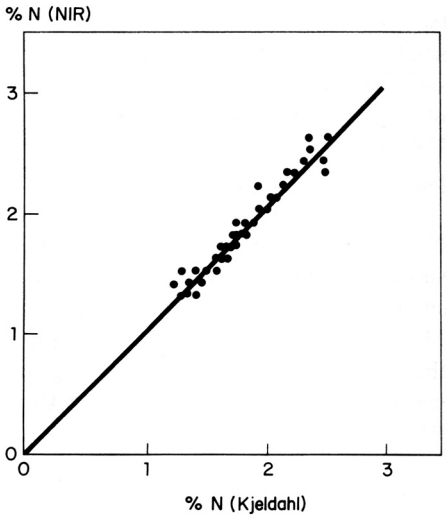

Relationship between NIR and the Kjeldahl methods of measuring rice shoot N status.

yield can be increased by topdressing N when plant N is below 1.5% at panicle initiation.

A 2- to 3-d analysis service is planned. Farmers will collect samples of their crops, dry them in domestic microwave ovens, and send the dry samples to a central laboratory. The laboratory will complete the analysis and advise the farmer on the amount of N fertilizer needed. □

Effect of source and rate of phosphorus on yield and yield attributes of rice

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A field experiment was conducted during the wet season at the Crop Research Centre (29°N 79.3°E and 243.84 m altitude). The experimental field soil was Beni silty clay loam, fine-silty, mixed, hyperthermic, Aquic Hapludoll with pH 7.6, CEC 20 meq, 1.06% organic C, 20 kg available (Olsen) P/ ha, and 196 kg available K/ ha.

Five P sources—rock phosphate, single superphosphate, rock phosphate + superphosphate, rock phosphate + single superphosphate + pyrite, and rock phosphate + pyrite—at 3 rates—13, 26, and 40 kg P/ha—in 16 combinations were compared. Mussoorie rock phosphate : pyrite and single superphosphate : Mussoorie rock phosphate were mixed in 1:3 ratio. Mussoorie rock phosphate (100 mesh) was applied on the basis of 7% total P (2% citrate soluble). Pyrite was mixed and applied 15 d before transplanting in dry soil.

Rice variety Pant Dhan 4 seedlings were transplanted at 20- × 20-cm spacing at 2-3 seedlings/ hill. The crop was fertilized with 120 kg N and 9 kg Zn/ha. No K was applied.

Grain yield, panicles/m^2, and filled grains/panicle with single superphosphate were significantly higher than with all other sources of P (see table). Other sources were also significantly superior to rock phosphate alone in effect on yield and yield attributes. Percentage unfilled grains decreased significantly with single superphosphate but was significantly higher with rock phosphate than with any other source.

P significantly increased grain yield, panicles/m^2, and filled grains/panicle. □

Grain yield and yield attributes of rice as influenced by source and rate of *P. Nainital*, India.

Treatment	Grain yield (t/ha)	Panicles/m^2	Filled grains/panicle	1000 grain wt (g)	Unfilled grain (%)
Source					
Rock phosphate	4.4	205	104	25.4	18.4
Superphosphate	5.4	252	108	25.7	13.1
Rock phosphate + superphosphate	4.7	219	107	25.8	15.7
Rock phosphate + superphosphate + pyrite	4.8	227	108	25.6	14.3
Rock phosphate + pyrite	4.7	220	108	25.8	15.2
LSD (P = 0.05)	0.2	7	2	ns	0.6
Rate (kg P/ha)					
13	4.6	215	106	25.5	17.1
26	4.8	228	107	25.8	14.9
40	4.9	231	108	25.7	14.0
LSD (P = 0.05)	0.2	5	2	ns	0.5
Control	4.3	193	100	25.6	20.4
Mean	4.77	223	107	25.6	15.6

Effect of modified urea on rice yield

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We studied the effect of an experimental coating material on N fertilizer use efficiency under lowland conditions during 1987 wet season. The coating material is a nonhydrous free-flowing liquid with a mild characteristic odor. The active principles that exert a nitrification regulatory effect are terpenoids and flavonoids compounded with certain polysaccharides and aldehydes.

The soil is a Vertisol with pH 8.4, CEC 50 meq/ 100 g soil, 0.1% total N (modified Kjeldahl method), and 6 ppm available P (Olsen's method). The experimental field was fertilized with 17.5 kg P and 33 kg K/ha at final puddling and 58 kg N/ha per treatment.

N fertilizers used were prilled urea (PU), large granule urea (LGU), and urea supergranule (USG). One percent of the experimental material and 5% neem cake powder were used to coat the modified urea materials.

Coated PU, LGU, and USG (hand placed 7 d after transplanting [DT]) with or without the new coating increased grain yield significantly over PU applied as standard split (2/3 basal, 1/3 at panicle initiation) (see table).

Yield of rice Rasi as influenced by coated urea materials. Andhra Pradesh, India, 1987 wet season.

Treatment	Grain yield (t/ha)
Control	3.5
PU (standard split)	4.1
PU + new coating (basal)	4.8
LGU (basal)	5.3
LGU (standard split)	4.7
LGU + new coating (basal)	5.0
LGU + new coating (split)	5.1
USG placement, 7 DT	5.6
Neem cake-coated USG (7 DT)	5.9
New coating + USG (7 DT)	5.6
Experimental mean	5.0
LSD (0.05)	0.4
CV (%)	5.1

There was no significant grain yield difference among USG, neem cake-coated USG, and USG with the new coating. □

Effect of urea-based N sources in rice - wheat cropping sequence

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We compared 5 urea sources—prilled urea (PU), gypsum-coated urea (GCU), nitrohumic-coated urea (NHCU), urea supergranule (USG), and Mussoorie phos-coated urea (MPCU) — at 56, 84, and 112 kg N/ha in a 1986-87 wet season-winter season field experiment.

Soil was a clay loam with pH 7.3, 0.34% organic C, 9.7 kg available P/ha ($NaHCO_3$ extract), and 132.8 kg available K/ha (ammonium acetate extract). The experiment was in a split-plot design (N in the main plots and sources in the subplots) with three replications.

Seedlings of 150-d-duration rice variety Jaishree at 2/hill were transplanted on 19 Jul at 20- × 15-cm spacing. All plots received 17.2 kg P and 16.6 kg K/ha. All GCU (31% N), NHCU (46% N), USG (46% N), MPCU (32% N), and 1/3 PU were applied at transplanting. USG was placed 8 cm deep in the center of 4 hills 10 d after transplanting (DT). Additional PU was applied in equal splits at 20 DT and at panicle initiation. The other N sources were incorporated at puddling.

The rice crop was harvested 20 Nov and the succeeding wheat crop, cultivar HP 1209, was sown 12 Dec. The wheat crop was fertilized with 50 kg N, 21.5 kg P, and 20.7 kg K/ha including the previous control plots. The wheat crop received three irrigations.

Rice grain yield increased significantly up to 112 kg N/ ha because of increased panicles/m^2 and filled spikelets/panicle (see table). Yields with USG were similar to those with PU and significantly greater than those with other N sources. The higher yield with USG was due mainly to larger panicles/ m^2 and filled spikelets/ panicle.

Residual effects of 84 and 112 kg N/ ha were similar and significantly superior to those of 56 kg N/ ha in the succeeding wheat crop (see table). Maximum wheat grain yield in the plot that received USG for the preceding rice was significantly superior to that with PU alone. □

Rice yield attributes, rice grain yield, and wheat grain yield with urea-based N sources. Bihar, India, 1986-87 wet-winter seasons.

Treatment	Panicles (no./m^2)	Filled spikelets/ panicle	1000-grain wt (g)	Grain yield (t/ha)	
				Rice	Wheat
N (kg/ha)					
0	169	70.1	19.8	2.3	2.5
56	229	90.5	21.3	3.1	2.9
84	243	98.0	22.1	3.5	3.0
112	263	99.9	22.5	3.8	3.2
LSD (0.05)	7.6	2.3	0.2	0.1	0.2
Forms of urea					
PU	250	92.8	22.1	3.6	2.9
GCU	232	96.8	21.8	3.3	3.0
NHCU	241	95.6	21.9	3.5	3.0
USG	261	100.6	21.2	3.8	3.2
MPCU	244	94.8	22.0	3.2	3.1
LSD (0.05)	6.9	2.4	ns	0.2	0.2

Effect of N source and application method on dry season irrigated rice

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We studied timing of urea application and method of urea supergranules (USG) placement on a clay loam soil with pH 6.5, 0.07% total N, 20 ppm available P, and 0.2 meq exchangeable K/100 g soil. Treatments are given in the table.

N was applied at 58 kg/ ha. Urea was

Effect of N source and method of application on performance of BR3 at BRRI.[a] Bangladesh.

Treatment[b]	Panicles (no./m^2)	Grain yield (t/ha)	N efficiency (kg grain/kg N)	N recovery (%)
No N	202 f	3.31 d	–	–
Urea 1/2 basal + 1/2 MT	222 e	4.31 c	17.25	20.6
Urea 1/3 basal + 1/3 IT + 1/3 5-7 DBPI	244 d	4.54 c	21.14	25.9
Urea 1/3 IT + 1/3 RT + 1/3 5-7 DBPI	252 c	4.63 c	22.67	31.0
USG deep placed with open hole	298 b	5.31 ab	34.34	58.6
USG deep placed with closed hole	305 a	5.49 a	37.56	67.2
CV (%)	7.4	4.4		

[a] In a column, means followed by a common letter are not significantly different at the 5% level of DMRT. [b] Except for no N, N for all treatments is 58 kg/ha. MT = maximum tillering, IT = initial tillering, RT = rapid tillering, DBPI = days before panicle initiation.