Aerospace Information Research Institute, Chinese Academy of Sciences

Key laboratory of Digital Earth Science, Chinese Academy of Sciences

National Engineering Research Center for Agro-Ecological Big Data Analysis & Application

State Key Laboratory of Remote Sensing Science

Key Laboratory of Forest and Grassland Pest Monitoring and Warning

Sino-UK Crop Pest and Disease Forecasting & Management Joint Laboratory

Key Lab of Aviation Plant Protection, Ministry of Agriculture and Rural Affairs, P.R. China

Vegetation pests and diseases monitoring and forecasting Global

May 2022

Pests will occur heavier than diseases on winter wheat
Affected areas are estimated to reach 25 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 monitoring and forecasting of pest and disease occurrence in the main producing countries entering the middle and late growth stage of

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wheat during May 2022. The results showed that occurrence areas of rust and aphid are estimated to reach 25 million hectares, will mainly occur in India, Russia, United States, Kazakhstan, Canada, Pakistan, Turkey, Iran, Ukraine, France, Germany, Morocco, Poland, Afghanistan, Romania, Spain, Italy, United Kingdom, Iraq and Uzbekistan. Among them, the total affected areas of rust are estimated to reach 8 million hectares, accounting for 5% of the total planting area, and the total affected areas of aphid are estimated to reach 17 million hectares, accounting for 11% of the total planting area during May 2022. Overall,

pest will occur heavier than disease. The specific research results of spatial distribution and occurrence area are as follows.

Wheat rust

The distribution, occurrence area and ratio of wheat rust in main wheat production countries is shown in Figure 1 and Table 1. The wheat planted area of India is 29 million hectares, the total affected areas of rust are estimated to reach 111 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in Gangatic plain and Western Himalayan region. The wheat planted area of Russia is 27 million hectares, the total affected areas of rust are estimated to reach 112 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in the Caucasus. The wheat planted area of the United States is 15 million hectares, the total affected areas of rust are estimated to reach 135 ten thousand hectares, accounting for 9% of the total planting area, will mainly occur in Corn Belt, Northern Plains, Southern Plains, and Northwest. The wheat planted area of Kazakhstan is 11 million hectares, the total affected areas of rust are estimated to reach 36 ten thousand hectares, accounting for 3% of the total planting area, will mainly occur in northern zone. The wheat planted area of Canada is 10 million hectares, the total affected areas of rust are estimated to reach 60 ten thousand hectares, accounting for 6% of the total planting area, will mainly occur in Prairies. The wheat planted area of Pakistan is 9 million hectares, the total affected areas of rust are estimated to reach 83 ten thousand hectares, accounting for 9% of the total planting area, will mainly occur in Northern Punjab, and Lower Indus River basin in south Punjab and Sind. The wheat planted area of Turkey is 7 million hectares, the total affected areas of rust are estimated to reach 28 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in Central Anatolia region. The wheat planted area of Iran is 7 million hectares, the total affected areas of rust are estimated to reach 79 ten thousand hectares, accounting for 12% of the total planting area, will mainly occur in Semi-arid to sub-tropical hills of the west and the north. The wheat planted area of Ukraine is 7 million hectares, the total affected areas of rust are estimated to reach 27 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in Southern wheat and maize area. The wheat planted area of France is 5 million hectares, the total affected areas of rust are estimated to reach 32 ten thousand hectares, accounting for 7% of the total planting area, will mainly occur in Northern barley zone, Mixed maize/barley and rapeseed zone from the Centre to the Atlantic Ocean, and Rapeseed zone of eastern France. The wheat planted area of Germany is 3 million hectares, the total affected areas of rust are estimated to reach 14 ten thousand hectares, accounting for 5% of the total planting area, will mainly occur in Central wheat zone of Saxony and Thuringia, Sparse crop area of the east-German lake and Heathland, and Bavarian Plateau. The wheat planted area of

Morocco is 3 million hectares, the total affected areas of rust are estimated to reach 8 ten thousand hectares, accounting for 3% of the total planting area, will mainly occur in northwestern region. The wheat planted area of Poland is 3 million hectares, the total affected areas of rust are estimated to reach 10 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in Central rye and potatoes area and Southern wheat and sugar beet area. The wheat planted area of Afghanistan is 3 million hectares, the total affected areas of rust are estimated to reach 22 ten thousand hectares, accounting for 8% of the total planting area, will mainly occur in eastern region. The wheat planted area of Romania is 2 million hectares, the total affected areas of rust are estimated to reach 3 ten thousand hectares, accounting for 2% of the total planting area, will mainly occur in Western and central maize, wheat and sugar beet plateau, and Eastern and southern maize, wheat and sugar beet plains. The wheat planted area of Spain is 2 million hectares, the total affected areas of rust are estimated to reach 8 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in northern and eastern regions. The wheat planted area of Italy is 2 million hectares, the total affected areas of rust are estimated to reach 7 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in central region. The wheat planted area of United Kingdom is 2 million hectares, the total affected areas of rust are estimated to reach 13 ten thousand hectares, accounting for 7% of the total planting area, will mainly occur in South English mixed wheat and Barley zone. The wheat planted area of Iraq is 2 million hectares, the total affected areas of rust are estimated to reach 14 ten thousand hectares, accounting for 7% of the total planting area, will mainly occur in northern region. The wheat planted area of Uzbekistan is 1 million hectares, the total affected areas of rust are estimated to reach 10 ten thousand hectares, accounting for 7% of the total planting area, will mainly occur in Eastern hilly cereals zone.
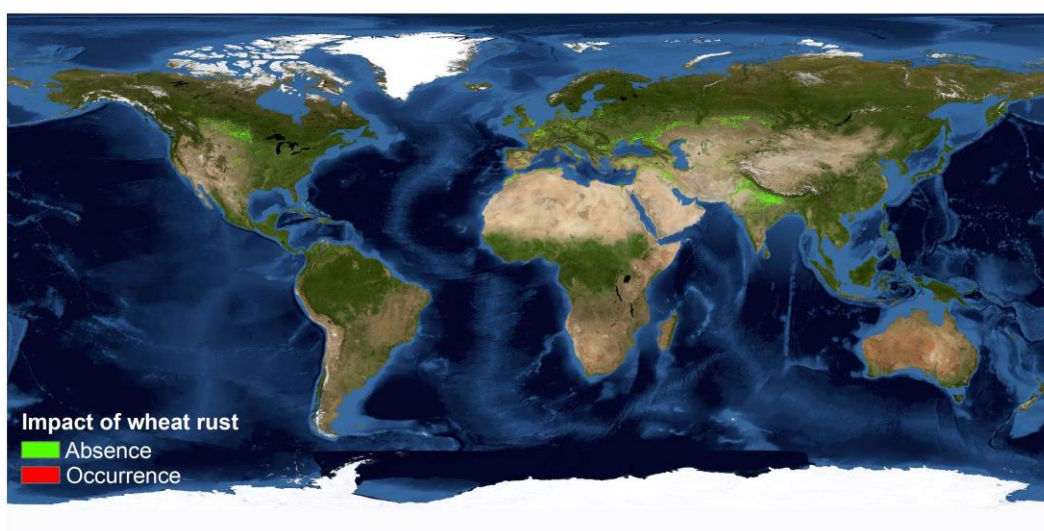

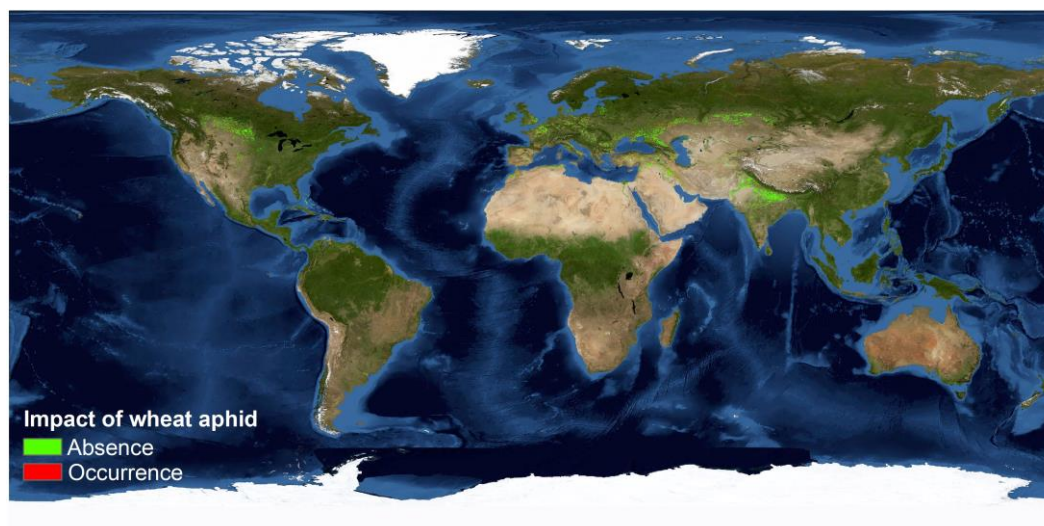**Figure 1** *Spatial distribution of wheat rust in winter wheat production countries*

Wheat aphid

The distribution, occurrence area and ratio of wheat aphid in main wheat production countries is shown in Figure 2 and Table 1. The total affected areas of aphid in India are estimated to reach 122 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in Western Himalayan region, and Gangatic plain. The total affected areas of aphid in Russia are estimated to reach 325 ten thousand hectares, accounting for 12% of the total planting area, will mainly occur in the Caucasus, and Volga Basin. The total affected areas of aphid in United States are estimated to reach 202 ten thousand hectares, accounting for 13% of the total planting area, will mainly occur in Northern and Southern Plains. The total affected areas of aphid in Kazakhstan are estimated to reach 58 ten thousand hectares, accounting for 5% of the total planting area, will mainly occur in Eastern plateau and southeastern zone, and Northern zone. The total affected areas of aphid in Canada are estimated to reach 77 ten thousand hectares, accounting for 8% of the total planting area, will mainly occur in Prairies. The total affected areas of aphid in Pakistan are estimated to reach 58 ten thousand hectares, accounting for 6% of the total planting area, will mainly occur in Lower Indus River basin in south Punjab and Sind, and Northern Punjab. The total affected areas of aphid in Turkey are estimated to reach 143 ten thousand hectares, accounting for 20% of the total planting area, will mainly occur in Central Anatolia region. The total affected areas of aphid in Iran are estimated to reach 204 ten thousand hectares, accounting for 31% of the total planting area, will mainly occur in semi-arid to sub-tropical hills of the west and the north. The total affected areas of aphid in Ukraine are estimated to reach 107 ten thousand hectares, accounting for 16% of the total planting area, will mainly occur in Southern wheat and maize area. The total affected areas of aphid in France are estimated to reach 58 ten thousand hectares, accounting for 13% of the total planting area, will mainly occur in Mixed maize/barley and rapeseed zone from the Centre to the Atlantic Ocean, Southwest maize zone. The total affected areas of aphid in Germany are estimated to reach 20 ten thousand hectares, accounting for 7% of the total planting area, will mainly occur in Central wheat zone of Saxony and Thuringia, Sparse crop area of the east-German lake and Heathland, and Bavarian Plateau. The total affected areas of aphid in Morocco are estimated to reach 70 ten thousand hectares, accounting for 26% of the total planting area, will mainly occur in northwestern region. The total affected areas of aphid in Poland are estimated to reach 17 ten thousand hectares, accounting for 7% of the total planting area, will mainly occur in Central rye and potatoes area, and Southern wheat and sugar beet area. The total affected areas of aphid in Afghanistan are estimated to reach 49 ten thousand hectares, accounting for 18% of the total planting area, will

mainly occur in northeastern region. The total affected areas of aphid in Romania are estimated to reach 37 ten thousand hectares, accounting for 18% of the total planting area, will mainly occur in Eastern and southern maize, wheat and sugar beet plains, and Western and central maize, wheat and sugar beet plateau. The total affected areas of aphid in Spain are estimated to reach 47 ten thousand hectares, accounting for 24% of the total planting area, will mainly occur in northern and eastern regions. The total affected areas of aphid in Italy are estimated to reach 40 ten thousand hectares, accounting for 20% of the total planting area, will mainly occur in central and southern regions. The total affected areas of aphid in United Kingdom are estimated to reach 7 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in South English mixed wheat and Barley zone. The total affected areas of aphid in Iraq are estimated to reach 10 ten thousand hectares, accounting for 5% of the total planting area, will mainly occur in eastern region. The total affected areas of aphid in Uzbekistan are estimated to reach 17 ten thousand hectares, accounting for 13% of the total planting area, will mainly occur in eastern region of Eastern hilly cereals zone.

Figure 2 *Spatial distribution of wheat aphid in winter wheat production countries*

Table 1 *Statistics of wheat rust and aphid in main winter wheat production countries*

Winter wheat production countries	Rust occurrence area and ratio		Aphid occurrence area and ratio		Total planting area / million hectares
	Area / ten thousand hectares	Ratio / %	Area / ten thousand hectares	Ratio / %	
India	111	4	122	4	29
Russia	112	4	325	12	27
United States	135	9	202	13	15
Kazakhstan	36	3	58	5	11
Canada	60	6	77	8	10
Pakistan	83	9	58	6	9
Turkey	28	4	143	20	7

Iran	79	12	204	31	7
Ukraine	27	4	107	16	7
France	32	7	58	13	5
Germany	14	5	20	7	3
Morocco	8	3	70	26	3
Poland	10	4	17	7	3
Afghanistan	22	8	49	18	3
Romania	3	2	37	18	2
Spain	8	4	47	24	2
Italy	7	4	40	20	2
United Kingdom	13	7	7	4	2
Iraq	14	7	10	5	2
Uzbekistan	10	7	17	13	1

Contact us

Aerospace Information Research Institute
Chinese Academy of Sciences

No.9 Dengzhuang South Road, Haidian District,
Beijing 100094, P.R.China.
http://www.rscrop.com/
http://www.rscropmap.com

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The Vegetation Pests and Diseases Monitoring and Forecasting system are available under:
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Contact us   **Email:** rscrop@aircas.ac.cn
Corresponding author
Professor Wenjiang Huang
Aerospace Information Research Institute, Chinese Academy of Sciences
Email: huanwj@aircas.ac.cn
Tel: +86-10-82178178
FAX: +86-10-82178177

Main contributors