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AMF Spore Abundance and some Physicochemical Properties of Soils under Long Term Tea Plantation

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Abstract

Land-use change, unsustainable land management, and unbalanced plant nutrition are a global problem. Land disturbances and degradation by reducing biodiversity and microbial activity affect soil quality. Changing the population of mycorrhizal fungi can be a good indicator of measuring the sustainability of agricultural operations. Therefore, this study aimed to determine the abundance of AM. spores and their relationship with some soil characteristics following different management practices and cultivation in tea plants in northern Iran. To conduct this research, 155 different tea gardens were selected from Iran's tea-growing areas, and a composite sample of soil and plant roots was taken at a depth of 0–30 cm. The results showed that 66 % of the soils there are spores of AM fungi and the rest of the soil do not have spores. The highest and average number of spores was 41 and 9.3/10 g soil, respectively. The roots of the sampled tea plant lacked the coexistence of AM. Soil physicochemical analysis showed that soil pH is acidic to very acidic and 37 % of soils have a pH > 4.5. The average soil organic carbon was 2.1 %. 35 % of the soils had very severe deficiencies and 46 % of the soils had very high levels of available phosphorus. 21 % of the soils have severe potassium deficiencies and pay serious attention to the use of potassium fertilisers. Soils with 150–100 mg K kg^{-1} have the highest frequency. The results showed that the only soil pH and available soil phosphorus had a positive correlation (r = 0.43 **) and negative (r = -0.54 **), respectively, with the number of AMF spores in tea garden soil. Overall, it can be concluded that although soils are moderately nutrient-rich, high soil acidity has created unfavourable conditions for the growth of tea plants and the activity of beneficial soil organisms. Therefore, it is necessary to plan carefully for proper nutrition management and plant-soil fertility, which, while improving soil quality, conditions conducive to the presence and activity of beneficial soil microorganisms.

Keywords: Acid soil, Mycorrhiza, soil quality

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