

Aerospace Information Research Institute, Chinese Academy of Sciences

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Vegetation pests and diseases monitoring and forecasting Global

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Pests will occur heavier than diseases on rice

Affected areas are estimated to reach 20.7 million ha

Overview

Integrated with multi-source Earth Observation data, e.g. meteorological data, field data, and remote sensing data (such as GF series in China, MODIS and Landsat series in US, Sentinel series in EU), and self-developed models and algorithms for vegetation pest and disease monitoring and forecasting, the research team constructed the 'Vegetation pests and diseases monitoring and forecasting system', which could regularly release thematical maps and reports on main vegetation pests and diseases at global scale.

This report focuses on remote sensing forecasting of pest and disease occurrence in 38 Asian, European and North American countries that entered the mid-to-late growth stage of rice during October 2022. The results showed that rice planthopper (*Nilaparvata lugens*) and rice blast (*Magnaporthe oryzae*) are the main types of rice pests and diseases, the cumulative occurrence areas of the pest and disease reach 20.7 million hectares, yield

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loss up to 3.4%. Of which, the affected areas of rice planthopper are estimated to reach 15.3 million hectares, accounting for 15% of the total planting area, and the total affected areas of rice blast are estimated to reach 5.3 million hectares, accounting for 5% of the total planting area. Overall, pest will occur heavier than disease. The analyses of specific forecasting results of the spatial distribution and occurrence area of the main pest and disease in 14 major rice producing and pest and disease occurrence countries (India, Thailand, Bangladesh, Myanmar, Vietnam, Philippines, Cambodia, Pakistan, Nepal, Japan, the United States, South Korea, Laos and Iran) are as follows.

Rice planthopper

The distribution, occurrence area and ratio of rice planthopper in main rice production countries is shown in Figure 1 and Table 1. The rice planted area of India is 46 million hectares, the total affected areas of planthopper are estimated to reach 933.3 ten thousand hectares, accounting for 21% of the total planting area, will mainly occur in deccan plateau, gangatic plain, eastern coastal region, and western coastal region. The rice planted area of Bangladesh is 11.3 million hectares, the total affected areas of planthopper are estimated to reach 54.1 ten thousand hectares, accounting for 5% of the total planting area, will mainly occur in gangetic plain and sylhet basin. The rice planted area of Thailand is 10 million hectares, the total affected areas of planthopper are estimated to reach 132.3 ten thousand hectares, accounting for 13% of the total planting area, will mainly occur in single-cropped rice north-eastern region. The rice planted area of Vietnam is 7.3 million hectares, the total affected areas of planthopper are estimated to reach 158.8 ten thousand hectares, accounting for 22% of the total planting area, will mainly occur in northern and southern zone. The rice planted area of Myanmar is 6.7 million hectares, the total affected areas of planthopper are estimated to reach 39 ten thousand hectares, accounting for 6% of the total planting area, will mainly occur in the central plains. The rice planted area of Philippines is 4.7 million hectares, the total affected areas of planthopper are estimated to reach 21.2 ten thousand hectares, accounting

for 5% of the total planting area, will mainly occur in the northern lowland agricultural area. The rice planted area of Cambodia is 3.3 million hectares, the total affected areas of planthopper are estimated to reach 67.3 ten thousand hectares, accounting for 20% of the total planting area, will mainly occur in the main crop producing area. The rice planted area of Pakistan is 3.3 million hectares, the total affected areas of planthopper are estimated to reach 43.7 ten thousand hectares, accounting for 13% of the total planting area, will mainly occur in northern Punjab. The rice planted area of Nepal is 1.3 million hectares, the total affected areas of planthopper are estimated to reach 3.5 ten thousand hectares, accounting for 3% of the total planting area, will mainly occur in the junction of Nepal and the gangatic plain. The rice planted area of Japan is 1.3 million hectares, the total affected areas of planthopper are estimated to reach 13.8 ten thousand hectares, accounting for 10% of the total planting area, will mainly occur in central zone. The rice planted area of South Korea is 0.7 million hectares, the total affected areas of planthopper are estimated to reach 12.1 ten thousand hectares, accounting for 18% of the total planting area, will mainly occur in southern zone. The rice planted area of Laos is 0.7 million hectares, the total affected areas of planthopper are estimated to reach 33.9 ten thousand hectares, accounting for 51% of the total planting area, will mainly occur in central zone and southern zone.

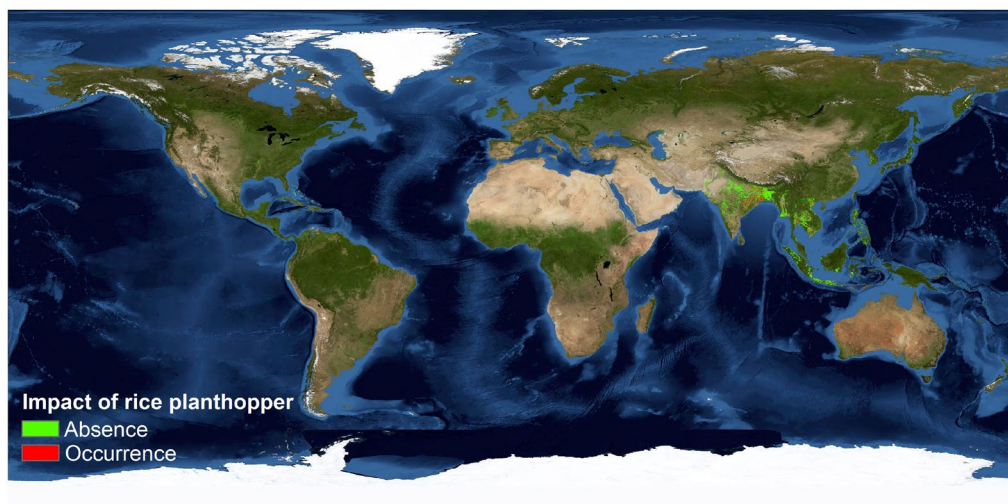


Figure 1 Spatial distribution of rice planthopper in rice production countries

Rice blast

The distribution, occurrence area and ratio of rice blast in main rice production countries is shown in Figure 2 and Table 1. The total affected areas of blast in India are estimated to reach 202 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in the gangatic plain. The total affected areas of blast in Bangladesh are estimated to reach 49.6 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in coastal region and gangetic plain. The total affected areas of blast in Thailand are estimated to reach 43.5 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in central double and triple-cropped rice lowlands, south-eastern horticulture area and central tonle-sap plain. The total affected areas of blast in Vietnam are estimated to reach 68.4 ten thousand hectares, accounting for 9% of the total planting area, will mainly occur in northern and southern zone. The total affected areas of blast in Myanmar are estimated to reach 37.3 ten thousand

hectares, accounting for 6% of the total planting area, will mainly occur in central plain and delta and southern-coast. The total affected areas of blast in Philippines are estimated to reach 7.4 ten thousand hectares, accounting for 2% of the total planting area, will mainly occur in lowlands and hills. The total affected areas of blast in Cambodia are estimated to reach 42.3 ten thousand hectares, accounting for 13% of the total planting area, will mainly occur in central tonle-sap plain and upland areas. The total affected areas of blast in Pakistan are estimated to reach 38.9 ten thousand hectares, accounting for 12% of the total planting area, will mainly occur in north Punjab. The total affected areas of blast are in Nepal estimated to reach 4.8 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in central and eastern zone. The total affected areas of blast in Japan are estimated to reach 18.2 ten thousand hectares, accounting for 14% of the total planting area, will mainly occur in central zone. The rice

planted area of the United States is 0.7 million hectares, the total affected areas of blast are estimated to reach 11.9 ten thousand hectares, accounting for 18% of the total planting area, will mainly occur in lower Mississippi. The total affected areas of blast in South Korea are estimated to reach 5.8 ten thousand hectares, accounting for 9% of the total planting area, will mainly occur in southern zone. The total

affected areas of blast in Laos are estimated to reach 3.3 ten thousand hectares, accounting for 5% of the total planting area, will mainly occur in southern Laos. The rice planted area of Iran is 0.7 million hectares, the total affected areas of blast are estimated to reach 4.7 ten thousand hectares, accounting for 7% of the total planting area, will mainly occur in western and northern regions of Iran.

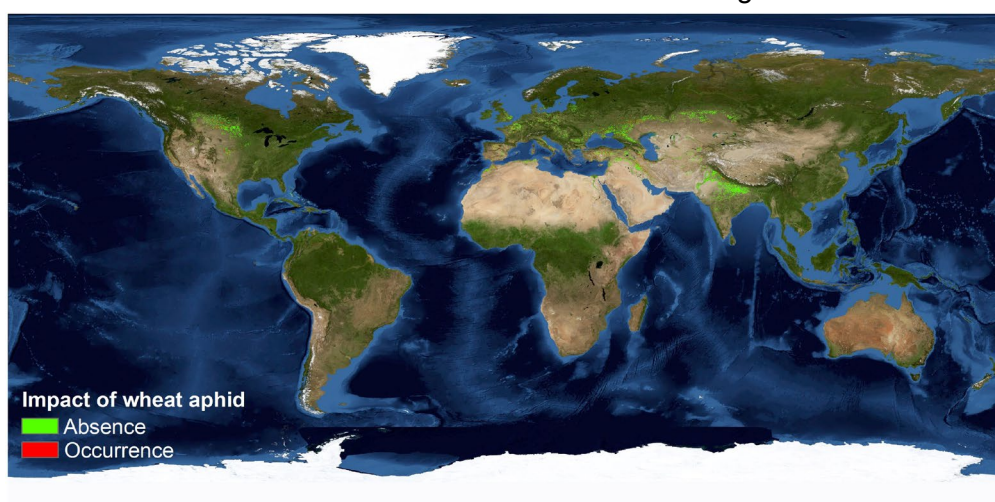


Figure 2 Spatial distribution of rice blast in rice production countries

Table 1 Statistics of rice blast and planthopper in main rice production countries

Rice production countries	Planthopper occurrence area and ratio		Blast occurrence area and ratio		Total planting area / million hectares
	Area / ten thousand hectares	Ratio / %	Area / ten thousand hectares	Ratio / %	
India	933.3	21	202	4	46
Bangladesh	54.1	5	49.6	4	11.3
Thailand	132.3	13	43.5	4	10
Vietnam	158.8	22	68.4	9	7.3
Myanmar	39	6	37.3	6	6.7
Philippines	21.2	5	7.4	2	4.7
Cambodia	67.3	20	42.3	13	3.3
Pakistan	43.7	13	38.9	12	3.3
Nepal	3.5	3	4.8	4	1.3
Japan	13.8	10	18.2	14	1.3
United States	/	/	11.9	18	0.7
South Korea	12.1	18	5.8	9	0.7
Laos	33.9	51	3.3	5	0.7
Iran	/	/	4.7	7	0.7

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Mission statements

As the science and knowledge service, the Sino-UK Crop Pest and Disease Forecasting & Management Joint Laboratory is to support independent evidence for crop monitoring.

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