Mungbean development in the northern territory

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Summary. The integration of breeding, applied agronomic research and market development to overcome major constraints to dryland mungbean production in the Northern Territory is described.

Introduction

Despite farm yields that on average are greater than the major mungbean producing states of NSW and Qld (12), high production costs and inconsistent returns from existing cultivars have constrained the expansion of mungbean in the NT. Addressing these constraints has required an approach to research and development that incorporates the entire production system from farm to consumer. Three broad deficiencies in the production and sale of mungbeans were identified:

Unsuitable varieties

All high yielding genotypes in screening trials were of short duration (50-60 days)(7). Short duration cultivars did not use growing season length effectively. Optimum sowing date was a balance between sowing early in the wet season to ensure good growth and late enough to avoid harvest rain damage to seed (8). Consequently producing reliable yields of high quality beans was very difficult, a fact confirmed by commercial experience (13). It was necessary to breed a late maturing cultivar so crop duration could approximate growing season length. It was felt that photoperiod sensitivity should be used to achieve this to allow flexibility in sowing date while ensuring maturity toward the end of the wet season (2).

High production costs

Following favourable seasons in the early 1980s, producers adopted a high input high output approach (10). Subsequent poor seasons have not supported this approach. It has been necessary to review the inputs required to produce mungbeans in the Northern Territory so that costs are at least less than likely returns.

Inadequate market options and infrastructure.

Export of mungbeans from the Northern Territory peaked in 1985 when *1100* tonnes were sold (13). This amounted to approximately 10% of the Australian crop (3). Production has fallen in recent years to 100500 tonnes. Poor market knowledge has contributed to this decline.

Results and discussion

Variety development

The cultivar Putland was released in 1991 (14). It is long duration and photoperiod sensitive, maturing 10-16 days later than cvv. King and Berken if sown in January (2). Field experiments at Katherine demonstrated that late maturity has reduced the chance of seed weathering without compromising grain yield (Fig. I). This result is surprising given the seasonal conditions over this period. In 4 of 7 seasons March rainfall was extremely poor with totals in the lowest 10% on record (4). At all sowings Putland flowered during March and as a consequence would have been expected to suffer yield reductions relative to King, which flowered under more favourable conditions.

It appears that Putland copes with less favourable conditions by extracting more soil moisture than King, particularly at depths greater than 90cm (Fig. 2). Both varieties, but particularly Putland appear to be

extracting moisture deeper than 1.6 m, which is greater than the maximum depth of 1.2 m reported for mungbean

A larger proportion of grain yield is formed in the second flush of flowers in Putland (Table 1). Thus it is able to recover from a drought during early reproductive development by reflowering. It was thought that this lack of floral synchrony would pose problems at harvest, however, harvesting methods have been adjusted to capitalise on this attribute. Farmers will attempt to harvest Putland after maturity of the first flush of pods if yield and quality appear good. Desiccation and/or grain drying may be required. If not, harvest is made at maturity of the second flush of pods and any weathered seed from the first flush is removed by grading.

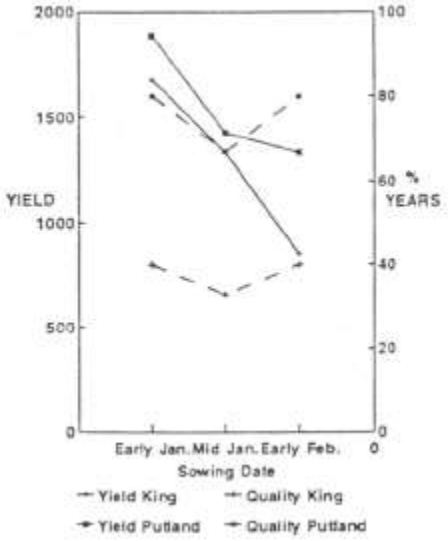

Figure 1. Effect of sowing date on grain yield and the percentage of years where sprouting quality beans were produced. Data from trials 1984-1988 at Katherine. Mid-January sowings for 1988 to 1990 only.

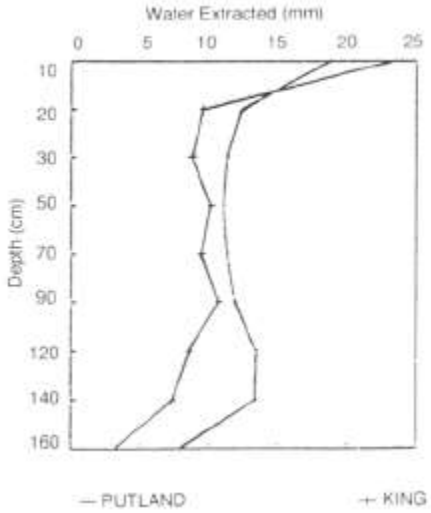

Figure 2. Volume of soil water extracted at Katherine in March 1991. Extraction calculated as the difference between the saturated soil and the soil moisture at crop maturity; there was no rain during the extraction period. Soil moisture was determined by neutron modulation. Measurement commenced when King had finished flowering and Putland had stared flowering and terminated 40 days later at maturity.

Table 1 Percentage of total grain yield formed by the second flush of flowers. Data collected from 4 replicated sowings in 1990 and 1991.

Cultivar	Mean %	Range %
King	28	17-34
Putland	46	36-65

Reducing production costs

Population studies showed there was no yield response in Putland between 10 and 40 plants/m^2. Based on light interception, a population of 20 plants/m^2 should provide similar weed shading to a population of 40 plants/m^2 (Table 2). A plant population of 20/m^2 is half that required to optimise yield and shade weeds in King (9).

Table 2 Response to plant population, cv. Putland at Katherine.

Population (plants/m^2)	Grain Yield kg/ha	% Light interception (at 35 DAS)
10	1476	71
20	1422	84
40	1332	90
l.s.d.	ns	6.3

Phosphorus response studies (Yeates, unpublished data), have led to a reduction in application rate from the previously recommended 20 kg/ha (10) to 10 kg/ha.

Control of insects (usually *Maruca testulalis)* required two preventative aerial applications during flowering and pod fill (10). An extension program to encourage farmers to inspect crops from flowering and to spray using tractor mounted misters or boom sprays, has reduced spray applications usually to one and often none and removed expensive aircraft costs.

The above changes have reduced the cost of growing mungbeans by approximately $106/ha.

Market development

The release of Putland provided an opportunity to address marketing deficiencies and to develop a marketing strategy for the new cultivar. Over a period of four years samples of Putland were sent to exporters and processors within Australia and internationally. Putland is small seeded and was acceptable to selected markets in South-east Asia and Europe. It was felt that as Putland was only likely to be grown in tropical Australia (14), product labelling should clearly show an association with this region. If strict quality standards were adhered to, buyers would identify a preferred product with this region and the Put land variety. In addition growers have been made more aware of their market options so that decisions regarding the marketing of mungbeans can be made at the farm gate stage. Extension efforts

have aimed to teach growers to estimate likely grading losses and quality grade from visual inspection of header samples. Decision aids such as returns to grading for different market options have been developed (5). The first crops of cv. Putland were successfully exported in 1992. Prices were good ($600/t) and grading losses low (<20%).

Future work

New market options are being developed including: (i) gaining an increased share of the Australian market for Putland. Small quantities were sold to Australian sprouters this season with a favourable response; (ii) value adding via the production of dhal if production increases.

The area of crops sown using conservation tillage is increasing in the NT. Future expansion of the area sown to mungbean is constrained by lack of effective herbicides.

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