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INFLUENCE OF APPLIED NITROGEN ON GRAIN YIELD, PROTEIN CONTENT AND MILLING OUTTURN IN TRANSPLANTED RICE

P. N. PISHARODY, R. R. NAIR and R. GOPALAKRISHNAN

Rice Research Station, Pattambi

Considerable variability in protein content of rice is caused by environmental factors such as season of the year, population density as well as time and rate of nitrogen application. Studies by Cagampang *et al.* (1966), on pairs of samples of several varieties differing in protein content showed t at high protein samples were more resistant to abrasive milling. Information is meagre on the effect of sources of nitrogen on the milling outturn of rice. With a view to studying the influence of sources and times of nitrogen application on grain yield, milling outturn, head rice recovery and protein content, an investigation was conducted in the Rice Research Station, Pattambi and the results arc reported in this paper.

Materials and Methods

The experiment was conducted in the irrigated uplands locally called as 'palliyals'. The soil of the experimental plot was lateritic sandy loam of moderate fertility (organic carbon 0.92 percent, available P_2O_5 27.8 kg per ha; availabe K_2O 200.0 kg per ha; pH 5.6). The design of the experiment was randomised block in 4 replications with 10 treatments. The treatments were: (1) Control (no nitrogen). (2) 100 kg N/ha as granular urea. (3) 100 kg N/ha as sulphur coated urea containing 37% nitrogen and 14% sulphur. (4) 75 kg N/ha at planting and 25 kg N/ha at tillering (as urea). (5) 75 kg N/ha at planting and 25 kg N/ha at panicle initiation (as urea). (6) 75 kg N/ha at planting and 25 kg N/ha as foliar spray (as urea) in 2 equal doses at panicle initiation and one week later. (7) 75 kg N/ha at planting and 25 kg N/ha at booting (as urea) (8) 50 kg N/ha at planting and 25 kg N/ha each at tillering and panicle initiation (as urea). (9) 50 kg N/ha at planting and 25 kg N/ha each at panicle initiation and booting (as urea). (10) 25 kg N/ha each at planting, tillering, panicle initiation and booting (as urea) stages.

All the plots received a uniform dose of P_2O_5 and K_2O at 50 kg each per ha at planting. The test variety was Thriveni, transplanted at a spacing of 20 cm x 10 cm with 2 seedlings per hill. The net plot size was 4.6 m x 2.8 m.

The crop came to maturity in 100 days after sowing. After harvest, paddy samples were dried to 14.0% moisture and milled in Satake mini mill and

polished to 5% PFA limit. Protein content of the polished rice was determined by Kjeldal nitrogen multiplied by the factor 5.95 which is based on the 16.8% N content of the major rice protein fraction, Glutalin.

Results and Discussion

The sources as well as the times of application of nitrogen significantly influenced the production of grain over the control. Treatment 3 receiving all the nitrogen at planting in the form of sulphur-coated urea registered the highest average yield (3.29 t/ha) although it was statistically on par with treatments 6, 7, 9, 10, 4 and 8 which received nitrogen in two or more splits. Similarly yield differences between treatments 8 and 5 and between 5 and 2 also did not touch the level of significance. The magnitudes of differences between the different times of application of nitrogen was, thus, low because of the shorter growth duration of the test variety. Sulphur-coated urea, however. recorded 26.4 percent more yield than granular urea applied entirely at planting at 100 kg N/ha. The yield difference was significant. The results indicated that the slow release source of nitrogen was as good as, or even slightly superior to split application of nitrogen during the different growth stages of rice The superiority of the coated fertilizer over prilled urea may be explained on the basis of greater availability of nitrogen to plants from the former due to its slow release, which possibly resulted in increased grain yields. According to Mohanty and Kib2 (1968) loss of nutrients due to leaching and downward translocation to greater depths are minimised by coating the fertilizer granules. In upland rice fields where the soil is usually maintained in a state of alternate wetting and drying, coated fertilizers will be of considerable advantage inreducing nutrient losses.

The treatment differences were not statistically significant on milling outturn. However, the recovery of head rice was seen influenced significantly by the sources and times of nitrogen applied. The treatments receiving no N or the whole quantity of N at planting invariably showed low head rice recovery, while treatments receiving N either as sulphur-coated urea at planting or as urea in two or more splits at planting, panicle initiation and booti g stages recorded high recovery of head rice.

Split application of nitrogen invariably increased the protein yield, especially when a portion of nitrogen was applied either at panicle initiation or at booting or during both these stages of growth. Applying all the nitrogen at planting as sulphur coated urea (Tr. 3 yielded a maximum of 9.33 percent protein although it was statistically at par with treatments. 9, 6, 10 and 7 which received a portion of nitrogen at the booting stage. Head rice recovery and protein content of rice seemed to be closely related. Higher the percentage of protein in grain, the larger was the recovery of head rice. High head rice recovery in treatments 3, 7, 9, 10, 8 and 6 may be owing to their high protein content in grain

indicating that a high protein rice might resist grain breakage more than one with normal protein. Similar observations have been recorded by Nangju and De Datta (1970)

Table 1

Grain yield, milling out turn, head rice recovery and protein content of 'Thriveni' rice as influenced by the sources and times of nitrogen applied

Treatment	Grain yield (kg/ha)	Milling outturn (%)	Head rice recovery (%)	Protein content of grain (%)
1.	1771	77.9	61.7	6.92
2	2694	79.0	64.0	7.54
3.	3290	81.5	69.3	9.33
4.	2890	80.1	65.0	7.45
5.	2786	79.3	66.0	8.33
6.	3136	78.0	67 0	8.70
7	3073	79.6	68.7	8.62
8.	2890	79.5	68.5	7.92
9.	3047	80.1	69.3	8.92
10.	3047	80.2	69 0	8.66
F	Sig.	N.S.	Sig.	Sig.
CD (0.05)	472		3.1	0.9!

Sig., Significant; N. S., not significant.

Summary

In an investigation conducted at the Rice Research Station, Pattambi using the early duration strain Thriveni as test variety, it was found that application of a portion of nitrogen as top dressing at panicle initiation and booting stages increased grain yield, protein content and recovery of head rice. Protein content of grain and head rice recovery were observed to be closely related. Higher the protein content, greater was the recovery of head rice. On equal nitrogen basis, sulphur coated urea applied at planting was as effective as split application but significantly superior to ordinary urea when applied entirely at planting.

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സംഗ്രഹം

പാക്യജനക rooororiJgsaraoo നെല്ലിന്റെ അരിവീഴ്ചയെയും മാംസ്യാംശത്തെയും സ്വാധീനിക്കുന്നുണ്ടോ എന്നു പഠിക്കുവാൻ പട്ടാമ്പിയിലെ നെല്ല് ഗവേഷണകേന്ദ്രത്തിൽ തിരവേനി എന്ന ഹ്രസ്വകാല വിത്തിനമുപയോഗിച്ച് ഒരു പരീക്ഷണം നടത്തുകയുണ്ടായി. സാധാരണ യൂറിയയും സംഘർ കോട്ടഡ് യൂറിയ (37% N) യുമാണ് പരീക്ഷണത്തിനുപയോഗിച്ച രാസവളങ്ങൾ.

ഏറ്റ കി. ഗ്രാം പാക്യജനകം (ഹെക്ടറിന്) ഒറ്റത്തവണയായി ചേർത്തപ്പോൾ, സംഘർ കോട്ടഡ് യൂറിയാ സാധാരണ യൂറിയയേക്കാൾ 26.4% അധിക വിളവുനൽകി. അരിയിൽ ഏറ്റവുമധികം മാംസ്യമുണ്ടായതും ഈ രാസവളമുപയോഗിച്ചപ്പോഴാണ്. എന്നാൽ, സാധാരണ യൂറിയ പല തവണകളായി നൽകിയപ്പോൾ ലഭിച്ച വിളവും സംഘർ കോട്ടഡ് യൂറിയാ ഒറ്റത്തവണയായി ചേർത്തപ്പോൾ ലഭിച്ച വിളവും തമ്മിൽ വലിയ അന്തരം കാണുകയുണ്ടായില്ല. കതിർക്കല ഉണ്ടാവിക്കുന്ന ദശയിലും തലക്കൊടി ദശയിലും പാക്യജനകം മേലുരമായി ചേർക്കുന്നതുമൂലം അരിയിലെ മാംസ്യാംശം വർദ്ധിക്കുന്നതായി അനുഭവപ്പെട്ടു. നെല്ലരി നുറുങ്ങാതിരിക്കുവാൻ മാംസ്യാംശം സഹായകമായി ഭവിക്കുന്നു എന്നാണ് ഈ പഠനത്തിലെ ഒരു പ്രധാന നിഗമനം.

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