipt of water in the canals and with the receipt of canal water, the crop can be converted to low land condition without sacrificing the yield. The effect of moisture stress faced during the vegetative stage can be minimised by hardening the seeds with 100 ppm Succinic acid.

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EFFECT OF NITROGEN AND PHOSPHORUS FERTILIZATION ON YIELD OF HORSEGRAM *(Macrotyloma uniflorum Lam)*

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ABSTRACT

The studies on effect of fertilization on yield of horsegram *(Macrotyloma uniflorum L)* Cv. Dapoli-1 revealed that application of 37.5 kg.ha $^{-1}$N had significant effect in increasing grain and straw yield of horsegram. However it was on a par with the application of 25 kg.ha^{-1}N. Similarly, applications of 60 kg.ha^{-1} P_2O_5 produced significantly more grain and straw yield over control, 40 and 20 kg.ha^{-1}P_2O_5

KEYWORDS: Horsegram, Nitrogen, Phosphorous Fertilisation, Konkan Region.

Pulses are chief source of proteins predominantly in vegetarian population of India. Recently on realization of the declined availability of pulses in Indian diet and their importance in crop rotation as a source of renewable nitrogen, efforts are being made to increase the pulse production in the country. Horsegram is the most hardy pulse crop which can be suitably grown on marginal, light soils. The Konkan region of Maharashtra state receives about 3500