（学位第３号様式）

学 位 論 文 要 旨

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題　目	Interactions among the small brown planthopper, bacterial symbionts manipulating insect reproduction, and an insect-borne plant virus （ヒメトビウンカと昆虫の生殖を操作する共生細菌および昆虫に媒介される植物ウイルスの相互作用に関する研究）

Bacterial symbionts are associated with various arthropods, including insects. The endosymbionts inside host cells are transmitted maternally to offspring through the egg cytoplasm. Therefore, some endosymbionts increase the fitness of the infected host females through reproductive manipulations, such as cytoplasmic incompatibility and male killing, to enhance their transmission efficiency. Many studies have reported that such endosymbionts have positive or negative effects on host fitness in aspects other than reproductive manipulation. Besides, when multiple endosymbionts coexist in the same host body, such a spatially and resource-limited environment may facilitate their interaction. In addition, although the genes of endosymbionts underlying reproductive manipulations have been progressively revealed in recent years, the detailed molecular mechanisms and host resistance mechanisms to these manipulations remain to be elucidated. In this study, I investigated the influences of two reproductive manipulators (CI-inducing *Wolbachia* and male-killing *Spiroplasma*) on the performance of their host *Laodelphax striatellus* and host-borne plant virus. Furthermore, I conducted the studies on the deletion of the CI gene in Wolbachia and on the male-killing suppression gene in *L. striatellus*.

The influences of two symbionts, *Wolbachia* and *Spiroplasma*, on the host performance were evaluated by larval duration, fecundity, adult longevity, and insecticide resistance. The results indicated that *Spiroplasma* negatively influenced fecundity, but the coexistence of Wolbachia improved the negative influence.

Secondly, the effects of *Wolbachia* and *Spiroplasma* on *Rice stripe tenuivirus* (RSV), which is host-borne and maternally transmitted, were examined in terms of viral titer and vertical transmission rate. The results revealed that the RSV titer was not affected by the presence or absence of *Spiroplasma* but was lowered by the *Wolbachia* presence.

I noticed that CI occurs when females of a *Wolbachia*-infected strain of *L. striatellus* mate with males of other *Wolbachia*-infected strains. As a third subject, I researched why this CI is induced. The results indicated that *Wolbachia* of this strain had deleted one of the four pairs of CI genes, *cifA* and *cifB*, from its genome, thereby being unable to rescue CI caused by *Wolbachia* in males of other host strains.

Finally, we verified the hypothesis that a *L. striatellus* strain that exhibited a 1:1 sex ratio despite having been infected with *Spiroplasma* had a male-killing suppressor. The results showed that this strain has the male-killing suppression gene, and the gene exhibits a dominant mode of inheritance like those reported in other insects belonging to different orders, such as lepidopteran and neuropteran species.