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ONLINE ISSN : 1349-1008

PRINT ISSN : 1343-943X

Plant Production Science

Vol. 11 (2008) , No. 2 171-177

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Distribution of Arbuscular Mycorrhizal Fungi in Upland Field Soil of Japan

2. Spore Density of Arbuscular Mycorrhizal Fungi and Infection Ratio in Soybean and Maize Fields

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(Received: October 5, 2006)

Abstract: In this study, soil samples were collected from upland fields where maize and soybeans had been cultivated and the density of AM (arbuscular mycorrhizal) fungal spores and the percentage of soybean roots infected with AM fungi (infection ratio) were assessed to determine the factors of the soil chemical properties affecting the mycorrhizal infection. The roots and rhizosphere soil were sampled from 9 soybean fields and 8 maize fields in the summer of 2004. The soil samples were examined for chemical properties (pH, electric conductivity, total phosphate, available phosphate, and phosphate absorption coefficient) and the density of AM fungal spores. Soybean roots were stained with trypan blue to determine the infection ratio. There was a significant difference in soil pH and available phosphorus content with the sampling site. The phosphorus absorption coefficient markedly varied with the sampling site and there was a significant difference in the phosphorus absorption coefficient with the site. The spore density in the soybean and maize fields markedly differed with the sampling site and there was a significant difference spore density with the sampling site. The density of AM fungal spores in the soybean field was negatively correlated with the available phosphorus content, and showed a positive correlation with the phosphate adsorption. This means that an increase in the available soil phosphorus due to the application of phosphate fertilizers will lower the density of AM fungal spores in the soil and that the density of AM fungi spores is generally higher in soils with a higher phosphate absorption coefficient. It is considered that this tendency is marked in the soil with a low phosphate adsorption coefficient. The infection ratio was positively correlated with spore density, and negatively with the available phosphorus content. To increase mycorrhizal

infection of soybeans, we need to decrease the amount of available soil phosphorus and simultaneously to increase the density of AM fungal spores. Excessive application of phosphorus fertilizers should be avoided.

Keywords: [Arbuscular mycorrhizal fungi](#), [Available phosphate](#), [Infection ratio](#), [Phosphate adsorption coefficient](#), [Spore density](#)

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Katsunori Isobe, Hanae Sugimura, Takashi Maeshima and Ryuichi Ishii: "Distribution of Arbuscular Mycorrhizal Fungi in Upland Field Soil of Japan

2. Spore Density of Arbuscular Mycorrhizal Fungi and Infection Ratio in Soybean and Maize Fields". Plant Production Science, Vol. **11**, pp.171-177 (2008) .

doi:10.1626/pps.11.171

JOI JST.JSTAGE/pps/11.171

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