

Agricultural Microbiology Services Section Front Page

Agricultural microbiology is presented as a synthetic research field responsible for the transfer of knowledge from general microbiology and microbial ecology to the agricultural biotechnologies. It was focussed on plants, but should emphasise the importance of micro organisms in relation to livestock nutrition and health and to the biocontrol of phytophagans. Analysis of the regular circulation of microorganisms between plant, animal and soil borne niches is required to reconstruct the arrangement of the microbiota in natural and agricultural ecosystems and to address the beneficial microbial functions in the terms of nutritional and defensive symbioses. The major goal of agricultural microbiology is a comprehensive analysis of symbiotic micro organisms like bacteria, fungi interacting with agriculturally important plants and animals: here we have focussed on plants. In plants, interactions with micro-organisms are diverse, ranging from two partite symbioses e.g. legume rhizobia N₂ fixing nodular symbioses or arbuscular mycorrhiza to multipartite endophytic and epiphytic root-associated, phyllosphere communities. Two-partite symbioses provide the clearest models for addressing genetic cooperation between partners, resulting in the formation of super-organism genetic systems, which are responsible for host productivity. Analysis of these systems has now been extended considerably by using the approaches of metagenomics, which allow the dissection of taxonomic, population structures and the metabolic, ecological functions of microbial communities, which have resulted from the adaptation of free-living, soil microflora in the endosymbiotic niches. Both beneficial nutritional, defensive, regulatory and antagonistic biocontrol functions expressed by symbiotic microbes towards their hosts are the potential subjects of effective agronomic use. A fundamental knowledge of the genetics, molecular biology, ecology and evolution of symbiotic interactions could enable the development of microbe-based sustainable agriculture.