# BREEDING PERENNIAL LABLAB: PERFORMANCE OF SELECTED LINES IN QUEENSLAND

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### Abstract

To breed perennial lablab cultivars with strong vigour, the annual cultivars Rongai and Highworth were crossed with perennial genotypes (with low vigour). Several lines from the cross between Rongai and CPI 24973 are strong perennials with forage yields reaching up to 80 percent of those of annual cultivars in the first growing season. Forage yields of several lines from the backcross Rongai x (Rongai x CPI 24973) are similar to those of annuals, but perenniality of these lines is uncertain. Results from the breeding program suggest that, among other advantages, use of perennial cultivars may provide feed in early spring in the second and subsequent seasons.

### Key words: Lablab purpureus - perenniality - breeding - ley farming

### Introduction

Reduction of soil fertility in northern Australian grain zones is a major concern for sustainable crop production (1). Of the various options to restore or maintain soil fertility, increasing the legume content of pastures in crop rotations appears the most cost-effective way to further improve cereal crop yields and protein content (2). The most commonly used tropical ley legume in this region is *Lablab purpureus* (lablab). It is a widely adapted, fast growing, annual legume. Experiments in central Queensland showed that, compared with many other legumes, lablab offered the best returns in net nitrogen fixation and effect on subsequent cereal crops (1). However, all three commercial cultivars, Rongai and Highworth (forage type) and Koala (grain type), are annuals and not suited to circumstances where a pasture phase is required for more than one year. To overcome this major weakness, a breeding program in progress in central and south-east Queensland aims to select a perennial lablab cultivar with vigorous growth. This paper describes the performance of some selected lines from the breeding program in Queensland.

### Materials and Methods

Two hundred F3 lines were sown at Lawes in 1994/5. The majority of them were derived from crosses between two annual cultivars (Rongai and Highworth) and a perennial accession (CPI24973). Based on their performance after the first winter, 48 lines were selected. Seeds of 42 of these were harvested and sown at Emerald, Biloela, Narayen (near Mundubbera) and Lawes (80 km to the west of Brisbane) in 1995/6. Ten of the most promising lines were seed increased at Walkamin. In 1996/7, 12 of the selections were sown at Emerald, Biloela and Lawes. Six of these lines were also sown at two additional sites, Brigalow (25km to south-west of Chinchilla) and Cadarga (90km to north of Chinchila). Visual ratings of forage yields for all trials were carried out five to six times during each growing season and forage yields of some of the selected lines were assessed by sampling the 1995/6 trial at Biloela and the 1996/7 trials at Brigalow and Cadarga.

#### **Results and Discussions**

Plants from some 25 of the original 200 F3 lines sowed at Lawes in 1994/95 had produced very few or no seeds and were still growing strongly in the fourth season before the trial was discontinued in November 1997. Thus there is little doubt that these lines are strong perennials. Many other lines produced seeds freely over the period, and soon after the first winter it became very difficult to distinguish the original plants from the volunteers for these lines, making determination of perenniality for these lines uncertain.

Based on their pedigrees, abilities of winter survival, and forage-yield performances over four season at Lawes, and two or three season at Emerald, Biloela, Narayen, Brigalow and Cadarga, four breeding lines

have been selected for further evaluation. Two of them are confirmed perennials but the perenniality of the other two is uncertain (Table 1).

Table 1: Pedigrees and yield performance of four breeding lines compared with their parents

Line Pedigree Rating<sup>a</sup> Yield<sup>b</sup> Perenniality

L94-44 Rongai x (Rongai x CPI 24973) 4.5 80 Weak?

L94-55 Rongai x (Rongai x CPI24973) 4.6 115 Weak?

L94-119 CPI 24973 x (Rongai x CPI 24973) 3.4 65 Strong

L94-142 Rongai x CPI 24973 3.5 70 Strong

Rongai - 5.0 100 Annual

Highworth - 4.6 80 Annual

CPI 24973 - 1.0 - Strong

<sup>a</sup> Average of three (forage yield) ratings each for trials at Lawes, Emerald and Biloela <sup>b</sup> Estimated forage yields (percentage compared to that of Rongai) at Brigalow and Cadarga at 22 weeks after planting by Bruce Pengelly and Beven Smith).

The two strongly perennial lines have a similar average yield rating. Based on their pedigrees, one would expect that the perenniality of L94-119 should be stronger than that of L94-142. However, such a difference has not been observed. They both grew strongly in their fourth season at Lawes before the experiment was discontinued, and both survived winter(s) at other sites.

The other two lines, L94-44 and L94-55, are highly vigorous and both persisted through the first winter. However, because they produce abundant seeds at most localities/years, their perenniality has yet to be confirmed. Together with several other selections, these two lines will be further assessed in trials where cutting or grazing will remove the influence of mature seeds.

All strong perennial lines flower so late in central and south-east Queensland that they produce few, if any, seed. The late-flowering annual cultivar Rongai also occasionally survives the first winter under cutting treatment. Perhaps lack of reproductive growth might be one of the factors contributing to perenniality. However, seed production processes do not seem to deter the re-growth of the perennial lines. Ten perennial selections were grown at Walkamin during the last two seasons for seed production. They all seeded freely when established from seeds or cuttings. After harvesting seed, plants were cut to ground level. Strong re-growth of these perennial selections was observed (B. Walker, pers. comm.).

# Conclusions

The breeding program has shown that, apart from saving on establishment cost, perennial lablab selections could have potential to provide feed in the spring in the second and subsequent seasons. After

the first winter, perennial selections can often reach the stage when they can be grazed as early as late-October in central and south-east Queensland. This compares favorably with the annual cultivars that are unlikely to be grazed till late-January. However, the response of these perennial selections to grazing is not clear. It is also desirable to determine the management requirements of the perennial type and to compare their nitrogen fixation ability with annual cultivars before releasing any of them as a commercial cultivar.

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