

## Characterization of *Acacia mangium* polyflavonoid tannins by MALDI-TOF mass spectrometry and CP-MAS <sup>13</sup>C NMR

### Abstract

The MALDI-TOF mass spectrometry (MS) and solid state CP-MAS <sup>13</sup>C Nuclear Magnetic Resonance (NMR) spectroscopic technique were introduced to characterize *Acacia mangium* tannin (condensed tannins). The MALDI-TOF MS illustrated a series of peaks corresponding to oligomers of condensed tannins of up to 11 flavonoid units (3200 Da). *A. mangium* condensed tannins were found to consist predominantly of prorobinetinidin combined with profisetinidin and prodelphinidin. Both the MALDI-TOF mass spectra and the solid state CP-MAS <sup>13</sup>C NMR indicated that the *A. mangium* tannins obtained from Kudat, had an almost completely linear structure; In addition, Lembah Beringin, consist of “angular” polymer structure; and Tawau, has included “twice-angular” polymer structures present in oligomers type of up to 7 flavonoid units. The high degree of polymerization of linear, angular type, twice-angular structures and longer oligomer (3200 Da) chains have not been observed in previous studies of condensed tannins. The spectra also indicated that *A. mangium* tannins are more heavily branched and have higher degree of polymerization (>7.0) compared to commercial mimosa (*A. mearnsii*) tannin (4.9). Because tannins are phenolic, it was expected that they can be used to replace phenol–formaldehyde (PF) adhesives.

**Keyword:** MALDI-TOF; Polyflavonoid; Tannin; Polymer; CP-MAS <sup>13</sup>C NMR; *Acacia mangium*