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STUDIES ON THE FRACTIONAL APPLICATION OF NITROGEN ON THE YIELD OF RICE

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Nitrogen is a very costly input in the present day agriculture and the high yielding varieties require large quantities of this nutrient for the full realisation of the yield potential. It is a well known fact that only less than 50% of applied nitrogen is utilized by rice plants under submerged conditions. In order to reduce the loss of nitrogen to the minimum, split application of nitrogen was suggested by many workers (Pande and Singh, 1970; Have, 1971; Srivastava and Thakur, 1971). An experiment was conducted at the Rice Research Station, Mannuthy to study the effect of fractional application of nitrogen on the yield of two dwarf rice varieties, *Jaya* and *Annapurna*.

Materials and Methods

The experiment was conducted in the sandy loam soil for six seasons commencing from first crop of 1972-73 to second crop 1974-75. The treatments consisted of 16 different fractional doses of nitrogen as follows:

Treatments	N kg/ha applied at different growth stages				
	Planting (Basal)	Tillering	Panicle initiation	Booting	Heading
T_1	100	0	0	0	0
T_2	0	100	0	0	0
T_3	0	0	100	0	0
T_4	50	50	0	0	0
T_5	50	0	50	0	0
T_6	50	0	0	50	0
T_7	50	0	0	0	50
T_8	50	25	25	0	0
T_9	50	0	25	25	0
T_{10}	50	0	0	25	25
T_{11}	0	50	50	0	0
T_{12}	0	50	25	25	0
T_{13}	0	50	25	0	25
T_{14}	0	0	50	25	25
T_{15}	20	20	20	20	20
T_{16}	25	25	25	25	0

The experiment was laid out in RBD with three replications The seedlings were planted at a spacing of 20 x 10 cm. Uniform doses of phosphorus and potash at the rate of 45 kg each per ha were applied as basal dressing. The nitrogen at the rate of 100 kg/ha in the form of ammonium sulphate was applied as per the treatments. Prophylactic plant protection measures were taken to ensure good crop protection.

Results and Discussion

The data on the yield of rice as affected by fractional doses of nitrogen for the six consecutive rice seasons from 1972-'73 to 1974-'75 are given in the Table 1.

It is seen from the data that the treatment effects were significant only during two first crop seasons of 1972-'73 and 1973-'74. During the first crop season of 1972-73, the highest yield was produced under the treatment no. 10 (50 kg N as basal, 25 Kg N at booting and the balance 25 Kg N at heading) which was on par with all the other treatments except the treatment nos. 1, 11 and 14. It may be seen in this connection that in the treatment no. 1, the entire dose of nitrogen was applied as basal while in treatment 11, this was applied in two equal split top dressings at the tillering and panicle initiation stages. In the case of the treatment No. 14 it was applied at the later stages of plant growth starting from panicle initiation with 50% of the total nitrogen 25% at booting and the balance *25%* at heading. This is a clear indication that bulk application of nitrogen either in the beginning or at later stage of growth or cumulative application of the entire dose during the middle age of growth is not beneficial for obtaining higher yield. The yield trend in treatments *7,* 9, 15 and 16 revealed the fact that a portion of nitrogen should be applied as basal dose for the initial growth and for a good start of the crop and two or three repeated additions at the other critical growth stages like tillering and panicle initiation are beneficial for the crop.

It is evident from the data that during the first crop season of second year the highest yield was obtained from the treatment in which nitrogen was applied at 50% as basal and the rest in two equal split doses at panicle initiation and booting stages. The next highest yield was obtained in the treatment no, 10 which has given the highest yield during the first crop season of first year. Nair *et al.* (1977) and many previous workers reported the beneficial effect of split application of urea as compared to single application for obtaining high grain production in rice.

During the first crop season of third year and during all the second crop seasons, the effect of different treatments were not significant. It may be mentioned in this connection that there used to be heavy flooding during the planting time of second crop seasons due to very heavy rainfall. In the first crop

Table 1

Mean Yield of grain in kg/ha

Treatments	Year 1972-73 First crop *Jaya*	Year 1972-73 Second crop *Annapurna*	Year 1973-74 First crop *Jaya*	Year 1973-74 Second crop *Annapurna*	Year 1974-75 First crop *Jaya*	Year 1974-75 Second crop *Jaya*
1	3928	3121	1744	1285	2458	3172
2	3957	3550	1897	1285	3213	3611
3	3947	3468	1561	1744	3050	3815
4	4029	3805	1622	1254	2836	4406
5	4213	3570	1796	1529	3091	4049
6	4264	3896	1968	1622	2570	4090
7	4376	3478	1815	1347	2326	3509
8	4192	3631	1591	1174	3091	4437
9	4386	4478	2203	1662	3039	4784
10	4447	3937	2102	1040	2785	4621
11	3835	3325	1906	1378	3121	3417
12	4019	3774	1958	1230	3181	3987
13	4172	3478	1928	1653	3233	3580
14	3825	3468	1591	1684	3437	3723
15	4284	3427	1949	1378	2917	3376
16	4386	3756	1714	1409	2999	4386
F-Test	S	NS	S	NS	NS	NS
SEm 1%	187.27	442.2	277.84	198.28	440.63	553.85
CD at 1%	514.99	—	769.99	—	—	—

S=Significant
NS=Not Significant.

season of third year also severe rains were received at the time of harvest. It is likely that the results during these seasons were vitiated by excess rainfall.

Summary

The effect of fractional application of nitrogen on the grain yield of two high yielding rice varieties *Jaya* and *Annapurna* was studied for six consecutive seasons during 1972–73 to 1974–75 in the Rice Research Station, Mannuthy. Significant results were obtained in two first crop seasons and the treatments receiving 50 kg N as basal and another quantity of 50 kg N in two equal splits given either at booting and heading or at panicle initiation and booting gave maximum grain yield.

സംഗ്രഹം

അന്നപൂർണ്ണ, ജയ എന്നീയിനങ്ങളിൽ പാക്യജനക പ്രധാനമായ വളങ്ങളുടെ പ്രയോഗത്തെ സംബന്ധിച്ച് മണ്ണുത്തി നെൽഗവേഷണ കേന്ദ്രത്തിൽ 1972–73 മുതൽ 1974–75വരെ നടത്തിയ പരീക്ഷണങ്ങളിൽ 50 കിലോഗ്രാം പാക്യജനകം rasne തുല്യഗഡുക്കളായി കൊതുമ്പുതലത്തിലും കതിരിട്ടു തുടങ്ങുമ്പോഴുമോ അല്ലെങ്കിൽ കതിർ മുളരൂപംപ്രാപിക്കുമ്പോഴും കൊതുമ്പു പ്രായത്തിലുമോ നൽകുന്നതു, വിളവ് ഗണ്യമായി വർദ്ധിപ്പിക്കുന്നതിനു സഹായകമാണെന്നു കാണുകയുണ്ടായി

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