Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

JEZS Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2021; 9(1): 285-290

Received: 25-11-2020
Accepted: 28-12-2020

**Mohan Kumar KS**
Department of Agricultural Entomology, College of Agriculture, V. C. Farm, Mandya, Karnataka, India

**Sugeetha G**
Department of Agricultural Entomology, College of Agriculture, V. C. Farm, Mandya, Karnataka, India

**Vijayalaxmi Kamaraddi**
Department of Food Science and Technology, Extension Education unit, Naganahalli, Mysuru, Karnataka, India

**Mahadev J**
Department of forestry and Environmental Science, College of Agriculture, V. C. Farm, Mandya, Karnataka, India

**Pankaja NS**
Department of Plant Pathology, College of Agriculture, V. C. Farm, Mandya, Karnataka, India

**Nagaraj TE**
AICRP (Millets) Head, GKVK, Bangalore, Karnataka, India

**Patel VN**
Sugarcane Entomologist, AICRP (Sugarcane), ZARS, V. C. Farm, Mandya, Karnataka, India

**Corresponding Author:**
**Mohan Kumar KS**
Department of Agricultural Entomology, College of Agriculture, V. C. Farm, Mandya, Karnataka, India

# Influence of morphological parameters on the incidence of *Abacarus sacchari* and *Aceria sacchari* on sugarcane varieties

**Mohan Kumar KS, Sugeetha G, Vijayalaxmi Kamaraddi, Mahadev J, Pankaja NS, Nagaraj TE and Patel VN**

## Abstract
A study was conducted to know the incidence of eriophyiid mite pests, *Abacarus sacchari* and *Aceria saccari* were influenced by morphological parameters of sugarcane crop at ZARS, V. C. Farm, Mandya. In the present investigation, distance at the base of the vein, leaf length, leaf area and plant height had positive correlation and influenced more incidence of sugarcane rust mite, *Abacarus sacchari* population. The parameters such as distance from one vein to another, width of the leaf, leaf inclination and trichome density did not support the growth of mite population and had negative correlation. In case of sugarcane blister mite, *Aceria saccari,* thickness of leaf sheath, girth of the shoot, moisture content in the leaf sheath and easily detachable leaf sheath were found to have significant positive correlation whereas leaf sheath length, width, fresh weight were found to have non-significant relation. From the present investigation, it can be concluded that no single morphological factor is responsible in mite population fluctuation but all the factors work in compliment with each other.

**Keywords:** Morphological parameters, *aceria sacchari, abacarus sacchari,* sugarcane varieties

## Introduction
Sugarcane is an important commercial crop of Indian agriculture and is grown extensively throughout the world. Anthropogenic climate change supports moderate crop growth and yield but favors the pest abundance. The insect pests attack sugarcane crop from planting to harvest and they include borers, sucking pests, defoliators, subterranean pests. Apart from these, sugarcane crop is also attacked by a number of phytophagous mites (Beard *et al*., 2003 [2]; Leslie, 2004 [7]) belonging to the families Tetranychidae, Tarsonemidae and Eriophyiidae and are considered as minor pests (Ozman – Sullivan *et al.*, 2006 [11]). About 30 species of phytophagous mites have been reported attacking sugarcane (Bolland *et al*., 1998 [3]; Fitz Gibbon *et al*., 1998 [4]). Among these, eriophyoid mites are more diverse, highly adaptable and have close association with the host plants (Petanovic and Vidovic, 2009 [12]). These mites are considered as smallest arthropods in the world and play key role in ecosystem (Sabelis and Bruin, 1996[13]). Totally, nine species of Eriophyoidea mites have been reported on sugarcane, namely *Abacarus delhiensis, Abacarus queenslandiensis, Abacarus doctus, Abacarus sacchari, Aceria sacchari, Aceria merwei, Cathetacarus spontaneae, Catarhinus sacchari and Diptacus sacchari* (Ozman-Sullivan *et al*., 2006 [11]; Navia *et al*., 2011 [10]). Among these, sugarcane blister mite *Aceria sacchari* and sugarcane rust mite *Abacarus sacchari* are known to cause considerable damage to the sugarcane crop. The application of insecticides to manage these eriophyiid mites is not feasible in the sugarcane field as it is cumbersome. As the mite infestation starts from 3rd month onwards and the plant height reaches to certain extent, it hinders the movement of a person engaged in plant protection operation creating unhealthy situation and non-uniformity in the deposition of insecticides. Therefore, developing a resistant sugarcane variety is a suitable option to reduce the mite incidence and at the same time it is eco-friendly which fulfills the ultimate goal of integrated pest management. Hence, a study was undertaken to assess the morphological parameters associated with the different varieties of sugarcane against eriophyiid mites and that enables us to identify a promising variety with a modified morphological parameter that helps in reducing the mite incidence and infestation.

## Material and methods
The morphological components of nine sugarcane varieties were studied against the phytophagous mites at the Zonal Agricultural Research Station, V.C farm, Mandya.

Studies were conducted to identify the differences in morphology among the nine sugarcane varieties. To study the incidence of sugarcane rust mite *Abacarus sacchari,* five plants were randomly selected from each variety. In each plant, three randomly selected leaves were taken for the observations on leaf characters. The observations on the parameters like height of the plant, number of leaves, interveinal distance, length of the leaf, breadth of leaf, leaf area, trichome density, leaf moisture per cent, thickness of the leaf, leaf inclination were recorded. To study the incidence of sugarcane blister mite, *Aceria sacchari* parameters like thickness of leaf sheath, length of the leaf sheath, moisture per cent of the leaf sheath, fresh weight of the sheath, girth of the shoot, width of the leaf sheath and leaf sheath detachability of the plants were recorded. The data was subjected to ANOVA and was correlated with the incidence of mite to calculate 'r' value.

**Morphological parameters studied on different sugarcane varieties**

Number of fully opened green leaves on a plant was recorded from each of the five plants and average was worked out. For measuring the length of leaves, three green leaves were taken from five randomly selected plants and length was measured from the place of joint of leaf sheath with leaf (ligule) to the tip of the leaf and finally average was worked out. The breadth of the leaf was measured at the three places *i.e*., at tip, from the middle and at the base of leaf and finally average was worked out. Leaf angle was taken from five plants in each plot with help of protractor and average was worked out. The thickness of leaf sheath and leaf was measured by disc method. The girth of the shoot was measured from five randomly selected plants. The average girth of the five plants taken from each genotype was then calculated and presented as girth of the plant. The height of the plant was recorded from five randomly selected plants and the average was taken. The trichome density was estimated by following the method suggested by Maite *et al.* (1980) [8].

**Leaf area**

Leaf area was measured by disc method and was expressed in cm$^2$. Fifty discs of known size were taken through a cork borer from randomly selected leaves. Both discs and remaining leaf blades were oven dried at 65º C and leaf area was calculated by using the formula suggested by Vivekanandan *et al*. (1972) [16].

$$LA = \frac{WA \times A}{WD}$$

Where, LA = Leaf area (cm$^2$ per leaf)
WD = Oven dry weight of 50 discs (g)
A = Area of 50 discs (cm$^2$)
WA = Oven dry weight of all the leaves with discs (g)

**Leaf moisture**

Leaf moisture was calculated based of fresh weight and dry weight of sheath.

$$\%\ moisture = \frac{\text{Fresh weight} - \text{dry weight}}{\text{Fresh weight}} \times 100$$

**Leaf Sheath moisture**

Leaf sheath moisture was calculated based of fresh weight and dry weight of sheath.

$$\%\ moisture = \frac{\text{Fresh weight} - \text{dry weight}}{\text{Fresh weight}} \times 100$$

**Sheath length**

Length of the leaf sheath was measured with centimetre scale.

**Sheath width**

Width of the leaf sheath was measured with centimetre scale at top, middle and bottom portion of the sheath and mean sheath width was calculated.

**Interveinal distance**

Interveinal distance was measured from top, middle and bottom portion of the leaf with the help of micrometre. Two types of distances were measured first one was distance at the base of the veins *i.e*., from the base of one vein to base adjacent vein, second one was distance from the top of one vein to top on adjacent vein.

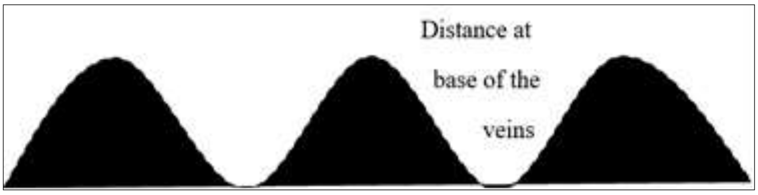


**Fig 1:** Distance from one vein to another vain

Data on the above-mentioned characters of the plant *viz*., the height, girth, number of green leaves and length and breadth of leaves *etc*., were analysed statistically.

## Results and Discussion

**Morphological characters influencing the preference and incidence of sugarcane rust mite, *Abacarus sacchari***

The effect of different morphological parameters on the mite population of *A. sacchari* was observed and has been presented in Table 1. A simple correlation between mite population and the leaf morphology was worked out and presented in the Table 2. The distance at the base of the veins was maximum (63.00 µm) in the varieties VCF 0517 and Co 86032 with the population of 5.80 and 1.16 mites/2 cm$^2$ leaf area, respectively. Minimum distance (44.24 µm) was found in the variety, CoVC 99463 with the population of 0.35 mites/2 cm$^2$ leaf area and 0.37 eggs/2 cm$^2$ leaf area (Table 1). A non-significant positive correlation (r= 0.56) was found between distance at the base of the veins and *A. Sacchari* population indicating that larger the distance at the base of the veins supported more number of rust mite population.(Table 2).

The distance from one vein to another vein was maximum (176.48 µm) in the variety, Co 0323 with the population of 0.13 mites/2 $cm^2$ leaf area and minimum (126.22 µm) was found in the variety, VCF 0517 with the population of 5.80 mites/2 $cm^2$ leaf area (Table 1). A significant negative correlation (r=- -0.61) was found between distance from one vein to another vein and population of *A. Sacchari* (Table 2).

The high amount of leaf moisture (59.80%) was found in the variety, Co 419 with the population of 3.53 mites/2 $cm^2$ leaf area. Lower leaf moisture (39.47%) was observed in the variety, CoM 0265 with the population of 0.37 mites/2 $cm^2$ leaf area. The leaf moisture content was found to have non-significant difference among the varieties (Table 1).

The length of the leaf was maximum (125.56 cm) in the variety, CoVC 99463 with the population of 0.73 mites/2 $cm^2$ leaf area. The shortest leaf (91.16 cm) was found in the variety, Co 62175 with the population of 0.10 mites/2 $cm^2$ leaf area (Table 1). A non-significant positive correlation (r= 0.07) was found between leaf length and population of *A. Sacchari* (Table 2).

The maximum width (3.31 cm) of the leaf was recorded in the variety, Co 0323 with the population of 0.13 mites/2 $cm^2$ leaf area. Minimum leaf width (2.37 cm) was noticed in the variety, Co 62175 with the population of 0.10 mites/2 $cm^2$ leaf area. A significant difference for leaf width was found among the genotypes (Table 1). A non-significant negative correlation (r= -0.03) was found between leaf width and population of *A. sacchari* (Table 2).

The number of leaves per plant showed significant difference among the varieties. The maximum number (7.40 leaves/plant) of leaves were recorded in the variety, Co 62175 with the population of 0.10 mites/2 $cm^2$ leaf area and the minimum (6.50 leaves/plant) number of leaves were recorded in the variety, CoM 0265 with the population of 0.37 mites/2 $cm^2$ leaf area. Among the varieties number of leaves per plant shows non-significant difference (Table 1). The lowest plant height (124.13 cm) was noticed in the variety, Co 0323 with the population of 0.13 mites/2 $cm^2$ leaf area. The highest plant height (186.03 cm) was noticed in the variety, Co 419 with the population of 3.53 mites/2 $cm^2$ leaf area. The plant height was found to have significant difference among the varieties (Table 1)**.** Plant height was found to have non-significant positive correlation (r= 0.18) with the population of sugarcane rust mite, *A. sacchari* (Table 2).

The leaf area showed significant difference among the varieties. The maximum leaf area (289.40 $cm^2$) was recorded in the variety, CoM 0265 with the population of 0.37 mites/2 $cm^2$ leaf area and minimum leaf area (177.00 $cm^2$) was observed in the variety, Co 0323, with the population of 0.13 mites/2 $cm^2$ leaf area (Table 1). The results of correlation study revealed that leaf area showed non-significant and positive correlation (r= 0.23) with the population of mites (Table 2).

The variety, Co 419 had thick leaf (0.0026 g/$cm^2$) with the population of 3.53 mites/2 $cm^2$ leaf area. The variety Co 0323 had thin leaf (0.0020 g/$cm^2$) with the population of 0.13 mites/2 $cm^2$ leaf area. The leaf thickness was found to have non-significant difference among the varieties (Table 1).

Leaf angle was high (35.30º) in the variety, Co 0323 with the population of 0.13 mites/2 $cm^2$ leaf area. The Less leaf angle (24.40º) was noticed in the variety Co 419 with the population of 3.53 mites/2 $cm^2$ leaf area. The leaf angle was found to have significant difference among the varieties (Table 1). The results of correlation study depicts a non-significant negative relation (r= -0.35) between leaf angle and *A. sacchari* incidence (Table 2).

**Table 1:** Morphological parameters influencing the incidence of *Abacarus sacchari* on different sugarcane varieties

| Varieties | No./ 2 $cm^2$ leaf area | Distance at the base of the vein (µm) | Distance from one vein to another vein(µm) | Leaf moisture (%) | Length of the leaf (cm) | Width of the leaf (cm) | No. of leaf/ plant | Height of the plant (cm) | Leaf area ($cm^2$) | Thickness of the leaf (g/$cm^2$) | Leaf inclination (º) | Trichome density/$mm^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Co 62175 | 0.10 | 49.00 | 140.59 | 57.41 | 91.16 | 2.37 | 7.40 | 157.20 | 226.70 | 0.0024 | 29.50 | 97.66 |
| CoVC 99463 | 0.73 | 44.24 | 128.44 | 52.18 | 125.56 | 2.57 | 6.90 | 155.20 | 265.33 | 0.0024 | 26.20 | 98.33 |
| VCF 0517 | 5.80 | 63.00 | 126.22 | 56.36 | 115.69 | 2.90 | 6.50 | 142.56 | 255.03 | 0.0023 | 28.60 | 86.98 |
| Co 419 | 3.53 | 60.55 | 132.00 | 59.80 | 100.33 | 2.73 | 7.20 | 186.03 | 244.43 | 0.0026 | 24.40 | 89.66 |
| Co 86032 | 1.16 | 63.00 | 138.14 | 58.46 | 113.93 | 3.07 | 6.80 | 155.96 | 271.33 | 0.0022 | 28.00 | 95.83 |
| Co 8371 | 0.43 | 51.11 | 134.44 | 55.44 | 105.02 | 3.07 | 7.20 | 162.06 | 208.20 | 0.0021 | 25.50 | 91.10 |
| CoM 0265 | 0.37 | 53.91 | 146.24 | 39.47 | 116.30 | 2.76 | 6.50 | 149.63 | 289.40 | 0.0022 | 34.50 | 110.33 |
| Co 0323 | 0.13 | 60.33 | 176.48 | 47.26 | 103.83 | 3.31 | 7.10 | 124.13 | 177.00 | 0.0020 | 35.30 | 116.40 |
| S. Em± | 0.43 | 0.45 | 0.36 | NS | 2.20 | 0.09 | NS | 5.95 | 7.27 | NS | 1.65 | 2.25 |
| CD@ P=0.05 | 1.30 | 1.37 | 1.09 | | 6.60 | 0.28 | | 18.04 | 22.07 | | 5.03 | 6.83 |

**Table 2:** Correlation between morphological characters of different sugarcane varieties and incidence of *Abacarus sacchari*

| Morphological parameters | Correlation with average mite per 2 sq cm of leaf |
|---|---|
| Distance at the base of the vein (µm) | 0.56 |
| Distance from one vein to another vein(µm) | -0.61* |
| Length of the leaf (cm) | 0.07 |
| Width of the leaf (cm) | -0.03 |
| Plant height (cm) | 0.18 |
| Trichome density/$mm^2$ | -0.82* |
| Leaf area/$cm^2$ | 0.23 |
| Leaf inclination (º) | -0.35 |

*Correlation is significant at 0.05 level

**Trichome density**

Leaf trichome density showed significant difference among the varieties. The high trichome Density (116.40 trichomes/$mm^2$) was found in the variety, Co 0323 with the population of 0.13 mites/2 $cm^2$ leaf area. Low trichome density was found in VCF 0517 with the population of 5.80 mites/2 $cm^2$ leaf area (Table 1). A significant negative correlation (r = -0.82) was observed between trichome density and *Abacarus sacchari* population (Table 2). Among various morphological parameters studied leaf length, leaf area and plant height had positive correlation and influenced more incidence of rust mite population. The parameters such as distance from one vein to another, width of the leaf, leaf inclination and trichome density did not support the growth of mite population and had negative correlation.

Leaf morphology played an important role in the preference and feeding by mites. Analysis of different morphological parameters extrapolates that the interveinal distance (distance at the base of the veins and distance from base of one vein to another vein), leaf area and trichome density were found to influence the mite population on different genotypes as well as on varieties. In the present investigation, interveinal distance was found to influence the *Abacarus sacchari* negatively and these results were found to be similar with the findings of Mukherjee *et al.* (1989) [9]. He found that interveinal distance does not play any role on the establishment of *Oligonychus oryzae* infesting paddy. Khanna *et al*., (1947)[5] studied the morphology of sugarcane leaves and concluded that grooves between the veins provide shelter for the mites, this might be the possible factor for the high incidence of this mite in some of the genotypes and varieties where intervenal distance gives a promising shelter to the sugarcane rust mite, *Abacarus sacchari*.

Leaf area and trichome density were found to be negatively correlated with the population of the rust mite, *Abacarus sacchari.* The larger leaf area in the cultivars had a negative influence on the population of *Abacarus sacchari.* This may be due to the fact that mite has to travel longer distance for mating which is not preferred by mites (Krips *et al.*, 1999) [6]. The trichome density played a prominent role in the buildup of mite population. The mite population of *Abacarus sacchari* showed a negative correlation with trichome density. These results showed that mite did not prefer leaf with high trichomes which creates hindrance in the movement of mite. Similar type of results were reported by Shakoor *et al.* (2010) [14] who are of the opinion that leaf hair density plays negative role in the movement of mites in tomato cultivars. According to Khanna *et al.*, (1947) [5] spineous like out growth helped in spinning of webs in the susceptible varieties of sugarcane. From the present investigation, it can be concluded that no single morphological factor is responsible in mite population fluctuation but all the factors work in compliment with each other.

**Incidence of Sugarcane blister mite, *Aceria sacchari* on different sugarcane varieties**

The different morphological parameters like sheath moisture content, length of the sheath, width of the sheath, sheath thickness, fresh weight of sheath, girth of the shoot and easily detachable leaf sheath were studied and results are presented in the Table 3. Simple correlations were worked out between the number of blisters per cane and morphological parameters. The results of the correlation study are presented in the Table 4.

The moisture content in sheath (76.77%) was found high in the variety, Co 8371 with the incidence of 9.10 blisters /cane. The moisture content was low in the variety, VCF 0517 with the incidence of 1.23 blisters /cane. The moisture in the leaf sheath showed significant and positive correlation (r= 0.70) with the incidence of blister mite on popular verities of sugarcane (Table 3 & 4).

The length of the sheath showed significant difference among the varieties. The longest leaf sheath (35.33 cm) was found in the variety Co 86032 with the incidence of 5.33 blisters /cane. The shortest leaf sheath (21.93) was found in the variety Co 0323 with the incidence of 0.40 blisters /cane (Table 3). There was a non-significant positive correlation (r= 0.15) between length of the leaf sheath and blister mite incidence (Table 4).

The leaf sheath width was more (5.46 cm) in the variety, VCF 0517 with the incidence 1.23 blisters /cane. The sheath width was low (3.80 cm) in the variety Co 86032 with the incidence of 5.33 blisters/cane. The width of the leaf sheath was found to have non-significant negative relation (r= 0.02) with the incidence of sugarcane blister mite (Table 4).

Among the varieties, leaf sheath thickness showed significant difference. The thicker leaf sheath (0.0660 g/$cm^2$) was found in the variety, Co 8371 with the incidence of 9.10 blisters /cane and thinner leaf sheath (0.0386 g/$cm^2$) was found in the variety, VCF 0517 with the incidence of 1.23 blisters/cane (Table 3). A significant positive correlation (r= 0.85) was found between the leaf sheath thickness and incidence of sugarcane blister mite (Table 4). An increasing trend in the leaf sheath was found with the increase in the incidence of blister mites.

The number of easily detachable leaf sheath showed significant difference among the varieties. More number of easily detachable leaf sheaths (4.53) was found in the variety Co 62175 with the incidence of 13.26 blisters /cane. The less number of easily detachable leaf sheaths (2.33) was found in the variety, CoM 0265 with the incidence of 0.50 blisters /cane (Table 3). Easily detachable leaf sheath showed significant and positive correlation (r= 0.96) with the incidence of blister mite (Table 4).

The shoot girth was maximum (2.47 cm) in the variety, Co 62175 with the incidence of 13.26 blisters/cane and minimum girth (1.43 cm) was observed in the variety, CoM 0265 with the incidence of 0.50 blisters/cane. A significant positive correlation (r= 0.77) was found between the blister mite incidence and girth of the shoot (Table 4).

Among various biophysical factors considered, sheath moisture, length, thickness, easy detachment and girth of the shoot showed positive correlation and influencing more incidence of *Aceria sacchari* whereas sheath width did not support the population.

Leaf sheath morphology was found to influence the incidence of sheath mite. Among the parameters studied thickness of the sheath, girth of the shoot moisture content in the leaf sheath, and easily detachable leaf sheath were found to have significant positive correlation with the incidence of blister mite. The Leaf sheath length, width, fresh weight were found to have non-significant relation with the incidence of sheath mite while thickness, girth, moisture per cent and detachable leaf sheath were found to have significant positive relation with blister mite, *Aceria sacchari.* The increasing trend of sheath thickness, moisture per cent, girth of the shoot and detachable leaf sheath were associated with increase in the incidence of blister mite. These results were similar to the findings of Agarwal (1965) [1], who found that leaf sheath thickness was positively associated with the varietal susceptibility. Sithananthan *et al.* (1972) [15] noticed that high sheath moisture content seems to be associated with the susceptibility of sugarcane to blister mite. The results of the present study were similar to the findings of these scientists. Since not much research has been done, the literature pertaining to the above study is very much meager.

**Table 3:** Morphological parameters influencing the incidence of *Aceria sacchari* on different sugarcane varieties

| Varieties | No. of blisters/cane | Moisture in leaf sheath (%) | Length of the sheath (cm) | Width of the sheath (cm) | Leaf sheath thickness (g/cm$^2$) | Fresh weight of leaf sheath (g) | No. of easily detachable leaf sheath | Girth of shoot (cm) |
|---|---|---|---|---|---|---|---|---|
| CoVC 99463 | 1.06 | 66.49 | 34.43 | 4.56 | 0.0483 | 8.19 | 4.00 | 1.52 |
| VCF 0517 | 1.23 | 60.32 | 29.63 | 5.46 | 0.0386 | 9.18 | 4.00 | 2.15 |
| Co 0323 | 0.40 | 63.83 | 21.93 | 5.13 | 0.0410 | 8.23 | 3.46 | 1.85 |
| Co 86032 | 5.33 | 75.12 | 35.33 | 3.80 | 0.0500 | 6.54 | 4.06 | 1.89 |
| Co 8371 | 9.10 | 76.77 | 28.73 | 5.16 | 0.0660 | 9.65 | 4.26 | 2.42 |
| Co 62175 | 13.26 | 76.32 | 31.4 | 4.76 | 0.0636 | 8.08 | 4.53 | 2.47 |
| Co 419 | 10.86 | 73.81 | 25.36 | 5.40 | 0.0516 | 5.97 | 4.33 | 2.15 |
| CoM 0265 | 0.50 | 74.06 | 24.73 | 5.13 | 0.0390 | 7.45 | 2.33 | 1.43 |
| S. Em± | 0.50 | 1.32 | 0.55 | 0.10 | 0.0007 | 0.13 | 0.05 | 0.07 |
| CD@ P=0.05 | 1.53 | 4.01 | 1.66 | 0.32 | 0.0024 | 0.40 | 0.16 | 0.22 |

**Table 4:** Correlation between morphological characters of different sugarcane varieties and incidence of sugarcane blister mite, *Aceria sacchari*

| Morphological characters | No. of patches of sheath mite per cane |
|---|---|
| Moisture in leaf sheath (%) | 0.70* |
| Length of the sheath (cm) | 0.15 |
| Width of the sheath (cm) | -0.02 |
| Leaf sheath thickness (g/cm$^2$) | 0.85** |
| Fresh weight of leaf sheath (g) | -0.19 |
| No. of easily detachable leaf sheath | 0.96* |
| Girth of shoot (cm) | 0.77* |

*Correlation is significant at 0.05 level
**Correlation is significant at 0.01 level

## Conclusion

Plant morphology plays an important role in the incidence of eriophyiid mites of sugarcane. Employing a promising variety with appropriate morphological parameters influences a negativity on eriophyiid mites which is beneficial in reducing the damage loss, as these mites cause considerable crop loss. Utilizing a resistant variety in minimizing the economic loss not only reduces the application of acaricides /acaro-insecticides also indirectly reduce environmental pollution.

## Acknowledgment

The authors acknowledge AICRP on sugarcane, Zonal Agricultural Research Station (ZARS) during the field activities at V.C.Farm, Mandya, for their valuable assistance and guidance for the fulfillment of the study.

## References

1. Agarwal RA. Resistance in sugarcane varieties to eriophyid mite (*Aceria* sp.). Indian Sugarcane J 1965;9:108-110.
2. Beard JJ, David Evans Walter and Peter G Allsopp. Spider mites of sugarcane in Australia: a review of grass-feeding *Oligonychus* Berlese (Acari: Prostigmata: Tetranychidae). Aus. J Entomol 2003;42:51-78.
3. Bolland Hr J. Gutierrez and Flechtmann Chw. World Catalogue of the Spider Mite Family Tetranychidae (Acari: Tetranychidae). Koninklijke Brill NV, Leiden, Netherlands 1998.
4. Fitzgibbon F, Allsopp PG, De Barro PJ. Sugarcane Exotic Pests. Pest Risk Analysis Database. CD-ROM 98001. Bureau of Sugar Experiment Stations, Indooroopilly 1998.
5. Khanna KL, Sharma SL, Ramanathan KR. Studies on the association of plant characters and pest incidence lII. Hardness of leaf midrib and top borer infestation in sugarcane. Indian J. Entomol 1947;9:115-137.
6. Krips OE, Kleijn PW, Gols PE, GJZ, Dicke M. Leaf hair influence searching efficiency and predation rate of predatory mite *Phytoseiulus persimilis* (Phytoseiidae: Acarina). Exptl.and Applied Acarol 1999;23:119-131.
7. Leslie G. Pests of sugarcane. In Sugarcane, ed. G. James. Oxford: Blackwell Science 2004, 78-100
8. Maite RK, Bidinger FR, Sheshu RKV and Davies JC. Nature and occurrence of trichomes in sorghum lines with resistance to shootfly. Joint ProgressReport on Sorghum physiology-3. Sorghum Entomology-3 ICRISAT, Patancheru, India 1980.
9. Mukherjee AB, Sarkar PK, Somchoudhury AK, Roy M. Relative incidence of Oligonychus oryzae on nine varieties of paddy and its control. Vol II. pp.53-57. In: G. P. Channa Basavanna G.P. and C. A. Viraktamath (Eds.), *Progress in Acarology*, Acarolgical society of India, Bangalore 1989.
10. Navia D, Flechtmann CHW, Lindquist EE, Aguilar H. A new species of *Abacarus* (Acari: Prostigmata: Eriophyidae) damaging sugarcane, *Saccharum officinarum* L., from Costa Rica- the first Eriophyoid mite described with a tibial seta on leg II. Zootaxa 2011;3025:51-58.
11. Ozman-Sullivan SK, Amrine JW, Walter DE. A new species of Eriophyoid mite (Acari: Eriophyidae) on sugarcane in Australia. Int. J Acarology 2006;32(4):387-

395
12. Pentanovic R, Vidovic B. New *Acaricalus* species (Acari: Eriophyoidea) from Turkey Oak, QuercusCerris L. (Fagaceae) and the new records for the fauna of Serbia. Acta entomologica serbica 2009;14(1):109-120.
13. Sabelis MW, Bruin J. Evolutionary Ecology: Life history patterns, food plant choice and dispersal In: Lindquist E.E., Sabelis M.W. and Bruin J. (eds.) Eriophyoid Mites-Their Biology, Natural Enemies and Control. World Crop Pest Series. Elsevier Science Publishers, Amsterdam, The Netherlands 1996;6:329-366.
14. Shakoor A, Sabri MA, Afzal M, Bashir MH. Role of plant Morphological characters towards resistance of some cultivars of tomato against phytophagous mites (Acari) under greenhouse conditions. Pak. J Life and Social Sci 2010;8(2):131-136.
15. Sithanantham S, Muthuswamy S and Bhaskaran TL. Varietal difference in the expression of streak virus disease symptoms in sugarcane as a factor in transmission studies. Sci. Cult 1972;39(5):232-234.
16. Vivekanandan AS, Gunasena HP, Sivananyaagaan T. Statistical evaluation of the accuracy of three techniques used in the estimation of leaf area of crop plants. Indian J Agric. Sci 1972;42:857-860.