

Details of the project conducted under ICAR- Mahatma Gandhi Integrated Farming Research Institute, Piprakothi, Motihari, East Champaran, Bihar

Title of the project (project code):	Assessment of natural farming in rice-wheat cropping system in north Bihar conditions (NRMAMGIFRISIL202200400016)
Institute-funded/externally funded	Institute-funded
Project time: Period of development/ evaluation/validation	01.07.2022 to 30.06.2027
Developers (Lead and Associates)	Lead: Dr. P. K. Bharti, Sr. Scientist (LPM), ICAR-MGIFRI, Piprakothi, Associate: • Dr. A K Singh, PS(Agronomy) wef 1.7.2022 to Dec 2024 (<i>transferred to other institute</i>). • Dr. S K Samal, Scientist (Soil Science) wef 1.7.2022 to 29.03.2023(<i>transferred to other institute</i>). • Dr. Haritha Mohan M, Scientist (Plant Pathology) wef May 2024 to June 2025 (<i>transferred to other institute</i>). • Dr. S. K. Singh, Principal Scientist (Agronomy), wef April 2025 • Dr. V.S.Meena, Senior Scientist (Soil Science) wef August 2025
Objective of the project	i. To assess effect of natural farming on productivity and profitability of rice-wheat cropping system in north Bihar ii. To standardize the frequency of application of Jeevamrit in natural farming for rice-wheat cropping system iii. To find out the effect of natural farming on soil fertility for rice-wheat cropping system

Treatment details	• A total of eight experimental plots of equal size (54m length x 8.85 m width with an area of 478 m² approx.) were prepared for experimenting on natural farming in comparison with chemical or conventional farming, organic farming, and semi-conventional farming. • A buffer zone of 1-meter width and raised soil bed of 0.5-meter height was made between each treatment to prevent seepage/intermixing of nutrients or inputs from one to other plots • Each plot had 5 replications viz R1, R2, R3, R4, and R5 of equal size. Two cropping seasons were covered in the experiment viz. <i>kharif</i> and <i>rabi</i> in which rice and wheat were cultivated, respectively. • The details of the treatments are T1: conventional or chemical farming, T2: Organic farming (based on use of FYM), T3: semi conventional farming (50% chemical and 50% FYM) and T4: natural farming (neither use of chemical nor use of FYM, only one-time application of Jeevamrita), T5: natural farming with 3 times Jeevamrita, T6: natural farming with 5 times Jeevamrita, T7: natural farming with 7 times Jeevamrita and T8: natural farming with 9 times Jeevamrita. • The Bijamrita was used in only once in all natural farming (T4 to T9). Each treatment had 5 replications viz R1, R2, R3, R4, and R5 of equal size. • The Neemastra, Agniastra and Brahmastra were used as per the need to control the insect and pest infestation in field crops.
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Summary of the project (Bullet point)	• The study was conducted at the institute research farm, ICAR-MGIFRI, Piprakothi, East Champaran, Bihar. The East Champaran district is situated between 26° 16' North to 27° 1' North latitude and the longitude between 84° 30' East to 85° 16' East. The Piprakothi is situated at latitude of 26° 54' North and longitude of 84° 93' East. • In 1st year Swarna sub-1 followed by Swarna samridhi variety of rice in 2nd , 3rd year was cultivated in kharif • In the rabi season, HD-2967 variety of wheat was cultivated every year • The organic carbon percentage of soil was non-significantly different to each other. Soil organic carbon for 15-30 cm depth in respective treatments was 0.35, 0.38, 0.36, 0.32, 0.32, 0.32, 0.33, and 0.33, respectively. The trend for organic carbon at two various depths in all treatments were almost similar. • The mean soil pH for T1 to T8 was 8.2, 8.4, 8.3, 8.2, 8.2, 8.3, 8.3 and 8.3, respectively. The soil pH in all treatments was non-significant from each other.
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Output of the project: Yield/productivity gain/ Saving of water, labour, time, and energy/ increase in water use efficiency	Yield of paddy crop			
	Treatment	Grain yield (t/ha): 2022-23	Grain yield (t/ha): 2023-24	Grain yield (t/ha): 2024-25
	Variety	Swarna sub1	Swarna samriddhi	Swarna samridhhi
	T-1	4.7	4.73 ^a	6.3a
	T-2	4.6	4.67 ^a	4.9b
	T-3	5.3	5.39 ^a	6.6c
	T-4	2.9	2.86 ^b	2.5d
	T-5	3.2	2.98 ^b	2.8e
	T-6	3.5	3.15 ^b	2.8e
	T-7	3.7	3.25 ^b	2.9e
T-8	3.9	3.78 ^{ac}	2.9e	
	Yield of wheat crop			
	Treatments	Grain yield (t/ha): 2022-23	Grain yield (t/ha): 2023-24	Grain yield (t/ha): 2024-25
	Variety	HD-2967	HD-2967 No tillage in T4-T8	HD-2967
	T1	4.07 ^a	3.75	4.8
	T2	3.8 ^b	3.45	5.3
	T3	4.09 ^a	3.84	6.6
	T4	2.7 ^c	0.31	2.4
	T5	2.7 ^c	0.33	2.5
	T6	2.8 ^c	0.34	2.7
	T7	2.8 ^d	0.36	2.7
T8	2.9 ^d	0.39	2.8	
Cost effectiveness, including B:C ratio	Net Income for paddy during 2024-25			
	Treatments	Net Income (Rs/m2)	Net Income (Rs/Ha)	B:C
	T1	7.95	79562	2.34
	T2	4.12	41267	1.39
	T3	10.96	109695	2.46
	T4	4.97	49759	2.31
	T5	5.81	58167	2.46
	T6	5.88	58891	2.27
	T7	6.97	69753	2.41
	T8	8.86	88661	2.72
Validation technology followed (within the Institute, collaborators, multilocation/multi-site testing at farmers' fields)	NA			
Proposed stakeholders	Farmers			
Publications/photos/video clipping, if any	Paddy crop 2024-25			

				
	Fig 1a: T1- Chemical farming	Fig 1b: T2- Organic farming	Fig 1c: T3- semi conventional farming (50:50)	Fig 1d: T4- Natural farming (Jeevamrita time)
				
	Fig 1e: T5- Natural farming (Jeevamrita 03-time)	Fig 1f: T6- Natural farming (Jeevamrita 05-time)	Fig 1g: T7- Natural farming (Jeevamrita 07-time)	Fig 1h: T8- Natural farming (Jeevamrita time)
	Wheat crop			
				
	Fig 2a: standing wheat crop in T1	Fig 2b: standing wheat crop in T2	Fig 2c: standing wheat crop in T3	Fig 2d: standing wheat crop in T4
				
	Fig 2e: standing wheat crop in T5	Fig 2f: standing wheat crop in T6	Fig 2g: standing wheat crop in T7	Fig 2h: standing wheat crop in T8
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