

Abstract

Currently looking for alternative approaches to crop production which would be in accord with sustainable development. The present thesis was aimed on testing of organic cultivation of tomato (*Solanum lycopersicum* L.) and leek (*Allium porrum* L.) by using amendment with organic maize biomass (*Zea mays* L.), mycorrhizal fungi and saprotrophic fungi. The effects of different combinations of microbial inoculations on nitrogen uptake, plant growth and yield were investigated in greenhouse conditions. Supplied ^{15}N -labelled organic matter was separated from the root system by a nylon mesh which permitted only fungal hyphae to pass through but not plant roots.

In the first year experiments the treatments differed in the presence or absence of three factors: organic matter, saprotrophic fungus *Agrocybe* sp. and mycorrhizal fungus *Glomus mosseae* (Nicolaj & Gerd.) Gerd. & Trappe. Plant inoculation with *Agrocybe* sp. alone or together with *G. mosseae* increased plant growth of tomato in the presence of organic matter. Tomato yield were not increased significantly. Shoot dry weight of leek increased when plants were treated with mycorrhizal fungus *G. mosseae* and organic matter. Microbial inoculation did not influence nitrogen (^{15}N) uptake from the organic source.

In following experiments, all treatments contained organic matter and different combinations of microorganisms (saprotrophic fungi *Thermomyces lanuginosus* Tsikl. or *Gymnopilus* sp. and mycorrhizal fungi *G. mosseae* or mixture of mycorrhizal fungi). Experimental design was modified to prevent spontaneous nitrogen diffusion. The ^{15}N enrichment of tomato fruits increased in the presence of saprotrophic fungi, nitrogen content and concentration, plant growth and yields did not differ. A synergistic positive effect of dual inoculation was observed for leek on nitrogen uptake from organic matter and yields especially for plants inoculated with saprotrophic fungus *T. lanuginosus* and mycorrhizal fungus *G. mosseae* or mixture of mycorrhizal fungi. Microbial inoculation did not influence an antioxidant activity of leek.

The present study showed a positive effect of the supplied organic plant biomass accompanied with inoculation with a proper combination of soil microorganisms on leek yield parameters.