



DOCUMENTATION OF PEST STATUS OF COCONUT MITE, *ACERIA GUERRERONIS* KEIFER ON INFESTED COCONUTS

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ABSTRACT

The coconut eriophyid mite was reported to cause damage in homestead coconut in southern region of Bangladesh. The study was conducted during the month of February to May 2016 and 2017 in selected places of six districts in southern region to documents the infestation levels of mite *A. guerreronis* Keirfer on coconuts. The infestation of eriophyid mites on the basis of percent plant infestation on coconut was more in Barisal and was ranged between 72.94% (Lakutia) to 91.44% (Bakergonj). But the lowest in Gotkhali, 65.77 of Barguna district during the year 2015-2016. During the year 2016-2017 the highest infestation was found in Pirozpur (Namazpur, 92.58%) and the lowest infestation was in Barisal (Sikerpur, 79.60). However, the pooled mean of infestation levels of both years during 2015-2016 and 2016-2017 were more in Barisal and Pirozpur districts (90.34%). The mean percent coconut infestation level of eriophyid mites on the basis of district during the years 2015-2016 and 2016-2017 was the highest in Pirozpur (87.42%) followed by Bhola (86.76%), Jhalokati (86.44%), Patuakhali (86.33%), Barisal district (83.94%) and the lowest in Barguna (80.92%).

Keywords: Infestation levels, Coconuts, Coconut eriophyid mite, Barisal region.

INTRODUCTION

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. Coconut (*Cocos nucifera* Beccari) is the main source of cash income for farmers in the coastal belt/southern region in Bangladesh. Coconut is an important homestead crop of Bangladesh. Coconut occupies only 0.65% of total cultivated lands for fruit crops in Bangladesh. However, in Bangladesh coconut

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is considered as a crop of high economic value due to its diversified uses. The crop is commonly grown in homesteads with efficient utilization of land. Many small holders' households generally depend on the coconut for their livelihood as it provides regular income (Eyzaguirre and Batugal 1999). 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. The national yield of coconut has been estimated at 63 kg/fruit bearing three/year with a total production of 1, 35,000 tones/year from 39,000 ha cultivated land (BBS 2013). It has also been estimated that around 44% of total production of coconut is consumed as tender nut and 40% as mature nut for fresh consumption. Only 9% is processed in industries while 7% is used for seedling purpose (Islam 2002). The yield of coconut is about 21 nuts/tree/year which is very low, compared to those of other coconut-growing countries. The crop is cultivated in an area of 2.07 million ha with a total production of 23,351 million nuts (CDB 2014). This poor yield is due to lack of high-yielding varieties, inadequate nourishment, insect pest and diseases as well as management practices. 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. Coconut orchards are at the verge of extinction now due to this pest (Keifer 1965). 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 and to manage pest, many pesticides and bio-pesticides have been used in Bangladesh without any successful result.

At least 750 insect pests of coconut have been recorded from globally. 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 two species of mites, 15 species of insect pests and three species of rodents (Lever 1969, Krantz *et al.* 1978, Red Ring Research Division 1983).

Among the different biotic and abiotic stresses for low productivity of coconut, different types of pest attacks are considered as the most important one. Among the insect pests Rhinoceros Beetle, *Oryctes rhinoceros*, Red Palm Weevil, *Rhynchophorus*

ferrugineus and Coconut Eriophyid Mite, *Aceria guerreronis* Keifer are considered the most destructive ones in Bangladesh. However, recently coconuts are found to be seriously suffered due to the severe infestation of coconut eriophyid mite. 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. Therefore, the documentation of pest status of eriophyid coconut mite infesting coconuts is important and essential for economic coconut production.

MATERIALS AND METHODS

The study was conducted at different plantation locations in southern region of Bangladesh during 2015-16 to 2016-17. Pest status investigations were conducted in 32 plantations of the six major growing areas of southern region in Bangladesh from February to May 2016 and 2017. These periods corresponded respectively with the onset of the long dry season at all plantation locations. In February to May 2016 first year the first investigation of pest status was conducted in Barisal, Jhalokati, Pirozpur, Barguna, Patuakhali and Bhola district. Similarly, 2017 second year the second investigation of pest status started from February till May 2017 in different plantation locations in southern region of Bangladesh.

Soil is saline and alkaline in nature and the soil pH was 7.0 to 8.5, with warm and humid climate. The selected districts were Barisal, Barguna, Patuakhali, Pirozpur, Bhola and Jhalokati. The places were selected randomly from each district for taking observations on eriophyid mite infestation. The selected locations belong to the Barisal division which is located in the southern part of Bangladesh. The region is rich with plenty of coconut plantations. Pest status on coconut mite infestation were recorded during two years separately by visual observation following scoring method as described by Julia and Mariau (1979), Muralidharan *et al.* (2001) and Girisha (2005).

District wise plantation locations selected for pest status

Name of district with locations selected with geographic position:

Barishal [22°70'N 90°37'E]: Barishal Sadar, Joyshree, Shikerpur, Punksha, Kalikapur, Dehergoti, Rahmatpur, Bakergonj, Banaripara, Lakutia.

Barguna[22°09'N90°37'E]: Barguna Sadar, Pathorgata, Dema, Kakchira, Gotkhali, Sekanderkhali.

Bhola [22°41'N 90°38'E]: Bhola Sadar, Maslimpara.

Patuakhali [22°21' N 90°19'E]: Patuakhali Sadar, Kuakata, Lebukhali, Pakhimara, Kolapara, Mahipur

Pirozpur [22°35''N 89°58''E]: Pirozpur Sadar, Zia nagar, Kawkhali, Namazpur, Matibanga.

Jhalokati [22°20''N 90°01''E]: Jhalokati Sadar, Nalsiti and Dopdopia.

Methods of recording observations: The pest status were recorded in the month of February to May of 2016 and 2017 in selected locations of six districts of southern region. Pest status of coconut mite infesting coconut trees were recorded during two years separately.

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

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

Statistical analysis: Data recoded on different parameters were processed for statistical analysis. Data were analyzed and presented by graphs using Excel software.

Incidence and severity of damage caused by *A. guerreronis* K.: Incidence and severity of fruit damage caused by *A. guerreronis* K. were assessed on three randomly selected trees per plantation location by classifying all coconut fruits from each plant on the basis of the extent of damage characteristic by *A. guerreronis* K. visible on fruit surfaces. Amongst the harvested coconuts, the infested coconuts were also graded on the basis of visual scoring method described by Murlidharan *et al.* (2001) given below: Coconut fruits were grouped into three grades based on the percentage of fruit surface damaged by *A. guerreronis* K. is given bellow:

Grade	Surface damage
Infestation free	No symptoms of coconut mite damage
Grade I	1-25% of coconut surface damaged by coconut mite (Plate 1)
Grade II	26-50% of coconut surface damaged by coconut mite (Plate 1)
Grade III	Above 50% of coconut surface damaged by coconut mite (Plate 1)



Grade-II

Grade-I

Grade III

Plate 1. Showing mite infestation of grade I, II and III

RESULT AND DISCUSSION

Documentation of pest status of coconut mite, *A. guerreronis* Keifer: The pest status of coconut mite, *Aceria guerreronis* Keifer were determined in 32 plantation locations of the six major growing areas of southern region of Bangladesh from February to May 2016 and February to May 2017. The infestation of coconut due to eriophyid mites on the basis of per cent infestation was more in Barisal district ranged (between Lakutia, 72.94 to Bakergonj, 91.44%), Barguna (from Gotkhali, 65.77 to Sekanderkhali, 83.45%), Bhola (between Maslimpara, 85.19 to Bhola Sador, 88.15%), Patuakhali (ranged from Lebukhali, 71.49 to Patuakhali Sador, 90.26%), Pirozpur (between Matibanga, 79.53 to Kawkhali, 89.14), Jhalokati district (from Dopdopia, 81.48 to Jhalokati Sador, 87.37%) (Fig.1). In Barisal district, the highest per cent infested coconuts was in Bakergonj (91.44%) followed by 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%) and the lowest at Lakutia (72.94%). In Barguna district, the highest per cent infested coconut was in Sekanderkhali (83.45%) followed by Barguna Sador (82.38%), Pathorgata (73.45%), Kakchira (69.71%), Dema (65.82%) and the lowest

in Gotkhali (65.77%). In Bhola district, the higher percent of infested coconut was in Bhola Sador (88.15%) and the lower at Muslimpara. (85.19%). In Patuakhali district, the highest percent of infested coconut was in Patuakhali Sador (90.26%) followed by Kalapara (89.02%), Kuakata (87.98%, Mahipur (85.66%), Pakhimara (78.37%) and the lowest in Lebukhali (71.49%). In Pirozpur district, the highest percent infested coconut was in Kawkhali (89.14%) followed by Zia nagor (87.63%), Pirozpur Sador (86.31%), Namazpur (84.29%) and the lowest in Matibanga (79.29%). In Jhalokati district, the highest percent of infested coconut was in Jalokati Sador (87.37%) followed by Nalsiti (82.30%) and the lowest in Dopdopia (81.48%). Pest status on an average, the highest percent coconut infestation of eriophyid mite was in Bhola district (86.67%) followed by Pirozpur (85.38%), Patuakhali (83.80%), Jhalokati (83.72%), Barisal (80.65%) and the lowest in Barguna district (73.43 %) during 2015-16. (Fig.1).

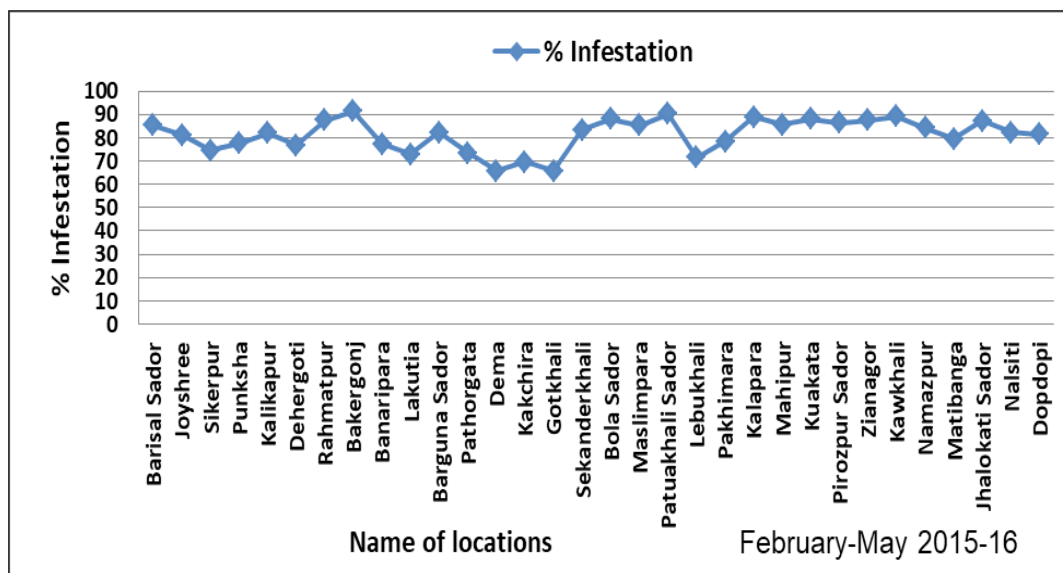


Fig. 1. Pest status on infested coconuts (%) due to *A. guerreronis* K. of different locations in southern region during 2015-2016

During the year 2016-17 in Barisal district ranged (between Sikerpur, 79.60% to Rahmatpur 91.40%), Bargona (from Bargona Sador, 86.70% to Gotkhali, 89.58%), Bhola (between Maslimpara, 82.45% to Bhola Sador, 91.40%), Patuakhali (ranged from Patuakhali Sador, 87.85% to Lebukhali, 91.39%), Pirozpur (between Zia nagor, 87.84% to Namazpur, 92.58%), Jhalokati district (ranged from Jhalokati Sador,

86.67% to Dopdopia, 90.17%). In Barisal district, highest percent infested coconuts was in 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%), Barisal Sador (81.82 %) and the lowest in Sikerpur (79.60%). In Barguna district, the highest percent infested coconut was in Gotkhali (89.58%) followed by Sekanderkhali (88.70%), Pathorgata (88.52%), Dema (87.06%) Kakchira (86.97%) and the lowest in Barguna Sador (86.70%). In Bhola district, the higher percent infested coconut was in Bhola Sador (91.40%) and the lower in Muslimpara. (82.85%). In Patuakhali district the highest percent infested coconut was recorded in Lebukhali (91.39%) followed by Kalapara (89.91%), Kuakata (89.62%, Patuakhali Sador (87.97%), Pakhimara (88.58%) and the lowest in Mahipur (87.85%). In Pirozpur district, the highest percent infested coconut was in Namazpur (92.58%) followed by Kawkhali (91.71%), Matibanga (89.21%) Pirozpur Sador (88.89%) and the lowest in Zia nagor (87.84%). In Jhalokati district, the highest percent infested coconut was found in Dopdopia (90.17%) followed by Nalsiti (89.31%) and the lowest in Jhalokati Sador (86.67%). Pest status on an average, the highest percent coconut eriophyid mite infestation was in Pirozpur district (90.05%) followed by Patuakhali (89.22%), Jhalokati (88.72%), Barguna (87.92%), Barisal (87.14%) and the lowest in Bhola district (87.13%). (Fig. 2).

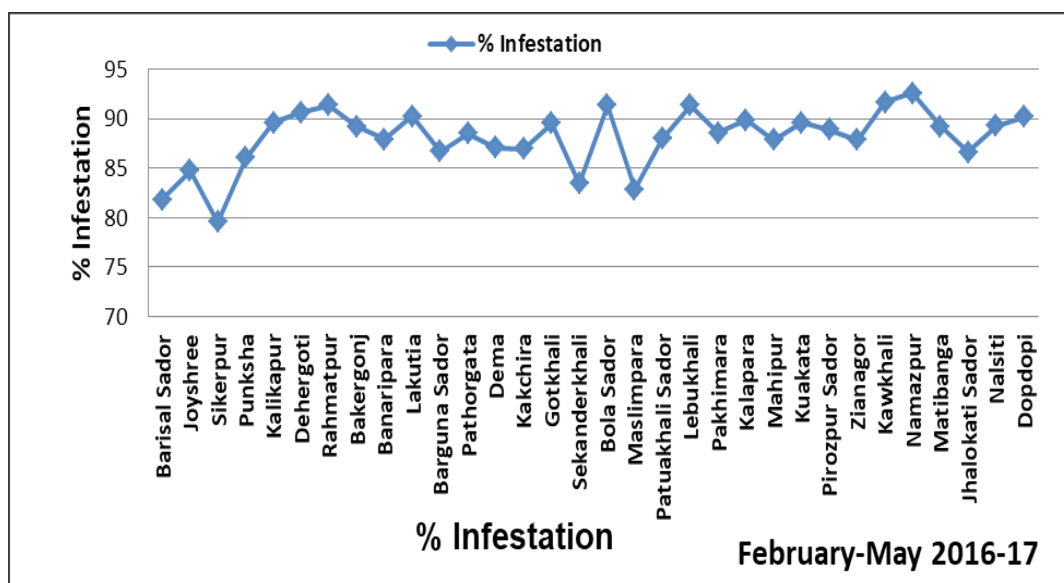


Fig. 2. Pest status on infested coconut (%) due to *A. guerreronis* K. of different locations in southern region during 2016-2017

Collective mean of both years during 2015-16 and 2016-17 in Barisal district ranged between Sikerpur 77.08 to Bakergonj, 90.34% followed by Borgona (ranged from Dema, 76.44 to Sekanderkhali, 86.08%), Bhola (ranged between Maslimpara, 84.02% to Bhola Sador, 89.78%), Patuakhali (ranged from Lebukhali, 81.44% to Patuakhali Sador, 89.47%), Pirozpur district (between Matibanga, 84.37% to Kawkhali, 90.43%) and Jhalokati (ranged from Nalsiti, 85.81% to Jhalokati Sador, 87.02%). Fig.3 revealed that in Barisal district, the highest percent infested coconut was in Bakergonj (90.34%) followed by Rahmatpur (89.52%), Kalikapur (85.80%), Dehergoti (83.67%), Barisal Sador (83.54%), Joysree (82.99%), Banaripara (82.65%), Punksha (81.78%), Lakutia (81.61%), and the lowest was in Sikerpur (77.075%). In Barguna district, the highest percent infested coconuts was recorded in Sekanderkhali (86.08%) followed by Barguna Sador (84.54%), Pathorgata (80.99%), Kakchira (78.34%), Gotkhali (77.68%) and the lowest was in Dema (76.44%). In Bhola district, the higher percent infested coconuts were in Bhola Sador (89.78%) and the lower in Muslimpara. (84.02%). In Patuakhali district, the highest percent infested coconuts was recorded in Kalapara (89.47%) followed by Patuakhali Sador (89.12%), Kuakata (88.80 %), Mahipur (86.76%), Pakhimara (83.48%) and the lowest in Lebukhali (81.44%). In Pirozpur district, the highest percent infested coconuts was in Kawkhali (90.43%) followed by Namazpur (88.44%) Zia nagor (87.74%), Pirozpur Sador (87.60%) and the lowest in Matibanga (84.37%). In Jhalokati district, highest percent infested coconuts was found in Jhalokati Sador (87.02%) followed by Dopdopia (85.83%) and the lowest in Nalsiti (85.81%) (Fig. 3). Pest status on an average, the highest percent coconuts eriophyid mite infestation was in Pirozpur district (87.42%) followed by Bhola (86.76%), Jhalokati (86.44%), Patuakhali (86.33%), Barisal (83.94%) and the lowest in Barguna district (80.92%). The present findings are more or less in similar to Naik (2003) who observed the percent infestation of palm nuts ranged between 33 percent and 80 percent in Thane district. The infestation of eriophyid mite is slowly reaching to highest limit of infestation due to favourable conditions. The results are in close agreement with that of Desai *et al.* 2009. The highest eriophyid mite in Thane district which must be started much earlier followed by Sindhudurg, Ratanagiri and Raigad districts. Bagde and Pashte (2014) observed the infestation rate of eriophyid mites infesting palm

and found the nut infestation they found more in Thane district (ranges between 73.23 to 84.40%) followed by Sindhudurg district (33.03 to 86.80%). 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 are 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 Barishal 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 it and these are the major dispersing agent. Therefore, it is necessary to start control measures to eradicate this pest from the southern region where it is the major threat to coconut plantations.

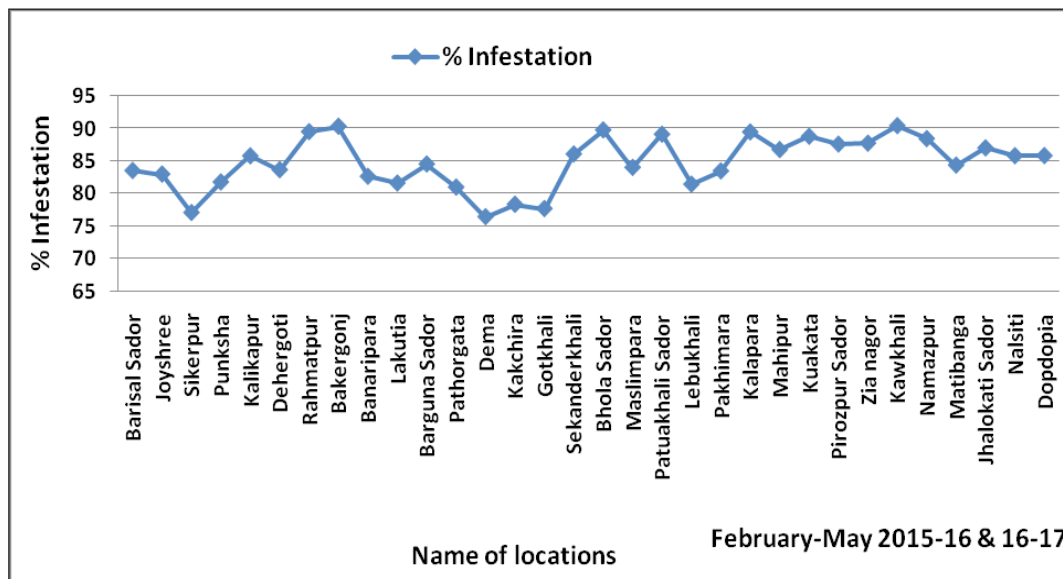


Fig. 3. Pest status on mean infested coconuts (%) due to *A. guerreronis* K. of different locations during 2015-2016 and 2016-2017

The percent infested coconuts due to *A. guerreronis* K. of different districts:

During the year 2015-2016, 2016-2017 and the pooled mean of both years data were presented in Table 1 based on percent infestation of coconuts eriophyid mite. During the year 2015 -2016 percent coconut infestation level of eriophyid mite was the highest in Bhola district (86.67%) followed by Pirozpur (85.38%), Patuakhali

(83.80%), Jhalokati (83.72%), Barisal (80.65%) and the lowest was in Barguna (73.43%). During the year 2016-2017, the percent coconut infestation level of eriophyid mite was the highest in Pirozpur district (90.05%) followed by Patuakhali (89.22%), Jhalokati (88.72%), Barguna (87.92%), Barisal (87.14%) and the lowest in Bhola district (87.13%). The mean of in both the years in percent coconut infestation level of eriophyid mite was the highest in Pirozpur district (87.42%) followed by Bhola (86.76%), Jhalokati (86.44%) Patuakhali (86.33%), Barisal (83.94%) and the lowest in Barguna district (80.92%).

Table 1. Pest status on percent infested coconut due to *A. guerreronis* K. of different districts in southern region during 2015/16-16/17

Name of district	Per cent infested coconuts		
	2015-2016	2016-2017	Mean
Barisal	80.65	87.35	83.94
Barguna	73.43	87.92	80.92
Bhola	86.67	87.13	86.76
Patuakhali	83.80	89.22	86.33
Pirozpur	85.38	90.05	87.42
Jhalokati	83.72	88.72	86.44

CONCLUSION

The infestation level of coconut eriophyid mites on the basis of per cent coconuts infestation, the highest coconut infestation was in Pirozpur (87.42%) and the lowest in Barguna(80.92%).

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