

# Grain Quality and Biochemistry

## Program at ICRISAT

The Grain Quality and Biochemistry Program is concerned with all the crops of ICRISAT, and the objectives are to identify cultivars with improved nutritional quality and superior grain quality characteristics.

In the case of chickpea, about 18 000 samples have been analyzed for protein content, and the range in protein percent was from 10.6 to 31.1 with a mean of 20.5 percent. Sulphur amino acids and tryptophan have also been analyzed in several cultivars. Chemical analyses of desi and kabuli cultivars were carried out and some notable differences were observed. Cooking quality characteristics and digestibility studies using *in vitro* techniques are being carried out in several chickpea cultivars. In a few selected samples, fractionation of proteins and chemical analysis of samples collected at different stages of maturation have been carried out.

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Fig. 1. Dr. C. L. L. Gowda, Chickpea Breeder, discusses chickpea material in ICRISAT fields with Mr. Assadullah Habibi from Afghanistan, and E. L. Tigani Siddig Mohamed from Sudan, who are undergoing training at ICRISAT Center. Details of training programs are obtainable from Dr. D. L. Oswalt, ICRISAT.

differently in their nodule development with different *Rhizobium* strains. The Syrian Local cultivar produced most of its nodules within 28 days of germination. However, only strain IC-26 continued forming nodules until the mid pod-fill stage.

For both cultivars, nodule weight continued to increase until the mid pod-fill stage, although the rate varied considerably between strains. At this harvest, Syrian Local produced the most nodule tissue with strain CC-1192; strain IC-20 formed fewest nodules and least nodule tissue. The desi cultivar developed most nodule tissue with strain IC-20 and the least with the Pantnagar inoculum.

For both cultivars, inoculation with some *Rhizobium* strains increased grain yield in comparison with the uninoculated treatments (Table 1). Syrian Local produced most grain yield with strain IC-26 (1508 Kg/ha compared to 1255 Kg/ha for the uninoculated treatments) and the desi type produced the highest yield with Ca-7 (1798 Kg/ha compared to 1470 Kg/ha for the uninoculated control plants).

## Screening Cultivars for Efficient Nodulation

The nodulation of 151 cultivars of chickpea was examined with and without inoculation. Only 40 percent of the uninoculated cultivars nodulated, averaging less than two nodules per plant.

All the inoculated cultivars formed nodules, with considerable differences in the numbers. For example, cultivar NEC-K 147 from Greece produced 19.2 nodules and 413 mg of dried nodule tissue/plant (mean for three harvests); whereas a cultivar NEC-K 126 from Spain produced only 1.7 nodules and 1.8 mg dried nodule tissue/plant when inoculated with the same *Rhizobium* strain. It was possible to identify some of the lines which had higher nodule forming ability and lines with low nodulating ability.

These results suggest that by inoculation with effective strains of *Rhizobium* the yield of chickpea can be considerably increased in dry areas. It also seems possible to select or breed cultivars for both increased nitrogen-fixation and for grain yield.

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