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## Present Status of Brown Planthoppers Control in Taiwan 【Review article】

### 台灣褐飛蟲防治之現況【綜合論述】

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#### Abstract

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#### 摘要

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# Present Status of Brown Planthoppers Control in Taiwan

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The Brown Planthopper (BPH), *Nilaparvata lugens* (Stål) is the major pest of rice in Taiwan. It congregated around the base of rice approximately 10 cm above water and occurs 8-10 generations annually. Besides inflicting damages by feeding on rice and causing "hopper burn", it is also known to transmit grassy stunt disease in some areas. Generally, the population density is very low in the first rice crop. In addition to the local damage of latter rice stage in Taichung and Kaohsiung district, the BPH do not cause severe infestation to the rice production. However, they outbreak in the second rice crop in mid and southern part of Taiwan. Were not control, the loss caused by BPH will be 40% or more in the average. In a word, the rice yield loss will be 2,000 Kg/ha. According to the survey of the second rice crop in 1983, it revealed that there were more than 70,000 hectares of rice infested by BPH. Among the areas infested, those in Changhua, Yunlin, Chiayi, Tainan, Kaohsiung and Pingtung were most severe.

In order to prevent and control planthopper infestation, the following strategies are developed.

## 1. Announcement of incidence forecasting and optimal control stages

- (1) The reproductivity of BPH is so high that it frequently outbreaks in hot and damp condition. Furthermore, it will cause hopper burn within 3 days. Since 1967, the investigation of incidence forecasting is advanced by the Agricultural Improvement Station and will be adopted as reference of optimal control stages.
- (2) The announcement of optimal control stages is from tillering to mature rice stage. Additionally, the meteorological conditions must be 25-30°C of daily average temperature, no or tiny rain on

ten consecutive days and 90% R.H. lasting for three days. The control threshold for the Strain Tainan No. 5 was set at an average of 5 hoppers per hill before heading stage and 10 hoppers per hill after heading.

- (3) As the BPH is the major pest of rice in Taiwan, the forecasting frequency occupies 26% of all of the rice disease and pest control, in the average. Forecasting data be mailed is 21350. Additionally, the proportion of data utilization is 70%. Moreover, severe falling over is scarce in recent years.

## 2. Screening of officially recommended insecticides in field

- (1) To control BPH, the insecticide is still the major measure. The recommended insecticides are more than 68. On the other hand, these insecticides have considerable discrepancy as the surrounding difference, differences between standard insecticides and the recommended insecticide is employed for such a long time that the tolerance of BPH is enhanced. In 1980, we proceed to compare the recommended insecticides in a unanimous environment and choose the best one to recommend to the farmers.
- (2) According to the formulation, concentration and dosage recommended in Plant Protection Manual, the Chiayi Agriculture Experiment Station and Taichung District Agricultural Improvement Station have engaged in the screening test in the second crop. Based on the data obtained, these insecticides have significant difference. Nevertheless, the better are shown as following:

- (a) Emulsifiable Concentrates: 40.64% Furadan F.P., 40% Hokhal E.C., 20% MIPC E.C.
- (b) Wettable Powders: 75% Furadan W.P., 50% Uden W.P., 50% MIPC W.P., 75% Orthene W.P., 40% BPMC W.P.
- (c) Dusting Powders: 1% Uden D., 3.5% Ofunak-M D., 2.5% Kayaphosbassa D.
- (d) Granules: 3% Furadan G., 5% Geofos G., 3% Tribassa, 6% Mipspanon G.

Passing through the BPH incidence forecasting and short-term training for the farmer, the above insecticides have been recommended and well adopted.

- (3) In addition to field screening of new pesticides and rescreening of officially recommended pesticides, the planthopper was found to have become resistant to a number of officially recommended pesticides, such as, Orthane 25% E.C., Dimethoate 44% E.C., Sumicidin 20% E.C. Kestrel 10% E.C., Malathion 50% E.C., etc. Among these, Sumicidin and Kestrel are synthetic pyrethroids which were rarely used in the past in Taiwan. Further studies are, therefore, necessary to elucidate the reason why the planthopper has become resistant to these two pesticides.

### 3. Extension of labor-saving pesticide application

#### (1) Low Volume Spraying

- (a) Among the different insecticide formulations for BPH control, solution and emulsifiable concentrates are widely adopted by the farmers but the spraying method is "high volume". The water consumed is 1000-1200 l/ha. It takes time and labor. Furthermore, it is inconvenient for water defect district. To improve the spraying technique and save labor, the fulfillment of low volume spraying is practical.
- (b) Low volume spraying is to improve the spraying volume and nozzle of a motorized mistblower. Such

spraying will let the particles spray in mist state and smoothly disperse in BPH's habit. Based on the data obtained, the modification of two-way spraying between rows and plants will reduce the volume from 1200 to 100 liters per hectare.

As compared with high volume, it increases the control efficacy 15%. In addition, the low volume method requires only 2 hours per hectare in contrast with the high volume spray method which requires 6-8 hours. This indicates that the low volume application has increased work efficiency by 3-4 times.

#### (2) Dust Application

- (a) Among the insecticide formulations, the most labor-saving is granular application. The BPH incidence is generally in the latter rice stage. Simultaneously, the root is aging and the root's absorption is not satisfied. Consequently, granular application in the latter rice stage is unsuitable for BPH control. Were dust sprayed among the rice stems, it will float, smoothly disperse and increase the contact with BPH. As the rice is luxuriant or lying down, dusting is the most effective and labor-saving.
- (b) To recommend the dusting in BPH control, we subsidized dusting in Taiwan for 5,000 hectares in 1982 and 8,000 hectares in 1983. If only the density attains to 5-10 BPH per hill, dusting is once no matter booting or tidy heading rice stage. The total is twice. According to the investigations, control efficacy is 90% or more and the wages curtailed is NT\$1600. For dusting, the time required is 2-3 hours/hectare and NT\$400-600 in labor cost. However, the time required for fogging is 10-12 hrs/ha and NT\$ 900-1200 in labor cost. In comparison with the two methods of pesticide application, dusting is more efficient and economical.

Therefore, in order to increase control effectiveness and to solve labor shortage in farming community, the dusting method should be used for brown planthopper control.

4. The breeding of BPH resistant rice varieties Extension of high resistant rice varieties is the most economical in pest control. Referring to the BPH resistant rice varieties that have so far been bred are of Japonica type,

including Chia-nun No. 11. Tainan No. 12, Taichung No. 10, Taichung No. 16 and Chia-nun No. 250 of Indica type.

As the special meteorological condition in Taiwan, the reproductivity of BPH is so high that the cost will occupy 70% or more in the whole rice disease and pest control. That will heavily damage the farmer's profit. Therefore, the BPH control in Taiwan is still the major measure in the future.