Breeding for weather resistance in mungbean

B.C. Imrie, R.J. Lawn, and Z.U. Ahmed

C.S.I.R.O. Division of Tropical Crops and Pastures, St. Lucia

Mungbean (Vigna radiata) cultivars grown in Australia are susceptible to weather damage which substantially reduces the value of the grain. Water absorption studies, together with field weathering observations have shown that hardseededness contributes to weather resistance (1,2). This paper presents results from within-line selection for hardseededness.

Methods

One to two hundred hard seeds of each of two cultivars (Berken and Celera) and three breeding lines (N63, 82-15, LWR) were sown in pots in a glasshouse in July 1983 (S₁ generation). Seed was harvested from individual plants, germination tested, and hard seed percentages calculated. Selection was applied with 536 seeds from 82 plants with the highest hard seed content (13.5% selection intensity) being resown in the glasshouse as the S₂ generation in October 1983. Again, seed was harvested from individual plants and hard seed levels determined. Seeds from each of 42 plants with the highest hard seed levels (8.4% selection intensity) were sown as the S3 generation in the field in two reps of ten seeds each in January 1984. Seed from each plot was harvested in bulk and germination tested to determine hard seed levels. Heritabilities were estimated from the regression of S2 on S₁ and S3 on S2 generations.

Results and Discussion

Data are presented in Table 1. Heritabilities were low and in many cases not significantly different from zero. However, S2 line means of breeding lines were significantly (P < 0.05) higher than S₁ line means suggesting the presence of more variability for hardseededness within these lines than within the cultivars.

| Line Popln. mean | S, generation | | S _a generation | | |
|------------------------|--|---|---|--|--|
| | and S.E. | Predicted response | Popln. mean | and S.E. | Predicted response |
| 25.9 | 0.04(0.14) | 1.1 | 20.4 | 0.33(0.24) | 13.0 |
| 35.0 | 0.23(0.21) | 6.4 | 40.8 | 0.05(0.32) | 2.0 |
| 15.6 | 0.26(0.08) | 12.3 | 54.4 | 0.22(0.17) | 10.1 |
| 22.5 | 0.27(0.11) | 10.4 | 37.1 | 0.04(0.40) | 1.1 |
| 24.6 | 0.14(0.10) | 4.2 | 57.1 | 0.07(0.10) | 2.3 |
| | Popln. mean 25.9 35.0 15.6 22.5 24.6 | S1 generati h ² and S.E. 25.9 0.04(0.14) 35.0 0.23(0.21) 15.6 0.26(0.08) 22.5 0.27(0.11) 24.6 0.14(0.10) | $\begin{array}{c} & & S_1 \ \ \mbox{generation} \\ \mbox{mean} & h^2 & \mbox{Predicted} \\ \mbox{and S.E.} & \mbox{response} \\ \hline \\ & & \\ 25.9 & 0.04(0.14) & 1.1 \\ \mbox{35.0} & 0.23(0.21) & 5.4 \\ \mbox{15.6} & 0.26(0.08) & 12.3 \\ \mbox{22.5} & 0.27(0.11) & 10.4 \\ \mbox{24.6} & 0.14(0.10) & 4.2 \\ \hline \end{array}$ | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ | $\begin{array}{cccccccccccccccccccccccccccccccccccc$ |

Table 1. Hardseededness in two generations of five mungbean lines.

Further increases are anticipated from selection among the progeny of crosses between cv. Berken and several V. <u>radiata</u> accessions which have consistently had hard seed levels above 80%. The use of V. <u>sublobata</u>, a related species in which some accessions have 100% hard seed, as a source of further variation for hardseededness is also being investigated.

1. Williams, R.W., Lawn, R.J., Imrie, B.C., and Byth, D.E. 1984. Aust. Seeds Res. Conf., Lawes, 1984. pp 191-7.

2. Imrie, B.C. 1983a. CSIRO Div. Trop. Crops and Past., Ann. Rep.1982-83. 32.