

Studies on the predatory mite fauna (Acari: Phytoseiidae) on tea trees in Shizuoka prefecture, Japan

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Summary

From 2007 to 2009, we studied the predatory mite fauna (Acari: Phytoseiidae) in tea fields in a mountainous region and a southern, flat region in Shizuoka Prefecture, Japan. We identified 4,125 female mites of 9 species of the family Phytoseiidae: 8 were domestic Japanese species—*Neoseiulus womersleyi* (Schicha), *N. barkeri* Hughes, *Amblyseius eharai* Amitai & Swirski, *A. orientalis* Ehara, *A. obtuserellus* Wainstein & Begljarov, *Euseius sojaensis* (Ehara), *Gynaeseius liturivorus* (Ehara), *Typhlodromus (Anthoseius) vulgaris* Ehara—and 1 was an exotic species, namely, *Phytoseiulus persimilis* Athias-Henriot, which has been recorded for the first time in Japan. The percentage of the fields where only 1, 2, or 3 species were found was 14.8%, 42.6%, and 36.1%, respectively, and the maximum number of species found in a field was 5. The dominant species were *A. eharai*, *N. womersleyi*, *E. sojaensis*, and *A. obtuserellus* in the given order. The percentage of fields in which *A. eharai* was dominant exceeded 65%.

Introduction

The predatory mites of Phytoseiidae are important natural enemies of Kanzawa spider mite, *Tetranychus kanzawai* and other pests in tea fields (Hamamura, 1986; Mochizuoki, 2002). Although the predatory mites fauna in tea fields are considered to be very diverse, the studies of the species composition were very few so far (Santoso et al., 2004). And the variety of pesticides used in tea fields is changing from non-selective insecticides such as organophosphate to selective insecticides such as IGR or neonicotinoides in recent years. Therefore the species composition of the predatory mites would be become different from the past. We investigated the present condition of the predatory mite fauna in tea fields in Shizuoka prefecture of Japan from 2007 to 2009 to acquire basic information to use the predatory mites efficiently as biological control agents in tea fields.

Materials and methods

We collected Phytoseiidae mites in tea fields at about 10 sites in mountainous region: Kawane area and about 20 sites in southern flat region: Maki-no-hara area in Shizuoka prefecture of Japan from May to July 2007, 2008 and 2009. The collecting method was beating the canopies of tea bushes by a hand at several points in a field and we picked up from 20 to 50 females of the mites fell in a tray. The collected mites were mounted on slide glasses and we identified them at species level by a phase contrast microscope in our laboratory.

Results and discussion

We identified 4,125 female mites of 9 species of the family Phytoseiidae: 8 were domestic Japanese species—*Neoseiulus womersleyi* (Schicha), *N. barkeri* Hughes, *Amblyseius eharai* Amitai & Swirski, *A. orientalis* Ehara, *A. obtuserellus* Wainstein & Begljarov, *Euseius sojaensis* (Ehara), *Gynaeseius liturivorus* (Ehara), *Typhlodromus (Anthoseius) vulgaris* Ehara—and 1 was an exotic species, namely, *Phytoseiulus persimilis* Athias-Henriot, which has been recorded for the first time in Japan. Fig. 1

shows numbers of tea fields where each species was found in mountainous region and southern flat region in three years. *A. eharai* was found in most of tea fields investigated, and in mountainous region this species was found in all of the fields. *N. womersleyi* – this species has been considered to be the most common species of Phytoseiidae mites in tea fields (Hamamura, 1986; Mochizuki, 2002) – was found in more than half of the fields. Compared between mountainous and southern flat region, the frequency of the fields in which *N. womersleyi* was found in southern flat region was more than that of the other region. On the other hand, in mountainous region the frequency of the fields in which *A. obtuserellus* found was more than that of the other. The percentage of the fields where only 1, 2, or 3 species were found was 14.8%, 42.6%, and 36.1%, respectively, and the maximum number of species found in a field was 5. This suggests that the species composition of Phytoseiidae mites in a tea field is not varied and a few dominant species occupy the mite fauna. The dominant species were 4 species: *A. eharai*, *N. womersleyi*, *E. sojaensis*, and *A. obtuserellus* in the given order. The percentage of the fields in which *A. eharai* was dominant exceeded 65% (Fig.2). This suggests that the primary dominant species of Phytoseiidae mites in tea fields has changed from *N. womersleyi* (Santoso et al., 2004) to *A. eharai* in these 10 years. We consider that this change is related to the innovation of the kind of insecticides used in tea fields. Because *N. womersleyi* has insecticide resistance to organophosphates in Shizuoka prefecture (Hamamura, 1986; Mochizuki, 2002) and *A. eharai* probably doesn't has it.

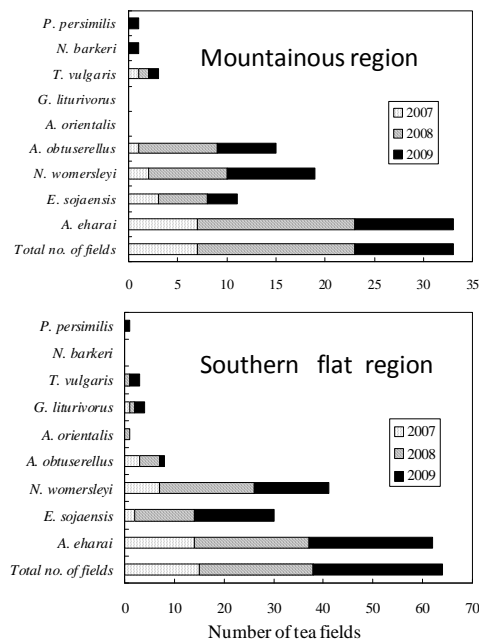


Fig. 1. Numbers of tea fields where each species was found in Shizuoka prefecture from 2007 to 2009.

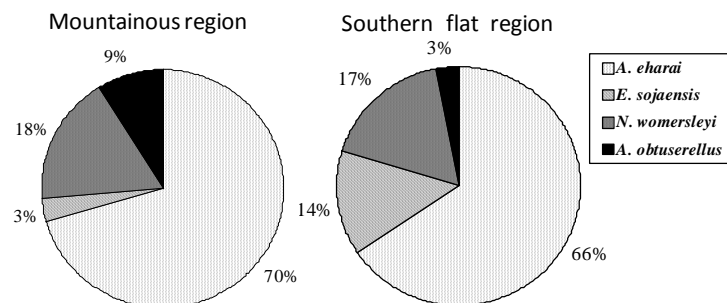


Fig. 2. Percentage of tea fields where each species was the primary dominant in Shizuoka prefecture from 2007 to 2009.

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References

- Hamamura, T. (1986) Studies on the biological control of Kanzawa spider mite, *Tetranychus kanzawai* Kishida by the chemical resistant predacious mite, *Amblyseius longispinosus* (Evans) in tea fields (Acarina: Tetranychidae, Phytoseiidae). Bull. Natl. Res. Inst. Tea 21: 121-201.
- Mochizuki, M. (2002) Control of Kanzawa spider mite, *Tetranychus kanzawai* Kishida (Acari: Tetranychidae) on tea by a synthetic pyrethroid resistant predatory mite, *Amblyseius womersleyi* Schicha (Acari: Phytoseiidae). Jpn. J. Appl. Entomol. Zool. 46: 243-251.
- Santoso S., A. Takafuji, H. Amano and A. Ozawa (2004) Species composition of phytoseiid mites (Acari: Phytoseiidae) in tea fields with different management practices in Shizuoka prefecture, Japan. J. Acarol. Soc. Jpn., 13(1): 77-82.