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**A Anuratha**  
ICAR, Krishi Vigyan Kendra,  
Tamil Nadu Agricultural  
University, Needamangalam,  
Thiruvavur, Tamil Nadu, India

**M Ramasubramanian**  
ICAR, Krishi Vigyan Kendra,  
Tamil Nadu Agricultural  
University, Needamangalam,  
Thiruvavur, Tamil Nadu, India

**V Vigila**  
ICAR, Krishi Vigyan Kendra,  
Tamil Nadu Agricultural  
University, Needamangalam,  
Thiruvavur, Tamil Nadu, India

**R Ramesh**  
ICAR, Krishi Vigyan Kendra,  
Tamil Nadu Agricultural  
University, Needamangalam,  
Thiruvavur, Tamil Nadu, India

**Corresponding Author:**  
**A Anuratha**  
ICAR, Krishi Vigyan Kendra,  
Tamil Nadu Agricultural  
University, Needamangalam,  
Thiruvavur, Tamil Nadu, India

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### PROMOTING & REINVIGORATING AGRI-HORTI, TECHNOLOGICAL INNOVATIONS [PRAGATI-2019] (14-15 December, 2019)

## Paddy - Pulses system as an alternative resilient technology for livelihood security at NICRA Village in Thiruvavur district of Tamil Nadu

A Anuratha, M Ramasubramanian, V Vigila and R Ramesh

### Abstract

Economics of paddy followed pulses system was studied in comparison with economics of paddy-fallow system. Farmers of the Rayapuram, Keezhapattu, Tamil Nadu state are generally keeping the land fallow after harvesting *rabi paddy* due to water scarcity resulting in less income during *rabi*. As an alternative to the paddy-fallow system, farmers of the Rayapuram, Keezhapattu, Tamil Nadu state were educated by the scientists of KVK, Needamangalam, Thiruvavur district under "National Innovations in Climate Resilient Agriculture (NICRA)" project to grow black gram (ADT 5) as a relay crop after *rabi paddy i.e.*, paddy-pulses system. All the cost economics including cost of cultivation, gross returns, net returns and cost benefit ratio of both the systems were calculated to recommend the best economical and sustainable system to the farmers. The net returns obtained from paddy-pulses (black gram) system were recorded as Rs.98,733 /- ha<sup>-1</sup> compared to Rs. 54,633/- ha<sup>-1</sup> from paddy-fallow system. The cost benefit ratio of both the systems was calculated and paddy- pulses (black gram) system recorded the higher cost benefit ratio (1:3.03) than the paddy-fallow system (1:2.43). Hence, it was concluded that, paddy- pulses system was the best economical income generation practice suitable to the prevailing situation of the village and was the best alternative system to paddy-fallow system

**Keywords:** Paddy, black gram, NICRA, BC ratio

### Introduction

Rayapuram one of the NICRA (National Innovations in Climate Resilient Agriculture) village belonging to Thiruvavur district, Tamil Nadu state has a population of 3246 individuals with 887 number of households. The total cultivated area is around 960 hectares with cultivation of major crops like paddy and pulses. The village receives an annual rainfall of 1044 mm with uneven distribution. The major soil types are black soils. The source of irrigation for cultivating crops is Canal and bore wells. The major climate challenge is drought and flood because of deficit and excess rainfall observed in every year. Farmers are cultivating rice during *rabi season* and after that they keep land fallow due to insufficient water. Thus affecting the livelihood of the farmers.

By studying the climatic conditions and considering the situation of the village, KVK, Needamangalam scientists have approached the farmers with a novel idea of cultivating black gram after paddy *i.e.*, paddy- black gram as an alternative cropping system to the paddy – fallow for income generation to the farmers for bringing the area under cultivation instead of leaving the land fallow in summer.

Pulses have great importance in Indian agriculture as they are rich source of protein (17 to 25%) as compared to that of cereals (6 to 10%), their ability to fix atmospheric nitrogen and

improve the soil fertility. Among pulses, black gram is one of the most important crop. Keeping the cheapest source of protein, it is important to increase pulses production to increase balanced diet among the socially and economically backward classes. Pulses are water saving crops and more than 92 per cent of the area under pulses is rainfed. This system is highly productive and stable besides its benefits through improvement in soil health. Adoption levels for several components of the improved technology of the crop were low emphasizing the need for better dissemination (Kiresur *et al.*, 2001).

Ram and Singh (2011) [4] reported that, it is one of the green manure crops suited to almost all parts of the India. Black gram has the ability to fix atmospheric nitrogen, adds organic matter to the soil, suppresses weeds and reduces soil erosion.

### Materials and Methods

Conservation and effective utilization of residual soil moisture through cultivation of black gram for seed production was demonstrated under NICRA project. During the period of paddy harvesting in the month of January - February, farmers has broadcasted the black gram seed during April in the field so that they can germinate by utilising the residual soil moisture. The seed can be broadcasted easily without much labour requirement; thus helping in timely sowing and also reduces the cost involved for labour. About 25 kg of seed is broadcasted per hectare. Seeds germinated within 5-6 days after sowing. Flowering comes at 25 days after sowing. The crop can be harvested for seed production by 65-70 days after sowing (DAS).

All the economics from the seed cost, sowing to harvesting was studied in the black gram seed production. Similarly, all the economic parameters *i.e.*, cost of cultivation, gross

returns, net returns and cost benefit ratio obtained was carefully studied, calculated and compared in both the systems *i.e.*, paddy- pulses and paddy-fallow.

### Results and Discussion

The results indicated that the total cost of cultivation for black gram seed production was Rs. 10,500/- including the seed cost (Rs.2000/- ha<sup>-1</sup>), broadcasting (Rs. 1000/- ha<sup>-1</sup>), plant protection measures (Rs.2500/- ha<sup>-1</sup>) and harvesting (Rs. 5000/- ha<sup>-1</sup>). All the plant protection measures were taken at appropriate time during the crop period to reduce the pest incidence and to obtain good yield. The total yield of black gram seed production achieved was 8.40 quintals ha<sup>-1</sup>. The total income generated by selling the 8.40 quintals of produce was Rs.54, 600/- ha<sup>-1</sup> (price per quintal was Rs. 6500/-). The net returns obtained by removing all the cost of cultivation was Rs.44,100/- ha<sup>-1</sup> (Table 1). Similar findings have also been observed in black gram by Veeramani *et al.*, (2017) [5] and Anuratha *et al.*, (2019) [1]

**Table 1:** Black gram seed production under rice follow - Economics (per Ha)

Details of cost of cultivation	Economics ha <sup>-1</sup>
Seed (20 Kg)	Rs. 2000/- (100 Rupees per kg)
Broadcasting black gram seed	Rs. 1000 /-
Weed management	-
Plant protection measures	Rs.2500/-
Harvesting	Rs. 5000/-
Total cost of Cultivation	Rs. 10500/-
Total production (Ha)	840 kg/ha
Price per quintal	Rs.6500/-
Total income	Rs. 54,600/-
Net Returns from black gram	Rs. 44,100 /-

**Table 2:** Paddy –fallow comparison with paddy- pulses

Details of cost of cultivation	Economics ha <sup>-1</sup>
Cost of seed – black gram	Rs. 2000/- (100 Rupees per kg)
Broad casting of black gram seed as paddy relay	Rs. 1000 /-
Weed management	-
Plant protection measures	Rs.2500/-
Harvest of black gram	Rs. 5000/-
Total cost of Cultivation	Rs. 10500/-
Total production (Ha)	840 kg/ha
Price per quintal	Rs.6500/-
Total income	Rs. 54,600/-
Net Returns from black gram	Rs. 44,100 /-
Paddy Grain yield (Kg Ha <sup>-1</sup> )	5,656 kg Ha <sup>-1</sup>
Price per quintal	Rs. 1640
Total income	Rs 92,758/-
Paddy cost of cultivation	Rs.38,125/-
Net returns	Rs.54,633/-
Net Returns from paddy -fallow	Rs. 54,633/- (CB Ratio 1:2.43)
Net Returns from paddy – black gram	Rs. 98,733 (CB Ratio 1:3.03)

As in Table 2, the paddy-fallow cropping system was compared with paddy- black gram system shown that the total cost of cultivation of paddy was Rs. 38,125/- ha<sup>-1</sup>. The total yield obtained from one ha of paddy was 5656 kg (56.56 quintals). The total income gained by selling 5656 kg produce was Rs. 92,758 /- ha<sup>-1</sup> and the net returns obtained after removing all the cost of cultivation was Rs. 54,633/-. If the land is kept fallow after paddy harvesting, then the farmers are left with only the net income gained from selling of paddy produce was Rs. 54,633/-. Thus the cost benefit (CB) ratio was 1:2.43. Farmers who have grown black gram after paddy are able to get the total net returns of Rs. 98,733 /- ha<sup>-1</sup> (Rs.

54,633 /- ha<sup>-1</sup> from paddy and Rs. 44,100/- ha<sup>-1</sup> from black gram). The cost benefit (CB) ratio was 1:3.03 which is more than the cost benefit ratio (CB) of paddy -fallow *i.e.*, 1:2.43. Thus, farmers by growing the black gram after paddy are able to gain an additional net income of Rs. 44,100/- ha<sup>-1</sup> through the seed production of black gram. This finding is in corroboration with the findings of Mokidue *et al.* (2011) [3].

### Conclusion

It is concluded as in the present day situation, due to monsoon vagaries and delayed and limited rainfall farmers are cultivating crops during *rabi* but with lot of difficulty by

conserving the moisture available; but they are leaving the lands barren after paddy. Paddy- black gram system was the best alternative income generation system suitable to the situation prevailed in the village and was the best alternative system to Paddy - fallow system.

Farmers of balaji have got an average yield of 8.40 q ha<sup>-1</sup> from black gram cultivation with net returns of Rs. 44,100/- ha<sup>-1</sup>. The technique fits into alternate planning to the farmers during the summer season as it provides flexibility in growing the crop with utilisation of residual moisture and fits into the season without keeping the land fallow. The technology which started with an area of 10 ha has now being followed by more than 40% of farmers in the village with successful income generation.

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