

## Effect of Organic Amendments with Wheat Straw and Sugarcane Bagasse on Activities of *Azotobacter*

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### ABSTRACT

A field experiment with *Azotobacter* in various combinations with wheat straw and sugarcane bagasse was conducted during the *kharif* 1975 season. Data on grain yield of jowar showed that the treatments, wheat straw (W.S.) + *Azotobacter*, wheat straw alone and sugarcane bagasse (S.B.) + *Azotobacter* gave significantly higher grain yields than control whereas W.S. + *Azotobacter* treatment gave significant increase in yield over *Azotobacter* alone. In studies using wheat as succeeding crop during the rabi 1975 season it was observed that the treatment W.S. + *Azotobacter* proved superior to other treatments in increasing the grain yield of wheat.

### INTRODUCTION

Seed and soil application of *Azotobacter* is being increasingly used for higher crop production. Besides producing the physiologically active substances that accelerate plant growth, *Azotobacter* is known to fix appreciable amount of atmospheric nitrogen under certain ecological conditions and make it available for plant growth (Vancura and Macura, 1960). To be able to carry out these activities efficiently *Azotobacter* should be able to derive required energy from the organic matter in the soil. An attempt was therefore made to determine the effect of organic amendments such as wheat straw and sugarcane bagasse on the activities of *Azotobacter* and on sorghum yield.

### MATERIALS AND METHODS

A field experiment with *Azotobacter* in the following combination with wheat straw and sugarcane bagasse was conducted during *kharif* 1975 season: wheat straw alone, W.S. + *Azotobacter*, sugarcane bagasse alone, S.B. + *Azotobacter*, *Azotobacter* alone, and control. The experiment was laid out in plots of 5 X 3 m size using randomised block design with four replications. Basal dose of fertilizers at 50 kg N, 50 kg K<sub>2</sub>O and 30 kg K<sub>2</sub>O/ha was added to all plots. The C:N ratios of wheat straw and sugarcane bagasse were adjusted to 36:1 by adding required quantities of urea to respective treatments. Organic amendments were incorporated into soil at the rate of 25 tons/ha before sowing.

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Jowar variety CSH-1 was used. Before sowing, the seed was coated with *Azotobacter* at the rate of one packet of 250 g (containing  $10^6$ - $10^8$  cells/g inoculant) for three kg seed. Seed rate used was 7.5 kg/ha. One month after sowing second dose of nitrogen at 24 kg N/ha was given. The crop was harvested 120 days after sowing. To study the residual effect of these treatments, wheat variety U.P.215 was sown in the same plots in *Rabi* 1975. No fertilizer dose was given to wheat crop. Data on grain yield and dry matter were recorded and statistically analysed.

## RESULTS AND DISCUSSION

The treatments W.S. + *Azotobacter*, wheat straw alone and sugarcane bagasse + *Azotobacter* gave significantly higher yields of jowar over the control whereas, W.S. + *Azotobacter* combination gave significant increase in yield over *Azotobacter* alone (Table). wheat straw alone, sugarcane bagasse

+ *Azotobacter* sugarcane bagasse, alone. W.S. + *Azotobacter* treatments gave significant increase in dry matter over the control. However, none of the treatments produced significantly higher dry matter over *Azotobacter* alone.

Studies on the residual effect of these organic amendments on grain yield of wheat crop showed that all treatments gave significant increase in grain yield of wheat over the control. Among these treatments, W.S. + *Azotobacter* treatment was superior to all other treatments. Increased yields due to direct incorporation of different organic amendments enriched with mineral fertilizers to narrow down C:N ratio have been reported (Dhar, 1968; Gupta and Idnani, 1970; Wani, 1975; Patil, 1976). Gaur *et al.* (1971) reported increase in population of *Azotobacter* due to addition of wheat straw to soil.

TABLE. Effect of organic amendments in combination with *Azotobacter* on yields of jowar and wheat

Treatment	Jowar		Wheat
	Grain yield (kg/plot)	Dry matter (kg/plot)	Grain yield (g/plot)
Wheat straw (W. S.)	6.41	15.35	550
W.S. + <i>Azotobacter</i>	6.66	13.78	622
Sugarcane bagasse (S.B.)	5.80	14.81	562
S.B. + <i>Azotobacter</i>	5.90	14.41	530
<i>Azotobacter</i> (alone)	5.71	11.35	510
Control	5.51	10.87	397
C.D. (P = 0.05)	0.01	0.07	69

Results obtained in the present investigation indicated that enriched wheat straw amendment in combination with *Azotobacter* appears to have beneficial effect as compared to enriched sugarcane bagasse plus *Azotobacter* on grain yield of both jowar and wheat crops. This may be due to ready availability of energy from wheat straw as compared that from sugarcane bagasse. It was also noted that combined use of enriched organic residues and *Azotobacter*, was better than simple amendments with enriched organic residues.

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