and a basal dose of 11 ppm P and 21 ppm K were applied. Grain and straw samples were analyzed for total N.

Soils were tested for available nitrogen by alkaline $KMnO_4$-oxidizable N, organic carbon, 2N KC1 extractable NH_4^+, and NO_3^--N and NH_4^+-N after incubating the soil in a 1 : 1 water suspension at 40°C. Correlation coefficients were calculated for yield and N uptake parameters with nitrogen indices (see table).

Grain yield varied from 3.2 to 19.7 g in control pots, and from 5.3 to 28.3 g in treated pots. Percent grain yield varied from 14.8 to 46.6%, showing 53.4 to 85.2% yield was due to nitrogen application. Total N uptake varied from 9.0 to 44.5 mg/pot and percent N uptake from 11.0 to 48.0%, showing 52.0 to 89.0% uptake was due to applied nitrogen.

$KMnO_4$-oxidizable N and NH_4^+-4 levels after incubation and organic carbon were significantly related to grain yield and N uptake. Grain yield had the highest correlation (0.649) with $KMnO_4$-oxidizable N. NH_4^+-N, NO_3^--N, and $NH_4^+ + NO_3^-$-N did not show significant correlation with grain yield or N uptake. No evaluation methods had a significant relation with percent yield or percent N uptake. □

Management of transplanted rice with seedlings of different ages

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The performance of 25-, 35-, and 45-day-old seedlings was studied at 3 nitrogen levels (0, 60, and 120 kg N/ha) and 15 × 15 and 15 × 10 cm spacing during 1981 wet season. Jaya was planted in the field in a randomized block design in three replications.

Transplanting 25-day-old seedlings produced highest yields, as did increased nitrogen levels. Spacing did not significantly influence yield (Table 1).

Nitrogen level-seedling age interaction (Table 2) indicated that 25-day-old seedlings responded best at 0 and 60 kg N/ha. However, 35-day-old seedlings yielded best at 120 kg N/ha, indicating that yield reductions caused by planting older seedlings may be offset by applying more nitrogen fertilizer.

Table 1. Effect of seedling age, nitrogen level, and spacing on grain yield of Jaya.

Treatment	Grain yield (t/ha)
Seedling age (days)	
25	5.8
35	5.1
45	4.5
N level (kg/ha)	
0	3.9
60	5.4
120	6.2
Spacing (cm)	
15 × 15	5.1
15 × 10	5.3

CONTINUED ON NEXT COLUMN

TABLE CONTINUED

Treatment	Grain yield (t/ha)
Seedling age	
S. Em ±	0.15
CD at 5%	0.31
N levels	
S. Em ±	0.15
CD at 5%	0.31
Spacing	
S. Em ±	0.13
CD at 5%	NS [a]

[a] Not significant.

Table 2. Seedling age – nitrogen inlteraction effect on grain yield.

Nitrogen (kg/ha)	Yield (t/ha) 25 d	35 d	45 d
0	4.6	3.4	3.6
60	6.0	5.4	4.8
120	6.6	6.4	5.5
S. Em ±	0.26		
CD at 5%	0.54		

Azolla and blue-green algae for wetland rice culture

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Increasing costs of synthetic nitrogen fertilizer are causing biological nitrogen-fixing systems to become more important. The efficiency of using blue-green algae and azolla to provide all or some nitrogen needs of the rice crop was studied during 1981 kharif. Treatments are indicated in the table.

Results show a significant increase in yield in the treatments where blue-green algae were inoculated at 10 kg crust/ha or when azolla was incorporated (6 t/ha) (see table).

There was no significant difference between the treatments where azolla was incorporated or BGA applied together with 25 kg N/ha as urea and the corresponding treatments without N fertilizer. □

Effect of azolla and blue-green algae on IR20 rice yield.

Treatment	Grain yield (t/ha)
Control	5.2
Azolla incorporated (6 t/ha)	6.2
Azolla inoculated and allowed to grow with rice	5.7
Blue-green algae (10 kg crust/ha)	6.8
25 kg N/ha as urea N + 6 t azolla/ha	6.0
25 kg N/ha as urea N + blue-green algae (10 kg crust/ha)	6.3
CD : P = 0.05	0.60