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Effect of N and P levels and biofertilizers on the growth and yield of wheat under late sown irrigated conditions

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ABSTRACT

A field experiment was conducted during the *rabi* season of 2002-2003 at the wheat research unit of Dr.P.D.K.V. Akola to study the effect of N and P levels and biofertilizers on the growth and yield of wheat under late sown irrigated conditions. Four NP fertilizer levels (0:0, 40:20, 60:30 and 80;40 kg NP/ha corresponding to control, 50%, 75%, and 100% RDF) in main plots and four biofertilizer treatments (control,Azotobacter, Phosphate Solubilizing bacteria(PSB) and coinoculation of Azotobacter+ PSB) in subplot were replicated four times in split plot design. The growth and yield attributes showed an increase with increase in the NP fertilizer levels.100% RDF recorded significantly highest grain yield (32.40 q/ha) and staw yield (39.78 q/ha). Azotobacter and PSB inoculation, being at par caused significant improvement in the growth and yield attributes over control. Co-inoculation of both the biofertilizers further increased the growth and yield attributes over individual inoculation. Combined inoculation yielded maximum grain yield (26.06 q/ha) and staw yield (33.69 q/ha). Interaction effect showed that application of 60:30 kg N:P/ha (75%RDF) coupled with combined inoculation registered significantly higher grain yield (30.96 q/ha) of wheat with higher net profit, B:C ratio than those with 80;40 kg N:P/ha (100%RDF) (30q/ha) without biofertilizer inoculation. Thus 25% saving in nitrogen and phosphorus application could be possible with combined inoculation of Azotobacter+ PSB.

Key words : Wheat, Nitrogen, Phosphorus, Biofertilizer, Late sown, Irrigated conditions.

INTRODUCTION

Wheat is the major foodgrain crop of India. To meet the growing demand of people for food the only suitable strategy now available in the country for large scale application is to increase production per unit area per unit time. Wheat is a fertilizer responsive and comparatively less risky crop. On the basis of field experimental results fertilizer recommendations have been made for different agro-ecological zones of the country. In Vidarbha region of Maharashtra state, a fertilizer dose of 80:40:40 NPK kg/ha has been recommended for irrigated wheat under late sown conditions.Sowing may be delayed because of previous *kharif* crop, non-availability of labour, seed material, irrigation etc.

Commercial fertilizer input is very expensive and there is finance constraint. It is in these contexts that the concept of integrated plant nutrient supply system(IPNS) is gaining ground. The concept calls for judicious and integrated use of chemical source of nutrients along with nutrients through green manures, crop residues, rural and urban wastes and biofertilizers.

Crop receiving Azotobacter inoculation with moderate level of fertilizer N gave similar yield as the crop receiving higher dose of mineral fertilizer but uninoculated (Nair andTauro, 1979). Phosphorus is an important macro plant nutrient ranked next only to N. Only about 20-25% of P applied to the soil is available for crop in the year of application and remaining part is converted into unavailable forms. Inoculation of seed or seedling with PSB can solubilze 30-50 kg P2O5/ha equivalent to p applied as s.s.p by solubilizing soil phosphorus and also applied phosphorus (Singh, 2002). Biofertilizers based on renewable energy source are a cost effective supplement to chemical fertilizers and can help to economise on the high investment needed for fertilizer use as far as N and P are concored.

MATERIALS AND METHODS

A field experiment was conducted at the Wheat research unit, Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, on plot no. 8 during *rabi* season of 2002-2003. The soil of the experimental field characterized clay loam in texture with PH 7.67 and was low in organic carbon (0.32%) and available nitrogen (171.3kg/ha),medium in available phosphorus (37.4kg/ha) and high in available potassium (352kg/ha). Treatments consisting of four combinations of N and P levels through urea and s.s.p. (0:0, 40:20, 60:30 and 80:40 kg NP/ha corresponding to control, 50%, 75%,and 100%RDF) in main plots and four biofertilizers treatments (control,Azotobacter, Phosphate Solubilizing bacteria (PSB) and coinoculation of Azotobacter+ PSB) in subplot were replicated four times in split plot design. The uniform dose of 40kg K20/ha was given through muriate of potash.

Treatment wise ½ dose of N and full dose of P and K were drilled in rows at the time of sowing. Remaining ½ dose of N was given at 30 days after sowing through urea. The crop variety was AKW-1071 (purna).The crop

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