

## **EFFECT OF DIFFERENT SOURCES OF FERTILIZERS ON THE YIELD AND YIELD COMPONENTS OF WHEAT VARIETY KOHAT-2000 UNDER RAINFED CONDITIONS OF KOHAT DURING 2012**

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### **ABSTRACT**

Experimental site had pH value of 7.44 with electrical conductivity of 0.14 dS/cm. Soil was alkaline, strongly calcareous (21.25% CaCO<sub>3</sub>), deficient in organic matter, nitrogen & phosphorus and adequate in potassium. It has no problem of salinity and is clay loam in texture. The grain yield was significantly increased due to different fertilizer combinations. The highest grain yield of 2133 kg ha<sup>-1</sup> was recorded by applying Nitrophos+UREA+K<sub>2</sub>SO<sub>4</sub> @ 90-60-30 kg ha<sup>-1</sup> followed by 1933 and 1900 kg ha<sup>-1</sup> obtained by applying DAP+ Ammonium sulfate+ Potassium sulfate combinations and DAP+URAE+K<sub>2</sub>SO<sub>4</sub> combinations respectively.

**Keywords:** Wheat, Rainfed, Fertilizer doses, Yield, Yield component, Kohat-2000.

### **1. INTRODUCTION**

Soil is main reserve and store of nutrients for crops and trees which is major natural source of supplying food and shelter to mankind. The population in Pakistan is increasing at an alarming rate of more than 3%, which is putting further pressure on this natural resource. With the continuous cropping, soil loses its native fertility and the goal of self-sufficiency can't be obtained without the addition of chemical fertilizers. In the process of Agricultural Development, during the past about 63 years, the major break through of high yielding varieties of cereals coupled with higher rates of fertilizer application and other technological aspects like use of herbicides for control of weeds and insecticides for insect pests. These aspects have created concerns about their impact on environment. Worries about the accumulation of nitrates in drinking water and possible pesticide residues in our food supply have caused many people to question the value of major tool of modern agriculture.

A nutrient imbalance exists when one or more nutrients are not in applied in proper ratio. This can cause deficiency, toxic level of one or more nutrients or just excess of a nutrient that is

not toxic but hinders another nutrient from performing its normal function. A constant and balanced supply of elements is essential to good plant growth, otherwise nutrient deficiencies, toxicities or other effect, will cause plant nutrients stress. So soil analysis is a better diagnostic tool than other methods of fertility evaluation because it gives rapid results before sowing of the crop. By knowing the actual status of the soil and application of balanced fertilizers, the maximum and economical crop production can be obtained as well as fertility of the soil could be restored. Nutrients are lost from the soil plant system in a number of ways including, leaching, volatilization, de-nitrification, precipitation and fixation by clay minerals. Considerable amount of nutrients are taken up from the soil in harvested crop material. For sustainable agriculture, fertility of the soil must be maintained by adding fertilizers to the soil both in natural and organic form. So it is therefore, imperative to add fertilizers to the soil either in organic or in mineral form to get maximum yield of the crops.

The types and amounts of fertilizer to be applied depend on the crop to be grown and nutrient supplying power of soil. It has been reported that judicious and balanced fertilizer can increase crop yield up to 40-50%. The present experiment was designed to determine the optimum levels of NPK for achieving the profitable yield of improved variety Kohat-2000 under the agro-climatic conditions of Kohat. Application of proper amount of nitrogen is considered key to obtain bumper crop of wheat. Nitrogen comprises 7% of total dry matter of plants and is a constituent of many fundamental cell components such as nucleic acids, amino acids, enzymes, and photosynthetic pigments [1]. Spilt N application had little effect on yield, but decreased lodging and spike population, while grain weight increased [2]. Nitrogen application at 120 kg/ha for wheat has been recommended by various research workers [3, 4]. Geleto, et al. [5] reported that spike numbers and grain weight were increased with high level of nitrogen. Singh and Uttam [6] recorded increased grain yield with increase in nitrogen level. Chaudhry, et al. [7] found highest wheat genotype grain and straw yield with NPK @ 120-90-60 Kgha<sup>-1</sup> respectively. Bhatti, et al. [8] recorded better yield of two wheat varieties (Khushal and Maxi Pak) with the application of 92 Kg N, 90 Kg P and 67 kg K<sub>2</sub>O ha<sup>-1</sup> under rainfed condition.

## 2. MATERIALS AND METHODS

The experiment was laid out at Barani Agricultural Research Station (BARS), Kohat in RCB design with 3 replications. The following seven different fertilizer levels were used;

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2. DAP+ UREA+ Potassium sulfate
3. DAP + Ammonium sulfate +Potassium sulfate
4. Nitrophos + UREA +Potassium sulfate
5. Nitrophos + ammonium sulfate + Potassium sulfate
6. Single Super Phosphate +UREA+ potassium sulfate
7. Single Super Phosphate + ammonium sulfate + Potassium sulfate @90-60-30, N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O Kg/ha.

Prior to fertilizer application, a composite soil sample was collected and analyzed for various fertility parameters like organic matters, nitrogen, phosphorus and potash & physico-chemical characteristics like pH, electrical conductivity, percent lime and textural class. The data about the effect of different sources of fertilizers on were recorded. The crop was harvested on 08-05-2012. The net plot harvested was 5m<sup>2</sup> for recording yield data. The grain yield data was subjected to statistical analysis by computing analysis of variance and employing DMRT for comparison of means using MSTAT-C.

Treatment	Sources of fertilizers
T1	0-0-0
T2	DAP+URAE+K <sub>2</sub> SO <sub>4</sub>
T3	DAP+Amm:Sulfate+ K <sub>2</sub> SO <sub>4</sub>
T4	NP+URAE+ K <sub>2</sub> SO <sub>4</sub>
T5	NP+ Amm:sulfate+ K <sub>2</sub> SO <sub>4</sub>
T6	SSP+UREA+ K <sub>2</sub> SO <sub>4</sub>
T7	SSP+Amm: sulfate+ K <sub>2</sub> SO <sub>4</sub>

### 3. RESULTS AND DISCUSSION

The physico-chemical analysis of composite soil sample indicated that the experimental site had pH value of 7.44 with electrical conductivity of 0.14 dS/cm. Soil was alkaline, strongly calcareous (21.25% CaCO<sub>3</sub>), deficient in organic matter, nitrogen & phosphorus and adequate in potassium. It has no problem of salinity and is clay loam in texture having sand (22%), silt (40%) and clay (38%). Potash and Phosphorus was recorded 160 mg/kg and 9.4 mg/kg respectively. (Table 1)

The grain yield was significantly increased due to different fertilizer combinations (Table 2). The highest grain yield of 2133 kg ha<sup>-1</sup> was recorded by applying Nitrophos+UREA+K<sub>2</sub>SO<sub>4</sub> @ 90-60-30 kg ha<sup>-1</sup> followed by 1933 and 1900 kg ha<sup>-1</sup> obtained by applying DAP Ammonium sulfate+ Potassium sulfate combinations and DAP+URAE+K<sub>2</sub>SO<sub>4</sub> combinations respectively. The difference between the treatment No. 2, 3 and 4 was not significant, while these treatments were significantly different from the treatment No. 5, 6 and 7. The lowest grain yield of 1200 kg ha<sup>-1</sup> was recorded in the control treatment. So, it was concluded that T4: Nitrophos +URAE+ Potassium sulfate combinations @ 90:60:30 Kg/ha can be recommended as a suitable combinations to obtain highest grain yield under the agro climatic conditions of Kohat. The results are in close association with Geleto, et al. [5]. Application of potassium sulphate increased yield, yield components and protein content of wheat cultivar [9].

Masoume, et al. [10] reported that that potash fertilizer had a positive effect on most traits. Of field and laboratory traits, height, number of grains per spike, grain weight, grain yield.

Ali [11] reported that that effect of potassium on grain yield was highly significant. Increasing the level of potassium to 100 kg/ha, increased the grain yield to 4985.3 kg/ha. The results also showed that effect of nitrogen on grain yield was highly significant. The grain yield was increased to 4800 kg/ha by the application of 80 kg/ha nitrogen.

#### 4. CONCLUSION

Nitrophos +URAE+ Potassium sulfate combinations@ 90:60:30 Kg/ha can be recommended as suitable combinations to obtain highest grain yield under the agro climatic conditions of Kohat. This combination is recommended for the farmers of the area.

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**Table-1.**Physico-chemical characteristics of experimental site at BARS, Kohat.

Parameter	Unit	Value
pH	-	7.44
ECx10 <sup>3</sup>	ds/cm	0.14
CaCO <sub>3</sub>	%	21.25
Organic Matter	%	1.035
Nitrogen	%	0.05175
Phosphorus	mg/kg	9.4
Potash	mg/kg	160.0
Clay	%	38
Silt	%	40
Sand	%	22
Textural Class	-	Clay loam

**Table-2.**Effect of different sources of fertilizers on the grain yield of wheat variety KT- 2000 at BARS, Kohat.

Treatment	Sources of fertilizers	R1	R2	R3	MEAN	Ranking
T1	0-0-0	1600	900	1100	1200	B
T2	DAP+URAE+K <sub>2</sub> SO <sub>4</sub>	2400	1700	1600	1900	A
T3	DAP+Amm:Sulfate+ K <sub>2</sub> SO <sub>4</sub>	2000	2100	1700	1933	A
T4	NP+URAE+ K <sub>2</sub> SO <sub>4</sub>	2500	2000	1900	2133	A
T5	NP+ Amm:sulfate+ K <sub>2</sub> SO <sub>4</sub>	1800	1800	1300	1633	AB
T6	SSP+UREA+ K <sub>2</sub> SO <sub>4</sub>	1700	1600	1400	1566	AB
T7	SSP+Amm: sulfate+ K <sub>2</sub> SO <sub>4</sub>	1700	1300	1800	1600	AB

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