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Yield and Quality of Late Sown Wheat (*Triticum aestivum* L.) as Influenced by Methods of Seeding and Fertilizer Application

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Abstract

Field experiment conducted in Ghaziabad revealed that placement of fertilizer in rows 5 cm below the seed resulted in higher yield, protein yield, total nitrogen, phosphorus and potassium uptake over other methods of seed and fertilizer placements.

Key words : Fertilizer placement, Nutrient uptake, Protein yield, Seed placement, Wheat.

The call for increased food production is necessary to keep pace with the tremendously growing population and constitute one of the important problem of the whole world. Delay in sowing beyond optimum time cause huge reduction in yield (1). Not only delayed sowing but faulty method of seeding and fertilizer application of crop is also an important factor in reducing the crop yield (2). In most parts of Uttar Pradesh, broad casting has become a common method for seed and fertilizer application. As result of these methods yields are reduced and nutrient uptake by crop, which is a multiple of nutrient content and yield, is highly affected. Hence, present study was carried out at Simbholi, Ghaziabad to study the effect of methods of seeding and fertilizer application on yield and quality of late sown wheat.

Methods

The study was conducted at the student research of Kisan Post Graduate College, Simbholi, Ghaziabad, Uttar Pradesh during winter season of 2002-2003. The soil was sandy loam with average value of pH 6.8, organic carbon 0.28%, available P_2O_5 22.4 kg/ha and available K_2O 135 kg/ha. The experiment was laid out in randomized block design. The treatments consisted of six different methods of fertilizer and seed placement viz. broadcast of seed and fertilizer separately followed by mixing with plough (T_1), broadcast of seed and fertilizer mixed together followed by mixing with plough (T_2), broadcast of fertilizer followed by sowing of seeds in rows (T_3), seed and fertilizer placed in rows simultaneously (T_4), fertilizer and seed mixed and then sown in rows (T_5), and placement of fertilizer in rows 5 cm below the seed (T_6). These comprises six treatments which were replicated three times. The wheat cultivar UP 2338, at the distance of 20 cm from row to row, was sown on 2 December during the year of experiment using a seed rate of 125 kg/ha. The experimental plot received uniform fertilizer dose 120 kg N/ha, 60 kg P_2O_5 and 60kg K_2O through urea, diammonium phosphate and muriate of potash, respectively. The half dose of nitrogen and full dose of phosphorus and potassium were applied as basal and remaining half dose of nitrogen was applied in two equal split at tillering and panicle initiation stages of wheat. The crop was grown under irrigated conditions with six irrigations during whole span of crop. The crop was harvested manually at the maturity and the grain and straw yields of wheat were recorded. The thoroughly washed plant samples were dried in oven at 70 ± 2C for 48h, grounded in Wiley mill, and digested in a di-acid mixture of HNo_3 and $HClO_4$(3). Concentration (%) of N, P and K of grain and straw were analyzed separately after harvesting the crop on dry weight basis. The uptake of nutrient was calculated by multiplying the concentration of nutrients with the respective yield of wheat in kg/ha.

Table 1. Effect of different methods of seeding and fertilizer application on grain yield , straw yield and quality of wheat. T_1 = Broadcast of seed and fertilizer separately followed by mixing with plough, T_2 = Broadcast of seed and fertilizer mixed together followed by mixing with plough, T_3 = Broadcast of fertilizer followed by sowing of seeds in rows, T_4 = Seed and fertilizer placed in rows simultaneously, T_5 = Fertilizer and seed mixed and then sown in rows and T_6 = Placement of fertilizer in rows 5 cm below the seed.

	Yield (kg/ha)			Quality	
Treatments	Grain yield	Straw yield	Mean	Protein content (%)	Protein in grain (kg/ha)
T_1	4417.00	8917.00	6667.00	10.90	481.53
T_2	4750.00	8583.00	6666.50	10.90	517.63
T_3	4850.00	8167.00	6508.50	10.93	529.70
T_4	4417.00	8917.00	6667.00	10.88	481.38
T_5	3667.00	7167.00	5417.00	10.87	398.40
T_6	5167.00	8312.00	6739.50	10.94	565.87
SE ±	109.08	215.20	–	0.24	15.16
CD (P = 0.05)	343.69	678.03	–	NS	47.78

Results and Discussion

Yield

The method of fertilizer and seed placement had a marked influence on grain yield and straw yield. Maximum grain yield was produced when fertilizers was placed 5 cm below the seed in rows whereas, sees and fertilizer placed in a row simultaneously visualized higher straw yield. Higher grain yield might be due to increased availability of nutrients due to localized placement below the seed (4). The reduction in grain yield was 40.9% when the fertilizer and seed mixed and then sown in rows over the placement of fertilizer in rows 5 cm below the seed. While reduction in straw yield was 24.4% due seed and fertilizer placed in rows simultaneously over fertilizer and seed mixed and then sown in rows.

Protein Content and Yield

Quality aspect of wheat is considered to be important aspect and it is a genetically governed character (5) so different methods of fertilizer and seed placement could not bring about significant influence on protein content (%) in grain. T_6 recorded highest protein content (%) in grain and may be attrib-

Table 2. Effect of different methods of seeding and fertilizer application on N, P and K uptake (kg/ha) by wheat. T_1 = Broadcast of seed and fertilizer separately followed by mixing with plough, T_2 = Broadcast of seed and fertilizer mixed together followed by mixing with plough, T_3 = Broadcast of fertilizer followed by sowing of seeds in rows, T_4 = Seed and fertilizer placed in rows simultaneously, T_5 = Fertilizer and seed mixed and then sown in rows and T_6 = Placement of fertilizer in rows 5 cm below the seed.

	Nitrogen uptake (kg/ha)			Phosphorus uptake (kg/ha)			Potassium uptake (kg/ha)		
Treat-ments	Grain	Straw	Total	Grain	Straw	Total	Grain	Straw	Total
T_1	77.04	41.18	118.23	14.71	15.56	30.27	17.49	35.37	52.86
T_2	82.82	42.69	125.51	15.95	15.30	31.25	21.84	39.55	61.38
T_3	84.75	41.41	126.17	16.48	15.03	31.51	23.75	40.04	63.49
T_4	77.02	46.04	123.06	15.28	16.67	31.95	18.56	37.41	55.98
T_5	63.74	41.99	105.73	12.83	13.62	26.45	16.76	32.73	49.49
T_6	90.54	51.74	142.28	18.29	17.04	35.33	28.12	45.27	73.39
SE ±	2.43	1.19	2.41	0.37	0.42	0.50	0.48	1.42	1.15
CD (P=0.05)	7.64	3.76	7.61	1.16	1.32	1.56	1.52	4.47	3.64

uted to higher nutrient up take as well as higher grain yield (5). Protein yield significantly affected by different methods of fertilizer and seed application. Among all the methods of seed and fertilizer application, T_6 recorded maximum protein yield which was 42.2% higher over lowest protein yielding treatment T_5. Similar results were reported by Mahajan et al. (5).

Nutrient Uptake

Out of all methods of fertilizer and seed application, when fertilizers was placed 5 cm below the seed in rows found to have highest nutrient uptake in grain and straw of wheat. This might be due to greater availability of nutrients on account of localized placement near the crop plants which led to the higher absorption of nutrients and their accumulation in grain and straw. Fertilizers when placed 5 cm below the seed in rows resulted in highest total uptake of N, P and K by wheat grains and straw. The uptake of nutrients in plant is an indication of their relative supply to the crop from the growing medium, resulting into increased uptake with increasing time of nutrient availability (6). In contrast to these, when fertilizer and seed mixed and then sown in rows accounted for lowest nutrient uptake in grain and straw of wheat, except nitrogen uptake by straw which was found to be lowest when broadcast of seed and fertilizer was done separately followed by mixing with plough.

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