# *RHIZOBIUM* SUPPLY SERVICE

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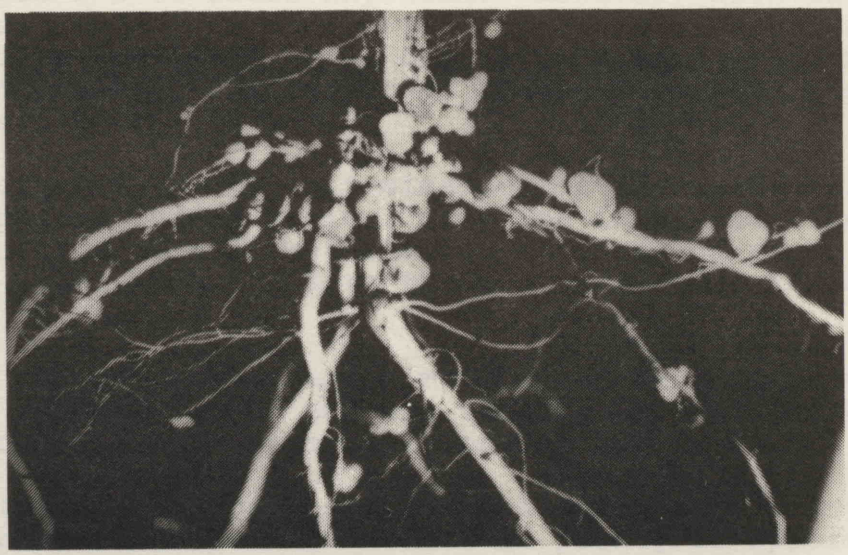
## INTRODUCTION

Nitrates are a very important type of plant food. Most plants have to have plenty of nitrates in the soil near their roots or they cannot grow well. Certain types of plants called legumes are helped by special bacteria to take nitrogen out of the air and make their own nitrates. This is called nitrogen fixation and the special bacteria are called *Rhizobia*. There are many different kinds of *Rhizobia* each of which can only help certain kinds of legumes.

*Rhizobia* are generally found living freely in the soil but when a suitable legume is growing near to them, they can move into its roots and live there instead. The bacteria make swellings called nodules in the roots and it is while they are in these nodules that they fix the nitrogen. The bacteria help the plant by doing this and the plant helps them by supplying them with carbohydrates. In biology, the sort of relationship where both partners benefit from living very closely together is called symbiosis.

The effects of nitrogen fixation are to increase plant growth rate and yield and to help maintain soil fertility.



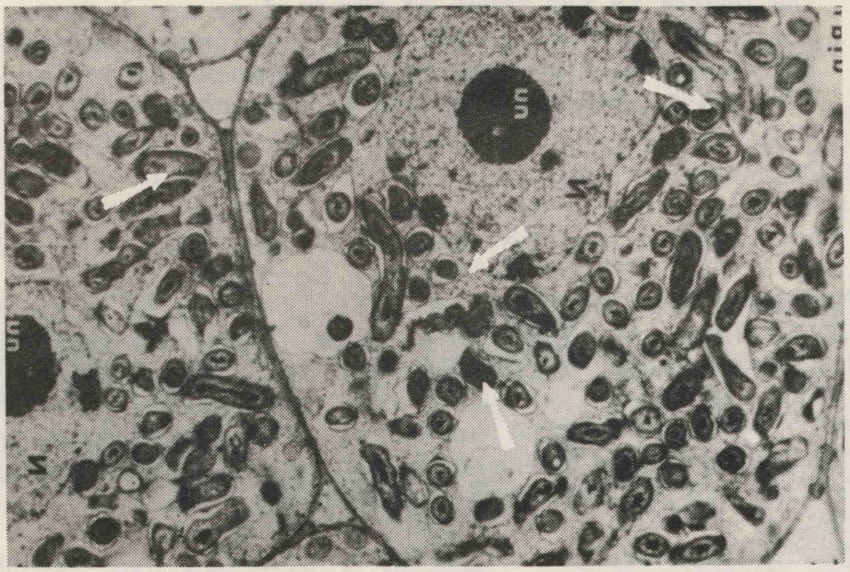
*Typical nodules on a legume root*

## IMPORTANCE OF LEGUMES

Many legumes in Papua New Guinea are valuable as food, pasture or cover crops.

The most commonly cultivated food legumes include peanut *Arachis hypogoea*, snake bean *Vigna sinensis*, mung bean *Phaseolus aureus*, common bean *Phaseolus vulgaris*, winged bean, *Psophocarpus tetragonolobus*, and soya bean *Glycine max*. Leguminous pasture and cover crops include puero *Pueraria phaseoloides*, siratro *Phaseolus atropurpureus*, stylo *Stylosanthes guianensis*, centro *Centrosema pubescens*, silver leaf desmodium *Desmodium uncinatum*, and green leaf desmodium *Desmodium intortum*. *Leucaena leucocephala* is frequently used as a shade tree in cocoa plantations and less frequently as a browse shrub for cattle.

Soyabeans with plenty of nodules on their roots can fix between 40 and 60 kg of nitrogen per hectare each year although some reports put the figure as high as 190 kg. Approximately 70% of this total would be harvested in the beans. The pasture legume centro has been shown to fix between 60 and 200 kg of nitrogen per hectare in a 4-6 month growing period and trials with *Leucaena* have also shown fixation of large amounts of nitrogen from the air. In Hawaii, the nitrogen yield averaged 460 kg/ha annually over a three year period.



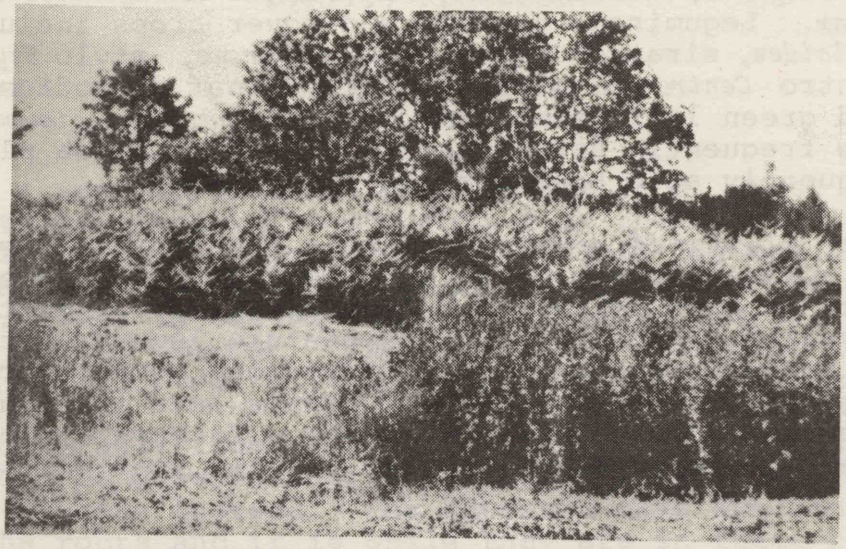
Rhizobia *(examples arrowed) inside the plant cells of a nodule*

## IMPORTANCE OF INOCULATION

Although *Rhizobia* are present naturally in many soils, often there are too few to infect the host successfully. In this case it is possible for the farmer to add *Rhizobia* to his seeds before he sows them.

He can also do this if the *Rhizobia* he has in his field are not the right type for the legume he wants to sow.

Adding *Rhizobia* to seeds is called inoculation. The beneficial effects of this are most clearly seen in areas newly planted to legumes. This is because there may not be many *Rhizobia* of the right type living there. Good effects can also be seen on some established legume areas especially if the soil conditions prevent the *Rhizobia* from living without the legume between crops.



*The plants in the front of the picture are legumes. The seeds of those on the right were inoculated with* Rhizobia *and it is easy to see how much better they have grown than those on the left which were not.*

## SUPPLY OF *RHIZOBIA*

*Rhizobia* for inoculation can be obtained free from the *Rhizobium* Supply Service, D.P.I. Plant Pathology Section, P.O. Box 2417, Konedobu. This service started in 1956, following work by L.B. Thrower and D.E. Shaw, with *Rhizobia* from *Leucaena leucocephala*. Later, *Rhizobia* from other native plants and from Australia extended the scope of the service. *Rhizobia* are now available for the inoculation of over 125 legume species. They are kept in the Konedobu Plant Pathology Laboratory and are distributed, on request, both within Papua New Guinea and overseas.

Any farmer who needs some *Rhizobia* to inoculate his legume seeds should contact the plant pathologist at the Plant Pathology Section, D.P.I., Konedobu (Tel. 21 4699 Ext. 317) and supply the following information:

(i) the name of the plant to be inoculated.

(ii) the quantity of seed to be sown.

(iii) the intended date of sowing.

Sheets describing the method of inoculation will be sent with each batch of inoculum supplied. Further information on the *Rhizobium* Supply Service is also available from the Plant Pathology Section.