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RESPONSE OF GARLIC (*Allium sativum* L.) TO BIOFERTILIZER APPLICATION

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ABSTRACT

Biofertilizer had a beneficial effect on growth, yield and quality of garlic. Biofertilizer mixture of *Azotobacter* + *Phosphobacteria* proved significantly superior than *Azospirillium* + *phophobacteria*. Increasing levels of chemical fertilizers, enhanced growth, yield and quality attributes, recording maximum values with 100kg N + 60kg P_2O_5/ ha. The effects were much more pronounced when *Azotobacter* + *Phosphobacteria was* applied in conjugation with75 kg N + 45 kg P_2O_5 ha^{-1}, resulting in a fertilizer economy of 25% without affecting crop yield.

Key words: *Azospirillium*, *Azotobacter*, Chemical fertilizer, Garlic, *Phosphobacteria*.

Garlic (*Allium sativum* L.) is the second most widely cultivated Allium after onion.It is cultivated as a valuable spice, for food and medicinal purposes. In India it is being cultivated on an area of 86 thousand hectares with an annual production of 350 thousand tonnes Thamburaj and Singh (2001).Garlic can be grown on a variety of soils, however proper nutritional management is essential, as application of different nutrients was found to influence growth, yield and quality of garlic Wange (1995). Use of organic manures along with inorganic fertilizers has been advocated by several workers. In view of the escalating costs of chemical fertilizers and due to their hazardous effects on soil, soil resources and human health, it is imperative to explore the possibility of supplementing chemical fertilizers with ecofriendly low cost inputs of microbial origin like Azospirillium, Azotobacter and phosphobacteria. These microbial inoculants improve nutrient availability resulting in enhanced growth, yield and quality of vegetable crops, besides reducing the quantum of nitrogen and phosphatic fertilizers as reported by Gaur (1985), Musmade and Konde (1986), Gurubatham *et al*. (1989), Wange, (1995), Chattoo *et al*.,(1997), Thiiakavathy and Rammaswamy, (1999) and Karauthamani *et al*. (1995). Keeping in view their significance present investigation was undertaken to assess the combined effect of biofertilizers both alone as in combination with chemical fertilizers on garlic under temperate conditions of Kashmir.

MATERIALS AND METHODS

The experiment was conducted during Rabi 2001-2002 and 2002-2003 at the experimental fields of the Division of Olericulture, SKUAST (K), Shalimar. Soil of the experimental plot was clay loam in texture, neutral in reaction, medium in organic carbon, low in available nitrogen, medium in available phosphorus and high in available potash. The experiment was laid out in RBD with three replications using local variety. The treatments included three levels of biofertilizers Bo (no biofertilizers), B_1 (Azospirillium + Phosphobacteria), B_2 (Azotobacter + Phosphobacteria) and four levels of chemical fertilizers, T_0 (no nitrogen and phosphorus), T_1 (50kg N+30kg P_2O_5 ha^{-1}) T_2 (75kg N+45kg P_2O_5 ha^{-1}) T_3(100kgN+60kg P_2O_5 ha^{-1}). The fertilizer, potassium and FYM applied to all treatments at the rate of 60 kg and 20 tha^{-1}, respectively. Full dose of phosphorus, potash and 50% nitrogen was applied as a basal dose, while remaining nitrogen was applied as top dose in two splits. The source of nitrogen, phosphorus and potash was urea, di-ammonium phosphate and muriate of potash. Carrier based bacterial inoculants were obtained from Division of Environmental Sciences, SKUAST(K), Shalimar and were used as clove dip method @ 2.0kg ha^{-1} and as soil inoculant @ 2.5kg ha^{-1}. Observations on growth yield and quality attributes were recorded from twenty random plants of each replication using standard procedures. Dry matter content of garlic bulb was worked out from a composite sample of 100g fresh bulbs. Total soluble solids were determined by using ERME hand refractometer. Since no significant difference was observed over the seasons, pooled data was subjected to