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Effect of *Glomus mosseae* and or *Azospirillum lipoferum* inoculation under graded levels of fertilizer nitrogen on growth and yield of onion (*Allium cepa* l.) cv. B-780 under field condition

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SUMMARY

A field experiment conducted during 2001-02 with onion (*Allium cepa* L.) indicated that inoculation with vesicular –arbuscular mycorrhiza (*Glomus mosseae*) and or *Azospirillum lipoferum* alongwith graded levels of fertilizer nitrogen *viz.*, 25, 50, 75 and 100 kg N/ha (recommended dose) augmented the growth parameters *viz.*, plant height, number of leaves, diameter of bulbs, dry weight of shoot and bulbs and bulb yield over their counter part uninoculated control treatment. In general, all the bioinoculants exhibited excel performance compared to the uninoculated control treatment. The yield obtained due to application of 75 kg N/ha conjugated with VAM + *Azospirillum* inoculation (31.18 MT/ha) was on par with application of 100 kg N/ha conjugated with VAM + *Azospirilium* (31.40 MT/ha). These findings explicitly indicated the possibility of saving fertilizer nitrogen to an extent of 25 kg N/ha. in onion.

Key words – VAM fungi, Growth parameters, Bio-inoculants.

Onion is a major vegetable grown in India and used for various purposes. It is an indispensable item in every kitchen as a condiment spice and vegetable. It is grown on a fairly large area in our country for local consumption and also for export purpose. It occupies an areaof 3.84 lakh ha with an annual production of 38.95 lakh metric tonnes of onion bulbs (Singhal, 1999). Maharashtra is a leading state in onion production with an area of 0.96 lakh ha producing 11.20 lakh tonnes of onion bulbs annually (Singhal, 1999).

Application of biofertilizers is known to increase the yield of various vegetable crops like tomato, brinjal and chillies etc. The role of vesicular – arbuscular mycorrhiza (VAM) in plant growth and nutrient uptake is well documented (Tinker, 1975). A major part of the beneficial effects of VAM is attributed to their role in phosphorus uptake and translocation. The ability of the *Azospirillum* to proliferate in the rhizosphere of crop suggests its ability to improve the nutrient availability to the plants and can supplement the expensive inorganic and organic fertilizers. The interaction between *Azotobacter chroococcum* and VAM fungus *Glomus fasciculatum* in tomato had studied by Bagyaraj and Menge (1978) and found a synergistic effect on plant growth. Mycorrhizal colonisation increased *Azotobacter chroococcum* population in the rhizosphere which in turn enhanced the colonisation and spore production. Obviously, there are no reports on effect of vesicular-arbuscular mycorrhiza and *Azospirillum* alone and in combined form under graded levels of fertilizer nitrogen on growth and yield of onion crop.

Keeping this in view, an attempt was made to find out effect of inoculation of VAM and *Azospirillum* on growth and yield of onion cv. B-780.

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MATERIALS AND METHODS

The field experiment was conducted during *kharif* 2001 in a split plot design having three replications and 16 treatment combinations. The treatments comprised four nitrogen levels *viz.*, 25, 50, 75 and 100 kg N/ha as a main plot and four cultures *viz.*, without culture, *Glomus mosseae*, *Azospirillum lipoferum* and *Glomus* + *Azospirillum* as a sub plot. The recommended P_2O_5 and K_2O @ 50 kg/ha each were applied prior to planting, whereas nitrogen was given in 4 split doses. Amongst the biofertilizers, *Glomus mosseae* fungus from the VA-mycorrhizal nursery of the Department of Plant Pathology and Agricultural Microbiology, MPKV, Rahuri were used as mycorrhizal inoculant in present studies, whereas the lignite based inoculants of *Azospirillum lipoferum* were obtained from the All –India Co-ordinated Biological Nitrogen Fixation Project, College of Agriculture, Pune. Mycorrhizal seedlings of onion (cv. Baswant –780) were raised on raised beds by using mycorrhizal cultures. The furrow of size 8-10 cm apart and 1.5 –2.0 cm deep were opened on the raised beds. The inoculum of *Glomus mosseae* consisting of colonised guinea grass roots and extramatrical spores in soils were palced @ 1 kg/m^2 in furrows 2 cm deep below the seed of onion. Then seeds of onion were sown and covered with soil following light irrigation. The non-mycorrhizal seedlings of onion served as control. Ten per cent jaggery solution was prepared in which 200 g of peat based *Azospirillum* cultures was mixed in one litre of solution and homogenous slurry was prepared. The roots of one and half month old seedlings of onion were dipped in slurry for 10 minutes for root inoculation and transplanting was done immediately. The soil analysis before planting and after harvest of crop was done for different parameters, following standard analytical procedure, Jackson, 1973). Soil had initial pH 8.3, total nitrogen 0.04 %. The growth