Journal of Pharmacognosy and Phytochemistry
Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; SP2: 82-84

Md. Parwaiz Alam
Department of Agronomy, Birsa Agricultural University
Ranchi, Jharkhand, India

SK Singh
Department of Agronomy, Birsa Agricultural University
Ranchi, Jharkhand, India

Kuldeep Kumar
Department of Agronomy, Birsa Agricultural University
Ranchi, Jharkhand, India

Correspondence
Md. Parwaiz Alam
Department of Agronomy, Birsa Agricultural University
Ranchi, Jharkhand, India

Behaviour of different wheat genotypes under various irrigation conditions under eastern region of Jharkhand

Md. Parwaiz Alam, SK Singh and Kuldeep Kumar

Abstract
Field experiments were conducted on sandy loam soil at Birsa Agricultural University, Ranchi, India in winter seasons of 2009-10 and 2010-11. The experiment was conducted in split plot design with 3 replication with treatments comprised three irrigation conditions *viz.* IR_1: One irrigation at CRI (20-25 DAS), IR_2: Three irrigations at CRI, Tillering (45-50 DAS) and Boot leaf stage (80-85 DAS) and IR_3: Five irrigations at CRI, Tillering, Jointing (65-70 DAS), Boot leaf and milk stages (100-105 DAS) in main plots and eight wheat genotypes *viz.*, HD-2997, DBW-46, RSP-561, HD-2733(C), PBW-343 (C), K-0307 (C), HD-2967 (I) and DBW-39 (I) in sub plots. The result revealed that, IR_3 produced significantly influenced most yield attributes and yield than other irrigation levels. Increase in irrigation level resulted in significantly more effective tillers (336/m^2), higher spike length (12.7 cm), fertile spikelets/ spike (46.27), number of grains/spike (41.42), 1000-grain weight (41.31g), resulting in 20.89 % higher grain yield (37.97q/ha) and straw yield (55.04 q/ha. Among the cultivars, PBW-343 (C) gave significantly more effective tillers (317/m^2), spike length (14.4 cm), fertile spikelets/spike (43.52), number of grains/spike (35.33), 1000-grain weight (40.90 g), grain yield (31.83 q/ha) and straw yield (45.69 q/ha) than that of mean of the rest of the seven cultivars.

Keywords: Eastern region, Irrigation, Genotypes, Wheat.

Introduction
Wheat is the second most important cereal crop after rice, grown under diverse agro climatic conditions on 28 M ha area in India with a production of about 84 M tones. In spite of a wide range of adoptability, little attention has been paid towards wheat production and maximization of yield potential of this crop in Jharkhand and its share to national production is less than 1%. Productivity of 2.8 t/ha is also far below the national average of 3.14 t/ha (Anon., 2013) [1]. Since wheat is a major cereal crop and population is gradually increasing with time, increasing its production and acreage should be given top priority in order to achieve food and nutritional security in the state. However, success of any crop production depends on the use of appropriate and selectivity of location-specific genotype of high yield potential, and additionally improved cultural practices is an imperative part, may not be ignored. Among the agronomic practices spacing plays a significant role in maximizing the crop yield as well as productivity. Wheat production in Jharkhand is lower than other wheat growing state in the India due to various problems. But major problems are delayed sowing after the harvest of transplanted rice and no or limited irrigation facilities. Irrigation plays an imperative role for optimum growth and development of wheat. Irrigation requirement is the quantity of water needed above the existing moisture level. Water supplied at booting to heading stages promoted both spike and grain development (Zhang-Xu Cheng *et al.*, 2011) [6]. Grain yield and its components of wheat declined when exposed to drought stress condition (Fang *et al.* 2006) [2].

Water is one of the most important factors that are necessary for proper growth, balanced development and higher yield of all crops. Water deficiency affects plant growth and grain yield. Grain yield in wheat and other cereals is the end result of a number of contributing and inter-related components such as number of grains per ear, number of ear per unit area and mean grain mass. The magnitude of each component is determined by processes such as tillering, ear development and grain filling, occurring at different stages of crop development. Therefore, keeping the above facts in view, a field experiment was conducted to identify the genotypes that yield better under restricted irrigation conditions.

Materials and Method
Field experiment was conducted during the *rabi* seasons of 2009-10 and 2010-11 at Birsa

Agricultural University, Ranchi (23°17' N latitude, 85° 10' E longitude and 625 m above mean sea level). The experiment was laid out in split plot design replicated three times. The treatment comprised three irrigation conditions *viz.* IR_1: One irrigation at CRI (20-25 DAS), IR_2: Three irrigations at CRI, Tillering (45-50 DAS) and Boot leaf stage (80-85 DAS) and IR_3: Five irrigations at CRI, Tillering, Jointing (65-70 DAS), Boot leaf and milk stages (100-105 DAS) in main plots and eight wheat genotypes *viz.*, HD-2997, DBW-46, RSP-561, HD-2733(C), PBW-343 (C), K-0307 (C), HD-2967 (I) and DBW-39 (I) in sub plots. The soil of the experimental field was sandy loam in texture with acidic in soil reaction (pH 5.63) low in organic carbon (0.51%) and available nitrogen (228.49 kg/ha), medium in phosphorus (12.6 kg/ha) and potassium (161.4 kg/ha). Wheat varieties were sown in rows at 23 cm apart as per treatment scheduled. The recommended basic full dose of PK and half dose of nitrogen as basel and the remaining nitrogen was applied in 2 equal doses, half at tillering and the rest half at boot stage. The sources of nutrients were urea, single super phosphate and muriate of potash for N, P and K, respectively. The crop was sown on a well prepared seedbed using a seed rate of 100 kg/ha. The crop was harvested on April 12 in 2010 and April 17 in 2011. Data on yield attribute and yield were recorded as per normal procedure. Soil sample were analyzed for Available nitrogen, phosphorus and potash as per standard laboratory procedures. The recommended dose of fertilizer was 150 kg N, 60 kg P_20_5 and 40 kg K_2O. The data were subjected to statistical analysis as prescribed by Gomez and Gomez (1984) [3] and significant effects were presented and discussed in this paper.

Results and Discussion

Yield attributes:

Significant improvement in yield attributes viz. number of spikes/m^2, spike length, filled grains per spike and test weight was recorded under (IR_3) Five irrigations at CRI, Tillering, Jointing (65-70 DAS), Boot leaf and milk stages (100-105 DAS) (Table 1). This may be attributed to adequate availability and supply of resources under IR_3 and their translocation along with other nutrients to the sink. The changes in the management could form more photosynthetic organ, strengthen photosynthetic ability, produce higher dry matter and provide sufficient nutrient to sink continually making the seed more plump, increased 1000-grain weight, seed setting percentage and filled grains per panicle (Shirpurkar *et al.*, 2008) [4] under IR_3. Similar results were recorded by Singh and Kumar (1990) [5]. Among cultivars, PBW-343(C) was found significantly superior to other cultivars but remained at par with HD-2967, DBW-39, RSP-561 and HD-2733 in respect of number of spikes/m^2, grains per spike and 1000- grain weight. This might be due to better vegetative growth which favoured effective translocation of photosynathate resulting in higher yield attributes.

Grain and straw yield

The data presented in Table-1 reveal that, the grain yield of wheat was influenced significantly due to different applied irrigation levels. Five irrigations at CRI, Tillering, Jointing (65-70 DAS), Boot leaf and milk stages (100-105 DAS) (IR_3) gave highest (37.97 q/ha.) grain and straw (55.04 q/ha) yield, which were significantly higher than no irrigation and one irrigation at CRI treatments. Similar results were recorded by Singh and Kumar (1990) [5]. The grain and straw yields were not influenced significantly due to different varieties. Wheat variety PBW-343 gave maximum grain yield (31.83 q/ha.) but it was statistically at par with HD-2967and DBW-39. The interaction between Irrigation levels x varieties was found to be non significant.

Conclusion

Thus, based on two year data it can be concluded that maximum wheat yield in Ranchi Jharkhand could be achieved with five irrigations at different growth stage, tillering stage, boot stage, anthesis stage and soft dough stage Because of hot temperature after heading, irrigation at anthesis and soft dough stages improved wheat grain yield. In addition, wheat genotypes PBW-343 seem to be a good, high yielding and short duration wheat genotype.

Table 1: Yield and yield attributes of wheat as influenced by different treatments (pooled data of 2 years)

Treatments	Yield (q/ha)		Productive tillers/m^2	Number of grains/spike	Spike length (cm)	Fertile spikelets/spike	1000 Grain weight (g)
	Grain	Straw					
Irrigation conditions							
IR_1 - One irrigation at CRI (20-25 DAS)]	19.59	28.24	231.79	20.88	10.0	37.56	42.02
IR_2 - Three irrigations at CRI, Tillering (45-50 DAS) and Boot leaf stage (80-85 DAS)	27.37	40.28	263.29	31.33	10.3	41.31	41.25
IR_3 - Five irrigations at CRI, Tillering, Jointing (65-70 DAS), Boot leaf and milk stages (100-105 DAS)	37.97	55.04	336.08	41.42	12.7	46.27	41.31
SEm±	0.43	0.84	1.83	0.53	0.1	0.46	0.18
C.D. (p=0.05)	1.42	2.81	6.12	1.75	0.3	1.66	0.62
Genotypes							
HD-2997	26.38	38.05	267.00	30.22	12.8	29.67	39.83
DBW-46	24.74	36.21	255.56	28.44	12.5	28.49	39.60
RSP-561	28.53	41.91	275.11	31.44	13.2	38.56	38.79
HD-2733 (c)	27.59	40.68	259.00	29.78	13.1	35.79	42.96
PBW-343 (c)	31.83	45.69	316.78	35.33	14.4	43.52	40.90
K-0307 (c)	26.85	38.99	265.22	29.11	12.6	28.51	37.67
HD-2967 (I)	30.42	43.80	291.22	32.56	14.1	42.07	46.15
DBW-39 (I)	30.12	44.14	286.56	32.78	13.8	40.47	46.30
SEM ±	1.30	1.93	7.71	1.19	0.1	0.92	0.22
CD (p=0.05)	3.75	5.54	22.14	3.42	0.2	2.62	0.64

References

1. Anonymous. Economic Survey of India (2012-13). Directorate of Economics and Statistics, Government of India, New Delhi, 2013.
2. Fang WB, Sakih MK, Nudi YB. Effect of water stress with physic development on yield of wheat grown in semi-aril environment. Field crops Research. 2006; 5(3):55-67.
3. Gomez KA, Gomez AA. Statistical Procedures for Agricultural Research 2nd Edn. John Willey and Sons, New York, 1984.
4. Shirpurkar GN, Sonawane PD, Wagh MP, Patil DT. Performance of wheat genotypes under restricted Irrigation conditions. Agric. Sci. Digest. 2008; 28(1):57-58.
5. Singh, Harbir, Kumar Vinod. Behaviour of different wheat genotypes under various irrigation conditions in semi-arid tropics of Haryana, India. Genetic aspects of plant mineral nutrition, 1990, 253-258.
6. Zhang-Xu Cheng, Zhu-Runshen, Xia-Fang Qin, Shangguan-Zhou Ping. Effects of irrigation at the critical growth stages of spring wheat plants and the period of' severe drought in the hilly loess plateau of middle Gansu province, Shaanxi, China. Journal of Triticeae Crops. 2011; 26(5):74-78.