International Journal of Scientific Research in Science and Technology
Available online at : www.ijsrst.com
Print ISSN: 2395-6011 | Online ISSN: 2395-602X
doi : https://doi.org/10.32628/IJSRST52310553

Effect of Chemical Nitrogen and Compost Rates on Wheat Productivity and Soil Properties at District Sriganganagar of Rajasthan

Rajender Singh*, Madhusudhan Sharma
Assistant Professor, Department of Chemistry, Govt Dungar College Bikaner, Rajasthan, India

ARTICLEINFO

Article History:
Accepted: 20 Sep 2023
Published: 06 Oct 2023

Publication Issue
Volume 10, Issue 5
September-October-2023
Page Number
397-408

ABSTRACT

Two field experiments were conduct at the Experimental site with the help of agriculture research Centre Sriganganagar Rajasthan, during season 2020-2021and 2021-2022 to study the effect of chemical nitrogen rate (0, 30, 60 kg N/fed.) and compost rates application (0,1.5, 3 ton /fed.) and its interaction on productivity of the wheat Raj-3077 and soil properties. Treatments were arranged in split plot design with three replicates (the main plots included chemical nitrogen. while, compost rates were allocated at the sub plots). The results revealed that increasing chemical nitrogen rates from 0 to 60 kg N/fed. significantly increased plant dry weight/m2, plant height, number of tillers and spikes/m2, number of grains /spike, weight of 1000-grain, grain and straw yield/ fed. and grain protein content in both seasons. Application of 60 kg N/fed. recorded the highest values for all previous studied traits compared with untreated plants (control treatment) which gave the lowest values. compost rates recorded significant differences for all studied traits of wheat as plant dry weight/m2, leaf area index, plant height, number of tillers and spikes/m2, number of grains/spike, weight of 1000-grains, grain yield, straw yield and grain protein content in both seasons except for dry weight in the first season; The application of 3 t/fed. recorded the greatest significant values for all previous studied traits compared with the untreated control treatment which showed the lowest values. The interaction between chemical nitrogen and compost rates application had a significant effect on plant dry weight/m2, leaf area index, plant height, number of tillers and spikes/m2, number of grains /spike, weight of 1000-grains, grain and straw yield in both seasons, with exception of plant dry weight/m2 in the first season and the grain protein content in both seasons. Application of 60 kg N/fed. + 3 t compost /fed. gave the highest significant value of plant height, number of tillers and spikes/ m2, weight of 1000 grain and grain yield/fed. without significant differences between them. The highest significant values of grain yield in both seasons and straw yield in the second season were achieved by 60 kg N/fed. + 3 t compost /fed. followed by 30 kg N/fed. + 1.5 t compost /fed. Soil salinity (ECe) and saturation hydraulic conductivity (Ks) as well as available N, P, and K in the soil were significantly increased with increasing N rates applied generally up to 60 kg N/fed., while soil pH and

bulk density (ρa) were not significantly affected in the two seasons. Saturation hydraulic conductivity (Ks) as well as available N, P, and K in the soil were significantly increased with increasing compost rate applied generally up to 3 ton/fed., while soil salinity, pH and bulk density were significantly decreased in the two seasons Finally, adding compost at rate of 3 t/fed. resulting in the improvement of soil properties. From the results and under the conditions of this study, it could be concluded that application of 60 kg N/fed. combined with compost at rate 3 t/fed producing the highest grain and straw yields.

Keywords : Wheat, Yield, Protein, Compost, N Fertilizer, Soil Salinity, Soil Bulk Density, Hydraulic Conductivity.

I. INTRODUCTION

Wheat is considered one of the most important strategically crop in India and in the world, increasing wheat productivity is a national target in India to fill the gab between the local consumption and production. There are several ways for increasing the productivity of wheat, one of them is fertilization process, the utilization of chemical fertilizers for several past years without any addition of organic sources resulted in most deficiency of nutrients in soil, which decreased the productivity and quality of crops. Moreover, more utilization of mineral fertilizers leads to soil and water pollution. Soil organic matter increases agricultural production by improving soil physical, chemical and biological properties. Application of organic residues could increase soil organic matter, buffer the soil, improve aggregate stability and enhance water retention capacity (Spaccini et al., 2002). Compost is rich source of nutrients with high organic matter content. Physical and chemical properties of soil can be improved by using compost, which may ultimately increase crop yields. Therefore, application of compost is the need of the time. Physical properties like bulk density, porosity, void ratio, water permeability and hydraulic conductivity were significantly improved when FYM (10 t ha-1) was applied in combination with chemical amendments, resulting in enhanced rice and wheat yields in sodic soil . Response of wheat to chemical nitrogen were studied by several authors. In this concern, Mauriya et al. (2013) indicated that yield and yield attributes of wheat were significantly respond to nitrogen application up to 75 kg N/ha. Singh et al. (2014) showed that maximum plant height, total number of plants/m² , number of spikes /m² , biological yield and grain protein content were observed at 200 kg N/ha. Bhaduri and Gautam, (2013) found that dry weight, leaf area index, plant height, number of grains/spike, number of spikelet's/spike, number of spikes/m2, weight of 1000-grain, grain yield, straw yield, and grain protein percentage were increased gradually by increasing nitrogen levels from 0 up to 105 kg/fed.. The combination of mineral fertilizers with organic manures resulted a significant increase in grain yield of wheat.Therefore, the aim of this study was to investigate the effect of nitrogen levels, compost rates, and their interaction on growth, yield, yield components of wheat (Raj-3077) and some soil properties.

II. METHODS AND MATERIAL

Two field experiments were carried out at the Experimental site with the help of agriculture

research Centre Sriganganagar Rajasthan, during season 2020-2021and 2021-2022. The experimental design was split plot with three replicates, where the three rates of chemical nitrogen (0, 30, 60 kg N/fed) were distributed in the main plots and three rates of compost s (0, 1.5, 3 t/fed.) were allocated in the sub plots. The sub plot area was 9 m2 (3 x 3 m) in both seasons. The chemical nitrogen fertilizers was applied in the form of urea (46.6 % N) in three doses, the first dose (1/5) at sowing, which was incorporated in dry soil, the second dose (2/5) was applied at the first irrigation and the third dose (2/5) at the second irrigation. Before the sowing, the experimental soil was fertilized with 100 kg/fed. of calcium super phosphate (15.5% P2O5) during soil preparation. Compost was made by animal manure according to the described methods (Albert hollard, 2007). Sample of soil was collected from (0-20 cm layer) before the soil preparation from the experimental sites in both seasons to determine soil analysis. Soil and compost analysis are presented in Table (1).

S.N	Soil Characteristics	Values
1	Mechanical Composition	
	(i) Coarse sand (%)	24.40
	(ii) Fine sand (%)	56.60
	(iii) Silt (%)	9.40
	(iv) Clay (%)	7.40
	(v) Textural class	Loamy sand
2	Physical Properties	
	(i) Bulk density (Mg m^{-3})	1.49
3	Chemical Properties	
	(i) pH	8.50
	(ii) ECe (dS m^{-1}) at 25^0C	2.54
	(iii) CEC [c mol (p^+) kg^{-1}]	5.15
	(iv) Exchangeable Na [c mol (p^+) kg^{-1}]	1.08
	(v) $CaCO_3$ (g kg^{-1})	16.08
	(vi) O.C (g kg^{-1})	1.80
	(vii) A.N (kg ha^{-1})	133.60
	(viii)A.P (kg ha^{-1})	9.48
	(ix) A.K (kg ha^{-1})	159.15

S.No.	Organic materials	Parameters				
		OC (%)	N (%)	P_2O_5 (%)	K_2O (%)	C : N
1	compost	17.00	1.40	0.80	1.05	11.0

Arduino

Seeds of the wheat raj-3077 were sown in the last of October in the first and second seasons respectively. Seeds were uniformly broadcasted at the rate of 60 kg/fed. The rest of cultural practices were applied as recommended. Surface soil samples (0-20 cm layer) were collected from each plot after harvesting, and then air dried to determine some physical and chemical properties, i.e. particle size distribution which was carried out by the pipette method described by Gee and Bauder(1986), soil bulk density (Pa) and saturated hydraulic conductivity (Ks) as described by Black (1983) in undisturbed samples. Also, chemical properties, i.e. soil pH, electrical conductivity (Ece) and available N, P and K were determined according to the methods described by Page et al. (1982). At heading the following traits were recorded:- dry weight of plants (g)/m2, leaf area index and plant height. At harvest, the following traits were determined: number of tillers/m2, number of spikes /m2, number of grains /spike, weight of 1000-grains (g), grain yield (t/fed.) and straw yield

(t/fed.). Nitrogen percentage in the grains was determined by using Micro-Kjeldahl method and then multiplied by the factor (5.75) to obtain the grain protein percentage according to A.O.A.C. (1990). The analysis of variance was carried out according to Gomez and Gomez (1984) for all collected data. Treatment means were compared by Duncan's Multiple Range test according to Duncan (1955). All statistical analysis was performed using analysis of variance technique by means of "MSTATC" computer software package.

III. RESULTS AND DISCUSSION

A- Growth characters: -

Plant dry weight/m2, plant height and number of tillers/m2 of wheat at heading as affected by chemical nitrogen fertilizer and compost in 2020-2021 and 2021-2022 are presented in Table (2 &3). The data show that increasing chemical nitrogen rate from 0 to 60 kg N/fed resulted in a significant increase in all mentioned growth traits in both seasons. A significant increase in these traits was accompanied with each increment of applied nitrogen. The data revealed that the level of 60 kg N/fed. gave the greatest values of all mentioned growth traits in both seasons, while the unfertilized treatment recorded that the lowest values. Such effect of nitrogen could be attributed mainly to its role in the stimulation of various physiological process including cell division and cell elongation of internodes resulting in more tillers formation, leaf numbers and photosynthetic area (leaf area), which resulted in more photosynthetic production and consequently increased dry matter accumulation per unit area. The application of compost resulted in a significant increase in leaf area index, plant height and number of tilles/m2 in both seasons and dry weight in the second season compared with control treatment (without compost). The rate of 3 t compost/fed. recorded the highest significant values more than the other rates for these traits. However, the lowest values were obtained from control treatment (without compost). Such effect of compost might have been resulted from the role of compost in enhancing the soil biological activity which improved nutrient mobilization from organic and chemical fertilizers which is closely related to the amount of absorbed nitrogen and then improve translocation of assimilates and thus improve the growth characters.

With regard to the interaction between chemical nitrogen and compost rates, the data in Table(2) show that there are a significant effect on all studied growth character in both seasons, except dry weight in the first season. Moreover, the data in Table (3) showed that the highest significant values were obtained by the application of 60 kg N/fed. with 3 ton compost /fed. Moreover, it can be noticed that further more application of either nitrogen or compost rates did not significant increase for all those growth characters in both seasons. Data showed that the untreated control gave the lowest values of leaf area index, plant height and number of tillers/m². These results might have been resulted from the quickly chemical nitrogen uptake by wheat roots and the role of compost which enhancing the physical and biological soil properties and then may be caused to improving root growth, slowly released nutrients from organic and chemical fertilizers which increasing the amount of absorbed nitrogen and thus improve the translocation of assimilates which results more vegetative growth in wheat plant.

Table (2): Growth characters of wheat plants as affected by chemical nitrogen and compost rates application and their interaction during 2020-2021and 2021-2022 seasons.

Treatments	Dry weight(g/m)		Leaf area index		Plant height(cm)		No. of tillers /m^2	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
(Kg N/fed.)								
0	312.85	310.62	2.00	1.78	82.45	80.88	265.04	261.05
30	380.90	397.97	2.83	2.53	93.5	91.72	291.4	287.97
60	483.78	482.50	3.37	3.02	98.84	96.96	297.88	293.6
Compost(t/fed)								
0	395.16	393.90	2.69	2.40	90.67	88.94	281.24	277.1
1.5	410.82	409.60	2.78	2.49	93.51	91.73	287.63	283.35
3	429.36	428.11	3.04	2.73	96.11	94.28	294.41	290.54
F-test	Ns	**	**	**	**	**	**	**
Interaction	Ns	**	**	**	**	**	**	**

Table (3): Leaf area index, Plant height and Number of tillers /m2 as affected by the interaction between mineral nitrogen levels and compost rates applicationduring 2020-2021and 2021-2022 seasons

Treatments		Leaf area index		Plant height (cm)		No. of tillers (N) /m^2	
N	C	1st season	2nd Season	1st season	2nd season	1st season	2nd season
0	0	1.65	1.46	76.7	75.2	246.1	242.00
	1.5	1.80	1.6	82.33	80.8	260.5	256.93
	3	2.19	1.95	85.08	83.5	275.63	271.56
30	0	2.46	2.2	89.98	88.3	284.9	281.78
	1.5	2.63	2.36	92.1	90.4	290.5	286.44
	3	2.97	2.66	94.88	93.1	294.75	296.2

60	**0**	3.23	2.9	97.1	95.3	292.55	288.02
	1.5	3.27	2.94	98.23	96.4	295.08	290.07
	3	3.49	3.13	99.68	97.8	300.35	296.20

B- Yield components :

The results in Table (4&5) show that mineral nitrogen rates, compost rates and its interaction had a significant effect on the yield components (number of spikes/m², number of grains/spike and weight of 1000 grains) in both seasons. The data in Table (4) revealed that the greatest values of such components were obtained from the application of 60 kg N/fed., but the lowest values of those components were recorded by the untreated plants (control treatment). Such favorable effect of mineral nitrogen on yield components might have been resulted from the quickly mineral nitrogen uptake by plant roots, which increased vegetative growth, photosynthetic area, which resulted in more assimilates products and consequently increased dry matter accumulation and translocation of more photosynthesis to grain. There are significant differences in yield components (number of Spikes/m2, number of grains /spike and weight of 1000 grains) due to the application of compost rates in both seasons. Increasing compost rates from zero up to 3 ton/fed. caused a significant increase for all yield components studied. The highest values were recorded from 3 ton/fed. followed by 1.5 ton/fed treatments without significant differences between them in 1000 grain weight in the first season only. However, the lowest values were obtained from the untreated plants (control treatment).

The interaction between the chemical nitrogen and compost rates had highly significant effect on yield components studied. The application of 60 kg N/fed. combined with 3 ton compost/fed. produced the highest significant values of all yield components studied in the two seasons without significant differences with the treatments of 60 kg N/fed. combined with 1.5 or 3 ton/fed. compost in the two seasons and on the other hand, the untreated plants gave the lowest values at all yield components studied in both seasons. From these results, it can be concluded generally that the highest rate of compost can be improve the yield components This may be attributed to the effect quickly chemical nitrogen uptake by wheat roots and the role of compost which lead to increasing the amount of absorbed nitrogen and thus improve vegetative growth in wheat plant which positively reflect on increasing yield components.

Table (4): Number of spikes/m2, number of grains/spike and weight of 1000 grains as affected by chemical nitrogen levels, compost rates application and their interaction during 2020-2021 and 2021-2022 seasons.

Treatment	Number of spikes/m^2		number of grains/spike		weight of 1000 grains	
Kg N /fed	1st season	2nd season	1st season	2nd season	1st season	2nd season
0	264.3	258.42	51.66	50.23	38.67	37.12
30	290.8	284.12	61.09	60.25	42.67	42.23
60	296.9 **	290.44	63.80	63.32	46.65	45.32
F-test		**s	**	**	**	**
Compost						

(t/fed.						
0	280.24	274.21	58.08	57.54	41.47	41.43
1.5	286.7	280.44	59.44	58.45	42.42	42.24
3	293.13	287.1	61.64	60.67	44.82	43.52
F -test	**	**	**	**	**	**
Interaction	**	**	**	**	**	**

, * and ns indicate p <0.05, <0.01 and not significant, respectively. Means of each treatment followed by the same letter are not significantly different at 5% level, according to Duncan's multiple range tests.

Table (5) : Number of spikes/m^2, number of grains /spike and weight of 1000 grains as affected by the interaction between chemical nitrogen levels and compost rates application during 2020-2021 and 2021-2022

Treatments		No. of spikes /m2		No. of grain /spike		1000 grain weight (g)	
N	C	1st season	2nd season	1st season	2nd season	1st season	2nd season
0	0	245.4	240.0	46.99	46.12	36.59	35.95
	1.5	259.8	254.0	50.19	48.86	37.69	37.13
	3	274.6	269.0	53.99	52.59	39.04	38.64
30	0	284.4	277.8	58.14	57.15	38.92	39.2
	1.5	289.8	283.2	59.67	58.93	41.89	41.77
	3	294.3	287.9	62.89	61.91	45.62	44.94
60	0	291.4	285.2	62.99	62.51	44.99	44.67
	1.5	293.7	287.7	63.17	62.68	44.97	45.01
	3	299.3	292.8	64.47	63.54	46.14	45.64

C. Grain and Straw yields /fed:-

It noticed from the data in Tables (6) that the grain and straw yields/fed. had a significant effect by the application of different chemical nitrogen fertilizer and compost rates as well as its interaction in both seasons. Data presented in Table (6) revealed that the grain and straw yields/fed. were significantly increased with increasing nitrogen rates up to 60 kg N/fed., while the lowest values were obtained by the untreated plants

(control). The superiority of grain yield/fed. with increasing N fertilizer rates may be due to the increase of no. of spikes/m2, no.of grains/spike and 1000 grain weight as recorded in Table (4). Increase of plants dry weight/m2 associated with increasing N rates may be lead to the increase in straw yield/fed. Data in Table (6) revealed that a significant effect was recorded on the grain yield and straw yield/fed by applying compost rates in the two growing seasons. The greatest value of grain and straw yields/fed. were obtained by applying 3 ton compost /fed. followed by 1.5 ton/fed. in a descending order in both seasons. However, the untreated plants (control) produced the lowest values of the two treats in both seasons. The superior effect of organic compost on grain and straw yields/fed. might be attributed to its beneficial effects on soil physical, chemical and biological properties which caused improving of nutrient availability from both organic and chemical fertilizers which lead to a lot of absorbed nitrogen and this in turn improve the growth, grains and straw attributes and translocation of assimilates to sink organs. With regard to the interaction between chemical nitrogen and compost rates on grain and straw yield in both seasons, the data in table (6) show that the wheat plants received the combination of 60 kg N/fed and 3 ton compost /fed. gave the highest values of grain yield in both seasons as well as straw yield/fed. in the second season. However, the application of 60 kg N/fed. combined with 3 ton compost/fed gave the greatest values of straw yield/fed. in the first season.

Table (6): Grain and straw yields /fed as affected by the interaction between mineral nitrogen levels and compost rates application during 2020-2021 and 2021-2022 seasons.

Treatments		**Grain yeild (t/fed)**		**Straw yeild (t/fed)**	
N	**C**	**1st season**	**2nd season**	**1st season**	**2nd season**
0	**0**	1.43	1.43	2.4	2.28
	1.5	1.66	1.66	2.62	2.72
	3	1.84	1.84	2.90	2.91
	4.5	2.66	2.66	3.05	3.34
30	**0**	2.13	2.13	3.14	3.45
	1.5	2.19	2.19	3.17	3.59
	3	2.32	2.32	3.47	3.71
	4.5	2.38	2.38	3.60	3.78
60	**0**	2.44	2.44	3.57	3.86
	1.5	2.52	2.52	3.70	3.95
	3	2.61	2.61	3.87	4.05
	4.5	2.68	2.68	3.82	4.26

*, ** and NS indicate p <0.05, <0.01 and not significant, respectively. Means of each treatment followed by the same letter are not significantly different at 5% level

E. Soil characters:-

Data in Table 7 indicated that soil salinity (ECe) was significantly increased by increasing nitrogen levels applied up to 60 kg N/fed. but was significantly decreased by increasing compost rates applied up to 3 ton/fad. in the two seasons.

The data in Table (7) indicated that the soil pH values were significantly decreased by increasing compost rate up to 3 ton/fed., while insignificantly affected by nitrogen levels applied and the interaction between nitrogen and compost in both seasons. Saturation hydraulic conductivity (Ks) was significantly affected by the application of nitrogen, compost rates and their interaction in the two seasons. The values of Ks were increased by increasing the rates of nitrogen and compost. This increase was higher for compost than for nitrogen rates. These results are to be expected because the role of organic matter in the compost which modified the soil structure and aggregates. From these results, it can be concluded that, Saturation hydraulic conductivity (Ks) has negatively related with soil bulk density)ρa) and positively with soil salinity ECe.Soil bulk density)ρa) was significantly decreased by increasing nitrogen levels in the two seasons. However, the application of compost had a significantly on)ρa) in 1st season only. The lowest values were obtained by the application of 60 kg N/fed and 3 t compost/fed. in the two seasons.The data in Tables 7 showed that the values of available N, P and K content were significantly increased by increasing nitrogen and compost rate applied. The improvement of plant growth and yield due to organic fertilizers could be attributed to the enrichment of soil with organic matter and therefore, improving soil quality.

Table (7): Some soil properties (0-20cm) as affected by mineral nitrogen level compost rate applied (C) and interaction between them after harvest of wheat crop during 2020-21 and 2021-2022 season

Treatments		EC_e (dS/m)	PH	Ks (cm./hr)	ρ_a (Mg/m^3)	Available, ppm		
						N	P	K
1st season								
N	**0**	2.20	7.92	0.379	1.26	35.25	12.60	352.25
	30	2.39	7.98	0.403	1.23	41.70	13.18	355.75
	60	2.65	7.89	0.503	1.20	44.40	13.90	373.00
F-Test		**	ns	**	ns	**	**	**
C	**0**	2.73	8.02	0.271	1.24	33.70	12.09	364.00
	1.5	2.64	7.96	0.378	1.20	42.43	12.66	369.75
	3.0	2.53	7.85	0.520	1.15	46.30	13.94	375.25
F-Test		**	**	**	**	**	**	**
Interaction		*	ns	**	*	**	**	**
2nd season								
N	**0**	2.05	7.73	0.348	1.29	32.15	9.89	404.75
	30	2.28	7.76	0.348	1.27	32.65	10.96	414.25
	60	2.59	7.81	0.418	1.24	37.18	12.65	431.50

F-Test		**	ns	**	ns	**	**	**
C	0	2.64	7.89	0.240	1.31	28.50	10.63	409.75
	1.5	2.54	7.85	0.325	1.28	33.80	11.23	418.25
	3.0	2.43	7.72	0.445	1.23	39.73	11.75	427.25
F-Test		**	**	**	**	**	**s	**

*, ** and NS indicate p <0.05, <0.01 and not significant, respectively. Means of each treatment followed by the same letter are not significantly different at 5% level

IV. REFERENCES

[1]. Ayer and Bansal KC and Sinha (2003) Assessment of drought resistance in 20 accessions of Triticum aestivum and related species. Total dry matter and grain yield stability national Journal of agricultural and food chemistry Vol.1,pp7-14.

[2]. Barma NCD(2005) Genetic study of morphophysiological traits related to heat tolerance in spring wheat. Department of Genetics and Plant Breeding, Bangladesh Agric. Univ. Mymensingh.Vol.34pp123-129.

[3]. Bangladesh. Barma NCD, Islam MA, Hakim(2011). Genetic variability and selection response to heat tolerance through membrane thermostability in spring wheat (Triticum aestivumL)Department of plant breeding, india Agriculture university National Journal of agricultural and food chemistry Vol.25 pp 258-260.

[4]. Blum A, Sullivan CY and Naguyen(2009) The effect of plant size of wheat in responses to drought stress II. Water deficit, heat and ABA. Aust. J. Plant Physiol. 24: 43-48.

[5]. Westcot (1998)"Water quality for agriculture and irrigation", Paper No. 29, Rev.1, FAO, Rome, pp.174-179.

[6]. Godfrey, Hawkesford, M. J., Powers, S. J., Millar, S. &Shewry, P. R. (2010). Effects of crop nutrition on wheat grain composition and end use quality. Journal of agricultural and food chemistry, 58 (5): 3012-3021.

[7]. Gooding, M., Smith, G., Davies, W. &Kettlewell, P. (2013). The use of residual maximum likelihood to model grain quality characters of wheat with variety, climatic and nitrogen fertilizer effects. The Journal of Agricultural Science, 128 (2): 135-142.

[8]. Groos, Gay, Perretant, M.-R., Gervais, L., Bernard, M., Dedryver, F. &Charmet, G. (2002). Study of the relationship between pre-harvest sprouting and grain color by quantitative trait loci analysis in a white× red grain bread-wheat cross. Theoretical and Applied Genetics, 104 (1): 39-47.

[9]. Groos, C., Robert, N., Bervas, E. &Charmet, G. (2016). Genetic analysis of grain proteincontent, grain yield and thousand-kernel weight in bread wheat. Theoretical and Applied Genetics, 106 (6): 1032-1040.

[10]. Gupta, R. & MacRitchie, F. (2015). Allelic Variation at Glutenin Subunit and Gliadin Journal of Cereal Science, 19 (1): 19-29.

[11]. Hermansson&Svegmark, K. (1996). Developments in the understanding of starch

functionality. Trends in Food Science & Technology, 7 (11): 345-353.

[12]. Humphreys, D. & Noll, J. (2002). Methods for characterization of preharvest sprouting resistance in a wheat breeding program. Euphytica, 126 (1): 61-65.

[13]. Johansson, Prieto-Linde, M. L. &Jönsson, J. Ö. (2001). Effects of wheat cultivar and nitrogen application on storage protein composition and breadmaking quality. Cereal Chemistry, 78 (1): 19-25.

[14]. Ritcha, M.C. (1999). Effect of high temperature exposure on grain growth in wheat (Triticum aestivum L.) M.Sc. (Ag.) Thesis, Indian Agricultural Research Institute, New Delhi.

[15]. Ritcha, M.C., Shukla, D.S. and Pande, P.C. (1994). Biochemical basis of high temperature tolerance in developing grain of wheat (Triticum aestivum L.). Indian. J. Expt. Biol. 32 : 296-298.

[16]. Roberts, E.H. (2001). Temperature and seed germination. In Plant and Temperature (Eds. S.P. Lang and F.I. Wodward) Symposium of the society for experimental biology pp. 109-132.

[17]. Saini, A.D. and Nanda, R. (1996). Influence of temperature and light intensity during ear growth period on grain number in wheat. Indian. J. Agric. Res. 56 : 512-519.

[18]. Sairam, R.K. (1994). Effect on moisture stress on physiological activities of two contrasting wheat genotypes. Indian J. Expt. Biol. 32 : 594-597.

[19]. Chandrasekhar, V. and Srivastava, G. C. (2001). Comparision of hexaploid and tetraploid wheat cultivar in there response to water stress. Biological Plantorum., 44 : 89-94.

[20]. Srivastava, G.C. and Saxena, D.C. (2000). Increased antioxidant activity under elevated temperatures : a mechanism of heat stress tolerance in wheat genotypes. Biol. Plant 42 : 245-251.

[21]. Salisbury, F.B. and Ross, C.W. (2016). Plant Physiology, 4th Ed. Wadsworth, Ann.Agril. Res., 23 (1) pp75- 78.

[22]. Savin, R. and slafer, G.A. (1991). Shaddin effects on the yield of an agrentinian wheat cultivars. J. Agri. Sci. Vol.32 pp1-7.

[23]. Sharma, Nirupma (2003). Effect of salinity of photosynthesis and oxidative stress tolerance in contrasting genotypes of wheat (Triticum aestivum L.) M.Sc. Thesis, RAU., Bikaner.pp125-129.

[24]. Shpiler, L. and Blum, A. (1999). Differential reaction of wheat cultivars to hot environment. Euphytica35 : 483-492.

[25]. Shukla, D.S., Kapasi, S.B., Pande, P.C. and Panwar, J.D.S. (1995). Structural components of wheat grain and the post anthesis high temperature tolerance. Symposium of the society for experimental biology Indian J. Plant Physiol. (In press).

[26]. Shukla, O.P.S., Deshmukh, P.S. and Wasnik, K.G. (1998). Solar energy traps : A method for temperature tolerance studies in crop plants. Ann Plant Physiol. 2 : 216-218.

[27]. Tomar, O.P.S., Desmukh, P.S. and Wasnik, K.G. (2014). Temperature effect of growth and development of wheat I. Interaction of nitrogen and moisture on grain development in cultivar HD 1981. Aust. J. Plant Physiol. 31 : 57-64.

[28]. Sikdar, S.; Ahmad, J.U. and Hossain, T. (2001). Heat tolerance and relative yield performance of wheat varieties under late sown seeded conditions. Indian J. Agric. Res., 27: 121-124.

[29]. Singh, A.K. and Singhal, G.S. (2001). Effect of irradiance on the thermal stability of thylakoid membrane isolated from acclimated wheat leaves. Photosynthetica, 39 (1) : 23-27.

[30]. Singh,Rawson, H.M. and Turner, N.C. (2000).Effect of radiation, temperature and humidity on photosynthesis, transpiration and water use efficiency of chickpea (Cicer

arientinum L.) Indian J. Plant Physiol. 25 : 32-39.

[31]. Singh, I.D. and Stoskoff, N.C. (1999). Harvest index in cereals. Agro. J. 63 : 224- 226.

[32]. Singh, K. and Purohit, S. S. (1996). Plant Productivity under environmental stress. Agro Botanical Publisher, India Bikaner 1st Eds.pp147-150.

[33]. Ziauddin Ahmad. (1997). Response of wheat (T. Aestivum) varieties to different dates of sowing. Indian J. Agric. Sci., 67 (5) : 208- 211.

[34]. Jain, M.C. and Singh, G.P. (2001). Growth and yield response of wheat cultivars to hyper thermal stress. Indian. J. Pl. Physiol. 6 (4) : 395-402.

[35]. Singhala, Pareek, A., Kush, A.K. and Grover, A. (1998). Distribution patterns of 104 kDa stress associated protein in rice. Plant Mol. Biol. 37 : 911-919.

[36]. Slafer, G.A. and Rawson, H.W. (1994). Sensitivity of wheat phasic development to major environmental factors : A re examination of some assumptions made by physiologists and modelers . Aust. J. Plant Physiol. 21 : 393- 426.

[37]. Fahong, W., Xuqing, W. and Sayre, K.D.(2004). Conventional, flood irrigated, flat planting with furrow irrigated, raised bed planting for winter wheat in China. Field Crop Reseach 87: 35–42.

[38]. Fahong, Xuqing, Jisheng, Si., Shengdong, Li. and Zhongming, Ma.(2005). Raised bed planting for wheat in China. Evaluation and performance of permanent raised bed cropping systems in Asia, Australia and Mexico (ACIAR) Proceedings 121: 112-133.

[39]. Fahong, W., Kong, L., Sayre, K.D., Shengdong. Li., Jisheng, Si., Bo, F. and Zhang, B. (2011). Morphological and yield responses of winter wheat (Triticum aestivum L.) to raised bed planting. African Journal of Agricultural Research 6 (13): 2991- 2997.

[40]. FAO. (2012). United Food and Agriculture Organization of the Nations,(2012) Francis, D.D. and Piekielek, W.P. (2012). Assessing Crop Nitrogen Needs with Chlorophyll Meters. The Site-Specific Management Guidelines series-12, published by the Potash & Phosphate Institute (PPI). Soil and Tillage Research 88(1&2): 242-252.

[41]. Gathala, M.K., Ladha, Saharawat, Y.S., Kumar, V., Sharma, P.K., Sharma, S. and Pathak, H. (2011). Tillage and crop establishment affects sustainability ofSouth Asian rice–wheat system. Agronomy Journal 103: 961– 971.

[42]. Ghazanfar, M., Asoodar, M.A. and Saeed, K.A.(2010). The effect of conservation tillage, planting and irrigating methods on water use efficiency and wheat grain yield in north of Ahwaz. JEAS - Journal of Engineering and Applied Sciences 5 (2): 101- 105.

[43]. Gill, M.S., Pal, S.S. and Ahlawat, I.P.S.(2010). Approaches for sustainability of rice (Oryza sativa)-wheat (Triticum aestivum L.) cropping system in Indo-Gangetic plains of India - A Review. Indian Journal of Agronomy 53(2): 81-96.

[44]. Gomez, K.A. and Gomez, A.A. (2015).Statistical Procedures for Agricultural Research, 2nd edition, A Wiley-Inter Science Publication, New York (USA), pp.196-211. Guan, D., Zhang, Y., Al-Kaisi, M.M., Wang, Q., Zhang, M. and Zhaohu, Li. 2015. Tillage practices effect on root distribution and water use efficiency of winter wheat under rain-fed condition. Soil and Tillage Research 146 (2): 286-295.

Cite this article as :

Rajender Singh, Madhusudhan Sharma, "Effect of Chemical Nitrogen and Compost Rates on Wheat Productivity and Soil Properties at District Sriganganagar of Rajasthan", International Journal of Scientific Research in Science and Technology (IJSRST), Online ISSN : 2395-602X, Print ISSN : 2395-6011, Volume 10 Issue 5, pp. 397-408, September-October 2023. Available at doi :

https://doi.org/10.32628/IJSRST52310553

Journal URL : https://ijsrst.com/IJSRST52310553