## Inheritance of susceptibility to iron chlorosis in chickpea

Iron chlorosis refers to the symptoms of plants caused by iron deficiency in the soil. Younger leaves of chickpea yellow when grown in soils deficient in available iron or when iron in the soil becomes bound or converted into unavailable form due to hydration. Genotypic differences for susceptibility to iron deficiency have been reported (Gowda and Smithson 1980). Germplasm accession ICC 5386 (NP 62) showed high degree of susceptibility and was chosen as a susceptible parent. It was crossed with cultivars such as Annigeri, K 850, G 130, H 208, and BDN 9-3. $F_1$, $F_2$ and parents were grown on a Vertisol at ICRISAT Center during the 1981/82 postrainy season. The field was irrigated 30 days after seedling emergence to enhance the expression of iron-deficiency symptoms. Plants showing symptoms of iron chlorosis were tagged and counted. All $F_1$s were normal indicating susceptibility to iron chlorosis to be recessive. $F_2$ populations segregated into normal and chlorotic plants. Data on numbers of plants segregating into normal and chlorotic types, and Chi-square values for goodness of fit to the expected 3:1 ratio are given in Table 1.

**Table 1. Numbers of normal and chlorotic plants, Chi-square values, and probabilities of goodness of fit to a 3:1 ratio in $F_2$ populations of crosses of normal parents with NP 62.**

| Cross | No. of plants | | $\chi^2$ | P |
|---|---|---|---|---|
| | Normal | Chlorotic | | |
| Annigeri x NP 62 | 173 | 41 | 3.81 | 0.1 - 0.05 |
| K 850 x NP 62 | 133 | 37 | 0.94 | 0.3 - 0.50 |
| G 130 x NP 62 | 47 | 23 | 2.30 | 0.1 - 0.20 |
| H 208 x NP 62 | 155 | 89 | 17.13 | 0.01 |
| BDN 9-3 x NP 62 | 159 | 35 | 5.01 | 0.05 |
| Total | 667 | 225 | 0.02 | 0.99-1.00 |
| Heterogeneity | | | 23.63 | 0.01 |

**Table 2. Frequencies of normal, segregating, and chlorotic $F_3$ progenies, Chi-square values, and probabilities of goodness of fit to 1:2:1 ratio of crosses of normal parents with chlorotic parent (NP 62).**

| Cross | Number of $F_3$ families | | | | $\chi^2$ | P |
|---|---|---|---|---|---|---|
| | Normal | Segregating | Chlorotic | Total | (1:2:1) | |
| Annigeri x NP 62 | 9 | 21 | 10 | 40 | 0.15 | 0.90-0.95 |
| K 850 x NP 62 | 8 | 22 | 10 | 40 | 0.60 | 0.70-0.80 |
| G 130 x NP 62 | 8 | 21 | 10 | 39 | 0.45 | 0.70-0.80 |
| H 208 x NP 62 | 9 | 19 | 10 | 38 | 0.06 | 0.95-0.98 |
| BDN 9-3 x NP 62 | 8 | 21 | 10 | 39 | 0.46 | 0.70-0.80 |

For the first three crosses, and also overall, the numbers of normal and chlorotic plants fitted into a 3:1 ratio. Cross H 208 x NP 62 showed an excess of chlorotic plants, and BDN 9-3 x NP 62 had excess of normal plants. Forty $F_3$ families (from $F_2$ single plants) were grown from each cross during the 1982/83 season. The $F_3$ progenies of chlorotic $F_2$ plants bred true. The remaining $F_3$ families were classified into nonsegregating normal, segregating normal and segregating chlorotic plants. The frequencies of progenies in different classes along with Chi-square values are given in Table 2. In all the crosses, the $F_3$ families fitted into the expected 1:2:1 ratio. This confirms that susceptibility to iron chlorosis is controlled by a single recessive gene. A symbol 'fe' is proposed for the character governing susceptibility to iron chlorosis.

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**Gowda, C.L.L.,** and **Smithson, J.B.** 1980. Iron chlorosis in chickpea. International Chickpea Newsletter 3:10.

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## Inheritance of an upright pedicel mutant characteristic in chickpea

In chickpea, the flower pedicel bends downwards after fertilization and the fruit develops below the leaf canopy. In 1974/75, a natural mutant with upright pedicel was observed in chickpea variety L 550 at ICRISAT Center (Pundir and van der Maesen 1977). This was designated as an upright pedicel mutant (Figure 1). The mutant has a reflexed pedicel so that the fruit remains above the plant canopy during the pod development. This characteristic appears to be of interest if it can increase the photosynthetic activity in the pod wall also.

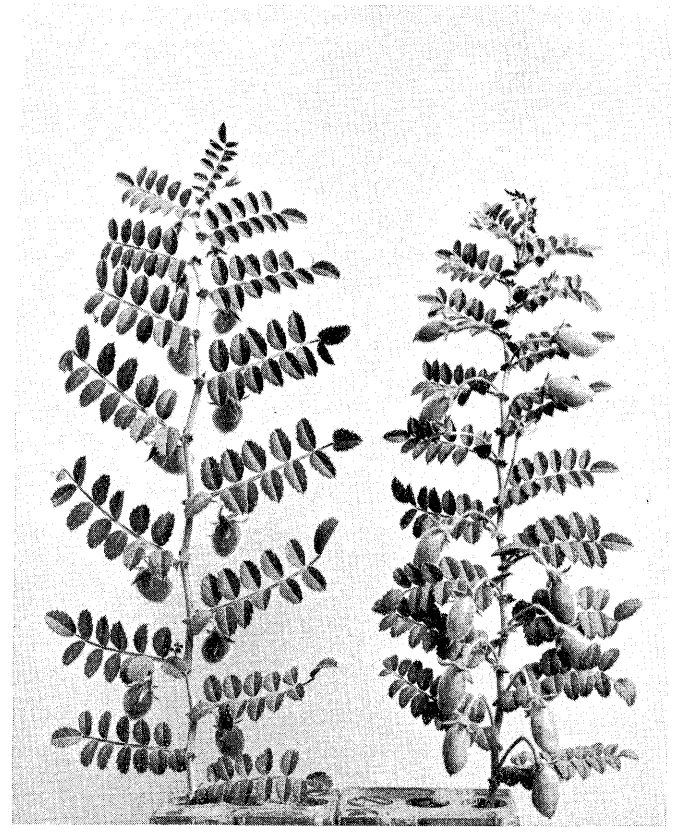

**Figure 1. Normal (left) and upright pedicel in chickpea.**

In order to study the inheritance of upright pedicel, the mutant was crossed with two normal cultivars, Annigeri and K 850, having normal pedicel. Reciprocal crosses were also made to check if there were any maternal effects. The parents along with their $F_1$'s and $F_2$'s were grown in the field at ICRISAT Center during the 1981/82 postrainy season and were observed for pedicel characteristics. The $F_1$'s were all normal, indicating that the normal pedicel characteristic is dominant and the upright pedicel characteristic is recessive. The $F_2$ plants segregated into normal and mutant types. The number of plants classified as normal and upright types, and the Chi-square values of goodness of fit to 3:1 ratio are given in Table 1. The segregation in all the crosses, individually and overall, very closely fitted a 3 normal:1 mutant ratio.

Forty $F_3$ families, derived from $F_2$ single plants, were planted and observed