Figure 1. Chickpea nodule showing internal damage due to Metopina sp.

are damaged (Reed et al. in press). The help extended by Dr Disney in the preliminary identification of Metopina sp is gratefully acknowledged.

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Reed, W., Cardona, C., Sithanantham, S., and **Lateef, S.S.** (in press). The chickpea insect pests and their control. In "The Chickpeas" (Saxena, M.C., and Singh, K.B. eds.), ICARDA/CAB.

Microbiology

Identification of a nonnodulating spontaneous mutant in chickpea

Nonnodulating legume genotypes can be used as nonfixing controls in the quantification of N_2 fixation by legumes. Further, by comparing growth of nonnodulating and nodulating legumes the ability of the soil to supply N for plant growth may be ascertained. Nonnodulating lines of soybean and groundnut have been used for these purposes for several years. Recently, Davis et al. (1985) reported nonnodulating mutants, induced by gamma-irradiation, of a double-podded chickpea line ICC 640. This communication reports on identification of a spontaneous nonnodulating mutant from a chickpea accession ICC 435.

During routine nodulation observations in the postrainy season of 1985, a plant without nodules was found amongst well-nodulated plants of 24-day-old ICC 435 growing in a Vertisol field at ICRISAT Center. To determine whether this was of a genetic nature, the nonnodulated plant, which looked similar in growth and color to the nodulated plants, was potted for seed production and cared for as described by Rupela and Dart (1982) after inoculating the pots with ~10^9 rhizobia per pot. Watering was done, whenever required, with 1/4 strength Arnon solution containing 25 ppm N as KNO_3 for about 3 weeks at first and then with tap water subsequently.

Individual pods from the potted plant were harvested when they turned pale, to allow continuous flowering and podding so as to maximize seed production. In a growth period of 122 days under greenhouse conditions, 24 pods were harvested having a total of 32 seeds. The plant was uprooted and the roots exposed for nodule observations while it was still flowering and podding, but no nodules could be found.

In an unreplicated test, the seeds produced were sown separately in 10-cm diameter pots having sterilized sand and at least 10^9 rhizobia of four strains F 75, H 45, IC 59, and IC 76. Seeds of the parent line ICC 435 were also inoculated with all the strains in separate pots to serve as a control. Watering was done with 1/4 strength Arnon solution without N. None of the four strains could nodulate the plants of the apparent spontaneous mutant while all the plants of the parent line were well nodulated when observed 42 days after sowing (Figure 1 and 2). Under these N-deficient conditions, all the

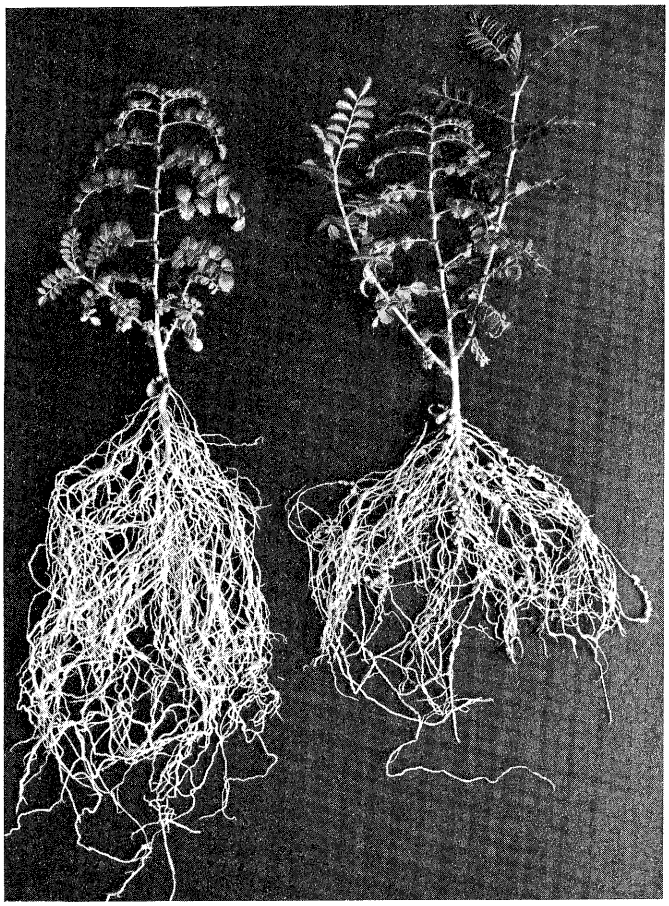
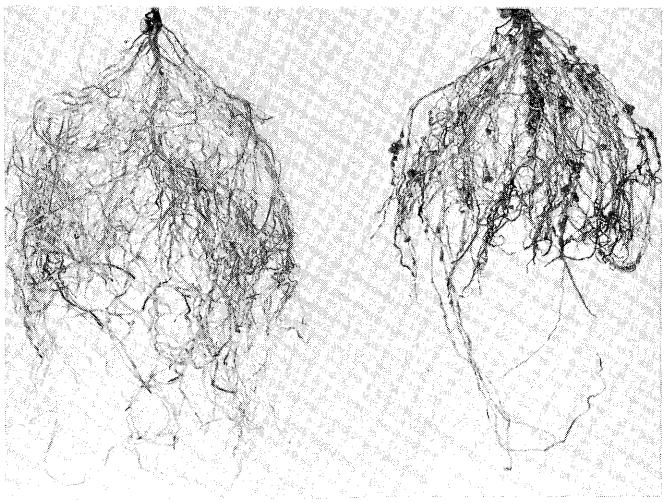


Figure 1. Nonnodulating spontaneous mutant (left) and normal nodulating parent line ICC 435 (right) after they were grown in pots for 42 days in the presence of chickpea rhizobia.

Figure 2. A close-up of the root system of the plants in Figure 1 to show the absence of nodules in the mutant (left) and their presence in the parent line (right).



nonnodulated plants grew poorly but showed good growth on medium supplied with N in a subsequent test.

The roots of nonnodulating plants had apparently normal root hair. This material may therefore be of value for studies on early events in the infection of root hair by rhizobia. Preliminary observations indicate that this mutant (ICC 435M) is different from PM 233 (Davis et al. 1985) in seed size, smoothness of seed surface, days to flowering, and is single podded. Seeds of this mutant would be available for interested workers after some preliminary studies have been made and enough seed bulked.

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Davis, T.M., Foster, K.W., and **Phillips, D.A.** 1985. Nodulation mutants in chickpea. Crop Science 25:345-347.

Rupela, O.P., and **Dart, P.J.** 1982. Screening for nodulation characteristics in chickpea and subsequent generation of seeds. Pages 57-61 in Biological nitrogen fixation technology for tropical agriculture: proceedings of International Workshop, 9-13 Mar 1981, Cali, Colombia (Graham, P.H., and Harris, S.C., eds.). Cali, Colombia: CIAT.
