

学位論文の要旨

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専攻入学年度	宮崎大学大学院農学工学総合研究科博士後期課程 資源環境科学 専攻 平成 25 年度 (4月) 入学
学位論文題目	Effects of the goldenrod aphid, <i>Uroleucon nigrotuberculatum</i> on the reproductive performance of the predatory lady beetles, <i>Coccinella septempunctata bruckii</i> and <i>Propylea japonica</i> (Coleoptera: Coccinellidae) (セイタカアワダチソウヒゲナガアブラムシがナナホシテントウおよびヒメカメノコテントウの繁殖特性に及ぼす影響)
<p>【論文の要旨】 (和文の場合1,200字程度、英文の場合800語程度)</p> <p>The goldenrod aphid, <i>Uroleucon nigrotuberculatum</i> (Olive), is a specialist aphid of solidago, <i>Solidago altissima</i> L., which was introduced into Japan in early 1990s from North America. The solidago plant also is an exotic invasive plant from North America, which has become widely spread around the arable land in abandoned fields and riparian areas in agroecosystems. Solidago and the goldenrod aphid have set a new habitat for the native aphidophagous lady beetles. Since the solidago patches harbor heavy infestation of the goldenrod aphid in late spring and early summer, they attract the aphidophagous lady beetles emigrant from vetch, <i>Vicia angustifolia</i> (Koch) patches depleted of vetch aphid, <i>Megoura crassicauda</i> (Mordvilko), especially during this period of prey aphid scarcity in crop vegetation. Therefore, any effect of the goldenrod aphid on the fitness of these lady beetles should alter the biological control service that they may offer to the Japanese agroecosystem. Despite extensive literatures on the negative effects of introduced predators on their native guilds, there still scanty of studies on the potential negative effects of novel exotic prey on the native predator performance. Thus, it is pertinent to study the impacts of this new prey aphid on the reproductive performance of two main aphidophagous lady beetles, <i>Coccinella septempunctata bruckii</i> Mulsant and <i>Propylea japonica</i> (Thunberg) (Coleoptera: Coccinellidae).</p> <p>Studies were conducted to evaluate the effects of the goldenrod aphid on these lady beetles reproductive performance by addressing: 1) The effects of the goldenrod aphid on the development and survival of larvae of <i>C. septempunctata</i> and <i>P. japonica</i> in comparison with <i>M. crassicauda</i> as well as the reproductive performance of the adults on both prey aphids; 2) The defensive function of red droplets secreted from the cornicles of the goldenrod aphid and their fatality to the predator larvae; 3) The foraging behavior of</p>	

these lady beetles on native prey aphid *M. crassicauda* and a novel prey, the goldenrod aphid as well as their prey preference; and 4) Seasonal occurrence and population dynamics of these lady beetles in both solidago patches and vetch patches during 2 years as well as their ovarian dynamics in response to the quality of prey aphids in different habitats.

I found that the novel prey aphid, the goldenrod aphid delays the development of both lady beetles larvae, causes high larval mortality and inhibits the reproduction of *C. septempunctata* adults but maintain them and supports reproduction of *P. japonica* at very low rate. The novel prey affects the larvae of the lady beetles physically by smearing them with sticky secretions which gum up the mouthparts, or prevent a successful molting. Learned *C. septempunctata* larvae can avoid preying on the goldenrod aphid, while *P. japonica* larvae are not selective for prey aphid and prey randomly on the different prey aphids. From early spring, the lady beetles community on vetch patches consists mainly of reproductively active females of *C. septempunctata* with mature ovarioles. *Propylea japonica* occurs at late April but remain lower in number than *C. septempunctata*. In solidago patches from early May, *C. septempunctata* adults and larvae are dominant but *P. japonica* becomes more prevalent from mid-May. However, the *C. septempunctata* adults in solidago patches were not reproductively active as their ovarioles were undeveloped.

These studies revealed that the goldenrod aphid is not an essential prey aphid for *C. septempunctata* or it does not support the reproduction of *C. septempunctata* but its occurrence during prey aphid depletion in vetch patches serves to maintain the newly emerged adults even though, it hinders *C. septempunctata* adults to realize second generation in early summer. However, *P. japonica* can realize a generation with low reproductive success on solidago patches. In conclusion, the presence of solidago and its specialist aphid, the goldenrod aphid have positive and negative impacts on the metapopulation of both *C. septempunctata* and *P. japonica* in agroecosystems. Although the goldenrod aphid in solidago patches maintains the lady beetles adults, it may act as an ecological trap for predatory lady beetles.

- (注1) 論文博士の場合は、「専攻、入学年度」の欄には審査を受ける専攻を記入すること。
- (注2) フォントは和文の場合、10.5ポイントの明朝系、英文の場合12ポイントのtimes系とする。
- (注3) 学位論文題目が外国語の場合は日本語を併記すること。
- (注4) 和文又は英文とする。