The Asian Journal of Horticulture, December 2007, Vol. 2 (2) : 4-7

STUDIES ON AM COLONIZATION IN SOILS OF APPLE ORCHARDS OF NORTH- WESTERN HIMALAYAN REGION

PRAMOD KUMAR AND SOM DEV SHARMA

See end of article for authors' affiliations

Correspondence to :
PRAMOD KUMAR
Department of Pomology,
Dr. Y.S. Parmar University of Horticulture and Forestry,
Nauni, SOLAN (H.P.) INDIA

Accepted : September, 2007

ABSTRACT

To study the AM colonization in soils of apple orchards located in different commercial growing regions of North-Western Himalayas, the survey was conducted. Arbuscular-mycorrhizae were found in the rhizosphere soils of apple trees grown in three different soil types. Twelve different AM species colonizing the apple roots were isolated and identified. It was observed that the arbuscular- mycorrhizal colonization in apple roots varied between 40 and 70 per cent.

Key words : Arbuscular-mycorrhizae, Spore count, Colonization, Apple.

Arbuscular-mycorrhizae (AM) are the most common endosymbionts of herbaceous and woody plants including fruit crops, almost in every habitat. These AM fungi facilitate an increased absorption of water and nutrients in moisture stress condition. AM association helps the host plant by augmenting disease resistance and improving the structure of the soil (Sitaramaih and Sikora, 1982). Further, AM fungi play significant role in fruit production by transporting slowly mobile nutrients, especially P, Mn, Zn, Fe and Cu from bulk of soil beyond the depletion zone surrounding active roots and/or secrete antibiotic and antifungal substances and stimulate plant growth (Brown and Carr, 1984). The survival multiplication and spread of arbuscular- mycorrhizae on any site may be attributed to the large network of fine mycorrhizal roots, extensively distributed in the soils of different habitats except in severely disturbed sites (Verma, 1994). Though world wide distribution of AM fungi has been reported (Hayman, 1982), but only very little information is available on indigenous AM fungal association with apple grown in different sub-temperate soils of north-western Himalaya, particularly, Himachal Pradesh. Therefore, an attempt was made to find out the colonization of apple trees by indigenous AM species.

MATERIALS AND METHODS

Thirty well managed apple orchards of 15-16 year age were selected in Shimla and Kullu districts of Himachal Pradesh for the survey of indigenous AM fungi. Composite rhizosphere soil samples were collected from the tree basin about 45cm away from the tree trunk at 30cm depth. There were three types of soils viz. sandy clay (coarse sand-65.32, fine sand-24.50, clay - 7.50, silt-4.50, moisture in air dry soil-0.30), clay loam (coarse sand-30.50, fine sand-10.50, clay-58.60, silt-5.20,moisture in air dry soil-1.5), and silty clay (coarse sand-15.20 , fine sand-3.50, clay-15.75, silt-70.50, moisture in air dry soil-2.0), respectively. Root samples were collected from the rhizosphere soil. Population of AM fungi was determined by spore isolation through wet sieving and decanting method. AM spores were identified upto species level using synoptic key of Gerdemann and Trappe (1975) and Schenck and Perez (1987). AM colonization was studied as per the staining technique given by Philips and Hayman (1970). Per cent root colonization was calculated using the grid line intersect method (Giovannetti and Mosse, 1980).

RESULTS AND DISCUSSION

AM spore count was done in the rhizosphere of the apple tree grown in sandy loam, clay loam and silty clay soils and the data is presented in the Table 1. Apple trees grown on sandy loam soils harboured more propagules of AM fungi, while their count was less in those grown on clay loam and silty clay soils. Further, AM colonization was maximum in sandy loam soils followed by other two soil types. These results are in conformity with those of Vijaya Kumar (1998). Differences in AM spore count and per cent root colonization among different locations could be due to variation in agricultural and horticultural operations, particularly, time of application and dose of