Doi: HTTPS://DOI.ORG/10.23910/2/2021.0418g

# Economic Performance of Crop based Intervention under Farmer FIRST Programme of National Dairy Research Institute (NDRI), Karnal

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**Article History**

Article ID: IJEP0418g
Received on 20th April, 2021
Received in revised form on 16th October, 2021
Accepted in final form on 20th November, 2021

**Abstract**

Farmer FIRST programme is a new approach for project development initiated by the Indian Council of Agricultural Research (ICAR). The present study entitled 'Impact Assessment of Selected Interventions under farmers FIRST programme of NDRI' was conducted in the farmer FIRST project area in five villages namely KamalpurRoran, GarhiGujran, NagalaRoran, Churni and Samourafrom Indri and Karnal blocks of Karnal district of Haryana state. This paper is about economic performance of crop-based intervention under this project. Total three crops-based interventions were selected and 42 respondents were selected in proportionate to the intervention. Informal' experimental design (before and-after without control design) was used. The results shows that respondents were getting benefit-cost ratios of Integrated Pest Management in paddy (2.08), Integrated Weed Management in wheat (1.97) and integrated nutrient management in wheat (2.05), respectively, with increased yields, effective pest management in paddy, better weed management and balanced nutrient management in wheat crop under these interventions. Overall project has made good impact in the study area.

***Keywords:*** Farmer, FIRST, intervention, integrated, management, benefit-cost ratio

## 1. Introduction

Farmer FIRST programme is a new approach for project development involving innovation and technology development with the strong partnership of the farmers for developing location specific, demand driven and farmer friendly technological options. By taking consideration of Farmer FIRST programme principles through farmers-scientist's interactions problems of farmers were identified and based on those different interventions were introduced to tackle the problems. So, under the farmer FIRST programme of ICAR, National Dairy Research Institute, Karnal undertaken the project entitled "Capacity Building of Resource Poor Farmers in Paddy-Wheat cum Dairy Production System through Farmer FIRST Programme under Irrigated Agro-Eco Region of Haryana**"** with the various Crop, Dairy, Horticultural, Enterprise and Advisory based technological Interventions were implemented. In case of crop-based interventions, the interventions like Integrated Pest Management (IPM) in Paddy, Integrated Weed Management (IWM) in Wheat, Round the year fodder production, Integrated Nutrient Management (INM) in Wheat and Dhaincha crop cultivation were undertaken. As farmer FIRST program (FFP) was implemented in the study area in 2016 to address the farmer's problem, various interventions have been introduced and the present study was undertaken with the title "Impact Assessment of Selected interventions under Farmer FIRST Programme of NDRI". Present paper is about the economic performance of crop-based interventions under farmer FIRST Programme of NDRI.

## 2. Materials and Methods

The present study was conducted in January 2020 in the farmer FIRST project area i.e., five villages namely: KamalpurRoran, GarhiGujran, NagalaRoran, Churni and Samourafrom Indri and Karnal blocks of Karnal district of Haryana state, India. The study area was selected purposively as project was undertaken in this area. Total three crop-based interventions *viz*., IPM in paddy, INM in wheat and IWM in wheat with total 42 respondents were selected proportionately. 'Informal' experimental design (which includes before and after without control design) research design was used in the present study. For accessing the economic performance of these intervention, detailed interview schedule was developed in consultation with experts. Interview schedule consists of calculation of cost of cultivation (Total Expenditure), Gross and Net returns, Crop yield. Economic gain to the farmers was calculated by using the formula Economic gain = Net returns under the intervention – Net returns under farmers' practice. Benefit-cost ratio was calculated by using formula B: C ratio = Gross returns / Total expenditure. Under this project during 2019, the interventions were implemented. During October, wheat was sown and harvested in April. Similarly, paddy was

sown in June and harvested in November.

## 3. Results and Discussion

In order to tackle the farmer's problems, above mentioned interventions were undertaken in the study area. Under economic performance of the intervention, total expenditure, gross and net returns involved under different interventions along with the benefit-cost ratios were calculated.

### *3.1. Integrated pest management (IPM) in paddy*

The Pest infestation in paddy was more in the study area. Farmers under the interventions were promoted to adopt on-farm inputs at their own end. Integration of chemicals were suggested to handle diversified pest control in paddy. From Table 1, it was observed that the total expenditure involved in the paddy production was ₹ 28,025.11 acre$^{-1}$ with average yield of 23 quintal per acre. Farmers were getting net returns of ₹ 30,282.03 acre$^{-1}$ with benefit-cost ratio of 2.08. It was observed that farmers obtained an economic gain of ₹ 5,000 acre$^{-1}$ under the IPM intervention over their practice. The increased returns were due to the better pest management after adopting IPM practices and increased awareness about IPM practices among the respondents. Farmers have obtained higher yields under the interventions over farmers' practices. The results were in line with findings of Khajuris et al. (2017). IPM demonstration has yielded highest benefit–cost ratio of 3.32 in chickpea (Malathi et al., 2016). The benefit cost of IPM in paddy was high (3.80) as compared to farmers practice i.e., 2.56 (Tanwar et al., 2016).

The highest benefit cost ratio (2.90) was recorded from IPM packages in brinjal crop (Khajuris et al., 2017). B:C ratio in IPM scheduled field was 1:1.57 as compared to non–IPM fields (1:1.38) (Shreenivasa and Sukanya, 2017). Treatment with 100% RDN as chemical fertilizer resulted in benefit cost ratio of 2.89 compared to other treatments in integrated nitrogen management of maize (Gudadhe et al., 2018). Cost-benefit ratio of 1:2.34 was found in IPM demonstrated practices (Hanumanthaswamy and Nagarajun, 2018). The benefit cost ratio was seen higher (1.73) in case IPM adopted plot (Pamar et al., 2019). The benefit –cost ratio of 2.17 in 50% recommended dose of inorganic fertilizers and 50% N through vermicompost (Singh and Tiwari, 2019). The marginal benefit cost ratio was found highest (5.13) in T3 Trichogramma card in chickpea (Abbas et al., 2020). Under cluster demonstration of INM and IPM practices, the benefit cost ratio of 1.61 compared to 1.43 under control plots was recorded (Raghav et al., 2020).

### *3.2. Integrated nutrient management (INM) in wheat*

Farmers in the study were practicing imbalanced nutrients usage before introduction of this intervention. Under this intervention, farmers were encouraged for the use of balanced nutrients in integrated manner and motivated for the use of organic manures and bio-fertilizers. The expenditure involved in the wheat production was ₹ 25,048.03 acre$^{-1}$ with average yield of 24 quintal acre$^{-1}$. Farmers were getting net returns of ₹ 26,377.00 acre$^{-1}$ along with benefit-cost ratio of 2.05. Farmers obtained an economic gain of ₹ 5,400 acre$^{-1}$ under the INM intervention over their practice (Table 2). The increased returns were due to the better nutrient management and adoption of INM practices in the crops and the increased yields under the intervention. The results were similar with findings of Seth et al. (2016).

Highest benefit ratio (2.76) was seen in integrated nutrient management in maize–wheat cropping system under controlled condition (Hasim et al., 2015). Treatment T8 RDF+FYM+bioferlizers+$FeSO_4$+IWM resulted in higher benefit

Table 1: Economic performance of integrated pest management in paddy, N=14

| Sl. No. | Particulars | Quantity | Cost / returns (₹) Acre$^{-1}$ |
|---|---|---|---|
| 1. | Total fixed cost (A) | | 16,552.00 |
| 2. | Total variable cost (B) | | 11,473.11 |
| 3. | Total expenditures (A+B) | | 28,025.11 |
| 4. | Grain yield | 23.00 quintal | 54,050.00 |
| 5. | By products (Straw and broken grains) | | 4,257.14 |
| 6. | Gross returns | | 58307.14 |
| 7. | Net returns (C) | | 30,282.03 |
| 8. | B:C ratio | | 2.08 |
| 8. | Net returns under farmer practices (D) | | 25,282.03 |
| 9. | Economic gain (C-D) | | 5,000.00 |

1 US$=73.06 INR

Table 2: Economic performance of integrated nutrient management in wheat, N=14

| Sl. No. | Particulars | Quantity | Cost / returns (₹) Acre$^{-1}$ |
|---|---|---|---|
| 1. | Total fixed cost (A) | | 15,000.00 |
| 2. | Total variable cost (B) | | 10,048.03 |
| 3. | Total expenditures (A+B) | | 25,048.03 |
| 4. | Grain yield | 24.00 quintal | 45,600.00 |
| 5. | By products (Straw and broken grains) | | 6,825.00 |
| 6. | Gross returns | | 51,425.00 |
| 7. | Net returns (C) | | 26,377.00 |
| 8. | B: C ratio | | 2.05 |
| 8. | Net returns under farmer practices (D) | | 20,977.00 |
| 9. | Economic gain (C-D) | | 5,400 |

1 US$=73.06 INR

cost ratio 3.30 (Sunil et al., 2015). The application of poultry manure (5 t $ha^{-1}$) than other organic manures yield higher benefit cost ratio (2.52) in wheat (Chopra et al., 2016). The application of 75% RDF+5 t $ha^{-1}$ vermicompost has recorded benefit cost ratio 2.09 in Toria (Hazarika et al., 2016). The benefit cost ratio of Integrated Nutrient Management in cowpea was 2.04 (Kumar and Pandit, 2016). INM has recorded higher benefit cost ratio 1.92 under wheat–chickpea intercropping system (Seth et al., 2016). The benefit cost ratio was found 1.40 under integrated nutrient management in rice (Sharma et al., 2016). The benefit cost ratio was 1.45 under integrated nutrient management practices in wheat (Kumar et al., 2017). Maximum B: C ratio (3.19) was seen in mustard under different cropping sequences with references to INM (Tomar, 2020). The benefit cost ratio was highest 1.68 in T5 under INM package for field cultivation of Makhana (Singh et al., 2020). The benefit cost ratio was highest (1.24) in case of 100% NPK+25% N through FYM in aromatic rice (Yadav et al., 2021).

*3.3. Integrated weed management (IWM) in wheat*

Weed infestation especially *Phalaris minor* was prominent in the study area. Farmers under this intervention were encouraged to follow the effective weed control methods especially against the *Phalaris minor*. The expenditure involved in the wheat production was ₹ 24,057.54 $acre^{-1}$ with an average yield of 22 quintal $acre^{-1}$. Farmers were getting net returns of ₹ 23,568.00 $acre^{-1}$ along with benefit-cost ratio of 1.97. Farmers obtained an economic gain of ₹ 5,000 $acre^{-1}$ under the IWM intervention over their practice (Table 3). The increased returns may be due to the better weed management and the increased yields under the intervention. These observations were found similar to the findings of Sunil et al. (2015).

Table 3: Economic impact assessment of integrated weed management in wheat, N=14

| Sl . No. | Particulars | Quantity | Cost / returns (₹) $Acre^{-1}$ |
|---|---|---|---|
| 1. | Total fixed cost (A) | | 14,000.00 |
| 2. | Total variable cost (B) | | 10,057.54 |
| 3. | Total expenditures (A+B) | | 24,057.54 |
| 4. | Grain yield | 22.00 quintal | 41,800.00 |
| 5. | By products (Straw and broken grains) | | 5,825.00 |
| 6. | Gross returns | | 47,625.00 |
| 7. | Net returns (C) | | 23,568.00 |
| 8. | B: C ratio | | 1.97 |
| 8. | Net returns under farmer practices (D) | | 18,568.00 |
| 9. | Economic gain (C-D) | | 5,000.00 |

1 US$=73.06 INR

## 4. Conclusion

Adoption of IPM practices lead to effective management of pest in paddy. Similarly, INM practices have resulted in balanced and better nutrient management in wheat and IWM practices lead to effective control of *Phalaris minor* in wheat. The introduction of these interventions has helped in increasing in the crop yields. These interventions helped the farmers in increasing their income with higher benefit-cost ratios.

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