Vegetative and reproductive characteristics of five genotypes of mungbeans grown under two water regimes

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Mungbeans are a recent introduction to Australian crop production. Detailed understanding of vegetative and reproductive characteristics is required to assist in production and planting breeding programs if mungbeans are to increase in importance in irrigated agriculture, and in dryland environments too dry for soybean production. The effect of two water regimes on plant development, yield and components of yield are reported here.

Methods

Five mungbean genotypes, viz. Celera, Berken, Regur and two breeders lines, D30 and N16, were planted in a black earth soil under fully (FI) and strategically irrigated (SI) conditions at Queensland Agricultural College on 23 January, 1986. Plant populations were 400 000 and 240 000 plants ha-1 respectively. Data on plant height (plht), plant width (plw), number of mainstem nodes (msn), inflorescences (inf), pods per plant (pods p1-1), pods per inflorescence (pods inf-1), pods per fertile node (pods node-1), seeds per pod (s pod-1), seed weight (sw) and yield (y) were collected. Analysis of variance was completed and correlation among plant characteristics examined.

Results and Discussion

Significant (I' < 0.05) interactions between genotype and water regime were detected for inf and sw. Significant (r< 0.05) differences between genotypes occurred for all characteristics measured. The FI treatment increased yield, msn and inf and reduced plw, though these effects would have been partly due to the higher plant population. It is not possible to separate plant population and irrigation treatment effect because of experimental design constraints.

Significant (P < 0.05) positive correlation were found between plht and plw, inf and msn, pod p1-1 and msn, pods p1-1, pods inf-1 and pods p1-1, and pods inf-1 and pods node-1, under both FI and SI conditions. Significant (P< 0.05) negative correlations were found between pods inf-1 and msn, and y and sw (both FI and SI conditions) and pods inf-1 and inf (FI only).

Under FI and SI conditions inf, pods p1-1, pods inf-1, seeds pod-1 and sw were the main contributors to yield. Of the genotypes used, D30 produced the highest average yield (1.73 t ha-1), suggesting that it is well adapted to limited moisture availability, and is responsive to irrigation. Berken and Celera were intermediate, though they appeared to be more responsive to irrigation. Regur yielded poorly (1.31 t ha-1) in contrast to earlier data (1,2). This is attributed to the late planting date - the ideal date for Regur is late November to mid December (3).

The genotypes used differ in time to maturity (85 days - Berken, N16, D30 to 125 days - Regur), thus the irrigation effect may be influenced by time of water application in relation to stage of physiological development of individual genotypes. This aspect requires further study.

The data presented identify those plant characteristics which make the most significant contributions to yield, and provide selection criteria for plant breeding programs. In production of mungbeans, practices which optimise inflorescence and seed number and contribute to seed size should be adopted.

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