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Vegetation pests and diseases monitoring and forecasting Global

April to May 2021

Pests will occur heavier than diseases on winter wheat

Affected areas are estimated to reach 23 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 wheat during April to May 2021. The results showed that from April to May 2021, the total occurrence areas of rust and aphid are estimated to reach 23 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 7 million hectares, accounting for 4% of the total planting area, and the total affected areas of aphid are estimated to reach 16 million hectares, accounting for 10% of the total planting area. Overall, pest will occur heavier than disease. The specific research results are as follows.

Content

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 94 ten thousand hectares, accounting for 3% of the total planting area, will mainly occur in Gangatic plain, North-western dry region or Rajastan and Gujarat, and Western Himalayan region. The wheat planted area of Russia is 27 million hectares, the total affected areas of rust are estimated to reach 81 ten thousand hectares, accounting for 3% 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 87 ten thousand hectares, accounting for 6% of the total planting area, will mainly occur in Corn Belt, Northern Plains, Southern Plains, and Lower Mississippi. The wheat planted area of Kazakhstan is 11 million hectares, the total affected areas of rust are estimated to reach 12 ten thousand hectares, accounting for 1% 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 49 ten thousand hectares, accounting for 5% 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 79 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 21 ten thousand hectares, accounting for 3% of the total planting area, will mainly occur in Eastern Anatolia region. The wheat planted area of Iran is 7 million hectares, the total affected areas of rust are estimated to reach 81 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 17 ten thousand hectares, accounting for 3% 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 29 ten thousand hectares, accounting for 6% 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 11 ten thousand hectares, accounting for 4% of the total planting area, will mainly occur in Central wheat zone of Saxony and Thuringia, Western sparse crop area of the Rhenish massif, and Bavarian Plateau. The wheat planted area of Morocco is 3 million hectares, the total affected areas of rust are estimated to reach 5 ten

thousand hectares, accounting for 2% of the total planting area, will mainly occur in northwestern region. The wheat planted area of Poland is 2 million hectares, the total affected areas of rust are estimated to reach 6 ten thousand hectares, accounting for 3% of the total planting area, will mainly occur in Central rye and potatoes area. The wheat planted area of Afghanistan is 2 million hectares, the total affected areas of rust are estimated to reach 20 ten thousand hectares, accounting for 9% 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 1% 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 6 ten thousand hectares, accounting for 3% of the total planting area, will mainly occur in northern and central regions. The wheat planted area of Italy is 2 million hectares, the total affected areas of rust are estimated to reach 5 ten thousand hectares, accounting for 3% 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, and Sparse crop area of N England, Wales and N. Ireland. The wheat planted area of Iraq is 2 million hectares, the total affected areas of rust are estimated to reach 12 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 9 ten thousand hectares, accounting for 6% of the total planting area, will mainly occur in Eastern hilly cereals zone.

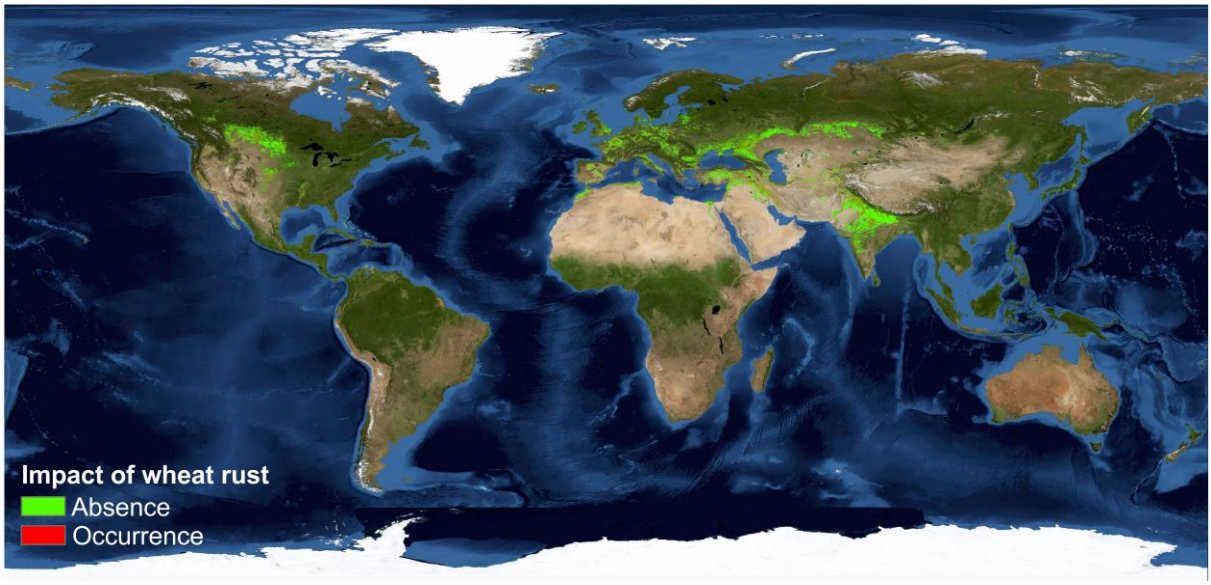

Figure 1 *Spatial distribution of wheat rust in winter wheat production countries*

Wheat aphid

The distribution, occurrence area and ratio of wheat aphid in main wheat production countries is shown in Figure 1 and Table 1. The total affected areas of aphid in India are estimated to reach 79 ten thousand hectares, accounting for 3% of the total planting area, will mainly occur in North-western dry region or Rajastan and Gujarat, and Western coastal region. The total affected areas of aphid in Russia are estimated to reach 291 ten thousand hectares, accounting for 11% 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 169 ten thousand hectares, accounting for 11% of the total planting area, will mainly occur in Southern Plains. The total affected areas of aphid in Kazakhstan are estimated to reach 28 ten thousand hectares, accounting for 2% of the total planting area, will mainly occur in Eastern plateau and southeastern zone. The total affected areas of aphid in Canada are estimated to reach 48 ten thousand hectares, accounting for 5% of the total planting area, will mainly occur in Prairies. The total affected areas of aphid in Pakistan are estimated to reach 52 ten thousand hectares, accounting for 6% of the total planting area, will mainly occur in Northern highlands, and Northern Punjab. The total affected areas of aphid in Turkey are estimated to reach 125 ten thousand hectares, accounting for 17% of the total planting area, will mainly occur in Central Anatolia region. The total affected areas of aphid in Iran are estimated to reach 186 ten thousand hectares, accounting for 28% 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 90 ten thousand hectares, accounting for 14% 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 62 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 16 ten thousand hectares, accounting for 6% of the total planting area, will mainly occur in Central wheat zone of Saxony and Thuringia, Western sparse crop area of the Rhenish massif, and Bavarian Plateau. The total affected areas of aphid in Morocco are estimated to reach 63 ten thousand hectares, accounting for 24% of the total planting area, will mainly occur in northwestern region. The total affected areas of aphid in Poland are estimated to reach 11 ten thousand hectares, accounting for 5% of the total planting area, will mainly occur in Central rye and potatoes area, and Southern wheat and sugarbeet area. The total affected areas of aphid in Afghanistan are estimated to reach 50 ten thousand hectares, accounting for 21% of the total planting area, will mainly occur in northeastern region. The total affected areas of

aphid in Romania are estimated to reach 33 ten thousand hectares, accounting for 15% 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 44 ten thousand hectares, accounting for 23% 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 38 ten thousand hectares, accounting for 21% 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 9 ten thousand hectares, accounting for 6% of the total planting area, will mainly occur in eastern region. The total affected areas of aphid in Uzbekistan are estimated to reach 16 ten thousand hectares, accounting for 11% of the total planting area, will mainly occur in eastern region of Eastern hilly cereals zone.

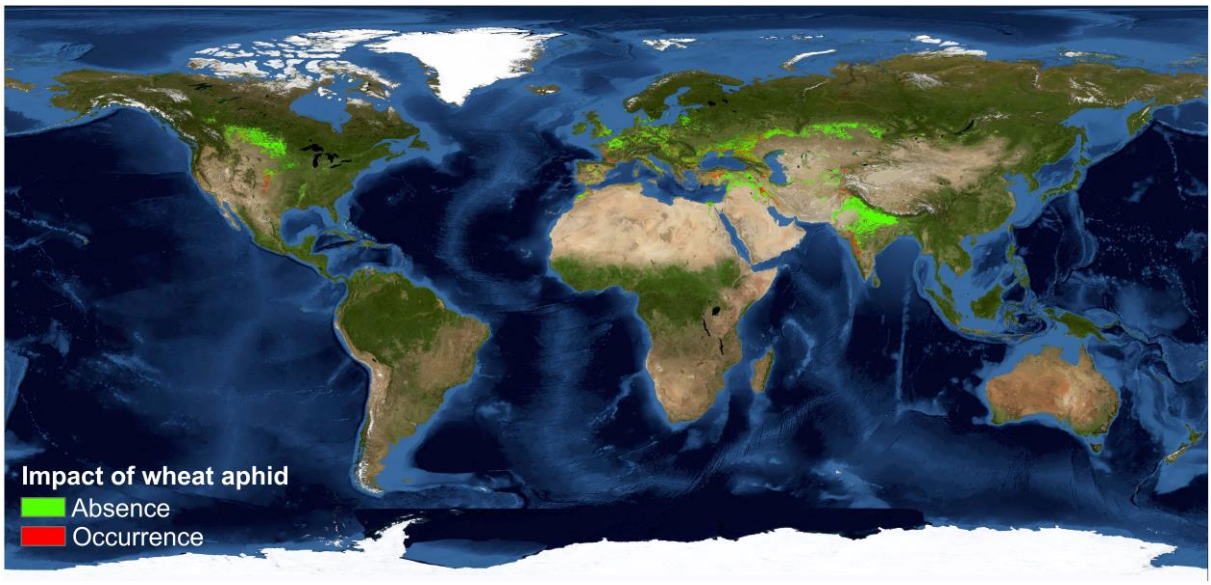

Figure 2 *Spatial distribution of wheat aphid in winter wheat production countries*

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	94	3	79	3	29
Russia	81	3	291	11	27
United States	87	6	169	11	15
Kazakhstan	12	1	28	2	11
Canada	49	5	48	5	10
Pakistan	79	9	52	6	9
Turkey	21	3	125	17	7

Iran	81	12	186	28	7
Ukraine	17	3	90	14	7
France	29	6	62	13	5
Germany	11	4	16	6	3
Morocco	5	2	63	24	3
Poland	6	3	11	5	2
Afghanistan	20	9	50	21	2
Romania	3	1	33	15	2
Spain	6	3	44	23	2
Italy	5	3	38	21	2
United Kingdom	13	7	7	4	2
Iraq	12	7	9	6	2
Uzbekistan	9	6	16	11	1

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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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