Histological studies on mango cultivars

Abstract

The present study was conducted on ten mango cultivars namely Alphonso, Bangalora, Kalepad, Himayuddin, Sendura, Mulgoa, Neelum, Rumani, Banganapalli and Swarnarekha and seasons are main and off-season at Kanyakumari and Tenkasi. The stem along with bud sample was collected during the month of October and November and conducted to examine the relation between internal structure of leafy and reproductive bud. During main season. Among ten mango cultivars, Bangalora and Swarnarekha have well developed at kanyakumar during main season for stage I, whereas Tenkasi, Alphonso and Bangalora well developed buds during the main season in stage I was observed. During off-season observed at kanyakumari Neelum and Alphonso had well developed for vegetative bud in stage I. At Tenkasi cultivars Kalapad and Bangalora had well developed for vegetative bud in stage I. ~~These stages has distinguished buds might be — quiescent and undifferentiated and the well development route of axillary buds of vegetative buds prevailing to climatic and physiological factors or cultural factors adopted (Moens, 1963; Kumar, 1982).~~ The climatic factors prevailing at Kanyakumari during the main and off seasons for the months of August to September low temperature (19^0C to 21^0C) and high humidity (85 to 90%) and main season for the month of October to November, low temperature (21^0C to 23^0C) and humidity (80 to 85%). Whereas reproductive stage observed mango cultivars, Alphonso, Bangalora, Kalapad, Neelum and Swarnarekha had well developed reproductive buds in stage II & III during main season at kanyakumari. During off-season, cultivars of Himampasand, Kalapad, Alphoso, Neelum and Swarnarekha had well developed reproductive bud for stag II & III was favoured different stages of bud differentiation in the ten cultivars of mango.

Key words: ~~mango cultivars~~, microtome, vegetative, reproductive

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Introduction

Mango (*Mangifera indica* L.) belonging to the family Anacardiaceae occupies a pre-eminent place among the fruit crops grown in India and christened as the 'King of fruits' owing to its delicious flavor and taste. Mango is among the most important fruits produced in India. They are

grown in an area of 1.23 million hectares with an annual production of almost 11.0 million tonnes, which accounts for more than 55 percent of the world's total production. Indian mangoes are famous for their flavour, aroma, and taste in different shapes, sizes, and colours.Mangoes are very popular among people because of their wide range of adaptability, high nutritional value, richness in variety, delicious taste, and excellent flavour. It is a rich source of Vitamin A and Vitamin C. Mangoes can be eaten raw and ripe. Raw fruits of the local varieties are used to make products like raw pieces in brine, pickle, chutney, and many others. During the present time, raw mangoes are used to prepare pickles and raw slices. Alphonso is used in preparing squash in the Coastal Western zone. It is a general consideration that mango flowering is a complex phenomenon. Besides, favorable climate conditions that favours off - season flowering, genetic potential of the varieties, physiological and biochemical variations and better management interventions could also play the vital role in promoting off season flowering. The current research was to study the histological characteristics of some mango cultivars which may be associated with their flowering behavior.

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Comment [M4]: The research has no objective, the objective is the author's.
Put: The study was carried out with the aim of ....

Materials and Methods

An experiment was conducted at State Horticultural Farm, Kanyakumari and farmers field of Tenkasi was undertaken by the Horticultural College and Research Institute, Tamil Nadu Agricultural University, Periyakulam. The experiment was laid out in a Factorial Randomized Block Design (FRBD), with two seasons and ten varieties and replicated twice. Ten year old trees of mango cultivars were selected for this study. Ten mango cultivars selected for this study are Alphonso, Bangalora, Kalepad, Himampasand, Sendura, Mulgoa, Neelum, Rumani, Banganapalli and Swarnarekha and seasons are main and off-season. The weather parameters viz., Maximum and minimum temperature, relative humidity, average rainfall in Kanyakumari and Tenkasi were recorded in experimental locations. The stem along with bud sample was collected both the location during the month of October and November and immediately fixed in F.A.A., dehydration of the ethyl and butyl alcohol and then the samples were sectioned by rotary microtome and stained with Safranin (Staining in red the lignified cell walls) and light green (staining in blue green cellulose walls) and examined under light microscope (Trifilo, *et al*.2007 and Bacelar, *et al*.2007). Images were captured by light microscope supplement with camera

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(Panasonic WV-CP 220, Japan). The obtained images were subjected to analysis by image analysis software (Digimizer software package) and the following parameters

Result and discussion

Vegetative shoot

The present study was microtome analysis and observed in ten mango cultivars both locations for vegetative and reproductive shoots. The images were captured by light microscope supplement with camera, and distinguished the images for Vegetative shoot and reproductive shoot. Among ten mango cultivars, Bangalora and Swarnarekha mango cultivars well developed at kanyakumar during main season for stage I, whereas Tenkasi mango cultivars of Alphonso an Bangalora well developed buds during the main season in stage I. During off-season observed at kanyakumari cultivars Neelum and Alphonso had well developed for vegetative bud in stage I. At Tenkasi cultivars Kalapad and Bangalora had well developed for vegetative bud in stage I. The anatomy of mango vegetative shoot development has been described by (Singh, 1958; Chaikiattiyos *et al.*, 1994). Vegetative shoots may arise either from axillary buds, if no apical bud exists due to flowering in the previous flush, or from the apical bud when present. The latter is considered as extension growth or addition of an intercalary unit on the existing stem, but the developmental events during shoot formation from either apical or lateral buds are basically the same. Cells in the leaf primordia of initiating buds begin to form individual leaves in the proximal portion of the vegetative shoot of the mango cultivars.

Reproductive shoot

The reproductive shoot was observed both the locations during main and off-season for ten mango cultivars. Among ten mango cultivars, Alphonso, Bangalora, Kalapad, Neelum and Swarnarekha had well developed reproductive buds in stage II & III during main season at kanyakumari. During off-season, cultivars of Himampasand, Kalapad, Alphoso, Neelum and

Swarnarekha had well developed reproductive bud for stag II & III. Two types of reproductive shoots typically occur in mango. Generative shoots display only flowers and have floral bracts or non-developed leaves at the base of each lateral inflorescence. Terminal inflorescences, that is panicles or thyrsoids (Weberling, 1989), develop from dormant apical buds. The anatomy of panicle development has been described (Ravishankar *et al.*, 1979; Scholefield *et al.*, 1986). The complexes of primary to quaternary branching lateral structures of the mango inflorescence each terminate with three cymose flowers. The terminal flower opens first, followed by two subtending lateral flowers. These complexes form the lateral inflorescence structures emerging from the central axis of the panicle. The central axis extension also terminates in a similar fashion. Morphological stages of mango floral buds and panicle development were described by Shu (1981) and Oosthuyse (1991).

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Generative shoot development in apical buds initially involves swelling of the lateral meristem tissues and their bud scales. Each axillary meristem develops as an inflorescence on a primary peduncle. The apical meristem then forms new lateral meristems and leaf primordia for the distal portion of panicle development if floral inductive conditions persist (Núñez-Elisea *et al.*, 1996). Panicles may be open or compact in nature, depending upon internodes elongation, which is cultivar dependent (Singh, 1960), but the architecture generally conforms to that in mixed shoots develop under weak floral inductive conditions (i.e. in the low-latitude tropics). Both leaves and primary pedunculate inflorescences develop from the same nodes. Leaf primordia and lateral meristems develop as leaf and floral structures, respectively.

Floral meristems could be easily distinguished from vegetative meristems due to their size difference. In general floral meristems are larger and broader than the vegetative ones. The size difference is caused by a marked increase in the frequency of cell division in the central

meristematic zone during the transition period from vegetative stage to floral stage (Fosket, 1994).When the axillary bud follows the reproductive path, the central cells of the apical portion undergo frequent periclinal and anticlinal divisions resulting in the broadening and enlargement of the apical zone (Moens, 1963).

Conclusion

Buds at stage I & II was observed both locations during main and off-season. During main season. Among ten mango cultivars, Bangalora and Swarnarekha have well developed at kanyakumar during main season for stage I, whereas Tenkasi, Alphonso and Bangalora well developed buds during the main season in stage I was observed. During off-season observed at kanyakumari Neelum and Alphonso had well developed for vegetative bud in stage I. At Tenkasi cultivars Kalapad and Bangalora had well developed for vegetative bud in stage I. These stages has distinguished buds might be quiescent and undifferentiated and the well development route of axillary buds of vegetative buds prevailing to climatic and physiological factors or cultural factors adopted (Moens, 1963; Kumar, 1982). The climatic factors prevailing at Kanyakumari during the main and off seasons for the months of August to September low temperature (19^0C to 21^0C) and high humidity (85 to 90%) and main season for the month of November to December, low temperature (21^0C to 23^0C) and humidity (80 to 85%). Whereas reproductive stage observed mango cultivars, Alphonso, Bangalora, Kalapad, Neelum and Swarnarekha had well developed reproductive buds in stage II & III during main season at kanyakumari. During off-season, cultivars of Himampasand, Kalapad, Alphoso, Neelum and Swarnarekha had well developed reproductive bud for stag II & III was favoured different stages of bud differentiation in the ten cultivars of mango.

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Comment [M8]:
This is not Conclusion, it is result.
There is no citation in the conclusion.
Here you just respond to the objectives.

References

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Plate 9.Histological studies on mango varieties during main season at Kanyakumari

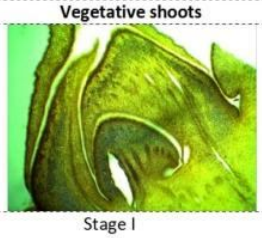
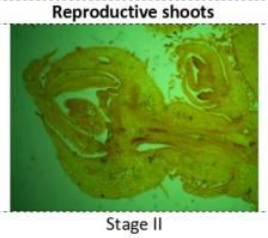
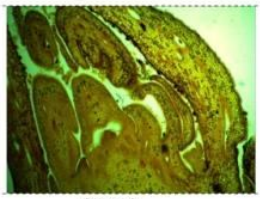
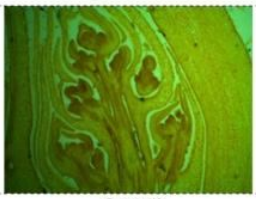
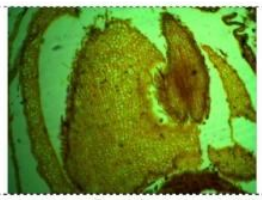
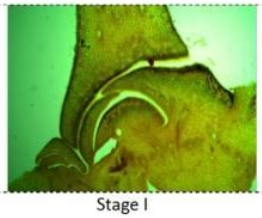
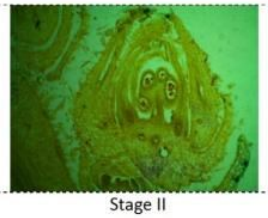
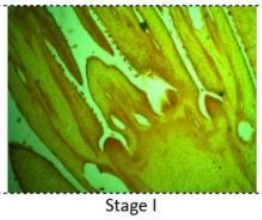
Vegetative shoots		Reproductive shoots
		
Stage I	Alphonso	Stage II
		
Stage I	Bangalora	Stage II
		
Stage I	Kalepad	Stage III
		
Stage I	Himayuddin	Stage II
		
Stage I	Sendura	StageII

Plate 9A. Histological studies on mango varieties during main season at Kanyakumari (cont...)

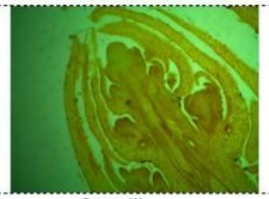
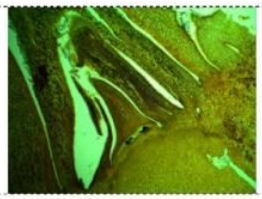
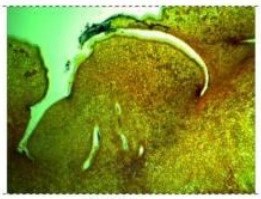
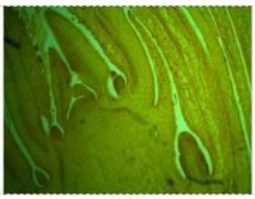
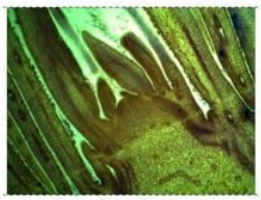
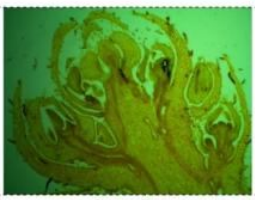
Vegetative shoots		Reproductive shoots
		
Stage I	Mulgoa	Stage II
		
Stage I	Neelum	Stage III
		
Stage I	Rumani	Stage II
		
Stage I	Banganapalli	Stage I
		
Stage I	Swarnarekha	Stage II

Plate 8. Histological studies on off season mango varieties at Kanyakumari

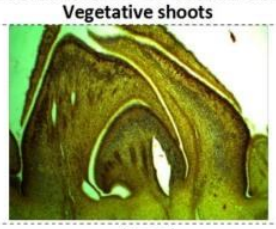
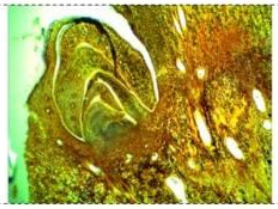
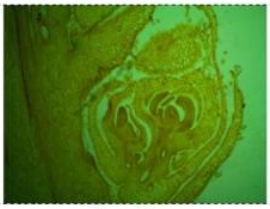
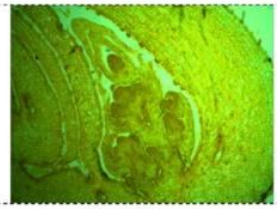
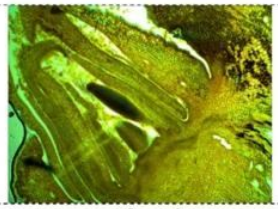
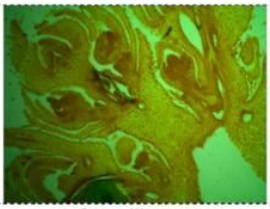
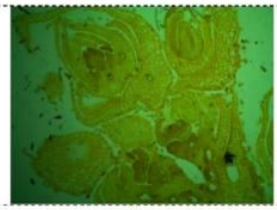
Vegetative shoots		Reproductive shoots
		
Stage I	Alphonso	Stage II
		
	Bangalora	Stage II
		
Stage I	Banganapali	Stage II
		
Stage I	Himayuddin	Stage III
		
Stage I	Kalepad	stage V

Plate 8A. Histological studies on off season mango varieties at Kanyakumari (cont...)

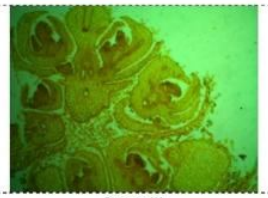
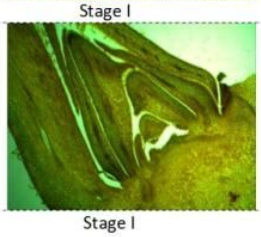
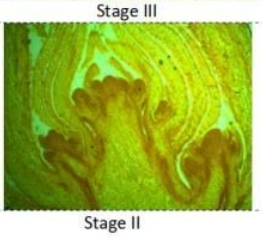
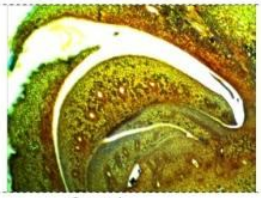
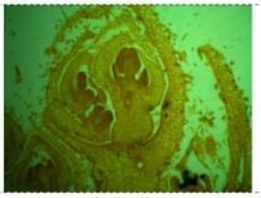
Vegetative shoots		Reproductive shoots
		
Stage I	Mulgoa	Stag III
		
Stage I	Neelum	Stage III
		
Stage I	Rumani	Stage II
		
Stage I	Senduram	Stage II
		
Stage I	Swarnarekhai	Stage I

Plate 11.Histological studies during main season at Tenkasi

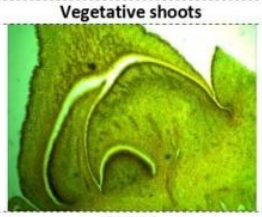
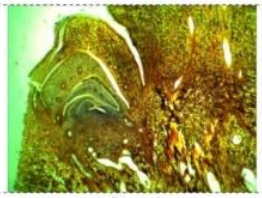
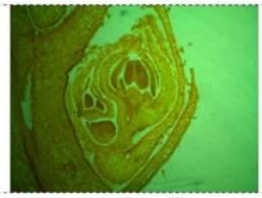
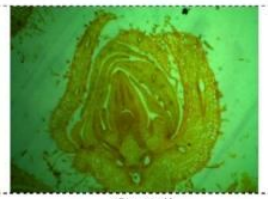
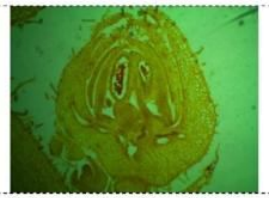
Vegetative shoots		Reproductive shoots
		
Stage I	Alphonso	Stage II
		
Stage I	Bangalora	Stage II
		
Stage I	Kalepad	Stage II
		
Stage I	Himayuddin	Stage II
		
Stage I	Sendura	Stage II

Plate 11A. Histological studies during main season at Tenkasi (cont...)

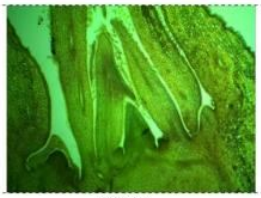
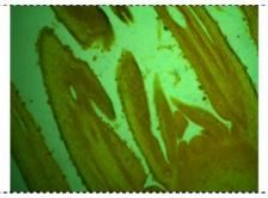
Vegetative shoots		Reproductive shoots
		
Stage I	Mulgoa	Stage II
		
Stage I	Neelum	Stage II
		
Stage I	Rumani	Stage II
		
Stage I	Banganapalli	Stage I
		
Stage I	Swarnarekha	Stage I

Plate 10. Histological studies during off season at Tenkasi

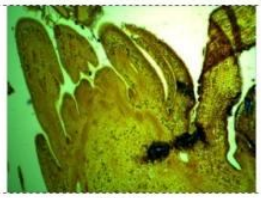
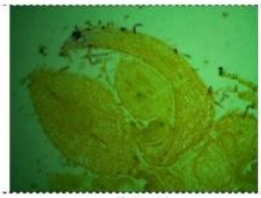
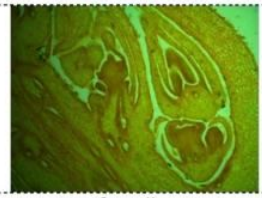
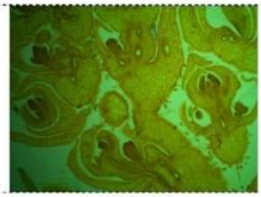
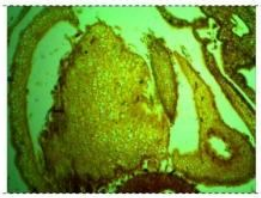
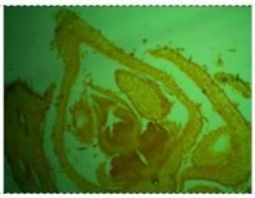
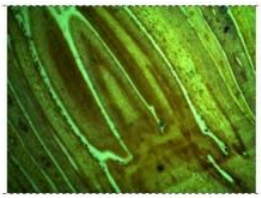
Vegetative shoots		Reproductive shoots
		
StageI	Alphonso	StageI
		
StageI	Bangalora	Stage II
		
StageI	Kalepad	Stage III
		
StageI	Himayuddin	Stage I
		
StageI	Sendura	StageI

Plate 10A. Histological studies during off season at Tenkasi (cont...)

Vegetative shoots		Reproductive shoots
		
StageI	Mulgoa	Stage II
		
StageI	Neelum	Stage II
		
StageI	Rumani	Stage II
		
StageI	Banganapalli	Stage II
		
StageI	Swarnarekha	Stage I