The Pharma Innovation Journal 2022; 11(7): 1367-1372

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(7): 1367-1372

www.thepharmajournal.com
Received: 06-05-2022
Accepted: 22-06-2022

Ajay Kumar Yadav
M.Sc., Department of Agronomy, Faculty of Agricultural Sciences and Allied Industries, Rama University, Kanpur Nagar, Uttar Pradesh, India

Ram Niwas
Department of Agronomy, Faculty of Agricultural Sciences and Allied Industries, Rama University, Kanpur Nagar, Uttar Pradesh, India

Corresponding Author:
Ajay Kumar Yadav
M.Sc., Department of Agronomy, Faculty of Agricultural Sciences and Allied Industries, Rama University, Kanpur Nagar, Uttar Pradesh, India

Effect of irrigation scheduling and nutrient management on growth and yield of wheat (*Triticum aestivum* L.) in central U.P

Ajay Kumar Yadav and Ram Niwas

Abstract
This study was conducted on "Effect of irrigation scheduling and nutrient management on growth and yield of wheat (*Triticum aestivum* L.) in central U.P" during the Rabi season of 2020-21 on Agricultural Farm of RAMA UNIVERSITY, KANPUR, 209217, (U.P.) INDIA. The experiment was laid out in Factorial RBD with three replication. Four irrigation schedule I_0Control no irrigation, I_1 at CRI stage (25 DAS), I_2 at tillering stage (45 DAS), I_3 at milking stage(105DAS) were allocated to the main plot along with the combination of four nutrient management schedule N_0 Control no fertilizer, N_1 100%RDF (NPK 120:60:40), N_2 NPK + FYM 10t/ha, N_3 NPK+ vermicompost 10t/ha. Among the factors applied the irrigation schedule (I_1 at CRI stage (25 DAS)) and Nutrient Doses (N_2 NPK + FYM 10t/ha) found to be best in the terms of Plant population, Plant height, Dry matters, Number of tillers, number of effective tillers, leaf area index, days taken to flowering, length of ear, number of spike, number of spikelet/ear, number of grain per ear, biological yield, grain yield, straw yield, harvest index and B:C ratio.

Keywords: Irrigation, NPK, FYM, vermicompost, growth, yield and quality

Introduction
In India, wheat (*Triticum aestivum* L.) is the second most important food crop after rice and account for 36.2% of total food grain reserved of over country. It has been grown under vast agro-climate condition. The total cultivated area of wheat crop in the world was 215.49 million hectares and production of 730.84 million tonnes also and productivity 3390 kg ha^{-1} the maximum producer of wheat in the world is the European Union followed by China, India, Russia and United States of America, Australia (FAOSTAT, 2018-19). In India the total cultivated area wheat was 29.65 millon hectares with production of 103.6 millon tonnes and also average productivity is 3507 kg ha^{-1} (ANONYMOUS, 2018-19) Uttar Pradesh has leading state among area (9.75 millon ha and production (32.59 millon tonnes) of wheat in India. however, productivity of wheat (2561 kg ha^{-1}) is still less than the national average (Directorate of Economics and statistics, DAC&FW, 2019-20).

Wheat (*Triticum aestivum* L.) is an annual plant of Gramineae family. It is the world most widely cultivated food crop. Wheat is an important staple food crop throughout the globe. India is the second largest producer of wheat after China, beginning an agrarian state leading in area and production of wheat in India. Wheat is the world's second most important annual crop after rice. Surface water gets depleted by runoff water from agricultural field containing pesticides fertilizer and waste chemicals from industries and sewage from cities and rural area the fall in ground water level owing to excessive removal for agriculture and other uses with high costs of fuel and electrical energy used in drawing groundwater. However a holistic strategy to evolve integrated solutions for multiple problems has been elusive the vertical effort practices *viz*. irrigation management application of mulches increase the duration of moisture availability with an increase in the amount of available moisture in the soil. Water is the most important factor that are necessary for proper growth balanced development and higher yield of all crop. Water deficiency effect plant growth and grain yield Irrigation management is one of the important managerial activities and effect the effective utilization of water by crop Maximum grain yield (2.27t/ha) was obtained with application of 200 mm irrigation treatment Under scarcity of water, four irrigation schedules at crown root initiation, tillering, flowering and milking stage recorded higher grain yield resulting in saving two irrigation for wheat irrigation at jointing and anthesis improved grain yield by an average of 12.70and 18.65%as compared with no irrigation in wheat.

The irrigation is the main factor to determining the grain yield of wheat. The advent of high-yielding varieties of cereal in agricultural development irrigation is very essential for wheat production. Total requirement of grain production can be obtained by three way Ist application of balance fertilizer, IInd use high yielding varieties and IIIrd timely irrigated the wheat crop.

The role of organic matter is well established in governing the nutrient fluxes, microbial biomass and improvement in soil physical chemical and biological properties. Extra mining of nutrients will have to be resisted in order to maintain the soil health. Maintaining soil health is of utmost important to ensure food and nutritional security of the country.

Vermicompost is rich in plant nutrients and contains higher number of microorganisms, which are responsible for decomposition process Vermicompost has been recognized as a low cost and environmentally sound process for treatment of many organic wastes. reported that vermicompost treated soils had lower pH and increased levels of organic matter, primary nutrients, and soluble salts. Edwards and Burrows (2010) reported that vermicompost, especially those from animal waste sources, usually contained more mineral elements than commercial plant growth media.

Materials and Method

Geographically, Kanpur is situated in sub tropical region at an altitude of 125.9 meter from the mean sea level and latitude ranging of 25^{0} 56' to 28° 58' North and longitude 79° 31' to 80° 34' East. The climate of locality is semi arid with moderate rainfall and cold winters. The mean annual rainfall is 850 mm extending generally from the mid June to mid October. The temperature rises maximum during May - June (45 – 48 °C) and come down to 4 -5 ^{0}C during December - January. Occasional showers are also received during winter and summer**.**

The experiment was laid out in Factorial RBD with three replication. Four irrigation schedule I_0Control no irrigation, I_1 at CRI stage (25 DAS), I_2 at tillering stage (45 DAS), I_3 at milking stage(105DAS) were allocated to the main plot along with the combination of four nutrient management schedule N_0 Control without fertilizer, N_1 100%RDF (NPK 120:60:40), N_2 NPK + FYM 10t/ha^{-1}, N_3 NPK+ vermicompost 10t/ha^{1}.

Experimental Findings

The effect of irrigation schedule and nutrient management on initial plant population was found non-significant.

Significantly maximum plant height was observed in wheat at 30, 60, 90 DAS and at Harvest was (70.86, 83.98, and 95.86) cm respectively with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum plant height was found in the N_2 (50% RDF+NPK+10 t FYM+ha^{-1}) with (24.92, 71.05, 85.96 and 86.37) cm at 30, 60, 90 DAS, and At harvest respectively.

Significantly maximum leaf area index was observed in wheat at30, 60 and 90 DAS was (1.56, 4.21 and 5.31) respectively with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum leaf area index was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with (1.49, 4.39, and 5.26) cm at 30, 60, 90 DAS, respectively.

Significantly maximum dry matter accumulation was observed in wheat at 30, 60, 90 DAS and at Harvest was (6.19, 6.52, 6.72, and 7.82) gram respectively with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum dry matter accumulation was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with (5.98, 6.37, 6.78 and 7.25) gram at 30, 60, 90 DAS, and at harvest respectively.

Significantly maximum number of effective tillers m^{-2} was observed in wheat at 45, 60, 90 and 120 DAS was (214.12, 226.65, 234.00, 252.00 and 252.00) respectively with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum number of effective tillers m^{-2} was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with (215.64, 227.19, 235.46 and 241.28) at 45, 60, 90 120 DAS respectively.

Significantly minimum number of days taken to 80% flowering was observed in wheat 77.68 days with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the minimum number of days taken to 80% flowering was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 76.78 days.

It was found that the effect of various irrigation scheduling on Days taken to maturity was non-significant minimum number of days taken to maturity was observed in wheat 130.24 days with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the minimum number of days taken to maturity was found in the N_2 (50% RDF+NPK+10t FYM ha^{-1}) with 131.56 days.

It was found that the effect of various irrigation scheduling on length of ear at maximum length of ear was observed in wheat 6.82 cm with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum length of ear was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 8.89 cm.

It was found that the effect of various irrigation scheduling on number of ear m^{-2} Maximum number of ear m^{-2} was observed in wheat 252.00 with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum number of ear m^{-2} was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 241.28.

It was found that the effect of various irrigation scheduling on number of spikelet ear^{-1} was significant. Significantly Maximum number of spikelet ear^{-1} was observed in wheat 15.68 with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum number of spikelet ear^{-1} was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 15.49.

It was found that the effect of various irrigation scheduling on 1000 grain weight was significant. Significantly Maximum 1000 grain weight was observed in wheat 41.34 g with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS).In case of nutrient management the maximum 1000 grain weight was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 41.65 g.

It was found that the effect of various irrigation scheduling on number of grains ear^{-1} was significant. Significantly Maximum number of grains ear^{-1} was observed in wheat 55.59 with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum number of grains ear^{-1} was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 54.64.

It was found that the effect of various irrigation scheduling on biological yield (kg ha^{-1}) was significant. Significantly

Maximum biological yield (kg ha^{-1}) was observed in wheat 10,520 kg/ha with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum biological yield (kg ha^{-1}) was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 10,483 kg/ha.

It was found that the effect of various irrigation scheduling on grain yield (kg ha^{-1}) was significant. Significantly Maximum grain yield (kg ha^{-1}) was observed in wheat 4235 kg/ha with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum grain yield (kg ha^{-1}) was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 4219 kg/ha,

It was found that the effect of various irrigation scheduling on straw yield (kg ha^{-1}) was significant. Significantly Maximum straw yield (kg ha^{-1}) was observed in wheat 6285 kg/ha with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum straw yield (kg ha^{-1}) was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 6264 kg/ha.

It was found that the effect of various irrigation scheduling on harvest index (%) was significant. Significantly Maximum harvest index (%) was observed in wheat 42.65% with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum harvest index (%) was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 42.89%.

It was found that the effect of various irrigation scheduling on protein content in grain (%) was significant. Significantly Maximum protein content in grain (%) was observed in wheat 10.90% with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum protein content in grain (%) was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 11.93%.

It was found that the effect of various irrigation scheduling on NPK content in Grain (%) was significant. Significantly Maximum protein content in grain (%) was observed in wheat 2.05, 0.375 and 0.371% of NPK respectively with the incorporation of the irrigation schedule I_1 (Irrigation at CRI stage (20-25DAS). In case of nutrient management the maximum NPK content in grain (%) was found in the N_2 (50% RDF+NPK+10 t FYM ha^{-1}) with 1.55, 0.398, 1.56% of NPK respectively which was followed by N_1 (50% RDF+10T FYM/ha).

The maximum net profit of Rs. 46285 /ha was obtained when the crop was irrigated 4 times at CRI, tillering, and milk stages and fertilized with RDF of (NPK+FYM 10 t ha^{-1}). Highest B:C ratio was calculated with the treatment combination 1_1N_2 (3.67).

Discussion

Effect of irrigation Schedule on Nutrient Management

Wheat requires adequate soil moisture for normal growth and development at all growth stages which is possible through precision irrigation scheduling to reduce over irrigation. The best irrigation schedule was found to be I_1 Irrigation at CRI stage (20-25DAS) which help in the availability of nutrients to plant for their proper growth and development. Excessive water application can result in water logging and leaching of nutrients beyond the root zone. To improve water use efficiency, there must be proper irrigation scheduling with just enough water, as flooding may lead to the reduction in WUE and sometimes in productivity also. The use of adequate water at critical growth stages is regarded as a superior practice over traditional flooding where the crop fields are filled with enormous volumes of water. Earlier reports suggesting benefits of using deficit irrigation to save water in WUE as major objective in wheat. Effect of reduced amount of irrigation water at critical growth stages may have adverse effect on grain yield, yield components.

Effect Nutrient management

Plant nutrition which is the most important factor affecting growth and development of a crop is not a simple problem. Its solution depends upon much more than the liberal use of commercial fertilizers, organic manures or other materials. Under these situations integration of chemical fertilizers with organic manures has been found quite promising not only in maintaining higher productivity but also in providing greater stability in crop production as evident from the long term fertilizer experiments. Farmyard manure (FYM) is being used as a major source of organic manure in field crops since ancient times. Limited availability of this manure is, however, an important constraint in its use as a source of nutrients. Wheat crop responds positively to applied fertilizers with FYM and Vermicompost. Application of organic along with inorganic sources not only improve soil health improve but also improve the produce quality and fertilizer use efficiency and there by reducing the cost of cultivation. Organic manures, particularly FYM and Vermicompost, not only supply macronutrients, but also meet the requirement of micronutrients, besides improving soil health

The three most vital nutrients that a plant can receive are nitrogen (N), phosphorous (P) and potassium (K). Nitrogen aids in the plant's growth above ground. Phosphorous enhances plant cell division. It also helps in flower and seed production and in the development of a strong root system. Potassium improves the plant's ability to fight off disease. It also gives it strong stems. Plant nutrition is the most important factor affecting grain yield, nutrient uptake and quality of a crop. This factor becomes still more important when an exhaustive crop like wheat is grown in an intensive crop rotation consisting of cereal crops. Hence, integrated nutrient management consisting of use of organic manures and chemical fertilizers are gaining importance for maintaining soil productivity. Its effect on wheat was studied in the present investigation and compared with different nutrient sources

Effect of Irrigation schedule and Nutrient management on Growth Parameters

Vegetative and reproductive growth of a plant is affected by physiological and metabolic processes which are modified by environmental conditions and varying cultural practices. Although, it is not possible to modify entirely the plant environment under field conditions to suit the seeds of a particular plant type, however, it can be manipulated to a great extent by judicious organization of controllable factors like selection of variety, seed rate, sowing time, nutrient supply, irrigation and plant protection. In the present studies application of irrigation schedule (I_1 Irrigation at CRI stage (20-25DAS)) and nutrient management (N_2 (50% RDF+NPK+10t FYM+ha^{-1}) treatments affected the overall growth of wheat plants measured in terms of plant height, Dry weight, number of tillers, Number of effective tillers, Leaf area Index, Days taken to 80% flowering, and Days taken to 80% maturity.

Crop growth is the result of modification in various morphological parameters like plant height, number of tillers per metre row length, leaf area and dry matter accumulation. Any treatment affecting these parameters will ultimately effect the overall growth of the crop. The results of this study revealed that all the growth parameters were increased at a faster rate during 60-90 DAS which could be said to be the peak growing point of the crop. Plant height, leaf area and dry matter accumulation increased steadily from 30-60 DAS, at maximum rate between 60-90 DAS and rate declined there after. Plant height, number of tillers per metre row length, leaf area per metre row length, leaf area index, dry matter accumulation,

The plant height was not affected significantly by various treatments at 30 DAS. The maximum plant height was recorded with irrigation schedule (I_1 Irrigation at CRI stage (20-25DAS)) and (N_2 (50% RDF+NPK+10 t FYM+ha^{-1}) through inorganic source being statistically at par with other treatment based on soil test value and was significantly superior over rest of the treatment.

Data revealed that the number of tillers increased upto 90 DAS and declined thereafter till harvest. The possible reason might be the mortality of smaller and weaker tillers at later stages of growth. RDF fertilizer with organic manure FYM and Vermicompost produced maximum number of tillers and which was statistically at par with other treatments on soils test value at all these stages of observation i.e. 60, 90 DAS and at harvest.

Effect of Irrigation schedule and Nutrient management on yield attributes

The results presented in preceding chapters revealed that maximum Length of ear, Number of Spike, Number of spikelet/ear, Number of grain/ear, Test weight was produced by application of irrigation schedule (I_1 Irrigation at CRI stage (20-25DAS)) and nutrient management (N_2 (50% RDF+NPKt+ FYM ha^{-1}) recommended dose of fertilizer along with FYM and Vermicompost which was statistically at par with the other treatments based on soils test value. Similar trend was observed in other yield attributing characters like length of spike, number of grains per spike and 1000-grain weight

Effect of Irrigation schedule and Nutrient management on Yield parameters

The yield of a crop is the final product of various yield attributing characters and the maximum Yield parameters value were found from the application of irrigation schedule (I_1 Irrigation at CRI stage (20-25DAS)) and nutrient management (N_2 (50% RDF+NPK+10 t FYM ha^{-1}). The effect of any treatment on yield attributes is directly reflected in the yield *viz* Biological yield, Grain yield, Straw yield, and Harvest Index%. In this study, recommended dose of fertilizers was given with organic manures FYM and Vermicompost produced significantly highest grain, straw and biological yields than other treatments except inorganic source based on soil test value. Data presented in preceding chapters indicated that harvest index was not affected by any of the treatments.).

Effect of Irrigation schedule and Nutrient management on quality parameters

The data in preceding chapters indicated that the application of irrigation schedule (I_1 Irrigation at CRI stage (20-25DAS)) and nutrient management (N_2 (50% RDF+NPK+10t FYM ha^{-1}) improved the protein content in grains by significant margin as compared to other treatments. Little is known about the effect of the reduced amount of irrigation water on performance of wheat in high input use regions of India however, there are few earlier reports on irrigation scheduling taking.

Effect of Irrigation schedule and Nutrient management on Economics Parameters:-

The data in preceding chapters indicated that the application of irrigation schedule (I_1 Irrigation at CRI stage (20-25DAS)) and nutrient management (N_2 (50% RDF+NPK+10 t FYM ha^{-1}) reduces the Total cost of cultivation and increases the Gross Profit and Net profit which ultimately leads to highest Benefit Cost Ratio (3.67).

Table 1: Effect of irrigation schedule and nutrient management on Plant population, Plant height, Leaf area index and Days taken to flowering

Treatment	Plant population m^{-2}	Plant Height				Leaf area Index			Dry matter accumulation			
		30 DAS	60 DAS	90 DAS	Harvest	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	At Harvest
A. Irrigation schedules												
I_0 Control without irrigation	101.87	22.35	65.25	81.47	86.89	1.25	3.56	4.89	4.47	4.90	5.46	5.71
I_1 Irrigation at CRI stage (20-25DAS)	104.72	25.64	70.86	83.98	95.86	1.56	4.21	5.31	6.19	5.83	6.89	7.29
I_2 Irrigation at tillering stage(40-45DAS)	103.93	23.49	69.87	83.65	90.65	1.37	3.78	4.61	5.62	6.41	6.68	7.49
I_3 Irrigation at milking stage (100-105DAS)	102,56	23.09	68.46	81.67	89.46	1.45	4.02	5.09	5.85	6.52	6.72	7.82
S.E(m)+	1.77	0.10	0.23	0.14	0.10	0.03	0.10	0.06	0.08	0.09	0.16	0.16
C.D. (at 5%)	NS	NS	0.79	0.48	0.35	NS	0.36	0.20	NS	0.27	0.47	0.35
B. Fertilizer levels												
N_0 Control without fertilizer	100.09	21.55	64.26	78.35	78.77	1.32	3.62	4.66	3.98	4.20	4.70	5.10
N_1 (50% RDF+NPK 120:060:40: kg/ha^{-1})	101.62	23.81	66.76	80.94	81.27	1.40	4.10	5.16	4.21	4.59	4.98	5.42
N_2 (50%-RDF+10 t FYM ha^{-1})	106.02	24.92	71.05	85.96	86.37	1.49	4.39	5.26	5.98	6.37	6.78	7.25
N_3 (50% RDF+ NPK+ 10 t VC/ha^{-1})	103.42	22.84	68.86	83.81	84.28	1.12	3.56	4.48	5.21	5.68	5.92	6.41
S.E(m)±	1.94	0.21	0.18	0.15	0.17	0.02	0.11	0.12	0.560	0.512	0.672	0.378
C.D. (at 5%)	NS	NS	0.52	0.43	0.49	NS	0.33	0.33	NS	1.023	1.628	1.312

Interaction (A X B)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
S.E(m) +-	4.163	0.14	0.15	0.26	0.26	0.15	0.26	0.24	0.713	0.687	1.032	0.891
C.D. (at 5%)	8.682	0.48	0.43	0.74	0.80	NS	0.51	0.48	NS	1.32	2.61	1.61

Table 2: Effect of irrigation schedule and nutrient management on Dry matter accumulation, Number of tillers, and days taken to maturity

Treatment	Number of Tillers				Number of effective tillers				Days taken to flowering	Days Taken to Maturity	Length of ear
	30 DAS	60 DAS	90 DAS	120 DAS	45 DAS	60 DAS	90 DAS	120 DAS			
A. Irrigation schedules											
I_0 Control without irrigation	320	340	350	346	194.62	212.75	218.50	225.75	80.34	133.24	5.19
I_1 Irrigation at CRI stage (20-25DAS)	338	348	358	350	206.50	218.50	221.00	230.00	77.68	130.24	6.82
I_2 Irrigation at tillering stage(40-45DAS)	335	346	355	349	210.25	225.25	233.00	241.00	79.12	134.46	6.20
I_3 Irrigation at milking stage (100-105DAS)	330	343	357	348	214.12	226.65	234.00	252.00	78.34	132.81	5.80
S.E(m)+	3.256	3.658	4.621	4.124	0.41	0.64	1.10	1.04	0.52	1.245	0.03
C.D. (at 5%)	NS	6.284	9.354	8.228	1.43	1.85	3.21	3.12	1.10	NS	0.12
B. Fertilizer levels											
N_0 Control without fertilizer	319	339	349	343	190.56	210.35	220.45	226.46	80.38	133.42	6.21
N_1 (50% RDF+NPK 120:060:40: kg/ha^{-1})	322	343	356	350	204.56	222.87	231.57	238.64	77.56	132.04	6.83
N_2 (50%-RDF+10 t FYM ha^{-1})	346	358	363	359	215.64	227.19	235.46	241.28	76.78	131.56	8.89
N_3 (50% RDF+ NPK+ 10 t VC/ha^{-1})	335	345	352	348	210.34	219.37	229.61	235.42	78.56	133.65	7.82
S.E(m)±	2.256	3.214	4.642	5.452	0.721	0.750	0.642	0.792	0.721	1.361	0.13
C.D. (at 5%)	NS	6.437	9.234	10.836	NS	1.621	1.325	1.624	1.42	NS	0.28
Interaction (A X B)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
S.E(m) +-	2.13	2.64	2.76	3.165	0.926	0.946	0.853	0.756	0.912	1.025	0.238
C.D.(at 5%)	4.215	5.246	5.468	6.284	NS	1.926	1.682	1.492	NS	2.061	0.462

Table 3: Effect of irrigation schedule and nutrient management on Number of ear m^{-2} Number of Spikelet ear^{-1} 1000 grain weight (g), Number of Grains ear^{-1} Biological yield (kg ha^{-1}) Grain yield kg ha^{-1} Straw Yield kg ha^{-1} Harvest Index%

Treatment	Number of ear m^{-2}	Number of Spikelet ear^{-1}	1000 grain weight (g)	Number of Grains ear^{-1}	Biological yield (kg ha^{-1})	Grain yield kg ha^{-1}	Straw Yield kg ha^{-1}	Harvest Index%
A. Irrigation schedules								
I_0 Control without irrigation	225.75	12.35	40.12	48.56	9070.00	3946	5124	40.21
I_1 Irrigation at CRI stage (20-25DAS)	252.00	15.68	41.34	55.59	10,520	4235	6285	42.65
I_2 Irrigation at tillering stage(40-45DAS)	241.00	14.25	40.21	49.00	10,147	4024	6123	40.89
I_3 Irrigation at milking stage (100-105DAS)	242.00	13.98	40.64	52.53	10,188	4134	6054	41.35
S.E(m)+	1.04	0.594	0.019	0.21	3.671	6.451	3.564	0.564
C.D. (at 5%)	3.12	1.180	NS	0.76	7.268	12.842	7.951	1.012
B. Fertilizer levels								
N_0 Control without fertilizer	226.46	12.64	40.35	49.35	8929	3895	5034	39.89
N_1 (50% RDF+NPK 120:060:40: kg/ha^{-1})	238.64	13.85	40.89	50.01	10,260	4135	6125	40.49
N_2 (50%-RDF+10 t FYM ha^{-1})	241.28	15.49	41.65	54.64	10,483	4219	6264	42.89
N_3 (50% RDF+ NPK+ 10 t VC/ha^{-1})	235.42	14.25	41.10	53.20	10,223	4189	6034	41.38
S.E(m)±	0.792	0.624	0.0631	0.52	4.261	6.592	3.948	0.948
C.D. (at 5%)	1.624	1.215	NS	0.109	8.452	1.351	7.895	1.821
Interaction (A X B)	NS	NS	NS	NS	NS	NS	NS	NS
S.E(m) +-	1.958	0.958	0.095	0.15	3.645	6.342	2.954	0.856
C.D. (at 5%)	3.842	1.726	0.172	0.45	7.261	13.264	5.893	1.501

Table 4: Effect of irrigation schedule and nutrient management on Protein Content in Grain%, NPK in Grain, NPK in straw

Treatment	Protein Content in Grain%	N in Grain (%)	P in Grain (%)	K in Grain (%)	N in Straw (%)	P in Straw (%)	K in Straw (%)
A. Irrigation schedules							
I_0 Control without irrigation	10.23	1.80	0.350	0.352	0.507	0.073	1.352
I_1 Irrigation at CRI stage (20-25DAS)	10.90	2.05	0.375	0.371	0.525	0.089	1.452
I_2 Irrigation at tillering stage(40-45DAS)	10.80	2.00	0.369	0.362	0.528	0.100	1.361
I_3 Irrigation at milking stage (100- 105DAS)	10.46	1.92	0.364	0.368	0.515	0.081	1.429
S.E(m)+	0.02	0.05	0.005	0.004	0.005	0.002	0.017
C.D. (at 5%)	NS	NS	NS	NS	NS	NS	NS
B. Fertilizer levels							

N_0 Control without fertilizer	10.49	1.48	0.354	1.32	0.522	0.087	1.427
N_1 (50% RDF+NPK 120:060:40: kg/ha^{-1})	10.93	1.51	0.366	1.38	0.515	0.084	1.414
N_2 (50%-RDF+10 t FYM ha^{-1})	11.93	1.55	0.398	1.56	0.511	0.082	1.4045
N_3 (50% RDF+ NPK+ 10 t VC/ha^{-1})	11.50	1.52	0.375	1.46	0.517	0.085	1.4048
S.E(m)±	0.06	0.042	0.006	0.008	0.002	0.001	0.008
C.D. (at 5%)	NS	NS	NS	NS	NS	NS	NS
Interaction (A X B)	NS	NS	NS	NS	NS	NS	NS
S.E(m) +-	0.04	0.02	0.001	0.003	0.006	0.02	0.003
C.D (at 5%)	0.10	NS	NS	NS	NS	NS	NS

Conclusion

On the basis of our finding it can be concluded that the factor I_1 and N_2 and their combination were found to be best in the terms of Growth Parameters, Yield attributes, Yield Parameters, quality parameters and benefit cost ratio.

References

1. Borin JBM, Carmona FDC, Anghinoni I, Marthins AP, Jaeger IR, Marcolin E, *et al*. Soil solution chemical attributes, rice response and water use efficiency under different flood irrigation management method. Agriculture Water Management. 2016;176:9-17.
2. Chaturvedi I. Effect of phosphorus levels alon or in combination with phosphate-solubilizing bacteria and farmyard manure on growth yield and nutrient up-take of wheat (*Triticum aestivum* L.) journal of agriculture and social science. 2006;2:96-100.
3. Gholve SG, Kamble SK, Shinde SN. Effect of integrated nutrient management in rice (*Oryza sativa*) - wheat (*Triticum aestivum*) cropping system in Western Maharashtra Biofertilizers technology, 2004, 187-192.
4. Haghverdi A, Leib BG, Washington-Allen RA, Buschermohle MJ, Ayers PD. studying uniform and variable rate center pivot irrigation strategies with the aid of site –specific water production function. Computers and Electronics in Agriculture. 2016;123:327-340.
5. Khokhar B, Hussain I, Khokhar Z. Effect of different irrigation frequencies on growth and yield of different wheat genotypes in Sindh. Pakistan J Agric. 2010;(23):3-4.
6. Mohammed SS, Osman AG, Mohammed AM, Abdall AS, Rugheim AME. Effects of organic and microbial fertilization on wheat growth and yield international Research Journal of Agricultural Science. 2012;2(4):149-154.
7. Nawab K, Shah P, Arif Amanullah MA, Rab A, Ali K. Effect of cropping patterns, farm yard manure, K and Zn of wheat growth and grain yield sarad journal of agriculture. 2011;27(3):534-536.
8. Nemat M, Awad, Khaled SM. Mximimizing effect of mineral fertilizers by compost and biofortofied. Australian journal of Basic and Applied Sciences. 2012;6(10):482-493.
9. Negi SC, Mahajan G. Effect of FYM Planting method and fertilizer levels on rainfed wheat. Crop Research (Hisar). 2002;20(3):534-536.
10. Nemat M, Awad, Khaled SM. Maximizing effect of mineral fertilizer by compost and biofortified. Australian Journal of Basic and Applied Science. 2012;6(10):482-493.
11. Pal SK, Verma UN, Thakur R, Singh MK, Upasani RR. Dry-matter partitioning of late sown wheat under different irrigation schedules. Indian journal of agriculture Science. 2000;70(12):831-834.
12. Yadav, Verma. Productivity, nutrient uptake and water use Efficiency of wheat under different irrigation levels and fertility Sources. Indian journal of Ecology. 2010;37(1):13-17.
13. Youssef *et al*. Impact of organic manure, biofertilizer and irrigation Intervals on wheat growth and grain yield. American-Europion J Agric. & Environ. Sci. 2013;13(11):1488-1496.
14. Zheng. Limited irrigation for improving water use efficiency of winter in the Guanzhong Plain of northwest China. Transaction of ASABE. 2016;59(6):1841-1852.