INTERNATIONAL JOURNAL OF AGRICULTURE & BIOLOGY
1560-8530/99/01-3-112-113

Effect of Biopost on Different Yield Components of Wheat

RUKHSANA KAUSAR, MUHAMMAD ZAFAR IQBAL†, MUHAMMAD IQBAL‡ AND MUHAMMAD ISMAIL†
Department of Plant Pathology, University of Agriculture, Faisalabad-38040, Pakistan
†*Plant Protection Institute, Faisalabad, Pakistan*
‡*University College of Agriculture, Rawalakot, Azad Kashmir*

ABSTRACT

Effect of biopost (biofertilizer) on different growth parameters viz., plant height, number of tillers/plant, grain yield and 500 grain weight was studied. NPK (½ of the recommended dose) + biopost single dose (300 kg/ha) gave a maximum of 39.99, 30.26 and 19.17% increase in number of tillers, yield and grain weight. The recommended dose of biopost showed 34 and 36% decrease over the control.

Key Words: Biopost; Wheat; *Azotobacter;* Fungi; Pakistan

INTRODUCTION

The modern day intensive crop cultivation involves the use of chemical fertilizers which are not only in short supply but also expensive besides being hazardous. The current trend would be to explore the possibility of supplementing chemical fertilizers with organic ones more particularly the biofertilizers. Biofertilizer contains live or latent cells of efficient strains of nitrogen fixing, phosphate solubilizing or cellulolytic micro-organisms used for application to seed, soil or composting areas to accelerate microbial processes to augment the extent of availability of nutrients.

Nitrogen fixation potential of *Azotobacter* and *Azospirillum* are known. The organic matter rich soils promote the activities of these organisms (Bhardwaj & Gour, 1970; Lakshami *et al.*, 1972; Dobereiner & Day, 1975). *Azolla pinnata* reported to be grown in 400 thousand hectares in vietnam provides nitrogen equivalent to 5 tonnes/ha rice (Tran & Tuan, 1973). *Azospirillum* has been isolated from roots and stems of different plants and wheat varieties (Lakshami *et al.*, 1977). Biofertilizer can appropriately be called as a microbial inoculant. Biopost is a combination of micro-organisms that act on organic matter and convert into humus.

MATERIALS AND METHODS

These studies were conducted at Plant Pathology Research Area, University of Agriculture, Faisalabad, during the years 1995-96 and 1996-97. The experiment was laid out in randomized complete block design with a plot size of 5x16.66 m. Field was divided into 18 plots with three replications and each replication having six treatments. In the next year, 16 plots were prepared having four replications and four treatments. Biopost was added @ 2.5 kg/plot. Urea, DAP and K_2SO_4 were added @ 1.73, 1.29 and 0.86 kg/plot, respectively. DAP, K_2SO_4 and urea (¼th) were added at the time of sowing and urea (¾th) was applied alongwith first irrigation. Farm yard manure was mixed before sowing @ 25 tonnes/ha. The replications were 1 m apart with line to line distance of 0.33 m and plot to plot 0.66 m. All the agronomic practices were kept uniform for all the treatments. Biopost was spread in the field before sowing during both years. The seed application was done only in 1996-97.

The observations were recorded on plant height, number of tillers, yield/sq.m. and 500 grain weight. The data were statistically analysed using Fisher's analysis of variance technique and least significant difference test at 5% probability level was applied to test the significance among treatment means (Steel & Torrie, 1984).

RESULTS AND DISCUSSION

Year 1995-96. The treatment NPK ½ + Biopost gave excellent results in all the yield components of wheat. Individual comparison indicated that it showed maximum increase in plant height i.e. 0.89 cm. It gave 6.24% increase and differed significantly with the treatments NPK ½ + Biopost double and NPK. It retained its effectiveness and increased the number of tillers, yield and grain weight by 31.6, 30.26 and 19.17%, respectively (Table I). The addition of NPK ½ + Biopost double gave 1.07, 8.97, 14.75 and 0.23% increase in plant height, number of tillers, yield and grain weight, respectively. It showed less effectiveness in all the parameters.

Year 1996-97. Four treatments were given this year. Seed was also treated with biopost. The best treatment came out to be biopost single dose in increasing the plant height (0.87 m) and it showed 10% increase (Table I). It was closely followed by NPK ½ + biopost. More number of tillers were produced by NPK ½ + biopost (15.13/plant). A significant increase (515 gm/plot) in grain yield was recorded over all the treatments by the same treatment (Table II). When a combination of NPK ½ + biopost was administered, the grain weight (24.14 gm) for 500 grains was also more as compared to all other treatments.

In soil, the beneficial effects of small amounts of humus on the growth of *Azotobacter* and its nitrogen fixation are known since long. Yield increases have been rather variable from simple general to significant increase in rice, cabbage and brinjal (Joi & Shinde, 1976). The utility of seed inoculation with *Azospirillum* was tried by Subba *et al.* (1979) on sorghum and pearl millet where enhancement in yield was recorded. The present study also deals with seed inoculation of wheat crop, wherein there looks to be ample chance of yield enhancement.

Table I. Per cent increases in different yield components of wheat

Treatments	1995-96				1996-97			
↓	Plant height	Tillers/ plant	Yield	Grain weight	Plant height	Tillers/ plant	Yield	Grain weight
Control	-	-	-	-	-	-	-	-
NPK	1.35	16.56	18.36	3.90	5.27	3.29	3.91	3.84
BP	4.13	28.77	25.34	8.44	10.00	10.56	8.93	8.39
BPD	2.66	27.89	23.00	7.51	-	-	-	-
NPK ½ + BP	6.24	31.60	30.26	19.17	8.31	39.99	15.00	14.51
NPK ½ + BPD	1.07	8.97	14.75	0.23	-	-	-	-

BP=Biopost; BPD= Biopost double dose

Table II. Comparison of means as affected by various treatments

Treatments	1995-96				1996-97			
↓	Plant height (m)	Tillers/ plant	Yield/m^2 (g)	500-Grain weight (g)	Plant height (m)	Tillers/ plant	Yield/m^2 (g)	500-Grain weight (g)
Control	0.84 b	11.47 c	305.00 d	17.16 d	0.79 c	11.55 c	447.50 c	21.08 c
NPK	0.85 b	13.37 b	361.00 c	17.83 bcd	0.83 b	11.93 c	465.00 c	21.89 c
BP	0.87 ab	14.77 a	382.30 b	18.61 b	0.87 a	12.77 b	487.50 c	22.85 b
BPD	0.86 ab	14.67 a	375.30 b	18.45 bc	-	-	-	-
NPK ½ + BP	0.89 a	15.10 a	397.30 a	20.46 a	0.85 ab	15.13 a	515.00 a	24.14 a
NPK ½ + BPD	0.85 b	12.50 bc	350.00 c	17.20 cd	-	-	-	-

BP=Biopost; BPD= Biopost double dose

REFERENCES

Bhardwaj, K.K.R. and A.C. Gour, 1970. The effect of humic and fulvic acids on the growth and efficiency of nitrogen fixation of *Azotobacter chroococcum*. *Folia Microbiol.*, 15: 364–7.

Dobereiner, J. and J.M. Day, 1975. Nitrogen fixation in the rhizosphere of tropical grasses. *In: Nitrogen fixation by free living microorganisms*. W.D.P. Stewart (ed.). Cambridge Univ. Press, London. pp: 39–56.

Joi, M.B. and P.A. Shinde, 1976. Response of onion crop to Azotobacterization. *J. Maharashtra Agri. Univ.*, 1: 161–2.

Lakshami, K., N.S. Subba, K.V.B.R. Tilak and C.S. Singh, 1972. *Azospirillum*, a new bacterial fertilizer for tropical crops. *Sci. Reporter, Council of Scientific and Industrial Research (India)*, 16: 690–2.

Lakshami, V.A., M. Satyanarayana and M. Vijayalakshmi, L. Kumari, K.V.B.R. Tilak and N.S. Subba, 1977. Establishment and survival of *Spirillum lipoferum*. *Proc. Indian Acad. Sci.*, 86: 397–404.

Steel, R.G.D. and J.H. Torrie, 1984. *Principles and Procedures of Statistics*. pp: 172–7. McGraw Hill Book Co. Inc., New York.

Subba, N.S., M.R. Pahwa and M. Lakshami Kumari, 1979. Effect of combined nitrogen in legume root nodulation. *Acta Botanica Indica*, 1: 54–63.

Tran, Q. and D.T. Tuan, 1973. *Azolla*. A green manure. *Agric. Prob., Vol.4, Vietnamese studies*, 38: 119–27.

(Received 09 June 1999; Accepted 25 June 1999)