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Effect of Chemical Fertilizer and organic manure on growth attributes of maize (*Zea mays* L.)

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Abstract
The present study was carried out during Kharif seasons of 2020-21 and 2021-22 at the Agronomy Research Station and in the laboratory of the College of Agriculture, Bhagwant University, Ajmer, (Rajasthan) India. The soil was low in available nitrogen (195 kg ha^{-1}) and phosphorus (18.5 kg ha^{-1}) and medium in available potassium (229 kg ha^{-1}). Average values for bulk density 1.41 g cc^{-1} and EC were 0.346 ds m^{-1}. Crop response to the treatments was measured in terms of various quantitative and qualitative parameters. For this purpose periodical observation on crop growth characters i.e. plant height, dry matter accumulation and number of leaf was recorded at 25, 50, 75 DAS and at harvest, while leaf area index and chlorophyll content recorded at 25, 50 and 75 DAS and developmental characters 50% days to tasseling and silking was recorded. Yield attributes (final plant stand, cob $plant^{-1}$, cob length, cob girth, number of grains row $cobs^{-1}$, number of grain $rows^{-1}$, grains cob^{-1} , kernel weight $cob^{-}1$, test weight (gram), yield (grain yield, stover yield and biological yield) and harvest index (%) were recorded at harvest of crop. Similarly N, P and K content and their uptake by grain and stover were estimated. Consumptive use of water, rate of water use and water use efficiency was worked out by adopting standard procedure. Economics of the treatments under study was calculated as per the local market price. Energy parameters were estimated by adopting standard procedure. Standard field techniques, methods of observation, analysis of soil and plant samples and appropriate statistical methods for the analysis of data were used.

***Key wards**: Chemical Fertilizer, Organic manure, Growth attributes.*

I. Introduction

Maize (*Zea mays* **L**.) is the world's most important food crop grown in diverse seasons and different ecosystem. It is known as queen of cereals because of its maximum genetic yield potential among food grain. It is also an important industrial raw material and provides opportunity for value addition. It cultivated an area of 9.26 m ha with 16.72 m t production and 3024 kg/ha productivity (Anonymous, 2022). Maize is important source of many industrial products such as corn sugar, corn oil, corn flour, starch, syrup, brewer's grit and alcohol. The increase demand in industrial use of maize as bio-fuel production is likely to create an extra demand for maize in the upcoming decades. With the increase in industrial demand and value-added foods for a growing economy and population, maize would continue to hold its share as a significant crop.

Maize is mainly cultivated in *kharif* season. Rainfall is the major source of moisture to *kharif* maize crops in rainfed conditions but the major constraint is the vagaries of monsoon. Due to moisture stress productivity of maize is reduced (Rana *et al*., 2006) and this could be achieved by conservation of soil moisture and management of other production factors. Therefore, the need for moisture conservation becomes an integral component to embark uponthrough following practice like mulching.

Maize is an exhaustive crop requires large amount of nutrients to gain its full yield potential. In order to meet the nutrient demand of crop farmers are applying a large quantity of imbalanced dose of chemical fertilizers which have a negative effecton soil health, crop yield and also contribute significantly to pollution.

The uptake and partitioning of nutrients to different plant parts depends basically on the fertility status of soil, amount of fertilizers applied, the growth stage of plant, and environmental conditions. In recent past there is a decline in potential factor productivity, even the optimum dose of N, P and K application are failed to maintain the yield level. To sustain the productivity there is a need for nutrient application. But it is observed that continuous use of higher dose of chemical fertilizers alone is not advantageous and leads to a decline pattern in productivity. On this condition, organic source of fertilizers plays a major solution and continuous use of this leads to enhanced soil humus and soil beneficial microbes besides, improving the soil physical properties and moreover, increases availability of nutrient and use efficiency by regulating the supply of nutrients. But the application of organics alone does not generate spectacular increment in crop yields, because of their low nutrient content while wise mix of natural and inorganic fertilizers assists with keeping up soil health and crop productivity (Kumar *et al.,* 2007).

II. Materials and Methods

The present study was carried out at the Agronomy Research Station and in the laboratory of the College of Agriculture, Bhagwant University, Ajmer, (Rajasthan) India, during 2020- 21 and 2021-22.

The experiment was laid out in a split-plot design with three replications. The mulching treatments were kept in main plots and integrated nutrient management was assigned to sub-plots. The treatments consisted of three mulching treatments *viz.* M_1-control (no mulch), M_2- dust mulch and M_3- rice straw mulch (7 t ha^{-1}) in the main plots and five integrated nutrient management levels (S_1- 100% RDF, S_2- 75% RDF + 25% N through poultry manure, S_3- 100% RDF + 25% N through poultry manure, S_4- 75% RDF + 25% N through FYM and S_5- 100% RDF + 25% N through FYM) in sub plots. The experiment was replicated thrice. RDF use at the rate of 150 kg N 60 kg P and 60 kg K hai^{-1}. Maize variety 'K-99' was sown at row distance of 60x20 cm.

III. Result and Discussion

The plant height of maize progressively increased with the development of crop. However, there was an increasing trend of plant height upto harvest. Higher plant height was noted under dust mulch this might be due to the easily available of soil moisture which helps to develop favorable environment for root development and improve micro environment for their growth during both the years of experimentation. Dry matter accumulation, leaf area index, number of leafs, chlorophyll content, crop growth rate and relative growth rate also recorded highest in dust mulch.

Dust mulch particularly restricts the evaporation of water from soil surface to atmosphere, which ultimately increase the availability of soil water to the crops resulting better growth and development of crop as reported by Kadu *et al*. (2014) and Verma *et al*. (2017). Jain *et al.* (2017) observed that significantly increase the crop growth parameters when sufficient moisture is present in soil. Among the Integrated nutrient management practices, higher plant height, number of leafs, LAI, dry matter accumulation and other growth characters were recorded under 100% RDF + 25% N through poultry manure followed by 100% RDF + 25% N through FYM and lowest values of growth parameters were recorded under 100% RDF. This may be due to appropriate availability of macro and micro nutrients. Adoption of nutrient management in integrated manner will helps to sustain soil fertility which leads to enhance the crop growth parameters.

This is due to the utilization of applied nutrients by crops. Integrated nutrient management practices in maize increases the vegetative growth upto the harvest which had been reported by several workers Pinjari, (2007), Enujeke (2013) and Anjum *et al*. (2017). Khandelwal *et al.* (2017) reported that application of 50% RDF + 50% poultry manure recorded significantly highest plant height, and dry matter accumulation plant-1 as compared to other treatments.

Plant height (cm)

Mulching and integrated nutrient management showed significant variation in plant height during both the years of experimentation are given in Table 1. A perusal of data showed that comparatively taller plant in 2021-22 than 2020-21. Maximum plant height was recorded under dust mulch (216 and 216.6), which was statistically at par with rice straw mulch (206.1 and 206.7) and significantly superior over control (no mulch) (190 and 190.9), respectively at all stages of crop growth except 25 DAS, during both the years.

Among integrated nutrient management practices, had application of 100% RDF + 25 % N through poultry manure (217.3 and 218.2) was recorded significantly tallest plant over 75% RDF + 25 % N through poultry manure (201.8 and 202.3),75% RDF + 25 % N through FYM (195.4 and 196.4), 100% RDF (193.4 and 194.0) and it were statistically at par with 100% RDF + 25 % N through FYM (212.0 and 212.8), respectively at all the stages of crop growth except 25 DAS, during both the year of experimentation. The interaction effect of mulching and integrated nutrient management practices on plant height was found to be non- significant during both the years of study.

Number of leaf ($plant^{-1}$)

The data on the number of leaf $plant^{-1}$ as influenced by mulching and integrated nutrient management are given in Table 2. The data indicates that in general, there was an increase in the number of leaf $plant^{-1}$ up to 75 DAS, irrespective of treatments and thereafter, a gradual reduction in number of leaf $plant^{-1}$were recorded till harvest stage of the crop. It is also clear from the data that mulching and integrated nutrient management have significant influence on the number of leaf $plant^{-1}$ at all the growth stage except 25 DAS during both the years. The number of leaf plant-1was comparatively higher in second year as compared to first year.

Data further reveals that dust mulch (9.53 and 10.18) recorded significantly maximum number of leaf plant-1as compared to no-mulch (7.54 and 7.95) and it were at par with rice straw mulch (8.97 and 9.49), respectively at all the stages of crop growth during both the year of study except 25 DAS.

Application of 100% RDF + 25 % N through poultry manure (9.50 and 10.05) was recorded maximum number of leaf $plant^{-1}$and it were statistically at par with 100% RDF + 25 % N through FYM (9.23 and 9.87) and significant superior over 75% RDF + 25 % N through poultry manure (8.62 and 9.10), 75% RDF + 25 % N through FYM (8.16 and 8.70), 100% RDF (7.89 and 8.33), respectively at all the stages of crop growth during both the years. Interaction effect of mulching and integrated nutrient management practices on number of leaf plant^{-1} was found to be non- significant at all the stages of crop growth during both the years.

Dry matter accumulation (g plant^{-1})

It is apparent from the data Table 3 that mulching and integrated nutrient management practices had significant influence on dry mater accumulation (g plant^{-1}) at all the crop growth stages except at 25 DAS during both the years of experimentation.

Maximum dry mater accumulation was recorded under dust mulch (1154.9 and 1161.4) fallowed by rice straw mulch (1055.9 and 1069.4) and significantly lowest under no mulch (967.9 and 973.8), respectively at all the stages of crop growth during both the years of experiment. A close scanning of the data showed that among integrated nutrient management practices, application of 100% RDF + 25 % N through poultry manure was recorded significantly the highest dry mater accumulation (1210.9 and 1221.1) which was superior over 75% RDF + 25 % N through poultry manure (1032.9 and 1042.0), 75% RDF + 25% N through FYM (979.3 and 989.3), 100% RDF (955.2 and 963.2) and it were at par with 100% RDF + 25 % N through FYM (1119.4 and 1125.4), respectively at all the stages of crop growth during both the year of study. Interaction effect of mulching and integrated nutrient management on dry matter accumulation was found significant at harvest (Table 4.3). Dust mulch was recorded significantly highest dry matter accumulation along with the application of 100% RDF + 25 % N through poultry manure over other treatment combinations during both the years of experiment.

Leaf area index

Mulching and integrated nutrient management significant influenced the leaf area index during both the years (Table 4). It is obvious from the data that leaf area index was increase progressively and reaches maximum at 75 DAS.

Among mulching treatments, dust mulch recorded significantly highest leaf area index over control (no mulch) (3.72 and 3.86) and it was at par with rice straw mulch (4.16 and 4.33), respectively at all stages of crop growth except 25 DAS during both the years of study. A perusal of data revealed that, application of 100% RDF + 25 % N through poultry manure (4.38 and 4.57) was found significantly superior over 75% RDF + 25 % N through poultry manure (4.10 and 4.26), 75% RDF + 25 % N through FYM (3.84 and 3.96), 100% RDF (3.77 and 3.93) and it were at par with 100% RDF + 25 % N through FYM (4.17 and 4.30), respectively at all the stages of crop growth except 25 DAS during both the years of experimentation. Interaction effect of mulching and integrated nutrient management on leaf area index was found to be non-significant during both the years.

Chlorophyll content (SPAD value)

Data related to chlorophyll content as influenced by mulching and integrated nutrient management are presented in Table 5. It is clear from data that mulching and integrated nutrient management practices have significant influence on chlorophyll content at all stages of crop growth except 25 DAS during both the years of study.

Data further reveals that dust mulch (45.2 and 45.4) was recorded significantly highest chlorophyll content as compared to control (no mulch) (39.7 and 39.9) and it were at par with rice straw mulch (42.2 and 42.5), respectively at all stages of crop growth during both the year of experiment.

A perusal of data indicated that all the integrated nutrient management treatment recorded highest chlorophyll content as compared to 100% RDF at all the crop stages during both the years of investigation. It is clear from the data that, application of 100% RDF + 25 % N through poultry manure (46.5 and 46.9) was recorded significantly maximum chlorophyll content as compared to 75% RDF + 25 % N through poultry manure (42.3 and 42.4), 75% RDF + 25 % N through FYM (40.0 and 40.2), 100% RDF (38.5 and 38.7) and it were at par with 100% RDF + 25 % N through FYM (44.6 and 44.9), respectively at all the stages of crop growth during both the years of study. Interaction effect of crop mulching and integrated nutrient management practices on chlorophyll content was found to be non-significant during both the years.

Crop growth rate (g m^{-2}day^{-1})

It is apparent from the data Table 6 that mulching and integrated nutrient management practices had significant influence on crop growth rate (g m^{-2} day^{-1}) during both the years of experimentation. Dust mulching was recorded significantly maximum crop growth rate (10.75 and 10.72) over control (no mulch) (7.60 and 7.65) and it remained statistically at par with rice straw mulch (8.11 and 8.33), respectively at all the stages of crop except 25 DAS during both the years of investigation.

Among integrated nutrient management treatments, significantly maximum crop growth rate was recorded with the application of 100% RDF + 25 % N through poultry manure (11.74 and 11.88) compared to 75% RDF + 25 % N through poultry manure (7.91 and 7.97), 75% RDF + 25 % N through FYM (7.58 and 7.73), 100% RDF (7.31 and 7.41) and it were at par with 100% RDF + 25 % N through FYM (9.56 and 9.51), respectively at all the stages of crop growth except 25 DAS during both the years of study. The interaction effect of mulching and integrated nutrient management on crop growth rate was found to be nonsignificant during both the years of investigation.

Relative growth rate (g g^{-1}day^{-1})

Data in respect to relative growth rate as influenced by mulching and integrated nutrient management practices are presented in Table 7. An estimation of data revealed that mulching and integrated nutrient management caused non-significant variation in the relative growth rate at all the stages of crop growth during both the years of study.

Amongst mulching treatments, dust mulch (0.01033 and 0.01024) recorded maximum relative growth rate, followed by rice straw mulch (0.00856 and 0.00868) and control (no mulch) (0.00876 and 0.00877), respectively during both the years of investigation. Application of 100% RDF + 25 % N through poultry manure (0.01087 and 0.01091) recorded maximum relative growth rate followed by 100% RDF + 25% N through FYM (0.00956 and 0.00947), 75% RDF + 25% N through poultry manure (0.00852 and 0.00851), 75% RDF + 25% N through FYM (0.00863 and 0.00872) and lowest under 100% RDF (0.00850 and 0.00855), respectively during both the years of study. A close analysis of the data further revealed that maximum relative growth rate was estimated during the second year as compared to first year. The interaction effect between and integrated nutrient management on relative growth rate was found to be non-significant during both the years of investigation.

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Table 1: Effect of Mulching and Integrated Nutrient Management on Plant Height

Treatments	25 DAS		50 DAS		75 DAS		At harvest	
	2020-21	2021-22	2020-21	2021-22	2020-21	2021-22	2020-21	2021-22
Mulching								
M_1 : Control (No mulch)	59.3	61.3	151.3	152.0	182.2	183.0	190.0	190.9
M_2 : Dust mulch	63.0	63.8	171.2	172.1	209.3	210.1	216.0	216.6
M_3 : Rice straw mulch	61.7	62.8	165.8	166.8	196.8	197.5	206.1	206.7
SEm±	1.8	1.7	3.3	3.2	4.4	4.5	4.8	4.7
CD (p=0.05)	**NS**	**NS**	**12.8**	**12.6**	**17.4**	**17.5**	**18.9**	**18.6**
Integrated Nutrient Management								
S_1:100% RDF	57.4	58.6	148.8	149.6	185.9	186.8	193.4	194.0
S_2:75% RDF + 25 % N through poultry manure	61.8	63.1	162.3	163.2	188.3	188.9	201.8	202.3
S_3: 100% RDF + 25 % N through poultry manure	64.6	66.0	178.3	179.0	210.2	211.0	217.3	218.2
S_4: 75% RDF + 25 % N through FYM	58.6	60.4	153.4	154.4	187.4	187.9	195.4	196.4
S_5: 100% RDF + 25 % N through FYM	64.2	65.0	171.1	171.8	208.6	209.7	212.0	212.8
SEm±	2.0	1.9	3.6	3.5	5.5	5.1	5.8	5.5
CD (p=0.05)	**NS**	**NS**	**10.7**	**10.3**	**16.1**	**14.9**	**17.0**	**16.1**

Table 2: Effect of Mulching and Integrated Nutrient Management on Number of Leaf per Plant

Treatments	25 DAS		50 DAS		75 DAS		At harvest	
	2020-21	2021-22	2020-21	2021-22	2020-21	2021-22	2020-21	2021-22
Mulching								
M_1 : Control (No mulch)	7.41	7.75	10.21	10.58	9.22	9.66	7.54	7.95
M_2 : Dust mulch	8.29	8.68	11.60	11.97	10.62	11.23	9.53	10.18
M_3 : Rice straw mulch	7.89	8.01	11.20	11.66	10.11	10.63	8.97	9.49
SEm±	0.20	0.22	0.19	0.16	0.26	0.26	0.38	0.27
CD (p=0.05)	**NS**	**NS**	**0.76**	**0.64**	**1.01**	**1.03**	**1.48**	**1.07**
Integrated Nutrient Management								
S_1:100% RDF	7.42	7.71	9.98	10.34	9.18	9.64	7.89	8.33
S_2:75% RDF + 25 % N through poultry manure	7.89	8.16	10.97	11.41	10.06	10.51	8.62	9.10

S_3: 100% RDF + 25 % N through poultry manure	8.33	8.64	11.98	12.31	10.54	11.12	9.50	10.05
S_4: 75% RDF + 25 % N through FYM	7.50	7.83	10.34	10.83	9.60	10.11	8.16	8.70
S_5: 100% RDF + 25 % N through FYM	8.18	8.38	11.74	12.14	10.52	11.14	9.23	9.87
SEm±	0.25	0.24	0.14	0.15	0.29	0.25	0.27	0.21
CD (p=0.05)	**NS**	**NS**	**0.41**	**0.45**	**0.85**	**0.74**	**0.80**	**0.60**

Table 3: Effect of Mulching and Integrated Nutrient Management on Dry Matter Accumulation (g m^{-2})

Treatments	25 DAS		50 DAS		75 DAS		At harvest	
	2020-21	**2021-22**	**2020-21**	**2021-22**	**2020-21**	**2021-22**	**2020-21**	**2021-22**
Mulching								
M_1 : Control (No mulch)	356.4	359.3	521.7	525.7	777.8	782.5	967.9	973.8
M_2 : Dust mulch	375.7	377.4	596.3	602.5	886.2	893.4	1154.9	1161.4
M_3 : Rice straw mulch	365.7	373.2	570.2	578.6	853.1	861.1	1055.9	1069.4
SEm±	7.5	7.4	12.5	13.9	16.0	16.2	18.4	17.1
CD (p=0.05)	**NS**	**NS**	**49.2**	**54.5**	**63.0**	**63.6**	**72.1**	**67.1**
Integrated Nutrient Management								
S_1:100% RDF	352.1	358.1	514.7	520.4	772.5	777.9	955.2	963.2
S_2:75% RDF + 25 % N through poultry manure	363.9	364.5	561.6	568.5	835.2	842.7	1032.9	1042.0
S_3: 100% RDF + 25 % N through poultry manure	384.3	387.1	616.8	623.7	917.5	924.2	1210.9	1221.1
S_4: 75% RDF + 25 % N through FYM	357.1	361.4	528.9	533.9	789.7	796.0	979.3	989.3
S_5: 100% RDF + 25 % N through FYM	372.3	378.7	591.8	598.0	880.3	887.6	1119.4	1125.4
SEm±	8.3	7.5	13.7	13.2	19.0	18.6	21.9	21.5
CD (p=0.05)	**NS**	**NS**	**39.9**	**38.5**	**55.4**	**54.3**	**64.0**	**62.8**

Table 4: Effect of Mulching and Integrated Nutrient Management on Leaf Area Index

Treatments	25 DAS		50 DAS		75 DAS	
	2020-21	**2021-22**	**2020-21**	**2021-22**	**2020-21**	**2021-22**
Mulching						
M_1 : Control (No mulch)	1.43	1.46	2.97	3.08	3.72	3.86
M_2 : Dust mulch	1.57	1.59	3.27	3.39	4.27	4.43
M_3 : Rice straw mulch	1.49	1.53	3.18	3.37	4.16	4.33

SEm±	0.03	0.03	0.04	0.04	0.10	0.11
CD (p=0.05)	**NS**	**NS**	**0.16**	**0.16**	**0.41**	**0.45**
Integrated Nutrient Management						
S_1:100% RDF	1.44	1.47	2.86	2.96	3.77	3.93
S_2:75% RDF + 25 % N through poultry manure	1.49	1.52	3.14	3.27	4.10	4.26
S_3: 100% RDF + 25 % N through poultry manure	1.56	1.59	3.38	3.53	4.38	4.57
S_4: 75% RDF + 25 % N through FYM	1.46	1.48	3.00	3.18	3.84	3.96
S_5: 100% RDF + 25 % N through FYM	1.54	1.57	3.32	3.47	4.17	4.30
SEm±	0.04	0.03	0.04	0.04	0.11	0.12
CD (p=0.05)	**NS**	**NS**	**0.12**	**0.12**	**0.33**	**0.34**

Table 5: Effect of Mulching and Integrated Nutrient Management on Chlorophyll Content (Spad Value)

Treatments	**25 DAS**		**50 DAS**		**75 DAS**	
	2020-21	**2021-22**	**2020-21**	**2021-22**	**2020-21**	**2021-22**
Mulching						
M_1 : Control (No mulch)	31.8	32.9	42.3	42.4	39.7	39.9
M_2 : Dust mulch	35.7	36.9	48.3	48.7	45.2	45.4
M_3 : Rice straw mulch	33.7	34.0	46.2	46.2	42.2	42.5
SEm±	0.9	1.0	1.0	1.0	1.0	1.0
CD (p=0.05)	**NS**	**NS**	**3.9**	**3.9**	**3.8**	**3.9**
Integrated Nutrient Management						
S_1:100% RDF	32.4	33.1	41.6	41.8	38.5	38.7
S_2:75% RDF + 25 % N through poultry manure	33.4	34.7	45.3	45.6	42.3	42.4
S_3: 100% RDF + 25 % N through poultry manure	35.4	36.0	50.2	50.5	46.5	46.9
S_4: 75% RDF + 25 % N through FYM	32.7	33.5	43.0	43.2	40.0	40.2
S_5: 100% RDF + 25 % N through FYM	34.8	35.8	47.8	47.9	44.6	44.9
SEm±	0.9	0.8	1.2	1.1	1.0	1.0
CD (p=0.05)	**NS**	**NS**	**3.4**	**3.1**	**2.8**	**2.9**

Table 6: Effect of Mulching and Integrated Nutrient Management on Crop Growth Rate (g $m^{-2}day^{-1}$)

Treatments	0-25 DAS		25-50 DAS		50-75 DAS		75-At harvest	
	2020-21	2021-22	2020-21	2021-22	2020-21	2021-22	2020-21	2021-22
Mulching								
M_1 : Control (No mulch)	14.26	14.37	6.61	6.66	10.24	10.27	7.60	7.65
M_2 : Dust mulch	15.03	15.10	8.83	9.00	11.60	11.64	10.75	10.72
M_3 : Rice straw mulch	14.63	14.93	8.18	8.22	11.32	11.30	8.11	8.33
SEm±	0.30	0.30	0.20	0.26	0.15	0.11	0.11	0.11
CD (p=0.05)	**NS**	**NS**	**0.80**	**1.03**	**0.59**	**0.43**	**0.41**	**0.44**
Integrated Nutrient Management								
S_1:100% RDF	14.08	14.32	6.51	6.49	10.31	10.30	7.31	7.41
S_2:75% RDF + 25 % N through poultry manure	14.56	14.58	7.91	8.16	10.94	10.97	7.91	7.97
S_3: 100% RDF + 25 % N through poultry manure	15.37	15.48	9.30	9.47	12.03	12.02	11.74	11.88
S_4: 75% RDF + 25 % N through FYM	14.29	14.45	6.87	6.90	10.43	10.48	7.58	7.73
S_5: 100% RDF + 25 % N through FYM	14.89	15.15	8.78	8.77	11.54	11.58	9.56	9.51
SEm±	0.33	0.30	0.25	0.27	0.31	0.30	0.22	0.24
CD (p=0.05)	**NS**	**NS**	**0.73**	**0.79**	**0.89**	**0.88**	**0.65**	**0.69**

Table 7: Effect of Mulching and Integrated Nutrient Management on Relative Growth Rate (g $g^{-1}day^{-1}$)

Treatments	25-50 DAS		50-75 DAS		75 - At harvest	
	2020-21	2021-22	2020-21	2021-22	2020-21	2021-22
Mulching						
M_1 : Control (No mulch)	0.0152	0.0151	0.0160	0.0160	0.00876	0.00877
M_2 : Dust mulch	0.0184	0.0187	0.0159	0.0158	0.01033	0.01024
M_3 : Rice straw mulch	0.0176	0.0174	0.0161	0.0159	0.00856	0.00868
SEm±	0.0001	0.0003	0.0002	0.0003	0.00020	0.00023
CD (p=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Integrated Nutrient Management						
S_1:100% RDF	0.0151	0.0149	0.0163	0.0161	0.00850	0.00855
S_2:75% RDF + 25 % N through poultry manure	0.0172	0.0177	0.0159	0.0158	0.00852	0.00851

S_3: 100% RDF + 25 % N through poultry manure	0.0189	0.0190	0.0159	0.0157	0.01087	0.01091
S_4: 75% RDF + 25 % N through FYM	0.0157	0.0155	0.0161	0.0160	0.00863	0.00872
S_5: 100% RDF + 25 % N through FYM	0.0185	0.0182	0.0159	0.0158	0.00956	0.00947
SEm±	0.0003	0.0004	0.0004	0.0003	0.00027	0.00029
CD (p=0.05)	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**