

PEST STATUS OF COCONUT MITE AT DIFFERENT PLACES IN BARISHAL



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Abstract

The coconut eriophyid mite was reported to cause damage in coconut homesteads at different places in Barishal. The pest status of *A. guerreronis* Keirfer was conducted during the month of February to May 2016 and 2017 in selected places in Barishal to documents the pest status of infested coconuts. The infestation of coconut eriophyid mites on the basis of percent plant infestation and coconut infestation was more in Bakergonj ranged between (Lakutia, 72.94 to Bakergonj, 91.44%), in the year 2015-2016. During the year 2016-2017 of coconut infestation was more in Rahmatpur ranged between (Sikerpur, 79.60 to Rahmatpur 91.40%). However, the pest's status was the pooled mean of both years during 2015-2016/2016-2017 of coconut infestation was more in Bakergonj ranged between (Sikerpur, 77.08 to Bakergonj, 90.34%). The infestation level of coconut eriophyid mites on the basis of different places during the years 2015-2016/2016-2017 percent coconuts infestation as well as on the basis of coconut infestation was highest in Bakergonj (90.34%) followed by Rahmatpur (89.52%), Kalikapur (85.80%), Dehergoti (83.67%), Barisal Sador (83.54%), Joyshree (82.99%), Banaripara (82.65%), Punksha (81.78%), Lakutia (81.61%) and the lowest Sikerpur (77.08%). The grade wise infestation of coconuts confirms the severity of coconut eriophyid mite infestation at Bakergonj, where the infestation started much earlier than in rest of the places (25.29%) Grade I, (29.57%) Grade II and Barisal Sador, (39.04%) Grade III in 2015-16, at Banaripara, (36.25%) Grade-I, Lakutia (35.84%) Grade-II and Rahmatpur (52.04%) Grade-III. During the years 2015-2016/2016-2017 at Banaripara (28.21%) Grade I, Lakutia (30.08%) Grade II and Rahmatpur (45.42%) Grade III .

Key words: Coconut mite, Infestation, Pest Status, Documentation, Grade.

Introduction

Coconut (*Cocos nucifera* Beccari) is the main source of cash income for farmers in the coastal belt/southern region of Bangladesh. Coconut varieties fall under two broad groups, tall or typica and dwarf or nana. Tall and dwarf coconut types may hybridize to produce intermediate forms. The traditional commercial coconuts were the tall varieties which were preferred to the dwarf varieties because of the quality and quantity of copra they produce. They normally live for over 60 years and are adaptable to a wide range of soil conditions, fairly resistant to diseases, insects and water

stress, and start to bear within six to ten years. The dwarf varieties come into fruiting within three to four years, attain full production by the ninth year and have a life span of about 30 to 40 years. Coconut belongs to the palm family, Arecaceae (= Palmaceae) which consists of 200 genera and over 2,000 described species (Child 1974). According to Woodroof (1970) the term coconut is derived from the Spanish and Portuguese word, "coco", which means "monkey/grotesque face", but the plant is known in many countries by local names. For example, it has been known as "naryal" in India for millennia and as "nut of India" by Cosmos,

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the Egyptian traveler, in AD 545. The tree itself has been described as, "man's most useful tree", "king of the tropical forest", "tree of life", "tree of heaven" and lazyman's crop, *inter alia*. (Woodroof 1970).

The coconut palm and its fruits are regarded as the most important plant to human being around the world. Among its most important uses coconut can be used as a food source, provides supplement for body fluids and minerals, and acts as an anthelmintic. The liquid endosperm is also a media for *in-vitro* storage of semen and a growth regulator of plants. Copra, a major product of the coconut industry, is the white kernel, or coconut "meat" after it is dried. In many tropical countries, coconut water is a principal product. Coconut water is the clear liquid in the coconut and is sometimes called coconut milk which is actually the paste made by grinding the kernel. Copra, the dehydrated endosperm of the nut, is next to soybean as a source of oil for food. Coconut oil is also used in cosmetics and pharmaceuticals. The material that remains after the oil is expressed from copra is called oilcake and is used as animal feed. Coconut shell is used directly as fuel, filler, extender in the synthesis of plastic, to make activated charcoal, household articles, and to produce various distillation products, such as tar, wood spirit and pitch. Coir, a coarse fiber from the husk of the nut, has various domestic and industrial uses. Coconut root is brewed and used in folk medicine, for example, as a cure for dysentery. Coconut accounts for a large part of the national earnings of the Asian and Pacific Coconut Communities (APCC 2010). In 1993 the APCC account for 86% of the world's coconut production. Indonesia, the Philippines, and India accounted for 81% of the coconut. Today over 90% of the coconut produced goes toward domestic use and copra is of secondary importance.

Coconut is an important homestead crop of Bangladesh. It contributes to the livelihood of farmers through its versatile uses. It has a high utilizing potential for shelter, cosmetics, pharmaceuticals energy and environmental protection. In a country with limited land space, orchard plantation rarely found with an exception in southern part of the country. Approximately 100 million coconuts are produced in the country in an area about 35 thousand hectares. South and southwestern parts of the country contributes 80% of total production (BBS 2009). The yield of coconut is about 21 nuts per year which is very low,

compared to those of other coconut-growing countries. This poor yield is due to lack of high-yielding varieties, inadequate nourishment, insect pest and diseases as well as Management practices. At least 750 insect pests of coconut have been recorded from around the world. These pests attack the leaves, stems, flowers, nuts and roots of the coconut plant. In the Caribbean over 26 major pests have been recorded. Among them are two species of mites, 15 species of insects and three species of rodents. Recently, coconut palms are found to suffer from mite attacks. The mite injures the tender portion of young nuts and suck sap from the nut. The injury ultimately leads to warring and longitudinal fissures on the nut surface. Due to their extensive feeding on young buds resulted in reduction in size followed by immature bud drop. The problem has become epidemic in south and southwestern parts of the country and extensive damage to coconut has been noticed causing high economic losses affecting a large number of farmers. The literature pertaining to coconut mite in Bangladesh is scanty as it is a recent pest. Considering the importance of coconut and the potentiality of this mite to cause damage the present study was undertaken to study pest status of coconut mite at different locations of Barishal district.

Materials and Methods

The study relating to documentation of pest status of coconut mite *Aceria guerreronis* (Keifer) (Acari: Eriophyidae) were conducted in different plantation places in Barishal during 2015-16 to 2016-17. Similarly pest status investigations were conducted in 10 plantation places of major growing areas in Barishal from February to May 2016 and February to May 2017. These periods corresponded respectively with the onset of the long dry season in all plantations places. In February to May 2016 first year first investigative pest status was conducted in Barishal sador, Joyshree, Shikerpur, Punksha, Kalikapur, Dehergoti, Rahmatpur, Bakergonj, Banaripara, Lakutia. Similarly, second year second investigative pest status from February to May 2017 with plantation places were conducted in Barishal. The studies were made with the emphasis to find out the documentation, damage potential and incidence of the promising pest. The materials and methods used for conducting the experiments have been described under the following sub headings.

Location of the pest

Different places in Barishal and those are coastal zone

besides Bay of Bengal with clay loam to sandy loam soil were conducted. It is saline and alkaline in nature and the soil pH is 7.0 to 8.5, with warm and humid climate. The selected places were Barishal sadar, Joyshree, Shikerpur, Punksha, Kalikapur, Dehergoti, Rahmatpur, Bakergonj, Banaripara, and Lakutia. The places were selected randomly for recording observations and data on eriophyid mite infestation (%) and intensity of eriophyid mite infestation. The selected places belong to the Barishal district which is located in the southern zone of Bangladesh. The region is rich with plenty of coconut gardens. Pest status about coconut mite infestation were done during two years separately by visual observation of scoring method as prescribed by Julia and Mariau (1979), Muralidharan *et al.* (2001) and Girisha (2005).

Methods of recording observations

The pest status was conducted in the month of February to May of 2016 and 2017 in selected places in Barishal. Pest status about coconut mite infesting coconuts was observed during two consecutive years separately.

Observation of coconut infestation

Three coconut plants were selected from each place for collecting sample coconuts. In each plant five matured bunches from selected three plants were observed to record the infested coconut due to coconut eriophyid mite infestation. Similarly, in the month of February-May every year, total number of harvested coconuts and number of infested coconuts were recorded for calculated percent infestation. The percent coconut infestation due to coconut mite infestation was calculated by using the following formula (Julia and Mariau, 1979).

$$\text{Per cent coconuts infestation} = \frac{\text{No. of infested coconut in a place}}{\text{Total no. of coconuts harvested in a place}} \times 100$$

Statistical analysis

Data recoded on different parameters were processed for statistical analysis. Data were analyzed by graphs were prepared by Excel software.

Incidence and severity of damage caused by *A. guerreronis* K.

Incidence and severity of fruit damage caused by *A. guerreronis* were assessed on three randomly selected

plants per plantation by classifying all coconut fruits on each plant on the basis of the extent of characteristic *A. guerreronis* damage visible on fruit surfaces. Amongst the harvested coconuts, the infested coconuts were also graded on the basis of visual scoring method given by Muralidharan *et al.*, (2001). Coconut fruits were grouped into three grades – based on the percentage of fruit surface damaged by *A. guerreronis*.

Grade	Surface damage
Free	No symptoms of coconut mite
Grade I	1-25% of coconut surface damage by coconut mite
Grade II	26-50% of coconut surface damage by coconut mite
Grade III	Above 50% of coconut surface damage by coconut mite

Results and Discussion

Documentation of pest status of coconut mite, *A. guerreronis* Keifer

Pest status on infested coconuts due to *A. guerreronis* of different places at Barishal in 2015-2016

The infestation of coconuts due to coconut eriophyid mites on the basis of per cent coconut infestation ranged between 72.94 and 91.44%, during 2015-2016 (Table 1). The highest per cent infested coconuts observed at Bakergonj (91.44%) followed by Rahmatpur (87.63%), Barisal Sador (85.26%), Kalikapur (81.97%), Joyshree (81.20%), Punksha (77.51%), Banaripara (77.37%), Dehergoti (76.67%), Sikerpur (74.55%) and the lowest (72.94%) at Lakutia. Whereas the highest per cent healthy coconuts observed at Lakutia (27.06%) and the lowest was Bakergonj (8.56%).

Pest status on infested coconuts due to *A. guerreronis* of different places at Barishal in 2016-2017

During the year 2016-2017, coconut infestation due to coconut eriophyid mites on the basis of per cent coconuts infestation ranged between 79.60 and 91.40% (Table 2). The highest per cent coconuts infestation level observed at Rahmatpur (91.40%) followed by Dehergoti (90.67%), Lakutia (90.27%), Kalikapur (89.62%), Bakergonj (89.23%), Banaripara (87.92%), Punksha (86.05%), Joyshree (84.77%), Barishal Sador (81.82 %) and the lowest Sikerpur (79.60%). Whereas the highest per cent healthy coconut was observed at Sikerpur (20.40%) as against the lowest (8.60%) at Rahmatpur.

In the both years of pest status on infested coconuts due to *A. guerreronis* of different places in Barishal during 2015/16-2016/17

The pooled mean of both years data were presented in Table 3 on pest status of coconuts infestation due to coconut eriophyid mite in different places of Barishal district. The highest per cent infested coconut observed (90.34%) at Bakergonj followed by Rahmatpur (89.52%), Kalikapur (85.80%), Dehergoti (83.67%), Barisal Sador (83.54%), Joyshree (82.99%), Banaripara (82.65%), Punksha (81.78%), Lakutia (81.61%) and the lowest (77.08%) at Sikerpur. Whereas the highest per cent of healthy coconut was observed at Sikerpur (22.93%) and the lowest was Bakergonj (9.67%). The present findings are more or less in confirmatory with Naik (2003) who observed the per cent infestation of

palm nuts ranged between 33 to 80 per cent in Thane district. Sarmalkar (2004) also observed that the per cent infestation of palm nuts ranged between 67 to 85 per cent in Thane district. The infestation of eriophyid mite is slowly reaching to highest limit of infestation due to favourable conditions. The results are close to agreement that the level of infestation of eriophyid mite was highest in Thane district must be started much

earlier followed by Sindhudurg, Ratanagiri and Raigad districts (Desai *et al.* 2009). Bagde and Pashte (2014) observed the infestation of eriophyid mites on the basis of per cent palm infestation as well as on the basis of nut infestation was more in Thane district (ranges between 73.23 to 84.40%) followed by Sindhudurg district (33.03 to 86.80%). Also Pushpa (2006) indicated that the mite population occurred in Dharwad area throughout the year with variation during different season of the year. The variations in the range of infestation may be due to changing environmental as well as biotic stresses. Desai *et al.* (2009) also observed that the intensity of infestation of coconut mite and scale index was low in Ratnagiri and Raigadh districts. In Barisal district, tourism is well developed because it is adjoining to Kuakata, Patuakhali sea beach. The tender coconuts are coming from different district in southern region to this area because of the huge demand for tender coconuts are the major dispersing agent. Therefore, it is necessary to start control measures to manage this pest from the southern region.

Pest status of coconuts in different grades in infested coconuts due to *A. guerreronis* at different places of Barishal

Grade wise infestation of coconuts during the initial year data on pest status of coconuts infestation due to coconut eriophyid mite at different places in Barishal have been presented in Table 4. The grade wise infestation of coconuts in confirms the severity of coconut eriophyid mite infestation to coconuts at Bakergonj, where the infestation started much earlier than in rest of the places (25.29%) Grade I and (29.57%) Grade II. At Barisahl Sador, where the infestation was started much earlier than in rest of the places (39.04%) Grade III. In rest of the places also, the infestation of eriophyid mite is slowly reaching to highest limit of infestation due to favourable conditions. Total per cent of infested coconuts in Bakergonj (91.44%), where the infestation reached to its maximum limit as compared to Rahmatpur

(87.63%), Barisal Sador (85.26%), Kalikapur (81.97%), Joyshree (81.20%), Punksha (77.55%), Banaripara (77.37%), Dehergoti (76.67%), Sikerpur (74.55%), Lakutia (72.94%) and very slight increase was observed in the per cent coconuts infestation.

Pest status of coconuts in different grades in infested coconuts due to *A. guerreronis* of different places in Barishal

Grade wise infestation of coconuts during the year 2016 to 2017 data were presented in Table 5 on pest status of coconuts infestation due to eriophyid mite at different places in Barishal. The grade wise infestation of coconuts in confirms the severity of eriophyid mite infestation to coconuts at Banaripara, where the infestation started much earlier than in rest of the places (36.25%) Grade-I. At Lakutia, the infestation started much earlier than in rest of the places (35.84%) Grade-II. At Rahmatpur, the infestation started much earlier than in rest of the places (52.04%) Grade-III. In rest of the places also, the infestation of eriophyid mite is slowly reaching to highest limit of infestation due to favourable conditions. Total per cent of infested coconuts was the highest (91.40%) at Rahmatpur, followed by Dehergoti (90.67%), Lakutia (90.27%), Kalikapur (89.62%) Bakergonj (89.23%), Banaripara (87.92%), Punksha (86.05%), Joyshree (84.77%),

Barisal Sador (81.82 %) and Sikerpur (79.60%), where there was very slight increase observed in the per cent coconuts infestation.

In the both years of pest status of nuts in different grades in infested coconuts due to *A. guerreronis* of different places in Barishal

Grade wise infestation of coconuts due to *A. guerreronis* the pooled mean data of both years were presented in Table 6. The grade wise infestation of coconuts in confirmed the severity of eriophyid mite infestation at Banaripara, where infestation started much earlier than in rest of the places (28.21%) Grade I. At Lakutia, the infestation was started much earlier than in rest of the places (30.08%) Grade II. At Rahmatpur, where the infestation started much earlier than in rest of the places (45.42%) Grade III. In rest of the places, the infestation of eriophyid mite was slowly reached to highest level due to favourable conditions. Total per cent of infested coconuts was recorded as the highest (90.34%) at Bakergonj, followed by Rahmatpur (89.52%), Kalikapur (85.80%), Dehergoti (83.67%), Barisal Sador (83.54%), Joyshree (82.99%), Banaripara (82.65%), Punksha (81.78%), Lakutia (81.65%) and Sikerpur (77.08%) as very slight increase was observed in the per cent coconuts infestation.

Table 1. Pest status on infested coconuts due to *A. guerreronis* at different places in Barishal during 2015-16.

Name of places	Total no. of coconut	SD	Healthy coconut				Infested coconut			
			No.	SD	%	SD	No.	SD	%	SD
Barisal Sador	251		37		14.74		214		85.26	
Joyshree	234		44		18.80		190		81.20	
Sikerpur	220		56		25.45		164		74.55	
Punksha	209	5.14	47	2.83	22.49	4.24	162	7.07	77.51	5.88
Kalikapur	294		53		18.03		241		81.97	
Dehergoti	210		49		23.33		161		76.67	
Rahmatpur	299		37		12.37		262		87.63	
Bakergonj	257		22		8.56		235		91.44	
Banaripara	243		55		22.63		188		77.37	
Lakutia	255		69		27.06		186		72.94	

Table 2. Pest status on infested coconut due to *A. guerreronis* at different places in Barishal during 2016-17.

Name of places	Total no. of coconuts	SD	Healthy/Mite free coconuts				Infested coconuts			
			No.	SD	%	SD	No.	SD	%	SD
Barisal Sador	264		48		18.18		216		81.82	
Joyshree	243		37		15.23		206		84.77	
Sikerpur	201		41		20.40		160		79.60	
Punksha	215		30		13.95		185		86.05	
Kalikapur	212	7.07	22	4.03	10.38	2.83	190	8.49	89.62	7.07
Dehergoti	225		21		9.33		204		90.67	
Rahmatpur	221		19		8.60		202		91.40	
Bakergonj	250		28		10.77		232		89.23	
Banaripara	240		29		12.08		211		87.92	
Lakutia	226		22		9.73		204		90.27	

Table 3. Pest status on infested coconuts due to *A. guerreronis* at different places in Barishal during 2015-2016/2016-2017.

Name of places	Total no. of coconut	SD	Healthy coconut				Infested coconut			
			No.	SD	%	SD	No.	SD	%	SD
Barisal Sador	257.50		42.50		16.46		215.00		83.54	
Joyshree	238.50		40.50		17.02		198.00		82.99	
Sikerpur	210.50		48.50		22.93		162.00		77.08	
Punksha	212.00	16.3	38.50	9.7	18.22	4.2	173.5	13.5	81.78	5.2
Kalikapur	253.00		37.50		14.21		215.50		85.80	
Dehergoti	217.50		35.00		16.33		182.50		83.67	
Rahmatpur	260.00		28.00		10.49		232.00		89.52	
Bakergonj	253.50		25.00		9.67		228.50		90.34	
Banaripara	241.50		42.00		17.36		199.50		82.65	
Lakutia	240.50		45.50		18.40		195.00		81.61	

Table 4. Distribution of coconuts in different grades in infested coconuts due to *A. guerreronis* at different places in Barishal during 2015-16.

Name of places	Total no. of coconuts	Infested coconuts												Total % infested coconuts	SD
		Grade-I				Grade-II				Grade-III					
		No.	SD	%	SD	No.	SD	%	SD	No.	SD	%	SD		
Barisal Sador	251	51		20.32		65		25.90		98		39.04		85.26	
Joyshree	234	46		19.66		55		23.50		89		38.04		81.20	
Sikerpur	220	38		17.27		54		24.55		72		32.73		74.55	
Punksha	209	31		14.83		49		23.44		81		38.76		77.55	
Kalikapur	294	64	3.11	21.77	2.23	78	4.22	26.53	1.67	99	3.41	33.67	1.87	81.97	5.88
Dehergoti	210	39		18.57		49		23.33		73		34.76		76.67	
Rahmatpur	299	65		21.74		81		27.09		116		38.80		87.63	
Bakergonj	257	65		25.29		76		29.57		94		36.58		91.44	
Banaripara	243	49		20.16		69		28.40		70		28.81		77.37	
Lakutia	255	40		15.67		62		24.31		80		31.37		72.94	

Table 5. Distribution of coconuts in different grades in infested coconuts due to *A. guerreronis* at different places in Barishal during 2016-17.

Name of places	Total no. of coconuts	Infested coconuts												Total % infested coconuts	SD
		Grade-I				Grade-II				Grade-III					
		No	SD	%	SD	No	SD	%	SD	No.	SD	%	SD		
Barisal Sador	264	45		17.05		63		23.86		108		40.91		81.82	
Joyshree	243	53		21.81		71		29.22		82		33.74		84.77	
Sikerpur	201	39		19.40		52		25.87		69		34.33		79.60	
Punksha	215	44	2.82	20.47	1.41	62	4.24	28.48	2.41	79	3.23	36.74	2.21	86.05	7.07
Kalikipur	212	41		19.34		65		30.66		84		39.62		89.62	
Dehergoti	225	38		16.89		61		27.11		104		46.22		90.67	
Rahmatpur	221	32		14.48		55		24.89		115		52.04		91.40	
Bakergonj	250	51		20.04		72		28.80		109		43.60		89.23	
Banaripara	240	87		36.25		54		22.50		70		29.17		87.92	
Lakutia	226	49		21.68		81		35.84		74		32.74		90.27	

Table 6. Distribution of nuts in different grades in infested coconuts due to *A. guerreronis* at different places in Barishal during 2015-16/2016-17.

Name of places	Total no. of coconuts	Infested coconuts												Total % infested coconuts	SD
		Grade-I				Grade-II				Grade-III					
		No.	SD	%	SD	No.	SD	%	SD	No.	SD	%	SD		
Barisal Sador	257.5	48.0		18.69		64.0		24.88		103.0		39.98		83.54	
Joyshree	238.5	49.5		20.74		63.0		26.36		85.50		35.89		82.99	
Sikerpur	210.5	38.5		18.34		53.0		25.21		70.50		33.53		77.08	
Punksha	212.0	37.5		17.65		55.5		25.96		80.00		37.75		81.78	
Kalikipur	253.0	52.5	13.41	20.56	4.67	71.5	10.06	28.60	3.66	91.50	8.97	36.65	4.59	85.80	5.22
Dehergoti	217.5	38.5		17.73		55.0		25.22		88.50		40.49		83.67	
Rahmatpur	260.0	48.5		18.11		68.0		25.99		115.5		45.42		89.52	
Bakergonj	253.5	58.0		22.67		74.0		29.19		101.5		40.09		90.34	
Banaripara	241.5	68.0		28.21		61.5		25.45		70.00		28.99		82.65	
Lakutia	240.5	44.5		18.68		71.5		30.08		77.00		32.06		81.61	

Conclusion

Coconut eriophyid mite, *Aceria guerreronis* Keifer is one of the potential invasive pests of coconut in Bangladesh. Coconuts are rarely grown on large plantation in Bangladesh except for few in the coastal areas. These are mainly grown in the homestead in almost all parts of the country. As coconut crop is the means of livelihood of many landless and marginal farmers, Government of Bangladesh is very much interested to increase the productivity of this crop on a sustainable basis. Coconut mite thrives in a favorable condition on nut surface near the stalk under the bract which is tightly attached to the coconut. Infestation of eriophyid mites to coconut occurred at all places of Barishal districts in Bangladesh and was found to have started much earlier at Bakergonj in the Barishal districts. The infestation of eriophyid mites on the basis of per cent coconut infestation was more at Bakergonj followed by Rahmatpur, Kalikapur, Dehergoti, Barishal Sador, Joyshree, Banaripara, Punksha, Lakutia and the lowest at Sikerpur. The coconut infestation at Rahmatpur was mostly belongs to Grade III followed by Dehergoti, Bakergonj, Barishal sador, Punksha, Kalikapur, Joyshree, Sikerpur, Lakutia and Banaripara.

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