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CORRELATION STUDIES OF CHEMICAL FERTILIZERS AND BIOFERTILIZERS WITH GROWTH, YIELD AND NUTRIENT STATUS OF OLIVE TREES (*OLEA EUROPEAN*)

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The olive (*Olea european* L.) is mainly grown for olive oil which is rich in poly-unsaturated fatty acid (PUFA) and is absolutely free from cholesterol. Inadequate nutrition and their poor uptake is one of the main limiting factors that can be enhancing up to great extent by application of nitrogen fixing bacteria and VAM fungi. The present studies were therefore under taken to compute a relationship between Azotobacter Azospirillum and VAM inoculation with growth, productivity and nutrient status of olive trees.

The studies were carried out at the experimental orchard of the Depertment of Pomology, UHF, Nauni, Solan (H.P.) during the year 1999-2000. 16 years old bearing olive trees cv. Frontoio were given the following treatments : T_1 - standard dose of NPK (750; 500; 500 g tree^{-1}), T_2 - 3/4th N + full dose of P +Azotobacter, T_3 - 2/3rd N + full dose of P + Azotobacter, T_4 -½ N + full dose of P + Azotobacter, T_5 - ¾th N + full dose of P + Azospirillum, T_6 - 2/3 rd N + full dose of P + Azospiriillum, T_7 - ½N + full dose of P + Azospirillum, T_8 - ¾th P + full dose of N + VAM, T_9 - 2/ 3rd P + full dose of N + VAM, T_{10} - ½ P + full dose of N + VAM. Azotobacter, Azospirillum (20g each/ tree) and VAM (200g/tree) with FYM were placed at 15 cm deep, and 30 cm away from tree trunk. Observations on various growth parameters, production characters, and nutrient status were estimated by standard methods. Correlation coefficients between these parameters were computed as per method suggested by Panse and Shukhatme (1978) and their significance was tested at 5% level of significance.

Significant and positive correlation of Azotobacter and VAM with shoot extension growth, whereas, Azospirillum had shown positive but non- significant correlation with shoot extension growth of olive trees. Azotobacter showed a significant and positive correlation with fruit set whereas other correlation of VAM and Azospirillum were non significant. It was further revealed from the data that yield was positively and significantly correlated with Azotobacter and VAM treatments. However oil content were non significantly affected by the micro-organism used. This positive and significant correlation between biofertilizers used and growth and productivity may be related to the general role of biofertilizer in stimulating nutrient uptake and biosynthesis of auxin, gibberellins and cytokinins, thereby stimulating growth and developmental processes of the plants (Godara, 1993). Azotobacter application was positively correlated with leaf N and P content whereas, it was negatively correlated with K, Ca and Mg levels. VAM application depicted positive and significant correlation with leaf P content whereas, its correlations with remaining macro nutrients were non- significant (Table 1 &2).

The observations further revealed that Azotobacter had positive and significant correlation with available N content of soil, whereas, it had negative but non-significant relationship with available K status of soil. VAM also showed positive and significant correlation with available P status of soil. This

increase in N status might be partly attributed to stimulation influence of Azotobacter on biosynthesis of plant bioregulators which in turn increase the rate of nutrient absorption and translocation in the plant system and consequently more N was accumulated in the tree's foliage (Awasthi et. Al; 1998), Rao and Das (1989). Similarly VAM fungi promotes P availability to the plant roots by converting fixed P into available from and also promotes its absorption by plant roots. The VAM fungi has also been reported to have 3 to 16 times higher influx rates of P into plant system as compared to non-mycorrhizal plant (Tinker, 1975; Azcon and Barea, 1997).

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Table 1. Relationship between different biofertilizers with growth and productivity

Biofertilizers	Shoot extension growth	Blooming intensity	Fruit set content	Yield	Oil
Azotobacter	0.654*	0.491	0.665*	0.698*	0.425
Azospirillum	0.420	0.233	0.422	0.325	0.143
VAM	0.642*	0.429	0.421	0.655	0.377

Tested at 5% level of significance

Table 2. Relationship between different biofertilizers with leaf and soil nutrient status

Biofertilizers	Leaf nutrient status					Soil nutrient status		
	N	P	K	Ca	Mg	N	P	K
Azotobacter	0.680*	0.048	-0.760*	-0.360	-0.494	0.653*	0.010	-0.523
Azospirillum	0.522	0.027	0.343	0.083	0.188	0.342	-0.170	0.285
VAM	0.083	0.696*	-0.120	-0.160	0.047	0.028	0.693*	-0.150

*Tested at 5% level of significance