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BIOCHEMICAL CHARACTERISTICS OF PLANTATION BAMBOO *(BAMBUSA BAMBOS)* LEAF WITH REFERENCE TO ORGANIC PRODUCTIVITY

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Bamboo is used in nearly every aspect of daily life in India. However, bamboo diversity in the natural habitat is dwindling, due to over-exploitation, shifting cultivation and extensive forest fires. A sustained availability can be ensured only by elaborate cultivation of bamboo as a crop. A survey of literature reveals that work on the growth and organic productivity of bamboo is very meagre (Sen Gupta 1952, Chacko & Jayaraman 1988, Shanmughavel & Francis 1996), especially on its physiology. Thus the present study was undertaken to evaluate the biochemical characteristics of the leaf of planted *Bambusa bambos* of different age groups with reference to its organic productivity.

A 6-y-old *Bambusa bambos* plantation was selected for the study at Kallipatty, Tamil Nadu, India, located at 12° 28'- 13° 00' E, 76° 59' - 77° 47' N, 540 m a.s.l. The soil is red to brown laterite, sandy loam in texture and has a pH of 7.4 - 7.8. The site has an annual mean temperature of 31 °C and rainfall of 600 mm. The 3-ha area, planted with the bamboo at 6 × 6 m spacing, has been producing rhizomes and healthy culms annually, with growth as shown in Table 2. Fifteen culms from each age group were selected for the biochemical analysis of the fresh leaf for chlorophyll (Arnon 1949), carotenoides (Goodwin 1954), protein (Lowry *et al.* 1951), total soluble carbohydrates (Dubais *et al.* 1956) and starch (McCready *et al.* 1950). For the biomass estimation, 15 culms (3 of which were excavated for their rhizomes) from each age group were randomly selected and felled.

Measurements of the parameters as given in Table 2 were taken from the felled samples, and for the biomass components, from sub-samples brought in plastic bags to the laboratory where they were dried at 103 ± 2 °C to constant weight. The bamboo leaf, which has a Krantz anatomy, typical of a tropical grass, showed contents of chlorophyll, carotenoides, protein, carbohydrates and starch which decreased with age (Table 1). The increasing above-ground biomass, from 1.36 t ha^{-1} for the 1-y-old bamboo to 286.64 t ha^{-1} for the 6-y-old bamboo, was probably due to the higher recruitment of bamboo culms from 1250 t ha^{-1} to 4250 t ha^{-1} in the same periods. The decreasing amounts of food materials in the leaf with age show that this tissue is not important for their storage compared to other parts of the plant, especially the rhizomes, as the plant matures. Although the total chlorophyll content decreased with age, the ratio of chlorophyll a:b generally increased indicating that this ratio influences the photosynthetic efficiency, and hence the productivity of the plant.

The organic productivity (biomass t ha^{-1}) of each plantation increased with age as expected, but at a decreasing rate. This increment is more prominent in the culm than other bamboo components. The grand total biomass increased by 5.4 times from year 1 to year 2, by 4.2 times from year 2 to year 3, by 2.4 times from year 3 to year 4, by 1.8 times from year 4 to year 5, and by 1.3 times from year 5 to year 6. The *Bambusa bambos* in this investigation appears to produce a much larger amount of above-ground biomass than the *B. vulgaris* and *Gigantochloa aspera* reported by Chinte (1965) or the *G. scortechinii* examined by Abd. Razak (1994).

Table 1. Biochemical characteristics of *Bambusa bambos* leaf

Age (y)	Total chlorophyll (μg g^{-1})	Chlorophyll a:b ratio	Carotenoides (μg g^{-1})	Protein (μg g^{-1})	Soluble carbohydrates (μg g^{-1})	Starch (μg g^{-1})
1	551	0.83	64.00	7.53	8.78	588.4
2	544	0.78	58.53	7.23	7.95	537.3
3	500	0.80	53.55	6.89	7.20	495.7
4	449	0.90	50.42	6.19	7.04	481.7
5	398	0.97	49.88	6.07	6.91	475.1
6	366	0.92	48.80	5.97	6.47	469.8

Table 2. Stand characteristics and production of biomass

Age (y)	No. of culms ha^{-1}	Culm diameter (cm)	Culm height (m)	Number of nodes	Biomass t ha^{-1}					
					Leaf	Branch	Culm	Total above ground	Rhizome	Grand total
1	1250	2.3	1.4	7	0.17	0.49	0.70	1.34	0.94	2.29
2	2250	3.3	3.2	16	0.67	1.90	6.80	9.36	3.15	12.51
3	3000	4.3	9.6	37	1.12	17.12	29.25	47.49	4.98	52.47
4	3500	4.8	21.8	86	1.86	27.16	92.75	121.77	6.06	127.83
5	4000	6.3	27.2	98	3.54	33.94	187.22	224.71	9.60	234.31
6	4250	8.3	28.5	103	4.02	39.87	242.73	286.64	11.22	297.86

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