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Preliminary studies on growth and fibre yield of wild bast fibre plants in Ghana

K. OBENG-DARKO

Summary

Obeng-Darko, K. (1976). Preliminary studies on growth and fibre yield of wild bast fibre plants in Ghana. *Boissiera* 24: 515-518.

Five wild bast fibre plants, viz. *Triumfetta cordifolia*, *T. rhomboidea*, *Sida cordifolia*, *Waltheria indica*, and *Wissadula amplissima* have been grown experimentally in order to study growth habits, retting and harvesting periods, fibre yield and quality. The results show that the variation is considerable according to the species.

Résumé

Obeng-Darko, K. (1976). Contribution à l'étude de la croissance et de la production de fibres chez quelques plantes sauvages du Ghana. *Boissiera* 24: 515-518. En anglais.

Cinq espèces de plantes sauvages à fibres libériennes, à savoir *Triumfetta cordifolia*, *T. rhomboidea*, *Sida cordifolia*, *Waltheria indica* et *Wissadula amplissima*, ont été cultivées expérimentalement afin d'étudier les modes et la durée de croissance, moisson et rouissage et les qualité et quantité des fibres. Il est démontré que des différences considérables existent selon l'espèce concernée.

Fibre plants are very important to mankind. They supply man with his clothing and protection, his ropes, and his sacking, his paper and many of the comforts of the twentieth century life. The tropics supply the bulk of the world's fibre requirements and some tropical countries rely almost entirely on fibre crops for their economy. A considerable amount of work (cf. Kirby, 1963) has been carried out on the fruit, leaf and bast (or phloem) fibres and improved varieties have been developed for cultivation either on small or large scale plantations or estates.

Intensive studies have been made on the phloem fibres of amongst others the following species (Ruinard, 1966): kenaf (*Hibiscus cannabinus* L.), jute (*Corchorus* spp.), *Urena lobata*, and roselle (*Hibiscus sabdarifa* L.). These plants provide the main source of bast fibre of the world. Several industries using bast fibre as their raw material, have been set up in many countries. In Ghana, only the Fibre Bag Manufacturing Company produces empty sacks for cocoa, rice, etc. This factory requires 1300 tons of fibre per year to produce 13 million bags, the annual need of the country. During the last few years some wild fibre plants are being used as sources of phloem fibre. Therefore the present author decided to study the fibre yield and quality of some of these wild species. These studies were carried out at the experimental farm of the University of Science and Technology (Faculty of

Agriculture, Kumasi, Ghana). It was felt that such a comparative study, involving some cultivated and wild species, would enable us to assess the potentials of the indigenous wild fibre plants.

Material and methods

Seeds of five wild bast fibre species (cf. Irvine, 1961), namely *Triumfetta cordifolia* A. Rich., *Triumfetta rhomboidea* Jacq., *Sida cordifolia* L., *Waltheria indica* L., and *Wissadula amplissima* R. E. Fries were collected from different areas of the country (cf. Table 1). The viability of the seeds of some species was low and large quantities were necessary in these cases. Thus plants were first grown for seed production.

Seeds of the above-mentioned species were sown on the 17th of April, 1964, in a non-repeated trial. For fibre yield a plot size of 24 x 10 feet (7.32 x 3.05 m) and a spacing of 8 x 8 inches (20.3 x 20.3 cm) were adopted. Data on germination, branching, and plant height were recorded before all plants in each plot were harvested on the 11th of November, 1965, for retting. The length of the retting period was recorded except that for *Wissadula amplissima*. Before retting, the fresh weight per plot of the harvested plants was measured. After retting, the fibre obtained from each plot was dried and weighed. The fibre content per plot was obtained from the ratio of dry fibre weight to green weight of the plants, these ratios being converted to percentage.

Results and discussions

The results are summarized in Table 1. Preliminary results indicate that the fibre yield ranges from 1.3 to 4.4%, the species *Waltheria indica* and *Wissadula amplissima* producing the lowest and the highest fibre yield respectively. Growth was rather slow in *Triumfetta rhomboidea*, *Sida cordifolia* and *Wissadula amplissima*. It was not easy to compare the branching of the different species because of the low seed viability of some of them (non-germinating seeds giving larger spacing between individuals, thus rendering the growing conditions non-comparable). However, heavy branching was observed in all taxa. The length of the retting period varied considerably, ranging between 14 and 25 days according to the species, *Waltheria indica* taking the longest period to ret. The fibre qualities were also very variable. Fibres from *Triumfetta cordifolia* and *Wissadula amplissima* were very close to those of the commercially cultivated bast fibre plants such as kenaf, jute, *Urena* and roselle.

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	<i>Triumfetta rhomboidea</i> (Tiliaceae)	<i>Triumfetta cordifolia</i> (Tiliaceae)	<i>Sida cordifolia</i> (Malvaceae)	<i>Wissadula amplissima</i> (Malvaceae)	<i>Waltheria indica</i> (Sterculiaceae)
Description	Weedy undershrub. Young leaves delicate, pink, about 5-8 cm in diameter, generally rhomboid. Flowers in axillary clusters, golden yellow, opening in evening; stamens 15. Fruits very small, 0.5 cm in diameter, tomentose, covered with glabrous, hooked prickles.	Shrub up to 5.5 m high, pubescent or nearly glabrous. Leaves ovate-cordate, about 10 x 8 cm, undivided or trilobed, hairy below, with long petioles. Flowers numerous, yellow; buds hairy; stamens 10-12. Fruits small, 0.8 cm in diameter, globose, dehiscent, covered with prickles and hooked spines.	Perennial woody herb up to 1.5 m high. Leaves and stems covered with long petioles; locally referred to as "ghost blankets". Flowers in the axils of the leaves, yellow. Fruits small, brown, divided into 10 carpels.	Low, stiff shrub, richly branched. Leaves cordate with a pointed tip covered with short soft hairs on both surfaces. Flowers small, yellow. Fruits with 5 carpels, beaked.	Erect herb, woody at base, up to 1.8 m high. Leaves up to 10 cm long, alternate, ovate, closely toothed, permanently hairy. Cymes sessile, flowers yellowish.
Habitat	Mainly in waste places: clearings and roadsides.	Common in coastal areas: clearings and roadsides.	Common along the coast and in the savannah belt.	Common weed, widely distributed in waste places and old clearings.	Very common in open places, on old farms and in open savannah.
Locality (Ghana)	Ashanti, Eastern, Western Volta, and Brong-Ahafo regions.	Aburi, Assuantsi and Ashanti (Kumasi) regions.	Ashanti and Central regions (near Cape Coast).	Ashanti and Agona regions.	Krobo Plains; Cape Coast and Achimota.
Cultivation experiment: observations	Growth very good from germination to maturity. Plant height 1.8-3 m (16-10 feet). Retting period about 18 days.	Growth very good and vigorous. Branching starting at an early age. Plant height 1.2-1.5 m (4-5 feet). Retting period 14 days. Dry fibre yellowish. Fibre fine, comparable with that of kenaf.	Growth rather slow. Branching considerable (due to the great spacing of plants), germinability low. Retting period 14 days.	Growth slow. Germinability low. Plant height 1.2-1.5 m (4-5 feet). Retting period not known. Fibre white, fine.	Growth vigorous. Branching considerable. Germinability low. Retting period 25 days. Dry fibre brown, very rough.
Fibre yield in the experiment: Green weight/plot, kg	213.2	177.4	60.8	15.5	93.4
Dry fiber weight/plot, kg	7.05	3.36	2.04	0.68	1.13
Dry fiber weight/kg/ha	3188	1513	919	303	527
Fibre content of green crop, %	3.3	1.9	3.4	4.4	1.3

Table 1. — Bast fibre plants studied: descriptions, habitats, localities, cultivation experiments.

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