

EFFECTS OF NITROGEN ON GROWTH AND YIELD COMPONENTS OF WHEAT. (REPORT)

Amjed Ali¹, A.Ahmad² W.H.Syed¹, T. Khaliq², M. Asif¹, M.Aziz¹, M. Mubeen²

¹University College of Agriculture, Sargodha.

² University of Agriculture, Faisalabad.

amjed_786@hotmail.com

ABSTRACT: A field experiment was conducted to study the effects of different levels of nitrogen on growth and yield of wheat crop. The wheat variety, Sehar-2006 was tested at four different nitrogen rates i.e. 0, 80, 130 and 180 kg ha⁻¹. Date of sowing was during the last week with seed rate of 100 kg ha⁻¹. The results showed that number of tillers per unit⁻¹, plant height, spike's length, number of grain spike⁻¹, 1000-grain weight and grain yield were significantly increased by increasing the nitrogen levels over control. Among nitrogen levels, highest grain yield (3.848 tons ha⁻¹) was obtained by an application of 180kg N ha⁻¹.

Key words: wheat, growth, nitrogen, yield.

INTRODUCTION:

Wheat (*Triticum aestivum* L.) is one of the most important food grain crop grown in the world. It ranks first in the world cereal crops accounting for 30% of all cereal food worldwide and is a staple food for over 10 billion people in as many as 43 countries of the world. It provides about 20% of the total food calories for the human race [1]. Wheat being a major food crop of Pakistan is cultivated on large scale in the country. It was cultivated on an area of 9042 thousands hectare with an annual production of 23,864 thousands tons and an average yield of 2.639 kg ha⁻¹ [2]. Nitrogen occupies a conspicuous place in plant metabolism. All vital processes in plant are associated with protein, of which nitrogen is an essential constituent. Consequently to get more crop production, nitrogen application is essential in the form of chemical fertilizer. Nitrogen fertilizer is known to affect the number of tillers m⁻², number of spikelet's spike⁻¹, number of Grains spike⁻¹, spike length and 1000-grain weight [3]. In view of the importance of nitrogen for crop production present study is planned with the objectives to determine the optimum nitrogen requirement of the wheat crop.

MATERIALS AND METHODS:

To determine the effect of different levels of nitrogen on growth and yield of wheat variety 'Sahar-2006' a field trial was conducted at the research area of University College of Agriculture, Sargodha. The experiment was laid out in a randomized complete block design in Factorial arrangement with three replications. Net plot size was 2.5×6 m. The experiment was comprised the following treatments; N₀ = (control), N₁ = 80 kg ha⁻¹, N₂, 130 kg ha⁻¹, and N₃ 180 kg ha⁻¹. The crop was sown at the rate of 100 kg ha⁻¹ during last week of November 2007 with the help of a single row hand drill in 23 cm apart rows. Phosphorus at the rate of 90 kg ha⁻¹ was applied to all plots at the time of sowing. Half nitrogen was broadcasted at the time of sowing and remaining half was applied with first irrigation which was given on 15th of December. All cultural practices were same for all treatments. The observations recorded were; number of tillers unit⁻¹ area, plant height(cm), spike length(cm), number of spikelet's spike⁻¹, number of grains spike⁻¹, 1000- grain weight, grain yield. Data collected were analyzed statistically by using Fisher's Analysis of Variance Techniques and Least Significant Difference (LSD) test at 5% probability level was applied to compare the treatment means [4].

RESULTS AND DISCUSSION:

All the nitrogen treatments significantly increased the number of tillers m⁻² than control. However application of 130 kg N ha⁻¹ (N₂) resulted into maximum number of tillers m⁻² (375.8) which is statistically at par with N₃ (369.0), where nitrogen was applied @ of 180 kg N ha⁻¹. Hameed *et al.* [5] also observed that increasing nitrogen application increases the number of tillers m⁻². Maximum plant height (82.35cm) was produced in treatment N₃ (180 kg ha⁻¹) followed by (80.40cm) in N₂ (130 kg N ha⁻¹) and minimum plant height (69.26cm) was recorded in treatment N₀ (control). All treatment significantly enhanced the plant height over the control (N₀). These results are in conformity with those of Gwal *et al.* [6] and Jan *et al* [7] who observed an increase in plant height due to nitrogen fertilization. This tendency can be attributed to higher dose of nitrogen, which greatly helps the plant to expose its potential to grow vigorously. The maximum spike length was (11.30cm) in case of 130 kg N ha⁻¹ followed by (10.71 cm) in case of N₁ where 80 kg N ha⁻¹ was applied which is statistically at par with (10.00 cm) N₃ (180 kg N ha⁻¹). Treatment N₀ where no nitrogen was applied produced minimum spike length of 10.13 cm. These results are in conformity with those of Ali *et al.* [3] and Asif *et al.* [8]. The treatment N₂ (150 kg N ha⁻¹) produced the highest number of grains (40.95) spike⁻¹ followed by N₁ (80 kg N ha⁻¹) which produced (40.49) grains spike⁻¹. Minimum number of grains per spike was recorded in N₀ (control) which produced 39.50 grains spike⁻¹. The highest value of 1000-grain weight (41.91g) was achieved in case of N₂ (130 kg N ha⁻¹) which was followed by N₃ (40.54g) and N₂ (40.44g), where nitrogen was applied at the rate of 180 kg N ha⁻¹ and 80 kg N ha⁻¹, respectively. The 1000-grain weight value (39.69g) for N₀ was significantly low than the N₁ or N₂ and N₃. These findings are in conformity with those of Ali *et al.* [3], Yang *et al.* [9] and Halepyati [10]. The highest value for grain yield (3.848 tons ha⁻¹) was obtained for treatment N₂ (130 kg N ha⁻¹), this value of grain yield is significantly differ than the grain yield of 3.212 tons ha⁻¹, 3.000 tons ha⁻¹ and 2.436 tons ha⁻¹ for treatment N₃ (180 kg N ha⁻¹), N₁ (80 kg N ha⁻¹) and N₀ (control), respectively. These results are quite in line with, Ali *et al.* [3], Khan *et al.* [11], Nazir *et al.* [12], Jan *et al.* [7], Hameed *et al.* [5], Khourgami and Bour [13] and Asif Iqbal *et al.*, [14].

Table: 2. Growth and yield of wheat as influenced by different levels of irrigation

Treatments Nitrogen levels (kg ha ⁻¹)	Number of tillers unit ⁻¹ area	Plant height (cm)	Spike length (cm)	Number of grains spike ⁻¹ .	1000- grain weight (g)	Grain yield (tons ha ⁻¹)
N ₀ = 0	303.5c	69.26d	09.11c	39.50c	39.69c	2.436d
N ₁ = 80	351.2b	77.96c	10.71b	40.49b	40.44b	3.000c
N ₂ = 130	375.8a	80.40b	11.30a	40.95a	41.91a	3.848a
N ₃ = 180	369.0ab	82.35a	10.00bc	40.80bc	40.54b	3.210b

Note; means sharing common letters do not differ significantly from each other 5% probability level

.Literature cited;

- [1] Reddy, S.R 2004. Agronomy of Field Crops. Kalyani Publishers Ludhiana. p.143.
- [2] GoP.2010. Agricultural Statistics of Pakistan 2009-10, Govt. of Pakistan, Ministry of Food, Agriculture and livestock, Economic wing. Islamabad, Pakistan.
- [3] Ali, A., M.A. Choudhry, M.A. Malik. R. Ahmad and Saifullah. 2000. Effect of various doses of nitrogen on the growth and yield of two wheat cultivar. Pak. J. Biol. Sci., 3(6): 1004-1005.
- [4] Steel, R.G.D and J.H. Torrie. 1997. Principles and Procedures of Statistics 2nd ed McGraw Hill Book Co. Inc. Singapore: p 172-177.
- [5] Hameed, E., W.A. Shah, A.A. Shad, J. Bakht and T. Muhammad. 2003. Effect of different planting dates, seed rate and nitrogen levels on wheat. Asian J. Plant Sci., 2(6): 467-474.
- [6] Gwal, H.B., R.J. Tiwari, R.C. Jain, and F.S. Prajapati. 1999. Effect of different levels of fertilizer on growth, yield and quality of late sown wheat. RACHIS Newsletter, 18(1): 42-44.
- [7] Jan, M.T., M. Shah and S. Khan. 2002. Type of N-fertilizer rate and timing effect on wheat production. Sarhad J. Agri., 18(4): 405-410.
- [8] Asif, M. A.Ali, M.E.Safdar, M.Maqsood, S.Hussain and M.Arif. 2009. Growth and yield of wheat as influenced by different levels of irrigation and nitrogen. Int.J. Agric.Appl.Sci.Vol.1, No. 1: 25-28.
- [9] Yang, J., J. Zhang, Z. Wang, Q. Zhu and L. Liu. 2001. Water deficit-induced senescence and its relationship to the remobilization of pre-stored carbon in wheat during grain filling. Agron. J., 93(1): 196-206.
- [10] Halepyati, A.S. 2001. Influence of irrigation and nitrogen levels on growth and yield of wheat. Karnataka. J. Agric. Sci., 14(2): 449-450. (CAB. Absts. 2002-2003).
- [11] Khan, S., N.D. Shah and M.T. Sheikh. 2000. Effect and economics of different levels of nitrogen fertilizer on the yield of zargoan wheat variety under irrigated conditions of Baluchistan. Sarhad J. Agri., 16(6): 581-585.
- [12] Nazir, M.S., A. Jabbar, Z. Waheed, A. Ghaffar and M. Aslam. 2000. Response of late sown wheat to seeding density and nitrogen management. Pak. J. Biol. Sci., 3(6): 998-1001.
- [13] khourgami, A and G. Bour. 2008. Z. Effect of nitrogen and zinc fertilizers on yield and protein content of durum wheat. Australian Agronomy conference. 14th AAC poster papers.
- [14] Iqbal, A., N. Akbar, H. Z. Khan and M.A. Bakar. 2010. Influence of nitrogen fertilization on growth and yield of two wheat varieties. Crop and environment 1(1): 57-58.