Effects of Chinese milk vetch (*Astragalus sinicus* L.) cultivation on functional agrobiodiversity in rice paddy fields

Kazuo Matsuno, Hidehiro Inagaki, Tomohiro Ohishi, Tomoki Takahashi
Shizuoka Prefectural Research Institute of Agriculture and Forestry, Shizuoka, Japan
(kazuo1_matsuno@pref.shizuoka.lg.jp / Fax: +81-538-37-8466 / Phone: +81-538-36-1557)

In Europe, functional agrobiodiversity is thought to be an essential resource in sustainable agriculture, and specific indicators of functional agrobiodiversity have been identified. On the other hand, in Japan, the study of indicators of functional agrobiodiversity in agricultural lands was started in 2008. We evaluated the functional agrobiodiversity in rice paddy fields, and considered that wolf spiders (Araneae: Lycosidae), which are natural enemies of rice pests, is one of the indicators of functional agrobiodiversity. In Japan, Chinese milk vetch (*Astragalus sinicus* L.) cultivation is one of the techniques of conservation agriculture in rice paddy fields. Chinese milk vetch is used as green manure and living mulch. Its cultivation is therefore expected to reduce the consumption of chemical fertilizers and herbicides. In this study, we investigated the population of wolf spiders in rice paddy fields with Chinese milk vetch cultivation.

We compared the population of wolf spiders in the following 3 types of rice paddy fields before rice transplanting: (1) non-tillage fields with Chinese milk vetch cultivation, (2) non-tillage fields with a weed community that was dominated by water foxtail (*Alopecurus aequalis* Sobol), and (3) tillage fields with no vegetation. Field studies were conducted in March 2009, using the quadrate method (quadrate size, 1 m × 1 m). For this purpose, we studied 3 sites in Shizuoka Prefecture. In addition, we compared the population of wolf spiders during rice cultivation in (1) non-tillage rice paddy fields with Chinese milk vetch cultivation before rice transplanting and (2) tillage fields with no vegetation before rice transplanting. The soil in these 2 types of fields was puddled. Field studies were conducted every 2 weeks from June to September 2008, using the quadrate method (quadrate size, 1 m × 1 m). This investigation was conducted at 1 site in Shizuoka Prefecture.

Before rice transplanting, there was little difference in the population of wolf spiders between the non-tillage rice paddy fields dominated by water foxtail and the tillage fields with no vegetation. The number of wolf spiders in the non-tillage rice paddy fields with Chinese milk vetch cultivation was larger than that in the other fields. During rice cultivation too, the number of wolf spiders was larger in the fields with Chinese milk vetch cultivation before rice transplanting than in those with no vegetation before rice transplanting. Although only
non-tillage is ineffective for increasing the wolf spider population, these results suggest that a non-tillage field with Chinese milk vetch cultivation could provide the principal habitat for wolf spiders before rice transplanting. Further, it is possible that Chinese milk vetch cultivation before rice transplanting may effect an increase in the population of wolf spiders during rice cultivation. It can be expected that this would lead to a decrease in the population of rice pests. We conclude that Chinese milk vetch cultivation before rice transplanting effects an increase in the population of wolf spiders in rice paddy fields.