

Effect of tillage practices and fertility-fertilization levels on nutrient uptake and content in grain and straw of wheat under rice-wheat cropping system

Abstract

The present investigation entitled “Effect of tillage practices and fertility-fertilization levels and yield of wheat in rice-wheat cropping system” was conducted at Agronomy Research Farm, CSAUAT, during *rabi* 2021-22 and 2022-23. The experiment was laid out into Split plot design with three replication replicates. The parameters were observed plant *viz.* N-nitrogen content in grain and straw (%), N-nitrogen uptake in grain and straw (kg ha^{-1}), P-phosphorus content in grain and straw (%), P-phosphorus uptake in grain and straw (kg ha^{-1}), K-potassium content in grain and straw (%), K-potassium uptake in grain and straw (kg ha^{-1}). Basis on the pooled data the results of study revealed that in case of tillage practices maximum nitrogen content in grain and straw (1.80 and 0.53 %), Nitrogen uptake in grain and straw (93.34 and 36.26 kg ha^{-1}). Phosphorus content in grain and straw (0.31 and 0.20 %) Phosphorus uptake in grain and straw (16.23 and 13.80 kg ha^{-1}), Potassium content in grain and straw (0.42 and 1.38 %), Potassium uptake in grain and straw (22.15 and 93.88 kg ha^{-1}) respectively was reported in conventional tillage whereas in case of various fertility levels maximum nitrogen content in grain and straw (1.83 and 0.59 %), Nitrogen uptake in grain and straw (100.31 and 35.06 kg ha^{-1}). Phosphorus content in grain and straw (0.35 and 0.25 %) Phosphorus uptake in grain and straw (18.16 and 16.63 kg ha^{-1}) respectively, Potassium content in grain and straw (0.45 and 1.41 %), Potassium uptake in grain and straw (24.97 and $101.03 \text{ kg ha}^{-1}$) respectively with the application of 125% RDF + tebunconazole.

Keywords: *Conventional tillage, Flag leaf stage, Nutrient uptake and Tebunconazole, Tillage practices, fertilization levels, rice, wheat, growth stages, cropping system, India*

1. Introduction

Wheat (*Triticum aestivum* L.), being an important prehistoric crop, is backbone of our national food security system. The idiom “Dal roti chalna” itself realized its significance in our livelihood. Its straw is accounted as a major feed to a large number of cattle. Thus, among the food grains, wheat is the richest source of protein and it stands at second place after pulses. It is utilized for bread, cakes, cookies, noodles, petri products and chapatti etc. Wheat grains contains starch 60-68%, protein 8-15%, fat 1.5-2.0%, cellulose 2.0-2.5%, and minerals 1.5-2.0% (Kumar *et al.* 2019).

Wheat (*Triticum aestivum* L.) crop contributes substantially to the national food

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security by providing more than 50 % of the calories to the people who mainly depend on it. Its grains contain starch 60-68%, protein 8-15%, fat 1.5-2.0%, cellulose 2.0-2.5%, and minerals 1.5-2.0% (Kumar *et al.*, 2019). As such, wheat provides a major source of energy requirement of human diet and animal feed across the world. Globally, wheat is broadly cultivated across the world and China is the first producer of this cereal followed by India, approximately 224 million hectares with an average annual global production of about 775.8 million metric tonnes. The largest producer of wheat in the world is the European Union followed by China, India and United States of America. Like wheat, rice is also a cereal and it largely grows across the world and China is the first producer followed by India. Rice is one of the major contributors to the food grain production contributing approximately 43 per cent of the total food grain production in India (Mondalet *al.*, 2020). Rice grains contain 80% carbohydrates, 7-8% protein, 3% fat, and 3% fiber (reference). India, being blessed and enriched with a diverse agro-ecological conditions, ensuring food and nutritional security to a majority of the Indian population through production and steady supply particularly in the recent past, is the second largest producer of wheat worldwide. In India, wheat is grown on 33.64 million hectares area with 107.59 million tons production and 3206.30 kg ha⁻¹ productivity during 2019-20 (Directorate of Economics and Statistics). The entire wheat growing area of the country has been categorized into 6 major zones. The highest area of wheat cultivation is occurred in North Western Plain Zone (NEPZ). Wheat is cultivated in all states of India except Kerala. Uttar Pradesh is major wheat growing State of India. In Uttar Pradesh wheat is grown in 9.85 million hectares area with 35.50 million tonnes production followed by Madhya Pradesh (area 6.39 million hectares and production 17.17 million tonnes) and Punjab (area 3.5 million hectares and production 17.14 million tonnes) respectively. The global demand of wheat will increase to about 900 million tons of wheat by the year 2050. It has been estimated that India will need at least 140 million tonnes of wheat by 2050 as against present estimated production of 109.24 million tonnes. The world acreage under wheat crop accounts 216.18 million ha producing 763.6 million metric tonnes with an average of 3530 kg ha⁻¹. In India, it covers 29.32 million ha producing 103.6 million metric tonnes, one third of the total food grain production, with an average productivity of 3530 kg ha⁻¹. The current world population of 7.7 billion is expected to reach 9.7 billion by 2050. India is the second most populous country (1.3 billion) after China (1.41 billion) and expected to surpass that of China by touching a peak of 1.7 billion by 2050 (Karet *al.*, 2021). Accordingly, wheat is likely to continue to be vital in ensuring food security across the globe. Uttar Pradesh is India's biggest wheat growing state with 9.65 million hectares (36.6%), 26.87 million tonnes (39.3%), and a productivity of 2785 kg ha⁻¹ (Anonymous,

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~~2019). In Asia about 90% of the world's rice is grown and produced in 142 million ha area with the production of 622 million tons (Rashid *et al.*, 2012). Rice is one of the major contributors to the food grain production contributing approximately 43 per cent of the total food grain production in India (Mondal *et al.*, 2020). In India, rice is cultivated in an area of 44.38 million hectares with a production of 104.31 million tons. The country has to produce about 130 million tons of rice by 2025 to meet the food requirement of the growing population. Over 2 billion people in Asia alone derive 80% of their energy needs from rice which contains 80% carbohydrates, 7-8% protein, 3% fat, and 3% fiber. The export destinations are Middle East countries, Malaysia, Korea, Japan, Australia, U.S.A, Canada, U.K., Italy and Sweden. The demand of Aromatic rice for internal consumption and also for export is increasing day by day (Ankit *et al.* 2022). Aromatic Rice emit specific aroma in field, at harvestings, in storage, during milling cooking and eating (Rajeev *et al.* 2014). Aroma development influenced by both genetic and environment factors. It is known that aroma is best developed when aromatic rice is grown in areas where temperature is cooler during flowering/maturity. Nearly two third of basmati rice produced in India is exported. Basmati rice is the leading aromatic fine quality rice of the world trade and it fetches export price in the international market. In fact, Basmati rice is a gift from "Mother Nature" to the Indian sub continent and grows in the Indo Gangetic plain only. There are known 23 varieties of basmati rice up to 2015, which have been approved under the Seeds Act, 1966. India is the largest producer and exporter of basmati rice in the world (Shoomro *et al.*, 1999). India produce more than 70% of the total world basmati rice production and the rest is produced by Pakistan. The production of Basmati rice in India is 8.7 million tonnes from 2.1 Million hectares during 2014-15. Generally, conventional tillage aims at reversing and stirring a deep layer of soil; incorporating and destroying plant debris; exposing soil pests to sunshine for control; lump breaking and ground leveling. Conventional tillage involves many mechanical operations starting with deep ploughing, deep discing, ripping, shallow tyne workings, and fine seedbed preparation after the harvesting of different grain crops, in both winter and summer production seasons. Thereafter, a fallow period is given to enable moisture capture before the planting of the next crop. This approach results in a bare soil surface exposed to wind and water erosion and high compaction after heavy rains which then needs to be loosened again to assist in weed control and to promote moisture absorption from subsequent rainfalls. Reduced tillage is designated as full-width tillage that disturbs the entire soil surface, leaving 15% to 30% of residue cover after planting. Other conservation tillage practices in the inland PNW include minimum tillage, delayed minimum tillage, under cutter fallow, chisel, discs, and sweep tillage systems. The under cutter method of fallow management uses wide V blade sweeps that slice beneath the soil~~

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Days) and flag leaf stage (80 DAS). (F66) (RDF (150:60:40 NPK kg/ha) + Two Spray of tebuconazole (Folicur 430 SC @ 0.1%) at first node and flag leaf stage (80 DAS). (F77) (75 % RDF (112.5:45:30 NPK kg/ha + 10t FYM/ha + Two Spray of Chloromequat chloride (Lihocine 0.2% at first node (45 DAS) and flag leaf stage (80DAS). (F88) (75 % RDF (112.5:45:30 NPK kg/ha + 10t FYM/ha + Two Spray to tebuconazole (Folicur 430SC @0.1% at first node and flag leaf stage (80DAS). (F99) (125% RDF (187.5:75:50 NPK kg/ha+ Two Spray of Chloromequat chloride (Lihocine 0.2% at first node (45 DAS) and flag leaf stage (80DAS). and (F1049) (125 % RDF (187.5:75:50 NPK kg/ha + Two Spray of tebuconazole (Folicur 430SC @ 0.1% (Folicur430 SC @ 0.1 % at first node and flag Leaf (80DAS)). These fertilization levels were randomly allocated to sub plots.

Standard culture practices recommended for Wheat was followed uniformly in all experimental plots.

2.3. N, P & K content and uptake in grain and straw of straw wheat

Grain uptake (kg ha⁻¹) = Grain yield (q ha⁻¹) × Nutrient content (%) in grain

Straw uptake (kg ha⁻¹) = Straw yield (q ha⁻¹) × Nutrient content (%) in straw

2.4. Statistical analysis

3. Results and Discussion

3.1. Nitrogen content in grain and straw (%)

The data of nitrogen content in grain was not significantly affected but in straw was significantly influenced by tillage practices and fertility fertilization levels. The grain have highest higher amount of nitrogen content than straw. The maximum nitrogen content in grain was recorded in the conventional tillage practice (1.80 and 1.76 %) followed by the reduced tillage (1.77 and 1.75%) and maximum nitrogen content in straw was recorded in conventional tillage (0.53 and 0.50 %) followed by reduced tillage (0.51 and 0.48%) during 2021-22 and 2022-23 year of study. Among fertility fertilization levels, The highest nitrogen content in grain (1.83 and 1.80%) and straw (0.59 and 0.56 %) were recorded in 125% RDF+ tebuconazole and it was at par with 125% RDF+ chloromequat chloride (1.82 and 1.79%) and (0.57 and 0.54 %) in grain and straw respectively. The minimum nitrogen content in grain (1.73 and 1.69%) and straw (0.47 and 0.45%) were recorded in the control and interaction in nitrogen content in grain and straw between tillage practices and fertility fertilization levels during both year of experimentation. These results also confirms the findings of Verma *et al.* (2006) and Kacharoo and Razdan (2006)

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3.2. Nitrogen uptake in grain and straw (kg ha^{-1})

The data of nitrogen uptake in grain was not significantly affected but in straw was significantly influenced by tillage practices and fertility levels. The grain has the highest amount of nitrogen uptake than straw. The maximum nitrogen uptake in grain was recorded in the conventional tillage practice (93.34 and 89.44 kg ha^{-1}) followed by the reduced tillage (88.69 and 85.56 kg ha^{-1}) and maximum nitrogen uptake in straw was recorded in conventional tillage (36.26 and 33.90 kg ha^{-1}) followed by reduced tillage (34.51 and 32.13 kg ha^{-1}) during 2021-22 and 2022-23 year of study. Among fertility-fertilization levels, the highest nitrogen uptake in grain (100.31 and 97.38 kg ha^{-1}) and straw (35.06 and 38.67 kg ha^{-1}) were recorded in 125% RDF + tebuconazole and it was ~~atpar~~ with 125% RDF + chloromequat chloride (98.89 and 95.57 kg ha^{-1}) and (40.36 and 37.88 kg ha^{-1}) in grain and straw respectively. The minimum nitrogen uptake in grain (78.40 and 75.01 kg ha^{-1}) and straw (29.77 and 29.61 kg ha^{-1}) were recorded in the control. There were no significant interaction in nitrogen uptake in grain and straw between tillage practices and fertility-fertilization levels during both years of experimentation. The consequences of the current investigation are additionally in concurrence with the investigation of Gholami *et al.* (2014), and Shri *et al.*, (2021).

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3.3. Phosphorus content in grain and straw (%)

The data of phosphorus content in grain was not significantly affected but in straw was significantly influenced by tillage practices and fertility-fertilization levels. The grain has the highest amount of nitrogen content than straw. The maximum phosphorus content in grain was recorded in the conventional tillage practice (0.31 and 0.27 %) followed by the reduced tillage (0.28 and 0.24 %) and maximum phosphorus content in straw was recorded in conventional tillage (0.20 and 0.19 %) followed by reduced tillage (0.18 and 0.17 %) during 2021-22 and 2022-23 year of study. Among fertility-fertilization levels, the highest phosphorus content in grain (0.35 and 0.31 %) and straw (0.25 and 0.23 %) were recorded in 125% RDF + tebuconazole and it was ~~atpar~~ with 125% RDF + chloromequat chloride (0.33 and 0.30 %) and (0.23 and 0.22 %) in grain and straw. The minimum phosphorus content in grain (0.22 and 0.19 %) and straw (0.12 and 0.12) were recorded in the control followed by RDF (0.26 and 0.23 %) and (0.16 and 0.15%) in grain and straw. There were no significant interaction in phosphorus content in grain and straw between tillage practices and fertility-fertilization levels during both years of experimentation. These results also confirm the findings of Bakhshandeh *et al.* (2018) and Seth and Singh (2020).

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3.4. Phosphorus uptake in grain and straw (kg ha^{-1})

The data of nitrogen uptake in grain was not significantly affected but in straw was significantly

influenced by tillage practices and [fertility—fertilization](#) levels. The grain have [highest-higher](#) amount of phosphorus uptake than straw. The maximum phosphorus uptake in grain was recorded in the conventional tillage practice (16.23 and 14.05 kg ha⁻¹) followed by the reduced tillage (14.24 and 12.23 kg ha⁻¹) and maximum phosphorus uptake in straw was recorded in conventional tillage (13.80 and 12.87 kg ha⁻¹) followed by reduced tillage (12.47 and 11.56 kg ha⁻¹) during 2021-22 and 2022-23 year of study. Among [fertility fertilization](#) levels, The highest phosphorus uptake in grain (18.16 and 15.99 kg ha⁻¹) and straw (16.63 and 15.29 kg ha⁻¹) were recorded in 125% RDF+ tebuconazole and it was [at par](#) with 125% RDF + chloromequat chloride (17.38 and 14.97 kg ha⁻¹) and (15.36 and 14.38 kg ha⁻¹) in grain and straw. The minimum phosphorus uptake in grain (10.21 and 8.40 kg ha⁻¹) and straw (7.52 and 7.36 kg ha⁻¹) were recorded in the control. There were no significant interaction in phosphorus uptake in grain and straw between tillage practices and [fertility fertilization](#) levels during both year of experimentation. The consequences of the current investigation are additionally in concurrence with the investigation of [Gupta et al. \(2020\)](#) and [Saini et al. \(2020\)](#)

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3.5. Potassium content in grain and straw (%)

The data of potassium content in grain was not significantly affected but in straw was significantly influenced by tillage practices and [fertility—fertilization](#) levels. The grain have [highest-higher](#) amount of potassium content than straw. The maximum potassium content in grain was recorded in the conventional tillage practice (0.42 and 0.41%) followed by the reduced tillage (0.41 and 0.40%) and maximum potassium content in straw was recorded in conventional tillage (1.38 and 1.36%) followed by reduced tillage (1.36 and 1.35%) during 2021-22 and 2022-23 year of study. Among [fertility fertilization](#) levels, The highest potassium content in grain (0.45 and 0.45%) and straw (1.41 and 1.39%) were recorded in 125% RDF+ tebuconazole and it was [at par](#) with 125% RDF + chloromequat chloride (0.44 and 0.44%) and (1.40 and 1.39%) in grain and straw. The minimum potassium content in grain (0.37 and 0.36%) and straw (1.31 and 1.30%) were recorded in the control followed by RDF (0.39 and 0.38%) and (1.35 and 1.33%) in grain and straw. There were no significant interaction in potassium content in grain and straw between tillage practices and [fertility—fertilization](#) levels during both year of experimentation and pooled. These results also confirm the findings of [Gupta et al. \(2007\)](#), [Kumari et al. \(2015\)](#) and [Singh et al. \(2018\)](#)

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3.6. Potassium uptake in grain and straw (kg ha⁻¹)

The data of potassium uptake in grain was not significantly affected but in straw was significantly influenced by tillage practices and [fertility—fertilization](#) levels. The grain have [highest-higher](#) amount of potassium uptake than straw. The maximum potassium uptake in

grain was recorded in the conventional tillage practice (22.15 and 21.09 kg ha⁻¹) followed by the reduced tillage (20.84 and 19.56 kg ha⁻¹) and maximum potassium uptake in straw was recorded in conventional tillage (93.88 and 91.03 kg ha⁻¹) followed by reduced tillage (91.52 and 88.73 kg ha⁻¹) during 2021-22 and 2022-23 year of study. Among fertility fertilization levels, The highest potassium uptake in grain (24.97 and 23.74 kg ha⁻¹) and straw (101.03 and 98.12 kg ha⁻¹) were recorded in 125% RDF + tebuconazole and it was at par with 125% RDF + chloromequat chloride (24.11 and 22.90 kg ha⁻¹) and (99.11 and 96.58 kg ha⁻¹) in grain and straw. The minimum potassium uptake in grain (16.99 and 15.93 kg ha⁻¹) and straw (82.41 and 80.07 kg ha⁻¹) were recorded in the control. There were no significant interaction in potassium uptake in grain and straw between tillage practices and fertility fertilization levels during both year of experimentation and pooled. The consequences of the current investigation are additionally in concurrence with the investigation of Singh et al. (2019), Yadav et al. (2019) and Puniya et al. (2019).

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4. Conclusion

With rice management the management varied significantly in respect of soil organic carbon and available nutrients as NPK in soil and soil organic matter improve with treatment Bio-decomposer Treated Residue statically at par with Urea Treated Residue (5 % urea) The treatment and at different stage of wheat during both the years of study. Different nutrient management option varied significantly in respect of soil organic carbon and available nutrients as NPK in soil and soil organic matter improve with treatment 75 % RDF + 10 t FYM + Growth Regulator (Chlormequat chloride @ 0.2 % + Tebuconazole @ 0.1 %) statically at par with treatment 125 % RDF + Growth Regulator (Chlormequat chloride @ 0.2 % + Tebuconazole @ 0.1 %). The treatment and at different stage of wheat during both the years of study.

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Table-1: Effect of tillage practices and fertility fertilization levels on Nitrogen content and uptake in grain and straw of wheat

Treatment	Nitrogen content (%)						Nitrogen uptake (kg ha ⁻¹)					
	Grain			Straw			Grain			Straw		
Tillage Practices	2021-22	2022-23	Pooled	2021-22	2022-23	Pooled	2021-22	2022-23	Pooled	2021-22	2022-23	Pooled
Conventional tillage	1.803 ^{±0.1a}	1.76 [±]	1.78	0.53	0.50	0.52	93.34	89.44	91.59	36.26	33.90	35.08
Reduced tillage	1.774	1.75	1.76	0.51	0.48	0.50	88.69	85.56	87.12	34.51	32.13	33.32
SE(m)	0.007	0.001	0.012	0.002	0.002	0.002	0.133	0.556	0.203	0.159	0.197	0.092
C.D.	NS	NS	NS	0.016	0.005	0.016	0.872	3.646	1.327	1.042	1.293	0.605
Fertility Fertilization Levels												
F1 (Control)	1.73 [±]	1.69 [±]	1.71	0.47	0.45	0.46	78.40	75.01	76.70	29.77	29.61	28.69
F2-RDF(150:60:40NPK kg/ha)	1.75	1.72	1.74	0.50	0.47	0.48	83.56	80.28	81.92	32.01	29.78	30.89
F3-75%RDF+10t FYM/ha	1.76	1.73	1.75	0.51	0.48	0.49	85.82	82.51	84.17	33.07	30.81	31.94
F4-125%RDF	1.77	1.74	1.76	0.52	0.49	0.50	88.01	84.65	86.33	34.25	31.96	33.11
F5-RDF+chloromequatechloride	1.78	1.75	1.77	0.53	0.50	0.51	90.28	86.88	88.58	35.51	32.85	34.18
F6-RDF+tebunconzole	1.79	1.76	1.78	0.54	0.51	0.52	92.33	89.12	90.73	36.75	34.38	35.56
F7-75%RDF+10t FYM/ha+ Chloromequatechloride	1.80	1.77	1.79	0.55	0.52	0.53	95.13	91.87	93.50	37.98	35.57	36.78
F8-75%RDF+10t FYM/ha+ Tebunconzole	1.81	1.78	1.80	0.56	0.53	0.54	97.01	93.71	95.36	39.09	36.65	37.87
F9-125%RDF+chloromequatechloride	1.82	1.79	1.81	0.57	0.54	0.55	98.89	95.57	97.23	40.36	37.88	39.12
F10-125%RDF+tebunconzole	1.83	1.80	1.82	0.59	0.56	0.57	100.31	97.38	99.05	35.06	38.67	40.86
SE(m)	0.017	0.017	0.023	0.006	0.007	0.005	1.154	0.971	0.979	0.388	0.346	0.319

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UNDER PEER REVIEW

Table- 2:EffectoftillagepracticesandfertilityfertilizationlevelsonPPhosphorus content and uptakein grain andstraw of wheat

Treatment	Phosphoruscontent(%)						Phosphorusuptake(kg.ha ⁻¹)					
	Grain			Straw			Grain			Straw		
TillagePractices	2021-22	2022-23	Pooled	2021-22	2022-23	Pooled	2021-22	2022-23	Pooled	2021-22	2022-23	Pooled
Conventionaltillage	0.31	0.27	0.293	0.20	0.19	0.19	16.23	14.05	15.14	13.80	12.87	13.34
Reducedtillage	0.28	0.24	0.266	0.18	0.17	0.18	14.24	12.23	13.24	12.47	11.56	12.02
SE(m)	0.003	0.001	0.001	0.001	0.001	0.001	0.068	0.030	0.038	0.067	0.012	0.065
C.D.	0.019	0.008	0.004	0.007	0.009	0.004	0.444	0.200	0.246	0.440	0.081	0.424
FertilizationtylLevels												
F1(cControl)	0.22	0.19	0.20	0.12	0.12	0.12	10.21	8.40	9.31	7.52	7.36	7.44
F2-RDF(150.60.40NPK/ha)	0.26	0.23	0.24	0.16	0.15	0.15	12.63	10.71	11.67	10.244	9.40	9.82
F3-75%RDF+10tFYM/ha	0.27	0.24	0.25	0.17	0.16	0.16	13.38	11.42	12.40	11.02	10.16	10.59
F4-125%RDF	0.28	0.25	0.26	0.17	0.17	0.17	14.14	12.13	13.14	11.86	10.97	11.42
F5-RDF+chloromequatechloride	0.29	0.26	0.27	0.19	0.18	0.18	14.93	12.88	13.90	12.73	11.82	12.28
F6-RDF+tebunconzole	0.30	0.27	0.28	0.20	0.19	0.19	15.70	13.64	14.67	13.61	12.68	13.14
F7-75%RDF+10tFYM/ha+ Chloromequatechloride	0.31	0.27	0.29	0.21	0.20	0.20	16.61	14.25	15.43	14.50	13.55	14.02
F8-75%RDF+10tFYM/ha+ tebunconzole	0.32	0.28	0.30	0.22	0.21	0.21	17.38	14.97	16.79	15.36	14.38	14.87
F9-125%RDF+chloromequatechloride	0.33	0.30	0.31	0.23	0.22	0.22	18.16	15.99	17.07	16.63	15.29	15.96
F10-125%RDF+tebunconzole	0.35	0.31	0.33	0.25	0.23	0.24	19.21	17.01	18.11	17.91	16.53	17.23
SE(m)	0.003	0.003	0.003	0.002	0.002	0.002	0.159	0.137	0.151	0.144	0.120	0.141
C.D.	0.010	0.007	0.008	0.006	0.006	0.006	0.457	0.394	0.436	0.415	0.346	0.406

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Table-3: Effect of tillage practices and fertility fertilization level on potassium content and in grain and straw of wheat

Treatment	Potassium content(%)						Potassium uptake(kg ha ⁻¹)					
	Grain			Straw			Grain			Straw		
Tillage Practices	2021-22	2022-23	Pooled	2021-22	2022-23	Pooled	2021-22	2022-23	Pooled	2021-22	2022-23	Pooled
Conventional tillage	0.42	0.41	0.420	1.38	1.36	1.375	22.15	21.09	21.62	93.88	91.03	92.46
Reduced tillage	0.41	0.40	0.408	1.36	1.35	1.360	20.84	19.56	20.20	91.52	88.73	90.13
SE(m)	0.003	0.001	0.001	0.006	0.004	0.006	0.097	0.025	0.067	0.113	0.259	0.191
C.D.	0.008	0.003	0.005	0.019	0.010	0.019	0.637	0.166	0.193	0.743	1.700	1.253
Fertility Fertilization Levels												
F1 (Control)	0.37	0.36	0.368	1.31	1.30	1.310	16.99	15.93	16.46	82.41	80.07	81.24
F2-RDF(150.60.40NPK/ha)	0.39	0.38	0.385	1.35	1.33	1.343	18.81	17.45	18.13	86.70	83.37	85.04
F3-75%RDF+10tFYM/ha	0.40	0.40	0.398	1.36	1.34	1.353	19.69	18.55	19.12	88.17	85.44	86.80
F4-125%RDF	0.41	0.41	0.410	1.37	1.34	1.358	20.57	19.65	20.11	90.23	86.82	88.85
F5-RDF+chloromequatechloride	0.42	0.41	0.415	1.37	1.35	1.365	21.49	20.05	20.77	92.12	89.01	90.56
F6-RDF+tebunconzole	0.42	0.42	0.420	1.38	1.37	1.378	21.86	20.96	21.41	94.25	91.43	92.84
F7-75%RDF+10tFYM/ha+ Chloromequatechloride	0.43	0.43	0.428	1.38	1.37	1.380	22.92	21.75	22.34	95.62	93.13	93.7
F8-75%RDF+10tFYM/ha+ tebunconzole	0.44	0.43	0.433	1.39	1.38	1.390	23.52	22.31	22.92	97.37	94.86	96.11
F9-125%RDF+chloromequatechloride	0.44	0.44	0.438	1.40	1.39	1.395	24.11	22.90	23.50	99.11	96.58	97.85
F10-125%RDF+tebunconzole	0.45	0.45	0.448	1.41	1.39	1.403	24.97	23.74	24.36	101.03	98.12	99.58
SE(m)	0.004	0.005	0.004	0.013	0.015	0.014	0.204	0.177	0.193	1.130	1.051	0.827
C.D.	0.013	0.014	0.012	0.037	0.041	0.041	0.587	0.510	0.555	3.254	3.027	2.381

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