



TRansition paths to sUstainable legume-based systems in Europe

## Comparing the inoculation success of two bacteria strains, under different N supply levels, in the Greek bean landrace Zargana Chryssoupolis

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### Aims of Case Study 21:

1. Study the effects of shoots on autoregulation of nodulation of legume roots interacting with rhizobia. Reciprocal grafting experiments between different landraces of common bean will be carried out to investigate the role of the shoot in the host-specificity of legume-rhizobia symbiosis and nodule type.
2. Select new rootstock genotypes of common bean landraces from partners' genebanks, aiming to develop new potential rootstocks with enhanced number of nodules.
3. Identify rootstock x scion favorable phenotype combinations of common bean plants for increasing yield, yield stability and quality, compared to control (ungrafted and self-grafted) plants under both conventional and organic sectors and single stressors (e.g. salinity).
4. Optimize yields for favorable rootstock x scion x environment combinations through adapting and/or developing management practices for sustainable production (e.g. fertigation optimizing water and nutrient use efficiency).

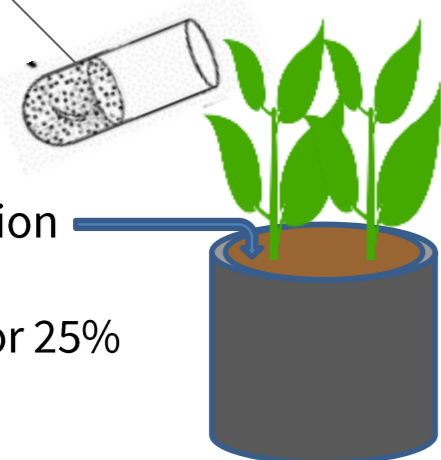
### 1. In soilless culture, how much nitrogen supply and which bacteria?

In soilless culture, inoculation of legumes with rhizobia can considerably reduce the input of inorganic nitrogen to the nutrient solutions. The practical application of this approach encounters some difficulties:

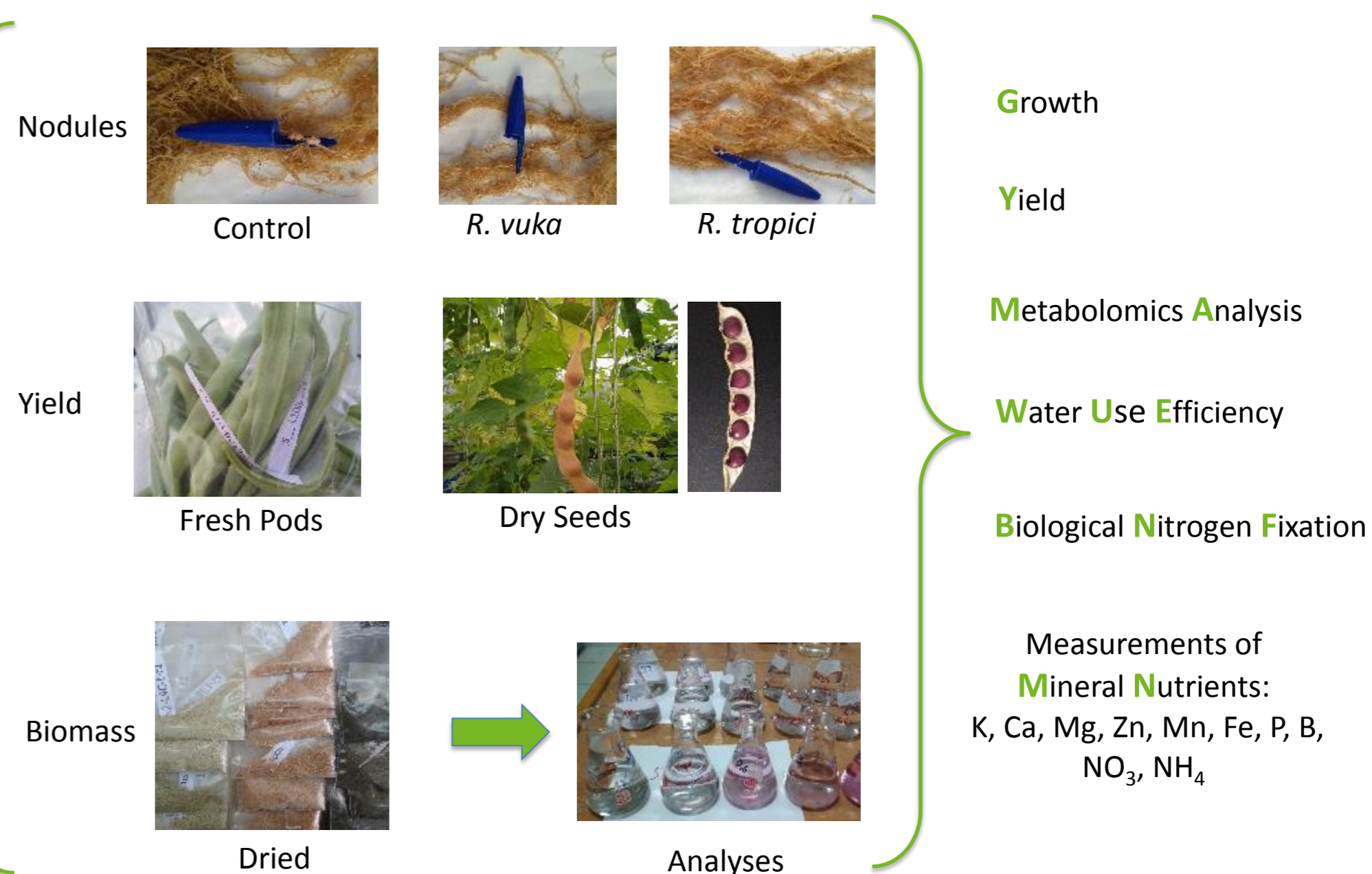
- A. The supply of plant available nitrogen is important at the early growth stage when the rhizobia are still not functional in terms of N<sub>2</sub>-fixation.
  - Inorganic nitrogen and especially nitrate N inhibits rhizobia colonization.
- To cope with these two contrasting issues, a fine tuning of the N supply is needed, when legumes grown in soilless culture are inoculated with relevant rhizobial strains.

*Rhizobium tropici*  
or  
*Rhizobium vika*

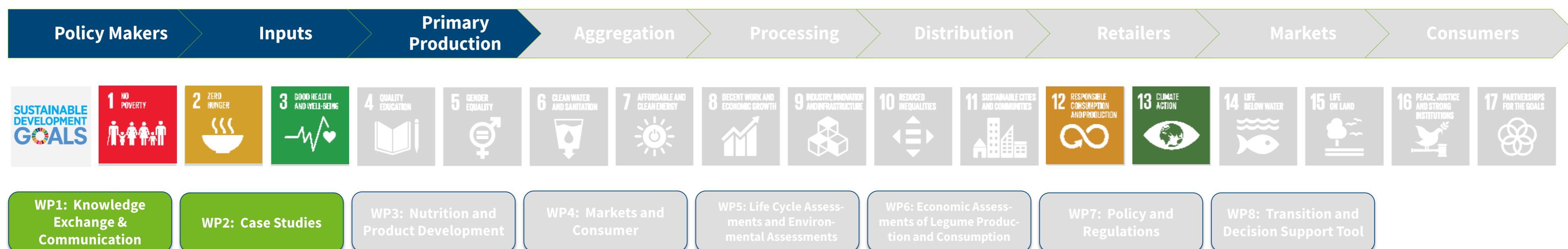
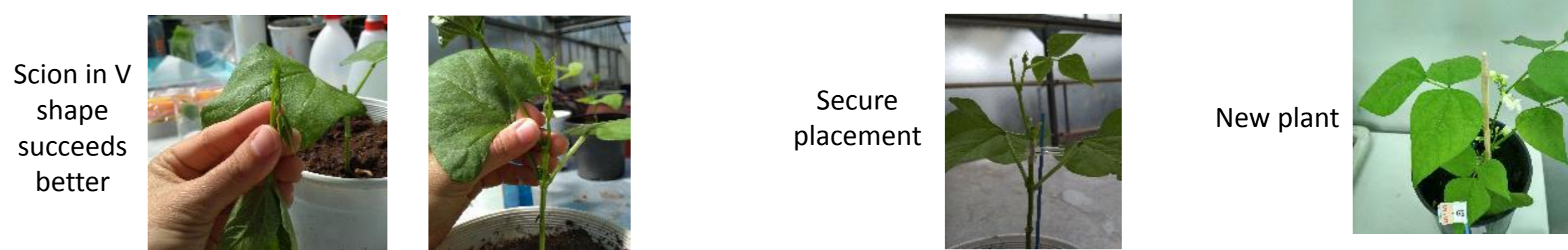
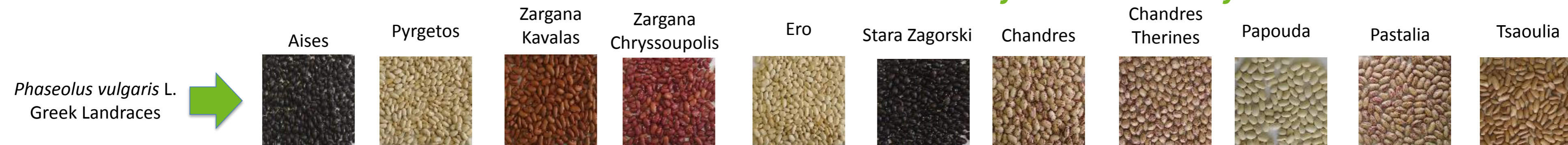
Nutrient Solution with Nitrogen 100% or 50% or 25%



*Phaseolus vulgaris* L.  
Greek landrace:  
Zargana Chryssoupolis  
Hydroponically cultivated



### 2. Identification of favourable rootstock x scions combinations for increased yield and stability



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