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The 21st International Grassland Congress / 8th International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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Effects of agricultural measures on insect diversity of alfalfa

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Key words : insect community, diversity, alfalfa, insecticide, cutting

Introduction Cutting and spraying insecticide are important measures of the scientific management in the alfalfa pasture. Studying characteristic of cutting and spraying insecticide on the impact of diversity of insect communities in alfalfa pasture, has important value for aiding control of alfalfa insect pest. This systematic study was done in Dingxi, Gansu Province, China in 2002.

Materials and methods Nine plots of 3-year-old alfalfa pastures were selected. The treatments consisted of control, one cutting (on June 1), and one spraying (on May 30) of 5% imidacloprid 3 times, with three replications. Every plot was randomly swept 50 times with a sweep net every 10-days from the middle of April to the last ten days of August, and all insect species and numbers were statistically analyzed (Jin et al., 1990; Pimentel, 1973).

Results and discussions The seasonal dynamics of insect community structure in alfalfa fields were investigated with biodiversity measures including Shannon's Index, and evenness. The result showed that at the initial state of spraying, diversity and evenness index of pest sub-community were not different from the control ($P > 0.05$), and they were lower than diversity and evenness indexes of cutting ($P < 0.05$). Spraying not only reduced the populations of dominant insect pests such as aphid, thrips, but also decreased species number. After treatment, due to the lack of natural enemies, the populations of dominant species number of aphid and thrips increased rapidly and exceeded that of control, which caused the diversity and evenness indexes to diverge more and more from that of control, declining to values lower than control during the last ten days of July.

At the first ten days of June, rising temperature sped up the growth of pest numbers, which attained higher levels than the slower increasing natural enemies. The population of dominant insect number such as aphid, thrips and alfalfa plant bugs was the largest. Cutting in this period could effectively reduce the populations of dominant insect pests, and at the same time, increase insect community diversity and evenness to strengthen the insect pest control by natural enemies. The diversity and evenness index of pest sub-communities in alfalfa pasture were at all times higher than in the sprayed and control field ($P < 0.05$), and therefore restrained the populations of insect pests at low levels during the second crop.

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