

Various Phosphorus Levels and Early Sowing Affect on Yield and Yield Components of Wheat under Semi Arid Conditions

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Abstract--A study was carried out to determine the effect of different doses of Phosphorus (0, 40, 70 and 100 kg ha⁻¹) on growth and yield of wheat. The application of 100 kg P₂O₅ ha⁻¹ produced significantly the highest total biomass, plant height (cm), number of fertile tillers m⁻², number of grains spike⁻¹, straw yield, harvest index and 1000 grain weight that consequently resulted to maximum grain yield (7060 kg ha⁻¹)

Key words: Phosphorus level, early sowing of wheat, yield and yield components. Punjab, Pakistan.

1 INTRODUCTION

Wheat is a staple food of the most of the countries like Pakistan. In Pakistan it is grown on an area of 9260 thousand hectares, with an annual production of 25482 thousand tons. The average grain yield is very low as compared to some other wheat producing countries obtained in UK, Germany, France, Egypt and USA.

Among many factors responsible for low yield, insufficient nutrient availability is the major one. Yield can be increased by the use of organic and inorganic manures. NP application to wheat results in an increase in grain yield, number of fertile tillers m⁻² and number of grains spike⁻¹ [2]. It has also been seen that if soil is deficient in Phosphorus, the response of crop Nitrogen is reduced [4]. Number of tillers m⁻² and grain yield have been reported to be significantly affected by different doses of P₂O₅ [6]. Grain weight spike⁻¹ was significantly affected by different doses of P₂O₅ was found by [11]. Different levels of Phosphorus have been shown to have a significant effect on grain yield of wheat [3]. The present study was therefore planned to investigate the optimum and balanced dose of Phosphorus for exploiting maximum inherent potential of wheat variety Inqlab-91.

2 MATERIALS AND METHODS:

This study was conducted to determine the effect of different doses of Phosphorus on growth and yield of wheat at the Experimental Farm. University College of Agriculture, Bahauddin Zakariya University, Multan on a clay loam soil. The experiment was laid out in a

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randomized complete block design (RCBD) with four replications having a net plot size of 2 x 2.5 meters. Different doses of Phosphorus tested were control (0) 40, 70 and 100 kg P₂O₅ ha⁻¹. Wheat variety inqlab-91 was sown by Rabi drill on October 25, 2014. Whole of P₂O₅ was applied at the time of seedbed preparation. All other agronomic practices were kept normal and uniform for all the treatment. Growth and yield parameters studied were number of fertile tillers m⁻² plant height, harvest index, number of grains spike⁻¹, 1000 grain weight, total biomass straw yield and grain yield against control. Standard procedures were adopted to record the data on various growth and yield parameters.

The data collected was analyzed statistically by using Fisher's analysis of variance technique and mean values were compared after least significant difference test at 0.05 probability level [10].

3 RESULTS AND DISCUSSION

Various doses of phosphorus affected significantly on wheat. The highest number of fertile tillers m⁻² (440) were produced by application of 100 kg P₂O₅ ha⁻¹ and the minimum number of fertile tillers m⁻² (358) were observed in control treatment. The same results were reported by [9].

Plant height was not affected significantly with different doses of phosphorus (Table-1). However, maximum height (99.35 cm) was found where 100 kg P₂O₅

ha⁻¹ was used and minimum (95 cm) was observed in control treatment. Various doses of P₂O₅ affected significantly the number of grains spike⁻¹ (Table-1).

Maximum numbers of grains (48.85) were observed where 100 kg P₂O₅ ha⁻¹ was applied and minimum numbers of grains (35.8) were found in treatment where no P₂O₅ was used. These result were confirmed by [3,7,8].

1000 grains weight was significantly affected by increasing doses of phosphorus. Maximum weight (45.58 g) was found by applying 100 kg P₂O₅ ha⁻¹ (Table-1) against untreated control (37.54 g). These results are supported by [4,6].

Statistically significant differences were observed regarding total biological yield at different P₂O₅ dose

levels Maximum (23600 kg ha⁻¹) applied against control (18815 kg ha⁻¹) (Table-1) [11]. Various doses of P₂O₅ affected significantly the grain yield (Table-2).

Maximum grain yield (7060 kg ha⁻¹) was obtained at application rate of 100 kg P₂O₅ ha⁻¹ against untreated control (5175 kg ha⁻¹). Similar conclusions were reported by [5].

Straw yield and harvest index was also significantly affected by the increasing doses of the P₂O₅ (Table-2).

Maximum straw yield (16435 kg ha⁻¹) was obtained by 100 kg ha⁻¹ P₂O₅ applications against control treatment (13640 kg ha⁻¹). The maximum harvest index (30.44) was found by 40 kg ha⁻¹ P₂O₅ application against untreated control (26.85). These results are in same line with those of [12].

Table-1 Effect of different levels of phosphorus on yield and yield components of wheat

Treatments (P ₂ O ₅ ha ⁻¹)	Plant Height (cm)	No. of Fertile tillers m ²	No. of Grains Spike ⁻¹	1000 Grains Weight (g)
100 kg	99.35 a	440 a	48.85 a	45.58 a
70 kg	98.12 a	401.5 b	44.80 b	44.41 a
40 kg	96.25 a	380 c	40.95 c	42.18 b
Control	95.0 a	358 d	35.8 d	37.54 c

Means sharing same letters are statistically non-significant at 5% probability level.

Table-2 Effect of different levels of phosphorus on yield and yield components of wheat

Treatments (P ₂ O ₅ ha ⁻¹)	Total Biomass kg ha ⁻¹	Grain Yield kg ha ⁻¹	Straw Yield kg ha ⁻¹	Harvest Index (%age)
100 kg	23600 a	7060 a	16435 a	29.92 b
70 kg	20528 b	6850 b	15450 b	30.10 b
40 kg	19146 c	6290 c	14710 c	30.44 a
Control	18815 d	5175 d	13640 d	26.85 c

Means sharing same letters are statistically non-significant at 5% probability level.

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