

Incidence of two spotted spider mite *Tetranychus urticae* Koch (Acarina : Tetranychidae) in grape vineyards

Agriculture and Horticulture crop ecosystems are suffering from altered challenges of pest management in recent past. Similarly, acarine species have been considered to be most dreaded pests of grapes (*Vitis vinifera* L.) very recently in India. According to a NRC, Grapes (Pune) report six species of mites viz., *Tetranychus urticae* Koch, *T. cinnabarinus* Boisduval, *T. neocoleonicus* Andre, *Oligonychus mangiferus* Rahmen and Sapra, *O. punicae* Baker and *Eutetranychus orientalis* Klein are found causing damage to grapevine in India (Anon., 2008). Amongst them infestation of *T. urticae* is reported to be significant as emerging key pest in abundance and damage these days (Chandra Sekhar *et al.*, 2008). Further, it has been confirmed (Veerendra *et al.*, 2014) that *T. urticae* relish the grapes in terms of bionomics supporting continued pestiferousness. Mites affect grape yield qualitatively and quantitatively through loss of chlorophyll, stunting of growth, stippling, webbing, leaf yellowing, defoliation, leaf burning, reduction in size and quality of fruits. Under optimal protection estimated avoidable loss due to *T. urticae* was 47.2 per cent. (Veerendra *et al.*, 2015) in Vijayapura. In the present study attempt has made to document the incidence of *T. urticae* and its natural enemies in grape growing districts of Karnataka (India).

Roving survey was undertaken to record the incidence of the mites and their natural enemies prevailing on grape during rabi and summer (November to February) in Vijayapura, Koppal, Bagalkot, Belagavi, Bengaluru, Chikkaballapur districts during 2012-13. In each district two talukas were covered with 1 to 5 villages / taluka based on area. Thus, a total of 23 villages (Table 1) were surveyed across the state. In each location two fields were selected to compute average incidence of mites and their natural enemies simultaneously. Five randomly selected vines / field, three canes / plant and five leaves / cane were selected (one each from top, middle and bottom canopy) satisfied the observation requirements. A 7x magnifier hands lens was used to observe mites by excising leaves. Further, selected mites specimens mounted on glass slides in Hoyer's media got identified at All India Coordinated Research Project on Agricultural Acarology, University of Agricultural Sciences, Bengaluru. Infested leaf samples were also used to support the identification process. The incidence of mites (*T. urticae* / sq inch, predatory mite/leaf and coccinellid beetle/vine) and insects from the survey are presented as mean and range locality wise (Table 1) and district wise (Fig) to discuss the results.

Among the four villages of Vijayapura taluka maximum population of *T. urticae* 22.1 ± 2.8 mites / inch² per sq inch was observed in Babaleshwar followed by 21.5 ± 3 in Jumnal. The population in Vijayapura taluk a ranged from 15.5 ± 1.5 to 22.1 ± 2.8 / inch² least being in Savalagi. The crop during the survey was of more than pea sized berries in majority gardens and variety being Thompson seedless. The age of the garden was six years old in Jumnal and Arjunagi, where as in Babaleshwar, Toravi

and Savalagi it was four, seven and five years respectively. In Sindagi taluk, the population of 17.6 ± 1.0 and 16.7 ± 1.8 mites / inch² was recorded in Tilagola and Devarahippuragi, respectively. Thus the population in Sindagi was higher than that of in Savalagi (Vijayapura Tq). In Belagavi district Gokak taluka had highest population of 16.7 ± 2.0 mites / inch² (Chippalakatte) followed by Kalligutti (15.9 ± 1.8 mites per sq) in four and six years old Thompson seedless vineyards with mostly pea sized berries. Similarly in Athani the population of mites was 19.2 ± 1.7 / inch² with in a pea size berry. Thus in Belagavi district major grape growing area there was 15.9 ± 1.8 to 19.2 ± 1.7 mite incidence on inch² area basis of the leaves.

Incidence of grape mites in Bagalkot district also revealed higher population. In Bilagi taluk, the population of 11.5 ± 1.3 / inch² was recorded in Anagawadi. The berries were at pea size and the variety was Thompson seedless in two years old garden. In Badami taluk the mite infestation was 12.0 ± 1.4 and 11.7 ± 1.8 / inch² at Katageri and Hunageri respectively. Here also the crop was at peanut sized berry stage but the garden was three to four years old with Thompson seedless variety. Thus across Bagalkot district the mite infestation ranged from 11.5 ± 1.3 to 12.0 ± 1.4 / inch². In two villages of Koppal district the population ranged 7 ± 1.18 to 8.2 ± 1.1 (Koppal Yelaburga). At both places Thompson seedless only was grown and crop was at pea size berry stage. The gardens were three to four years old. On the contrary the incidence of grape mites in Southern districts of Karnataka (Bengaluru and Chikkaballapur) revealed a different scenario. In Bengaluru district, the highest population of mites were observed in Devanahalli (0.5 ± 0.7 mites / inch²). The grape varieties grown were Banagalore blue and Anab-E-Shahi. At all the places the grape berries were at pea size or slightly bigger. The age of the garden was three to five years. Thus in Bengaluru district the mites' incidence was negligible compared to the districts of Northern Karnataka. In Chikkaballapura, the highest population of mites observed was in Dasarahalli with 1.4 ± 0.4 / sq inch. No population of mites was observed in The new flesh stage vineyards of Doddsagarahalli and Muddenahalli were free from mite infestation. Thus in Chikkaballapura district the

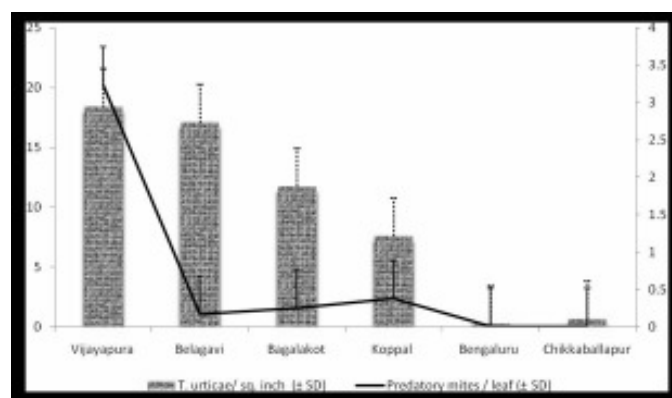


Fig. 1. District wise incidence of grape mite *Tetranychus urticae* in Karnataka during 2012-13

Table 1. Incidence of mites *Tetranychus urticae* and predatory arthropods on grapes in Karnataka during 2012-13

District /Taluk	Field spot (village vicinity & geographic position)	Date of visit	Variety	Age of garden	Stage of crop	No. of mites /sq inch ($\pm$ SD)	Predatory mites /leaf ($\pm$ SD)	Coccinellids/pl. ($\pm$ SD)
Vijayapura	Jumnal [16°44' 20.57" N 75°43' 18.15" E & 606.9 MSL]	05/01/2013	Thompson seedless	6yrs	Pea size & Sorghum size	21.5 $\pm$ 3.0	4.0 $\pm$ 0.9	2.7 $\pm$ 0.9
	Babaleshwar [16°59' 25.89" N 75°47' 00.23" E & 518.7 MSL]	05/01/2013	Thompson seedless	4yrs	>Pea size	22.1 $\pm$ 2.8	3.5 $\pm$ 1.1	1.2 $\pm$ 0.1
	Arjunagi [16°35' 18.01" N 75°28' 12.57" E & 546 MSL]	05/01/2013	Thompson seedless	6yrs	>Sorghum size	18.3 $\pm$ 1.2	2.1 $\pm$ 0.8	-
	Toravi [16°49' 50.33" N 75°41' 32.13" E & 611.7 MSL]	05/01/2013	Thompson seedless	7yrs	Pea size	17.2 $\pm$ 1.2	2.5 $\pm$ 0.95	-
	Savalagi [16°67' 10.11" N 75°35' 15.30" E & 559 MSL]	05/01/2013	Thompson seedless	5yrs	>Pea size	15.5 $\pm$ 1.5	3.2 $\pm$ 0.8	-
	Devarahippargi [16°54' 43.61" N 76°13' 56.04" E & 495 MSL]	10/01/2013	Thompson seedless	6yrs	>Pea size	16.7 $\pm$ 1.8	4.2 $\pm$ 1.5	1.0 $\pm$ 0.8
Sindagi	Tilagola [16°34' 17.38" N 76°10' 26.50" E & 557.4 MSL]	10/01/2013	Thompson seedless	4yrs	Pea size	17.6 $\pm$ 1.0	3.13 $\pm$ 0.8	-
Dist : Belagavi								
Gokak	Kalligutti [16°10' 04.91" N 74°49' 20.51" E & 552.3 MSL]	25/01/2013	Thompson seedless	9yrs	>Pea size	15.9 $\pm$ 1.8	0.25 $\pm$ 0.5	-
	Chippalakatte [16°00' 30.25" N 75°11' 43.45" E & 594.3 MSL]	25/01/2013	Thompson seedless	5yrs	Pea size	16.7 $\pm$ 2.0	-	-
Athani	Athani [16°43' 26.70" N 75°03' 49.82 E & 576.6 MSL]	25/01/2013	Thompson seedless	8yrs	Pea size	19.2 $\pm$ 1.7	0.25 $\pm$ 0.5	-
Dist : Bagalkot								
Bilagi	Anagawadi [16°20' 27.02" N 75°37' 41.66" E & 581.7 MSL]	29/12/2012	Thompson seedless	2yrs	Pea size	11.5 $\pm$ 1.3	0.50 $\pm$ 0.6	-
Badami	Katageri [15°54' 53.78" N 75°40' 36.52" E & 549.6 MSL]	29/12/2012	Thompson seedless	4yrs	Pea size	12.0 $\pm$ 1.4	0.25 $\pm$ 0.5	-
	Hunageri [15°57' 11.59" N 75°46' 47.15" E & 527.7 MSL]	29/12/2012	Thompson seedless	3yrs	Pea size	11.7 $\pm$ 1.8	0.00 $\pm$ 0.6	-
Dist : Koppal								
Koppal	Koppal [15°32' 09.79" N 76°16' 15.90" E & 518 MSL]	14/1/2013	Thompson seedless	3yrs	Pea size	8.2 $\pm$ 1.1	0.75 $\pm$ 1.0	-
	Yelaburga [15°35' 44.51" N 76°00' 18.48" E & 582.6 MSL]	14/1/2013	Thompson seedless	4yrs	Pea size	7 $\pm$ 1.8	-	-
Dist : Bengaluru								
Bengaluru	Devanahalli [13°14' 36.65" N 77°42' 33.15" E & 886.2 MSL]	28/11/13 & 1/02/2013	Bangalore blue, Anab-E-Shahi	5yrs	New flesh	0.5 $\pm$ 0.7	-	-
	Rajanakunte [13°10' 47.83" N 77°33' 01.72" E & 895.8 MSL]	28/11/13 & 1/02/2013	Bangalore blue, Anab-E-Shahi	3yrs	Pea size	0.3 $\pm$ 0.5	-	-
	Hosakote [13°04' 09.91" N 77°47' 19.89" E & 891.3 MSL]	28/11/13 & 1/02/2013	Bangalore blue, Anab-E-Shahi	5yrs	>Pea size	0.2 $\pm$ 0.4	-	-
	Doddaballapura [13°17' 22.03" N 77°32' 03.04" E & 891.3 MSL]	28/11/13 & 1/02/2013	Bangalore blue, Anab-E-Shahi	5yrs	>Pea size	-	-	-
Dist : Chikkaballapur								
Chikka-ballapur	Dasarahalli [13°02' 44.91" N 77°30' 39.82" E & 886.2 MSL]	28/11/13 & 2/02/2013	Thompson seedless	3yrs	Pea size	1.4 $\pm$ 0.4	-	-
	Chikkasagara halli [13°19' 34.71" N 77°44' 06.26" E & 887.1 MSL]	28/11/13 & 2/02/2013	Thompson seedless, Bangalore blue, Anab-E-Shahi	6yrs	Pea size	1.2 $\pm$ 0.7	-	-
	Doddasagarana halli [13°20' 06.80" N 77°42' 22.38" E & 911.1 MSL]	28/11/13 & 2/02/13	Thompson seedless, Bangalore blue, Anab-E-Shahi	6yrs	New flesh	-	-	-
	Muddena halli [13°24' 25.35" N 77°41' 46.32" E & 937.5 MSL]	28/11/13 & 2/02/2013	Thompson seedless	4yrs	New flesh	-	-	-

mite population appeared to be slightly higher than that of in Bengaluru district but still less compared to Northern Karnataka. The districtwise average incidence data (fig) revealed a range of mites 0.25 ± 0.2 to 18.41 ± 2.48 per sq inch, higher being in the Northern parts. Vijayapura district was most affected followed by Belagavi and then Bagalkot.

Further, a predatory mite *Euseius* sp (0.25 ± 0.5 to 4.2 ± 1.5 per leaf) and coccinellid beetle *Telsimia bengalorensis* Kapur were found actively engaged in natural control of *T. urticae* in mostly northern districts vineyards (Table 1 and 3). At Devarahippargi (Tq Sindagi) predatory mite activity was highest (4.2 ± 1.5 per leaf). The incidence of coccinellid beetles was noticed only in Jumnal, Baballeshwar and Devarahippargi villages of Vijayapura district with a range of 0 ± 0.8 to 2.7 ± 0.9 per plant highest being at Jumnal.

Thus, the survey revealed widespread and severe incidence of *T. urticae* in northern parts of Karnataka, Vijayapura/Belagavi/ Bagalkot districts being hot spots. Earlier, Chandrsa Sekhar *et al.* (2008) observed *T. urticae* as new serious pest of grape around Hyderabad (Andhra Pradesh, India). Thus from available reports it appears that the mites particularly *T. urticae* is well established in conventional areas of grape cultivation in Maharashtra, Karnataka and Andhra Pradesh where in Thompson seedless variety is dominant one. This area is known for hot humid climate which encourages more pest and diseases compared to Bengaluru and Chikkaballapur districts. The NRC report (Anon., 2008) stresses upon the opinion that drought prone areas succumbing to mite outbreak and hence, hot dry

conditions essentially severity in northern part of the state. The present rowing survey appears to be first attempt across Karnataka for mite infestation in grapes (and other crops too) and hence it lacks published literature for comparison. It is also likely that prevailing pest management practices targeting other insect pests might have lead to the resurgence of mites especially the use of neonicotinoids and synthetic pyrethroids against thrips and mealy bugs in this area. Personal discussion with farmers revealed the usage of imidacloprid, sulphur and pyrethroids in their pest management schedule.

Further, during the survey, the incidence of phytoiseiid mite *Euseius* sp. and a predatory insect *Coccinellid* have also been noticed in host dependant density pattern. Predatory mite viz., *Euseius vignus* and *E. insanus* have been reported as dominant species in both vineyards and surrounding vegetation in Jammu valley (Rathar, 2006). *T. urticae* being polyphagous pest its predator *Euseius* sp. observed in the present study may be in more abundance in other hosts (brinjal, chilli etc.) which have lesser pesticide pressure. The potentiality *E. finlandicus* as bio-control of *T. urticae* and its intraguild dominance amongst other predator (Raquel *et al.*, 2010) suggest conservation and exploitation of predatory mite *Euseius* sp for bio-control options. It was quite appealing from present study that mites have considerable economical significance as emerging pest of grape, particularly in North Karnataka a likely endemic area. The acaricides with better efficacy viz., hexythiazox, propargite, abamectin etc (Veerendra *et al.*, 2015, Karbhantanal *et al.*, 2012) could be relied upon with due residue care.

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