

VARIATION FOR QUALITATIVE FRUIT PARAMETERS AMONG SEED PRODUCTION AREAS OF TEAK (*TECTONA GRANDIS* L.F) IN KERALA

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Introduction

Teak is an important tropical tree species with a wide natural distribution in the Indian sub-continent and South-East Asia. Due to its unique wood properties among the tropical timber, teak is still one of the major plantation species in India and also widely planted outside its natural range. Teak is naturally distributed in different climatic and edaphic zones and it has developed different ecotypes during the course of evolution. The occurrence of such ecotypes has been recognized by Koegh (1982) and White (1993). The Indian sub-continent is considered as a centre of diversity for teak because of the presence of much genetic variation for economically important traits such as bole form, timber quality, floral and fruit traits, biochemical traits etc. (Kumar *et al.*, 1997). Kadambi (1972) reported considerable variation in teak trees growing in different regions of Kerala.

Understanding the reproductive biology of trees is important before attempting their genetic improvement, such basic studies however, are in general, scanty among tropical tree species (Zobel and Talbert, 1984). The supply of quality propagules in sufficient quantity for the requirement of the state and commercial

sector is the prime objective of any breeding programme and a pre-requisite for its success. This can be achieved either by managing the seed stands/seed production areas (Kedharnath and Mathew, 1962), or through increasing the fruit production in the present clonal seed orchards (Misra *et al.*, 1996; Gunaga, 2000). In India, several attempts were made to study of reproductive biology of teak in seed stands, in seed production areas and in clonal orchards (Vasudeva *et al.*, 2001).

There are several reports on teak regarding variation in features such as morphology, anatomy, ecology, bole form and timber characteristics, floral biology and seed biology (Bedell, 1989). Fruit traits are believed to be the most conserved traits; hence any detectable variation in these traits may be attributable to genetic base and can be effectively used as markers to characterize different clones (Hanumantha, 2000) or different seed sources (Anon., 2002). The present study was carried out with an objective of assessing variation among 40 seed sources of Kerala for a few qualitative fruit parameters in teak.

Material and Methods

Forty seed production areas (SPAs) of

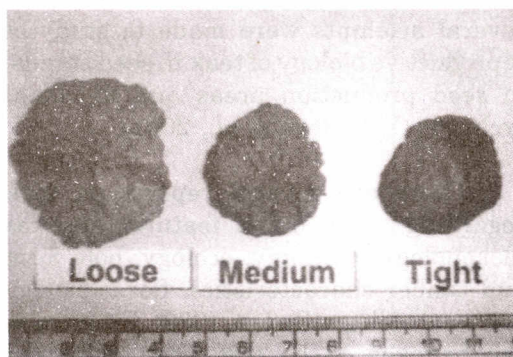
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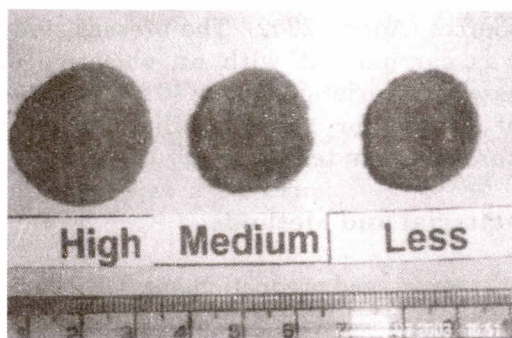
teak from six different seed sources namely, Nilambur, Mananthavady, Parambikulam, Konni, Achencoil and Erumeli in Kerala were selected. Fruits were collected from three sample plots (40 x 40 m), which are laid down randomly in each teak SPA. They were assessed for qualitative fruit traits using 30 fruits with three replications. Each trait was scored by visual observations and grouped as loose, medium and tight for nature of calyx (Fig. 1); high, medium and low for hairiness (Fig. 2) and splitting of fruit mentioned in percentage (Fig. 3).

Fig. 1



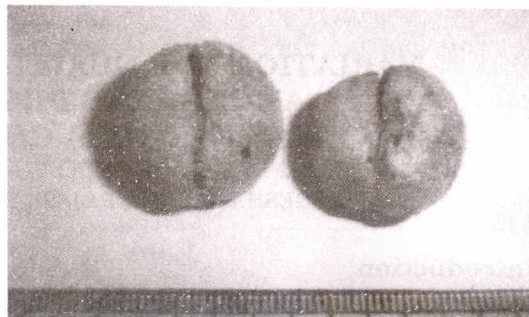
Nature of calyx in teak fruits

Fig. 2



Hairiness of teak fruit

Fig. 3



Splitting nature in teak fruit

Results and Discussion

Variation for qualitative fruit traits as mentioned above among teak SPAs is presented in Table 2. While variation among the SPAs for these traits was considerable, within SPA variation was very less.

Nature of calyx enclosing fruit : Variation within and between seed sources was observed for calyx enclosing fruit. Out of forty SPAs, 13 showed tight calyx, 12 were loose type and the remaining 15 were intermediate (Table 2). All types of calyx enclosing fruit were represented in almost all seed sources. A detailed distribution of SPAs in each seed source for this trait is presented in Table 1.

Hairiness of fruit : This trait also showed variation among SPAs and within seed sources. Majority of SPAs (25) showed low hairiness on the fruits, where as, only 7 SPAs recorded high and 8 SPAs recorded medium hairiness. However, fruits from all SPAs of Konni and Achencoil seed sources were found to be of low hairiness in nature. This study confirms with that of Hanumantha *et al.* (2001); who reported variation in hairiness of teak fruits of different clonal origin. For instance, clones

Table 1

*Distribution of teak SPAs in different seed sources of Kerala
for a few qualitative fruit characteristics.*

Seed source	Total SPA	Nature of calyx enclosed			Hairiness of fruit			Splitting observed on fruit	
		Tight	Medium	Loose	High	Medium	Low	Present	Absent
Nilambur	7	2	4	1	-	3	4	3	4
Mananthavady	9	2	3	4	4	-	5	8	1
Parambikulam	9	3	1	5	3	4	2	4	5
Konni	10	5	4	1	-	-	10	-	10
Achencoil	3	-	2	1	-	-	3	-	3
Erumeli	2	1	1	-	-	1	1	-	2
Total	40	13	15	12	7	8	25	15	25

Note: Values indicated in the above tables are total number of SPAs in each class of seed source and fruit characters.

Table 2

Variation for qualitative fruit traits among different teak SPAs

Seed source	Name of Teak SPA	Fruit parameter		
		Nature of calyx enclosed	Hairiness	Nature of splitting
1	2	3	4	5
Nilambur	Kangirakadavu	Loose	Low	Absent
	Chatanapurai-A	Medium	Low	Absent
	Chatanapurai-B	Medium	Low	Absent
	Chatanapurai-C	Tight	Low	1.0 %
	Edacode (North)	Tight	Medium	1.0 %
	Erampadam	Medium	Medium	1.0 %
	Sankarancode	Medium	Medium	Absent
Mananthavady	Tholpetty-1	Tight	Low	46.0 %
	Tholpetty-2	Tight	Low	37.0 %
	Tholpetty-3	Loose	Low	11.0 %
	Tholpetty-4	Loose	High	Absent

Contd...

1	2	3	4	5
	Camp road-1	Medium	High	2.0 %
	Camp road-2	Medium	High	1.0 %
	Camp road-3	Medium	High	1.0 %
	Thettu road-1	Loose	Low	1.0 %
	Thettu road-2	Loose	Low	3.0 %
Parambikulam	Thoonakadavu-1	Loose	High	3.0 %
	Thoonakadavu-2	Loose	High	Absent
	Thoonakadavu-3	Medium	Medium	1.0 %
	Thoonakadavu-4	Loose	High	1.0 %
	Thoonakadavu-5	Loose	Medium	Absent
	Thoonakadavu-6	Tight	Medium	Absent
	Peruvvari-1	Tight	Low	Absent
	Peruvvari-2	Tight	Medium	11.0 %
	Anapady	Loose	Low	Absent
Konni	Kummanoor-1	Tight	Low	Absent
	Kummanoor-2	Tight	Low	Absent
	Vattapara	Tight	Low	Absent
	Nadavathumoozhy-1	Medium	Low	Absent
	Nadavathumoozhy-2	Medium	Low	Absent
	Kadiyar	Medium	Low	Absent
	Nellidapara	Tight	Low	Absent
	Kondodi-1	Tight	Low	Absent
	Kondodi-2	Medium	Low	Absent
	Perunthumoozhy	Loose	Low	Absent
Achencoil	Chempala	Loose	Low	Absent
	Achencoil-1	Medium	Low	Absent
	Achencoil-2	Medium	Low	Absent
Erumeli	Kalaketty-1	Medium	Medium	Absent
	Kalaketty-2	Tight	Low	Absent

from Thithimatti in Karnataka have medium hairiness of fruits and clones 13 and 37 have high and low hairiness on their fruits, respectively.

Splitting : Nature and degree of splitting

on fruits is also one of the fruit characters observed in teak. There was strong variation between the seed sources of teak in Kerala for this trait also, where all the SPAs of southern parts of Kerala namely, Konni, Achencoil and Erumeli did not show

splitting nature on their fruit wall (Table 1). However, SPAs of northern seed source *viz.* Nilambur, Mananthavady and Parambikulam have shown splitting nature. Fruits from 15 SPAs were with splitting nature on fruit wall, while fruits from other 10 SPAs were without this character. Highest percentage of splitting was observed in SPA Tholepetty-1 (46%) and Tholepetty-2 (37%). Most of the SPAs, those have presence of splitting, were showed 1 per cent splitting only (Table 1). Similar observations were reported by Hanumantha *et al.* (2001), in which, clones from southern areas showed splitting nature in teak fruits. Of course, clones from southern Karnataka (i.e. Thithimatti origin) and seed stands from northern areas of Kerala (i.e. Mananthavady) are geographically similar in climatic, edaphic and other factors. It suggests that this variation may be controlled by genetic factors and whatever the variation found in these

fruit morphology may be effect of seed source.

Characters such as higher hairiness on fruit retain moisture content for long time that may help in maturation of fruits, usually teaks from drier areas. Another possible advantage is that both hairiness and splitting nature on fruit may result in quicker germination, because during pre-sowing treatment high hairiness and more splitting fruit can withstand more water that help in softening the hard fruit coat in teak. However, Hanumantha *et al.* (2001) also suggested that advantage of splitting nature of teak fruit might influence on quick germination. The present study is also helpful when identification of seeds of different SPAs can be done very easily observing their morphological differences. Some time variations exist in these qualitative traits might be also useful in teak improvement programme.

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SUMMARY

Teak is an important plantation species of the tropics. Due to its unique wood properties, it is also widely planted out side its natural range. Variation present in reproductive traits is most important in tree improvement programmes. Seed production areas and seed sources were identified for qualitative variations in fruit traits such as nature of fruit calyx attachment, hairiness and splitting nature. Considering seed production areas, variations were found to be strong between SPAs and within seed sources differences were negligible. Splitting nature of fruits was also observed as strong seed sources effect, while SPAs located in southern seed sources of Kerala, were without splitting nature. These variations could be helpful during identification of seeds of different seed sources and it may have important role on germination.

केरल के सागौन (*टेक्टोना ग्रांडिस* लि० वत्स) के बीजोत्पादन क्षेत्रों में फलों के
गुणात्मक परिमाणों का अन्तर
एच० नागेश प्रभु, राजेश पी० गुनग व टी० सुरेन्द्रन्
सारांश

सागौन उष्णक्षेत्रों की महत्वपूर्ण रोपवन वृक्षजाति है। अपने विलक्षण काष्ठ गुणों के कारण इसे अपने प्राकृतिक सीमाओं से बाहर भी विस्तार से रोपा जाता है। वृक्ष परिष्कार कार्यक्रमों की दृष्टि से इसके पुनरुत्पादन लक्षणों में मिलने वाला अन्तर सबसे अधिक महत्व का है। इसके फल लक्षणों में, जैसे फल पुष्पकोश जुड़ाव की प्रकृति, रोमिलपना और फटने की प्रवृत्ति के गुणात्मक अन्तर जानने के लिए बीजोत्पादन क्षेत्रों और बीज स्रोतों की पहचान की गई। बहुत से बीजोत्पादन क्षेत्र उन क्षेत्रों के अन्दर पाए जाने वाले अन्तर की दृष्टि से मजबूत पाए गए परन्तु बीज स्रोतों के अन्दर पाया जाने वाला अन्तर नगण्य था। फलों के फटने की प्रवृत्ति भी मजबूत बीज स्रोत प्रभाव के कारण होती देखी गई जबकि केरल के दक्षिणी बीज स्रोतों में अवस्थित बीजोत्पादन क्षेत्रों में फटने की प्रवृत्ति थी ही नहीं। ये अन्तर विभिन्न बीज स्रोतों के बीजों की पहचान करने में लाभप्रद रह सकते हैं और अंकुरण में इनकी भूमिका महत्वपूर्ण हो सकती है।

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