

Effect of *Orius laevigatus* and *Neoseiulus cucumeris* on Suppression of Thrips Density on Paprika in Greenhouse in Summer

Lim, Y. S., Lee, M. J., Shin, Y. S. & Han, Y. Y.
Gyeongsangbuk-do Agricultural Research & Extension Service,
Daegu 702-708, Korea

Abstract

When paprika is cultivated during summer season, thrips starts to occur in the early growing season and reaches its peak in late June. In the treatment using *Orius laevigatus* and *Neoseiulus cucumeris*, natural enemies to thrips, thrips density was 87.6/trap and 51.3/trap on June 23. After *Orius laevigatus* and *Neoseiulus cucumeris* were treated twice on June 24 and July 23, the number decreased considerably. On August 23, it was 36.9/trap and 40.3/trap and from the mid August to early September thrips density remained low. Effect of *Orius laevigatus* and *Neoseiulus cucumeris* on suppression of thrips density was 35.7% and 44.6% on July 22, however, the number went up to 88.8% and 80.5% on September 3.

Introduction

Paprika (*Capsicum annuum* L.) was first cultivated as a tree for export to Japan in 1995. Its cultivation area size increased to 343ha in 2007. Major harmful insects in summer season from March to December are thrips, spider mite, whitefly, rootfly and others (Kim et al., 2008). *Frankliniella occidentalis* and *Frankliniella intonsa* (*F. intonsa*) are found in flower first and both cause similar damage (Lee et al., 2006). Larva causes more damage than imago and both insects nibble the surface of fruit. This turns the surface brown and makes the fruit malformed (Moon et al., 2006). Natural enemies to such insects are *Orius laevigatus* and *Neoseiulus cucumeris*. Some Korean paprika farms control insects by using natural enemies, however, most insect control research is focused on winter season cultivation. Currently, cultivation area during summer season is on the rise, therefore, further research on natural enemies against insects is needed. The purpose of this study is to present materials about biological control using *Orius laevigatus* and *Neoseiulus cucumeris*.

Materials and Methods

Field Management

Experiment site was 264 m² glass house in Gyeongsangbuk-do Agricultural Research & Extension Service and paprika was planted on April 22, 2010. Cultivation, except insect control, was managed using standard cultural practices. Phymetrozine Wettable Powder was sprayed to control aphids.

Release of natural enemies and its effect

Thrips was treated with single number of quantities of natural enemies and the enemies were produced by Nabis. Co., Ltd. The amount of applied natural enemies and time are described in Tab. 1. The insides of the plants were examined with naked eye every ten days. Yellow sticky trap (15×25 cm) was used for 15 selected spots and the trap was replaced every ten days.

Results

Tab. 1: Application of natural enemies to control thrips on paprika in greenhouse

Pest	Natural enemies	Application time		Quantity (No./m ²)
		First	Second	
Thrips	<i>Orius laevigatus</i>	Jun. 24	Jul. 23	10
	<i>Neoseiulus cucumeris</i>	Jun. 24	Jul. 23	500

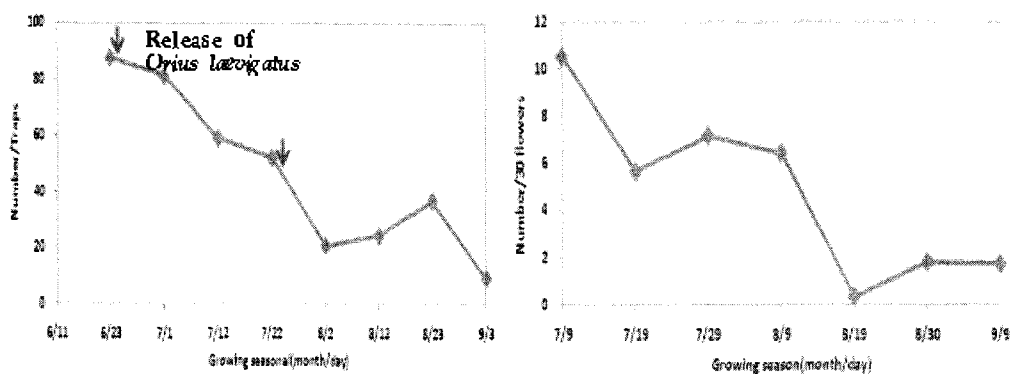


Figure 1: Biological control effect of *Orius laevigatus* against thrips on paprika in greenhouse

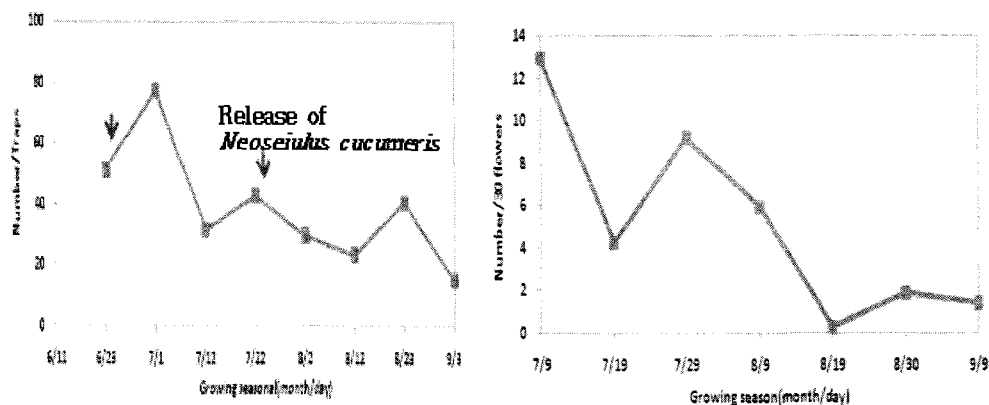


Figure 2: Biological control effect of *Neoseiulus cucumeris* against thrips on paprika in greenhouse

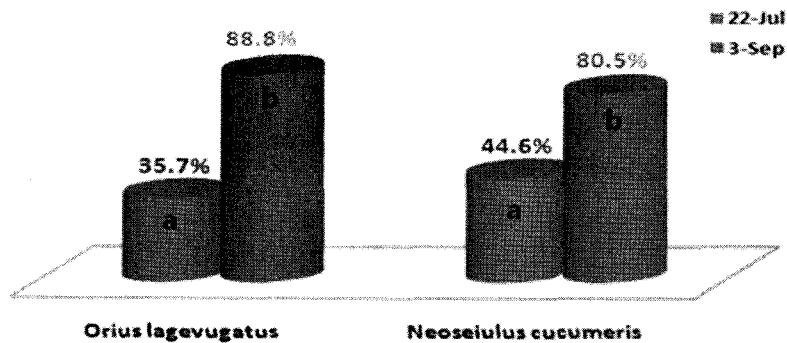


Figure 3: Biological control values of *Orius laevigatus* and *Neoseiulus cucumeris* against thrips on paprika in greenhouse

When paprika was cultivated during summer season, thrips started to appear from the early growing season and reached its peak in the late June. It was on the decline until mid August and kept occurring until the early to mid September. During that period, *Orius laevigatus* and *Neoseiulus cucumeris* were released, the natural enemies to thrips. The result of release is in Fig. 1 and Fig. 2.

In the treatment of *Orius laevigatus* and *Neoseiulus cucumeris*, thrips density was 87.6/trap and 51.3/trap on June 23. After the release of both types of insects, thrips density started to decrease, especially after the second release on July 24. On August 23, the number was 36.9/trap and 40.3/trap and on August 19, both types of insects were rarely found in the flower. Furthermore, low density continued from mid August to early September. The effect of release of natural enemies on suppression of thrips density is shown in Fig. 3. Biological control values of *Orius laevigatus* and *Neoseiulus cucumeris* were 35.7% and 44.6% on July 22 and the numbers grew to 88.8%, and 80.5% on September 3.

Discussion

In the investigation of thrips occurrence, it was found out that thrips density on the red pepper naturally decreases from late July, according to Moon et al. (2006). On the other hand, Choi et al. (2009) identified that the thrips density on paprika during summer season was 7.5/ trap, the highest, in late June. Then, the number kept going down and thrips was rarely found in the early August. Thrips occurred in similar timing in Kimje and Daegu and the density gradually reduced in both areas. It is considered that the timing of natural reduction of thrips and the release of natural enemies contributed to enhancing the density reduction effect.

On the contrary, from late August to mid September, thrips continued to occur in Daegu, unlike Kimje. Natural enemies to thrips are *Orius laevigatus*, *O. Strigicollis*, *Neoseiulus cucumeris* and others (Malais and Ravensberg, 2003). As it was found that *Neoseiulus cucumeris* is effective for winter cultivation (Messelink et al., 2006), it was applied to summer cultivation. As a result, thrips density could be lowered effectively by release of *Orius laevigatus* and *Neoseiulus cucumeris*. If accurate precautions, facilities and environment as well as appropriate natural enemies are applied, biological control effect using natural enemies on summer cultivation can be enhanced.

Conclusions

Major insects of paprika cultivation in summer season are known as thrips, spider mite, whitefly, rootfly and others (Kim et al., 2008). In Korea, most studies on biological

control of insect occurring in paprika have carried out on winter cultivation, while few studies on summer cultivation. Therefore, this study presents effect of *Orius laevigatus* and *Neoseiulus cucumeris* on biological control of thrips. Thrips start to occur in the early growing season and reaches peak at late June. Control efficacy of *Orius laevigatus* and *Neoseiulus cucumeris*, natural enemies of thrips, was investigated after release of them at June 24 and July 24. The number of thrips decreased considerably from 87 to 36 thrips/trap and from 51 to 40 thrips/ trap after release of natural enemies. The low density of thrips had been maintained until early September by treatment. Control efficacy of *Orius laevigatus* and *Neoseiulus cucumeris* on thrips was 35.7% and 44.6% after first treatment, however the efficacy was increased dramatically to 88.8% and 80.5% with second treatment. So, it is suggested that thrips could be controlled by two time release of *Orius laevigatus* and *Neoseiulus cucumeris* for summer cultivation of paprika.

References

- Choi, M. Y., Kim, J. H. Kim, H. Y., Byeon, Y. W. & Lee. Y. H. (2009): Biological control base IPM of insect pest on sweet pepper in greenhouse in the summer. Korean J. Appl. Entomol. 48(4): 503-508.
- Kim, J. H., Kim, H. Y., Kim, H. Y., Lee, Y. W. & Lee, M. S. (2008): Field application program for the biological control of the pests on sweet pepper (Summer culture type). Ann. Res. NIAST (Agricul. Biol. Res.): 1827-1839.
- Lee, G. H., Paik, C. H., Hwang, C. Y., Choi, C. M., Kim, D. H., Na, S. Y., Kim, S. S. & Choi, I. H. (2003): Effect of host plants on the development and reproduction of *Frankliniella occidentalis* (Pergande) (Thysanoptera: Thripidae). Korean J. Appl. Entomol. 42(4): 301-305.
- Malais, M. & Ravensberg, W. J. (2003): Knowing and recognizing, the biology of grasshopper pests and their natural enemies. Koppert, B. V. 288p.
- Messelink, G. J., Van Steenpaal I.S. E. F. & Ramakers, P. M. J. (2006): Evaluation of phytoseiid predators for control of western flower thrips on greenhouse cucumber. BioControl 51:753-768.
- Moon, H. C., Cho, I. K., Im, J. U., Goh, B. R., Kim D. H. & Hwang, C. Y. (2006): Seasonal occurrence and damage by thrips on open red pepper in Jeonbuk Province. Korean J. Appl. Entomol. 45(1): 9-13.