

## EFFECT OF AGE OF SEEDLINGS AND NITROGEN LEVELS ON ANNAPURNA RICE

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Precise knowledge on improved agronomic practices including optimum age of seedlings and nitrogen requirement is essential to fully exploit the production potential of a variety. Annapurna is an early duration (maturing in 90-100 days) high yielding rice, very popular in Kerala and parts of Tamilnadu and Karnataka. Performance of this variety is usually poor when aged seedlings are transplanted. In order to study the optimum age at which the seedlings of this variety are to be transplanted and to investigate the influence of age of seedlings on nitrogen response, the present study was undertaken.

### Materials and Methods

The experiment was conducted in the double crop wetlands of the Rice Research Station, Pattambi, Kerala during the first (June-September) and second (October-January) crop seasons of 1970-71 and 1971-72. The soil of the experimental plot was red lateritic loam with 1.12 per cent organic carbon, 15 and 95 Kg of available phosphorus and potassium respectively per ha and a pH of 5.8. There were 12 treatments consisting of 4 ages of seedlings (15, 20, 25 and 30 days) and 3 levels of nitrogen (40, 50 120 Kg N per ha). The design of the experiment was randomized block with 3 replications. Seedlings raised in wet nursery beds transplanted at spacing of 15 x 15 cm with 2 seedlings per hill. Nitrogen, phosphorus and potash were applied through urea, super phosphate and muriate of potash respectively. Threefourth of the dose of nitrogen and 50 Kg each of  $P_2O_5$  and  $K_2O$  per ha were applied at the time of planting. The remaining quantity of nitrogen was applied at panicle initiation.

### Results and Discussion

#### *Effect of age of seedlings*

Age of seedlings exerted significant influence on plant height, panicle weight and grain yield during all the four seasons (Table 1). Effect of age on the number of panicles per hill was significant only during second crop season. A reduction in plant height and panicle weight could be noticed with an increase in the age of seedlings. This would be ascribed to a more or less proportionate increase in the number of panicles per hill produced with an increase in the seedlings age causing competition among tillers within the hill. It appears that by transplanting younger seedlings it is possible to reduce the number of weak and small tillers and

Table I

Effect of age of seedlings on growth characters and grain yield of rice

	Age of Seedlings (days)	1969 - 70		1970 - 71		Mean	
		1st crop	2nd crop	1st crop	2nd crop	1st crop	2nd crop
Plant height (cm.)	15	78.7	66.9	73.5	65.9	76.1	66.4
	20	76.5	66.4	72.4	64.3	74.5	65.4
	25	72.9	63.6	69.2	62.6	71.1	63.1
	30	68.2	60.3	68.8	61.9	68.5	61.1
	C. D (0.05)	1.27	2.24	2.81	1.50		
Number of panicles per hill	15	8.07	7.60	7.21	7.59	7.64	7.60
	20	8.20	8.44	7.45	8.42	7.83	8.42
	25	8.80	8.81	7.94	8.71	8.37	8.76
	30	8.94	9.21	8.07	9.04	8.50	9.12
	C. D. (0.05)	N. S.	0.85	N. S.	0.51		
Weight of panicle (gm)	15	2.23	2.11	2.20	2.14	2.22	2.13
	20	2.12	2.05	2.04	2.10	2.08	2.08
	25	1.96	1.75	1.81	1.79	1.89	1.77
	30	1.81	1.76	1.72	1.76	1.77	1.76
	C. D. (0.05)	0.21	0.13	0.11	0.22		
Weight of 1000 grains (gm)	15	24.82	25.22	24.57	24.81	24.69	25.02
	20	24.47	24.55	24.17	24.22	24.32	24.39
	25	24.34	24.24	24.13	24.24	24.24	24.24
	30	24.02	24.72	23.33	24.34	23.68	24.53
	C. D. (0.05)	N. S.	N. S.	N. S.	N. S.		
Grain yield (kg/hay)	15	3906.0	4675.1	3880.6	3820.5	3893.3	4247.8
	20	3508.8	4825.9	3644.6	3956.3	3576.7	4391.1
	25	3428.4	4534.4	3443.7	3664.7	3436.1	4099.6
	30	3383.2	3991.4	3086.6	3579.2	3234.9	3785.3
	C. D. (0.05)	187.5	168.4	221.3	176.0		

produce large and strong panicles. Though not significant, the 1000 grain weight was always higher in favour of 15 day old seedlings.

Effect of age of seedlings on grain yield varied according to the season of planting. During first crop season 15 day old seedlings were significantly better than those of the other age groups. On the other hand, 20 day old seedlings recorded the highest grain yields during second crop season although they were statistically on par with 15 day old seedlings. Lowest yields were always recorded by 30 day old seedlings. Similar influence of season on the age of seedlings has been reported by Subbiah Pillai (1958) in short duration tall *indica* rices. The mean increases in grain yields recorded by the 25.20 and 15 day old seedlings over the 30 day old seedlings were 201.2, 341.8, and 658.4 Kg/ha during first crop season and 314.3, 605.8 and 462.5 Kg/ha during second crop season, respectively. The higher yields in younger seedlings during first crop season were contributed by higher panicle weights. The large number of panicles per hill in aged seedlings were at the expense of panicle weight which determined the ultimate yield. The higher grain yields obtained with 20 day old seedlings over 15 day old ones during second crop season were contributed by more number of panicles per hill without any appreciable reduction in panicle weight. Competition among tillers within the hill may not be so marked in the second crop season characterised by bright weather and sunshine. Younger seedlings sustain little injury to the roots and leaves and quickly establish after transplanting during first crop season due to favourable weather conditions. On the other hand warm weather and sunny days at the time of planting in second crop season adversely affect rooting and growth of the soft and week 15 day old seedlings resulting in lower yield. Matsushima (1966) reported similar influence of weather on young seedlings. Though there are some disadvantages in planting very young seedlings during second crop season, younger seedlings in common have the benefit of getting a longer period of growth in the main fit-Id which enables them to utilise the nutrients in the soil and other environmental conditions more effectively and produce larger and stronger tillers. The significant contribution of such tillers to grain yield has been reported by Matsushima (1966). Older seedlings, on the otherhand, waste an important period of their growth in the nursery.

#### *Effect of nitrogen*

Nitrogen exerted significant influence on the number of panicles per hill during all the 4 seasons. Its influence on plant height and panicle weight were significant only in the second crop season of 1970-71 (Table 2). The test weight of 1000 grains was not affected by nitrogen levels. Though the grain yields increased progressively with increasing levels of nitrogen, the rate of increase beyond 80 Kg N per ha was not significant suggesting little advantage due to nitrogen application beyond that level. The mean increases in grain yields over 40 Kg N with the application of 80 and 120 Kg N per ha were 263.9 and 309.2 Kg during first crop season and 314.2 and 465.0 Kg during second crop

Table 2

## Effect of nitrogen levels on growth characters and grain yield of rice

	Nitrogen levels (kg/ha)	1969 - 70		1970 - 71		Mean	
		1st crop	2nd crop	1st crop	2nd crop	1st crop	2nd crop
Plant height (cm.)	40	73.8	63.8	70.1	62.5	71.95	63.15
	80	74.2	64.6	71.7	63.7	72.95	64.15
	120	74.3	64.5	71.0	64.7	72.65	64.60
	C. D. (0.05)	N. S.	N. S.	N. S.	1.03		
Number of panicles per hill	40	7.24	7.99	6.55	7.93	6.89	7.96
	80	8.37	8.44	7.91	8.31	8.14	8.38
	120	7.89	9.16	8.50	9.07	8.19	9.11
	C. D. (0.05)	0.87	0.73	0.54	0.44		
Weight of panicle (gm)	40	2.01	2.09	2.03	2.09	2.06	2.05
	80	2.02	1.89	1.93	1.95	1.98	1.92
	120	1.97	1.87	1.86	1.81	1.92	1.84
	C. D. (0.05)	N. S.	N. S.	N. S.	0.19		
Weight of 1000 grains (gm)	40	24.57	24.83	24.33	24.46	24.45	24.65
	80	24.48	24.51	24.06	24.40	24.27	24.46
	120	24.19	24.70	23.76	24.25	23.98	24.48
	C. D. (0.05)	N. S.	N. S.	N. S.	N. S.		
Grain yield (kg/ha)	40	3408.5	4308.1	3242.4	3433.4	3325.5	3870.8
	80	3619.4	4564.5	3599.3	3855.4	3609.4	4209.9
	120	3649.4	4650.0	3699.9	3971.6	3674.7	4310.8
	C. D. (0.05)	183.6	145.8	208.1	135.9		

season respectively. Higher grain yields at higher levels of nitrogen were contributed by the larger number of panicles per hill.

#### Interaction

The interaction between age of seedlings and nitrogen levels was not significant either on plant characters or on grain yield.

### Summary

An investigation was undertaken to study the effect of age of seedlings and nitrogen levels on Annapurna rice at the Rice Research Station, Pattambi, during first and second crop seasons on 1969-70 and 1970-71. The results revealed that the optimum age of seedlings for transplanting was 15 days during first crop season and 20 days during second crop season. Response due to nitrogen was significant only up to 80 Kg N/ha.

### സംഗ്രഹം

ഘൃതകാലയിനത്തിൽപ്പെട്ട (90-100 ദിവസം) അത്യല്പാദനശേഷിയുള്ള അന്നപുണ്ണി പരിച്ച നട്ടമ്പോൾ ഞാറിന് പ്രായം കൂടുതലായാൽ വിളവു കുറഞ്ഞുപോകുന്നതായി കണ്ടു. തയ്ലം പരിച്ചനട്ടമ്പാൽ ഏറ്റവും അനുയോജ്യമായ പ്രായവും പ്രായവ്യത്യാസംമൂലം ഉപയോഗിക്കുന്ന നൈട്രജനിൽ നിന്നും ലഭിക്കുന്ന പ്രതികരണവും മനസ്സിലാക്കുവാൻ വേണ്ടി പട്ടാമ്പി നെല്ലു ഗഷേവണ കേന്ദ്രത്തിൽ 1969-70, 1970-71 എന്നീ വർഷങ്ങളിൽ വിരിച്ച മുണ്ടകൻ വിളകളിലായി (ഒന്നും, രണ്ടും വിള) പരീക്ഷണങ്ങൾ നടത്തി നോക്കിയതിൽനിന്നും താഴെപ്പറയുന്ന ഫലങ്ങൾ ലഭിച്ചു.

ഞാറിന്റെ മൂപ്പു വർദ്ധിക്കുന്തോറും ചെടിയുടെ ഉയരവും കതിരിന്റെ തൂക്കവും കുറയും. മുണ്ടകൻ വിളയിൽ മാത്രം ഞാറിന്റെ മൂപ്പു വർദ്ധിക്കുമ്പോൾ ചിനപ്പുകളുടെ എണ്ണത്തിൽ ഗണ്യമായ കുറവു സംഭവിക്കുന്നു. പ്രായവ്യത്യാസംകൊണ്ട് വിളവിലുണ്ടാകുന്ന പ്രതികരണം കൃഷിക്കാലങ്ങൾക്കനുസരണമായി വ്യത്യാസപ്പെടും. ആദ്യവിളക്ക് 15 ദിവസം പ്രായമുള്ള ഞാറിൽനിന്നും, രണ്ടാംവിളക്ക് 20 ദിവസം പ്രായമുള്ള ഞാറിൽ നിന്നും ആണ് ഏറ്റവും കൂടുതൽ വിളവു ലഭിച്ചത്.

നൈട്രജൻ ചിനപ്പുകളുടെ എണ്ണം വർദ്ധിക്കുവാൻ സഹായിക്കുന്നു. എന്നാൽ രണ്ടാം വിളയിൽ മാത്രം അത് ചെടിയുടെ ഉയരത്തിലും, കതിരിന്റെ തൂക്കത്തിലും ഗണ്യമായ സ്വാധീനം ചെലുത്തുന്നു. നൈട്രജൻ കൂടുതൽ നൽകുന്നതനുസരിച്ചു വിളവും വർദ്ധിക്കുമെങ്കിലും ഹെക്ടറിന് 80 കി. നൈട്രജനിൽ കൂടുതൽ നൽകുമ്പോൾ വിളവിൽ ആനുപാതികമായ വർദ്ധനവുണ്ടാകുന്നില്ല.

ഞാറിന്റെ പ്രായവും, നൈട്രജനും തമ്മിൽ പരസ്പരബന്ധം ഒന്നും ഇല്ലെന്നും ഈ പരീക്ഷണത്തിൽ നിന്നും തെളിഞ്ഞു.

ചുരുക്കത്തിൽ അന്നപുണ്ണി നെല്ലു കൃഷിചെയ്യുമ്പോൾ ആദ്യവിളക്ക് 15 ദിവസവും, രണ്ടാംവിളക്ക് 20 ദിവസവും പ്രായമുള്ള ഞാറുകൾ ഉപയോഗിക്കുന്നതായിരിക്കും ഉത്തമം. നൈട്രജൻവളം ഹെക്ടറിന് 80 കി. എന്ന തോതിൽ കൂടുതൽ നൽകുന്നത് പ്രയോജനകരമല്ല.

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