



Effect of stand density and tapping techniques on productivity of gum *talha* from *Acacia seyal* var. *seyal* in South Kordofan, Sudan

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1. Introduction:

Gum *talha* is the dried natural exudate obtained from trees of *Acacia seyal*. In Sudan, gum *talha* contributes to about 10% of the total gum production. *A. seyal* (Fig. 1) growing naturally in clay plains of central and eastern Sudan is extensively managed for firewood and charcoal production. Although, the species is reported to produce significant amount of natural exudates (gum), little information is known about its potentiality to produce gum under different stand densities as well as the response of the trees to tapping techniques. The objectives of the study were to:

- investigate the influence of stand density and tapping tools on productivity of gum *talha*
- estimate probability of gum *talha* production from *A. seyal*.



Fig. 1 *Acacia seyal*

2. Data collection:

Data were collected from Umfakarin forest in south Kordofan, Sudan, during September 2007 to February 2008. A sample of 167 individual trees of *A. seyal*, growing in pure natural stands of different densities (dense, medium and slight), were selected based on diameter at breast height (DBH) for the experiment. The selected trees were exposed to tapping (Fig. 2) on the first of November using two local tools i.e. *Sonkey* and *Makmak* in addition to untapped trees used as control. Correlations, multiple comparison method for means and logistic regression models were applied.



Fig. 2 Technique of tapping *A. seyal*

The model below was used to estimate probability of gum yield. Where Y = probability of gum to produce; e = base of natural logarithm (2.718281828) and d = diameter at breast height (DBH, in cm).

$$Y = 1 / (1 + e^{(0.068 \cdot d - 1.122)})$$

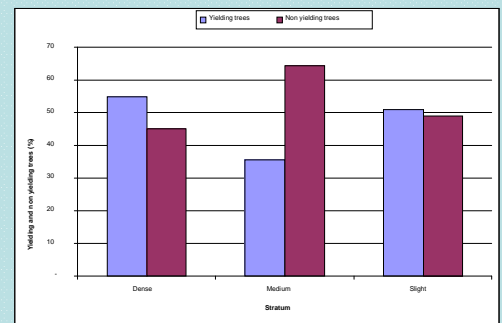


Fig. 3 percent of yielding and non-yielding trees

3. Results:

The results indicate that non-yielding trees comprise almost more than 50% of the total sample (Fig. 3). Statistical analysis shows no significant difference, at 0.05 level, in gum yield between the three strata. The highest gum yield (25.8 g/tree/season) is obtained by tapping trees using *Makmak* in slight stratum (Table 1; Fig. 4). No relationships were detected between gum yield and explanatory variables such as stratum, tapping tool, neighbourhood trees and DBH. However, the probability of gum production increases with increasing tree diameter. The outcomes of the logistic regression model showed that 59.3% of the predictions were correctly classified when using DBH as a predictor. When other variables (stratum, tapping tool and neighbourhood trees) are incorporated, 64.7% (which may be seen moderately good) of the predictions were classified correctly (Table 2).

Table 1. Average gum *talha* yield (g)/tree/season

Stratum	Tool	Observations	Gum yield*	Std. Error
Dense	Untapped	14	7.70	11.14
	Sonkey	19	13.60	1.25
	Makmak	18	10.94	0.75
Medium	Untapped	15	3.51	0.58
	Sonkey	23	4.49	0.33
	Makmak	21	12.63	1.58
Slight	Untapped	9	14.61	4.87
	Sonkey	21	22.55	2.38
	Makmak	27	25.78	2.48

*. Results are not significant at 0.05 level

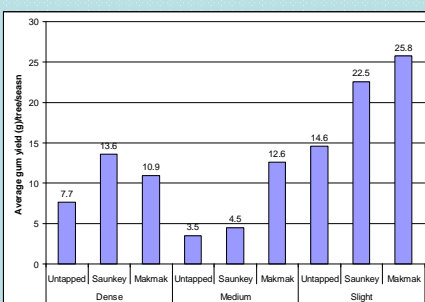


Fig. 4 Average gum yield (g)/tree/season

4. Conclusion:

Although the results of this study did not show any significant difference in gum yield, the results may be of great importance for future studies in order to improve the predictions of gum *talha* yield and to manage trees of *A. seyal* for multipurpose objectives.

Table 2. Classification table based on logistic regression model (the cut value is 0.5)

Observed	Predictable: DBH		Percentage correct
	Non-yielding trees	Yielding trees	
Non-yielding trees	58	29	66.7
Yielding trees	39	41	51.2
Overall percentage			59.3
Predictables: (stratum, tool and number of neighbourhood trees)			
Non-yielding trees	59	28	67.8
Yielding trees	31	49	61.2
Overall percentage			64.7