

PHENOLOGICAL AND POD BEARING CHARACTERISTICS OF *PARKIA JAVANICA* LAMK. – A POTENTIAL TREE LEGUME USED AS A SOURCE OF NON-CONVENTIONAL FOOD IN TRIPURA

SASWATI CHAKRABORTI

Cytogenetics and Plant Tissue Culture Laboratory, Department of Life Science, Tripura University, Suryamaninagar – 799 130, Tripura (W), India.

Email: chakrabortisas@yahoo.co.in

Tripura is having age-old practice of diversified food habit among the tribals and other ethnic communities. Non-conventional plant species are playing great role in the daily diet of such communities. During the course of present study phenological and pod bearing characteristics of *Parkia javanica* Lamk. was recorded. Nutritional value of flowers and pods of this species used as non-conventional food vegetable were worked out in terms of biochemical estimates. Characteristics variability in pod bearing clusters and nutritional potential of the seeds of *P. javanica* growing in Tripura conditions were recorded.

Keywords: Non-conventional food; Nutritional value; *Parkia javanica*; Tripura.

Introduction

Tripura is one of the smallest provinces in North-Eastern region of India and known to harbour many useful plant species which are having socio-economic values and also serves unique ecological habitat. This land is inhabited by different tribals along with Bengali community and other minor communities like Manipuri and Muslims since king dynasty. This ethological diversity has not only reflected their sociological and cultural aspect but also revealed unique traditional food habit. Different food habit with less known, non-conventional plants has been recorded through ages by tribals¹. The indigenous less known food and vegetables have also been contributing critical role in the dietary habit of different tribals and other communities in the state since time immemorial. It has been necessitated to consider and take necessary measures for fruitful study and evaluation of less-known, non-conventional plant species used as food or vegetables in the state.

Parkia javanica belonging to the family Mimosaceae occurs throughout the state in dispersed condition². The species known as 'Owakere' in 'Kokborok', 'Yonkchak' in 'Manipuri' and 'Zawngtah' in 'Mizo'. The species is a tree legume with spreading branches and grow wild in hilly rural areas. No organized plantation of the species is recorded in the state. The flowers, pods and seeds are used as vegetables in the state. The present work is aimed to generate phenological account of *P. javanica* growing wild in Tripura condition along with characteristics morphometric measurements of flowers and pods. An effort has also been made to reveal

nutritional value of flowers, pods and seeds used in edible form in terms of number of biochemical characters.

Materials and Methods

Several field visits were conducted at the selected sites of West District of Tripura for gathering information on habit and habitat of the species. Interaction with the rural people was also made to generate information on use and utility of the species as food vegetable. Plant was identified taxonomically using Flora of Tripura³, Flora of Assam³ and Flora of British India⁴. Detailed phenological account along with morphometric measurements of different characters of flower was carried out. Nutritional value as biochemical characters like protein, sugar, total phenolics, vitamin C, titrable acidity and moisture content were estimated following the methods of modified Lowry's method⁵, Anthrone method⁶, Swain and Hillis method⁷, Sadasivam and Manickam⁸ method, Agarwal method⁹ and AOAC method¹⁰ respectively. In the present study sample was prepared according to their form of use as food. Fertile flowers from the inflorescence, young pods are taken in fresh for different biochemical works. Mature pods of different ages were also used for biochemical works in semi-boiled condition after peeling the outer skin of the pod. Boiling of pods strip for 15 minutes in water produce semi boiled condition which is optimum for consumption. Biochemical analysis thus carried out with the pod flesh and cotyledons, were recorded in tabular form (Table 3, 4 & 5).

Results and Discussion

During the course of investigation and visit to different

Table 1. Morphometric characters of *Parkia javanica* Lamk. flowers.

*Mean length (mm) \pm SD										
Peduncle	Bract	Calyx tube	Sepal	Corolla tube	Petal	Filament	Anther	Staminode (long)	Staminode (short)	Gynoecium
32.5	3.5	7.7	1.0	7.5	0.98	2.9	0.98	7.5	3.3	4.9
\pm	\pm	\pm	\pm	\pm	\pm	\pm	\pm	\pm	\pm	\pm
1.84	0.45	0.75	0.00	0.45	0.04	0.20	0.04	0.45	0.40	0.20

*Mean of 5 replications

Table 2. Variability in pod bearing clusters of *P. javanica* in Tripura condition.

Categories of pod cluster size	Range of cluster number per tree	*Average no. of cluster \pm SD per tree	Range of pod number per cluster	% of pod bearing cluster per tree	*Mean no. of pods per cluster \pm SD	**Mean length of pods cm \pm SD	**Mean no. of seeds per pod \pm SD
Maximum	90-95	91.80 \pm 1.89	19-25	25.26	21.8 \pm 2.14	39.53 \pm 5.99	14.60 \pm 2.22
Medium	60-75	67.30 \pm 5.00	12-16	40.00	13.7 \pm 1.27	42.05 \pm 3.89	14.55 \pm 3.03
Minimum	30-35	32.10 \pm 2.12	5-9	34.74	6.5 \pm 1.50	36.65 \pm 3.08	14.80 \pm 2.29

* Replication of 10 observations

** Replication of 20 observations

Table 3. Estimates of some biochemical parameters of flower and young pod of *P. javanica* used in different food recipes.

Sample used for biochemical estimation	*Mean biochemical values \pm SD			
	Ascorbic acid (mg/g. fr. wt.)	Total soluble protein (mg/g. fr. wt.)	Free soluble sugar (mg/g. fr. wt.)	Total free phenolics (mg/g. fr. wt.)
Fertile flower	5.57 \pm 0.03	8.62 \pm 0.20	35.38 \pm 0.19	13.88 \pm 0.13
Fresh young pod 35 days old	1.12 \pm 0.01	30.47 \pm 0.29	17.69 \pm 0.42	3.76 \pm 0.05

* Mean of 5 replications

Table 4. Variation of some biochemical characters of pods of *P. javanica* collected at different ages for using as food vegetable in Tripura.

Age of pods (days)	% of moisture content per pod	*Mean biochemical values of semi boiled pods \pm SD				
		Ascorbic acid (mg/g. fr. wt.)	Total soluble protein (mg/g. fr. wt.)	Free soluble sugar (mg/g. fr. wt.)	Total free phenolics (mg/g. fr. wt.)	Titration acidity [Milli equivalent of (N) Na ₂ CO ₃ /g. fr. wt.]
65	66.95	0.34 \pm 0.01	27.97 \pm 0.38	20.96 \pm 0.54	0.35 \pm 0.04	0.14 \pm 0.013
75	69.97	0.76 \pm 0.02	39.54 \pm 4.77	12.68 \pm 0.40	0.55 \pm 0.13	0.30 \pm 0.006
85	70.00	1.68 \pm 0.03	32.42 \pm 0.75	17.95 \pm 0.63	0.85 \pm 0.08	0.96 \pm 0.015
95	67.75	1.63 \pm 0.05	34.80 \pm 1.35	23.39 \pm 0.34	0.79 \pm 0.06	0.20 \pm 0.010
105	29.90	1.88 \pm 0.04	28.60 \pm 0.28	81.32 \pm 1.93	1.37 \pm 0.02	0.56 \pm 0.006

* Mean of 5 replications

Table 5. Comparative nutritional characters of fresh and semi boiled seeds of *P. javanica*.

Nature of seed	Form of seed used	% of moisture content per seed	*Mean biochemical values of fresh and semi boiled seeds \pm SD				
			Ascorbic acid (mg/g. fr. wt.)	Total soluble protein (mg/g. fr. wt.)	Free soluble sugar (mg/g. fr. wt.)	Total free phenolics (mg/g. fr. wt.)	Titration acidity [Milli equivalent of (N) Na ₂ CO ₃ /g. fr. wt.]
Mature yellowish green	Fresh	68.27	4.72 \pm 0.02	48.29 \pm 0.56	53.14 \pm 0.47	1.56 \pm 0.14	0.22 \pm 0.01
	Semi boiled	77.05	2.48 \pm 0.13	23.80 \pm 0.82	34.73 \pm 0.43	0.22 \pm 0.05	0.17 \pm 0.01
Mature black	Fresh	34.08	14.65 \pm 0.23	78.22 \pm 1.89	128.73 \pm 3.70	0.97 \pm 0.03	0.25 \pm 0.00
	Semi boiled	43.31	6.31 \pm 0.08	65.39 \pm 0.56	121.87 \pm 3.35	0.56 \pm 0.04	0.23 \pm 0.01

* Mean of 5 replications



Fig. 1. Flowering twigs of *Parkia javanica* Lamk.; 2. Inflorescence stalk of the flower; 3. Enlarged view of inflorescence head showing staminode at the base (arrow); 4. Bunches of young pods in cluster; 5. Mature pods in cluster during harvesting time.

localities of remote rural areas of western districts of Tripura, *Parkia javanica* trees were found to grow wild at different locations. The species is 15–30 m high tree with a diameter ranging up to 50–100 cm. The plant is characterized by its spreading branches with bipinnate leaves on long stalks. Flowering of *P. javanica* as recorded in the present study starts with early week of November and continued maturity by the end of January every year (Fig. 1). The inflorescence is a head with sterile flowers in dense clavate on long peduncle (Fig. 2). Flowers are characterized with sterile staminodes at the base of the heads with tubular yellowish corolla (Fig. 3). Morphometric

measurements of the different parts of the flower were carried out showing characteristic organization of the flower (Table 1). In the present study, the use of *P. javanica* flowers as a source of edible vegetable by the tribals and other ethnic communities was found to be a common practice in Tripura. Fruit initiation was recorded during December-January (Fig. 4) and continued to mature in April. Peak season of harvesting of mature pods was February to April (Fig. 5). Number of cluster of pods per tree and number of pods per cluster were found to vary from plant to plant. Pod bearing characteristics with pod characters were worked out. Variability of pod bearing per

cluster was clearly recorded and found to range from 6.5 ± 1.50 to 21.8 ± 2.14 (Table 2). In spite of variable size of pod cluster, the number of seeds per pod did not vary and remains almost same with a range from 14.55 ± 3.03 to 14.80 ± 2.29 . This observation suggests that no significant relation with the pod cluster size and seeds per pod. Young pods are yellowish, green with small non-traceable seeds and as the pods matures the colour of the pods changes to deep green with distinctly noticeable oval shaped seeds. At full maturity the pod becomes black in colour with dark brown to black seeds. Even the pod flesh changes from whitish soft tissue to powdery white.

Some of the biochemical characters of *P. javanica* flowers and pods used as vegetable were analysed. Biochemical analysis of the flowers and pods were also done in accordance with their form of use as food and also at different ages of pod maturity (Table 3, 4). Biochemical estimates of different parameters of the flowers showed higher value of phenolics and sugar content, whereas pods were found to have rich sugar and protein contents. Comparative biochemical works on fresh and semi boiled seeds was also carried out (Table 5) and revealed higher values of biochemical estimates in fresh seeds as compared to that of semi boiled state. Reduction in the level of total phenolics in semi boiled seeds is much less as compared to fresh seeds though other biochemical estimates like total protein, sugar and ascorbic acid also reduced significantly. The rôle of boiling practice in reducing biochemical contents of vegetable was also reported¹¹. However, semi boiled seeds of *P. javanica* is the usable form in different food recipes recorded in the present study. Semi boiling practice produce better acceptability of the seed pod as non conventional food vegetable and could be useful step to avoid any anti nutritional factor that may exist in the fresh pods. Therefore, present study clearly indicates the extent of variability in size of pod bearing cluster in *P. javanica* tree in Tripura condition. Biochemical estimates of various forms of plant part used as non-conventional food vegetable also indicted high level of protein and sugar content as nutritive value.

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