

S4 Investigating and promoting new local legume symbioses for development in West African and Mediterranean countries

Philippe de Lajudie¹, Marc Neyra¹, Antoine Galiana¹, Angèle N'Zoué¹, Abdoulaye Sy¹, Fiore Molouba¹, Clémence Chaintreuil¹, Lionel Moulin¹, Christine Le Roux¹, Odile Domergue¹, Philippe Jourand¹, Adeline Rénier¹, C. Merabet², A. Bekki², M. Gueye³, Samba Sylla³, I. NDoye³, Diegane Diouf³, T. Wade³, H. Sow⁴, P. Houngnandan⁵, A.M. Zoubeirou⁶, I. Yattara⁷, O. Sacko⁷, T. Atallah⁸, F. Zakhia⁸, Mohamed Mars⁹, Mosbah Mahdhi⁹, Habib Jeder⁹, A. Filali-Maltouf¹⁰, S.H. Mohamed¹¹, and Bernard Dreyfus¹

¹Laboratoire des Symbioses Tropicales et Méditerranéennes, CIRAD/INRA/IRD/SupAgro/UM2, UMR113, 34398 Montpellier Cedex, France; ²Université d'Oran, Es-Senia, Algeria; ³IRD/ISRA/UCAD, Dakar, Senegal; ⁴Association sénégalaise pour la promotion du développement à la base, Dakar, Senegal; ⁵Université d'Abomey Calavi, Cotonou, Benin; ⁶Faculté des Sciences, Université Abdou Moumouni, Niamey, Niger; ⁷Université du Mali, Bamako, Mali; ⁸Faculté d'Agronomie, Université Libanaise, Beirut, Lebanon; ⁹Faculty of Sciences, Gabès, Tunisia; ¹⁰Rabat University, Rabat, Morocco; ¹¹Sebha University, Sebha, Libya

In the context of climate change, increasing earth population, and burst of energy cost, legumes should contribute more to both food security and sustainable management of natural resources (water and soils) in the next years. A collaborative work with research groups in several developing countries during the past 20 years focused on investigation and sampling of local wild legumes (herbs, shrubs, and trees) with environmental/agronomic/forestry potential in West Africa and in the Mediterranean region. New symbiotic systems were discovered, resulting in new models for fundamental research, and new applications. This is, for one part, due to their associated microsymbionts, often belonging to unexpected bacterial groups with original physiological/metabolic properties, i.e. photosynthesis, free-living nitrogen fixation, methylothrophy, tolerance to extreme environmental conditions (salinity, aridity, heavy metals, and hydrocarbon breakdown), stem nodulation, and beneficial associations with non-legume plants (cereals). This may account for their wider adaptation to a variety of plant species and ecological habitats than previously thought, opening new insights for the domestication of these "multipurpose rhizobia". Indeed, new arable soils are required worldwide, often from degraded lands, affected by aridity, salinity, mining activities, and pollution. Rhizobia may thus participate as tools. Several examples picked up from our diversity investigations over recent years will be presented to illustrate either success stories of beneficial use of these new symbioses or reasonably good perspectives of application of research in different aspects, soil fertility regeneration/maintenance, food crop production optimization (i.e. green manure, nematode control, and associated cultures), and sustainable environmental management. We will present how federations farmers organizations at the local, regional, and national levels became active collaborative partners in these studies, and how results can be efficiently disseminated to their end-user members (small farmers, NGOs, foresters, agronomists, cattle breeders, industrials, etc).