Crop pests and diseases monitoring and forecasting Global

Early April 2020

Desert Locust monitoring and loss assessment in Somalia and Pakistan

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 Desert Locust monitoring and forecasting, the research team constructed the 'Crop pests and diseases monitoring and forecasting system', which could regularly release thematical maps and reports on Desert Locust.

This report focuses on the locust plagues in Somalia and Pakistan. The results showed that, by the end of March 2020, 11 states in Somalia had been harmed since Desert Locusts invaded northern Somalia in June 2019. The vegetation damaged area is 2239.4 thousand hectares, including 9.3 thousand hectares of cropland, 596.7 thousand hectares of grassland and 1633.4 thousand hectares of shrub, accounting for 9.6%, 15.3% and 3.7% of the total cropland, grassland and shrub in Somalia, respectively. In March 2020, Desert Locust in Pakistan harmed about 449.5

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thousand hectares of vegetation area (including 374.1 thousand hectares of cropland and 75.4 thousand hectares of grassland), mainly distributed in Punjab, Khyber-Pakhtunkhwa, Federally Administered Tribal Areas in northern Pakistan and Baluchistan in the southwest. At present, locust spring breeding is underway in Somalia and Pakistan. Considering that April is the best period for Desert Locust control, it's very important for Somalia and Pakistan to focus on locust hatching and conduct monitoring, warning, prevention and control of locusts during this month. April-June is an important growing or harvesting season for wheat and corn in both countries. If not controlled properly, locusts will bring major threat to agricultural and pasture production national economy and the people's

livelihood. It is necessary to continue the monitoring and early warning of intercontinental Desert Locust plague and organize joint prevention and control in multiple countries to ensure the safety of agricultural and pasture production and regional stability.

Monitoring and assessment of Desert Locust in Somalia

In May 2018, the tropical cyclone brought lots of rainfall to northern Somalia. The increasing vegetation provided suitable conditions for locust breeding. In September, Desert Locust began breeding locally in Berbera (northwestern Somalia).

From June to July 2019, mature locust swarms of Yemen moved southward across the Gulf of Aden to northern Somalia. Mature locust swarms appeared along the coast of Bosaso in the northeast and Berbera in the northwest. In early August, a group of swarms on the northwestern coast of Somalia migrated to eastern Ethiopia. At the end of August, swarms appeared on the plateau between Boroma and Burao in the northwest. There were many adults on the east coast of Berbera and swarms continue to breed on the plateau between Hadaaftimo and Iskushuban in the northeast. Till the end of September, locusts had invaded Awdal, Woqooyi Galbeed, Togdheer, Sanaag and Bari in northern Somalia. Grassland and cropland were severely affected, with a damage area of 494.4 thousand hectares (2.7 thousand hectares of cropland, 38.5 thousand hectares of grassland, and 453.2 thousand hectares of shrub). In mid-to late October, swarms in Ethiopia migrated southeast to Bohotley at the border between Somalia and Ethiopia, as well as Laascaanood

in northern Somalia. In November, swarms in eastern Ethiopia continued to multiply and spread to Gaalkacyo in central Somalia. In early December, locusts spreaded to Dhuusa Mareeb and Beled Weyne. At the end of December, locusts in eastern Ethiopia and central Somalia migrated southward through Huddur to Garbaharey. The newly added damaged area was about 940.8 thousand hectares (3.2 thousand hectares of cropland, 307.7 thousand hectares of grassland, and 629.9 thousand hectares of shrub).

In January 2020, swarms in central and southern Somalia continued to migrate south to the middle of Jubbada Dhexe at the border of southern Somalia and northeastern Kenya; theycontinued to move to northeastern Kenya and began to lay eggs. At the end of January, locusts appear in the Garowe of northeast Somalia. In February, the locusts in Beledwin and Galkayo of central Somalia continued to multiply, and the immature locust population was found in northeast Garowe. In March, locusts continued to breed in northeastern, central and southern Kenya. Till the end of March, damaged area in Somalia had increased by about 804.2 thousand hectares (3.4 thousand hectares of cropland, 250.5 thousand hectares of grassland and 550.3 thousand hectares of shrub), shown in Fig 1 and Fig 2.

Our results showed that by the end of March, the locusts had affected 2239.4 thousand hectares of vegetation area in Somalia, including 9.3 thousand hectares of cropland, 596.7 thousand hectares of grassland and 1633.4 thousand hectares of shrub, accounting for 9.6%, 15.3% and 3.7% of the total cropland, grassland and shrub,

respectively. Gedo, a region in southern Somalia on its border with northeastern Kenya, suffered the largest area as 440.1 thousand hectares. There are about 304.2 and 299.2 thousand hectares of damaged area in Togdheer and Woqooyi Galbeed respectively, The damaged area in Mudug and Bakool are about 211.6 thousand hectares and 177.2 thousand hectares. The damaged areas in Sanaag and Sool are about 133.7 thousand hectares and 132.9 thousand hectares. The damaged areas in Bay and Galguduud are about 120.7 thousand hectares and 112.5 thousand hectares. The damaged areas in Awdal and Bari are about 90.3 thousand hectares and 88.1 thousand hectares. The damaged areas in Hiiraan, Shabeellaha Dhexe, Jubbada Dhexe and Nugaal are about 87.7 thousand hectares, 25.7 thousand hectares, 11.9 thousand hectares and 3.6 thousand hectares respectively. The locust plague has devastated pastureland and cropland in Somalia, causing huge losses to local farming and animal husbandry. It was the worst locust disaster in Somalia for the past 25 years, exacerbating the food and nutrition crisis of the local vulnerable groups.

Comprehensive analysis showed that, from April to June 2020, the Desert Locust in northern, central and southern Somalia will continue its spring breeding. It is expected that the swarms will migrate to summer breeding areas in northeastern Ethiopia, Djibouti and the southern coast of Yemen from April to June. At the same time, the locusts in the spring breeding area of the central Somalia are expected to migrate towards the Indo-Pakistan border with the southwest monsoon of the Indian Ocean in June. At present, a large number of locusts in Somalia have laid eggs on the ground and the next generation of spring breeding has already begin. If not controlled effectively, the locust plague will continue, which may bring a heavy blow to the agricultural and pasture production in Somalia.
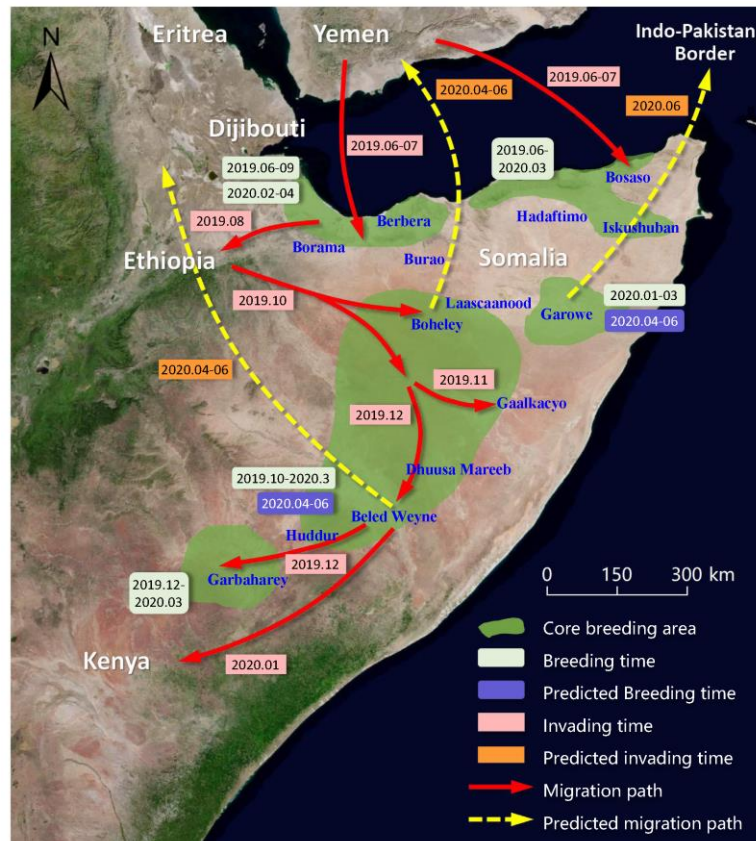
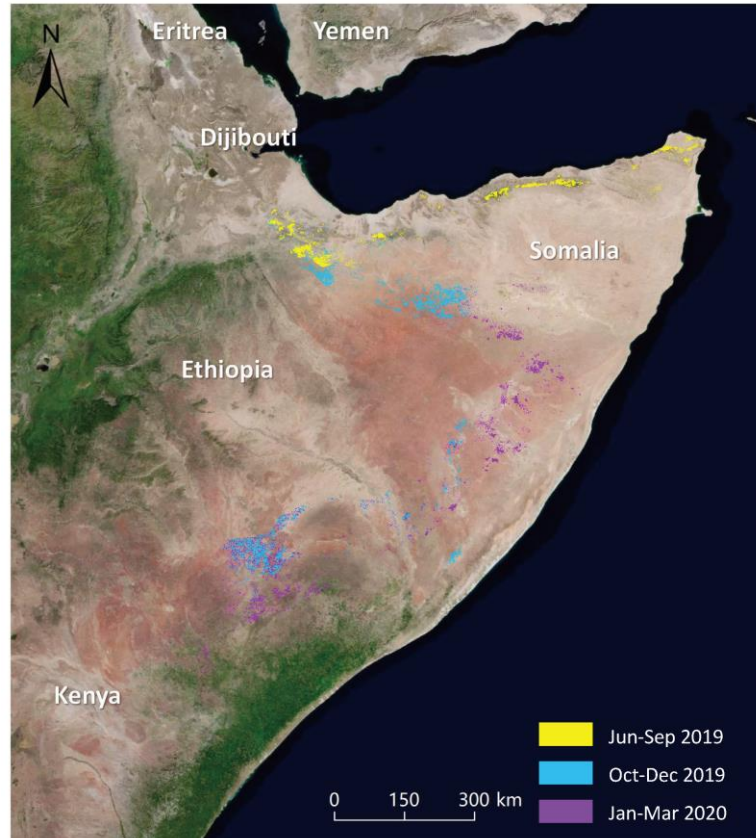*Figure 1* *Migration path of Desert Locust in Somalia (2019-2020)*

Figure 2 *Monitoring of Desert Locust damage in Somalia (June 2019-March 2020)*

Monitoring and assessment of Desert Locust in Somalia

From late February to the end of March 2020, the Desert Locusts in Pakistan were mainly distributed in central Punjab, southern Khyber Pakhtunkhwa, central Federally Administered Tribal Areas, and southwestern and Central Balochistan. From February 25th to March 5th, 2020, the China Locust Control Working Group went to Pakistan to conduct a field survey of the Desert Locust plagueand provided technical support for locust prevention. China provided 14 sets of locust control equipment and 250 barrels of insecticide to Pakistan on March 9th. The locust plague was under primary control. Our research results showed that in March 2020, the Desert Locusts in Pakistan endangered the area of vegetation in the country by a total of 449.5 thousand hectares, including 374.1 thousand hectares of cropland and 75.4 thousand hectares of grassland. Damaged areas are mainly located in the north central part of Punjab (damaged area of about 354.6 thousand hectares), the southern part of Khyber Pakhtunkhwa (damaged area of about 53.2 thousand hectares), the central part of Federally Administered Tribal Areas (damaged area of about 19.7 thousand hectares) and the central and southwestern of Balochistan (damaged area of about 18.4 thousand hectares). In addition, Sind also had a damage area of 3.6 thousand hectares adjacent to Balochistan (Fig 3).

We used Planet images with higher spatial resolution of 3m to monitor the Desert Locusts damage in the severely damaged cropland innorthern Pakistan (Fig 4). The study areas are located in Punjab. Area 1 is in Chawinda of northeast Punjab, about 80 km south to Lahore and 40 km southwest to Gujranwalawith the Degh Nala River flows through this area. The main vegetation type in Area 1 is cropland with a total area of 52.2 thousand hectares. The monitoring results showed that the cropland was obviously damaged by Desert Locusts in February 2020, with an area of 4.3 thousand hectares, accounting for 8.2% of the total area. Area 2 is in the north-central part of Punjab, about 10 km northeast to Chiniot and 20 km southeast to Faisalabad, with the Genab River flows through the northern edge of Area 2. The main vegetation type is cropland, with a total area of 52.4 thousand hectares. The monitoring results showed that the cropland in Area 2 was obviously damaged by the Desert Locusts in February 2020, with an area of 4.5 thousand hectares, accounting for 8.6% of the total area. The results of our research indicate that Desert Locusts caused great damage to cropland and seriously threaten food security.

At present, locust eggs in Pakistan are gradually hatching, and the best period for locust prevention and control is early to mid-April. Pakistan could carry out targeted Desert Locust egg removal and monitor adults' migration. In Pakistan, 52% land is grassland, and desert grassland with water sources is the key area for Desert Locusts eggs laying. Therefore, it is necessary to focus on monitoring the hatching of Desert Locusts in desert grassland areas. April-May is the harvest season of wheat and corn in Pakistan. If the Desert Locusts are not effectively controlled, the locust plague will continue to erupt, which may cause a heavy blow to agricultural production in Pakistan.
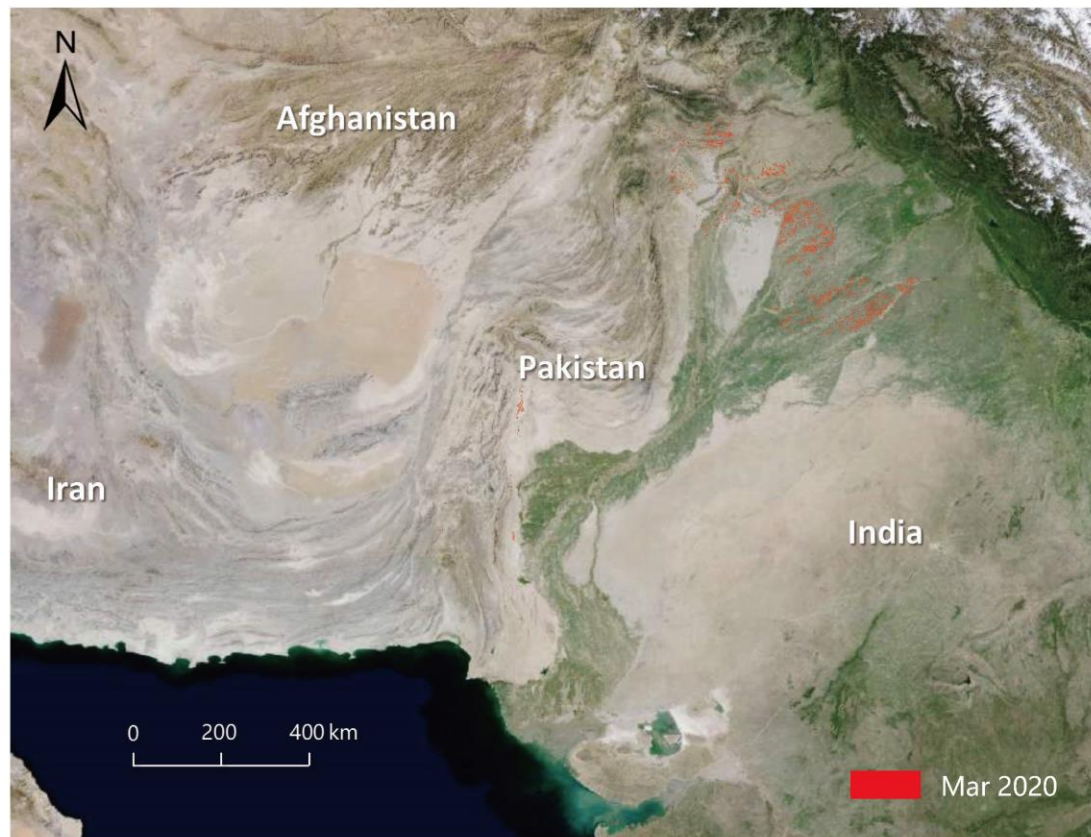
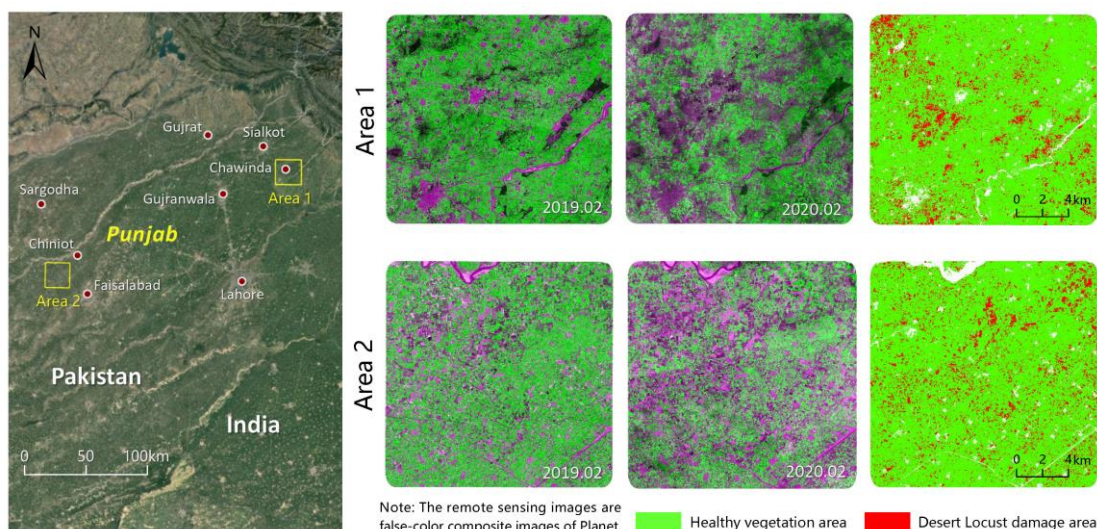***Figure 3*** *Monitoring of Desert Locust damage in Pakistan (March 2020)*

Figure 4 *Monitoring of Desert Locust damage in cropland of northern Pakistan based on Planet images*

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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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

This report was released by Professor Wenjiang Huang's and Associate Professor Yingying Dong's research team in Aerospace Information Research Institute, Chinese Academy of Sciences.

Chinese contributors: Wenjiang Huang, Yingying Dong, Longlong Zhao, Huichun Ye, Kun Wang, Xiaoping Du, Changyong Dou, Jun Yan, Jingcheng Zhang, Bei Cui, Linsheng Huang, Dailiang Peng, Hong Chang, Yun Geng, Chao Ruan, Huiqin Ma, Anting Guo, Linyi Liu, Naichen Xing, Yue Shi, Qiong Zheng, Yu Ren, Hansu Zhang, Tingguang Hu, Yanru Huang, Yu Jin, Chao Ding, Biyao Zhang, Zhongxiang Sun, Xiangmei Qin, Xueling Li, Weiping Kong, Juhua Luo, Jinling Zhao, Dongyan Zhang, Xiaodong Yang, Yanhua Meng, Wenjie Fan, Yue Liu, Gang Sun, Bin Wu, Qing Zhang, Dacheng Wang, Wei Feng, Xianfeng Zhou, Qiaoyun Xie, Muyi Huang, Jing Jiang, Zhaochuan Wu, Cuicui Tang, Fang Xu, Jianli Li, Wenjing Liu, Junjing Lu, Furan Song, Qingsong Guan, Qinying Yang, Chuang Liu, Yingxin Xiao, Zhuoqing Hao, Kang Wu, Yong Liu, Bo Wu.

Foreign contributors: Belinda Luke, Bethan Perkins, Bryony Taylor, Hongmei Li, Wenhua Chen, Pablo Gonzalez-Moreno, Sarah Thomas, Timothy Holmes, Stefano Pignatti, Giovanni Laneve, Raffaele Casa, Simone Pascucci, Martin Wooster, Jason Chapman.

Advisory Experts: Bing Zhang, Gensuo Jia, Jihua Wang, Qiming Qin, Puyun Yang, Jingquan Zhu, Yuying Jiang, Zhonghua Zhao, Binyuan Ren, Dongmei Yan, Xiangtao Fan, Jianhui Li, Jie Liu, Yubin Lan, Jingfeng Huang, Anhong Guo, Zhanhong Ma, Yilin Zhou, Xiongbing Tu, Wenbing Wu, Feng Zhang, Zhiguo Wang, Lifang Wu, Dong Liang, Yanbo Huang, Chenghai Yang, Liangxiu Han, Ruiliang Pu, Hugh Mortimer, Jon Styles, Andy Shaw, Jadu Dash.