July 2020

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Desert Locust monitoring and forecasting

Mid July 2020

Desert Locust monitoring and loss assessment in six Asian and African countries

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 updates the assessment of Desert Locust plague in six key Asian and African countries, and forecasts the possible breeding areas and migration paths from July to August 2020 in India, Ethiopia, and Kenya. The results showed that the Desert Locusts are mainly distributed in India, Pakistan, Ethiopia, Kenya, Yemen, and Somalia, severely endangering the agriculture and animal husbandry of these countries. By the end of June 2020, Desert Locusts caused great losses of the vegetation areas, with harmed areas about 1058.3 thousand hectares in India, 792.9 thousand hectares in Pakistan, 1137.5 thousand hectares in Ethiopia, 936.8 thousand hectares in Kenya, 780.0 thousand hectares in Somalia and about 763.5 thousand hectares of vegetation area in Yemen.

At present, locusts in Asia and Africa are experiencing multi-generation breeding. The period from July to August coincides with the important crops sowing season, growing

Content

season, or harvesting season in Asian and African countries. If not properly controlled, locusts will bring a major threat to agricultural and pasture production. It is necessary to continue the monitoring and early warning of the intercontinental Desert Locust plague, and organize joint prevention and control in multiple countries, ensuring the safety of agricultural and pasture production and protecting regional stability.

Migration path and prediction of Desert locust in India

In July-September 2018, rainfall on the Indo-Pakistan border created a suitable ecological environment for the breeding of Desert Locusts. Scattered Desert Locusts began to appear in the west of Rajasthan, India. In June 2019, local locusts in western Rajasthan began summer breeding, spawning, hatching, and forming early locust swarms. At the same time, locusts in Pakistan and southern Iran continued to move towards the Indo-Pakistan border; From July to August, Rajasthan locusts continued to develop and reproduce, gradually spreading to the surrounding area, and the number of locusts further increased; In September, the second generation of Desert Locusts began to breed, and India implemented ground control of locusts in Rajasthan; In October, as climatic conditions became drier than before, some locusts began to move from India to spring breeding areas in southwestern Pakistan and southeastern Iran; From November to December, the third generation of locusts on the Indo-Pakistan border began to multiply, and the number of locusts gradually increased. Some locust groups moved across the Arabian Sea to the south of Oman.

In January 2020, although there were still locust groups in the territory, the number of locust groups had gradually declined due to control operations and migration to southern Iran, eastern Oman, and southern Yemen. From February to April, the number of locusts decreased due to the impact of control operations and migration; In May, the spring breeding locusts in western Pakistan began to move towards the Indo-Pakistan border. The locust swarms in western Rajasthan continued to gather and expand, and continued to move to the central regions such as Madhya Pradesh and Maharashtra with the westerly wind brought by the cyclone Amphan in the Bay of Bengal; In June, the locusts on the Iran/Pakistan border continued to migrate to the Indo-Pakistan border for summer breeding, while the locusts in the middle began to migrate to northern India with strong south winds and arrived on the 26th in Bhairahawa, southern Nepal, bordering Uttar Pradesh, then spread in the central lowlands of Nepal. Some locust swarms reached Butwal and Kathmandu at the foot of the Himalayas on the 27th and 30th respectively (Fig.1).

The results showed that, by the end of June 2020, Desert Locust in India harmed about 1058.3 thousand hectares of vegetation area, including 450.9 thousand hectares of cropland, 320.6 thousand hectares of grassland and 286.8 thousand hectares of shrub, accounting for 0.2%, 0.7% and 1.6% of the total cropland, grassland, and shrub in India, respectively. The harmed areas are mainly located in southern Rajasthan (with 630.7 thousand hectares of affected area),

northern Gujarat (with 207.6 thousand hectares of affected area), central Madhya Pradesh (with 176.6 thousand hectares of affected area), Punjab (with 23.6 thousand hectares of affected area), as well as northern Maharashtra (with 10.1 thousand hectares of affected area), while Uttar Pradesh and Haryana have small affected areas (Fig.2).

The comprehensive analysis showed that, In July 2020, locusts in India will continue to hatch. Due to the southerly wind, they may continue to move northward to Nepal and pose a potential threat to Tibet, China. In mid-to-late July, locusts in northern India are expected to return to western India before the onset of the summer monsoon; From July to August, locusts in southern Iran will continue to migrate to western India for summer breeding. July to August is the important growing season of corn, rice, and other crops in India. If the locusts couldn't be controlled effectively, the locust plague will continue, which may bring a heavy blow to the agricultural and pasture production in India.

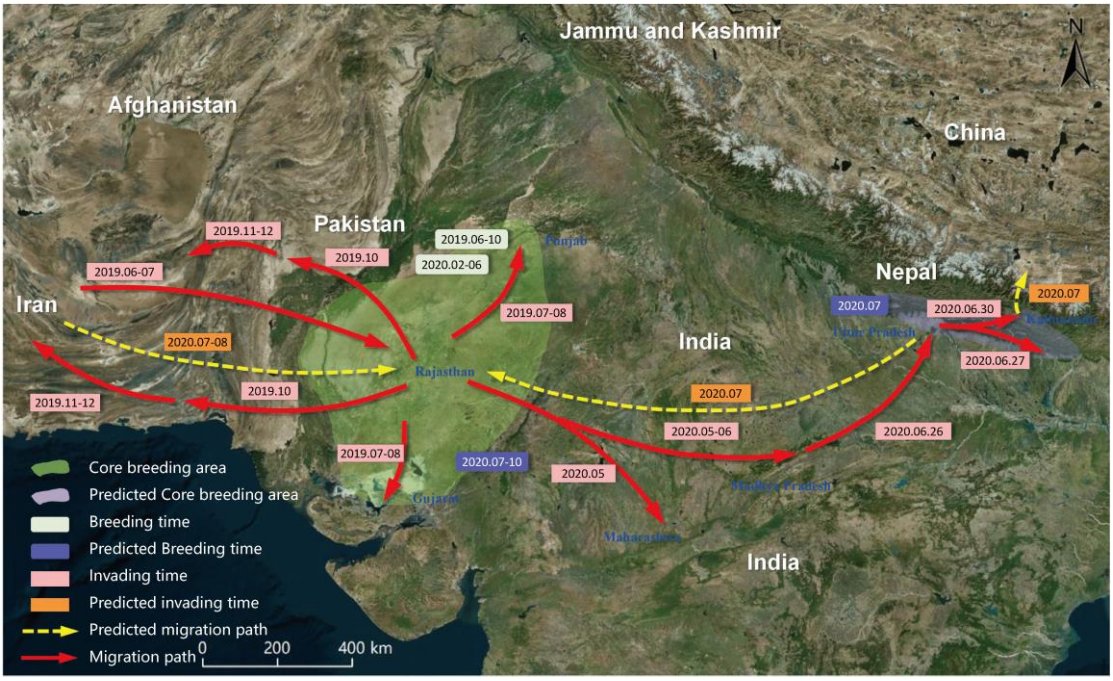

Figure 1 *The breeding area, migration path of Desert Locust in India (June 2019-August 2020)*

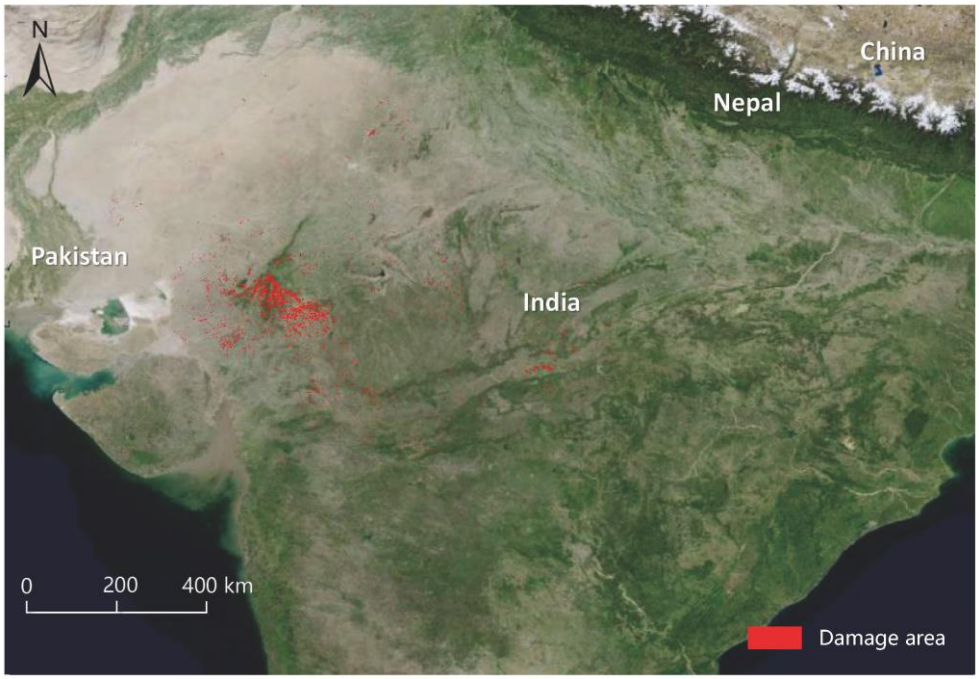

Figure 2 *Monitoring of Desert Locust damage in India (June 2020)*

Monitoring and assessment of Desert Locust in Pakistan

In May 2020, the Desert Locusts in western Pakistan continued their spring breeding and began to move eastward to the summer breeding area on the Indo-Pakistan border. At the same time, locusts in northern Pakistan continued to multiply and colonize. In June, the spring breeding locust swarms in Pakistan continued to move towards the Indo-Pakistan border and gradually spread into India.

The results showed that, by the end of June 2020, Desert Locust in Pakistan harmed about 792.9 thousand hectares of vegetation area, including 455.2 thousand hectares of cropland and 337.7 thousand hectares of grassland, accounting for 1.8% and 3.5% of the total cropland and grassland in Pakistan respectively. Among them, Sindh Province has the largest damaged area of 433.4 thousand hectares; followed by Punjab, with damaged area of 238.6 thousand hectares; while Baluchistan Province (32.3 thousand hectares), Federally Administered Tribal Areas (31.7 thousand hectares), and Khyber Pakhtunkhwa Province (56.9 thousand hectares) have less affected areas (Fig.3).

The comprehensive analysis showed that, In July 2020, the locust swarms breeding in spring in southern Iran, southwestern Pakistan, and northern Somalia will continue to migrate to the summer breeding area along the Indo-Pakistan border. In August, due to the end of the spring breeding, the number of locusts in southwestern Pakistan will decease. Desert locusts along the Indo-Pakistan border will hatch and breed in July. It is expected that the first generation of summer locust swarms will form in August. July to August is the important growing season of crops in Pakistan. If the locusts couldn't be controlled effectively, the locust plague will continue, which may bring a heavy blow to the agricultural and pasture production in Pakistan.

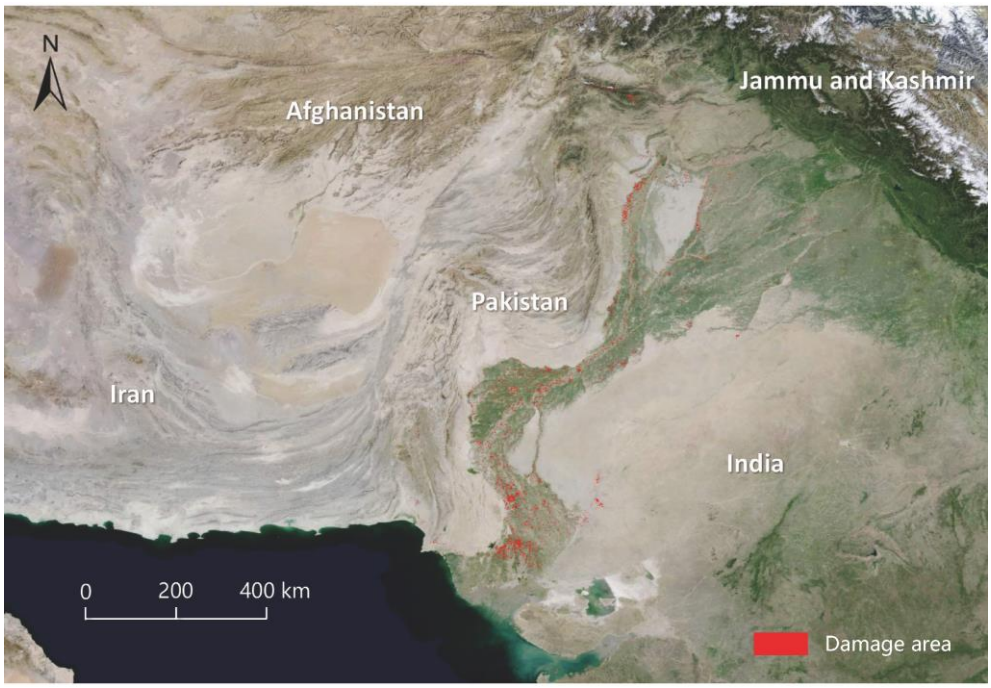

Figure 3 *Monitoring of Desert Locust damage in Pakistan (June 2020)*

Monitoring and assessment of Desert Locust in Ethiopia

From late May to early June 2020, the Desert Locusts in Ethiopia mainly distributed in Somali, eastern Oromiya, Southern Afar, and northeastern Amhara. In middle June, the locusts swarm in northern Ethiopia migrated to Amhara, Tigray, Afar and Somali in eastern Ethiopia; meanwhile, locust swarm in southern Yemen spread to Afar. In late June, the number of locusts in Ethiopia continued to increase due to local breeding and locust supply from Yemen, the locust population continued to grow in size (Fig.4).

The results showed that by the end of June, Desert Locust in Ethiopia harmed about 1137.5 thousand hectares of vegetation area (including 304.8 thousand hectares of cropland, 364.5 thousand hectares of grassland, and 468.2 thousand hectares of shrub), accounting for 1.3%, 2.1% and 0.6% of the total cropland, grassland, and shrub, respectively. The harmed areas are mainly located in eastern Oromiya with an area of 250.7 thousand hectares, southern nations, southern tribes and southern with an area of 243.8 thousand hectares, northwestern Somali with an area of 277.1 thousand hectares, eastern and northern Tigray with an area of 195.6 thousand hectares, eastern Afar with an area of 132.0 thousand hectares. The affected areas in Amhara and Gambela are relatively small (Fig.5).

The comprehensive analysis showed that, in July 2020, the Desert Locusts in Ethiopia will continue to breed and spread. It is estimated that the locust swarm will move westward to central Sudan and northeastward to the Indo-Pakistan border for summer breeding in July-August, and may spread to Somalia halfway. The period from July to August is an important growing season for Ethiopian crops. If the Desert Locusts are not effectively controlled, the locust plague will continue, which may

cause a heavy blow to the agricultural and animal husbandry production in Ethiopia.

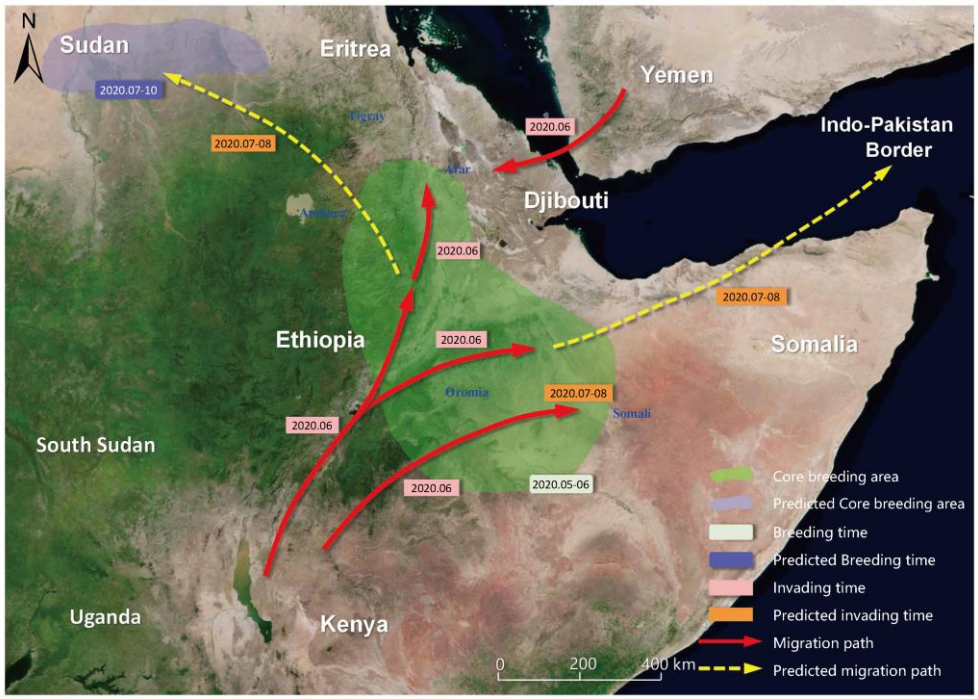

Figure 4 *The breeding area, migration path of Desert Locust in Ethiopia (June-Aug 2020)*

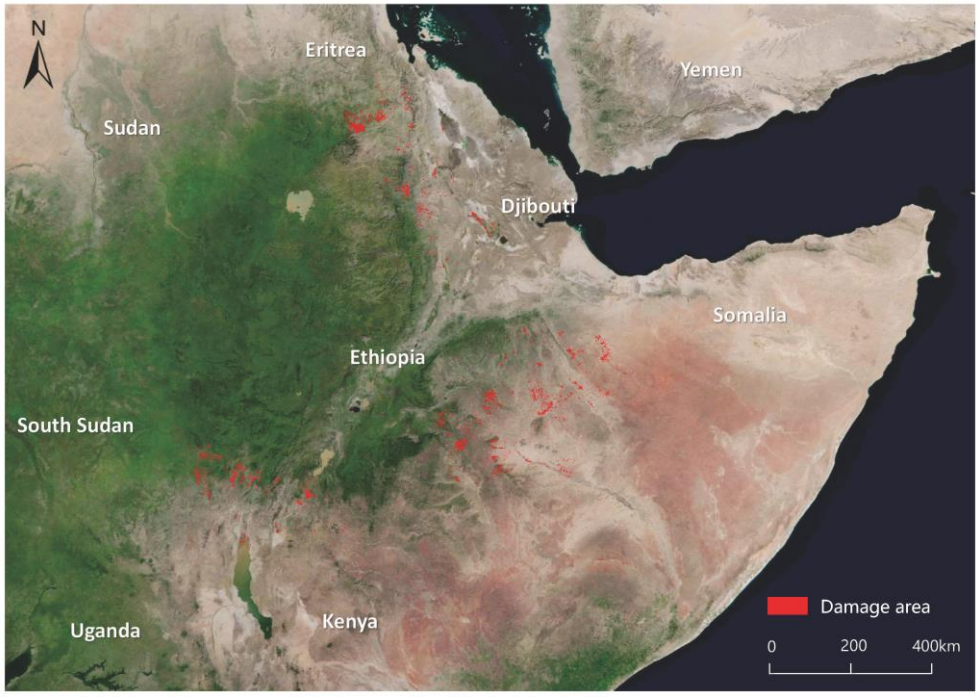

Figure 5 *Monitoring of Desert Locust damage in Ethiopia (June 2020)*

Monitoring and assessment of Desert Locust in Kenya

In late May 2020, Desert Locusts in Kenya continued thei spring breeding; in early June, the locusts were mainly distributed in the Rift Valley Province and northern of the Eastern Province of Kenya, mostly mature locusts; in mid-June, some locusts migrated

northwestward to the summer breeding area in southern Sudan through South Sudan and northeast Uganda, and some locust swarms migrated northward and northeastward to the northeast and northwest Ethiopia; in late June, locusts continued to breed and formed more swarms, and kept to migrate to the Northwest (Fig.6).

The monitoring results showed that by the end of June 2020, the vegetation area harmed by locust in Kenya had reached 936.8 thousand hectares, including 86.7 thousand hectares of cropland, 492.8 thousand hectares of grassland and 357.3 thousand hectares of shrubs, accounting for 1.7%, 2.5%, and 1.0% of the total cropland, grassland, and shrub in Kenya, respectively. The damaged areas were mainly located in the central and northern part of Rift Valley Province (with 504.1 thousand hectares of affected area), the central part of northeast province (with 262.0 thousand hectares of affected area), and the northwest and east part of eastern province (with 170.8 thousand hectares of affected area) (Fig.7).

The comprehensive analysis shows that Desert Locusts in Kenya will continue to breed in July 2020. It is expected that locusts will continue to migrate to the northwest to central Sudan for summer breeding from July to August. It coincides with the important growing season of crops in Kenya, which makes the control of Desert Locust in urgency. It is necessary to carry out continuous monitoring and joint prevention and control among countries to ensure local agricultural and animal husbandry production and food security.

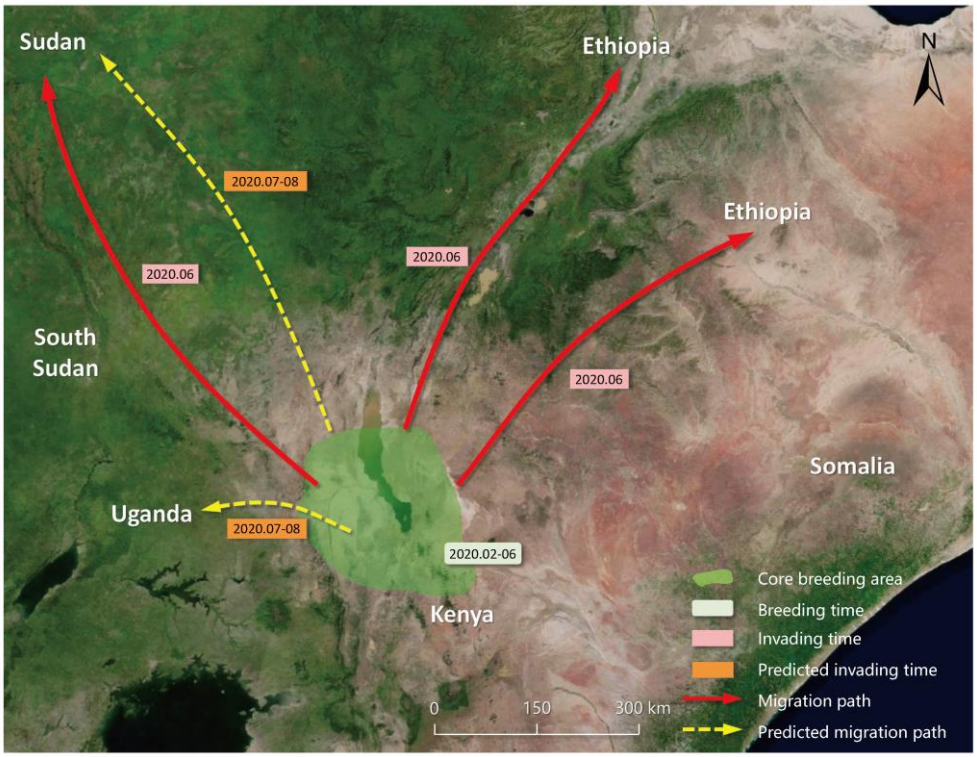

Figure 6 *The breeding area, migration path of Desert Locust in Kenya (June-August 2020)*

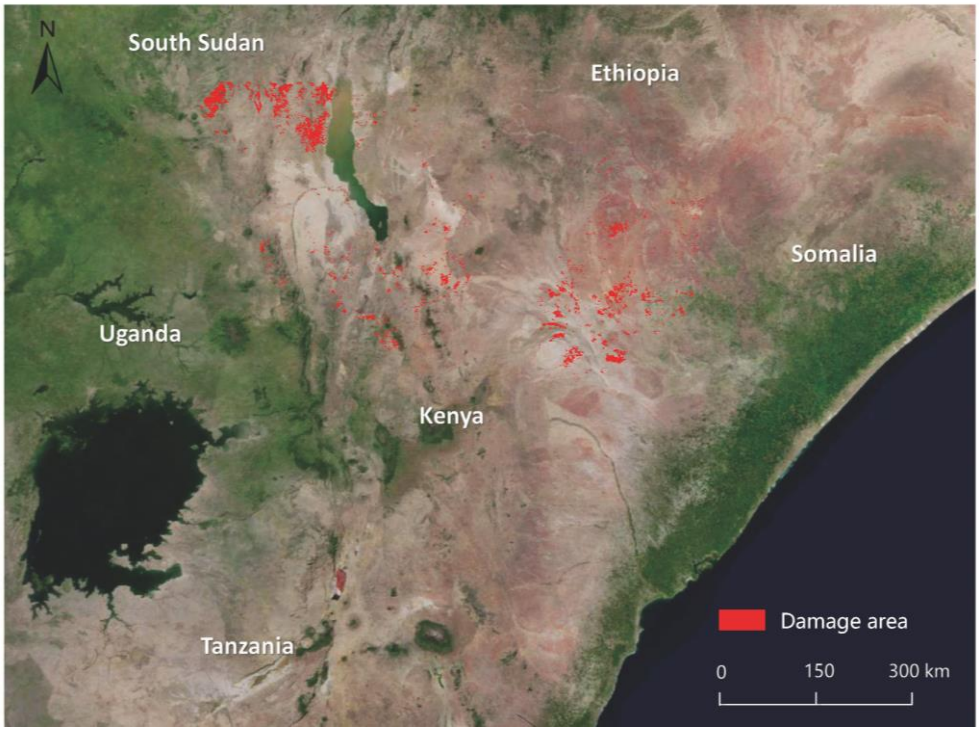

Figure7 *Monitoring of Desert Locust damage in Kenya (June 2020)*

Monitoring and assessment of Desert Locust in Somalia

From May to June 2020, the Desert Locusts in Somalia continued their spring breeding locally. The locusts continued to incubate to form new locust colonies, which are mainly located in the northwestern, northern coastal and central Somalia and the border with Ethiopia. The result shows that Desert Locust in Somalia harmed about 780 thousand hectares of vegetation area by the end of June (including 1.6 thousand hectares of cropland, 154.7 thousand hectares of grassland and 623.7 thousand hectares of shrub), accounting for 1.6%, 4.0% and 1.4% of the total cropland, grassland, and shrub in Somalia, respectively. The harmed area are mainly distributed in west Mudug with an area of 218.3 thousand hectares, east Togdheer with an area of 143.9 thousand hectares, northwest Woqooyi galbeed with an area of 140.9 thousand hectares, south Sool with an area of 113.6 thousand hectares, south Awdal with an area of 79.6 thousand hectares, north Galguduud with an area of 45.2 thousand hectares, north Bari with an area of 20.8 thousand hectares, and south Nugaal with an area of 11.4 thousand hectares. In addition, part of Sanaag and Hiiraan was slightly harmed by Desert Locust for 5.6 and 0.7 thousand hectares, respectively.

The comprehensive analysis showed that, in July 2020, the Desert Locusts in Somalia will continue to breed. It is estimated that from July to August, the Desert Locusts in southwestern Yemen will move across the Gulf of Aden to northwestern Somalia, and the locusts in eastern Ethiopia will spread to central Somalia. Meanwhile, the locusts in Somalia will migrate along with the southwest monsoon towards the summer breeding district located on the Indo-Pakistan border. The period from July to

August coincides with the important growing or harvesting season in Somalia. If not effectively controlled, the locust plague will continue to erupt, which may cause a heavy blow to agricultural and animal husbandry production in Somalia.

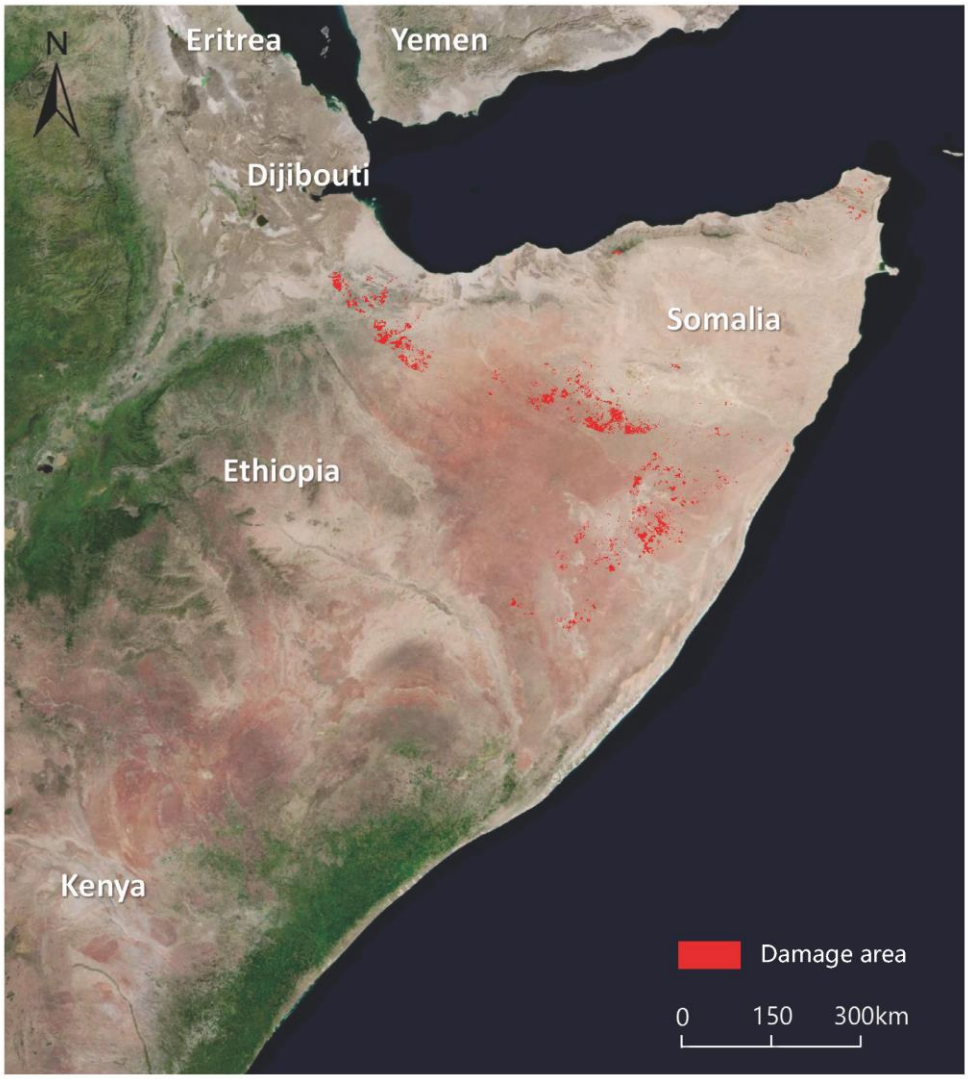

Figure 8 *Monitoring of Desert Locust damage in Somalia (June 2020)*

Monitoring and assessment of Desert Locust in Yemen

In early May 2020, the Desert Locusts of Yemen were scattered on the southern coast and the central region. Subsequently, the locusts continued to multiply and spread, and formed multiple mature locust colonies by the end of May. There were also locust colonies on the west coast of Yemen. The locusts continued spring breeding locally in June, continuing to incubate to form new locust groups. The locust groups on the west and southwest coasts continue to expand. Some locust groups move southward to northeastern Ethiopia. At the end of June, locusts along the Red Sea continued to breed and form new locust swarms.

The results showed that by the end of June, Desert Locust in Yemen harmed about 763.5 thousand hectares of vegetation area (including 143.8 thousand hectares of cropland, 47.9 thousand hectares of grassland, and

571.8 thousand hectares of shrub), accounting for 14.3%, 8.3% and 10.1% of the total cropland, grassland, and shrub, respectively. The harmed areas are mainly located in eastern Ta'izz with an area of 215.5 thousand hectares, western Amran with an area of 101.7 thousand hectares, northwestern Lahij with an area of 81.7 thousand hectares, middle and southern Dhamār with an area of 74.2 thousand hectares, middle and western Ibb with an area of 62.5 thousand hectares, most of Ad-Dāli with an area of 59.0 thousand hectares, eastern Al-Mahwīt with an area of 30.3 thousand hectares, eastern Hajjah with an area of 26.3 thousand hectares, southern Hadramawt with an area of 24.3 thousand hectares, southern Al-Baydāwith an area of 23.3 thousand hectares, western San'āwith an area of 23.0 thousand hectares, western Abyān with an area of 17.5 thousand hectares, and southern Al-Mahrah with an area of 10.3 thousand hectares. The affected areas in middle Ma'rib, western Al-Jawf, southern Shabwah, southern Raimah, eastern Adan, and Al-Hudaydah are relatively small, with affected area of 4.5, 3.6, 2.6, 2.5, 0.4, and 0.3 thousand hectares, respectively (Fig.9).

The comprehensive analysis showed that, in July 2020, locusts in Yemen will continue to breed. The locust swarms in southwest Yemen will move across the Gulf of Aden to northwestern Somalia and northeastern Ethiopia. The period from July to August is the important growing or harvesting season of crops in Yemen. If not effectively controlled, the locust plague will continue to erupt, which may cause a heavy blow to agricultural and animal husbandry production in Yemen.

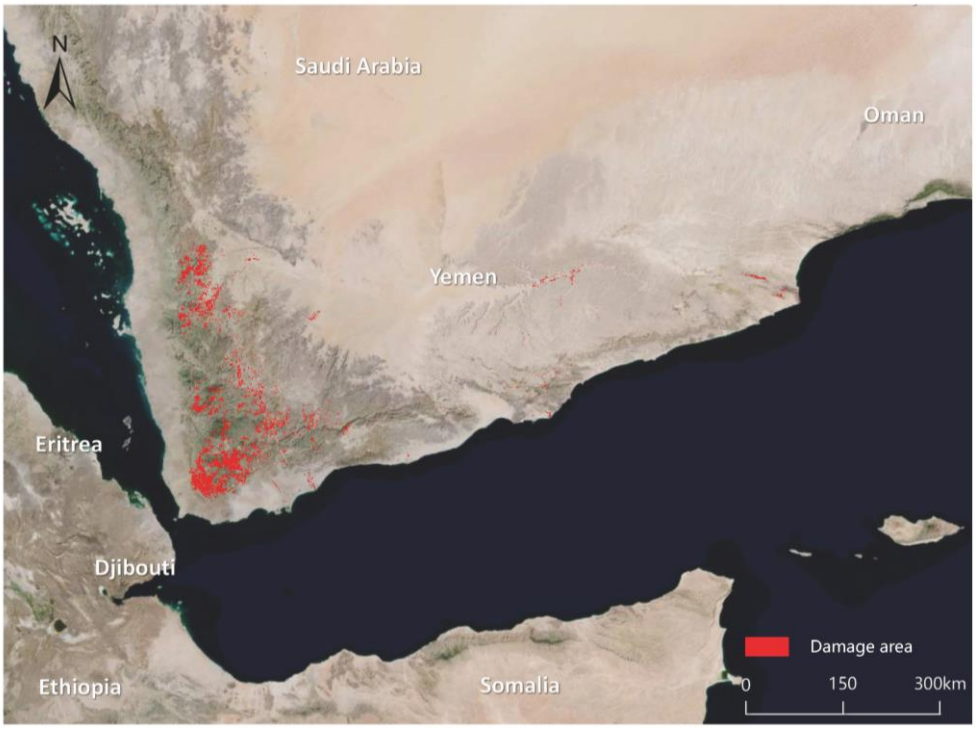

Figure 9 *Monitoring of Desert Locust damage in Yemen (June 2020)*

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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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