PERFORMANCE OF ZERO TILL MAIZE IN RICE FALLOW
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Several studies have reported the adverse impact of conventional PTR cultivation on soil health and microbial functions that in turn affect the successive winter crop performance 25 , Formation of hard layer in the sub-surface soil due to wet-tillage increases the soil resistance that restricts the root growth of successive crop and limits water extraction from lower soil depths Bandyopadhyay et al.

Our result also showed that wet-tillage in PTR increased the soil cracking that possibly a factor of increased loss of soil moisture. Alternative tillage and crop establishment methods in rice should be aimed at fewer inputs to produce at par crop yields compared with PTR production system 29 , Rice grain yield was lower under conservation tillage treatments compared to PTR treatment.

This might be due to higher crop-weed competition under conservation tillage practices has also been reported to be one of yield limiting factors The yield advantages of conservation tillage practices in rice are mostly evident in long-run with the increase in water stable aggregates, soil organic carbon, and increased availability of soil nutrients 26 , It indicates that growing of chickpea, lentil and safflower under the conservation agriculture production system is a better option for the farming community of rice fallow areas in eastern India Soil moisture deficit is the major abiotic stress factor that limits the winter crop productivity in rice - fallsows.

The conservation tillage practices treatment particularly ZTDSR was effective in conserving soil moisture in upper soil depths and maintained a higher level of moisture for an extended period. Fundamentally, soil hydrology is largely influenced by the tillage practices Soil moisture distribution in the undisturbed soil profile is moderated by capillary continuity and crop residue retention further minimizes the evaporative loss The higher ambient temperature at later stages of winter crops DAS onwards increased the evaporative loss of soil moisture and thus the effect of CERM practices on soil moisture was marginal at later growth stages of crop.

Several studies have reported that standing stubbles in CA practices could reduce the soil evaporative losses of moisture and moderates the soil temperature by shading effects 32 , 33 , 34 , Production economics is the primary driver of cropping intensification in rice-fallows areas, where the farmers are mostly poor with marginal land holdings 6 , 7 , 11 , Equally, production potential and market price of winter crops directly influenced the profit margin.

The result suggests that rice residue retention could be an economically viable and sustainable crop management option for rice-fallows cropping intensification. The economic advantage of conservation tillage practices in rice-based systems has also been reported earlier from non-rice fallow production systems 31 , 32 , Improved energy productivity remains crucial for sustainable crop production in long-run 38 , Nowadays, the sustainability of rice-based production systems is questioned due to excessive use of energy sources, degradation of natural resources groundwater and soil , declining factor productivity and profit margin Our results showed that the strategic choice of crop rotations and conservation tillage practices could minimize energy inflow and increase energy ratio over energy intensive PTR production system.

Rice and winter crop production, tillage and irrigation were the major variables of energy. Rice residue retention markedly reduced the energy ratio as it largely increased the bio-energy input. Nevertheless, crop residue retention has been suggested as a sustainable approach particularly in the tropical agro-climate, where the soil native carbon pool is low 25 , Further, residue retention could be the best alternative to crop residue burning,
which is extensively being practiced in rice-growing areas of Indo-Gangetic plains.

Conventional PTR production system, which is highly labour intensive, can effectively be substituted by ZTDSR with a little negative impact on rice grain yield but more importantly with a significant reduction in water use, CH4 emissions and higher net profits. The GWP is steered by cultivar-environment-management interactions and, thus developing a high-yielding rice variety adapted to an improved CERM option with low GWP should be a future priority. Thus, legume-inclusive rotations are better to rationalize the energy and GWP due to lower input requirements.

Among the farm operations that can lower GHG emissions include minimum use of nitrogen fertilizer, inclusion of pulses and adoption of ZTDSR for rice crop establishment in rice-fallow. With a lower requirement of nitrogenous fertilizer and irrigations, legume-based cropping systems in rice-fallow have a strong potential to reduce energy use and GWP, while maintaining similar net returns as those from other crop rotations. Thus, these rotations may be preferred options towards the sustainable cleaner, safer agricultural production system under the scarce resources in the rice-fallow areas of South Asia.

Our study concluded that chickpea, lentil and safflower could be the candidate crops for sustainable cropping intensification of rice-fallow areas in eastern India. Grain legumes along with safflower inclusive rotations led to higher system productivity, energy productivity and economic returns in rice-fallow conditions. The relative responses of winter crops to conservation tillage and residue retention practices were better for safflower followed by chickpea and lentil.

Thus, the study suggests that inclusion of grain legumes chickpea and lentil and safflower with conservation tillage and rice residue retention could be a sustainable approach for cropping intensification in rice-fallow areas for food, nutritional and environmental security. Systemic future research on soil moisture conservation and nutrient management, cultivars selection, and farm mechanization is needed that may further upscale the productivity and profitability of rice-fallows agro-ecosystem in eastern India.


Mishra, J. Low cost technologies for management of rice falls in Eastern India. Enhancing the productivity of rice fallow area of Eastern India through inclusion of pulses and oilseeds.


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Energy management in crop production. Climate change the physical science basis. Stocker, T. Press, Cambridge and New York, Padre, T. Quantifying changes to the global warming potential of rice - wheat systems with adoption of conservation agriculture in north - western India. Pratibha, G. Impact of conservation agriculture practices on energy use efficiency and global warming potential in rainfed pigeonpea - castor systems.


Evaluation of post - rainy season crops with residual soil moisture and different tillage methods in rice fallow of eastern India. Response of lentil Lens culinaris to post-rice residual soil moisture under contrasting tillage practices.

Jat, H. Re-designing irrigated intensive cereal systems through bundling precision agronomic innovations for transitioning towards agricultural sustainability in North-West India. Chakraborty, D. A global analysis of alternative tillage and crop establishment practices for economically and environmentally efficient rice production. Kumar, V. Can productivity and profitability be enhanced in intensively managed cereal systems while reducing environmental footprint of production?

Assessing sustainable intensification options in breadbasket of India. Assessing soil properties and nutrient availability under conservation agriculture practices in a reclaimed sodic soil in cereal - based systems of North - West India. Choudhary, K. Evaluating alternatives to rice - wheat system in western Indo-Gangetic Plains: crop yields, water productivity and economic profitability.

Nath, C. Nitrogen effects on productivity and soil properties in conventional and zero tilled wheat with different residue management. Nat Acad. India Sec. B: Bio. Mondal, S. Effect of short-term 5 years conservation agriculture on soil physical properties and organic carbon under cereal based cropping system in Indo-Gangetic Plain of Bihar.
The "coverage" chart below show how much of the daily needs can be covered by grams of the food. Contains less Sodium Equal in Zinc - 0.
Equal in Vitamin B1 - 0. Equal in Vitamin B6 - 0. Summary score is calculated by summing up the daily values contained in grams of the product. Obviously the more the food fulfills human daily needs, the more the summary score is. Macronutrient comparison charts compare the amount of protein, total fats and total carbohydrates in grams of the food.

The displayed values show how much of the daily needs can be covered by grams of the food. Comparison summary table Pay attention at the most right column.

It shows the amounts side by side, making it easier to realize the amount of difference. Which food is preferable in case of diets? Low Calories diet. Low Fats diet.

Performance Of Zero Till Maize In Rice Fallow Reviews

Majority of the farmers grow rice, maize, soybean, tomato, brinjal, ginger and turmeric etc. Generally, mono-cropping system of rice cultivation is practised. Instead of taking up second crop after kharif rice, farmers leave rice field fallow during rabi season mainly owing to lack of irrigation facilities.

Initially some capacity building programmes were organised on zero tillage technology in which skill based knowledge on the technology was imparted to the farmers. The technology was first adopted by the progressive farmer Mr. Stephan Shadap during Along with him four other farmers also took up the zero tillage method of cultivation on garden pea covering around 1. Thereafter, regular monitoring of the demonstration programme was made by scientists and project staff through frequent village visits and timely advisory services.

The demonstration was conducted in the village continuously for three consecutive years from to Details of number of farmers involved, area covered, average yield, income etc. Table: Economic return from different cropping sequences rice —fallow monocropping VS rice-pea zero tillage.

Gross Expenditure Rs. Gross Income Rs. Rice-fallow var. Shasarang Monocropping. All winter crops were raised on residual soil moisture and no irrigation was applied to the winter crops. Rice equivalent yield REY of the winter crops was computed by converting their grain yield to rice yield with a price factor as per following formula. The system rice equivalent yield SREY or annual system productivity and system production efficiency SPE were calculated by the following formula:

Random samples from harvested grains of each crop were taken in triplicate from each treatment and weight of 1, filled grains was weighed by analytical electronic balance and mean weight expressed in gram g. To estimate the quantity of recycled rice straw in residue retention plots, 1.

The soil moisture depletion cm in different soil depths were calculated using the formula: An area of 1. Crack width measurement was done 1. The crack volume in an area of 0. The required sand volume to fill up the cracks was measured as crack volume. Six measurements were performed in each plot to even out the spatial variability. All the fixed and variable costs tillage, seed, fertilizers, pesticides, irrigation, harvesting were taken into account for economic analysis. Table 2. The net return was computed as the difference between gross return and total cost of cultivation.

The system net return was calculated by adding the net returns from both rainy and winter season crops in annual crop rotation. For estimation of energy inputs and outputs, a complete record of all the inputs seed, fertilizer, agrochemicals, fuels, mechanical and machinery power and outputs grain and straw were maintained. Inputs were translated from physical unit to the energy unit by multiplying with respective conversion coefficients Suppl.

Table 3. The energy use indices were calculated as suggested by Devasenapathy et al. Data were subjected to analysis of variance ANOVA techniques to work out the significant differences among the treatments. The data of parameters viz. Effect of CERM practices was prominent on plant growth and yield attributes i. Rice grain yield was the highest in PTR treatment Table 3. Error bar indicates standard error of mean. Crack volume was markedly higher 2. Field view of soil cracks under different tillage cum crop establishment practices a — c. Crack width d , depth e and volume f as influenced by different tillage cum crop establishment practices 2-year mean.

The system net energy output was calculated by adding the net returns from both rainy and winter season crops in annual crop rotation. For estimation of energy inputs and outputs, a complete record of all the inputs seed, fertilizer, agrochemicals, fuels, mechanical and machinery power and outputs grain and straw were maintained. Inputs were translated from physical unit to the energy unit by multiplying with respective conversion coefficients Suppl.

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Results demonstrated that conservation tillage with crop residue retention could increase the yield of winter crops in rice-fallows by improving soil physical properties and moisture retention. Lower length, width and volume of cracks under conservation tillage indicate better soil aggregation and pores size distribution. Several studies have reported the adverse impact of conventional PTR cultivation on soil health and microbial functions that in turn affect the successive winter crop performance. Formation of hard layer in the sub-surface soil due to wet-tillage increases the soil resistance that restricts the root growth of successive crop and limits water extraction from lower soil depths. 

Our result also showed that wet-tillage in PTR increased the soil cracking that possibly a factor of increased loss of soil moisture. Alternative tillage and crop establishment methods in rice should be aimed at fewer inputs to produce at par crop yields compared with PTR production system. Rice grain yield was lower under conservation tillage treatments compared to PTR treatment.

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Among the farm operations that can lower GHG emissions include minimum use of nitrogen fertilizer, inclusion of pulses and adoption of ZTDSR for rice crop establishment in rice-fallow. With a lower requirement of nitrogenous fertilizer and irrigation, legume-based cropping systems in rice-fallow have a strong potential to reduce energy use and GWP, while maintaining similar net returns as those from other crop rotations. Thus, these rotations may be preferred options towards the sustainable cleaner, safer agricultural production system under the scarce resources in the rice-fallow areas of South Asia.

Our study concluded that chickpea, lentil and safflower could be the candidate crops for sustainable cropping intensification of rice-fallow areas in eastern India. Grain legumes along with safflower inclusive rotations led to higher system productivity, energy productivity and economic returns in rice-fallow conditions.

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Systemic future research on soil moisture conservation and nutrient management, cultivars selection, and farm mechanization is needed that may further upscale the productivity and profitability of rice-fallows agro-ecosystem in eastern India. Rice-fallow in the Eastern India: problems and prospects.

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About Performance Of Zero Till Maize In Rice Fallow Writer

The Nongthymmai village in Ribhoh district of Meghalaya under the subtropical hill agro-climatic zone is a climatically vulnerable area mostly affected by acute scarcity of water during rabi season.

The main occupation of the population rests on agriculture and allied activities. Majority of the farmers grow rice, maize, soybean, tomato, brinjal, ginger and turmeric etc. Generally, mono-cropping system of rice cultivation is practised. Instead of taking up second crop after kharif rice, farmers leave rice field fallow during rabi season mainly owing to lack of irrigation facilities.

Initially some capacity building programmes were organised on zero tillage technologyin which skill based knowledge on the technology was imparted to the farmers. The technology was first adopted by the progressive farmer Mr.

Stephan Shadap during Along with him four other farmers also took up the zero tillage method of cultivation on garden pea covering around 1. Thereafter, regular monitoring of the demonstration programme was made by scientists and project staff through frequent village visits and timely advisory services. The demonstration was conducted in the village continuously for three consecutive years from to Details of number of farmers involved, area covered, average yield, income etc. Table : Economic return from different cropping sequences rice —fallow monocropping VS rice-pea zero tillage.

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Browse by : Author Author Serial Subject. Enter author surname: Display : 25 50 Previous record Next record. Actions Tools Choose a colour. Initial and final plant stand of maize was higher under zero tillage conditions than in conventional planting. Random sowing with appropriate weed control measures under zero tillage conditions recorded higher initial and final plant stand. Growth and yield parameters viz.

Evaluation of the performance of rice fallow maize under zero-tillage conditions in comparison to conventional planting. Random sowing with appropriate weed control weed control Subject Category: Techniques, Methodologies and Equipment see more details measures under zero tillage conditions recorded higher initial and final plant stand.

On the other hand, net returns and benefit-cost ratio were higher in line sown zero till integrated weed control treatment compared to conventional planting. Back to top. Edit annotation. Cancel Edit annotation. Add annotation. Cancel Add annotation. Print citation. Cancel Print. Email citation. Please enter a valid email address. Cancel Send.

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