

研究论文

棉花型和黄瓜型棉蚜 (*Aphis gossypii* Glover) 的寄主适应性及转移通道

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摘要 采用寄主转接建立生命表的方法研究了棉花型和黄瓜型棉蚜对不同寄主植物的适应性, 以及两寄主型棉蚜是否可通过中间桥梁寄主实现寄主互换的问题。结果表明, 两寄主型棉蚜直接互换寄主后, 其存活和繁殖力显著下降, 表现为棉花型和黄瓜型棉蚜的净增殖率比在原寄主上分别下降980倍和12倍, 平均世代寿命缩短5~12d。两寄主型棉蚜均能利用木槿植物, 并且适应性没有显著差异。但是两寄主型棉蚜均不能在车前草和大叶黄杨上存活和繁殖后代。西葫芦作物对棉蚜在木槿、棉花和黄瓜寄主上的相互转移起到了重要的桥梁寄主作用。冬寄主木槿上棉蚜可通过甜瓜或西葫芦转移到黄瓜寄主上, 棉花和黄瓜上棉蚜也可通西葫芦作物分别转移到黄瓜和棉花作物上, 从而形成棉蚜在不同寄主植物间的相互转移通道, 造成受害和病毒病的扩张。

关键词 棉蚜; 寄主型; 适合度; 寄主转移通道; 桥梁寄主

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The fitness of host biotypes of the cotton aphid (*Aphis gossypii* Glover) to host plants and their reciprocal transfer pathways

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Abstract The cotton aphid *Aphis gossypii* Glover is one of the main pests of cotton *Gossypium hirsutum* L., cucurbits and other crops. Many researches have confirmed that there are various host biotypes in wild populations of the cotton aphid, but the capacity of the biotypes to survive on other host plants differed between them. In the present study, the fitness of two host biotypes, the cotton and cucumber biotypes, and their reciprocal transfer pathways were investigated. Survival, reproduction and other life table parameters of the cotton and cucumber biotypes on six host plants were measured by host transplantation and life table methodology. The results showed that the survival and reproduction of the cotton and cucumber biotype aphids declined dramatically when their host plant was exchanged. The net reproductive rate of the cotton biotype aphid decreased from 19.67 ± 6.22 on the original host plant cotton to 0.02 ± 0.05 on cucumber, and the cucumber biotype aphid decreased from 32.65 ± 3.72 on cucumber to 2.49 ± 0.88 on cotton. Compared with the original hosts, the net reproductive rate of the cotton and cucumber aphids declined 980 times and 12 times, and the average life span decreased by 5 and 12 days, respectively on the alternative host plant. Both the cotton and the cucumber biotype aphids could survive on *Hibiscus syriacus* L., and the fitness on *H. syriacus* L. was not significantly different. But the two biotype aphids could not survive on *Plantago centralis* and *Euonymus japonica*, because offspring production and survival was very low. The remarkable result was that both the cotton and cucumber biotype aphids were able to survive and establish populations on *Cucurbita pepo* L., and the intrinsic rate of natural increase was 0.19 ± 0.05 and 0.28 ± 0.02 , respectively. Moreover, the vegetable plant *C. pepo* played an important role in the reciprocal transfer of the cotton aphids between hibiscus, cotton and cucumber plants. The results of host transfer pathways indicated that the cotton aphids originally living on hibiscus

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could survive and establish populations on cucumber plants after being reared on *Cucumis melo* L. for three generations, and the intrinsic rate of natural increase (r_m) of the subsequent three generations of aphids on cucumber was not significant differently (the values of r_m were 0.23 ± 0.03 , 0.20 ± 0.03 and 0.19 ± 0.03 , respectively). On the other hand, cotton aphids on hibiscus could also attain the capacity to use cucumber plants after their transfers from hibiscus to cotton and then to *C. pepo*. At the same time, the cotton biotype aphid and the cucumber biotype aphid could transfer between the cucumber and cotton plants via the intermedial transfer on *C. pepo*, and values of r_m were significantly different when compared with the direct transfers. The values were 0.25 ± 0.07 for the cucumber biotype aphids indirectly transferred to cotton and 0.27 ± 0.02 for the cotton biotype aphids indirectly transferred to cucumber. The results suggest that there are reciprocal transfer pathways for the host specialized cotton aphids between cotton and cucumber plants, and these pathways will facilitate the dispersion of the cotton aphid and aggravate the damage caused directly by their probe penetration for sap-sucking and the transmission of viral diseases.

Key words cotton aphid host biotype fitness transfer pathway medium
host plant

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