Locust Watch
Locusts in Caucasus and Central Asia

LOCUST BULLETIN No. 36

FAO - Plant Production and Protection Division (AGP) 15 June 2015

Situation level: CAUTION in Georgia (Italian Locust, CIT), Kazakhstan (CIT and Moroccan Locust, DMA), Kyrgyzstan (DMA) and Tajikistan (DMA)

Situation level: CALM elsewhere

General Situation during May 2015 Forecast until mid-July 2015

In May, Moroccan Locust (DMA) hopper development was in progress in all Central Asian countries, while hatching started in the Russian Federation; fledging and breeding were reported in Uzbekistan. No DMA was reported from Caucasian countries. Italian Locust (CIT) hopper development was in progress in all Caucasian and Central Asian (CCA) countries but Armenia. Asian Migratory Locust (LMI) infestations were reported in Kazakhstan, Uzbekistan and the Russian Federation. Control operations continued in Afghanistan, Kyrgyzstan, Tajikistan and Uzbekistan and began in Georgia, Kazakhstan and Russian Federation; almost 674 000 hectares have been treated in May (and almost 837 500 ha since the beginning of the 2015 anti-locust campaign), almost exclusively in Central Asia.

Caucasus. Due to unsuitable weather conditions, CIT hatching was first reported on 24 May in **Georgia**, where control operations started on 26 May and concerned 340 ha. No locust hatching was reported from **Armenia** and no bulletin was received from **Azerbaijan**. The control campaign will effectively start during the forecast period.

Central Asia. DMA hopper development continued in the previously six infested countries, Afghanistan, Kyrgyzstan, Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan, and hatching occurred in the **Russian Federation**; fledging and breeding started in Uzbekistan. CIT hopper infestations were probably present in all seven countries and LMI infestations mainly from **Kazakhstan** and **Uzbekistan**. Control operations, which had started in April in Afghanistan, Kyrgyzstan, Tajikistan and Uzbekistan, continued in those countries and began in May in Kazakhstan and the Russian Federation, concerning 673 400 ha during the month.

Weather and Ecological Conditions in May 2015

In southern Central Asia, i.e. Afghanistan, Tajikistan and Uzbekistan (and probably Turkmenistan), temperatures were normal to warm. Elsewhere (in Caucasus, some Russian federal districts, Kazakhstan and Kyrgyzstan), persisting variable, rainy and cooler than usual weather conditions delayed further locust hatching or slowed down hopper development.

In **Caucasus**, the weather was variable and rainy.

In Armenia, the weather was variable and rainy, with thunderstorms in some areas, sometimes with hail of a

diameter ranging from 10 (lowlands) up to 20 mm (mountainous areas). The average temperature was mostly normal with little positive variations of 2/3°C. Temperatures ranged from 4/6°C to 30/32°C in the lowlands, from 2/6°C to 27/30°C at foothills and from -1/4°C to 19/24°C in mountainous areas. Recorded quantity of rain was of 18-35 mm in the lowlands, 51-52 mm at foothills and 61-65 mm in mountainous areas. The natural vegetation was mostly green with a thick cover in lowlands and foothills and a medium one elsewhere. Agricultural activities were sometimes disrupted by rain.

In Georgia, there were 11 rainy days in May. Average temperature was of 20/27°C. Natural vegetation was drying out and had a low to medium cover.

In **Central Asia**, weather conditions were normal to warm in the South and variable, sometimes cool and rainy, in the central and the northern parts of the region.

In Afghanistan, low pressure systems in March resulted in good rainfalls throughout the country. These widespread rains and increased temperatures during the 3rd decade resulted in daily locust hatching. In April, persisting rains and relatively cool temperatures were suitable for crops. In May, weather conditions continued to be suitable for agriculture works, with widespread rainfalls ranging from 2 to 122.9 mm. However, it was cooler than usual in the north-east, with rainfalls ranging from of 44.5 to 122.9 mm in Badakhshan, which was therefore still unsuitable for locust development.

In Kazakhstan, the weather was unstable, with both sunny and rainy days. In the South, clear and sunny days alternated with rainy ones (monthly rainfall of 4-125,5 mm). Average temperature ranged from 13 to 30°C with night minimum of 4.6°C and maximum up to 35°C. Relative humidity varied from 27 to 95%. South-westerly and south-easterly winds prevailed at a speed of 1--15 m/s, with gusts up to 30 m/s. In the East, the weather was unstable with warm sunny days and cloudy and rainy ones (monthly rainfall of 37.2 mm). Average temperature was of 14.4°C with minimum of 3°C and maximum of 29°C. Relative humidity was of 64%. South-easterly and north-westerly wind prevailed at a speed of 1-6 m/s, with gusts up to 15 m/s. In the West, the weather was variable and rainy (monthly rainfall of 5-120 mm). The average temperature varied from 7.7 to 32.5°C with minimum of1.8°C and maximum of 36°C. The relative humidity varied from 32 to 90%. Despite erratic wind direction, northerly and south-easterly winds prevailed at a speed of 0.5-10 m/s. In the North, the weather was variable with sunny days and cloudy and rainy ones (monthly rainfall of 10-128,5 mm). The average day temperature varied from 7.2 to 22.1°C, with minimum of 0°C and maximum of 32°C. The relative humidity ranged from 29 to 98%. South-westerly, westerly and north-westerly winds prevailed at a speed of 1-20 m/s with gusts reaching 34 m/s.

In Kyrgyzstan, during the month of April, the weather was cool and rainy (47-53 mm but under the norm). Average temperature of 10-12°C was within the norm, with night temperatures ranging from -2 to 5°C and day ones from 2/7°C up to 22/27°C. The vegetation was green with a medium cover and a height of 5-7 cm. In May, the weather was relatively hot and rainy (monthly rains of 64-74 mm in the South and 42-51 mm in the North). The average monthly temperature was 1 to 3°C below normal and last year values with minimum night temperatures of 1°C in Naryn during the first decade and maximum of 21/25°C in Batken and Jalal-Abad during the second decade. The relative humidity ranged from 65 to 75%. The natural vegetation was green, with a thick cover and a height ranging from 5 to 12 cm.

In the Russian Federation, weather was variable and remained cooler than usual in several Federal Districts (FD), thus resulting in unsuitable conditions for locusts. In southern regions of Central FD, the weather was variable during the first half of the month, with brief cooler periods and warmed up during the second fortnight, sometimes with local rainfalls. Average temperatures ranged from 11 to 24°C. In North

Caucasus and Southern FDs, cool weather continued to prevail, with frequent rainfalls. Average temperature was of 13.4-15.5°C, which was below the norm. In the Volga FD, the weather conditions were variable and local rains, sometimes with hail. Average temperatures ranged from 116 to 28°C. In the Siberian and Ural FDs, temperatures were very variable and prolonged rainfalls occurred. Average temperature was of 5/20°C.

In Tajikistan, the weather was warm, with some heavy rains in Khatlon and Sughd. In Khatlon, average temperatures ranged from 12/16°C at night to 28/35°C during the day up to 11 May. On 12 and 13 May, heavy showers caused damage to crops and orchards, whose economic losses are currently estimated by a Governmental Commission. In Sughd, average temperatures ranged from 16/18°C at night to 24/28°C during the day, reaching up to 38/40°C at the end of the month. On 23-25 May, torrential rains fell. In the Region of Republican Subordination (RRS), showers fell on a daily basis on 11-25 May. Agricultural work was in progress and early harvest of onions and fruit started in Khatlon. Cotton was at flowering stage.

In Uzbekistan, average daily temperatures were of 35/38°C in the North and the Center and of 36/40°C in the South. Natural vegetation was drying out.

Area treated in May 2015

Afghanistan	70 542 ha (April)
	54 842 ha (May)
Georgia	340 ha
Kazakhstan	257 700 ha
Kyrgyzstan	28 808 ha (April)
	49 769 ha (May)
Russia	1 700 ha
Tajikistan	63 250 ha
Uzbekistan	246 145 ha.

Locust Situation and Forecast

(see also summary on page 1)

CAUCASUS

Armenia

• **SITUATION**

Hatching of grasshoppers was observed in lowlands. Rainy and cool weather conditions slowed down hatching and hopper development of grasshopper and locust species. Surveys were carried out on 400 ha but no control operations were conducted so far.

• **FORECAST**

Hatching of the Italian Locust (CIT) is expected in early June in lowlands (Ararat region), during the second half of the month at foothills and during the 3rd week in mountainous areas. The development of the two other locusts is not expected unless they arrive from neighboring countries.

Azerbaijan

• **SITUATION**

No bulletin received for May. Hatching of the Moroccan Locust (DMA) may have occurred and hopper development be in progress.

• **FORECAST**

Control operations against DMA hopper bands will take place during the forecast period.

Georgia

• **SITUATION**

During a joint locust survey carried out by Armenian, Azeri, Georgian and Russian experts on 3-6 May 2015 in Kakheti, no locust presence was observed neither in Kvareli district, along the border with Russia, unlike in previous years, nor in Dedoplistskaro district, along the Alazani river as a result of unsuitable weather conditions; in the latter area, locust egg-pods were found at a density of 2-3 egg-pod/m^2. The number of eggs per pod varied from 23 to 25 and damaged egg-pods from 5 to

10%. Overall, surveys were carried out on 5 000 ha in Kakheti and 2 000 ha in Kvemo-Kartli in May. First CIT hatching was detected on 24th May only in the Alazani Valley and 1st and 2nd instar hoppers were observed at a density of 20/m^2 in late May. Storm and hail on 29th May did not impede CIT hoppers attacking crops; damage was reported on vineyards, sorghum, sunflowers, winter pastures, melons and watermelons. Control operations started on 26th May and 340 ha were treated in Kakheti (Signani district) with conventional pesticides (alpha-cypermethrin and deltamethrin) and insect growth regulator (diflubenzuron).

• **FORECAST**

Mass CIT hatching followed by hopper development will occur during the forecast period. It is expected that 3rd and 4th instar hoppers will threaten or damage crops and winter pastures in Kakheti (Signani and Dedoplistskaro districts), in June. Control operations against CIT will be carried out in Kakheti and Kvemo Kartly regions, including by air.

CENTRAL ASIA

Afghanistan

• **SITUATION**

In March, surveys were carried out in nine northern and north-eastern provinces but no hatching was observed due to weather conditions still unsuitable for locusts.

In April, DMA hatching started at the beginning of the month in the North (Balkh, Faryab, Jowzjan, Samangan, and Sar-i-Pul) and from mid-April in the North-East (Baghlan, Kunduz and Takhar). Hoppers from 1st to 4th instars (with a prevalence of 1st-3rd instars) were observed during the remaining of the month. In Faryab, CIT hoppers (mainly of 2nd and 3rd instars) were also reported. . A total of 70 542 ha was treated in seven provinces: against DMA, in Baghlan (17 980 ha), Samangan (17 784 ha), Balkh (15 200 ha), Takhar (8 900 ha), Kunduz (6 708 ha) and Sar-i-Pul (2 720 ha); against both DMA and CIT, in Faryab (1 250 ha).

In May, 2nd to 5th instar DMA hoppers were observed in the seven previously mentioned provinces as well as in Jowzjan, with prevalence of 3rd and 4th instars, except in Takhar and Sar-i-Pul (prevailing 2nd and 3rd instars). From 1st May to 3rd June, 54 842 ha were treated in these eight provinces: Takhar (18 200 ha), Samangan (15 000 ha), Baghlan (8 122 ha), Balkh (4 924 ha), Kunduz (3 846 ha), Sar-i-Pul (3 348 ha), Faryab (1 250 ha) and Jozjan (152 ha).

• **FORECAST**

Untreated DMA hopper populations will start fledging during the forecast period in the eight provinces where infestations were already reported; in addition, DMA hatching is expected to occur in Badakhshan from mid-June. Control operations, mainly against DMA, will continue during the forecast period.

Kazakhstan

• **SITUATION**

DMA surveys were carried out on 897 300 ha, out of which 237 600 ha were found infested by hoppers, including 99 300 ha exceeding the economic threshold in South-Kazakhstan and Zhambyl oblasts.

CIT spring egg-pod surveys were completed on a total area of 335 400 ha and egg-pods were found on 131 300 ha. The number of eggs per pod ranged from 15 to 50 and damaged egg-pods from 0.2 to 50%. Spring hopper surveys were conducted on 1 619 300 ha, out of which 234 500 ha were found infested, including 130 200 ha exceeding the economic threshold in Aktobe, Kostanay, West Kazakhstan, Atyrau, Karaganda, Kyzylorda, Almaty, East Kazakhstan, Zhambyl and South Kazakhstan oblasts; Almaty, Kostanay and Kyzylorda were the most infested oblasts and 20 000 to 28 000 ha were treated in each of them. As of 1st June, hoppers reached 2nd-4th instars in the southern regions and were of 1st and 2nd instars in the northern, eastern and central

regions of the country.

LMI spring egg-pod surveys were completed on a total of 113 600 ha; egg-pods were found on 22 500 ha. The number of eggs per pod ranged from 24 to 92 and damaged egg-pods from 1 to 40%. As of 1st June, spring hopper surveys were carried out on 290 800 ha, out of which 54 400 ha were found infested by 1st to 3rd instar hoppers, including 28 200 ha exceeding the economic threshold in Aktobe, Atyrau, Kyzylorda and South Kazakhstan oblasts.

Overall, 257 700 ha were treated in May against DMA, CIT and LMI hopper infestations.

• **FORECAST**

DMA mating and egg-laying are expected during the 2nd decade of June in South Kazakhstan; in Zhambyl mass fledging should occur during the second decade of June, followed by mating and egg-laying during the 3rd one.

CIT hopper development will continue in Kostanay and Aktobe during the forecast period while mass hatching is expected during the 2nd decade of June in Pavlodar and North Kazakhstan. In southern and western oblasts, fledging should start during the last decade of June.

LMI hopper development will continue in the southern oblasts during the 1st half of June while mass hatching is expected during the 2nd decade of June in Kostanay and West Kazakhstan.

Kyrgyzstan

• **SITUATION**

In April, DMA hatching was first observed on 10th in Jalal-Abad. A total of 38 374 ha were surveyed, out of which 31 532 ha were found infested at a density of 6-18 hoppers/m^2, mainly in in Jalal-Abad (29 952 ha). Aerial and ground control operations using conventional pesticides in ULV and EC formulations were carried out on 28 808 ha (27 858 ha in Jalal-Abad and 950 ha in Batken).

In May, DMA surveys were carried out on 70 813 ha, of which 55 689 ha were found infested at an average density of 5-25 hoppers/m^2 (45 679 ha in Jalal-Abad, 7 410 ha in Batken and 2 100 ha in Osh). As far as Batken (Batken and Leilek rayons) is concerned, 11 000 ha were surveyed on 6-7 May during a cross-border survey (CBS) carried out with Tajikistan, which also underlined that some remote mountainous areas were only accessible from Tajikistan. During another CBS conducted with Uzbekistan on 9-13 May, 2nd to 4th instar DMA hoppers were observed in three oblasts (Batken, Jalal-Abad and Osh). A total of 49 769 ha (44 829 ha in Jalal-Abad and 4 940 ha in Batken) were treated by air (41.6%) and ground (58.4%) with conventional pesticides in ULV (40.8% of the treatments) and EC formulation. CIT surveys concerned 1 480 ha in Chuy, where 100 ha were found infested by 2nd and 3rd instar hoppers at a density of 8 to 50 hoppers/m^2. No control operations were conducted so far against CIT hoppers.

• **FORECAST**

DMA mating and egg-laying will occur during the forecast period and control operations in Batken and Osh should be completed by mid-June. CIT mass hatching is expected during the 1st and 2nd decades of June in in Chuy and Naryn with control operations starting during the first decade.

Russian Federation

• **SITUATION**

Egg-pod surveys were completed in May on 911 900 ha; locust egg-pods were found on 142 870 ha at a density of 0.87 /m² and grasshopper egg-pods on 246 510 ha at a density of 0.97 /m². From 5 to 15 % of the egg-pods were damaged mainly by entomophagous insects. Hatching of locusts and grasshoppers occurred in May in five Federal Districts (FD); 80 800 ha infested by locusts and 180 900 ha by grasshoppers. DMA hoppers were present at a density of 7,8/m² in the North Caucasus FD. CIT hoppers were observed in four FDs, at a density from 0.23 to 7.9 /m² in the Central (0.23),

Southern (1-50), North Caucasus (7,9) and Volga (1). LMI hoppers had a density of 10/m² in the Southern FD. Grasshoppers were observed at a density ranging from 0.41 to 10 /m² in the Central (1.2-3), Southern (1.9-10), North Caucasus (2,7), Volga (1.83) and Ural (0.41) FDs. Control operations were carried out on 1 700 ha.

Russian Experts together with Armenian, Azeri and Georgian Experts participated in a joint-survey held in Kakheti, Georgia, on 3-6 May 2015 in the framework of the Programme to improve national and regional locust management in CCA.

• **FORECAST**

Grasshoppers and locusts hatching and hopper development will continue during the forecast period.

Tajikistan

• **SITUATION**

During a CBS carried out in early May with Kyrgyzstan on 10 000 ha in Sughd oblast (Kanibodom and Ghafurov on 4 May and Spitamen, Rasulov and Ghonchi on 5 May), hoppers were observed along the border. Locust hatching came to an end throughout the country during the first half of May due to suitable weather conditions. During another CBS conducted with Uzbekistan on 20-23 May, DMA swarms, at a maximum density of 35 adults/m², some of them in oviposition, were observed within an area of 50 000 ha in Khatlon oblast and Region of Republican Subordination (RSS), where they posed a direct threat on 1 520 ha of irrigated crops. On 25 May, DMA presence was also observed on 300 ha in the East, in Gorno-Badakhshan. As of 29th May, hopper infestations of DMA, CIT and grasshoppers had been observed on 78 539 ha, out of which 63 250 ha, were treated.

• **FORECAST**

Mass breeding and egg-laying, favored but expected higher than usual temperatures in June, will took place. Control operations will continue in particular in RRS and Sughd against both locusts and grasshoppers.

Turkmenistan

• **SITUATION**

No bulletin was received for the third consecutive month. DMA should have fledged and mating and egg-laying have probably started.

• **FORECAST**

Mating and egg-laying will probably come to an end during the forecast period.

Uzbekistan

• **SITUATION**

DMA hoppers were observed on 9-13 May in the North-east (Andijan, Namangan and Fergana oblasts in the Fergana Valley), on 1 450 ha, during a CBS carried out with Kyrgyzstan. In the South, adults, at a density of 12/m², formed swarms; egg-laying was in progress as seen during a CBS carried out on 43 000 ha in Surkhandarya province on 20-23 May, with Tajikistan; these swarms posed a direct threat on 4 500 ha of irrigated cropping areas. Adult disappearance also started in the South while breeding was still ongoing in the northern and central parts of the country. DMA fledging was also observed in mountainous areas, at an altitude of 1 800-2 000 m. CIT and LMI hopper development was in progress with prevailing 2nd and 3rd instars for CIT and 1st and 2nd instars for LMI. Control operations continued against DMA and CIT and started on 20 May against LMI. As of 1st June, a total of 254 456 ha had been treated (17% more than last year at the same period), of which 246 145 ha against DMA, 5 311 ha against CIT and 3 000 ha against LMI. A total of 638 workers were involved in those operations, which were mainly carried out by ground.

• **FORECAST**

With high temperatures during the forecast period, it is expected that LMI infestations will significantly increase and expand and it is planned to treat 60 000 ha. Control operations will also continue against CIT and DMA,

including in mountainous areas against the latter, which is an issue and will probably extend the treatments by 15-20 days.

Announcements

Locust warning levels. A color-coded scheme indicates the seriousness of the current situation for each of the three main locust pests: green for calm, yellow for caution, orange for threat and red for danger. The scheme is applied to the Locust Watch web page dedicated to the current locust situation ("Locust situation now!") and to the regional monthly bulletin header. The levels indicate the perceived risk or threat of current locust infestations to crops and appropriate actions are suggested for each level.

Locust reporting. During calm (green) periods, countries should report at least once/month and send standardized information using the national monthly bulletin template. During caution (yellow), threat (orange) and danger (red) periods, often associated with locust outbreaks and upsurges, updates should be sent at least once/week. Affected countries are also encouraged to prepare decadal bulletins summarizing the situation. All information should be sent by e-mail to CCA-Bulletins@fao.org. Monthly information received by the 5th of each month will be included in the CCA Locust Bulletin to be issued by mid-month; otherwise, it will not appear until the next bulletin. Reports should be sent even if no locusts were found or if no surveys were conducted.

April 2015 events and activities

- **Fellowships on locust management**: Final selection of students was made by FAO and E-Committee on fellowships, in liaison with hosting institutions, and results were announced to the candidates.
- **Joint and cross-border activities:**

  - A joint survey involving a total of 13 plant protection officers/locust specialists from Armenia, Azerbaijan, Georgia and the Russian Federation was organized on 3-6 May in Kakheti, Georgia.

  - A joint cross-border survey between Kyrgyzstan and Tajikistan, involving eight plant protection officers/locust specialists (four by country) was carried out in the Fergana Valley (Kyrgyz Batken and Tajik Sughd oblasts) on 4-7 May 2015. The two countries agreed to carry out control operations as needed and assist each other in this border area.

  - A joint cross-border survey involving six Kyrgyz and five Uzbek plant protection officers/locust specialists was conducted on 28 000 ha in the Fergana Valley (Kyrgyz Osh and Jalal-Abad and Uzbek Andijan, Namangan and Fergana oblasts) on 9-13 May. Control operations were carried out against hopper infestations detected on 1 450 ha on the Uzbek side, where crops were under direct threat.

  - A joint cross-border survey involving six Tajik and four Uzbek plant protection officers/locust specialists was carried out on 93 000 ha in Tajikistan (Khatlon and RRS) and Uzbekistan (Surkhandarya) on 20-23 May, in presence of a FAO International Consultant, Locust Expert. The most serious locust situation was observed in the Kafirnigan Valley, including in a neutral area of 4 500 ha along the common border.
- **Training on locust monitoring and information management:** a regional training was delivered to the benefit of 12 Locust Experts from Armenia, Azerbaijan and Georgia on 26-30 May in Kakheti, Georgia, by Mr A. Latchininsky, a FAO International Consultant, Locust Expert.
- **Human Health and Environmental aspects**:

  - Videos on the use of biopesticides: translation in relevant languages in progress for the 4-minute video to promote the use of biopesticides (for decision-makers, donors and other partners, locust experts)

and the 10-minute video tutorial on the field operational use of biopesticides (for locust experts and control operators).

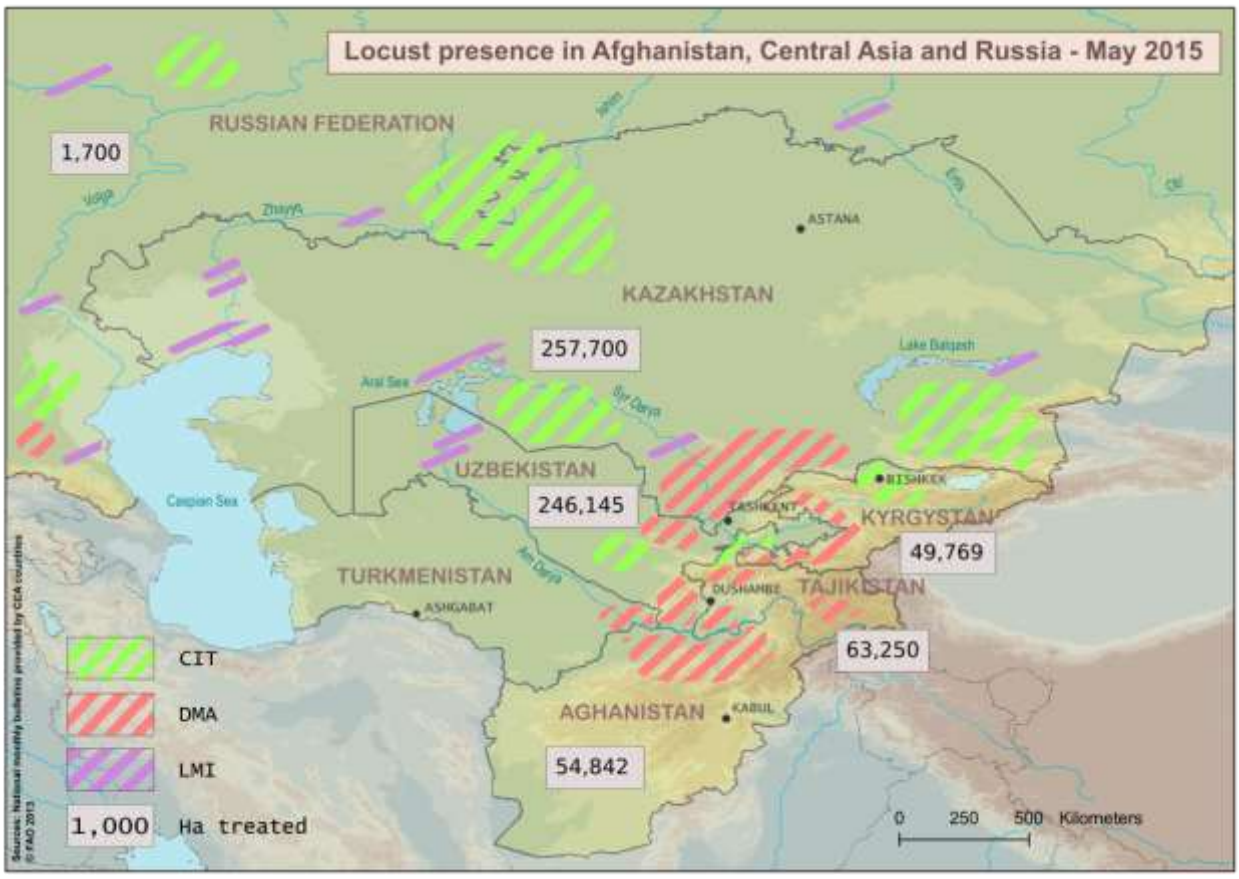
- Final joint Study on the "Fate of insecticides used for locust control on pasture in Kyrgyzstan", aiming at measuring the decline rate of the residues on pasture for various insecticides used in locust control as well as establishing appropriate re-entry periods for livestock, under review.

- **Resource mobilization**: project document regarding the contribution of Japan to the benefit of Afghanistan, Kyrgyzstan and Tajikistan under final approval process.

Forthcoming events and activities in June 2015

- **Fellowships on locust management**: Arrangements to be started with hosting institutions to organize fellowships during forthcoming academic year 2015/2016.
- **Pesticide Referee Group (PRG):** Report of the 10th Meeting of the PRG, held in Tunisia on 10-12 December 2014, available online in English. Translation into Russian to be ensured. http://www.fao.org/ag/locusts/common/ecg/2241/en/PRG10e.pdf.
- **Human Health and Environmental aspects**:
  - Videos on the use of biopesticides: under finalization.
  - Delivery of two Assay kits to the benefit of the Human Health and Environmental Monitoring Team in Tajikistan.
  - Monitoring system on quality control and efficacy of locust treatments to be developed in Kyrgyzstan: visit by an FAO International Consultant, Environment Expert, including on-the-job training for national technical staff, scheduled on 23 June-3 July; delivery of two Assay kits and monitoring and sampling material in this context.
- **Resource mobilization:** final approval to be granted by Japan regarding the project document regarding the contribution of Japan to the benefit of Afghanistan, Kyrgyzstan and Tajikistan.


Locust presence in Caucasus and Russia - May 2015
RUSSIAN FEDERATION
GEORGIA
340
TBILISSI
Black Sea
Caspian Sea
ARMENIA
AZERBAIJAN
YEREVAN
BAKU
CIT
DMA
LMI
1,000
Ha treated
0 50 100 Kilometers


Locust presence in Afghanistan, Central Asia and Russia - May 2015
RUSSIAN FEDERATION
1,700
ASTANA
KAZAKHSTAN
257,700
Aral Sea
Lake Balqash
UZBEKISTAN
246,145
Caspian Sea
BISHKEK
KYRGYSTAN
49,769
TURKMENISTAN
ASHGABAT
DUSHANBE
TAJIKISTAN
63,250
AGHANISTAN
KABUL
54,842
CIT
DMA
LMI
1,000
Ha treated
0 250 500 Kilometers