**Diversitas Journal**

**ISSN 2525-5215**
**DOI: 10.48017/dj.v6i4.1621**

**Volume 6, Número 4 (out./dez. 2021) pp: 3811-3815.**
**https://periodicos.ifal.edu.br/diversitas_journal/**


# Occurrence and instantaneous rate of increase of *Tetranychus bastosi* Tuttle, Baker & Sales (Acari: Tetranychidae) in the state of Alagoas, Brazil



# Ocorrência e taxa instantânea de crescimento de *Tetranychus bastosi* Tuttle, Baker & Sales (Acari: Tetranychidae) no estado de Alagoas, Brasil

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*Recebido em: 25 de novembro de 2020; Aceito em: 19 de julho de 2021; publicado em 10 de outubro de 2021. Copyright© Autor, 2021.*

**ABSTRACT:** *Tetranychus bastosi* Tuttle, Baker & Sales (Acari: Tetranychidae) is a species with restricted occurrence in Brazil and has already been reported infesting 36 species of plants, including ornamental, fruits, leguminous and spontaneous plants. In Alagoas state, its presence was found on *Turnera subulata* L. and *Ipomoea batatas* L. To analyse the population growth of *T. bastosi* on the hosts, bioassays were carried out evaluating the instantaneous rate of increase (*ri*). For both hosts, the population growth of *T. bastosi* showed positive values of 0.3509 ± 0.0239 and 0.2179 ± 0.0934 for *I. batatas* and for *T. subulata*, respectively, with significant differences between them. In addition, significant differences were observed for the mean number of eggs, nymphs, and the final population after 10 days of evaluation. Thus, it is registered the presence o *T. bastosi* in the state of Alagoas with high potential of development on *I. batatas* and *T. subulata*.
**KEYWORDS:** population growth, red spider mite, host plant

**RESUMO:** *Tetranychus bastosi* Tuttle, Baker & Sales (Acari: Tetranychidae) é uma espécie com ocorrência restrita ao Brasil, sendo relatada infestando 36 especies de plantas, incluindo plantas ornamentais, frutíferas, leguminosas e plantas espontâneas. No estado de Alagoas, foi recentemente encontrado em *Turnera subulata* L. e *Ipomoea batatas* L. Para analisar o crescimento populacional de *T. bastosi* nas plantas hospedeiras, bioensaios foram realizados para avaliar a taxa instantânea de crescimento (*ri*). Para ambos os hospedeiros, o crescimento populacional de *T. bastosi* mostrou valores positivos de 0.3509 ± 0.0239 e 0.2179 ± 0.0934 para *I. batatas* e para *T. subulata*, respectivamente, com diferenças significativas entre eles. Além disso, diferenças significativas foram observadas para os números médios de ovos, ninfas e da população final após 10 dias de avaliação. Assim, registra-se a presença de *T. bastosi* no estado de Alagoas, apresentando alto potencial de desenvolvimento em *I. batatas* e *T. subulata*.
**PALAVRAS-CHAVE:** crescimento populacional, ácaro vermelho, planta hospedeira.

## INTRODUCTION

The mites in Tetranychidae family are mostly polyphagous, being found on several crops, such as fruits, ornamental and leguminous, besides spontaneous plants, which may act as alternative hosts and a focus for the spread of mites (VASQUÉZ et al., 2009). *Tetranychus bastosi* Tuttle, Baker & Sales (Acari: Tetranychidae) is originally from South America and was described in Brazil for the first time on red mulberry, *Morus rubra* L. (Moraceae) in the municipality of Crato, State of Ceará, Northeast, Brazil (TUTTLE et al., 1977).



Moreover, the Northeast of Brazil is the most abundant region regarding *T. bastosi* host plants, including different botanical families, such as Moraceae (*Morus nigra* L.), Asteraceae (*Birdens pilosa* L.), Euphorbiaceae (*Jatropha gosypifolia* L., *Jatropha curcas* L., *Jatropha molíssima* (Pohl) Baill, *Ricinus communis* L., *Cnidoscolus phyllacanthus* Pax and Hoffmann, *Manihot esculenta* Crantz and *Manihot pseudoglaziovii* Pax e Hoffman), Malvaceae (*Malva rotundifólia* L. and *Gossypium sp.* L.), Caricaceae (*Carica papaya* L.), Fabaceae (*Phaseolus vulgaris* L.), Passifloraceae (*Turnera* sp.) and Solanaceae (*Ipomeas batatas* L.) (TUTTLE et al., 1977; BOLAND et al., 1998).

Recent information based on *T. bastosi* fertility life tables on *C. papaya*, *P. vulgaris* and *M. esculenta* points out to significant reproduction and population growth rates, exhibiting a high potential of colonization (LIMA et al., 2017). Nevertheless, there is no record of *T. bastosi* in the state of Alagoas, Northeast, Brazil. Thus, the objective of this study was to register the occurrence of *T. bastosi* as well as to evaluate the instantaneous rate of increase (*ri*) on its host plants in the state of Alagoas.

## MATERIAL AND METHODS

For that, eggs, larvae, pototonymph, deutonymph and adults of *T. bastosi* were collected at the municipality of Maceió on the spontaneous plant, *Turnera subulata* L. Also, *T. bastosi* was found on *I. batatas* in a greenhouse at the Campus of Engineering

and Agricultural Sciences of the Federal University of Alagoas (CECA / UFAL), in Rio Largo, AL. The red mites were spreading across the abaxial surface of the leaves, with the presence of gray-white and silvery spots on the leaf blade. Leaves with high infestation, were slightly wavy and withered.

Leaf samples from the host plants were preserved in paper bags, labelled and taken to the Laboratory of Agricultural and Forestry Entomology (LEAF) of CECA / UFAL. The mites were mounted on microscope slides for taxonomic identification. The observed structures were the proximal tactile setae of tarsus I approximately on a line with the proximal duplex setae and the male aedeagus strongly down curved, according to Moraes and Flechtman et al. (1981) description of *T. bastosi*.

In order to evaluate the population growth of *T. bastosi* on its host plants, the instantaneous rate of increase (*ri*) were estimated on *T. subulata* and *I. batatas*. Leaf discs of 3.0 cm (Ø) obtained from plants sown in 1.5L pots, were placed in arenas with polyethylene foam. Five females of *T. bastosi* obtained from the laboratory stock rearing on *Canavalia ensiformes* L. (Fabaceae) were released in each disc. The arenas were kept in a B.O.D. incubator chamber at 25±1°C, 70±5% HR and 12h of photophase. The evaluations were carried out after 10 days, in a completely randomized design with ten repetitions.

The instantaneous rates of increase (*ri*) were calculated according to the equation: $Ln(Nf/No)/\Delta t$, where *Nf* is the number of eggs, immature and adults present in each disc; *No* is the initial number of females and $\Delta t$ is the period of evaluation (WALTHALL & STARK, 1997). According to the equation, positive *ri* values indicates population growth, $ri = 0$ indicates balance, while negative values of *ri* means that population is declining which could lead to extinction (STARK & BANKS, 2003).

## RESULTS AND DISCUSSION

The obtained data was subject to normality tests and the means were compared by Student's t-test. The population of *T. bastosi* presented positive values for the instantaneous rate of increase (*ri*) of 0.35±0.01 on *I. batatas* and 0.21±0.04 on *T. subulata*, significantly

differing between the two hosts (t=3.0 ; P< 0.0001) (Table 1). In addition, when comparing the mean numbers of eggs, larvae, nymphs, adults and the total population after 10 days of evaluation, significant differences were observed for eggs, with mean values of 90.0±10.2 and 27.8±2.8 (t=5.83; P<0.0001); nymphs, with mean values of 73.5±9.55 and 34.3±3.3 (t=3.88; P=0.0001) and the final population, with mean values of 175.4±16.8 and 63.8±8.6 (t=5.9; P<0.0001) on *I. batatas* and *T. subulata*, respectively.



Table 1 - Mean number of eggs, larva, nymph (protonymphs/deutonymphs), adults, final population and instantaneous rate of increase (*ri*) (Mean ± SE) of *Tetranychus bastosi* (Acari: Tetranychidae) on different hosts.

| Host | Eggs (Mean±SE) | Larva (Mean±SE) | Nymph ( Mean±SE) | Adults (Mean±SE) | Final Population (Mean±SE) | *ri* (Mean±SE) |
|---|---|---|---|---|---|---|
| *Turnera subulata* | 27.8±2.8 b | 8.5±0.92 a | 34.3±3.30 b | 0.20±0.20 a | 63.8±8.6a | 0.21±0.04a |
| *Ipomeas batatas* | 90.0±10.2 a | 11.3±1.12 a | 73.5±9.55 a | 0.60±0.26 a | 175.4±16.8a | 0.35±0.01b |
| Statistic | t=5.83 P<0.0001 | t=1.92 P=0.07 | t=3.88 P=0.001 | t=1.20 P=0.245 | t=5.9 P<0.0001 | t=3.00 P=0.007 |

These results demonstrate that although *I. batatas* is a more suitable host for the development and population growth of *T. bastosi*, the mean values in *T. subulata* suggest that the spontaneous plant, which constantly occurs in agricultural fields, can be configured as an alternative quality host, acting as a dissemination point of mites for primary hosts and economic crops.

## CONCLUSION

Thus, it is registered the occurrence of *T. bastosi* in *I. batatas* and *T. subulata* in the state of Alagoas, Northeast, Brazil, with significantly high population growth rates and the possibility of using the spontaneous plant *T. subuluta* as an alternative host.



## ACKNOWLEDGEMENTS

To the Coordination for the Improvement of Higher Education Personnel - Brazil (CAPES) for financial support.

## DECLARATION OF CONFLICT OF INTERESTS

The manuscript does not present any kind of conflict of interests.

## AUTHORS' CONTRIBUTIONS

The authors contributed equally to the manuscript.

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