CHAPTER 31

*Rhizobium* Resources in the Arid Region of Xinjiang

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1 Introduction

The Xinjiang region is situated at 36°-48°N and 71°-96°E in the middle of Eurasia and far from the ocean. Being surrounded by high mountains, its terrain is complicated. Rainfall is rare and evaporation is high causing the region to suffer from dryness. Annual and daily temperature fluctuations are drastic. This makes it a typical continental inland arid region. Affected by topographic features, many different ecologic conditions have been formed. Desertification and salinization of soils are widespread. However, in this great natural arid ecological system there are various kinds of nitrogen-fixing microorganisms, which have become fitted to the dry and saline conditions. Xinjiang is a vast land of about 1.65 million square kilometers, but the cultivated land only accounts for 2% of the whole area (Wen 1965). Therefore, the nitrogen-fixing microorganisms play a very important role in the nitrogen cycle in this ecosystem. *Rhizobium* research and its application in this region would help to improve the soil fertility, increase crop productivity and is also beneficial for energy-saving and environmental protection. According to Jordan and Allen (1974) so far, only about 0.3–0.4% of the *Rhizobium* species have been studied with respect to their symbiosis with plants. Most of the rhizobia have not been isolated and studied. To study *Rhizobium* resources in the Xinjiang arid area and identify new species or strains will certainly be useful for *Rhizobium* classification. Our research work in the period from 1982 to 1987 included testing the nitrogen-fixing ability of rhizobia in symbiosis, their resistance to unfavorable conditions and exploring their physiological and biochemical characteristics. This paper describes some of our research results.

2 Strains of Rhizobia in the Arid Region of Xinjiang

Through extensive investigations of leguminous plants, including those from natural grasslands, sandy desert, forest and saline-alkali soils, we have obtained 373 strains of rhizobia from 1208 nodule samples that belong to 109 species of 31 genera of leguminous plants (Table I). Among them, 88 new *Rhizobium* strains from 39 species were isolated from the plants nodules (Table 2).

Taxonomic studies were carried out through nodulation tests. The species of leguminous plants were infected by homologous rhizobia, followed by cross-inoculation. The plants tested included, among others, *Medicago, Glycine max, Pisum sativum, Phaseolus vulgaris* and *Vicia sinensis*. Some rhizobia isolated from root nodules of *Astragalus* could not nodulate any one of the above 5 plants. But some rhizobia, such as those from *Glycine max, Vicia sinensis*, and *Phaseolus vulgaris* infected plants that were also infected by the rhizobia isolated...