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Studies on the Comparative Efficiency of EM-Biokasht and Chemical Fertilizers in Improving the Yield Attributes of Wheat

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Abstract

The results revealed that maximum grain yield (5.56 t ha^{-1}) was obtained with the application of standard recommended dose of chemical fertilizer. However, it was followed by the treatment where 1000 kg ha $^{-1}$ of EM-Biokasht was applied at sowing. It can thus be concluded that although use of EM-Biokasht did not produce comparable results with that of NPK application, but keeping in view the high cost of NPK fertilization, the use of EM-Biokasht at the rate of 1000 kg ha^{-1} can be recommended for obtaining a reasonable wheat yield with the addative benefit of producing priced wheat under natural farming system.

Introduction

Jain *et al*. (1973) applied phosphorus, potassium and seed inoculation with Azotobacter at 1, 2, 3 kg ha^{-1} to wheat crop and obtained grain yield of 1.99, 2.08 and 2.19 t ha^{-1}, respectively. Application of 40, 60, 80 and 100 kg N yielded 1.90, 2.03, 2.08 and 2.15 t ha^{-1}, respectively compared with 1.9 t ha^{-1} on plots given no nitrogen or seed inoculation. Seed inoculation with Azotobacter at 3 kg ha combined with application of 100 kg N ha^{-1} gave the highest yield of 2.38 t ha^{-1}. Akhtar (1982) found that addition of Archniotus sp. alongwith chaffed wheat straw unamended or amended with N or NK to the field during seed bed preparation enhanced the yield of wheat and maize by 42.7 and 11.4 percent, respectively, Giannone *et al*. (1990) observed in green house trials that plant dry weight and grain weight per spike were higher in 60 percent of durum wheat cultivars inoculated with *Azopirillum brasilense* strain Sp 7 than uninoculated control. Savalgi *et al*. (1991) obtained grain yield of 0.82 t ha^{-1} in wheat crop inoculated with *Azopirillum brasilense* and given 37.5 kg N ha^{-1} (75% of the recommended rate) compared with 0.78 with no seed inoculation. Jilani *et al*. (1992) conducted several experiments to determine the usefulness of EM in crop production. The results revealed that during the first year, the wheat crop showed a little positive response to EM application. In the second year, in an experiment on rice and wheat, the effect of EM was statistically significant in both crops. However, the yield of crops was maximum with fertilizer treatment followed by green manure + EM. It was observed that EM caused rapid decomposition of organic material to give higher N contents at 15 and 45 days of composting. Hussain *et al*. (1993) applied EM alone and in combination with NPK fertilizer, green manure and FYM on rice-wheat and wheat-cotton sequences. EM application increased the yield of rice and wheat significantly. The highest response of EM was obtained with NPK fertilizers followed by green manuring. The average yield increase with EM was 18.3 and 39 percent for rice and wheat, respectively.

The present study was, therefore, undertaken to compare the growth and yield response of wheat genotype Inqulab-91 with high cost fertilizer technology and effective micro organisms (EM) Biokasht application where Biokasht was poultry manure fermented with EM.

Materials and Methods

A field experiment with Randomized Complete Block Design was conducted at the Post-graduate Agricultural Research Station (PARS), University of Agriculture, Faisalabad during the year 1994-95. The net plot size measured 4 m x 7 m. The soil was clay loam with pH 7.92. Nitrogen, available phosphorus and potash were 0.035 percent, 6.2 ppm and 120 ppm, respectively. Wheat variety inqulab-91 was sown in 25 cm spaced rows with a single row hand drill. The experiment comprised the following treatments: control, recommended NPK at 120-90-60 kg ha^{-1}, EM Biokasht at 250 kg ha^{-1}, EM Biokasht at 500 kg ha^{-1}, EM Biokasht at 1000 kg ha (all broadcasted at sowing time) and EM Biokasht at 250 kg ha^{-1} (side dressed at the time of sowing). All other cultural practices were done uniformly in all the plots. Observations were recorded on plant parameters like number of tillers/m^2, length of spike, number of grains/spike, 1000-grain weight and grain yield ha^{-1} using standard procedures. Data collected were analysed using analysis of variance technique and least significant difference (LSD) test was employed at 0.05 probability level to compare the differences among treatment means (Steel and Torrie, 1984).

Results and Discussion

The data pertaining to various yield parameters are presented in Table 1.

It is evident from the table that the application of NPK fertilizers at 120-90-60 kg ha^{-1} resulted in significantly maximum number of tillers m^2 followed by EM-Biokasht at 1000 kg ha^{-1} (broadcasted at sowing) and EM-Biokesht at 250 kg ha^{-1} (side dressed at sowing). Similarly, highest length of spike was obtained by the application of NPK. However, it was statistically similar to the length of spike obtained by applying EM-Biokasht at 1000 kg ha^{-1} (broadcasted). Similar results were also reported by Giannone *et al*. (1990). The data further showed that recommended NPK fertilizer produced highest number of grains per spike followed by all the EM-Biokasht treatments which produced statistically the same results.

Table 1: Wheat yield attributes as affected by NPK fertilizer and EM-biokasht applications

	No. of tillers Per unit area (m^2)	Length of spike (cm)	No. of grains per spike	1000-grain weight (cm)	Grain yield (t/ha)
Control	355.50 c	9.22 c	52.55 c	44.95 c	1.74 c
Recommended NPK at 120-90-60	482.00 a	12.82 a	64.85 a	49.38 a	5.56 a
EM.Biokasht at 250 kg ha^{-1} (Broadcasted at sowing)	361.25 c	10.77 b	55.27 bc	47.88 b	2.07 c
EM-Biokasht at 500 kg ha^{-1} (Broadcasted at sowing)	393.00 bc	11.40 b	57.55 b	47.93 b	3.43 b
EM-Biokasht at 1000 kg ha^{-1} (Broadcasted at sowing)	424.25 b	11.85 ab	59.22 b	48.57 ab	3.98 b
EM-Biokasht at 250 kg ha^{-1} (side dressed at sowing)	417.00 b	11.04 b	56.77 b	47.06 b	3.44 b

Means followed by the same letters did not differ significantly at 5% probability level.

Maximum grain weight was also recorded with NPK fertilizer application. All other treatments showed increasing trend in 1000-grain weight and were significantly higher over control but varied non-significantly from each other. These results are in line with those of Giannone *et al*. (1990). The data indicate that maximum grain yield (5.56 t ha^{-1}) was recorded where NPK at 120-90-60 kg ha^{-1} was applied. Treatments where EM-Biokasht was applied at 500 kg ha^{-1} (broadcasted), 1000 kg ha^{-1} (broadcasted) and 250 kg ha^{-1} (side dressed) were next to NPK application but remained statistically alike. However, minimum grain yield (1.74 t ha^{-1}) was recorded in control treatment.

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Three-year data indicate that fertilizers studied before fertilization (factor A) and nitrogen fertilizers used in early spring fertilizing (factor B) significantly increased the yield of winter wheat relative to the natural agrochemical background (Table 3). Analysis of the results of the experiment under study indicates a significant role of the main fertilizer (A) in the formation of crop yield, the increment, depending on the background of the feed, was 0.34-0.49 t / ha. When choosing a fertilizer system for winter wheat, located after winter wheat in the zone of unstable moistening on lea