

Short Communication

Effect of planting time and seed priming on growth and yield of lentil under rice-*utera* system

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Lentil is mostly planted after *aman* (*kharif*) rice as a relay (*utera* or *paira*) crop in major lentil growing areas (Das and Das 1998, Gupta and Bhowmick 2005). Availability of soil moisture is must at the time of sowing seeds for their proper germination, better emergence and early establishment (Saha and Maharana 2005). Timely planting is, therefore, the key factor to better utilize the residual soil moisture on rice-fallows. Seed priming is another technology to obtain better plant stand and high crop yield (Ali *et al.* 2005a). Pre-sowing soaking of seeds with KH_2PO_4 , Na_2HPO_4 , etc. or simple water was earlier reported to improve seed germination, seedling vigor and root growth early in the season, resulting in good establishment, better drought tolerance and more yield of crop plants (Solaimalai and Subburamu 2004). There is a limited scope for agronomic manipulation under rice-*utera* system though it has potential for increasing cropping intensity in considerable areas that remain idle after *aman* rice (Rautaray 2008). Information on the effect of planting time and seed priming in rainfed lentil under this system is scanty. Keeping this background in view, the present investigation was initiated to identify a suitable planting time and seed priming method for enhancing yields of lentil under *utera* cultivation.

A two-year field study was conducted during *rabi* season of 2003-04 and 2004-05 at the Pulses and Oilseeds Research Sub-station, Beldanga, Murshidabad, West Bengal, India, located at 23°55'N latitude and 88°15'E longitude with an altitude of 19.0 m above MSL. The soil of the experimental site was clay loam having pH 7.6, organic carbon 0.30%, available P_2O_5 67 kg/ha and available K_2O 117 kg/ha. Two different times of planting *viz.* 7 and 15 days before rice harvest (DBRH), and four levels of seed priming *viz.* no seed soaking, seed soaking in water for 6 hours, seed soaking in 2% KH_2PO_4 solution for 6 hours and sprouted seeds were tested in a factorial randomized block design with three replications. Individual plot size was 4 m x 3 m. The crop variety Subrata (WBL58) was used for study. A basal dose of N: P_2O_5 : K_2O : S @ 20:40:20:20 kg/ha was given at 3 days prior to lentil sowing in between the rows of rice crop plants, whereas the previous rice crop was fertilized with N: P_2O_5 : K_2O @ 60:30:30 kg/ha and harvested on November 28 and 19 in 2003 and 2004, respectively. As per the treatments, seed priming was done

before sowing of lentil seeds which were broadcast using a recommended seed rate of 50 kg/ha (Ali *et al.* 2005b) in the standing *aman* rice crop without any land preparation. Other recommended practices (Bhowmick *et al.* 2005) were followed meticulously to raise the crop. Treatment-wise harvesting was done on March 11-17 and 9-16 in 2004 and 2005, respectively. Data on plant height, yield attributes and seed yield were recorded at harvest.

Time of planting had a significant influence on plant stand, pods/plant and seed yield in the first year (2003-04), whereas no significant difference in respect of all the parameters studied was recorded in the second year (2004-05). Regardless of seed priming, highest seed yields were, however, recorded in the crop sown at 15 DBRH during both the years of study (Table 1). This might be due to the fact that sowing at 15 DBRH could enable better and earlier establishment of lentil seedlings because of an adequate availability of soil moisture which otherwise would quickly be depleted once the rice crop was harvested. Saha and Maharana (2005) also advocated sowing of *utera* crops at about 2-3 weeks before harvesting of rice preferably at dough stage. Sowing at 7 DBRH did not show any remarkable improvement in growth and yield attributes along with seed yield (Table 1).

Seed yield and most of the yield attributes differed significantly due to various seed priming methods during both the years of study (Table 1). Use of sprouted and KH_2PO_4 soaked seeds recorded significantly the highest number of pods/plant. Higher plant height, better plant stand and more number of seeds/pod as well as 100-seed weight were also registered under these treatments which ultimately exhibited yield advantages of 30.0 and 19.6%, respectively, compared with no soaking. Next in order was soaking of seeds in water, registering an average of 13.7% higher seed yield over no soaking. Better performance of crop plants under seed priming treatments could be attributed to their good establishment (Solaimalai and Subburamu 2004). Ali *et al.* (2005a) also reported that seed priming in water for a short period of 2 hours and non-priming were equally ineffective as small seeded lentil having a hard testa would require a longer time for water to reach the cotyledon and embryos.

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Table 1. Effect of planting time and seed priming on growth, yield attributes and seed yield of lentil under rice-*utera* system during 2003-04 and 2004-05

Treatments	Plant height (cm)		Plant stand (⁴ 000/ha)		Pods/plant		Seeds/pod		100-seed weight (g)		Seed yield (kg/ha)	
	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05	2003-04	2004-05
<i>Planting time</i>												
7 DBRH	36.0	33.6	841.7	734.2	64.3	51.1	1.6	1.9	1.8	1.8	1162.2	1078.8
15 DBRH	37.9	34.8	940.0	790.8	77.0	53.4	1.7	1.9	2.0	1.9	1232.3	1130.0
S.E.m±	0.7	0.5	28.0	20.0	1.5	2.0	0.0	0.0	0.1	0.0	13.5	33.6
C.D. (P=0.05)	NS	NS	84.9	NS	4.5	NS	NS	NS	NS	NS	40.8	NS
<i>Seed priming</i>												
No soaking	34.2	32.9	773.3	657.5	62.0	48.2	1.6	1.8	1.8	1.8	1018.8	981.7
Water soaking	34.9	33.6	855.0	739.8	69.6	49.6	1.7	1.9	1.9	1.8	1174.8	1099.2
KH ₂ PO ₄ soaking	36.5	33.9	928.3	804.2	73.7	54.5	1.7	1.9	1.9	1.9	1265.3	1126.7
Sprouted seeds	42.1	36.5	1006.7	848.5	77.2	56.6	1.8	1.9	2.1	2.0	1329.8	1210.0
S.E.m±	1.1	0.6	39.6	22.4	2.1	2.1	0.1	0.1	0.1	0.0	19.0	34.6
C.D. (P=0.05)	3.2	1.3	120.0	46.7	6.4	4.3	0.2	NS	NS	NS	57.7	72.1

DBRH: Days before rice harvest; NS: Not significant

Thus, from the above study, it can be concluded that sowing of properly primed (either sprouted or KH₂PO₄ soaked) seeds at 15 days before rice harvest would be a promising low-cost technology for growing lentil in rice-fallows under rainfed *utera* condition.

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