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Effect of liquid formulation of Symbion – N (*Azospirillum*) and Symbion - P (*Phosphobacter*) on the growth and yield of okra

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ABSTRACT

A field experiment was conducted to evaluate the effect of liquid biofertilizer Symbion N (*Azospirillum*) and Symbion P (*Phosphobacter*) on the growth and yield of okra. The experiment was laid out in Annamalai University experimental farm in clay loam soil during summer 2006. The treatments studied were T_1 – Symbion N (foliar), T_2 – Symbion P (soil), T_3 – Symbion – N (foliar) + Symbion P (soil), T_4 – Symbion N + Symbion P (soil) and T_5 – control. All the treatments were replicated three times in RBD. A fertilizer schedule of 40:50:30 kg N: P_2O_5:K_2O / ha was applied to all the treatments. The foliar application of Symbion N was followed @ 250 ml /ha and sprayed at 10 days after sowing and another at flowering. The soil application of liquid formulations was carried out @ 250 ml / ha applied one at 10 days after sowing and another at flowering. Okra variety Parbani Kranti was sown as test crop. The results of the study indicated that application of liquid bio-fertilizer both Symbion N and Symbion P significantly increased the growth character, yield character and yield of okra. Among various treatments, Symbion N and Symbion P both applied in soil was significantly superior in increasing the growth and yield of okra. This treatment recorded the highest okra yield of 6280 Kg ha^{-1}.

Key words : Liquid biofertilizer, Foliar and Soil application, Okra.

Okra (*Abelmoschus esculentus* L.) is a popular vegetable grown under tropical and sub – tropical conditions. It is a nutritious vegetable containing considerable quantities of minerals especially calcium and fair amount of vitamins like A, B and C. The total area under cultivation of this crop in India is about 3.83 lakh hectares with a production of about 34.0 lakh metric tones (Kalloo Pandey, 2002). It has been proved that indiscriminate use of fertilizers and neglect of organics have resulted in decrease in soil fertility and productivity of crops. In modern crop production technology emphasize are made to reduce the chemical fertilizers and organics nutrient management in horticultural crops especially in vegetable crops. Application of organics and biofertilizers also remains as the alternative choice for the production of residue free wholesome vegetable produce. Application of biofertilizers in improving the growth and yield of okra was earlier reported by Selvi and Raniperumal (1997). Hence, a study was carried out to find the effect of liquid formulation of Symbion – N (*Azospirillum*) and Symbion - P (*Phosphobacter*) on the growth and yield of okra.

MATERIALS AND METHODS

A field experiments was conducted at Annamalai University experimental farm during summer 2006. The soil of study area was well drained clay loamy soil and had pH 7.94, EC 0.98 dSm^{-1}, organic carbon 0.52 per cent and available NPK status were low, medium and high, respectively. The crop selected for the study was okra variety Parbani Kranti. The experiment was carried out in a Randomized Block Design with three replications. The experimental treatments were T_1 - Symbion N alone (Liquid *Azospirillum*) @ 250ml/ha as foliar application, T_2 - Symbion P alone (Liquid *Phosphobacter*) @ 250ml/ha as soil application, T_3 - Symbion N (Liquid *Azospirillum*) + Symbion P (Liquid *Phosphobacter*) @ 250ml/ha as foliar and soil application, T_4 - Symbion N (Liquid *Azospirillum*) + Symbion P (Liquid *Phosphobacter*) @ 250ml/ha + 250 ml/ha as soil and soil application, T_5 – Control. Symbion N and Symbion P were liquid biofertilizer formulations supplied by T. Stanes and Co., Pvt. Ltd. The foliar and soil application of biofertilizers were carried out at 10 days after sowing and another at flowering. Various growth characters *viz.*, plant height and DMP at flowering and harvest stage, yield characters like no. of fruits per plant and fruit length and fruit and stover yield were recorded.

RESULTS AND DISCUSSION

Growth parameters :

The results of the study indicated that the application of liquid biofertilizers both Symbion N and Symbion P favourably increased the growth character of okra (Table 1). Among the treatments, application of Symbion N + Symbion P both applied in soil (T_4) was significantly