北京昆虫学会通讯

Newsletter of the Entomological Society of Beijing

第28期　　2016年4月16日

No. 28　　April 16, 2016

北 京 昆 虫 学 会

中国　北京

Effect of wheat-based intercropping systems on pests and natural enemies: a review with a special focus on China

Séverin Hatt[1,2], Thomas Lopes[2], Qinxuan Xu[1,2], Yong Liu[3], Frédéric Francis[2], Julian Chen[1]

(1. State Key Laboratory for Biology of Plant Diseases and Insect Pests, Institute of Plant Protection, Chinese Academy of Agricultural Sciences, 2 West Yuanmingyuan Road, Beijing 100193, P.R. China; 2. Functional and Evolutionary Entomology, Gembloux Agro-Bio Tech, University of Liège, Passage des Déportés 2, B-5030 Gembloux, Belgium; 3. College of Plant Protection, Shandong Agricultural University, 61 Daizong Road, Taian, Shandong 271018, P.R. China.)

Abstract: Intercropping is a farming practice consisting of cultivating at least two plant species simultaneously in the same field, but without necessarily sowing and/or harvesting them at the same time. By increasing plant diversity at the field scale, intercropping may be an efficient method to control insect pests and support natural enemies on the associated crops.

We performed a systematic research of the peer-reviewed literature which studied the effect of intercropping systems on pests and natural enemies, compared to pure stands. The research was restricted to wheat-based systems, as it is an important crop worldwide, and the main one in Northern China.

A total of fifty research papers were obtained from the literature search. Results from a vote-counting analysis, using binomial tests, indicated that pest abundance was significantly reduced in intercropping systems compared with pure stands, but their natural enemies were not particularly favoured (i.e., predators and parasitoids). Among these papers, 23 were studies from China. There, wheat was associated with cotton in relay-intercropping, as well as alfalfa, chili peppers, fava bean, garlic, mung bean, oilseed rape and pea in strip-cropping. Aphids were systematically reduced and natural enemies (i.e., predators and parasitoids) significantly

favoured in intercropping systems compared to pure stands.

This study shows that intercropping is a viable practice to biologically control pests, and potentially support natural enemies, especially in China. Therefore it can be seen as a viable method to reduce insecticide use in wheat production systems.

Keywords: sustainable agriculture, crop diversity, conservation biological control, predators, Parasitoids

气候变暖对冬小麦-麦蚜-天敌互作关系的影响

韩宗礼　徐庆宣　陈巨莲　范　佳　孙京瑞

（中国农业科学院植物保护研究所　北京 100193）

摘要：全球气候变暖已经成为不争的事实。自然条件下，气候变暖对昆虫以及昆虫与寄主和天敌之间的互作关系，鲜有研究。本文采用田间增温试验与历史资料分析，初步探究了自然条件下，气候变暖对麦蚜的种群动态以及不同营养级之间的互作关系的影响。

麦蚜历史资料整理分析，选用河北香河县 18 年的田间麦蚜百株蚜量资料和气象资料。将 1979 年-1999 年 18 年（1989 年未统计）气象资料（4 月中旬至 5 月底）按照平均气温升序的方式分为 3 类（Ⅰ、Ⅱ、Ⅲ），对三类最高气温，最低气温，平均气温，地表温度，相对湿度，降雨量进行方差分析及 Duncan 多重比较。对麦蚜百株蚜量（logx 转化）进行方差分析及 Duncan 多重比较。田间红外辐射增温模拟气候变暖试验：在田间进行随机重复设计，设置 6 个增温小区和 6 个对照小区，小区之间的间隔大于 3m，小区大小 2m×2m。通过悬挂红外辐射灯改变增温小区下冬小麦周围气温，增温小区平均气温比对照小区高 1.79±0.08℃。观察记录小麦群落中小麦不同生育期麦长管蚜、禾谷缢管蚜、燕麦蚜茧蜂、瓢虫以及僵蚜的数量。

历史资料分析可知，Ⅱ类比Ⅰ类的平均温度高 0.85℃，Ⅲ类比Ⅱ类的平均温度高