

**In Vitro Study of the Forage Quality of the Potential Psyllid-Resistant *Leucaena* Hybrid**E.J. Litzow<sup>A</sup>, S.A. Dalzell<sup>B</sup> and H. M. Shelton<sup>B</sup><sup>A</sup> Department of Primary Industries and Fisheries, Mutdapilly Research Station, Peak Crossing 4306.<sup>B</sup> School of Land and Food Sciences, University of Queensland, St Lucia 4072.

A major limitation to leucaena (*L. leucocephala*) productivity is the psyllid insect (*Heteropsylla cubana*). This insect causes yield losses by feeding on the phloem of young shoots and leaves, thus limiting the rate of new growth. Work is in progress to establish a high yielding psyllid-resistant hybrid of *Leucaena* using resistance genes from *L. pallida*; however, the forage quality of *L. pallida* is lower than that of the commercial cultivars. The aim of this research was to assess the *in vitro* forage quality of psyllid-resistant breeding lines.

Lines from the breeding program were established in a stratified row column design. Agronomically elite plants were selected including 19 progeny of backcrosses of F1 and F3 hybrids (BC1 & BC3), 21 outcrosses (OC) and 10 trees of each of the commercial *L. leucocephala* ssp. *glabrata* cvv. Tarramba (T) and Cunningham (C). The youngest fully expanded leaves were sampled in February 2007, freeze-dried and prepared for analysis of crude protein content (CP), *in vitro* dry matter digestibility (IVDMD) and condensed tannin content (CT). Extractable (ECT) and bound (BCT) tannins were both assessed and analysed as well as the total tannin content of the plants. Crude protein was determined using a LECO CNS analyzer, IVDMD using the pepsin-cellulase method (McLeod & Minson 1978) and condensed tannins were extracted using a proanthocyanidin (butanol/HCl) assay and determined using a scanning spectrometer (Dalzell & Kervan 1998). Results for CT were measured against a *L. pallida* standard and therefore results are relative, rather than actual, values. One-way ANOVA and LSDs were used to compare means for each forage quality parameter.

The breeding line BC1 was not significantly different ( $P > 0.05$ ) in CP content to Tarramba and Cunningham, however, BC3 and OC were significantly lower ( $P < 0.05$ ) (Table 1). The LSD showed that the OC line was not significantly different ( $P > 0.05$ ) in IVDMD to Tarramba. Plant lines BC1, BC3 and Cunningham were found to be significantly higher ( $P < 0.05$ ) than Tarramba. All lines were found to be significantly lower ( $P < 0.05$ ) in IVDMD compared to Cunningham. The OC lines had a significantly higher condensed tannin content (ECT + BCT) than the remaining lines (20.0% DM compared to less than 15.8% DM for other lines). The comparison of means showed that BC1, BC3, OC and Tarramba were significantly higher ( $P < 0.05$ ) than Cunningham in CT content, with BC1 and BC3 being similar to Tarramba with means ranging from 15.1 to 15.8% DM.

**Table 1. Means and LSD for crude protein (DWT%), *in vitro* dry matter digestibility (DWT%), relative extractable condensed tannins (%DM), relative bound condensed tannins (%DM) and relative total condensed tannins (%DM) for *Leucaena* lines BC1, BC3, OC, Tarramba and Cunningham.**

	Crude Protein (%DM)	IVDMD (%DM)	Extractable CT (%DM)	Bound CT (%DM)	Total CT (%DM)
	Mean	Mean	Mean	Mean	Mean
BC1	24.6	56.8	14.8	1.0	15.8
BC3	23.2	56.4	14.3	0.8	15.1
OC	23.1	54.1	18.6	1.4	20.0
T	24.5	54.1	14.8	0.5	15.3
C	24.2	60.2	9.5	0.3	9.8
LSD	1.2	2.0	3.5	0.2	3.6

ECTs are the biologically active component that interferes with the utilization of proteins, minerals and fibre by animals, whereas BCTs are insoluble and are bonded to the cellular protein and fibre components in plant tissue. High CT is therefore undesirable as it reduces the digestibility of protein to livestock. Some OC lines were higher in CT content; however, they were also highly variable which offers scope to select lines with low CT and high CP content and IVDMD. The BC lines recorded forage quality similar to the commercial varieties and could produce new commercial lines after further development. This shows that it is possible to select psyllid resistant leucaena lines high in forage quality. If the OC varieties are selected, it is recommended that lines be selected which are high in forage quality and low in CT levels.

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