



# Screening of coconut germplasm against coconut eriophyid mite, *Aceria guerreronis* Keifer in Andhra Pradesh

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## Abstract

Eight tall coconut varieties (45 years age) and 17 new hybrids (15 years age) available at HRS, Ambajipeta were screened for resistance against coconut eriophyid mite, *Aceria guerreronis* Keifer for four years [2004 to 2007] under natural conditions of coastal ecosystem of Andhra Pradesh. Out of the eight varieties; the lowest mite damage index was recorded in Laccadive Ordinary (LO) - 1.99, Andaman Ordinary (AO) - 2.10, Philippines Ordinary (PO) - 2.23 and East Coast Tall (ECT) - 2.24 and West Coast Tall (WCT) - 2.54 while Laccadive Micro (LM) - 2.43 recorded the highest damage index. Among the 17 coconut hybrids screened, ECT x GB (Godavari Ganga – the first hybrid from Andhra Pradesh) - 1.87, LO x COD - 1.95, VHC-1 (ECT x MGD) - 2.08 recorded the lowest mite damage whereas, LM x GB - 2.88, Java x GB - 2.83 and Fiji x GB - 2.75 recorded the highest damage among the crosses.

**Keywords:** *Aceria guerreronis*, coconut eriophyid mite, crosses, varieties

## Introduction

Coconut (*Cocos nucifera* L.) is an important plantation crop of southern states of India and is cultivated in 1.02 lakh ha in Andhra Pradesh which ranks fourth in area and second in productivity. The production and productivity of coconut are often threatened by incidence of various pests. The wide spread occurrence of coconut eriophyid mite, *Aceria guerreronis* Keifer is posing a serious threat to the economy of the coconut growers. It inhabits the floral bracts and tender portion of the nut covered by perianth. Severe infestation leads to poor development of nuts, kernel content and 25 per cent loss in yield of copra (Julia and Mariau, 1979, Sathiamma *et al.*, 1998; Mohanasundaram *et al.*, 1999). There are promising lines of research that could lead to management of the pest by use of resistant cultivars, agronomic manipulation and biological control. Although there is evidence that improved agronomical practices reduces mite attack, the use of resistant lines needs to be considered. Incidence of mite attack has been reported on almost all cultivated varieties of coconut. However, a low incidence of mite has been reported in Kenthali

(Ramaraju *et al.*, 2000) and Chowghat Orange Dwarf (Nair, 2000) varieties. Hence, with an objective of identification of resistant source for coconut eriophyid mite in germplasm under east coast conditions, a study was conducted to screen certain varieties and hybrids of coconut against this pest.

## Materials and Methods

Screening studies were conducted on eight coconut varieties and 17 new hybrids against coconut eriophyid mite (*A. guerreronis*) for a period of four years (2004 to 2007). The palms under varieties are 45 years old while that of hybrids are 15 years old. The palms were given regular manurial and agronomic practices as per the recommendation of HRS, Ambajipeta, APHU. The experiment was replicated thrice and each replication consisted of three palms.

Eriophyid mite intensity was recorded at quarterly intervals (1<sup>st</sup> quarter - March, 2<sup>nd</sup> quarter - June, 3<sup>rd</sup> quarter - September, 4<sup>th</sup> quarter - December) in a year both in young nuts (2 to 4 months old) as well as in harvested nuts (11 months) by scoring the mite damage as per the

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The total return realized from sale of first year clean coffee harvested from plantation established using seedlings raised in poly bag of 32.5 x 20 cm was 51.5 to 54.0 per cent higher than the return obtained from normal poly bags (22.5 x 15 cm). It clearly indicates that extra investment (Re 1/seedling) made on obtaining vigorous seedlings from bigger poly bags could be met from the sale of first year yield alone.

### Conclusion

Improved growth of plants established from first year seedlings raised in 32.5 x 20.0 cm poly bag (which were 18 months old seedlings during field planting) resulted in increased stem girth, more number of primaries, length of the longest primary, bearing nodes on the longest primary branch which in turn reflected in 40 to 45 per cent yield increase of clean coffee compared to plants established from normal poly bags (22.5 x 15.0 cm). Increased yield in plants established from second year bigger poly bag seedlings could also be attributed to improved growth components, which resulted in more bearing wood compared to plants established from smaller and normal poly bags.

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standard procedure developed by Central Plantation Crop Research Institute (CPCRI) Kasargod, Kerala (Nair *et al.*, 2001). Data on mite damage index was recorded from the total number of young nuts available on 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> bunch (2 to 4 months age) of the sample palm whereas, for harvested nuts (11 months), the damage index was recorded at the time of harvest of the sample palm.

## Results and Discussion

### Screening of varieties against coconut eriophyid mite

#### i) Young nuts (2 to 4 months)

Studies revealed that among all the varieties screened, the variety Laccadive Ordinary recorded the lowest damage due to mite (1.99) and was statistically superior over all the other varieties. The next best varieties are Andaman Ordinary (2.10) followed by Philippines Ordinary (2.23) and East Coast Tall and the latter two are (Philippines Ordinary and East Coast Tall) statistically on par with each other. The varieties with increased mite damage are Fiji (2.37), Cochin China (2.40), Laccadive Micro (2.43) and West Coast Tall (2.54) (Table 1).

**Table 1. Screening of varieties against coconut eriophyid mite on young and harvested nuts**

Varieties	Mite damage grade index (mean of four years)	
	Young nuts (2 to 4 months)	Harvested nuts (11 months)
Laccadive Micro (LM)	2.43	3.56
East Coast Tall (ECT)	2.24	2.98
Philippines Ordinary (PO)	2.23	2.96
Andaman Ordinary (AO)	2.10	2.40
Laccadive Ordinary (LO)	1.99	2.17
West Coast Tall (WCT)	2.54	3.61
Cochin China (CC)	2.40	3.40
Fiji	2.37	3.54
CD (P=0.05)	0.08	0.20

#### ii) Harvested nuts (11 months)

Among the eight varieties screened, the variety Laccadive Ordinary recorded the lowest damage index (2.17) on harvested nuts followed by Andaman Ordinary (2.40) and both the varieties were statistically significantly different from each other. The varieties next in order are Philippines Ordinary (2.96), East Coast Tall (2.98), Cochin China (3.40), Fiji (3.54), Laccadive Micro (3.56) and West Coast Tall (3.61), which recorded higher grade indices (Table 1).

By observing the mite damage both in young as well as in harvested nuts, it can be concluded that the variety Laccadive Ordinary recorded the lowest damage

followed by Andaman Ordinary and both of them have recorded mild level of damage index whereas, the highest damage index was recorded in West Coast Tall and Laccadive Micro.

### Screening of new hybrids against coconut eriophyid mite

#### i) Young nuts (2 to 4 months)

Among all the new hybrids evaluated, ECT x GB (Godavari Ganga) proved to be superior by recording the lowest mite damage index (1.87) and it was on par with, LO x COD (1.95) followed by Veppankulam Hybrid Coconut-1 (VHC-1) (2.08). The next best crosses were GB x ECT (2.12), LO x PO (2.18), CC x GB (2.19), LO x GB (2.28), COD x WCT (2.31) and WCT x COD (2.33). The highest damage grade index was recorded in the cross LM x GB (2.88) followed by Java x GB (2.83) (Table 2).

**Table 2. Screening of hybrids against coconut eriophyid mite on young and harvested nuts**

Hybrids	Mite damage grade index (mean of four years)	
	Young nuts (2-4 months)	Harvested nuts (11 months)
Cochin China x Gangabondam (CC x GB)	2.19	3.04
Laccadive Micro x Gangabondam (LM x GB)	2.88	3.23
Laccadive Ordinary x Chowghat Orange Dwarf (LO x COD)	1.95	2.86
Andaman Ordinary x Gangabondam (AO x GB)	2.45	3.07
Laccadive Ordinary x Gangabondam (LO x GB)	2.28	2.96
Philippines Ordinary x Gangabondam (PO x GB)	2.37	3.01
Laccadive Ordinary x Philippines Ordinary (LO x PO)	2.18	2.91
Java x Gangabondam (J x GB)	2.83	3.21
Fiji x Gangabondam (F x GB)	2.75	3.38
Veppankulam Hybrid Coconut - 1 (ECT x MGD)	2.08	2.85
Gangabondam x Laccadive Ordinary (GB x LO)	2.49	3.13
Gangabondam x Fiji (GB x F)	2.36	2.97
Gangabondam x East Coast Tall (GB x ECT)	2.12	2.89
Gangabondam x Philippines Ordinary (GB x PO)	2.64	3.47
West Coast Tall x Chowghat Orange Dwarf (WCT x COD)	2.33	2.95
Chowghat Orange Dwarf x West Coast Tall (COD x WCT)	2.31	2.90
East Coast Tall x Ganga Bondam (ECT x GB) (Godavari Ganga)	1.87	2.63
CD (P = 0.05)	0.14	0.20

## ii) Harvested nuts (11 months)

Among the crosses, ECT x GB (2.63) was found significantly superior over other crosses by recording the lowest damage grade index of mite followed by VHC-1 (ECT x MGD) (2.85). The crosses LO x COD (2.86), GB x ECT (2.89), COD x WCT (2.90), LO x PO (2.91), WCT x COD (2.93), GB x Fiji (2.96), PO x GB (3.01) and CC x GB (3.04) are the next best crosses (Table 2).

From the studies, it can be inferred that the varieties, Laccadive Ordinary, Andaman Ordinary and Philippines Ordinary which are having green and yellow coloured, round and oval shaped nuts are showing the tolerance towards coconut eriophyid mite. The crosses ECT x GB, LO x COD and VHC-I (ECT x MGD) in which lower damage index was recorded are also having green and yellow coloured, round and oval shaped nuts.

Muthiah and Bhaskaran (1999) from Tamil Nadu reported that Laccadive Ordinary, Cochin China, Andaman Ordinary and Philippines Ordinary varieties are less susceptible to mite and in the present study also the varieties Laccadive Ordinary, Andaman Ordinary and Philippines Ordinary recorded the lowest mite damage index indicating tolerance to mite. Nair *et al.* (2000) recorded the maximum level of mite incidence on WCT variety with green and oblong nuts as compared to WCT with reddish to bronze colour and round nuts. Less mite damage on round coconuts was reported by Moore (1986) and Moore and Alexander (1990) in which petals are tightly pressed on nuts. This is found to be true in the present studies also as LO, AO and PO varieties are of round and oval nuts. The studies conducted by Ganesamurthy *et al.* (2003) revealed the same trend of reaction by LO, CC and AO which recorded the lowest mite damage among the 31 genotypes screened.

Ambily Paul and Thomas Biju Mathew (2002) found 26.6 % damage for Laccadive Ordinary variety under the west coast conditions. Nampoothiri *et al.* (2002) reported high incidence of mite on the varieties viz., WCT and CGD and similar observations were recorded in the present studies as well where WCT recorded the highest mite damage among the varieties screened. Muthiah and Rajarathinam (2002) in their studies found Philippines Ordinary as one of the moderately tolerant genotypes against coconut eriophyid mite and the present studies are in conformity with these results. Mariau (1986) reported that cultivar from Cambodia has not recorded mite damage. Kenthali, a tender coconut cultivar was reported with the lowest mite damage from Tamil Nadu by Kannaiyan *et al.* (2000). In respect of crosses, Kannaiyan *et al.* (2002) reported

that GB x WCT and ECT x GB were having the lowest mite susceptibility and in the present investigation also ECT x GB recorded the lowest damage index. Cultivars with tolerance to coconut mite have got future scope as they can be included in resistance breeding. As the varieties LO, AO and PO proved to suffer less with coconut eriophyid mite, they can be suggested for utilization in breeding for mite resistance / tolerance. The crosses viz., ECT x GB, LO x COD and VHC-1 (ECT x MGD) can be recommended for planting in new areas as they were found withstanding the mite damage.

## Conclusion

Since it has been observed that the varieties viz., Laccadive Ordinary, Andaman Ordinary and Philippines Ordinary and crosses East Coast Tall x Ganga Bondam, Laccadive Ordinary x Chowghat Orange Dwarf and Veppankulam Hybrid Coconut-1 (which are of green – yellow coloured and round and oval shaped nuts) recorded the lowest mite damage under east coast conditions, it can be suggested that establishment of gardens with these varieties and crosses may help in reducing the loss by coconut eriophyid mite. In the future multiplication programmes also progenies of these palms can be used. Knowledge about highly susceptible varieties like West Coast Tall and Laccadive Micro can be used in elimination of such varieties in new plantings. Even though, the resistance breeding in coconut is long term process, the varietal difference in tolerance to eriophyid mite can be exploited to develop resistant varieties and hybrids.

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