Beneficial legume-microbe interactions:

A case study on the diversity of rhizobial strains nodulating common bean landraces growing in Greece

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TRansition paths to sUstainable legume-based systems in Europe

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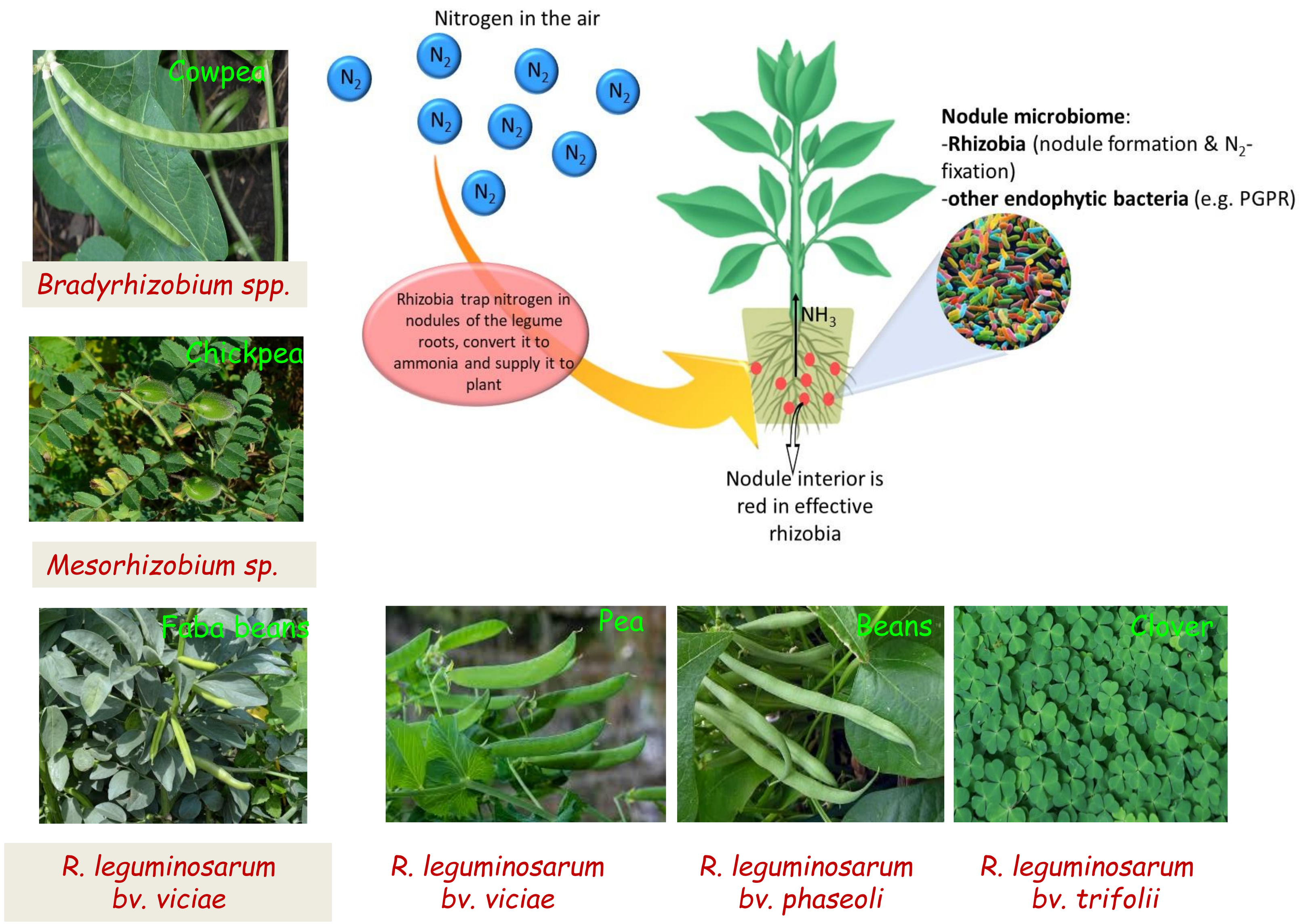
Objectives

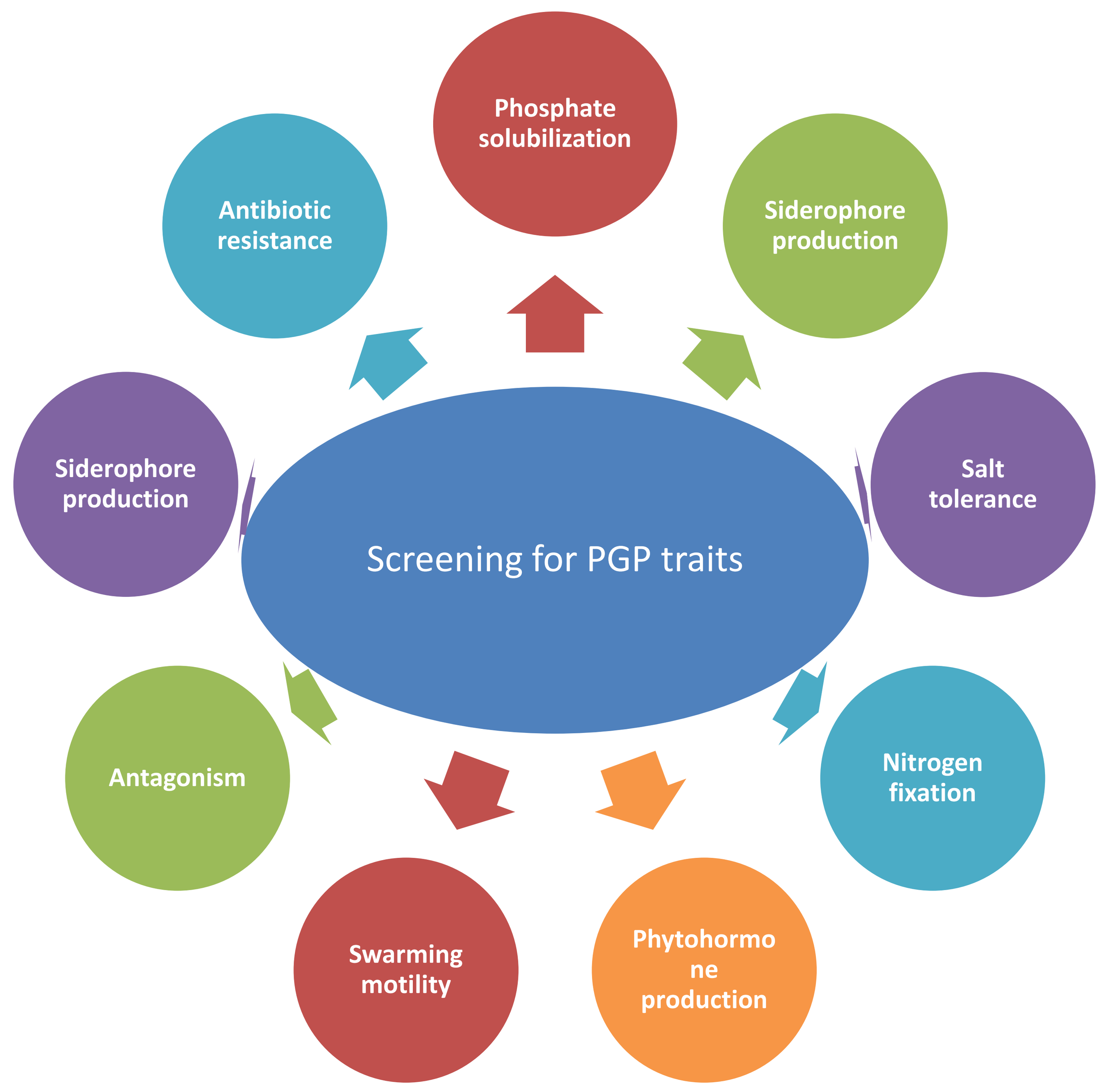
P. vulgaris forms nitrogen-fixing symbiosis with bacteria belonging to different genera and species. Initially, all bean-nodulating rhizobia were classified as *Rhizobium leguminosarum* bv. *phaseoli*. However, *Phaseolus vulgaris* L. (common bean) is considered a promiscuous legume in its association with rhizobia since it can be nodulated by several species of the *Rhizobiaceae* family, such as *Rhizobium etli*, *Rhizobium gallicum*, *Rhizobium giardinii etc.* The diversity of rhizobia nodulating *P. vulgaris* has been widely studied, but, because of the promiscuous nature of this plant concerning its association with rhizobia, novel endosymbionts should be expected as more ecological niches are examined. Moreover, little is known about the genetic and symbiotic diversity of indigenous rhizobia nodulating common bean in Greek soils. The objective of the present study is to investigate the genetic and symbiotic diversity of indigenous rhizobia isolated from field-grown bean nodules in different Greek regions. Authenticated strains will be subjected to a detailed polyphasic taxonomic study, in order to identify and determine their taxonomic position at species and symbiovar levels. The genetic heterogeneity of the isolates will be assessed by DNA fingerprinting analysis and representative strains will be further analyzed by multilocus sequence analysis (MLSA) using well-known housekeeping and symbiosis-related genes. The isolated rhizobial strains will be assessed for their ability to promote plant growth in different common bean landraces in order to select the most appropriate combinations of rhizobia and bean landraces with enhanced nitrogen fixation and number of nodules. Such research will allow to select strains for common bean with high nitrogen fixing capacity to be used as inoculants and to finally contribute to the sustainability of traditional cropping systems.

Overview

Biological Nitrogen Fixation
Microbes fix nitrogen in the roots of legumes



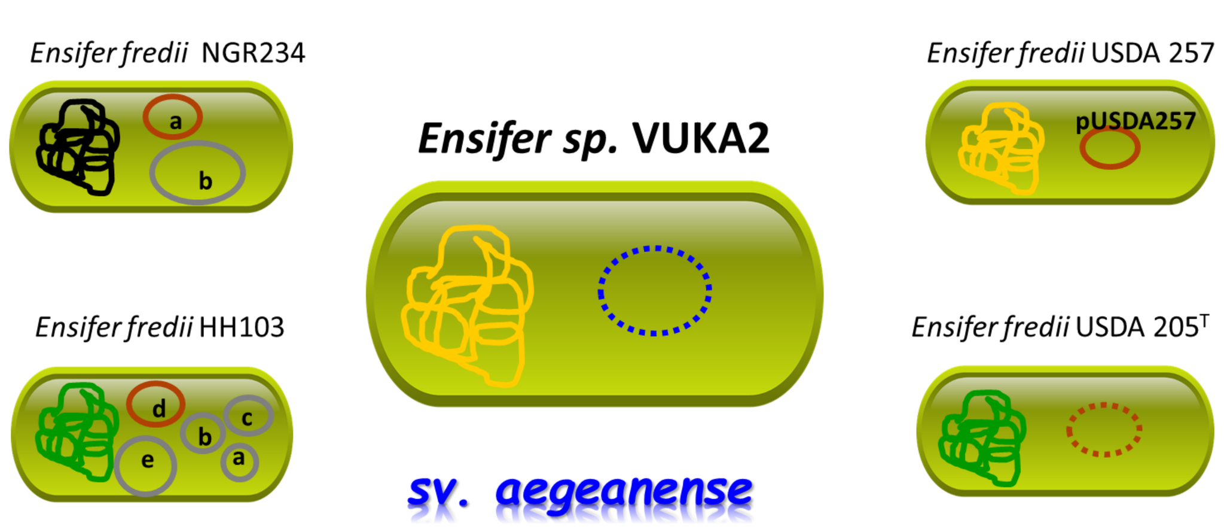
Nodule Microbiome: A Source of Plant Growth-Promoting Bacteria



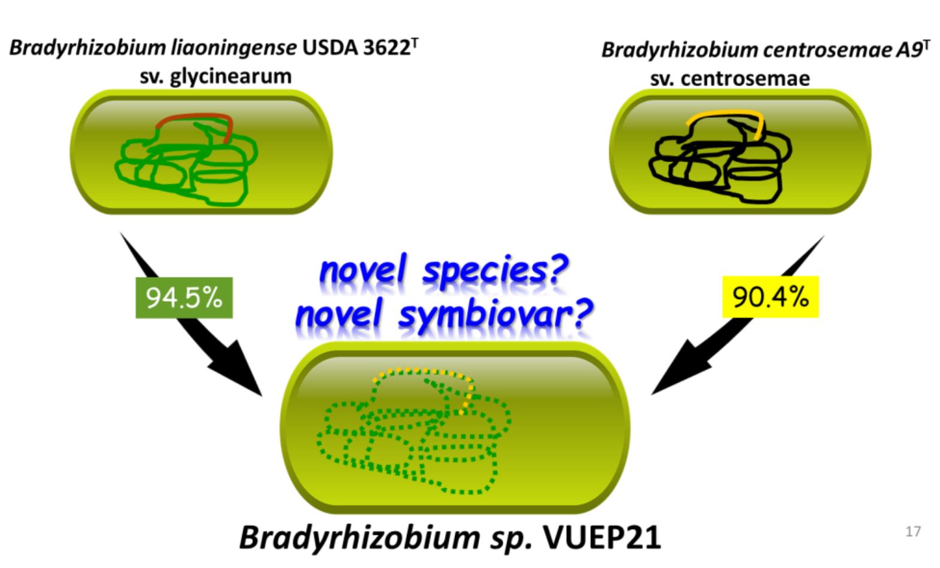
Recent achievements related to TRUE

New species of rhizobia were isolated from field-grown cowpea nodules in Greece

A novel symbiovar within *Ensifer* genus: "aegeanense"



A novel species and a novel symbiovar within *Bradyrhizobium* genus:



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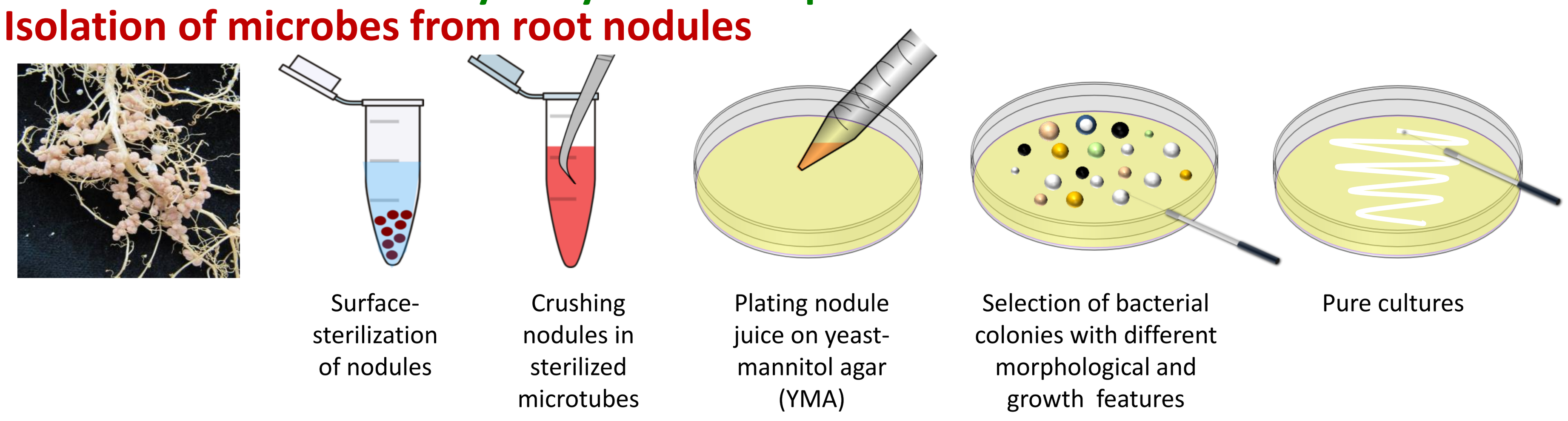
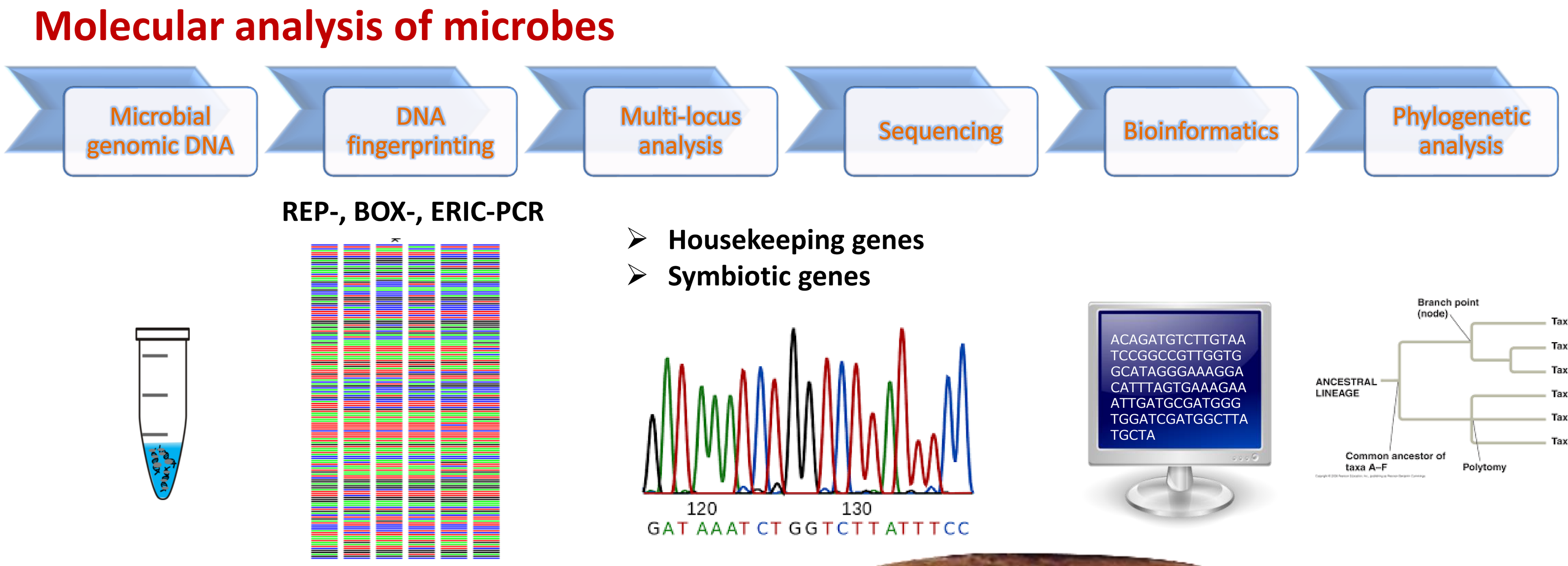
Approaches

Nodule microbiome analysis by culture-dependent methods

Isolation of microbes from root nodules



Molecular analysis of microbes



Contact Information

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Relevant publications

Tampakaki A*, Fotiadis C, Ntatsi G, Savvas D. 2017. A novel symbiovar (aegeanense) of the genus *Ensifer* nodulates *Vigna unguiculata*. J Sci Food Agr

Tampakaki A*, Fotiadis C, Ntatsi G, Savvas D. 2017. Phylogenetic multilocus sequence analysis of indigenous slow-growing rhizobia nodulating cowpea *(Vigna unguiculata* L.) in Greece. Syst Appl Microbiol, pii: S0723-2020(17)30002-4.

Kontopoulou CK, Liasis E, Iannetta P, **Tampakaki A**, Savvas D. 2017. Impact of rhizobial inoculation and reduced N supply on biomass production and biological N_2-fixation in common bean grown hydroponically. J Sci Food Agr, 97(13):4353-4361.

Tampakaki AP. 2014. Commonalities and differences of T3SS in plant pathogenic and symbiotic bacteria. Front. Plant Science, 5:114.

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