

Effect of va mycorrhizae inoculation on vegetative growth in *Trachyspermum ammi* l. (Ajwain, Ova)

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Abstract

Trachyspermum ammi commonly known as 'Ajwain' belonging to family Apiaceae. The plant is used traditionally in medicine and food for humans and animals. Considering its importance present investigations were carried out for studying effect of VAM *Glomus fasciculatum*. Positive results were seen for various parameter of vegetative growth. VAM improves phosphate absorption capacity of plants which helps in improving the growth and development. The result of present investigation clearly indicates that *Trachyspermum ammi* responds well to the mycorrhizal inoculation under pot condition.

Keywords: *Trachyspermum ammi*, *Ajwain*, *Glomus fasciculatum*, *Innoculation*, *vegetative growth*.

Introduction

Trachyspermum ammi commonly known as 'Ajwain' belonging to family Apiaceae is distributed throughout India and it is mostly cultivated in Gujarat and Rajasthan. The plant is used traditionally as a stimulant, carminative, flatulence, atonic dyspepsia, diarrhoea, abdominal tumors, abdominal pains, piles, and bronchial problems, lack of appetite, galactagogue, asthma and amenorrhoea. Ajwain possess various pharmacological activities like antifungal, antioxidant, antimicrobial, antinociceptive, cytotoxic activity, Hypolipidaemic, Antihypertensive, antispasmodic, broncho-dilating actions, Antilithiasis, diuretic, Abortifacient, Antitussive, Nematicidal, Anthelmintic and Antifilarial Activity.

About VAM

VAM means vesicular arbuscular mycorrhizal fungi. They form symbiotic association with majority of plants. This association is symbiotic association. The improve phosphate absorption capacity of plants which helps in improving the growth and development. Mycorrhizal fungi live in a 'symbiotic' relationship with plants. They grow in close association with the roots and play an important role in the concentration and transfer of soil nutrients to the plant. In exchange, the plant supplies the fungus with sugars. This association is symbiotic association. They improve phosphate absorption capacity of plants which helps in improving the growth and development. The VAM selected for the project is *Glomus fasciculatum*.

Methodology

Investigation was conducted at the Department of Botany, Arts, Commerce and Science College, Narayangaon, Pune to study the response of three commercially important plant *Trachyspermum ammi* to VA mycorrhizal inoculation.

Mature healthy seeds of *Trachyspermum ammi* were collected from local area, Narayangaon Tal. Junnar, Dist. Pune (Maharashtra) and used in all the experiments. Earthen pots with 30 cm diameter, and depth, with a hole at the base for drainage system were selected and were filled with 3 kg of sterilized soil mixture of sand: soil: FYM in 1: 2: 1 proportion. The pots were placed in full sunlight and were watered till field capacity a day before sowing and alternate days till the final harvest. Recommended phosphate fertilizer was procured from Suryakant agro service, Kalamb added at different levels as suggested in various treatments.

In *Trachyspermum ammi* there were five sets with five treatments in sterilized soil.

Set I – UP00- Control, uninoculated without phosphate.
Set II – IP00 - VAM inoculated without phosphate.
Set IV – IP100% - VAM inoculated with 1gm phosphate per pot.

Set III – UP75% - Uninoculated with 0.75 gm phosphate per pot.

Set IV – IP50% - VAM inoculated with 0.5 gm phosphate per pot.

The similar sets were made for non-sterilized soil also.

Ten root segments of each species were collected and subjected for detection of mycorrhizal colonization. The root segments were fixed in F.A.A. for 24 hours and were autoclaved in 10% KOH. The autoclaved root segments were washed in 1 percent HCl- and stained with cotton blue in lactophenol. The stained roots were mounted on micro slide in lactophenol and were observed under microscope for the presence and kind of VAM fungi. Identification is attempted solely on manual for identification of VAM fungi by Schenck and Perez, [1]. Frequency was calculated using the formula,

$$\% \text{ frequency of mycorrhizal colonization} = \frac{\text{Number of mycorrhizal root segments}}{\text{Total number of root segments screened}} \times 100$$

Further observations were recorded at flowering period for vegetative parameters. Dry biomass on 60th day for which samples were oven dried at 60° C for 48 hours. S.E was calculated using excel program.

Results and Discussions

UP00 (Control, un-inoculated, without phosphate & VAM). **IP00** (VAM Inoculated, without phosphate). **UP100** (VAM un-inoculated with 1gm phosphate per pot). **IP100** (VAM Inoculated with 1gm phosphate per pot). **IP75** (VAM Inoculated with 0.75gm phosphate per pot). **IP50** (VAM Inoculated with 0.50gm phosphate per pot). Standard *deviation (SD).

The result of present investigation clearly indicates that *Trachyspermum ammi* responds well to the mycorrhizal inoculation under pot condition. Maximum plant height was noted in plants inoculated with VAM at 100 percent recommended phosphate and least in control in both sterilized and non-sterilized soil. Collectively VAM and

phosphate showed two-fold increase in growth as compared to un-inoculated control plants

Many workers showed that VAM alone or with phosphate increased growth. Mosse, *et. al* [2] observed that mycorrhizal onion seedlings grew better in both sterilized and non-sterilized soil as compared to untreated plants. Arafat *et. al* [3] showed increased growth in *Vicia faba* in hydroponic culture.

Maximum numbers of leaves were found in plants inoculated with VAM at 100 percent recommended phosphate and least in control in both sterilized and non-sterilized soil. VAM or Phosphate alone did not show marked effect as compared to combinations of VAM and phosphate. Similar trend was observed in Red Maple (*Acer rubrum*) reported by Daft and HacsKaylo [4] in *Tamarindus Indica*, *L.*, *Acacia nilotica* and *Calliandra calothyrsus* by Reena and Bagyaraj [5].

Inoculation of plants with VAM without phosphate shows two-fold increase in Total leaf area as compared to uninoculated plants without phosphate. VAM with 50 percent recommended phosphate shows tenfold increase as compared to uninoculated plants without phosphate. Generally, the inoculation of VAM along with recommended phosphates shows increase in leaf area per plant. Similarly, Biermann and Linderman [6] reported that total leaf area was increased in inoculated plants as compared to uninoculated plants in China aster.

Percentage of VAM colonization was higher in mycorrhizal plants with 50 percent recommended phosphate in sterilized and non-sterilized soil. Similar observation was reported by Okon *et. al.* [7] in *Gliricidia sepium* and *Senna siamea*. VAM with 50 percent recommended phosphate shows maximum number of Mycorrhizal spores in non-sterilized soil. Clamydospores were not observed in uninoculated plants. This suggests that the number of infective propagules in the soil is low and the infectivity of native fungi lower than that of inoculant fungus. Further there is decrease in VAM colonization level at 100 percent recommended phosphate and higher soil phosphate levels. There is increase in VAM colonization level in

nonsterilized soil inoculated with VAM also observed by Bagyaraj and Manjunath [8] in Cotton Cowpea, Menge, *et. al.* [9] in Citrus.

Conclusion

Present investigation clearly indicates that *Trachyspermum ammi* L. responds well to *Glomus fasciculatum*. VAM inoculation in combination with Phosphate at all levels increased height of shoot, Total leaf area and Dry biomass in both non sterilized and sterilized soil.

Conflicts of interest: The authors stated that no conflicts of interest.

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