

A screening technique for weathering resistance in mungbean

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The production of mungbeans (*Vigna radiata*, *V. mungo*) in Australia is limited by the susceptibility of current varieties to pre-harvest sprouting and to reductions in seed quality and viability following rainfall. Simple selection for resistance to weather damage using visual measurements in the field was unsuccessful (1). A series of studies on the role of water absorption in weathering showed that weather damage was cumulative and dependent upon interactions between the timing of rainfall and the stage of pod development. The aim of this present study was to develop a reliable screening procedure based on pods protected from previous exposure to wetting, and use it to measure the variation in response to weathering for a range of germplasm.

Methods

Pods were obtained from plants protected from rain by being grown in the glasshouse in soil beds watered by sub-surface irrigation. In the most successful procedure for inducing weather damage, intact, dry pods were hand-harvested, suspended inside a plastic-coated chamber 2m * 1m * 1m, and exposed to five consecutive cycles of wetting (4hr sprinkling, 20hr at 100%RH, and 4hr sprinkling) and drying (44hr at 50%RH) at 30°C. A total of 302 genotypes were screened, and the degree of weather damage evaluated using germination tests and expressed as an index of seed death (SDI).

Results and discussion

The screening procedure successfully reproduced both field symptoms of weather damage and known differences in response between the relatively resistant black gram cultivar, Regur, the moderately susceptible green gram cv. Celera, and the extremely susceptible cv. Berken (Table 1). The responses of other lines ranged from all seeds viable to all killed following exposure (Figure 1). Weather-damaged pods of each accession were typically darkened and split, and the testas of seeds were discoloured and cracked. Weathering also reduced cell membrane integrity, and seed weight, vigour, and viability. Twenty-five lines of green gram were identified with weathering resistance equivalent to cv. Regur, including an experimental line also selected for other desirable traits ("N63"- R.J. Lawn. unpubl.), and subsequently released as cv. Satin. Thus, an efficient, controlled screening Method for weathering resistance was developed for use in the routine evaluation of experimental lines and/or new Introductions of mungbean.

Line	SDI	Rank
N63	7.9	26
cv. Regur	8.2	28
N19	24.1	100
cv. Celera	25.8	111
cv. King	37.0	161
cv. Berken	76.4	285

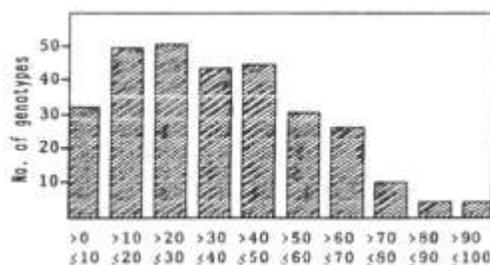


Table 1. The index of seed death (SDI) and rankings out of 302 mungbean lines for

Figure 1. The frequency distribution among genotypes for the index of seed death (SDI) from

four cultivars, and two breeding lines.

intact pods exposed to controlled weathering.

1. Imrie, B.C. Proc. Aust. Plant Breeding Conf., Adelaide, 1983. pp. 348-50.