Recurrent questions from agronomists in the temperate Midwest and in tropical wet or semiarid areas have been of the type: “How often must I re-inoculate if (i) the winter was colder or warmer than average; (ii) the summer was wetter or drier or hotter or colder than average; (iii) the same crop was grown in past years?” These questions and other similar ones can be summarized by the questions: “Do rhizobia exist in soils?” and “How long can they survive?” This chapter is intended to provide some broad guidelines to answer these questions where detailed on-site studies are not yet available.

I. NEED FOR AND EFFICACY OF INOCULATION

Legumes must be inoculated when planted in an area for the first time unless an appropriate, efficient *Rhizobium* that also nodulates a different plant species is already present. Where environmental conditions include extended dry periods, high temperatures, or saline, acidic, or alkaline soils, re-inoculation with each planting may be necessary. In temperate climates similar to the midwestern United States, inoculation is usually required only upon introduction of the legume, as long as the legume is replanted in the field within 3 to 5 yr of any previous planting and if the initial crop was well-nodulated. Johnson and Boone (1976) found no yield increase of soybeans [*Glycine max* (L.) Merr.] in two Illinois soils with either seed-applied or granular inoculant; other workers in midwestern states have reported similar results. Inoculation should also be performed if the previous legume crop was not well-nodulated. Detailed criteria for determining whether or