



# Water and Energy Efficient Integrated Farming System for Rainfed Farmers

## TECHNOLOGY BRIEF

Integrated Farming System is the foreseeable management option for the small and marginal farmers of rainfed ecology to generate more income, food, and employment per unit area. Water and energy efficient farming system could be achieved through optimum cropping system (rice-horse gram and rice-sunflower), less use of agro-chemicals (green manuring and vermi-compost), mulching, ring method of irrigation (cucurbits), paired row bed planting (okra), multiple use of water (pisciculture, horticulture, apiculture, poultry and mushroom cultivation), growing of widely spaced crop with large ground coverage (bottle gourd and water melon) and redgram cultivation on field bunds. Residue recycling of poultry and duckery for pisciculture, paddy straw for mushroom cultivation, and bio-waste for vermi-compost production saved energy on fish feed and fertilizer.

The farming system model (3408.44 m<sup>2</sup>) was based on water harvesting pond (30 m x 30 m x 2.8 m depth), dyke around pond (556 m<sup>2</sup>), field crop unit (1879 m<sup>2</sup>) and field bund (73.44 m<sup>2</sup>). Net return/ha and employment generation/ha were Rs1,88,341 (without considering the cost on land modification) and 509.3, respectively under IFS as compared to wet season rice (Rs 27,982 and 157.7). Net water productivity under IFS was also very high (Rs53.7/m<sup>3</sup>) due to multiple use of water.

## IMPACT / UTILITY

This technology was demonstrated on-farm through Farmers' Training Programme and Trainers Training Programme on scaling-up of water productivity and enhancing income in agriculture. It is also demonstrated to visiting farmers and extension officers to the research farm from Odisha, West Bengal and Bihar under PMKSY. This technology has the potential for implementation in around 12 lakhs ha in India as well as in other parts of south-east Asia. Using this technology, low productivity in rainfed areas can be up scaled and surplus labour under small and marginal holdings can be gainfully employed.

## HIGHLIGHTS

- Growing of paddy crop in wet season under integrated nutrient managed with in-situ green manuring resulted in higher energy output: input ratio (18.7) and net returns (Rs 27982/ha) as compared to use of chemical fertilizers alone (energy output: input ratio of 13.9 and net returns of Rs 23412/ha).
- After paddy harvest, growing of legume (horse gram) under reduced tillage, and use of farm generated vermi-compost reduced energy requirement and resulted in high energy output: input ratio, water productivity, net returns and beneficial residual soil fertility (organic carbon, available N, P and K).



### Project Details

Development of water and energy efficient integrated farming system model for the rainfed farmers (Project Code: DWM/09/143)

### Publications

- Rautaray, et al. (2017) Archives of Agronomy and Soil Science 63(14): 1993-2006
- Rautaray et al. (2020) Nutrient Cycling in Agroecosystems 116 (1) 83-101



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