Zoosymposia 22: 275–276 (2022)
https://www.mapress.com/j/zs

Correspondence

ISSN 1178-9905 (print edition)
ZOOSYMPOSIA
ISSN 1178-9913 (online edition)

https://doi.org/10.11646/zoosymposia.22.1.174

Effects of inbreeding on development, growth, reproduction and survival in a predatory mite *Stratiolaelaps scimitus**

LIXIA XIE, NA ZHANG, XU ZHANG, LI WANG & YI YAN#

Department of Entomology, College of Plant Protection, Shandong Agricultural University; Shandong Provincial Key Laboratory for Biology of Vegetable Diseases and Insect Pests, Taian, 271018, China

Xie LX: xielixia2006@163.com; https://orcid.org/0000-0003-1029-3575

Zhang N: 764076392@qq.com; https://orcid.org/0000-0001-7871-6138

Zhang X: 2440559825@qq.com; https://orcid.org/0000-0003-4610-1213

WL: 1715721170@qq.com; https://orcid.org/0000-0002-7160-1079

#*Corresponding author: Yan Y: miteyy@163.com; https://orcid.org/0000-0002-4041-3366*

**In*: Zhang, Z.-Q., Fan, Q.-H., Heath, A.C.G. & Minor, M.A. (Eds) (2022) *Acarological Frontiers: Proceedings of the XVI International Congress of Acarology (1–5 Dec. 2022, Auckland, New Zealand)*. Magnolia Press, Auckland, 328 pp.

Stratiolaelaps scimitus living in microhabitats (e.g., soil, humus and litter), is an important predatory mite (Zhang *et al*., 2022) used in biological control of pests, such as the thrips pupae (Satio and Brownbridge, 2016; Mouden *et al*., 2017), fungus gnat larvae (Castilho *et al*., 2009; Wen *et al*., 2017; Zhou *et al*., 2018) and snout moth eggs (Xie *et al*., 2018). It has been commercially produced (Knapp *et al*., 2018). However, commercial production of predatory mites inducing inbreeding is inevitable, which may lead to inbreeding inhibition and lower fitness of offspring (Slate *et al*., 2000), for example, the decline of vitality, fecundity, stress resistance, adaptability and retardation of growth.

In this study, we investigated the effects of inbreeding on *S. scimitus* development, growth, reproduction and survival. Using a Two sex-Mschart program, we estimated the two-sex life table parameters for a 31-generation-inbred population and a natural population of *S. scimitus* under 25 ± 0.5°C and 70 ± 5% humidity in darkness. The results show that inbreeding had a significant negative effect on *S. scimitus*. The preadult period of this mite in inbred population was 12.4 d, which was significantly longer than that in the natural population (10.5 d). The fecundity of females in the inbred population (50.4 eggs) was also significantly lower than that in the natural population (58.5 eggs). The intrinsic rate of increase (r) was 0.1616 and 0.1297 daughters/mother/day for the inbred and natural population, respectively. While compared to that in natural population, the survival rate and lifespan of *S. scimitus* in inbred population increased. Therefore, our results indicate that inbreeding only negatively affected such traits as development, growth and reproduction in *S. scimitus*.

Acknowledgements. The authors would like to thank Prof. Zhi-Qiang Zhang (School of Biological Sciences, The University of Auckland) and an anonymous reviewer for helpful comments. This work was supported by the National Natural Science Foundation of China (Grant No. 31970401), the Natural Science Foundation of Shandong Province (Grant No. ZR2020MC046), and the Shandong Provincial Key Laboratory for Biology of Vegetable Diseases and Insect Pests.

Keywords: inbreeding, predatory mites, *Stratiolaelaps scimitus*, two-sex life table

References

Castilho, R.C., Moraes, G.J. & de Silva, E.S. (2009) The predatory mite *Stratiolaelaps scimitus* as a control agent of the fungus gnat *Bradysia matogrossensis* in commercial production of the mushroom *Agaricus bisporus*. *International Journal of Pest Management*, 55 (3), 181–185.
https://doi.org/10.1080/09670870902725783

Knapp, M., Houten, Y.V., Baal, E.V. & Groot, T. (2018) Use of predatory mites in commercial biocontrol: current status and future prospects. *Acarologia*, 58 (Suppl), 72–82.

Submitted: 31 Oct. 2022; Accepted by Zhi-Qiang Zhang: 13 Nov. 2022; published: 30 Nov. 2022

https://doi.org/10.24349/acarologia/20184275
Mouden, S., Sarmiento, K.F., Klinkhamer, P.G.L. & Leiss, K.A. (2017) Integrated pest management in western flower thrips: Past, present and future. *Pest Management of Science*, 73 (5), 813–822.
https://doi.org/10.1002/ps.4531
Saito, T. & Brownbridge, M. (2016) Compatibility of soil-dwelling predators and microbial agents and their efficacy in controlling soil-dwelling stages of western flower thrips *Frankliniella occidentalis*. *Biological Control: Theory and Application in Pest Management*, 92, 92–100.
https://doi.org/10.1016/j.biocontrol.2015.10.003
Slate, J., Kruuk, L.E., Marshall, T.C., Pemberton, J.M. & Clutton-Brock, T.H. (2000) Inbreeding depression influences lifetime breeding success in a wild population of red deer (*Cervus elaphus*). *Proceedings Biological Sciences*, 267 (1453), 16–17.
https://doi.org/10.1098/rspb.2000.1192
Wen, M.F., Chi, H., Lian, Y.X., Zheng, Y.H., Fan, Q.H. & You, M.S. (2017) Population characteristics of *Macrocheles glaber* (Acari: Macrochelidae) and *Stratiolaelaps scimitus* (Acari: Laelapidae) reared on a mushroom fly *Coboldia fuscipes* (Diptera: Scatopsidae). *Insect Science*, 26 (2), 322–332.
https://doi.org/10.1111/1744-7917.12511
Xie, L.X., Yan, Y. & Zhang, Z.Q. (2018) Development, survival and reproduction of *Stratiolaelaps scimitus* (Acari: Laelapidae) on four diets. *Systematic and Applied Acarology*, 23 (4), 779–794.
https://doi.org/10.11158/saa.23.4.16
Zhou, C.Y., Zhang, Q., Li, Y.Y., Yan, Y. & Xie, L.X. (2018) Functional response of *Stratiolaelaps scimitus* to *Bradysia odoriphaga*. *Chinese Journal of Applied Entomology*, 55 (4), 705–710.
https://doi.org/10.7679/j.issn.2095-1353.2018.088
Zhang, N., Liu, X.Y., Lu, W.Z., Tan, Y.Y., Xie, L.X. & Yan, Y. (2022) How long do laelapid mites (Acari: Mesostigmata: Laelapidae) live? *Zoosymposia*, 21, 37–56.