RELATIONSHIP BETWEEN MIMOSINE CONTENT IN EXUDATE AND IN THE LEAFLETS

Although the isolation of mimosine from Mimosa pudica is best carried out using phloem exudate rather than whole-tissue extraction (Tiwari and Spenser, 1965) there appears to be no published reference to such exudate in leucaena. This seems surprising as we have found the exudate appears readily on cutting young stems, and often gives rise to a visible white encrustation of mimosine. Crystallisation occurs so readily in a micropipette that samples must be collected by weight rather than volume.

The exudate from leucaena is a clear, slightly viscous liquid in which mimosine occurs at remarkably high concentrations. When the youngest accessible stem sections were cut with a sharp blade, and the exudate collected and analysed by liquid chromatography (Lowry, 1981), mean mimosine concentrations (g/100 g exudate) for the four available cultivars were: Cunningham, 10.4 ± 0.4; Salvador, 13.4 ± 2.4; Peru, 12.3 ± 1.9 and Hawaiian, 9.9 ± 3.4. These values are 3-4 times higher than the mimosine content of the leaflets. They are also much higher than the solubility of mimosine in pure water (0.2 g/100 g). This is being investigated.

When mimosine in the exudate was measured in the stem close to each leaf attachment it was found to decrease as the content in the leaflet decreased (Figure 1). Although there is a significant correlation, the decrease was approximately linear in the exudate and exponential in the leaflets; two fold change versus a five fold change overall.

It would be attractive to use the exudate for assessing mimosine content of the plant because:

1. One can work with a clean solution rather than a complex tissue.
2. There are no losses during drying.
3. The concentrations are higher.
4. The variation with position in the stem is much less than in the leaflets.

However, as the quoted standard deviations show, there is still considerable plant-to-plant variation. Furthermore it seems likely that collection of exudate is only easily possible when there is no moisture stress, as in the very humid conditions of West Java, and may not be practicable in the drier climates where leucaena is more valuable.
Figure 1. Relationship between mimosine content in leucaena exudate and in leucaena leaflets.

References:
