

THE LEAFHOPPERS AND PLANTHOPPERS OF RICE IN CHINA

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ABSTRACT

The author has collected 67 species of leafhoppers and 22 species of planthoppers on rice in China in the past 20 years. The taxonomy and distribution of some of the more important species are discussed.

For the past 20 years the author has collected leafhoppers and planthoppers from rice. Among the leafhoppers on rice in China, the new genera Parathaia Kuoh and Pseudothaia Kuoh; and the new species Thaia rubiginosa Kuoh, Parathaia bimaculata Kuoh, P. macra Kuoh, P. infumata Kuoh and Pseudothaia striata Kuoh were described. Among the planthoppers, Nilaparvata lineolae Huang & Tian and N. castanea Huang & Ding were new and Kakuna kuwaharai (Ishihara) was established as a new combination.

The 16 commonest species of leafhoppers in rice-fields were found to be Nephotettix cincticeps (Uhler), N. nigropictus (Stal), N. virescens (Distant), Thaia rubiginosa Kuoh, Inazuma dorsalis (Matsumura), Inemadara oryzae (Matsumura), Macrosteles fasciifrons (Stal), M. fuscinervis (Matsumura), Thamnotettix cyclops (Mulsant & Rey), Psammotettix striatus (L.), Empoasca flavescens F., E. pirusuga (Matsumura), Zygina limbata Matsumura, Z. maculifrons (Motschulsky), Tettigella spectra Distant and T. viridis L.

The 10 commonest planthoppers were Nilaparvata lugens Stal, N. bakeri Muir, Sogatella furcifera (Horvath), S. longifurcifera (Esaki & Ishihara), Laodelphax striatella (Fallen), Unkanodes sapporona (Matsumura), Toya propinqua (Fieber), Saccharosydne procerus Matsumura and Tropidocephala brunneipennis Signoret.

The most injurious leafhoppers and planthoppers on rice in China are Nephotettix cincticeps, N. nigropictus, N. virescens, Thaia rubiginosa, M. fasciifrons, Nilaparvata lugens and Sogatella furcifera.

Of these, Nephotettix cincticeps has the broadest distribution, extending from 18° 22' to 51° N. lat. and from 98° 50' to 104° E. long. The distribution of M. fasciifrons is generally similar. The other 3 leafhoppers are confined to more southern and central areas: T. rubiginosa does not extend further north than 35° N. lat., and N. virescens and N. nigropictus no further than 32° 20' lat.. The main outbreak region for N. virescens is in Yunnan Province; N. nigropictus is the major species in Guandong Province; and the main outbreak region for T. rubiginosa is south of 30° N. lat..

Nilaparvata lugens and S. furcifera are widely distributed, because they are migratory but the former does not go north beyond 43° N. lat. or west beyond 102-103° E. long. The latter species is more broadly distributed, occurring in southern regions of Xizang Autonomous Region, but not in Qinghai Province or Xinjiang Uygure Autonomous Region.

The distribution of all these species has been related to geographical features and the host-plant. The cultivated rice plant has been grown in China for 5,000 years, having originated from wild rice in the south and spread progressively to the whole country, so that insect pests spread with it. In the course of their spread, they were subjected to topographic and climatic conditions. Westward extension was affected by the Himalayan and Qinling Mountain Ranges. In the western and northern parts of these mountain ranges, forming the Qinghai-Kizang Plateau, the cold climate and absence of rice ensure the absence of rice planthoppers and leafhoppers also. In the east, in the absence of mountain ranges, the insects have extended far to the north.

Nevertheless, their outbreak areas differ from distributions as a result of their specific characteristics; the main outbreak areas are in the central and southern regions.

The main species of leafhoppers and planthoppers in rice-fields are related to the vast extent of the Chinese territory, its rich fauna, the long history of rice-growing, over a large area, and especially the fact that many leafhopper and planthopper species are polyphagous, many on graminaceous plants other than rice.

The biological and ecological features of these important pest species have been studied; their importance and type of injury; plants attacked; life-history; appearance; habits; outbreak numbers in relation to climate; their host-plants; the breed and growth period of the rice plant; cultivation techniques of rice; and their natural enemies have all been clarified. Some control measures against them have also been suggested.

In connection with the migratory planthoppers N. lugens and S. furcifera, the former has no stage that can overwinter north of the region where average 10°C isotherm occurs in January. Its overwintering regions must be south of the region with the 16°C isotherm, i.e. its northern boundary line is generally 25° N. lat., in cold winters. The boundary line for overwintering in S. furcifera is in the region where the average January temperature is above 8°C, i.e. south of the 26-27°C isotherm.

As to indicator plants, any region where the rice seedling or ratooning rice can be grown in winter supports the overwintering planthoppers. Their migratory routes, take-off and landing, and return route from north to south, have been clarified.