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Gum exudation in relation to depth of incisions on stem-bark of *Butea monosperma* L.: A dominant interspersed tree species in grazing lands

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Introduction

Butea monosperma (Palas), a medium-sized deciduous tree belonging to the family Leguminosae-Papilionaceae (family Fabaceae), is a native to tropical South Asia, especially from the regions of India (Indo-Gangetic plains). *B. monosperma* is a gum yielding tree, found naturally in most of the rangelands and grasslands particularly in arid and semi-arid regions. It is an important multipurpose tree for the rural population providing fodder, fibre, fuel wood, gum, medicine and shade. In Bundelkhand it is most widespread species and mainly found in open woodlands, degraded/ pasture lands and forest and farmer's lands. It is adapted to survive under harsh environmental conditions such as low and erratic rainfall, and intense solar radiation. The green leaves are lopped for fodder and the yield of milk in buffaloes fed with *Butea* leaves has reportedly improved. The digestibility of *butea* leaves is comparable to that of straw and caloric content is reported to be 3.761 cal/g dry weights.

Gums and resins are almost ubiquitous in plant Kingdom and many of them continue to play an important role in our daily lives. Numerous plants produce some kind of gum and resin, but only a few are commercially important. They have been used as adhesives, emulsifiers, thickening agents, added to varnishes, paint and ink; for aromas added to perfumes and cosmetics and even play a role in pharmacy and medicine (Howes, 1959; Fernandes, 1964; Kaushik and Dhiman, 2000). India is the producer of different gums in international market. Gum-*butea* is a minor gum. Traditionally, tapping of gum-*butea* (known as *kamarkas*) is one of the key livelihood option for tribes particularly the Saharia community in Central India. The gum is collected by Saharia tribe by making incisions or cuts on stem-bark of *butea* trees (Prasad *et al.*, 2014). They collect the gum and sell it at very nominal price in local market. It has been found that on an average 10-15 trees/ha of *B. monosperma* are available in farmer's field which are used by saharia tribe for collecting gum (Prasad *et al.*, 2014). Traditionally, tribal collects gum during November to February, once in a year. The selection of trees for gum collection is done judiciously and only those trees which have at least 25-30 cm girth are marked for gum tapping. For inducing gum oozing, tribal first remove bark or dead bark from the stem. Thereafter, with the help of a special designed bill hook (having three side sharp edges) incision or cuts or tapping are made to depth 1 to 2 cm. After two days of tapping, trees are visited again for collecting gum. The juice or tears are removed from bark with hand or with the help of small knife. The complete process of gum collection is a labour intensive as the tribal family has to visit every tree twice in a season.

However, much information is not available about the tapping possibilities of *B. monosperma* for gum production. Therefore, study was conducted at Central Agroforestry Research Institute, Jhansi to investigate the effect of different depths (0.5 cm, 1.0 cm and 1.5 cm) of incision or cuts made on stem-bark on yield of exuded gum from *B. monosperma*.

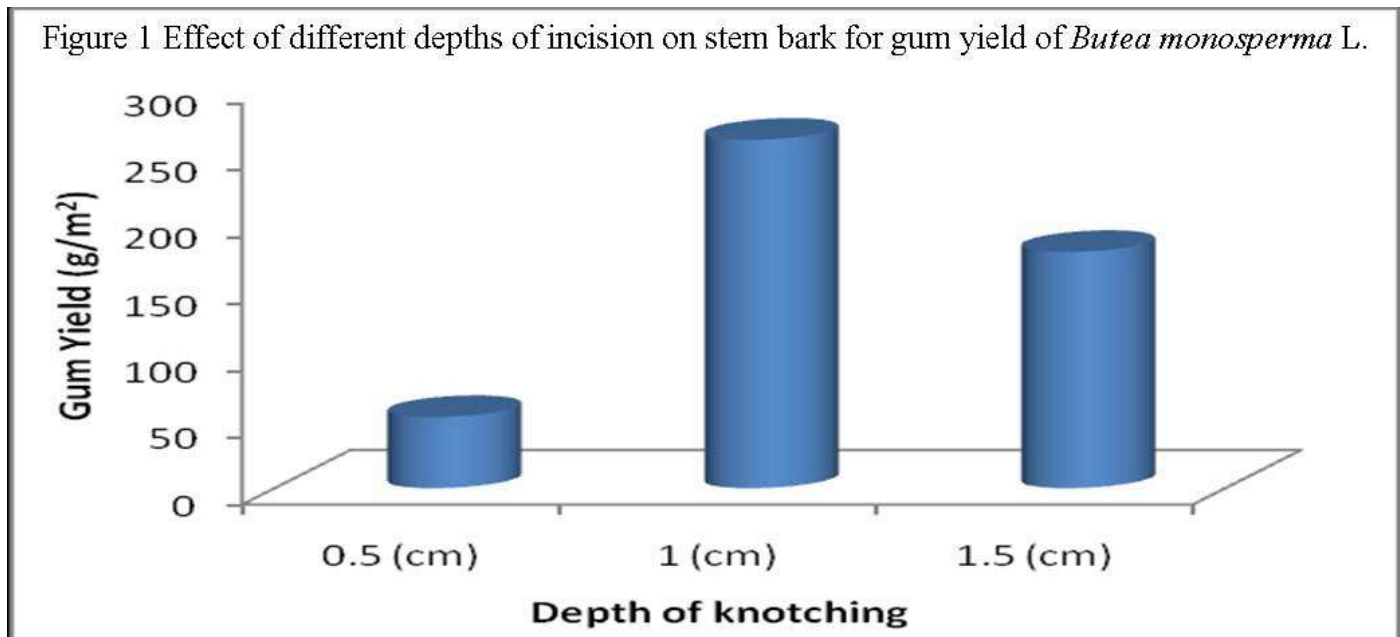
Materials and Methods

The study was conducted at Central Agroforestry Research Institute (24° 11' N latitude, 78° 17' E longitude and 271 m above msl), Jhansi, U.P., India. Mean annual rainfall is 960 mm with an average of 52 rainy days per year. Mean maximum temperature ranges from 47.4°C (June) to 23.5°C (January) and mean minimum temperature from 27.2°C (June) to 4.1°C (December).

A field trial was conducted on naturally occurring 15-20 years old trees of *B. monosperma* for assessing whether depth of knotching on stem bark had any effect on yield of gum-*butea*. To regulate depth of cuts, a bill hook was purposely designed and got fabricated locally. The field trial consisted of three depths of cuts *viz.* 0.5, 1.0 and 1.5 cm, and each replicated on three trees. The experimental design adopted was randomised complete block design. It was conducted in the month of February 2015 and exuded gum yield was evaluated. Data were analysed by using the SYSTAT (12.0) statistical package.

Results and Discussion

The results clearly indicated that incisions of different depths had a great influence on the amount of gum yield (Fig.1). The incision depths of 0.5, 1.0 and 1.5 cm produced 53.32, 260.96 and 176.93 g/m² gum, respectively. The explanation for tapping on stem-bark to a depth of only 0.5-1.5cm is that the gum-butea exudes from the stem-bark and not the stem-wood. The thickness of the bark varies from 1.0 to 1.5cm (Prasad *et al.*, 2014). The second fact revealed is that the gum-butea can be achieved only after making artificial injury to the plant in the form of incisions or cuts. This traditional wisdom contradicts the most accepted theory of gummosis which says that gums and resins are formed as a natural phenomenon of the plant in which internal plant tissues disintegrate and form cavities, and transformed carbohydrates are exuded in the form of gums. However, it holds true with the second theory which opines that gum is caused as a result of injury to the bark or stem (RCDC, 2006).



Conclusion

It is concluded that the value addition in total productivity of grazing land can be done by adopting proper gum tapping techniques for tapping gum-butea from *B. monosperma* trees naturally occurring in rangelands and pasturelands.

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