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Morphological Charecter of Teak Leaves and Their Influence on Teak Defoliator and Skeletonizer

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ABSTRACT

In order to study the morphological characters of teak leaves and their influence on teak defoliator and skeletonizer, the study was conducted in the Laboratories of Biotechnology and Agricultural Chemistry of ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat during 2010 and 2011. Result revealed that average leaf length, width and area to the tune of 38.52 cm, 33.79 cm and 459.60 cm2, respectively. Leaf colour (dark green) in teak failed to influence leaf damage inflicted by teak defoliator and skeletonizer, significantly.

Key words: *Teak, defoliator, skeletonizer, leaf, width, leaf area and leaf colour*

INTRODUCTION

Teak (*Tectona grandis* L., Family: Verbenaceae) is the most valuable and undisputed global leader of high quality tropical timbers (Tewari, 1992). It is attacked by 174 species of insects, mostly from order Lepidoptera (86), Coleoptera (50), Hemiptera (20) and Orthoptera (18). These cause damage to root (7), trunk and branches (8), defoliate the tree (136), suck the sap from inflorescence (20) and feed on seed (3). (Beeson, 1941, Nairs *et al.*, 1985 and Mathur, 1990). The insect defoliators on teak comprises Lepidoptera (78), Coleoptera (40) and Orthoptera (18). The most important amongst these are the Lepidopterans *Hyblaea puera* Cramer and *Eutectona machaeralis* Walker: Pyraustidae. These are the most pernicious pests of teak responsible for epidemic defoliation regularly in nurseries, plantations and natural forests of all teak growing areas (Beeson, 1941). The larvae of this insect feed only on the fleshy leaf tissue, leaving only the major veins, thus it affects adversely the growth and vigour, besides causing certain abnormalities, resulting in both qualitative and quantitative loss in timber production, (Beeson, 1941). Outbreaks occur almost every year in the early flushing period and trees suffer a total defoliation, sometimes there is partial defoliation later in the growth season (Nair, 1988). For the management of this pest, farmers usually resort to spray of synthetic pesticides. This practice of indiscriminate use of pesticides leads to build up of pesticide residues in the produce, destruction of beneficial insects, pest resurgence, pesticide exposure to farm workers and environmental pollution. Host plant resistance (HPR) is the economically sound technique to reduce pest linked damage in teak clone as well as to protect the environment from adverse effects of pesticides. In many cases it is obvious that the morphological characters of the host or combined factors are important in conferring resistance to teak defoliator and skeletonizer. Various morphological characters in teak leave play an important role by providing resistance to the plant. An understanding of different morphological of resistance is essential for developing strategies to breed for resistance to insect pests. Thus present

investigation was undertaken to study the morphological characters of teak leaves and their influence on teak defoliator and skeletonizer.

MATERIALS AND METHODS

Investigations on morphological characters of teak leaves was carried out by selecting five leaves on each tree at each of the five locations viz., Waghai, Shamgahan, Sarvar, Subir, in Dangs district and NAU farm, Navsari. The sampled leaves thus obtained were brought to the Food Quality Testing Laboratory, N. A. U., Navsari. The observations on leaf colour, leaf length, width and area were recorded.

Correlation

To study the influence of morphological characters on population of teak defoliator and skeletonizer, the simple correlation coefficient was worked out.

RESULTS AND DISCUSSIONS

The leaf length, leaf width and leaf area content in different teak clone (Table-1) grown at various elevations ranged from 36.14cm at (Waghai) to 41.34 cm (Sarvar), 31.96 cm at (Waghai) to 35.62cm (Navsari) and 428.34 cm^2 at (Subir) to 452.54 cm^2 (Navsari). While, the average leaf length, leaf width and leaf area content in teak clones of different location was 38.52cm, 33.79 cm and 459.60 cm^2. Similarly, the leaf colour ranged from dark green at (Waghai) to light green (Navsari). The average leaf colour in teak clones of different locations was dark green. The results of morphological characters are supported by Kumar (2006) who studied relationship of fifteen mango cultivars to mango hopper and its associated damages wherein morphological characters *viz;* leaf area, tree height and leaf color were studied in relation to hopper population and its associated damage. However, Hanumantha *et al.* (2001) indicated negligible clonal differences in teak on the basis of leaf area, hairiness and leaf colour. However, they reported significant difference amongst various *Tectona grandis* clones wherein except one; all clones from Northern provenance did not show splitting and two clones from Southern provenance showed extensive splitting in their fruits. Similarly, Hanover (1980) investigation based on insect-plant interactions revealed that the morphological feature of leaf, physiological conditions of host plant and their interactions are basically responsible for the palatability of leaf eating insects. Variations based on morphological characters have been proved in various agricultural and horticultural crops by earlier workers. In the ongoing discussion, the selected teak clones exhibited great degree of variability based on morphological characters at different locations. So, the current discussion is in accordance with the earlier workers.

Correlation of teak defoliator and skeletonizer with morphological characters

The results based on correlation of per cent leaf damage done by teak defoliator and skeletonizer with morphological characters of teak clones has indicated non significant but positive correlation with leaf length, leaf width, leaf area, while it was non significant but negatively correlated with leaf colour. Thus, it was proved that the morphological characters did not influence the intensity of damage caused by teak defoliator and skeletonizer.

Earlier, Kumar (2006) indicated non-significant relationship of mango hopper incidence and sooty mould with morphological characters of fifteen mango cultivars. However, Senn *et al.*(1992) established positive correlation of leaf morphology and phenology with tree height, leaf size, bud growth pattern in a population of the mountain birch (*Betula pubescens*) and insect. They further added that positive correlations between tree height, leaf size and differences in bud growth patterns indicated that the mountain is genetically related to the dwarf birch, *B. nana*.

Likewise, Ghoghari (2008) studied host plant resistance of sorghum shoot fly in 21 genotypes of sorghum. The correlation between physical characters of plant and shoot fly based on plant

height and number of leaves per plant at 14 DAE had significant negative correlation with oviposition of shoot fly. The relationship of dead heart percentage with number of leaves per plant at 28 DAE, plant height at maturity and number of leaves at maturity was significant but negatively correlated, whereas it was significant and positively with leaf width at maturity.

Table-1: Status of morphological character at different elevations

*Morphological Characters	Location					
	Waghai	Shamghan	Sarvar	Subir	Navsari	Average
Leaf length (cm)	36.14	39.40	41.34	36.50	39.26	38.52
Leaf width (cm)	31.96	34.72	33.16	33.52	35.62	33.79
Leaf area (cm^2)	434.58	464.09	446.48	428.34	524.54	459.60
Leaf colour	Dark green(2)#	Dark green(2)	Dark green(2)	Dark green(2)	Light green(1)	Dark green (2)

*Morphological characters: N=5 tree/ location/ 5 leaves per tree i. e. 25 leaves / location
#Figures inside the parentheses are rating of leaf colour

Table-2: Correlation of morphological character of teak clone and per cent damage of teak defoliator and skeletonizer.

Morphological Characters	Average	#Teak defoliator	Correlation Value	#Teak skeletonizer	Correlation Value
		% damage		% damage	
Leaf length (cm)	38.52	43.59	0.208	46.61	0.226
Leaf width (cm)	33.79	43.59	0.324	46.61	0.356
Leaf area (cm^2)	459.60	43.59	0.315	46.61	0.347
Leaf colour	Dark green (2)*	43.59	-0.151	46.61	-0.168
Significant at 1% (r=0.399)					

#Per cent damage: N= 5 tree/ location/5 twigs per tree/ location/5 leaves/ location i.e. 125 leaves/location
*Figures inside the parentheses are rating of leaf colour .

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