


Implementation of SSNM involved an added expense, which ranged between INR 1,210 in rice-potato to INR 4,488 in rice-garlic (**Table 3**). SSNM was most beneficial within the rice-potato system through its highest additional return over FFP as well as its lowest extra cost. INR return per INR invested in SSNM were calculated at 13.3 in rice-wheat, 50.2 in rice-potato, 37.1 in rice-garlic, 10.2 in rice-chickpea, 10.3 in rice-mustard, and 9.8 in rice-berseem.

Widespread multi-nutrient deficiencies (K, S, Zn, and B) within the soils of the intensively cultivated IGP, owing to constant depletion, have become major constraints to improving productivity. These results underline the significance of soil test-based SSNM in augmenting crop yields, system productivity, and net returns. Generalized recommendations prove to be suboptimal and insufficient for high yielding varieties grown under intensive cropping systems. Such recommendations require an upward revision as well as more inclusive consideration of all yield-limiting nutrients.

Although implementation of SSNM involved added expense, it was offset by substantial yield responses (direct as well as residual) to secondary and micronutrients (S, Zn, and B in this present study). This suggests that balanced fertilization within the region no longer means application of NP or NPK. There is further need to study the impact of each primary, secondary, and micronutrient included within the SSNM recommendation to establish their individual significance in balanced fertilization. 

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**Table 3.** Extra cost and returns due to fertilization (INR/ha) over farmer fertilizer practice.

Nutrient management options	Rice-wheat	Rice-potato	Rice-garlic	Rice-chickpea	Rice-mustard	Rice-berseem
----- Extra cost -----						
SR	285	-1,840	1,418	739	345	831
ISR	698	-662	2,219	1,110	1,016	1,157
STLR	128	-1,510	1,611	642	529	662
SSNM	2,388	1,210	4,488	3,224	3,110	2,876
----- Extra return -----						
SR	10,985	29,518	104,196	14,204	12,610	13,547
ISR	20,178	38,093	137,717	19,955	23,804	19,195
STLR	8,541	27,950	118,861	15,539	17,210	14,260
SSNM	31,946	60,765	166,478	33,034	31,904	28,163

Notes: The prices (INR per kg) for input materials were: N = 11.15; P = 46.11, when applied with SSP and 47.46 when applied with DAP; S = 26.43; Zn = 76.19; and B = 76.19. The cost of N supplied through DAP was subtracted from the cost of N supplied through urea. The prices (INR per kg) of produce were 10 for rice, 18.3 for mustard, 17.3 for chickpea, 50 for garlic clove, 0.50 for berseem fodder, 4 for potato, and 10.8 for wheat. 1 USD is approximately 45 INR.

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## A Guide to Identifying and Managing Nutrient Deficiencies in Cereal Crops

A new booklet has been developed by the IPNI South Asia Program in cooperation with the International Maize and Wheat Improvement Center (CIMMYT). It is a 50-page field guide (8 1/2 x 11 in. size, wire-o bound) designed to describe the underlying causes of nutrient deficiencies in maize, wheat, rice, sorghum, pearl millet, and barley, with tips on how they might be prevented or remedied. Hundreds of excellent deficiency photographs provided by the authors and IPNI will allow the user of this field guide to understand the development of nutrient deficiency symptoms through the growth stages of the crop.

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