A DATABASE OF THE PEST INSECTS FOUND ON ISOLATED ISLANDS IN KAGOSHIMA PREFECTURE, JAPAN

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Abstract

A pest insect database for isolated islands in Kagoshima Prefecture was developed and made available for public use via the World Wide Web. Most of the insect fauna in this island area is unique and differs from that of central Japan. However, there are few publications with sufficient photographs or biological notes on agricultural pest insects living on such islands. By browsing the database, farmers and non-experts with little knowledge of pest insects can easily search for and identify a pest and get information on the method to control it.

Key words: Pest insect, Database, Isolated islands, Kagoshima, World Wide Web

Introduction

The isolated islands in Kagoshima and Okinawa prefectures, which are located at the southwestern end of Japan, have a subtropical climate. Many tropical crops and fruits that are not grown on the mainland are cultivated on these isolated islands, which are a poorly defended "gateway" to southwestern Japan for pest insects invading from Southeast Asia. The islands are also a source of tropical crops and fruits. Invading pests may find suitable host plants and successfully colonize such islands. To protect plants in Japan, it is important to enumerate the pest insect fauna on these islands, because we need to identify which species might extend their distributions. In the last century, some notorious pest insects have invaded these islands from Southeast Asia, the Philippines, and Oceania, including the sweet potato weevil (*Cylas formicarius*), coconut weevil (*Rhynchophorus ferrugineus*), melon fly (*Dacus cucurbitae*), and sweet potato vine borer (*Omphisa anastomosalis*), and some crops have suffered severe damage in Kagoshima and Okinawa (SAKAE, 1988).

Moreover, many species of migratory pests swarm and invade Japan from the Philippines and southern China every year, including the rice leaf roller (*Cnaphalocrocis medinalis*), brown delphacid (*Nilaparvata lugens*), and army worm (*Spodoptera litura*) (KIRITANI, 2001). They attack many crops in summer and autumn, but are unable to overwinter in Japan. However, greenhouses and the heat island phenomena will help them to colonize and overwinter in Japan.

Every year, a few new pest species are discovered in Japan, and these are reported in special reports from the plant protection office in some prefectures. New crops are introduced to Kagoshima and Okinawa prefectures from tropical areas every year. With the rapid proliferation of information on insect fauna and the introduction of new crops from tropical areas, farmers and pest management experts find it increasingly difficult to identify a pest insect using only printed publications. This paper presents a database system that focuses initially on pest insects distributed in mainland Kagoshima Prefecture and on the islands of Tanegashima, Yakushima, Amami-Oshima, Tokunoshima, and Okinawa. The database includes photographs of pest insects that attack crops, which should aid in pest identification.

The Database

Data were extracted from the literature, primarily from a Japanese atlas and papers published in Japanese journals. Minor data sources included research bulletins and reports from agricultural experiment stations. I took most of the photographs. Each database record consists of 13 fields (Table 1) and includes the scientific and Japanese common names of the pest, the names of the host plant(s), distribution on and off the islands, literature references, photographs of the pest, and control methods.

Table 1. Description of the fields contained in the database.

Field	Content of the field
1.	Taxonomic order of pest insect
2.	Taxonomic family of pest insect
3.	Scientific name of pest insect
4.	Author name describing the pest insect
5.	Japanese common name of pest insect
6.	Scientific name of host plant (crop)
7.	Japanese common name of host plant (crop)
8.	Distribution of isolated islands in Kagoshima Pref. and Okinawa
9.	Primary literature on pest damage and distribution
10.	Secondary literature
11.	Taxonomic and ecological notes
12.	Photograph
13.	Methods for controlling the pest

The database was developed using the commercial database program FileMaker Pro. 5.0. Currently, the database holds about 1,000 records, with photographs of over 50 important pests. Most of the pests are lepidopteran insects (over 900 species). The records can be searched either by inputting key words or by choosing key words from pop-up menus.

Even a beginner with no knowledge of pest insects can find a pest insect by searching for pest information in the database using key words. The database has been designed to fit the needs of farmers, and focuses on pest insects that are distributed on islands in Kagoshima and Okinawa prefectures. There are many publications on pest insects in central Japan; however, few of the insects described in such publications are distributed on isolated islands. There are few publications with sufficient photographs and biological notes on common agricultural pest insects living on islands. Unfortunately, the database does not yet contain sufficient good photographs of living pests attacking crops, but the number of photographs will be increased to facilitate effective use of the database by farmers and non-experts.

Browsing the Database on the WWW

The Japanese version of the database is available on the World Wide Web. Anybody can access it and browse the records. The database is stored on a server at the Kagoshima University Research Center for the Pacific Islands, and is linked to its homepage (http://cpi.kagoshima-u.ac.jp/index.html).

The main menu of the database offers the user five search methods: a key word search (input words) or pop-up menus for searches by the taxonomic order of the pest insect, taxonomic

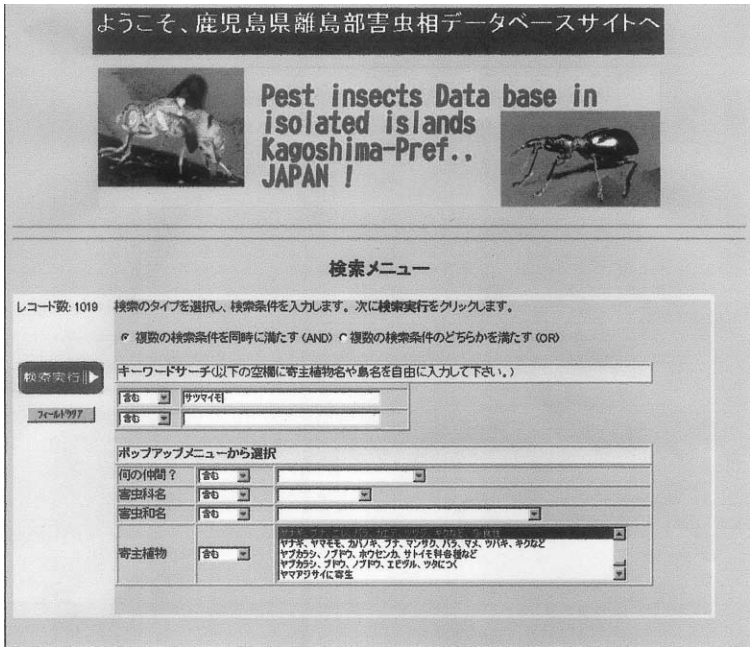

Fig. 1. Top page exhibeted on WWW.

Top page gives search menu. Key words can be inputed in top two blank, and some key words can be selected lower four pop-up menu. In this example host plant name "Satsumayimo (サツマイモ)" is inputted as a key word.

詳細ボタン	科	和名	日本での寄主植物
	タテハチョウ科	リュウキュウムラサキ	サツマイモなど
	ハモグリガ科	ヒルガオハモグリガ	ノアサガオ, マルバアサガオ, サツマイモ
	ハモグリガ科	ノアサガオハモグリガ	ノアサガオ, マルバアサガオ, サツマイモ
	ホソガ科	サツマイモホソガ	サツマイモ
	キバガ科	イモキバガ	サツマイモ(葉), ヒルガオ属
	メイガ科(ツトガ科)	カクモンミスジノメイガ	サツマイモ
	メイガ科(ツトガ科)	サツマイモノメイガ	サツマイモ、モミジヒルガオ、グンバイヒルガオ
	トリバガ科	サツマイモトリバ	サツマイモ
	スズメガ科	エビガラスズメ	サツマイモ、ヒルガオ、アサガオなど
	ミツギリゾウムシ科	アリモドキゾウムシ	サツマイモ、ノアサガオ、グンバイヒルガオなど
	ヘリカメムシ科	ホオズキカメムシ	ナス、トマト、トウガラシ、ホオズキ、アサガオ、サツマイモなど
	ヤガ科	カブラヤガ	ダイコン, カブ, レタス, キャベツ, ハナヤサイ, ネギ, ワケギ, ナス, トマト, ピーマン, ジャガイモ, ニンジン, ゴボウ, サツマイモ, イチゴ, ウリ類, マメ類などのほか, 花卉類全般
	ヤガ科	ナカジロシタバ	サツマイモ、ヒルガオ科各種
	ヤガ科	タマナヤガ	アブラナ科を主とし, ダイコン, カブ, レタス, キャベツ, ハナヤサイ, ネギ, ワケギ, ナス, トマト, ピーマン, ジャガイモ, ニンジン, ゴボウ, サツマイモ, イチゴ, ウリ類など

Fig. 2. A list of search result.

The taxonomic order name, Japanese common name of each pest insect and that of host plants are shown. Button combined square and circle in a left end of each record is linked to detailed information page of each species.

family Japanese common name, and host name (Fig. 1). If any of the last four search methods are selected, all the user need do is choose an item on a menu. If the key word search is selected, the user can search records by inputting information, such as island name, insect name, host name, and so on. For example, if a user inputs the word "サツマイモ", which is the Japanese word for sweet potato, the database exhibits a list of 14 records associated with sweet potato (Fig. 2). The list includes four fields (family name, Japanese common name, scientific name, and host plant in Japan) and one button per record. Each button is linked to detailed information on each species, including photographs. The original database file developed with FileMaker Pro can be manipulated in a manner similar to WWW browsing.

At present, 90% of the records in the database are for lepidopteran insects. More records for insects in other orders will be added in the near future, and an English version of the database will also be added. I plan to extend the database to include islands in neighboring prefectures and surrounding countries in the future.

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