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ORGANIC FARMING PRACTICES FOR ENHANCING SOIL FERTILITY AND CROP PRODUCTIVITY

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ABSTRACT

There is a significant amount of manure resource potential in India. Farmers in Kerala, the southernmost state of India, employ organic manures such as farm yard manure and chicken waste the most frequently. Kerala is India's southernmost state. The cultivation of vegetables, in particular, benefits greatly from the addition of poultry manure to their soil. The breakdown of organic waste into its component parts by earthworms results in the production of vermicompost, which is rich in various nutrients, hormones, and enzymes and has a stimulatory influence on the development of plants. Because it is such a rich source of protein, cowpea is one of the most significant vegetable crops that can be found in Kerala's diverse agricultural landscape. The experimental land had a flat terrain and a consistent textured composition over its entirety. It was extremely fruitful. It was connected to the primary irrigation channel, which was linked to the farm tube well to ensure that the irrigation process was quick, routine, and on schedule. This endeavour was undertaken in order to find out how these variations may be measured. At the time of harvesting, growth characteristics as well as yield characteristics were observed. In addition, the biological, chemical, and physical features, as well as the enzymatic activities and nutritional contents of the soil and plants, were investigated. During the course of the inquiry, the data that were gathered were subjected to the conventional method of statistical analysis so that appropriate conclusions could be drawn.

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Keywords: Organic, Farming, Enhancing, Soil Fertility, Crop Productivity

INTRODUCTION

Organic farming is one potential solution to the problem of maintaining high food, air, water, and soil standards while also protecting the natural environment for future generations. Experiments conducted in the field over extended periods of time have made it abundantly evident that consistent use of chemical fertilizers is detrimental to the health of the soil (Yadav,2003). Since its independence, India's primary social concern has been to ensure that its population has access to sufficient food supplies. People's overall health and nutritional status are directly impacted by the consumption of vegetables. Vegetables have a low calorific value and a high amount of proteins, vitamins, and minerals; as a result, food experts and nutritionists have recognized and acknowledged the importance of the role that vegetables play in the human diet. As a result, organic farming techniques prioritise growing vegetables over all other types of crops. There is a significant amount of manure resource potential in India. Farmers in Kerala, the southernmost state of India, employ organic manures such as farm yard manure and chicken waste the most frequently. Kerala is India's southernmost state. The cultivation of vegetables, in particular, benefits greatly from the addition of poultry manure to their soil. The breakdown of organic waste into its component parts by earthworms results in the production of vermicompost, which is rich in various nutrients, hormones, and enzymes and has a stimulatory influence on the development of plants. Because it is such a rich source of protein, cowpea is one of the most significant vegetable crops that can be found in Kerala's diverse agricultural landscape. As a result, research has been conducted on cowpea (Vigna unguiculata subsp. sesquipedalis (L.) Verdcort) in order to track how organic farming affects the soil's health as well as the quantity and quality of the crops that are produced.

ORGANIC SOURCES OF PLANT NUTRIENTS

In comparison to chemical fertilizers, the concentration of nutrients in organic fertilizers and sources is lower, and organic fertilizers release their nutrients more gradually. When the crop does not receive enough of the nutrients it needs, it suffers negative consequences that eventually hinder its growth and development. The key to successful organic farming of any crop is to apply the appropriate nutrients at the appropriate times, in the appropriate amounts, and at the appropriate times of the growing season. Because an inadequate supply of nutrients

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throughout any of the stages of crop development might have a negative impact on crop productivity. Therefore precise nutrient control is crucial for good crop development in organic agriculture. The ratio of carbon to nitrogen is an important factor that influences how effective organic nutrients are. When the carbon to nitrogen ratio is high, the rate at which nutrients are released is slowed down, and in some situations, immobilization takes place. On the other hand, a lower ratio of carbon to nitrogen will result in an increased rate of nutrient release and will speed up the breakdown process.

EFFECTIVE MANAGEMENT PRACTICES FOR IMPROVING SOIL ORGANIC MATTER FOR INCREASING CROP PRODUCTIVITY IN RAINFED AGROECOLOGY OF INDIA

Soil organic matter, also known as SOM, may have an effect on a number of different soil qualities, all of which are essential for sustaining the productive capacity of soils through time. It has been thought of as the soil's "lifeline," as it has a substantial impact on the soil's ability to hold water, its cation exchange capacity (CEC), its aggregate stability, its buffering capacity, its tendency toward salinization and sonification, acidification, and other processes. In addition to these, it is a significant component in influencing the cycling of nutrients and the delivery of these nutrients to plants, particularly nitrogen, phosphorus, sulphur, and micronutrients. The agroecological regions of India that get rainfall have soils that are quite varied and include a wide variety of different types, such as Vertisols and Vertic sub-groups, Alfisols, Oxisols, Inceptisols, Aridisols, Entisols, and so on. Every type of rainfed soil has some issue that prevents it from supporting crop yield optimally. In rainfed locations, the predominant soil health restrictions are moisture stress, subnormal permeability, nutrient fixation (P-fixation), erosion, inadequate nutrient retention, and slope. Moisture stress is sometimes referred to as water stress. In addition, the annual precipitation might be anywhere between 400 and 1500 millimetres, making for a wide range of possible values. There is also a considerable amount of diversity in the duration of the growth period (LGP), which can be anywhere from 60 to 180 days or even less under the country's rainfed agroecology.

ROLE OF SOC IN SOIL HEALTH MAINTENANCE

It is common knowledge that soil organic matter (SOM) plays a significant part in the upkeep of the vast majority of soil qualities, which is necessary for improved crop yield and overall soil health. The water-holding capacity, aggregate stability, and compaction and strength

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properties of soils are all greatly impacted by the presence of SOM. In addition to this, it tends to prevent water erosion and enhances the aggregate's stability. When the aggregate particles are fewer than 850 micrometres in size, they are more susceptible to being eroded by the effects of both wind and water. Researchers have shown that the amount of organic matter in soil has an inverse connection with the bulk density of the soil, which is an important factor in crop production11,12. Bandyopadhyay et al. 13 reported that the use of organic matter (FYM at 4 t ha–1) in combination with the recommended levels of inorganic fertilisers resulted in a decrease in bulk density (9.3%) and soil penetration resistance (42.6%), and an increase in hydraulic conductivity (95.8%), size of water-stable aggregates (13.8%), and SOC (45.2%) when compared to the control. It has been demonstrated that the thermal heat characteristics of soil, which are connected to storage and heat transport through it, may also be altered by SOM14.

ORGANIC AGRICULTURE

The concepts and reasoning behind organic agriculture are based on those of a living organism, in which all components (soil, plant, farm animals, insects, the farmer, and the circumstances of the local environment) are intricately connected to one another. This is done by making use of agronomic, biological, and mechanical approaches whenever possible, adhering to the laws governing these interactions, and employing the natural ecosystem as a model.

DIFFERENT APPROACHES TO EFFICIENTLY MANAGE SOIL FERTILITY

An integrated approach to managing soil fertility seeks to improve crop yields while also achieving the highest possible level of agronomic productivity from the usage of fertilisers. This is something that may be accomplished by the cultivation of grain legumes, which improve the fertility of the soil through the process of biological nitrogen fixation, as well as through the use of chemical fertilisers.

Leguminous crops, whether grown as pulses for grain, as green manure, as pastures, or as the tree components of agro-forestry systems, have a key value that lies in their ability to fix atmospheric nitrogen, which helps reduce the use of commercial nitrogen fertiliser and enhances soil fertility. Leguminous crops can be grown as pastures. Integrated nutrient management is the foundation of sustainable agricultural systems, and nitrogen-fixing legumes are an essential component of these systems. The utilisation of nitrogen-15

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contributes to a better understanding of the dynamics and interactions between the various pools in agricultural systems, such as the fixation of nitrogen by legumes and the utilisation of soil and fertiliser nitrogen by crops, both in sole cropping systems and in mixed cropping systems.

OBJECTIVE

1. To Study On The Organic Farming Practices For Enhancing Soil Fertility And Crop Productivity

2. To Study On The Role Of Soc In Soil Health Maintenance

REVIEW OF LITERATURE

Rajib Roychowdhury (2013) Since the beginning of the 21st century, sustainable development has captivated the attention and efforts of people all over the world. Agriculture that is run in a sustainable manner is essential to achieving the objective of sustainable development. According to the Food and Agriculture Organization (FAO), sustainable agriculture is the successful management of resources to satisfy the changing human needs while also maintaining or enhancing the quality of the environment and conserving natural resources. This can be accomplished without degrading the natural resources themselves. Maintaining an agricultural growth rate that is able to supply the demand for food from all living creatures without depleting the fundamental resources for crop development is a central tenet of all definitions of sustainable agriculture. This tenet is given a considerable deal of weight in the discussion. The goals of sustainable agriculture can, in part, be met by the practise of organic farming, which is just one of numerous possible techniques. The majority of the agricultural activities that are utilised in organic farming, such as intercropping, mulching, and the integration of crops and animals, are not foreign to other agricultural systems or practises, including conventional agricultural methods.

Charanjit Singh Aulakh 2022. The strategies used to manage soil and crops have an effect on the processes that occur in soil, as well as the functioning of agroecosystems and the sustainability of agricultural production systems. The production method of organic farming is now being advocated as a low-cost and environmentally friendly production method that may enhance human and soil health, as well as the environment and the agricultural industry's

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capacity to remain profitable. The body of research that was examined reached a unanimous conclusion that organic farming unquestionably enhances soil quality as a result of the use of organic manures and composts as well as the adoption of legume-based diverse cropping systems. On the other hand, most people agree that organic farming results in a productivity of crops that is between 5 to 58% lower than conventional farming, despite the fact that there are exceptions to this rule.

Anjali Tiwari 2021. An increasingly industrialised global economy, increasing population density, increasing socio-economic pressures, land gradation, impact of climatic variability on monsoon (temporal and spatial variation in rainfall), increase in surface temperature, increasing phenomena like floods and droughts, and the role of various human activities are all contributing to the rapid depletion of natural resources. Agriculture that is sustainable can better satisfy the needs of the nation's food production, but this demands conservation of the land's natural resources. The country's food production as well as its environmental security are both under jeopardy due to the depletion of its water resources and the degradation of its land. As a result, the effective management of natural resources via the practise of organic agricultural farming may have the capacity to satisfy the need for food while also preserving soil fertility and increasing the amount of soil carbon pool in various agroecosystems.

Kambaska Kumar Behera 2011. Organic farming is a method of crop production that does not make use of any artificial fertilisers, pesticides, or genetically modified organisms. This helps to reduce the negative impact that these agricultural practises have on the surrounding environment. The percentage of a country's farmland that is dedicated to organic agriculture ranges from 0.03% in India to 11.3% in Austria. Farming with organic methods is helpful for both the environment and the natural resources. Organic farming is a method that prioritises the use of organic materials and microbial fertilisers to the greatest extent possible in order to enhance the quality of the soil and boost crop yields.

Srinivasrao Ch. 2017. In addition to the irrigated regions, it is essential to boost the production capacity of rainfed agroecological zones through the enhancement of soil health in order to fulfil the requirements of the growing demand for food and fodder and to assure food security. A significant obstacle to the maintenance of crop and fodder production is the deterioration of soil health, which is caused by a loss in soil organic carbon (SOC) and, as a direct consequence of this decline, an overall decrease in soil fertility in rainfed areas. Over

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the past few years, there has been a lot of focus placed on the role that soil organic matter (SOM) plays in carbon sequestration and the cycling of nutrients. This is due to the significance of soil organic matter (SOM), as well as its close connection to the health of the soil and the production of crops.

METHODS

An investigation into the 'Impact of Tillage and Crop Establishment Practices on Soil Fertility and Crop Productivity under Rice- Wheat Cropping System in an Inceptisol' was the purpose of the field experiment. During the experimental era, the materials that were utilised, the procedures that were followed, and the associated work that was done are all detailed in this chapter. It consists of a brief explanation of the location of the experimental field, the characteristics of the soil, the climate, the experimental design and treatment combinations, the intercultural operation, crop harvesting, data gathering, and other relevant topics. This chapter provides a condensed description of the materials and methods that were utilised during the inquiry.

RESULTS AND DISCUSSION

PHYSICO-CHEMICAL AND MICROBIAL PROPERTIES OF INITIAL SOIL

The data pertaining to soil properties at starting of the experiment from the experimental field of the Agricultural Research Farm of IAS, Banaras HinduUniversity are presented in the table 4.1. The physically soil had come under sandy loam textural class, bulk density (1.38Mg m^{-3}), particle density (2.64Mg m^{-3}), pore space (47.81 %), and soil moisture content (8.15%). Soil which was collected before starting the experiment had chemical properties i.e. pH 8.17, EC 0.28 dS m^{-1}, organic carbon 0.39%, available N 192.24 kg ha^{-1}, available P 21.45 kg ha^{-1}, available K 180.11 kg ha^{-1}, available sulphur 13.59 kg ha^{-1} and boron 0.63 kg ha^{-1}).The initial value of available zinc, Iron, manganese, and copper was like this 1.44, 35.32, 9.36, and 2.21 mg kg^{-1}, respectively. The bacterial, fungal, actinomycetes, population were recorded 20.43, 17.74 and 14.76 cfu $\times 10^6$ g^{-1} soil, respectively. Whereas, dehydrogenase activity and SMBC were obtained 23.75 µg TPF g^{-1} soil day^{-1} and 190.64 µg g^{-1}, respectively.

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Table 4. 1: Initial soil properties of experimental field

S. No.	Parameter	Initial value
Physical properties		
1	Textural class	Sandy loam
A	Sand	60.26
B	Silt	27.41
C	Clay (%)	12.33
2	Bulk density (Mg m^{-3})	1.38
3	Particle density (Mg m^{-3})	2.64
4	Pore space (%)	47.81
5	Soil moisture content (%)	8.15
Chemical properties		
6	pH (1:2.5)	8.17
7	EC (dS m^{-1})	0.28
8	Organic Carbon (%)	0.39
9	Available N (kg ha^{-1})	192.24
10	Avail. P ((kg ha^{-1})	21.45
11	Avai. K (kg ha^{-1})	180.11
12	Available sulphur (kg ha^{-1})	13.59
13	Available Boron (kg ha^{-1})	0.63

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14	DTPA extractable zinc(mg kg^{-1})	1.44
15	DTPA extractable iron (mg kg^{-1})	35.32
16	DTPA extractable manganese (mg kg^{-1})	9.36
17	DTPA extractable copper (mg kg^{-1})	2.21
Microbial properties		
18	Bacterial Population (cfu $\times 10^6$ g^{-1} soil)	20.43
19	Fungal Population (cfu $\times 10^6$ g^{-1} soil)	17.74
20	Actinomycetes Population (cfu $\times 10^6$ g^{-1} soil)	14.76
21	Dehydrogenase activity (µg TPF g^{-1} soil day^{-1})	23.75
22	SMBC (µg g^{-1})	190.64

EFFECT OF TILLAGE AND CROP ESTABLISHMENT PRACTICES ON SOIL PROPERTIES

Soil bulk density

Bulk density of post harvest soil are mentioned in table 4.2. The tillage and crop establishment were significantly influenced the bulk density during bothyears.

The bulk density of soil was decreased with experimentation years. The bulk density of soil after 1^{st} year of rice harvest ranged from 1.34 to 1.40 Mg m^{-3}, whereas in the case of 1^{st} year of wheat harvest soil, it varied between 1.33 to 1.39 Mg m^{-3}. The lowest bulk density of soil after harvest of rice was recorded 1.34 Mg m^{-3} with treatment CE_6. Similarly in wheat, it was recorded 1.33 Mg m^{-3}, with treatment CE_5 and CE_6. The highest value of bulk density was noted in CE_1 in 1^{st} rice and CE_1 and CE_2 in 1^{st} wheat.

The bulk density of the second year was found in the range of 1.33 to 1.41 Mg m^{-3} and

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1.32 to 1.39 Mg m^{-3} in post-harvest soil of rice and wheat crops. The CE_6 significantly reduced bulk density as compared to CE_1. Meanwhile, the highest bulk density in the soil of rice (1.41 Mg m^{-3}) and wheat (1.41 Mg m^{-3}) were obtained with the CE_1 plot, followed by CE_2. The full conservation agricultural shows statistically higher value as a comparison to conventional and partially conservation treatments in both crops. During both years of the experiment, the lowest bulk density was recorded under CE_6 after the 2^{nd} wheat harvest soil.

Soil particle density

The information that can be found in table 4.2 pertains to the particle density of post-harvest soil and how it is affected by the various techniques of tillage and crop establishment.

A close examination of particle density data reveals that the particle density of soil differs non significantly during both years. Meanwhile, the particle density of soil in 1^{st} rice and wheat varied from 2.63 to 2.65 Mg m^{-1}. The lowest particle density of soil (2.63 Mg m^{-1}) was recorded in the field with treatment full conservation tillage in 1^{st} rice and full conservation tillage and partial conservation tillage with crop residue incorporation in 1^{st} wheat. The higher value of particle density was recorded under conventional tillage experimental field during both crops.

The particle density was varied from 2.62 to 2.64 Mg m^{-3} in soils of rice and wheat crops during the second year of the experiment. Full conservation tillage non significantly reduced the particle density of soil as compared to conventional tillage and followed by partial conservation tillage. The particle density of soil (2.64 Mg m^{-3}) was obtained with CE_1 in post-harvest soil of both crops, which was non-significantly higher than the rest of the other tillage and crop establishment treatments.

Table 4. 2 Effect of tillage and crop establishment practices on bulk density and particle density

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Treatment	Soil bulk density (Mg m^{-3})				Soil particle density (Mg m^{-3})			
	2018-19		2019-20		2018-19		2019-20	
	Rice	Wheat	Rice	Wheat	Rice	Wheat	Rice	Wheat
CE_1	1.40	1.39	1.41	1.39	2.65	2.65	2.64	2.64
CE_2	1.39	1.39	1.40	1.38	2.65	2.64	2.63	2.63
CE_3	1.38	1.37	1.38	1.37	2.64	2.64	2.63	2.63
CE_4	1.37	1.36	1.36	1.36	2.64	2.63	2.63	2.63
CE_5	1.35	1.33	1.34	1.33	2.63	2.63	2.62	2.62
CE_6	1.34	1.33	1.33	1.32	2.63	2.63	2.62	2.62
S.Em (±)	0.01	0.01	0.02	0.01	NS	NS	NS	NS
CD (*p=0.05*)	0.04	0.03	0.05	0.02	NS	NS	NS	NS

Soil Pore space

In table 4.3, the data that correspond to the porosity of post-harvest soil, which is impacted by tillage and the methods used to grow crops, are shown. A review of the data suggests that there is no substantial difference in the porosity of the soil during the first year of rice production, but that this difference becomes considerable during the second year. On the other hand, the treatments that were done to the wheat crop in both years had a substantial impact on it.

The percent porosity in soils of 1st rice ranged between 47.07 to 49.05%. The maximum porosity (49.05%) was recorded with plot received treatment CE6 followed by CE_5. The lowest porosity (47.07%) was recorded under CE_1. In 1st wheat crop, the soil porosity was improved as compared to the rice post-harvest soil sample. The full conservation tillage significantly influenced porosity as compared to conventional tillage and was at par with partial tillage. Similar, porosity in partial conservation agriculture treatments was statistical at par with conventional tillage treatments. The highest porosity was recorded 49.43 % with full conservation agricultural i.e. CE_6 and CE_5, whereas, the lowest value of porosity (47.34%) was obtained under CE_1 followed by CE_2 (47.55%).

From second year data of porosity further revealed that the substitution Theporosity of soil ranged between 46.44 to 49.24% and 47.35 to 49.62% in soils of 2nd rice and wheat, respectively. Meanwhile, the soils of the plot with treatment CE_6 reported 5.28 and 4.40 % higher porosity as compared to conventional tillage with residue

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incorporation (CE_2) in post-harvest soils of 2^{nd} year rice and wheat, respectively. As compared to conventional tillage practice without residue plot (CE_1), the plots under full conservation tillage were statistically improved soil porosity and statistical at par with partial conservation tillage in the soil of both crops. Similarly, the porosity of post-harvest soils from 2^{nd} rice and wheat under partial conservation tillage plots (CE_3 and CE_4) were statistically at par withconventional tillage plots (CE_1 and CE_2) and full conservation tillage experiment plots.

Soil moisture content

Taking a closer look at the data that is provided in table 4.3 makes it abundantly evident that the complete conservation tillage based treatments were responsible for the large increase in soil moisture content that was seen in rice and wheat throughout both of the study years.

The soil moisture content was varied from 9.48 to 6.85% and 9.57to 7.27% in 1^{st} year rice and wheat, respectively. The highest moisture content in soil was obtained in a plot with treatment CE_6 in 1^{st} year crops, which was statistically at par with CE_5 and significantly higher than the rest of the treatments. The soil moisture content was recorded lowest under CE_1 in 1^{st} year rice and wheat,followed by treatment CE_2, which was significantly lower than partial and full conservation tillage i.e. CE_3 to CE_6. In 1^{st} rice, the CE_5 was significantly improved soil moisture content as compared to the treatments in partial conservation and conventional tillage (CE_1 to CE_4) while in 1st wheat, the soil moisture content of CE_5 was statistically at par with CE_4 whereas it was significantly higher than the CE_1 to CE_3 treatments.

During the second year of the study, the researchers looked at the moisture content of the soil again, and this time they found that the treatments of complete conservation with residue retention were statistically on par with the treatments of full conservation without residue in both crops. In the post-harvest soil of rice fields, the moisture content of the soil was statistically comparable across two treatments: partial conservation with residue incorporation and partial conservation without residue incorporation. Neither treatment involved complete removal of soil residue. While partial conservation of wheat crops by residue inclusion saw substantial improvement, this was not the case with other crop types. When compared to partial conservation

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without residue integration in post-harvest soil, the post-harvest soil's moisture content was measured. With the treatment CE_6, the soil moisture content reached its highest point (9.62%), which was 9.96% for wheat, whereas under the treatment CE_1, the soil moisture content reached its lowest point (6.78%), which was 7.42% for rice.

Soil pH

After going over the data in table 4.3, it was discovered that the treatments did not have a significant impact on the pH of the post-harvest soil in the experimental plots for rice and wheat.

Table 4. 3 .Effect of tillage and crop establishment practices space and soil moisture contect

Treatment	Pore space (%)				Soil moisture content (%)			
	2018-19		2019-20		2018-19		2019-20	
	Rice	Wheat	Rice	Wheat	Rice	Wheat	Rice	Wheat
CE_1	47.07	47.55	46.44	47.35	6.85	7.27	6.78	7.42
CE_2	47.50	47.34	46.77	47.53	7.23	7.71	7.19	7.91
CE_3	47.73	48.11	47.53	47.91	7.97	8.47	8.00	8.72
CE_4	48.11	48.29	48.28	48.29	8.25	8.57	8.30	8.83
CE_5	48.66	49.43	48.85	49.24	9.39	9.37	9.48	9.74
CE_6	49.05	49.43	49.24	49.62	9.48	9.57	9.62	9.96
S.Em (±)	NS	0.465	0.626	0.355	0.35	0.29	0.40	0.28
CD (*p=0.05*)	NS	1.361	1.832	1.038	1.04	0.84	1.18	0.82

While this was taking place, the pH of the soil in the first rice and wheat plots varied between 8.09 and 8.18 and 8.09 and 8.19, respectively. The treatment of full conservation tillage followed by full conservation tillage without crop residue in the first wheat crop resulted in the lowest pH readings recorded for the soil. This was followed by full conservation tillage in the first rice crop. Under the experimental plot that utilised conventional tillage, the higher pH value was measured in the soil throughout the duration of both crops.

During the second year of the experiment, the pH of the soil was altered to range anywhere from 8.04 to 8.19 and 8.06 to 8.19 Mg m^{-3} in the soils of rice and wheat

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crops, respectively. When compared to conventional tillage, full conservation tillage had the least significant effect on the soil pH, while partial conservation tillage was the most effective. After rice and wheat had been harvested, the CE1 treatment resulted in a pH of the soil that was 8.19 mg m^{-3}, which was not substantially higher than the pH of the soil obtained with any of the other tillage and crop establishment treatments.

Soil electrical conductivity

The data in table 4.4 were analysed, and the results revealed that the treatments did not have a significant impact on the electrical conductivity of the post-harvest soil in the rice and wheat experimental plots.

Rice's post-harvest soil had an electrical conductivity ranging from 0.26 to 0.29 dS m^{-1}, whereas wheat's post-harvest soil had an electrical conductivity ranging from 0.27 to 0.29 dS m^{-1} during the first year of the experiment. The treatment of complete conservation tillage in the first rice and wheat crop yielded the lowest recorded value of electrical conductivity in the soil in the field. However, this treatment did not considerably lag behind the other treatments in terms of its performance. The conventional tillage experimental field produced the highest value of soil electrical conductivity in both crops when compared to the other conditions tested.

Table 4. 4 Effect of tillage and crop establishment practices on soil pH and electrical conductivity

Treatment	Soil pH				Soil electrical conductivity (dS m^{-1})			
	2018-19		2019-20		2018-19		2019-20	
	Rice	Wheat	Rice	Wheat	Rice	Wheat	Rice	Wheat
CE_1	8.18	8.19	8.19	8.19	0.29	0.29	0.28	0.28
CE_2	8.15	8.17	8.15	8.16	0.28	0.30	0.27	0.27
CE_3	8.14	8.16	8.13	8.15	0.27	0.29	0.27	0.28
CE_4	8.12	8.13	8.09	8.12	0.26	0.28	0.26	0.27
CE_5	8.11	8.11	8.07	8.08	0.27	0.28	0.26	0.27
CE_6	8.09	8.09	8.04	8.06	0.26	0.27	0.26	0.26
S.Em (±)	0.06	0.05	0.08	0.07	0.02	0.01	0.01	0.02
CD ($p=0.05$)	NS	NS	NS	NS	NS	NS	NS	NS

despite several replications of each treatment, there were no discernible changes seen.

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According to the statistics on conductivity, the no-tillage system has the maximum electrical conductivity, while the traditional tillage method has the lowest level. This contrast can be seen when comparing the two systems.

CONCLUSIONS

The rice-wheat cropping system, often known as the RW cropping system, is one of the most important agricultural production systems found in the Indo-Gangetic Plains. However, following a tremendous increase in output as a result of a range of inputs that were employed and the adoption of improved agronomic methods that came about as a result of the green revolution, the viability of this system is currently in question. Rice and wheat farmed using traditional methods require a lot of resources—including money, water, and energy—to produce. When growing traditional rice, you need to do things like puddling and prepare the seedbed. This requires additional water and labour, and it also damages soil aggregates, which leaves the soil vulnerable to the oxidation of organic carbon. In compared to wheat that was produced after an unpuddled field, the yield of wheat that was grown after a field that had puddles and rice that had been transplanted was lower.

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