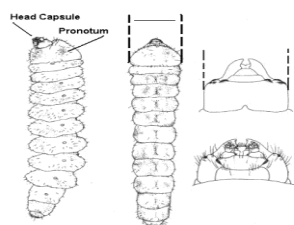


The speciation of agricultural pest insects

The biological term "species"—a category that is also applied to agricultural pests—serves as the fundamental unit of biological classification, yet defining it is unexpectedly difficult. Generally, a species is understood as a reproductively isolated group (the biological species concept; Mayr, 1942); this means that viable offspring can only be reproduced through mating between individuals of the same species.

Here, a study (Niide et al., 2006) that investigated the possibility of speciation in this pest resulting from a shift in host plants is presented in this article.

It is not known how the Dectes stemborer (*D. texanus*), which attacks sunflowers (*H. annuus*) and utilizes plants in the same Asteraceae family including ragweed (*Ambrosia* spp.) and cocklebur (*X. strumarium*) as host plants, had come to adopt the legumene soybean (*G. max*) as a host plant.



Measuring points on head capsule and pronotum

Growers in the U.S. Midwest frequently reported clear differences in adult size among individuals observed in the fields of their respective host crops, with those found in sunflower fields being larger.

If reproductive isolation (exactly speciation) has occurred due to morphological differences—such as body size—resulting from a shift in host plants, there may also be differences in their physiology and ecology (i.e., phenology), potentially necessitating distinct approaches for pest forecasting and control.

Therefore, the authors: 1) Collected a total of approximately 900 final-instar larvae from crop residues of their host plants—soybean and sunflower—in the U.S. Midwest; measured the widths of the larval head capsules and pronotum, as well as the body weights of the larvae,

pupae, and adults, to confirm differences in body size associated with the host plant; and 2) Mated the resulting adults in four patterns—pairing males and females from the same host plant and pairing males and females from different host plants—to observe mating success rates between individuals from the same versus different host plants.

Significant differences were observed in the widths of the head capsules and pronotum of final-instar larvae derived from different host plants, and variations in body weight at



Oviposition bags on sunflowers

specific developmental stages in larval, pupae and adults (ranging from 186% to 212%) were also confirmed.

However, no significant difference was found in mating success rates (34.9% vs. 26.2%) between pairs sharing the same host plant and those derived from different host plants; consequently, based on the definition of a species cited earlier, the conclusion was reached that two populations derived from the different host plants of soybeans and sunflowers did not constitute distinct species.

Due to experimental constraints, all tested female specimens were placed to oviposit on sunflowers, regardless of the host plants from which they were originally collected. Consequently, it was not possible to adequately investigate factors such as: a. oviposition site preference (i.e., whether females that emerged on soybeans show a preference for laying eggs on soybeans); and b. the morphological compatibility of the ovipositor with the host plants (i.e., whether the ovipositor can penetrate the epidermis of different host plants with equal ease).

(May 2025, NIIDE)

Spin-offs from Technical Cooperation Projects

Beyond Predetermined Outcomes: “Call and Response” in Action

Introduction

Technical cooperation projects are generally designed using a logical framework known as the Project Design Matrix (PDM). By organizing activities, outputs, project purposes, and overall goals together with their indicators, the PDM provides a common framework for implementation and evaluation. In JICA technical cooperation projects, it also serves as an important “blueprint” for strengthening the institutions, organizations, and human resources of partner countries.

Through planned cooperation such as technology transfer and institutional development, projects seek to strengthen the capacity of partner countries to address their own challenges. In this sense, the PDM shows the logic and direction of cooperation and can also be regarded as the basic “skeleton” of a project.

In the field, however, things do not always develop exactly as planned in the PDM. As experts work with local counterparts, extension officers, farmers, and rural women, unexpected interactions and responses often emerge. Ideas and technologies introduced by a project are interpreted through people’s own experience and circumstances, and may be reconsidered, adapted, and reshaped through these exchanges.

One way of understanding this dynamic is through the idea of “Call and Response.” A “Call” refers to an initiative or proposition introduced by project experts: a new cultivation technique, an extension approach, an organizational framework, or a concept such as rural women’s empowerment. These “calls invite responses from local counterparts, extension officers, farmers, rural women, and others involved in the project.

The “Response” takes different forms according to local circumstances. A technology may be adapted to available resources, reinterpreted through existing knowledge, or applied in unexpected ways. These responses can, in turn, influence how experts think and act. Repeated “Call and Response” thus turns project implementation from a one way transfer of knowledge and technology into a more interactive and creative process.

Knowledge and technologies are therefore no longer simply things “introduced” from outside. They become

embedded in everyday practices and acquire new meanings in the local context. In other words, they are internalized, and then locally reproduced and adapted by being combined with local resources, knowledge, and ways of doing things.

As cooperation deepens, developments may emerge that cannot be fully captured by the original activities or indicators. These are what we call “spin-offs.” A spin-off is a new activity or practice that emerges from the ideas and actions of participants themselves, either during a project or through its medium- to long-term development.

Although not specified in the PDM, such developments grow out of the knowledge, experience, relationships, and opportunities created through the project. Spin-offs are therefore not simply unplanned “by-products.” Rather, they suggest that what was introduced through cooperation has taken root locally and become a source of new ideas and actions.

Spin-offs can thus be seen as another dimension of the results of technical cooperation. They show how local actors take what they have learned or experienced, give it new meaning, and develop it further on their own initiative. What emerges may differ from what was originally envisioned, yet still reflect—and sometimes deepen—the value of the cooperation.

The value of technical cooperation should therefore not be assessed solely through PDM indicators or project progress. Attention to spontaneous developments from the field allows us to see forms of change that conventional project frameworks may not fully capture, and whether cooperation has truly become rooted in local practice.

This series examines the processes through which spin-offs have emerged in several technical cooperation projects in which we have been involved. What these cases share are changes that emerged through “Call and Response,” followed by new interpretations and voluntary actions by the people involved. By looking closely at these processes, we hope to explore another kind of achievement that emerges beyond predetermined outcomes, and the lasting value that technical cooperation can leave behind.

Our Concept of Resource Management and Its Technical Development <Part 4>

The Potential of Conservation Agriculture for Building Healthy Soil: A Case Study from Laikipia, Kenya

Soil management is key to sustainable agricultural production. Have you ever heard of an approach called conservation agriculture (CA)? FAO defines CA according to three principles. The first is minimum mechanical soil disturbance (no-tillage or reduced tillage); the second is permanent soil cover (cover crops or organic mulch); and the third is diversification of plant species (crop rotation, mixed cropping, and the integration of livestock). These three elements interact with one another, and practicing all three in combination is considered to improve the soil's physical, chemical, and biological properties in an integrated manner.

Since the 1990s, FAO and other international organizations have promoted the introduction of CA through agricultural development projects in many countries, particularly in arid and semi-arid regions. More recently, CA has also attracted attention for its potential as a measure for climate change adaptation and mitigation. The author first learned about this approach in 2018 and has remained interested in it as a means of achieving sustainable agricultural intensification. In the same year, while enrolled in a master's program, the author joined a Pan-African NGO that promotes CA. This article presents experiences from field research conducted in the Laikipia region of central Kenya while working at the NGO.

In semi-arid Laikipia, farmers practice mixed crop-livestock farming centered on maize. In this farming system, securing sufficient soil cover is the first



**Farmers field in Laikipia,
intercropping maize and beans**

barrier to adopting CA. Because crop residues are used as livestock feed, there is a shortage of material for soil cover. Farmers who continued to practice CA found ways to reconcile it with livestock production, such as introducing cover crops or forage grasses, or leaving a certain amount

of crop residue in their fields. Another major practical challenge was access to appropriate farm implements. No-till jab planters, hand rippers, shallow weeders, and other implements for small-scale farmers had been introduced through projects, but they were generally difficult to obtain locally. Farmers therefore responded by working with local blacksmiths to produce implements or by making and modifying them themselves.

Various locally adapted techniques and farmer innovations were observed in this region, where CA projects have been implemented continuously since 2004. It was also considered that these efforts had been supported by a collaborative framework among stakeholders known as an innovation platform (IP).

The author also interviewed farmers who had discontinued CA several years after adopting it (dis-adopters). The main constraints were securing sufficient soil cover material and obtaining appropriate farm implements, and the findings also highlighted a strong need for ongoing technical training and information. These constraints and needs should be given adequate consideration during project design and implementation. The survey also found a tendency among farmers practicing CA to increase their use of inputs such as pesticides and chemical fertilizers. If these inputs are a prerequisite for continuing CA, the approach may not be suitable for resource-constrained small-scale farmers. This point requires caution and further investigation.

Unlike North and South America, where no-till farming expanded commercially alongside large-scale mechanization, CA in Africa has been promoted through projects targeting a diverse range of small-scale farmers. As the Laikipia case demonstrates, establishing CA requires adaptation to the existing farming system in each locality, as well as the corresponding modification of technologies. In this process, mechanisms for generating suitable technologies, as well as project designs that support them, will also be important.

Farm visiting reports <Part 8>

Rooftop garden ~Edible KAYABAEN~

In April 2024, we visited Edible KAYABAEN (KAYABAEN), a rooftop garden in the office district of Kayabacho, Tokyo. KAYABAEN was opened in May 2022 through collaboration among Edible Schoolyard Japan (ESYJ), UNIVERSAL ENGEISHA Co., Ltd., and Heiwa Real Estate Co., Ltd.

ESYJ promotes the “Edible Schoolyard” initiative in Japan, originally developed by Alice Waters in Berkeley, California. Through school garden activities, ESYJ aims to support children’s learning and foster local communities. Meanwhile, Heiwa Real Estate had been exploring ways to make use of rooftop spaces as part of its efforts to revitalize the Kayabacho area. UNIVERSAL ENGEISHA added the idea of creating a place where local children could experience nature and brought ESYJ into the initiative. Through this collaboration, the concept developed into KAYABAEN as a kids’ garden in the heart of Tokyo’s business district.

The garden at KAYABAEN covers approximately 600 m², where more than 150 varieties of crops are grown throughout the year, including cucumbers, blueberries, sweet corn, green beans, arugula, Japanese radish, and sugarcane. As temperatures in central Tokyo are several degrees higher than in surrounding areas, planting schedules are adjusted to cope with the extreme summer heat. In winter, the warmer rooftop temperatures allow crops that normally cannot survive the winter in Tokyo, such as passion fruit and chili peppers, to overwinter.

The garden also contributes to the urban ecosystem, attracting birds and other wildlife. Based on permaculture principles, KAYABAEN practices organic farming and various environmentally friendly activities, including beekeeping, the use of rainwater for a pond, and composting coffee grounds and shredded paper waste from the building.

At the same time, growing crops under rooftop conditions presents several challenges. Blueberries, in particular, require careful management. Due to restrictions on the load that can be placed on the rooftop, the amount of soil available for cultivation is limited. This makes it difficult to maintain sufficient soil moisture, and the soil tends to dry out quickly, especially during hot weather. Soil pH management is another challenge, as blueberries, which

prefer acidic soil, are grown together with other fruit trees with different growing requirements. Despite these constraints, the garden continues to explore practical solutions based on permaculture principles. For example, coffee grounds are applied around the blueberries as one way of improving soil conditions and supporting their growth.

One of the core activities of KAYABAEN as a kids’ garden is providing opportunities for children from the nearby Sakamoto Elementary School in Chuo Ward, Tokyo, to learn through contact with nature. For children studying in this urban area, KAYABAEN seems to provide a relaxing and refreshing space. Second-grade students participate in the “Edible Education” program, where they learn about food and nature through hands-on activities. One child was so happy to visit KAYABAEN that the child called it “heaven.”

Garden plots are also provided for partner companies in and around the building, where employees can experience growing and harvesting crops or enjoy lunch during their lunch breaks. As KAYABAEN is located on the rooftop of an office building, public access is limited. However, weekend events are held both in person and online, providing opportunities for the public to experience KAYABAEN and participate in various community activities.

KAYABAEN goes beyond simple rooftop greening. It contributes to community revitalization, creates new value, and enhances real estate value. Rooftop gardens are becoming increasingly common in urban areas across Japan, and KAYABAEN was introduced as a pioneering example of urban agriculture at the “Edible Tokyo Rally” held in May 2024.

KAYABAEN’s approach to making effective use of the constraints of an urban rooftop provides useful ideas for our activities in Japan and overseas. We hope to apply what we learned from this visit to our future activities.



Rooftop garden surrounded by office buildings