EFFECT OF DIFFERENT NUTRIENT SOURES AND ORGANIC MANURES ON WHEAT YIELD AND GROWTH IN CANAL AND SALINE WATER IRRIGATED FIELDS (GANGANAGAR TEHSIL, DISTRICT SRI GANGANAGAR OF RAJASTHAN)

[1]RAJENDER SINGH, [2]DR HARISH KUMAR

[1]Assistant Professor, [2]Research Supervisor
[1]Department of chemistry
[1]Govt Dungar College Bikaner & Research Scholar Tantia University, Sri Ganganagar

ABSTRACT:

During a rabi seasons of 2019-2020 and 2020-2021 in Sriganganagar, Rajasthan, an integrated usage of vermin compost and chemical fertilizers was used to evaluate the yield performance of raj-3077 under saline and non-saline irrigation water. During both years, canal water had significantly more effective tillers/MRL, ear head length (cm), number of grains/spikes, grain, straw, and yields (q/ha) than saline water. During 2019-20 and 2020-21, the number of effective tillers/MRL, number of grains/spikes, grain, straw, and yields (q/ha) were greater in vermicomposting @5 t/ha and lowest in no inoculation treatment. During 2019-20 and 2020-21, 125 percent RDF, which is statistically equivalent to 100 percent RDF, generated significantly more effective tillers/MRL, grains/spike, grain, straw, and yields (q/ha) than 75 percent RDF. During both years, there were no significant differences in test weight (g) or harvest index based on irrigation water quality, fertilizer levels, or vermicomposting treatments.

Key words- wheat, yield, saline water.

1. INTRODUCTION:

Wheat (Triticumaestivum L.) is the second most important grain after rice, and it plays a critical role in the food security of India's burgeoning hungry population. Wheat demand for human consumption in agricultural countries is expected to grow at a rate of 1.8 percent per year in the future years, paving the way (Ortiz et al. 2008). In this way, increasing production is critical for maintaining global food security. Recent research into environmental change predicts marked increases in precipitation and temperature. Wheat is filling 27.01 million hectares in our country, yielding 72.9 million tones. Wheat is grown on roughly 2.6 million hectares in Rajasthan, with an annual production of 7.01 million tones and a normal yield of 28.03 kg ha-1 (Anonymous 2004-05). Wheat profitability and production are primarily influenced by the selection of proper varieties, soil and natural conditions, as well as administrative considerations. The ground water in northwestern Rajasthan is average, with high salinity and high chlorine and sulphate levels. Such water is frequently utilized in agribusiness, depending on the level of hazardous elements. However, the water system water in such areas is of poor quality, but this is unavoidable because there is no choice water system wellspring in such areas. The salinity of ground water in Rajasthan wells increased from 2.1 to 9.1 dS m-1 (Agrawal et al., 2009). Although crop responses to organic and bio inoculants are not as dramatic and quick as chemical fertilizers, they do contribute to higher fertilizer efficiency and improved physio-chemical characteristics of soil over time. Furthermore, due to the overuse of chemical fertilizers, the quality of irrigation water has worsened over time. Salinity is also a significant stumbling block to wheat yield in semi-arid areas, causing physiological drought stress, ion toxicity, and mineral shortages. As a result, it was determined that combining chemical fertilizers with vermicompost will increase wheat yield, productivity, and net income in both saline and non-saline irrigation water. The experiment included two levels of irrigation water quality: canal (non-saline) water and saline water (2.1-9.1 dS/m), as well as two inoculation and vermicompost treatments: no inoculation (control), vermicompost @ 5 t/ha, plots, and three levels of fertilizer: 75, 100, and 125 percent RDF in sub-plots. Number of effective tillers/mrl, number of grains/spike, ear head length, test weight, harvest index, grain, straw, and biological yield are among the statistics on yield and yield attributing characteristics.

Statistical analysis: Graphs and tables were created using Microsoft Excel 2007 edition. The level of significance was determined using a two-way ANOVA and a General Linear Model (GLM). The likelihood of getting a given grain yield is determined by a recurrence appropriation examination of this informational index, just as the effect of atmosphere on a cultivar's profitability is determined by a recurrence appropriation examination. Here, a contrast between 75 percent and 25 percent likelihood levels is used to show the degree of impact of climatic variation; the greater the difference, the greater the yield fluctuation due to atmosphere. This change is re-imagined on a relative assumption, because potential yield alters fundamentally with area:

1.2 Study Area:

- **Area of Sriganganagar Block :** Area of**Ganganagar** district 11,154.66 km² or1,115,466 hectares in which area **Sriganganagar Block** 851.2 sq km.
- **The latitudinal position (Ganganagar district):** 28º 42' 19.22” north latitude to 30º 12' 02.23” northern latitude.
- **Longitudinal position of ganganagar district**from 72º37' 57.53’’ east longitude to 74º18' 50.47’’east longitude.
- **Climate and weather:** The climate of **Ganganagar** district is a extreme hot to extreme cold. The temperature reaches ≥ 50°C in summer and falls around 0°C in winter. Normal temperature range between 25 to 35° C.

Fig. Experimental site: Sri Ganganagar District (Tehsilswise)

Results and Discussion Yield:

Per metre of row length, effective tillers:
During 2019-2020 and 2020-2021, the number of effective tillers/mrl was significantly higher in canal water treatment (91.22, 86.25) than in saline water treatment (76.33, 74.31). (Table 1). According to Kumar (2000) and Saqib et al. (2004), effective tillers/m2 were significantly reduced when the soil was salinized. The reduction in effective tillers was also attributed to a severe reduction in tiller number during the early growth stages of wheat, which was attributed to the fact that the viability of primary and secondary tillers is greatly influenced by soil salinity. During both years, effective tillers/mrl was significantly higher in vermin compost @5 t/ha (86.38, 82.69) and lowest in no inoculation (81.11, 78.07), possibly due to increased and consistent availability of N, P, and K, as well as other plant nutrients released by vermin compost. 125 percent RDF (86.70, 82.66) had the most effective tillers/mrl, which was statistically higher than 100 percent RDF (85.66, 81.62) and significantly higher than 75 percent RDF (82.00, 78.04) during both years. In agreement, the treatment of 150 kg N/ha was followed by 125 kg N/ha, yielding the highest number of fertile tillers, while the control treatment yielded the lowest number of fertile tillers/m2.

The length of the ear head (cm):
During both years, ear head length was significantly higher in canal water (9.32, 9.70) than in saline water treatment (8.9, 9.4) under irrigation water quality. Salinity also caused a significant reduction in ear head length when compared to the control group. During both years, the application of 125 percent RDF resulted in longer ear head length than the application of 100 percent RDF and 75 percent RDF. During both years, inoculation and vermin compost treatments have no effect on ear head length.

Number of grains/spike:
Significantly more number of grains/spike was observed in canal water (46.96, 46.71) than under saline water (42.54, 42.30) during both the years, respectively.vermicompost@5t/ha produced significantly higher number of grains/spike (45.83, 45.70) and minimum was observed under no inoculation (43.22, 43.15) during rabi seasons of 2019-20 and 2020-21, Application of 125 percent RDF produced higher number of grains/spike followed by 100 percent RDF and minimum under 75 percent RDF during both the years.

Grain, straw and biological yield (q/ha):
Wheat crop irrigated with canal water produced 20.5 and 14.60 per cent higher grain yield over saline water in 2019-20 and 2020-21, respectively (Table 2).Likewise, higher grain yields to the quantal of 10.29, and 6.68 were recorded in canal water as compared to saline water treatments in wheat crop by Kumar (2000), Kumar et al., (2012) and Mojid et al., (2013). (2013). In general, the significant loss in yield under impact of varied salinity levels was related to the increase in EC of soil which in turn was responsible for the reduction in grain production by producing a restricted availability of water and nutrients to the plant. The rise in grain yield might be attributed to adequate quantities and balanced proportions of nutrients supplied to the crop resultant increase in yield

attributing features which finally resulted towards an increase in economic yield. Improved physico- chemical properties of the soil and microbial activities by the application of vermi compost would be the second possible reason for higher output. Application of 100 percent RDF greatly boosted the grain yield above 75 percent RDF; however, it was at par with 125 percent RDF for both the years.

Table.1 Effect of saline water and different nutrient management strategies on yield parameters of wheat crop

Treatments	Effective tillers/ mrl		Ear head length (cm)		Number of grains/spike		Test weight (g)	
	2019-20	2020-21	2019-20	2020-21	2019-20	2020-21	2019-20	2020-21
Quality of irrigation water								
Canal water	91.22	86.25	9.32	9.70	46.96	46.71	38.30	37.95
Saline water	76.33	74.31	8.90	9.40	42.54	42.30	37.98	36.89
SEm±	**0.83**	**0.48**	**0.06**	**0.07**	**0.47**	**0.51**	**0.48**	**0.44**
CD at 5%	**2.50**	**1.62**	**0.23**	**0.26**	**1.79**	**1.90**	**NS**	**NS**
Inoculation and vermicompost								
Vermicompost @5t/ha	86.38	82.69	9.17	9.60	45.83	45.70	39.14	38.95
No inoculation	80.11	78.07	8.60	8.90	43.22	43.15	37.72	37.74
SEm±	**1.20**	**0.75**	**0.10**	**0.11**	**0.79**	**0.84**	**0.52**	**0.45**
CD at 5%	**3.65**	**2.28**	**NS**	**NS**	**2.33**	**2.60**	**NS**	**NS**
Fertilizers								
75% RDF	82.00	78.04	8.89	8.90	43.01	42.85	37.60	37.20
100% RDF	85.66	81.62	8.92	8.95	45.09	44.95	38.12	37.65
125% RDF	86.70	82.66	8.98	9.00	46.18	46.01	38.60	37.99
SEm±	**0.92**	**0.64**	**0.08**	**0.08**	**0.74**	**0.73**	**0.29**	**0.26**
CD at 5%	**2.79**	**1.9**	**0.24**	**0.30**	**2.17**	**2.14**	**NS**	**NS**

Table.2 Effect of saline water and different nutrient management practices on grain yield, straw yield, biological yield and harvest index of wheat crop

Treatments	Grain yield (q/ha)		Straw yield (q/ha)		Biological yield (q/ha)		Harvest index	
	2019-20	2020-21	2019-20	2020-21	2019-20	2020-21	2019-20	2020-21
water Quality of irrigation								
Canal water	50.18	45.50	75.53	65.17	128.6	113.7	39.0	40.5
Saline water	39.89	38.82	61.99	52.19	104.9	94.10	38.3	42.0
SEm±	**0.45**	**0.39**	**0.47**	**0.35**	**0.72**	**0.61**	**0.27**	**0.22**
CD at 5%	**1.39**	**1.21**	**1.45**	**1.12**	**2.20**	**1.88**	**NS**	**NS**
Inoculation and vermicompost								
Vermicompost @5t/ha	45.60	42.77	71.40	61.66	118.4	105.5	40.79	43.0
No inoculation	42.41	40.14	68.08	58.39	111.8	99.43	40.33	42.6
SEm±	**0.65**	**0.56**	**0.68**	**0.51**	**1.03**	**0.85**	**0.40**	**0.33**

CD at 5%	**2.00**	**1.75**	**2.10**	**1.59**	**3.21**	**2.70**	**NS**	**NS**
Fertilizers								
75% RDF	41.69	39.38	65.59	56.49	108.5	96.8	38.2	40.5
100% RDF	45.95	43.19	69.75	59.10	116.9	103.5	38.8	41.6
125% RDF	47.22	44.10	69.92	60.59	119.9	105.8	40.2	42.8
SEm±	**0.51**	**0.38**	**0.53**	**0.74**	**0.87**	**0.87**	**0.28**	**0.24**
CD at 5%	**1.47**	**1.12**	**1.55**	**2.10**	**2.50**	**2.48**	**NS**	**NS**

Conclusion:
The beneficial effect of fertilizers on grain yield can be very well explained in the light of the fact that fertilizer application increased the number of effective tillers/unit area and number of grains/spike which ultimately contributed to higher grain yield (Devi et al., 2011). (Devi et al., 2011). In present studies, wheat crop irrigated with canal water produced 17.90 and 19.91 per cent higher straw yield over saline water in 2019-20 and 2020-21, respectively. Among the fertilizer levels 125 percent RDF resulted in higher straw yield and grain yield in 2019-20 and 2020-21, respectively.

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