

Retrospective of the research work undertaken by the “Management and Functioning of cultivated soil’s fertility” Team

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Research Objectives of the team

Main Objective: Improvement of soil fertility and crop production through the use of soil microorganisms.

Specific Objectives:

- Evaluation of soil fertility and symbiotic potential in areas of interest.
- Creation of a collection of specific symbiotic bacteria.
- Evaluation of the genetic diversity and efficiency of soil microorganisms.
- Development of a biofertilizer and trials introduction among farmers.

These objectives have been achieved through the implementation of the following research projects:

Collection of indigenous Rhizobium strains from various Algerian agro-climatic zones and enhancement of atmospheric nitrogen fixation in chickpeas (PNR1)

The objective of this work is to use Rhizo-legume symbiosis to rehabilitate legume crops, preserve biological resources, and improve soil fertility.



Chikpea field Chikpea nodulated roots Purified Rhizobium culture

This work has shown that Algerian soils contain a various rhizobial potential in both quantity and quality.

It has also allowed the establishment of a collection of indigenous strains of Rhizobia specific to chickpea.

Furthermore, the project underwrote the acquisition of equipment for setting up the “soil biology laboratory”.

Modulation of plant-bacteria interactions to enhance tolerance to water deficit for grain legumes in the Mediterranean dry lands (Euro Mediterranean Project AQUARHIZ)

The primary goal of AQUARHIZ is to increase the production of legumes in Algeria, where their nutrition and yield are affected by water deficit.

Strains conferring a certain tolerance to water deficit to pulses have been isolated.

After selecting the best adapted strains, inoculation trials were undertaken with reference farmers.

Valorization of the symbiotic potential and integrated development of legumes adapted to the potential production areas of semi-arid regions of western Algeria - RHIZOLEG (PNR2)

This project continued the work of the PNR1 project by expanding the study to other food and forage legume species.

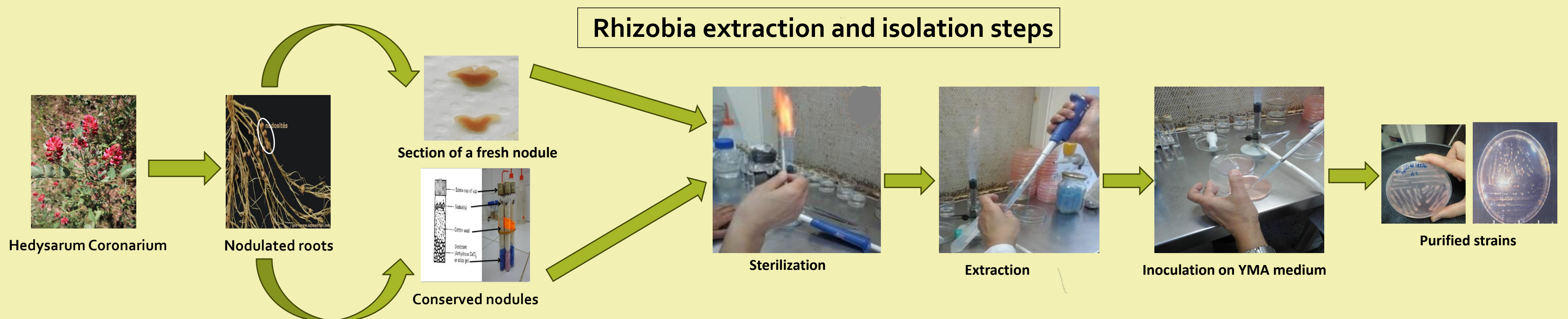


Chikpea Field Sulla(Hedysarum) Bean Field

The results allowed the enrichment of the Rhizobia collection (strain bank) and the selection of the most efficient legume-rhizobia pairs.

Collection of native Rhizobium strains and valorization of symbiotic nitrogen fixation specific to forage species: Hedysarum coronarium and Trifolium squarrosum (PNR3)

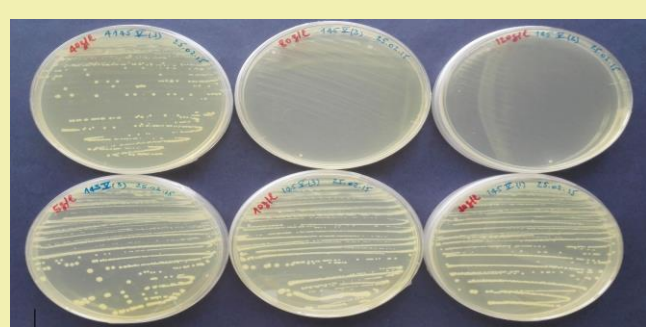
This work was based on the results of surveys and a preliminary characterization of bacteria associated with Sulla isolated from different soils in Algeria to provide information on the soil nodulation potential and the diversity of symbiotic bacteria of Sulla.



Data from 80 different sites reveal a diversity of nodulation with a decreasing gradient from east to west. The majority of the nodules examined were efficient and most isolated strains were tolerant to stress conditions. The selection of high-performing isolates could allow inoculation of soils in marginal areas.

Pilot Project on the Development of Saline Lands in Algeria (Sino-Algerian International Cooperation)

The work focused on researching salinity-tolerant and phosphorus-solubilizing microorganisms in the soils of H'madena station, which could enable a better assimilation of mineral elements from the soil and thus achieve better growth of the cultures.



Evaluation of resistance to different NaCl concentrations (5g/l-120g/l)



Isolation of bacteria with phosphorus-solubilizing activity

Isolats	Pppm 24H	Pppm 48H	Pppm 72H	Pppm 96H	Pppm 120H
Témoin	0	0	0	0	0
142 IV	821,75	1007	1014,666	944,666	998,166
145 IV	840	909,166	908,166	873,666	874,583
145 V	1005,5	981,583	981,666	936,083	925,833
145 VI	946,75	944,333	930,25	817,9166	943,166

Evaluation of phosphorus solubilization by bacteria during five days of incubation

This work allowed the isolation of strains which are able to acidify the medium, to solubilize P, and that have a potential resilience to salinity.

Improvement, Selection, and Valorization of Food Legumes -ASLeg (PISE)

This work involved studying rhizobia symbiosis in chickpea lines at the sites of Ain-Témouchent, Tlemcen, Sidi Bel Abbess, and Baraki to evaluate their infectivity and efficiency potential.



Chickpea field in Ain Temouchent



Nodulated chickpea roots



Chickpeas grown in greenhouse

The main obtained results are:

- The presence in all studied sites of native local rhizobia able to infect the different chickpea lines tested.
- Water stress and the presence of limestone in the soil, particularly in Sidi Bel Abbess site, hinder the nodulation process.