सत्यमेव जयते
Ministry of Agriculture &
Farmers Welfare

Report of the Committee on Doubling Farmers' Income

Volume VII

"Input Management for Resource Use Efficiency & Total Factor Productivity"

"Improving the Factors of Productivity & Efficient Use of Resources to Add to Farmers Income"

Document prepared by the Committee on Doubling Farmers' Income,
Department of Agriculture, Cooperation and Farmers' Welfare,
Ministry of Agriculture & Farmers' Welfare.

March 2018

uptake/NUE and soil parameters, ignoring economic impact. Nonetheless, sporadic studies involving computation of economic returns gave mixed results, rather than suggesting superiority of INM over sole fertilizer application in terms of net income and B:C ratio in different cropping systems (Table 1.5). The extent of advantage obviously depends on factors such as annual productivity level and price of organic manures. Usually, organic manure purchased from off-farm sources/market adds to the cost of cultivation, rather than decreasing the same on account of reduced fertilizer application. In an ongoing long-term experiment at IARI Farm, New Delhi, use of FYM along with NPK (*i.e.*, recommended NPK+ 5 t FYM ha^{-1}) was not very much remunerative in maize, but the annual net return under this option in maize-wheat system was significantly greater than fertilizer NPK alone. This was mainly due to substantial residual effect of FYM in wheat following maize. In fact, the methodology for computing economics of INM needs to be standardized.

1.7.4. Real-time N management

One approach to increasing N use efficiency is to synchronize the rate and timing of N fertilizer application with the N demand of the crop. Unlike fixed N-scheduling as usually prescribed and adopted, this approach requires *in situ* monitoring of crop N status, so as to take a decision on N application. At least, three decision gadgets, namely, leaf color chart (LCC), chlorophyll meter (SPAD) and GreenSeeker are available for *in situ* monitoring of leaf N status.

A chlorophyll meter can provide a quick estimate of the leaf N status, but it is relatively expensive. The LCC, on the other hand, is an inexpensive, simple and easy to use tool to monitor the relative greenness of leaf as an indicator of crop N status. In the on-station and on-farm studies conducted with RWS, fertilizer N scheduling based on LCC proved superior to conventional practice *i.e.* application of recommended N in pre-scheduled 2 or 3 splits.

In some cases, even a saving of fertilizer N (up to 30 kg N ha^{-1}) was recorded with the use of LCC, obviously on account of increased N use efficiency. For using LCC, threshold score has to be ascertained for individual crops and also for distinctly different varieties (e.g. *Basmati*, inbred and hybrid rice). Real-time N management studies further revealed that basal application of N could be safely skipped under modified N scheduling, so as to enhance N use efficiency and minimize N losses.

Table 1.5 Effect of INM on economics of different cropping systems

Nutrient management options	Cost of Cultivation (Rs. ha^{-1})	Net return (Rs. ha^{-1})	B:C ratio
Rice-wheat (Modipuram)			
Fertilizer alone	62032	51402	1.94
INM	66497	48647	2.12
Rice-wheat (Jabalpur)			
Fertilizer alone	35591	53997	2.56
INM	37200	52388	2.40
Rice-wheat-mungbean (Ludhiana)			
Fertilizer alone	58385	118083	2.24
INM	58604	92515	1.92