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THE CHOLAM MITE †

(*Paratetranychus indicus* on *Sorghum*)

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Introduction. Next to paddy (*Oryza sativa*), cholam (*Sorghum*) is the most important cereal in the Madras Presidency.* It is subject to a variety of pests such as the earhead bug (*Calocoris angustatus*), the shoot bug (*Pundaluoya simplicia*), the stem borer (*Chilo simplex*), the Deccan grasshopper (*Colemania sphenarioides*) and the mite (*Paratetranychus indicus*). The present paper deals with certain observations made on the life history and remedial measures tried in regard to the last named, namely the cholam mite.

Description of the mite. The cholam mite belongs to family ***Tetranychidae* the members of which are commonly known as "red spiders". The general appearance of the mite as seen under the microscope is shown in figures 1 and 2. The general colour of the mite is greyish green. Generally the males have also a slight tinge

† Paper read before the Indian Science Congress, 1932.

* For the year 1930—31, out of a total of 25,666,722 acres under Cereals paddy came first with 11,677,529 acres and cholam second with 4,7209 acres.

** The classification followed is that of Nathan Banks.

of red. In addition to this difference in colour the males may also be distinguished by their smaller size. The males are about 0.3 mm. long and the females about 0.5 mm. long. Further the tip of the abdomen of the male is pointed while it is more rounded in the female. Mr. Hirst of the British Museum to whom the specimens were sent for identification described it as a new species in the *Proceedings of the Zoological Society of London*, Part IV December 1923.

Life History. There are four stages in the life history of the mite viz., the egg, the larva, the nymph and the adult.

Eggs are spherical in shape and white. The diameter of an egg is about 0.12 mm. A day before hatching the colour of the egg changes to dark-red. The egg stage lasts 3 to 4 days. One female which began egg laying on 6th February 1924 but escaped on 21st February, laid 63 eggs distributed over 16 days, the maximum being 9, the minimum 1 and the average 4 per day. The maximum number for a day in the case of another individual was 19 eggs.

Larvae. The larvae which hatch out of the eggs are pale white in colour. They have three pairs of legs only, in contrast to the nymphs and adults which have four pairs. Eyes are present and are reddish in colour. The larvae feed on plant sap and in two to four days moult into nymphs.

Nymphs. Nymphs very much resemble the adults. Both have four pairs of legs and are rusty green in colour. But in size the nymph is smaller than the adult. As soon as the nymphs emerge they begin to feed. In about two days they become quiescent, stop feeding and then moult. This is the first moult. After this they feed for two days more and moult a second time. After the second moult they are no longer nymphs but adults. When moulting, the skin is ruptured transversely and the line of rupture is the groove between the cephalothorax and the abdomen.

Adults. As stated above the adult stage is reached after the second nymphal moult. In a day or two the females begin egg laying either after copulation* or without copulation. The whole life cycle lasts 9 to 12 days.

Parthenogenesis. In the course of examination of a number of mite-affected plants it was found that there was a preponderance of males over females in the case of a few plants. This led the writer to suspect the phenomenon of "Parthenogenesis" i. e. reproduction without the intervention of the male. Experiments were therefore devised to test this. It was found that the usual method of introducing a cholam leaf within a glass chimney and closing both ends with cotton

* Mr. Wood-Mason describes the act of copulation in detail in the case of *Tetranychus bioculatus*, a red-spider mite on Tea in his "Report on the Tea mite and Tea bug of Assam 1884" which is applicable in this case also.

wool did not prove useful as the mites often wandered away and were lost in the wool. The following method tried by the writer gave satisfactory results.

A glass basin 6 inches in diameter was filled with water. Another smaller basin about 3 inches in diameter was filled with soil and a cholam seedling planted in it. This was then placed inside the bigger basin with water. The whole thing was then covered with a glass chimney about 2 ft. high and 1 ft. in diameter, the upper portion being tied with muslin for aeration. A mite egg (not known whether it was fertilised or not) was introduced on the cholam leaf by means of a fine brush. A female was reared from this egg. Though no male could have access to this female, due to the water in the bigger basin, she laid eggs from which both males and females were reared out parthenogenetically. One of the females of this generation again laid eggs from which both males and females were got parthenogenetically. In the next generation however all the progeny of one of the females selected happened to be males.

Nature and symptoms of damage. The injury caused to the plants by mites is quite comparable to that of the plant bugs (*Rhynchota*) since in both cases, plant sap is sucked out. As a result of their attack, the cholam leaves turn bright red in colour and ultimately dry up. The infestation starts at different centres on the leaf and gradually spreads out from these. In the field also small patches of attack are first noticeable on plants at a few centres and these gradually enlarge and the infestation spreads in all directions.

At first sight the red patches produced by mites are liable to be mistaken for patches caused by the sorghum 'rust'. But on closer examination it is seen that the mite patches are bigger in size than the rust patches and that they can be easily distinguished by the presence, on the lower surfaces of the leaves, of a delicate web under which thousands of minute creatures in all stages of development could be seen together with their white moult skins. In a few cases mites have been noticed on the upper sides of the leaves also, but this is rather the exception than the rule.

Method of spread. In the field, leaves of neighbouring sorghum plants would touch one another and it is only natural that the mites should travel from the dry leaves to the green. If the plants are not touching one another the mites descend to the soil and travel over it until they reach fresh plants. Stabler* has made the observation that mites in the case of fruit trees are distributed by the agency of wind. It is possible that in the case of the cholam mite also strong winds

* Stabler (H. P.) "Red spider spread by winds". Monthly Bull. Stale Comn. Hortie. Sacraments. Cal. ii, No. 12, Dec. 1913, pp. 777-784.

may be one of the means of dispersal. This will be tested in the coming season.

Amount of loss. In the Central Farm, Coimbatore, the amount of loss due to mites may roughly be estimated at 5%. In 1909 the attack was so severe in one of the fields that the whole crop had to be destroyed. There are records to show that in Vellore and Salem there was considerable damage to the cholam crop due to the mites in certain years.

The amount of loss seems to depend on the age of plants. If the attack begins when the plants are tender they may not yield any earheads at all or even if earheads are produced they will be very small in size. If the infestation appears in the later stages of the crop there may not be much damage done to the earheads, but the leaves of attacked plants do not seem to be much relished by cattle.

Distribution in the Madras Presidency. In the Coimbatore district mites are found both in the *Chitrai cholam* (irrigated) and *Periamanjai cholam* (rain-fed). The former is sown sometime in the middle of March and harvested in June and the latter is sown in August and harvested in December. It is mostly in the irrigated crop between March and June that mites are noticed in large numbers. In Bellary they are found from December to March. In Salem, Chittoor and North Arcot districts also there are reports of mite damage.

Alternate food plants. In regard to the Central Farm, Coimbatore, the question of alternate host plants does not arise at all. One field or other is sure to have the cholam crop, grown either for grain or for fodder throughout the year. It is only natural that the mites should find shelter in some of these crops ready to attack the next. Because of the continuous growing of the crop the number of generations of the mites also may be large. A search was however made for alternate host plants and as a result the writer was able to collect a few mites from *Panicum javanicum* and *Panicum distachyum*, two common grasses found on field bunds.

Effect of weather conditions on mites. It is found by experience that during dry hot weather mites generally thrive and that heavy rains seem to be inimical to them.

Natural enemies. Six different natural enemies have been noted till now, five being insects and one a mite. Life histories of these are briefly given below:—

1. *Scymnus gracilis*, Motsch. (Fig. 3). This Coccinellid is the most important enemy of the cholam mite. Both grubs and adults feed on mite eggs and occasionally also on larvae and nymphs.

The female beetle after mating lays eggs singly. Under laboratory conditions a female laid as many as 30 eggs. Eggs are 0.3 mm. long and 0.17 mm. broad and rounded at both ends. Generally they are

seen on the delicate silken webs of the mites. Egg period is about 3 to 4 days. The newly hatched grubs are over 1 mm. in length and pale white in colour. The head and thorax are large and the abdomen short with terminal claspers. Legs are comparatively large and stout. The body segments have rings of transparent hairs. Grubs when mature measure 2 mm. in length and 0.75 mm. in breadth and are pale yellow in colour, with stout dark hairs. The larval period is from 4 to 5 days, the number of moults being three. The grubs feed mostly on eggs piercing the egg shell and sucking the contents, but occasionally they may go in for other stages also.

The pupae are dark black in colour. The larval hairs persist on the pupae. At the hind end there is a cap-like portion which is pushed out when the adult emerges. Pupae are generally attached to the lower surface of the cholam leaves. The pupal period lasts 3 to 4 days. The adults which emerge are dark black in colour and measure 1.3 mm. long and 0.8 mm. broad. The males are slightly smaller than the females. Adult beetles also feed on mite eggs. Occasionally they may feed on mites also. If kept without food the adult beetles live only from 4 to 6 days. When given sufficient food they live for about three weeks. In one case an adult lived for 35 days.

2. *Scolothrips sexmaculatus*, Pergande.* This insect (Fig. 4) belongs to family Thripidae, (sub-order Terebrantia, order Thysanoptera). It is commonly known as the six-spotted thrips. The nymphs and adult thrips feed chiefly on the eggs but occasionally stages of mites other than eggs are also attacked. It has been found that the time taken to finish one egg is about a minute. The adult thrips can easily be spotted out, the three dark spots on each forewing being very characteristic of this species.

3. *Oligota flaviceps*, Bernh. (Fig. 5). This beetle belongs to family Staphylinidae. In this case the adults are harmless but the grubs are very active creatures destroying mite eggs. They are yellow in colour. A dark spot at the hind end of the abdomen is quite characteristic of the grub. When full fed the grubs pupate in the soil.

4. *Triphleps tantilus*, (Fam. Anthicidae). Some of these bugs were found attacking the mite nymphs. These are not so important checks as the first three. The whole life cycle of the bug lasts about two weeks.

5. *Geocoris* sp. This bug belongs to sub-family Geocorinae, family Lygaeidae. On certain occasions these were found puncturing the adult mites and nymphs. The life cycle of the bug is about two weeks, the egg period being 4 to 5 days.

6. *Gamasid mite*. It is yellowish in colour and found moving about actively in search of mites. It attacks the larvae of the mite by puncturing their body and sucking in their contents.

* This thrips identified by Dr. T. V. Ramakrishna Ayyar is described in the Trans. of St. Louis Acad. 1894, page 542.

Insecticides tried at Coimbatore. The following insecticides were tried and results of these trials are given below in tabulated form.

Name of insecticide.	Treatment & Strength.	Results.
1. Flowers of sulphur.	Dusted 1 lb. to 4 lb. road dust.	Good against mites. Leaves not scorched.
2. Fish oil Rosin soap.	Sprayed 1 lb. in 6 gal. of water.	do.
3. Crude oil emulsion.	do.	do.
4. Soap solution.	Sprayed 1 lb. in 4 gal. of water.	Not satisfactory.
5. Harbas.	Sprayed 1 in 40 parts of water.	Fair but leaves scorched.
6. Harola.	do.	do.
7. Vermisapon.	Sprayed 1 lb. in 10 gal.	Fair.
8. Tobacco decoction.	Sprayed 1 in 4 gal.	Not satisfactory.
9. Germicide.	Sprayed 1 lb. in 10 gal.	Fair.

Methods of control. 1. Be on the look-out for the first signs of attack. It is easy to spot them out due to the presence of red patches on the leaves. Pull out the first attacked plants and destroy them or dust flowers of sulphur on the plants by means of hand bellows. In the later stages, when the attack has already spread and injury done, it will not be of any use to have recourse to dusting.

2. Keep the bunds clean of grasses like *Panicum Javanicum* as the mites can live on them.

Acknowledgments. In conclusion, the writer wishes to thank Rao Sahib Y. Ramachandra Rao for his valuable advice in the course of this work and Mr. Hirst for kindly identifying the specimens.

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A SHORT NOTE ON CULTIVATION OF MANGOSTEENS IN THE COURTALLAM HILLS

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Mangosteen is cultivated in the Courtallam hills in the Thekkumalai Estate, Arivikkarai Estate, Udatram and at Five Falls hills.