

## ABSTRACT

Greenhouse and field experiments studied inoculant, nutritional, plant and soil factors on growth and nitrogen fixation of several forage legumes. A visual assessment of the degree of nodulation and nodule effectiveness in a large forage legume collection was also performed.

Inoculation of Centrosema virginianum with effective Rhizobium strains did not always increase the top yield or nitrogenase activity suggesting that the effect of inoculation was offset by the presence of an indigenous Rhizobium population in the soils. Lime-pelleting the seeds of Centrosema virginianum improved Rhizobium survival evident by higher growth and nitrogenase activity of plants.

Nutrients such as P increased the yield of some Stylosanthes species only at a very low level (25 kg P/ha). Inorganic N (100 kg N/ha) drastically reduced the nitrogenase activity of several Stylosanthes species and had a variable effect on dry matter yield. In a low fertility soil, omission of P, S and Mo resulted in reduced yield and nitrogenase activity of Centrosema pubescens compared with those receiving full nutrient amendment.

Defoliation of Desmodium intortum reduced nitrogenase activity through reduction in nodulation and top yield. Increasing moisture stress adversely affected the yield of Desmodium intortum. Growth of Stylosanthes hamata was favoured by low nutrient concentration and a higher pH level both in culture solution and in soil.

Growth and nitrogenase activity of several legumes were more influenced by soil type than by the origin of plant seed. The legumes responded positively to nutrient application, and a strong nutrient/soil and nutrient/legume interaction was observed.

Visual assessment of nodulation in the field indicated the presence of a wide spectrum of Rhizobium species in the soil. However, some legumes did not nodulate suggesting that their compatible rhizobia were absent.