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Developmental stages of the cassava mite, *Tetranychus truncatus* Ehara

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Spider mites impact the yield of numerous crops in global greenhouses and fields. Over 1300 species of spider mites have been identified, with over 100 categorized as pests, and approximately 10 of them classified as significant pests (Migeon & Dorkland, 2006–2017). These significant spider mite pests possess a high level of potential threat to numerous food and ornamental plants. Higher reproductive potential and rapid development are the main causes of spider mite population size increase (Ullah *et al*., 2011; 2012). In India, the spider mites belonging to the genus Tetranychus are recognized as serious agricultural pests affecting vegetables, with documented instances of yield reduction ranging from 7% to 48% (Srinivasa and Sugeetha, 1999).

Amongst these, *Tetranychus truncatus* Ehara (Acari: Tetranychidae) is the predominant one infesting numerous economically significant crops in Karnataka. Moreover, Migeon & Dorkland (2006–2017) reported that *T. truncatus* was found on 86 host plants that belong to 32 families. This mite feeds on the lower surface of the leaves and produces webs that cover their eggs and immature stages. Damaging symptoms of *T. truncatus* is yellow spots appear on the upper surface of the leaf and then leaf will lose its normal green colour (Charanasri *et al*., 1982). *T. truncatus* can develop and reproduce within a wide range of temperatures and the range 24-31% was the most suitable for development, survival rate and reproduction of this mite (Sakunwarin *et al*., 2003). For successful management of any pest, a thorough knowledge about biology of the pest is necessary. This article gives the information regarding the different developmental stages of the mite *T. truncatus*.

Developmental stages of *Tetranychus truncatus*

Egg

Female mites have a preference for depositing eggs on the upper surface of leaves, particularly in close proximity to the midrib. Eggs that were laid exhibited a round shape, a translucent appearance, and a smooth texture. The colour of the eggs underwent a progressive transformation from transparent to a yellow-orange shade, accompanied by the emergence of two red-eye spots prior to hatching. The duration of the incubation periods varies significantly across the range of temperatures Sakunwarin *et al*., 2003.

Larva

Newly hatched larvae of *T. truncatus* were yellow in colour with a pair of red eyes on the opisthosoma. It has three pairs of legs Before entering a quiescent period known as the protochrysalis, the larvae stopped feeding.

Protonymph

The protonymphs are oval-shape and yellow-orange in colour. They started feeding immediately after molting. The quiescent stage after protonymph is duetochrysalis.

Deutonymph

Deutonymphs of *T. truncatus* were orange-red in colour. Sexes could be easily distinguished during this stage where the size of female deutonymph was usually larger than the male. They are also characterized by a rounded posterior-end as compared to a slightly pointed posterior-end of the male. The quiescent stage after deutonymph is teliochrysalis.

Adults

Adult mites were orange-red in colour with relatively long and yellow legs. Adult female is larger in size compared to adult male. Male abdomen is pointed or 'V' shaped. Whereas, female abdomen is rounded. Copulation takes place almost immediately after female emergence from teliochrysalis. It was quite common to see 2-3 males guarding the same female. One female mite was able to copulate many times and the male mite would copulate with more than one female during its life span.

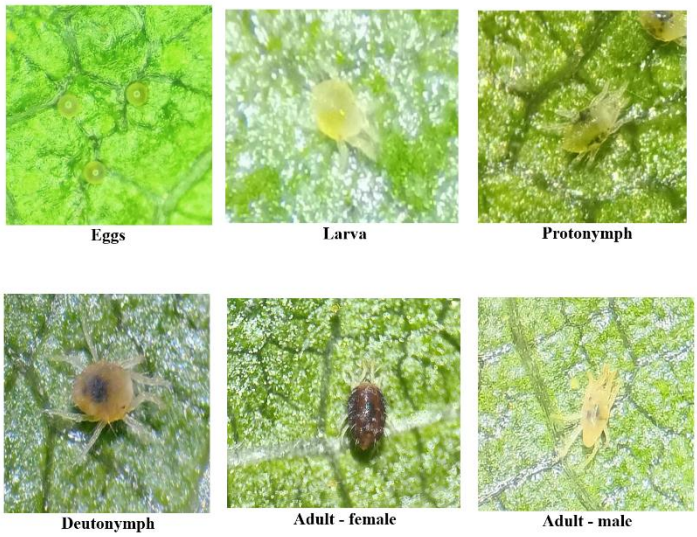

Fig. 1: Developmental stages of *T. truncatus*

Damaging sysmptoms produced by *T. truncatus*

Fig. 2: Damaging symptom produced by *T. truncatus*

Nymphs and adults suck the sap from lower surface of leaves that results in white patches. The affected leaves become mottled, turn brown and fall. In severe infestation, mites form silken webs. The mite infested plants can be identified from the distance by the characteristic mottling symptom produced on the upper surface of leaf.

Conclusion

The pest management programs should be designed to effectively manage agricultural pests, achieving significant results in terms of environmental sustainability and sustainable economic management. To plan, successful control strategies on cassava mite, the information regarding the biology of this pest is much necessary. Different developmental stages of *T. truncatus* is briefed here to carry out the effective management practices.

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