Brief information about the project

Name of the project	AP15473383 «Studying the possible synergism between mycorrhizal and predatory fungi in ensuring the stability of tomatoes affected by phytoparasitic nematodes» (0122PK00920)
Relevance	The project is aimed at considering the possibility, on the basis of obligate mutually beneficial cohabitation of organisms-plants, mycorrhizal and predatory fungi (synergism), the synergistic effect of these micromycetes on the suppression of phytoparasitic nematodes. This idea is being discussed in many laboratories around the world, but it is being proposed in the Republic of Kazakhstan for the first time. The idea is to combine mycorrhizal fungi (AMF) and nematophagous predatory fungi of local strains to combat phytoparasitic nematodes and phytopathogenic fungi. The proposed fundamental research will form the basis for the creation of new bionematicide drugs both in world science and in Kazakhstan, which will certainly support the scientific and technical development of the republic.
Purpose	To study the possibility of synergism in the joint use of local strains of mycorrhizal and predatory fungi in ensuring the stability of tomatoes under the action of phytoparasitic nematodes.
Objectives	1. Molecular taxonomic identification of local arbuscular mycorrhizal fungi (AMF) isolated from the soils of the Almaty region (laboratory collection). 2. Storage and reproduction of arbuscular mycorrhizal fungus Rhizoglomus irregulare (DAOM 197198, Syn. Glomus intraradices) obtained from the collection of Estación Experimental del Zaidín in the form of an inoculum based on sand and vermiculite in the culture of Trifolium repens L. During the experiment, both a commercial preparation of mycorrhizal fungi Rhizoglomus irregulare and local AMF species will be used to compare the effectiveness of action against the mold fungus Botrytis cinerea and phytoparasitic nematodes. As a result, the effectiveness of both the commercial drug and the AMF from the laboratory collection will be evaluated. These AMF strains will be used in further experiments. 3. Molecular taxonomic identification of local species of phytoparasitic nematodes (laboratory collection) and storage, reproduction of Meloidogyne incognita culture isolated from soil samples of Southern Kazakhstan. 4. Molecular taxonomic identification of local species of nematophagous (predatory) fungi (laboratory collection). 5. Sowing tomato seeds (greenhouse): - inoculation of plants with mycorrhizal fungi; - inoculation with predatory fungi; - contamination of soils with phytoparasitic nematodes;

	- assessment of fungi colonization of tomato roots; - infection of plants with mold fungi and biotesting of the pathogen B. cinerea; - assessment of growth and photosynthetic parameters (chlorophyll, flavonoids, etc.) of tomato plants. 6. Determination of the effect of separate or joint (synergism) inoculation of mycorrhizal and predatory fungi against nematodes: - assessment of the number of nematode galls in tomato roots. 7. Gene expression analysis: RNA isolation, cDNA synthesis, real-time PCR analysis of gene expression. All operations are carried out according to the manufacturer's instructions.
Expected and achieved results	1. The following arbuscular mycorrhizal fungi were isolated into pure culture and propagated: *Rhizoglomus irregular*; Predatory fungi: *Arthrobotrys oligospora*, *Arthrobotrys brochopaga*. 2. Based on the identification results, the types of predatory fungi were identified: *Arthrobotrys oligospora, Arthrobotrys brochopaga*; and AMF: *Rhizoglomus irregulare*. 3. Nematodes have been identified before the genus: a species of the genus Meloidogyne. 4. According to the results of the analysis of gene expression by quantitative real-time PCR, the level of colonization by mycorrhiza was 18.3%. Joint inoculation with predatory fungi enhanced mycorrhizal colonization: inoculation with *A.oligospora* fungi showed higher colonization rates; inoculation with *A.brochopaga* led to a significant stimulation of mycorrhizal colonization - 27.3%.
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List of publications with links to them	-
Patents	-