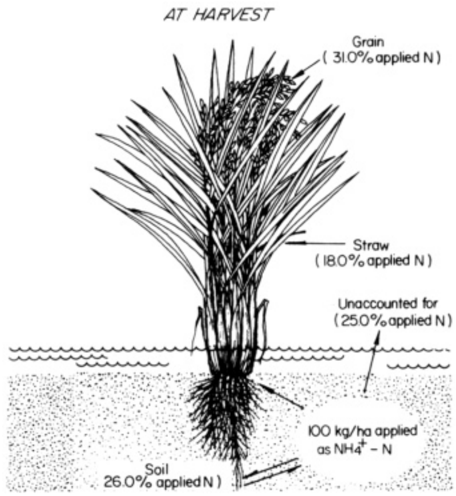
Soil and crop management

Fertilizer nitrogen budget in rice fields

K. R. Reddy, Department of Biological and Agricultural Engineering, North Carolina State University, Raleigh, North Carolina 27607; and W. H. Patrick, Jr., Laboratory for Wetland Soils and Sediments, Center for Wetland Resources, Louisiana State University, Baton Rouge, Louisiana 70803, USA

To improve the efficiency of fertilizer nitrogen use by rice, it is important to know what happens to N applied to the soil. Fertilizer labeled with ^{15}N is used to distinguish fertilizer N from soil N.

A field experiment to determine the fate of applied fertilizer N was conducted on Crowley silt loam at the Rice Experiment Station, Crowley, Louisiana. Ammonium sulfate enriched with ^{15}N was applied at 100 kg N/ha by deep placement (7 cm in the soil by the side of each row, 10 cm apart) at the beginning of the growing season. Fertilizer ^{15}N was measured in the soil-plant system at harvest.



The fate of applied fertilizer nitrogen. Rice Experiment Station, Crowley, Louisiana, USA.

About a third of the added fertilizer N applied to the rice was recovered in the grain, about a fifth was recovered in the straw, about a fourth remained in the soil and roots, and the remaining fourth was unaccounted for and presumably lost from the soil system (see figure).

Split application of nitrogen in direct-seeded rice

R. S. Dixit and M. M. Singh, N. D. University of Agriculture and Technology, Faizabad, U.P., India

Nitrogen has become costly in India in the last few years. Its proper use is essential to maximize profits. To increase crop yields, not only is the quantity of fertilizer important, but also the proper timing of its application. An experiment was designed through the All India Coordinated Rice Improvement Project to determine the best time of nitrogen application. The field trial was conducted during the 1974 and 1975 kharif seasons in the alluvial light soils of the Rice Research Station, Faizabad, where 1,260 and 1,248 mm of rain fell during the two respective crop seasons.

Treatment T3 (15–30–15) produced the maximum grain yield (4.7 t/ha and 5.1 t/ha), followed by T4 (20–20–20) and T5 (20–40–0) during both cropping seasons. During 1974, treatment T3 produced significantly higher yields than T1, T2, T6, and T7, while during 1975, T3 gave significantly higher yields than T1, T2, T5, T6, and T7 (see table). When all nitrogen was applied at sowing, it was subject to loss through runoff, leaching, and weeds in upland, well-drained, light soils. However, a small quantity of nitrogen is essential to give the plants a good start after germination.

Grain yield of paddy under different nitrogen treatments, Faizabad, India.

Treatment	N application (kg/ha)	Amount of N applied (kg/ha) at			Paddy yield (t/ha)		
		Sowing	Tillering	Panicle initiation	1974	1975	Mean
T1	0	0	0	0	2.7	2.8	2.8
T2	60	60	0	0	3.5	3.9	3.7
T3	60	15	30	15	4.1	5.1	4.9
T4	60	20	20	20	4.6	4.9	4.8
T5	60	20	40	0	4.2	4.5	4.4
T6	60	0	20	40	3.9	3.9	3.9
T7	60	0	30	30	3.9	4.1	4.0
L.S.D. at 5%					0.54	0.58	

Efficiency of some phosphatic fertilizers with varying soil and water-management practices

U. C. Sharma, assistant soil scientist, Fruit Research Station, Udhoywala, Jammu (JCK), India; and H. Sinha, head, Department of Soil Science and Agricultural Chemistry, Ranchi Agricultural College, Ranchi-6, India

Studies on the efficiency of some phosphatic fertilizers in relation to soil and water management practices were conducted in the red loam soil (pH 6.3) of Kanhe Bihar, India. Phosphatic fertilizers were superphosphate, rock phosphate, yellow phosphorite, and ash-colored phosphorite. Liming and application of farmyard manure were the soil management practices under saturated, flooded-granulated, and flooded-puddled conditions. Among other data, the dry matter yield and the phosphorus content and its corresponding uptake were determined.

Dry-matter yield using superphosphate (44 g/plot) was significantly superior to that with rock phosphate (32 g/plot), ash-colored phosphate (30 g/plot), or yellow phosphorite (29 g/plot). The application of well-rotted farmyard manure significantly increased the dry-matter yield with the phosphates that were not water soluble, but had no effect with superphosphate. Lime significantly reduced yield with all phosphates. Flooded-puddled paddy gave 64.7% more dry-matter yield than flooded-granulated paddy, and 52.9%