



Food and Agriculture Organization  
of the United Nations

**WORKSHOP ON LOCUST DATA COLLECTION,  
ANALYSIS, FORECAST AND REPORTING IN  
CAUCASUS AND CENTRAL ASIA (CCA)**

**16-17 February 2023**

**REPORT**

Plant Production and Protection Division (NSP)  
Food and Agriculture Organization of the United Nations (FAO)  
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### List of acronyms and abbreviations

ASDC	Automated System of Data Collection
CCA	Caucasus and Central Asia
CCALM	Caucasus and Central Asia Locust Management System
CIT	<i>Calliptamus italicus</i> (Linnaeus 1758), Italian Locust
DLIS	Desert Locust Information Service (FAO)
DMA	<i>Dociostaurus maroccanus</i> (Thunberg 1815), Moroccan Locust
ET	Economic Threshold
EVI	Enhanced Vegetation Index
IVI	Integral Vegetation Index
FAO	Food and Agriculture Organization of the United Nations
GIS	Geographic Information System
GPS	Global Positioning System
ha	Hectare
HTC	Hydrothermal Coefficient
ISTT	Institute of Space Technique and Technologies (Almaty, Kazakhstan)
JICA	Japan International Cooperation Agency
LMI	<i>Locusta migratoria migratoria</i> (Linnaeus 1758), Asian Migratory Locust
NSP	Plant Production and Protection Division (FAO)
NSPMD	"Locusts and Transboundary Plant Pests and Diseases" Team (FAO)
NDSI	Normalized Difference Snow Index
NDVI	Normalized Difference Vegetation Index
NDWI	Normalized Difference Water Index
RAMSES	Reconnaissance And Management System of the Environment of <i>Schistocerca</i> (Desert Locust national GIS)
TCP	Technical Cooperation Programme (FAO)
TCPf	Technical Cooperation Programme Facility (FAO)
ToT	Training-of-Trainers
SWAC	Commission for Controlling the Desert Locust in South West Asia (FAO)
SWARMS	<i>Schistocerca</i> WARning Management System (global Desert Locust GIS)
USSR	Union of Soviet Socialist Republics
USAID	United States Agency for International Development

## **OPENING**

### **Introduction, round of presentation and adoption of the Agenda (Items 1 and 2)**

1. The Workshop on locust data collection, analysis, forecast and reporting in Caucasus and Central Asia (CCA) took place online on 16-17 February 2023. It was organized by the Food and Agriculture Organization of the United Nations (FAO) in the framework of the interregional and multi-funded “Programme to improve national and regional locust management in Caucasus and Central Asia (CCA)” (Programme).
2. Representatives from Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russian Federation, Tajikistan and Uzbekistan, as well as a resource person from Afghanistan, participated in this Geographic Information System (GIS) Workshop. Turkmenistan was also planned to take part but the participants could not connect due to Internet issues. Besides, the participants included Representatives from FAO-Headquarters and decentralized offices as well as the Software developer from the Institute of Space Technique and Technologies (ISTT) Almaty, Kazakhstan. The list of participants (with up to 56 experts online simultaneously) is provided in Annex 1.
3. Mr Alexandre Latchininsky, Agricultural Officer/Locust Management, Locusts and Transboundary Plant Pests and Diseases Team (NSPMD), opened the Workshop and welcomed all participants. He said that this is fourth specialized GIS workshop organized. The first one had taken place in November 2019 in Uzbekistan thanks to the project funded by the United States Agency for International Development - USAID (GCP/GLO/963/USA); the second and third ones were held remotely in March 2021 and February 2022 thanks to project funded by the Japanese International Cooperation Agency - JICA (GCP/INT/384/JICA) and the FAO Regular Programme; this fourth workshop is held thanks to support from JICA and the FAO Regular Programme. Its objectives are to discuss the practical use of the Automated System for Data Collection (ASDC) and the management of the “Caucasus and Central Asia Locust Management System” (CCALM), with a view to improve data collection, validation, analysis, forecast and reporting for early warning and timely locust control. Such Workshop also aims to improve the GIS in addition to promoting experience exchange, problem solving and network creation between designated Information Officers from CCA countries. Besides, the possibility to add a new specific form for Human Health and Environmental (HH&Env) Monitoring Teams into ASDC&CCALM will be addressed. Mr Alexandre Latchininsky underlined that the GIS Workshop targets specifically the staff responsible for the use and management of ASDC and CCALM at the national level, in the ten CCA countries covered by the FAO Programme.
4. A round of presentations allowed the Delegates from the nine participating countries to introduce themselves and afterwards the provisional agenda was presented and endorsed, as provided in Annex 2. An overview of the development, introduction and use of the locust GIS in CCA (2013-2022) was also briefly provided (given in Annex 3).

## SESSION 1: LOCUST DATA COLLECTION

### Use of the Automated System for Data Collection (ASDC) during the 2022 locust campaign: features, challenges, solutions, etc. (Item 3)

5. Countries were invited to present ASDC use and related issues during the 2022 locust campaigns, including: availability of tablets/smartphones; training sessions and users; extent of use (number of records and geographic coverage) during locust surveys and control operations; problems/difficulties met by staff; lessons learned and recommendations to improve ASDC functionalities.
6. The Delegate of Azerbaijan noted the importance of the GIS for plant protection services and thanked FAO for the related trainings and assistance provided. He underlined that out of the 61 tablets delivered by FAO, 44 are used in the field while 12 tablets do not function anymore. In 2022, five national briefing sessions were organized for a total of 82 specialists of 32 districts, which included ASDC use. In 2023 it is planned to increase the number of Master-Trainers and hold more national sessions. ASDC was used during locust survey on 103 331 ha (69% of the entire surveyed area) and during control operations on 20 788 ha (72%). Thus 1182 Survey Forms and 277 Spray Monitoring Forms were sent to CCALM database. The records were made by 34 Locust Experts. Among the difficulties, Internet access was sometimes problematic. The intention is to improve the work in 2023 and increase the number of ASDC records. The recommendations to FAO included the organization of a training on data analyzing and use for effective forecast as well as the provision of system support. The Delegate of Azerbaijan noted the importance of practical parts of trainings, to be taken into account in the agendas.
7. The Delegate of Armenia indicated that in 2022, 21 tablets were delivered in September, at the end of locust season. Four Master-Trainers carried out two trainings as follows: on 20 April in Yerevan and on 28-29 June in in Syunik, for 19 experts each. In 2023, it is planned to train young specialists in March and the tablets will be distributed. In 2022, ASDC was used only during locust survey. Locust experts made 622 records including 85% on the paper form and 15% by the tablets/smartphones. The Delegate noted that the funding of plant protection service is insufficient, the older generation retires and the young one does not work for a long time in the same position. This is very difficult to manage. In terms of recommendations, the need to carry out more trainings locally was stressed.
8. The Delegate of Georgia underlined that in 2022, ASDC was used both during locust survey and control operations and only by tablets/smartphones. The Italian Locust (CIT) was widely distributed on the areas more than 135 000 ha, including 97 000 ha with a density above the Economic Threshold (ET), while the Moroccan locust (DMA) infested 18 000 ha, including 10 000 ha above ET. A total of 80 locust experts were trained and made 734 records during locust survey and 1120 during treatments. The renewed instruction on locust monitoring and control includes mandatory ASDC use. The Delegate noted that more than 90% of data were covered by ASDC. A difficulty is that locust distribution has extended from Kakheti to other neighboring regions during the last years because of climate influence and multiyear hot conditions.
9. The Delegate of Kazakhstan informed that from the 20 tablets delivered by FAO, 13 ones were registered in CCALM and transferred to local locust specialists for use during the 2023 locust campaign. It was recommended to use the tablets in the districts with high locust density and/or next to country borders. For this purpose, these specialists were trained by Master-Trainer. The Delegate underlined the needs of new training for Kazakh specialists with FAO support. In reply, the Agricultural

Officer/Locust Management, NSPMD, clarified that it is not possible until the Government of Kazakhstan signs the ongoing JCA project.

10. The Delegate of Kyrgyzstan informed that the 20 tablets delivered by FAO in 2021 had been registered in CCALM and used during 2022 locust campaign. Presently the three Master-Trainers who were trained in 2017-2022 continue to work in plant protection service and follow-up on ASDC use. A total of 166 records were made during 2022, including 100 records during locust survey on 45 750 ha (65,4%) and 66 records during treatments on 26 450 ha (51,3%). Unfortunately, the data from 2020 paper forms were not entered into CCALM database through WEB-interface due to lack of work time. The Delegate underlined the annual national sessions before the locust campaign starts in the end of February and the needs of technical support of FAO to overcome problems.
11. The Delegate of the Russian Federation reminded that the Russian Agricultural Center (Rosselhozcenter) developed and uses its own digital phytosanitary monitoring system, which was connected with CCALM as far as the locust part is concerned in 2022 as well. He indicated that in parallel more than 30 ASDC records were made in 2022 during survey operations in Saratov, Orenburg and Volgograd oblasts and Stavropol territory. The Delegate noted that presently two new Master-Trainers from Kalmykia and Bashkortostan will organize collection of ASDC data in 2023 in their regions.
12. The Delegate of Tajikistan remarked that in 2022, a total of 103 locust experts have been trained on locust management as well as ASDC and CCALM use in Khatlon oblast. In total, 58 tablets were handed over by FAO, dispatched as follows: 20 in Vakhsh rayon and in 6 in Kulyab, Khatlon; 12 in Sughd; and 6 in DRS; 14 are not functioning anymore. Some difficulties were connected with old age of Locust experts who can not use a tablet properly. As a recommendation, he noted that it is necessary to organize national sessions to train new staff for ASDC use. Trained Master-Trainers are able to do this.
13. The Delegate of Uzbekistan mentioned that both tablets and personal smartphones were used in 2022. He noted that ASDC training was delivered by FAO to 25 specialists from all locust oblasts. In 2022, a total of 1770 records were made during locust survey (51%) and 623 during treatments (25,6%) by the locust experts of the Agency of Quarantine and Plant Protection (AQPP), Uzbekistan.
14. Ms Nadiya Muratova, FAO International Consultant, GIS Expert, provided an overview of ASDC use in CCA during Programme Year 11 (1<sup>st</sup> October 2021 to 30 September 2022). She indicated that as of 30 September 2022, a total of more than 5500 reports had been made by 188 users from nine CCA countries (against about 5000 records from 133 users from ten countries in 2021). The GIS Expert also underlined a significant increasing of the number of ASDC records in Armenia, Georgia and Uzbekistan. For example, the area covered by ASDC against the total surveyed/treated areas in Georgia is 74% and 93%; but in Tajikistan is still low - 10% and 3%. The GIS Expert expressed the hope that the trainings of Master-Trainers delivered in late 2022 to all CCA countries will facilitate the progress in 2023 and that ASDC will be used as widely as possible during locust surveys and control operations.
15. In response to a question raised by a participant from the Russian Federation about the possibility to stop of ASDC data collection because of the developed own monitoring system and to exchange of locust data with CCALM, the GIS Expert explained that every country has access to CCALM and can display ASDC information for locust surveys from neighboring countries which contains more

parameters. In the future, when FAO Hand-in-Hand (HiH) initiative will display ASDC data, absence of such data will influence the analysis.

#### **Discussion on number of GPS points around survey and control sites and saving/coping coordinates into another form (Item 4)**

16. ISTT software developer informed that in the new ASDC beta-version, the following possibilities will be given to the users: after receiving the mandatory required geographic coordinates of the center of surveyed site, the fields for the next point of latitude and longitude will be dynamically added to data along the perimeter of the surveyed/treated area. The limit in the number of points is 100.
17. The second possibility is to upload the coordinates of a previously filled form (i.e. of already surveyed/treated site) into a new form. In the new ASDC beta-version, the geofences will be displayed on the map from all forms that are present in ASDC. Herewith, the geofences will be highlighted in two different colors: green will mean a form which is currently being edited, blue - all the rest. If the user holds down the blue geofence for five seconds, he will be prompted to copy it to the current form, and after confirmation, the coordinate points will be duplicated.
18. During the discussion, a participant from the Russian Federation asked why the need to transfer the coordinates from one form to another could occur. The GIS Expert explained that presently in CCALM there is the possibility to show a locust survey/treatment site as a polygon. ASDC&CCALM functionality improvement is thus going into two directions: first, to collect many coordinates around the surveyed/treated site and second, to transfer the coordinates from one form to another if it is the same site during treatment.

#### **New procedure for authorization/registration of smartphones and tablets using QR codes in ASDC (Item 5)**

19. The GIS Expert informed the participants about the procedure to register a tablet by QR-code (see Annex 4). She underlined that this procedure can be done only by the Authorized Operator of the country if user's tablet has Android operational system version 5.0 and higher. A warning in case of absence of authorization on the tablet will always remind about necessity of the registration. In reply to a question of the participants, the GIS Expert clarified that it will also be possible to follow the former registration's procedure.

#### **Discussion about special test mode of ASDC use during trainings (Item 6)**

20. The GIS Expert informed the participants about the necessity to introduce a test mode in ASDC which will allow to distinguish the real forms filled during locust survey/treatment from the test ones filled during regional or national training sessions by CCA experts. The participants approved this idea.



## **Introduction of new ASDC form for Human Health and Environmental Monitoring Teams (Item 7)**

21. Mr Harold Van der Valk, FAO International Consultant, Environmental Expert, NSPMD, reminded the participants that since 2014, four Human Health and Environmental (HH&Env) Monitoring Teams had been created in CCA, i.e. in Tajikistan (2014), in Kyrgyzstan (2015), in Azerbaijan and in Georgia (2019), and that it should follow soon in Uzbekistan. He highlighted the main tasks, as follows: (a) collection of information on intentional and unintentional impacts of anti-locust treatments, including their effectiveness and impact on human health and the environment; (b) analysis and interpretation of this information in order to optimize control, increase economic efficiency and minimize negative impacts on human health and the environment.
22. To support and organize data collection by HH&Env Teams, the following was proposed to CCA countries: (1) introduce a new, third HH&Env Monitoring Form in ASDC, whose content should be discussed; (2) establish linkages in ASDC between the Spray Monitoring Form and the new HH&Env form; (3) enable easy loading of ASDC human health and an environment data into CCALM to improve the quality of the analysis (spatial); (4) promote storage and exchange of human health and an environment data between CCA countries.
23. The Agricultural Officer/Locust Management, NSPMD, explained that one of the big achievements of FAO Locust Programme in CCA is an increased attention and protection of human health and the environment. Previously, pesticide exposure for humans and non-target organisms was not or was poorly tracked. The creation of HH&Env Monitoring Teams, currently operational in several CCA countries, had been very instrumental in this regard. However, presently, the teams use a specific paper form. The work of the HH&Env Teams could be streamlined and facilitated by digital collection of data as well as transfer of the coordinates and other corresponding information from the Spray Monitoring Forms to the HH&Env Forms. As the proposed content of the third ASDC form had been sent to the participants prior to the workshop, comments and suggestions were expected.
24. The Delegate of Georgia noted that it is necessary to compare the existing paper HH&Env form with the suggested new ASDC form. Special attention should be paid to the mandatory fields. He asked about testing phase for this third ASDC form and why the filling of the field «Rate of working solution (l/ha)» had been marked as mandatory. The Environmental Expert clarified that equipment calibration is done as a rule before a treatment; however, it does not mean that the amount of pesticides used corresponds to the calibration. If the area treated and the quantity of insecticide used are known, then the correctness of pesticides application can be checked. The Delegated was positive in introducing this new form in ASDC but he suggested to consider a testing period at first.
25. The Delegate of Azerbaijan expressed interest in introducing such new form and suggested to organize a specific meeting involving HH&Env Monitoring Teams and FAO experts to discuss more into detail the proposed new form and to clarify all aspects, including with respect to terminology. He suggested to continue using the paper form during 2023 locust season.
26. In conclusion, the Environmental Expert underlined that the test phase is very important, based on which all details can be discussed. He noted that the creation of an electronic form will facilitate the work of HH&Env Monitoring Teams, including data analysis, especially as countries work in different languages. In reply to the Agricultural Officer/Locust Management, the Environmental Expert

underlined that CCA will be pioneers in creating such digital form for HH&Env as it doesn't exist yet in other geographical areas.

## **SESSION 2: LOCUST DATA ANALYSIS & FORECAST**

### **Use of the Caucasus and Central Asia Management System (CCALM) to analyze locust data and make forecast (Item 8)**

27. The participants from various countries provided information on the use of CCALM at the national level as follows:

- The Delegate of Azerbaijan noted that due to the staff turnover, a number of specialists has just started using CCALM and are thus not confident about all opportunities.
- The Delegate of Armenia noted that in 2022, the specialists used CCALM to enter data from the ASDC paper forms. Unfortunately, only four specialists were trained. She expressed the hope that more users would be trained in 2023. To that end, all presentations which were transferred during the regional sessions of the Training-of-Trainers (ToT) held in September 2022 were translated into Armenian. She also indicated the difficulty in using tablets for the aged agronomists. She concluded that CCALM helps following the locust situation in neighboring countries and indicated that the data are published on the Ministry's site.
- The resource person of Afghanistan noted that the locust situation in the provinces adjacent to Turkmenistan, Tajikistan and Uzbekistan could be dangerous if locust control is not carried out timely. Financial support is needed in this regard. For ASDC&CCALM use, annual trainings and coverage of Internet costs are required.
- The Delegate of Georgia noted that six specialists are currently registered in CCALM. This system provides data which are well correlated to field observations. As the volume of ASDC data has increased, three centers in Kakheti, Kvemo Kartli, Mtskheta-Mtianeti were set up, which prepare reports on a monthly basis using CCALM. Georgian Locust Experts also always consult CCALM regarding the situations in neighboring countries.
- The Delegate of Kazakhstan informed that ASDC will be used for the first year, in 2023, in 13 oblasts. The locust specialists are interested to use the satellite products but there is no experience in this.
- The Delegate of the Russian Federation noted that CCALM is used to monitor the locust situation and soil temperature in the neighboring countries. Unfortunately, though some branches of Rosselhozcenter collect ASDC data, they do not use the data in practice because they are too busy with data collection for their own pest monitoring system in the Russian Federation.
- The Delegate of Tajikistan remarked that there is no practical experience in using of CCALM. He underlined the necessity of a special training for this.
- The Delegate of Uzbekistan underlined the importance of CCALM use, especially for the analysis of locust situation in neighboring countries.

31. The Agricultural Officer/Locust Management, NSPMD, reminded that CCALM was developed to the benefit of the ten CCA countries to improve data analysis as well as forecasting and reporting at the

national and regional levels. However, active use of ASDC and CCALM is not yet effective in all CCA countries. Satellite products are effective but the main source of locust data comes from ASDC. This shouldn't be considered as extra work but as a means to make the work easier at the national level. This is why it is recommended to use ASDC&CCALM as much as possible.

### **Soil moisture and other satellite products for the analysis of locust situation (Item 9)**

32. The GIS Expert noted that CCALM main goal is to improve data analysis and forecasting of locust situation at the national and regional levels, thus contributing to early warning and response. In this connection and in addition to ASDC data, several satellite products, based on remote sensing data, were introduced in CCALM in 2021/2022, as follows: daily average soil and air temperatures and total precipitation, Normalized Difference Vegetation (NDVI), Water (NDWI) and Snow (NDSI) Indexes. Based on this data, Selyaninov hydrothermal coefficient and Integral Vegetation Index (IVI) are calculated for different periods of time. She suggested to add satellite product of soil moisture estimation for the analysis of dry or wet weather conditions during the locust season.
33. The GIS Expert showed various satellite products for different CCA countries and underlined their usefulness for analyzing weather conditions and the corresponding locust situation. For example, analysis of accumulated daily average air temperature and total precipitation during locust season allows to assess the sequence of hot and dry weather conditions contributing to the increase of locust populations. NDSI makes possible to identify areas with a low snow cover and its early melting process; in combination with soil temperature data, it can be used for forecasting locust hatching. On the basis of long-term NDVI data, it is possible to identify areas with a relatively sparse vegetation cover and hot and dry weather conditions, which lead to an increase of locust number. NDWI data allow to analyze water floods in the current and past years in the territories of Uzbekistan, Kazakhstan and the south of the Russian Federation and thus to identify the territories under water in the areas of intensive egg-laying of the Asian Migratory Locust.
34. During the discussions, the Delegate of the Russian Federation asked about automatizing the interpretation process of satellite products. The GIS Expert clarified that in 2022 two new products which build on satellite ones were introduced in CCALM. For example: the Selyaninov hydrothermal coefficient allows to analyze the weather conditions during the whole locust season and the Integral Vegetation Index, the vegetation biomass. The Delegate of Kazakhstan underlined that it is very important to observe weather conditions and it is difficult to make a forecast of the timing of locust hatching. He gave an example when in 2018 in Pavlodar oblast 32% of locust eggs perished because of heavy rainfall and cold spring. He expressed the intention to use of CCALM data for such analysis.
35. The Agricultural Officer/Locust Management clarified the meaning of locust situation forecast. First, it entails forecasting the timing of locust hatching and then of transition from one developmental stage to other. For example, in the spring, DMA hatching can be interrupted if conditions become unsuitable and resume when precipitation reaches 100 mm. Soil temperature is also important for this process. Second, it is important to forecast the interannual trend of locust population increase or decrease. For this, it is necessary to analyze the current situation, i.e. locust density, infested and treated areas. For this purpose, ASDC data and historical locust data are collected at one/two administrative levels. But there are no ready-made recipes for using satellite products to enhance forecasting of locust outbreaks. For example CIT has a big distribution area with different influencing factors in the north (hot and dry weather) and in the south (soil moisture). CCALM now offers many

satellite products, to be used while accumulating experience. This year, CCA countries are again invited to convene a meeting of the E-Committee on CCALM, consisting of GIS specialists and Locust Experts, to continue to discuss the algorithms for the analysis and interpretation of the satellite products.

36. The Delegate of the Russian Federation asked about other digital instruments in other countries. The Agricultural Officer/Locust Management reminded that in the beginning ASDC was created based on the experience of elocust3, which is used for Desert Locust monitoring in over 30 countries of north Africa and the Middle East. For the forecast, the related GIS uses satellite products as NDVI, precipitation and soil moisture, as in CCALM. In conclusion the Agricultural Officer/Locust Management remarked that it is necessary to study ecological conditions for locust development when infestations are low and again urged to use as much as possible CCALM and ASDC data.

#### **CCALM use for monthly bulletins (Item 10)**

37. The Agricultural Officer/Locust Management recommended to all CCA countries to prepare a map with ASDC data in CCALM and insert it in the monthly CCA locust bulletins for a better visual perception. He showed several similar maps. The Agricultural Officer/Locust Management reminded again that it is very important to collect ASDC data as much as possible for an overall and accurate picture of the locust situation.

#### **Transliteration of ASDC field forms in CCALM (if needed) (Item 11)**

38. ISTT Software Developer explained that the transliteration means the transfer of characters of one script/alphabet to the characters of another script/alphabet, in which each character (or sequence of characters) of one writing system is transmitted by the corresponding character of another writing system. In CCALM it is planned to apply transliteration for Armenian, Georgian, Dari, considering the specific alphabets used in these countries, into Cyrillic and Latin alphabets. This applies to ASDC fields such as Rayon, Rural district, Name of village, Farm or site, Name of survey/control team leader in both forms system of as well as trade name of insecticides and active ingredient in the Spray Monitoring Form. The Software Developer demonstrated the transliteration for different languages into Latin and noted that for transliteration into Cyrillic, it is planned to pass through Latin.

#### **Examples of different locust GIS used in CCA (Item 12)**

39. The Delegate of the Russian Federation presented the digital phytosanitary monitoring system named «Agroexpert», which contains observations on more than 2000 harmful organisms, including plant pests and diseases, weeds etc. Information is collected using about 1300 smartphones. In 2022, more than 58 000 records made during locust surveys were transferred to CCALM. Basic objective of this system is to reduce staff workload.
40. In conclusion, the Delegate of the Russian Federation recommended the following: (1) it is necessary to simplify as much as possible GIS use; (2) the «Agroexpert» data is transferred into CCALM and the recommendation of continuation of this process must be included in FAO Report of the annual Technical Workshop on Locusts in CCA; (3) Because ASDC data collected in the Russian Federation represent about 0,6% of all locust data in the country, the Delegate suggested to stop this activity and to use only «Agroexpert» information in CCALM; (4) National public map showing the distribution of gregarious locusts in Russia was launched in test mode, which should be taken into account by CCA

users. Additionally, he mentioned the necessity to organize the filter of ASDC data by selection of rayon.

41. The Delegate of Kazakhstan presented the digital phytosanitary monitoring system which is been developed since 2020. The system belongs to the Republican State Institution «Republican Methodological Center for Phytosanitary Diagnostics and Forecasts» of the State Inspection Committee in the Agro-Industrial Complex. There is a program named as «FitokZ» and installed on tablets for collection of following data: oblast, rayon, rural district, name of farm or agricultural organization, name of the quarantine object/pest/particularly dangerous pest, developmental phase, infested area (for future treatment), date and geographic coordinates. There is the possibility to add a media file. All data are transferred through mobile Internet. Special geoservice (<https://fito.gharish.kz>) provides access to these data to the central, oblast and rayon staff through a personal account with a login and password. On the basis of these data, decisions are taken with respect to chemical treatment. In reply to a question, the Delegate of Kazakhstan clarified that the developer is the Joint Stock National Company “Kazakhstan Gharysh Sapary”, which is responsible for staff training as well. The access to the map could be received on the basis of special permission.
42. The Agricultural Officer/Locust Management reminded CCALM was developed for locust monitoring. In CCA, the specialists who carry out phytosanitary monitoring survey many other pests. In the front line countries in Africa, there are specialized centers for Desert Locust management only, which is the ideal situation. That is why, in some CCA countries, the use of ASDC&CCALM became as a double duty. There is a compromise to be found, i.e. expand the module of data collection inside national GIS to keep on collecting the same data as in ASDC. Moreover, the transparency of forms is a huge advantage and it is necessary to keep on supporting this.

#### **Preparation of CCALM video (Item 13)**

43. The FAO International Consultant, GIS Expert reminded that in 2022 a video entitled “Get started with ASDC” was produced with the objective to facilitate ASDC use by CCA countries. It is a step-by-step tutorial for ASDC users, especially new ones, explaining how to download, install and run the application, with details on the use of the two forms included in the system, the Locust Survey Form and the Spray Monitoring Form. Both English and Russian versions of the video are available on “Locust Watch in CCA” (<https://www.fao.org/locusts-cca/activities/locust-gis/en/>) and on YouTube (English: <https://youtu.be/5kdXRocsOkQ>; and Russian: <https://www.youtube.com/watch?v=qchZtE3atNA> ).
44. The GIS Expert also presented a plan for producing a similar video tutorial for CCALM, which should include two parts. The first one should describe CCALM, its content and the procedure for users’ registration and their role. The second part will provide a more detailed description of data used in CCALM, i.e. ASDC data, locust historical data analysis, satellite products, and of the user’s ways to manage different information.

#### **CLOSING SESSION**

##### **Recommendations for ASDC and CCALM improvement and use in 2023 (Item 14)**

45. After having reviewed the implementation of the recommendations on ASDC and CCALM use and management, formulated by CCA countries and FAO during the previous GIS Workshop in 2022, the

below listed recommendations were formulated and endorsed by the participants, addressed to countries and to FAO.

### **ASDC/CCALM use and management:**

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- 1) *Advocate for introduction and wide use of ASDC and CCALM at the national levels (action: countries and FAO)*
  - To Turkmenistan and FAO: ensure CCALM in-depth introduction to Turkmenistan in 2023.
  - To all countries: further increase the number of ASDC reports in order to be able to carry out a meaningful analysis and move to effective forecast thanks to CCALM.
- 2) *Designate/confirm at least two information officers with appropriate education and skills who will be responsible for managing CCALM at the national level (action: countries)*
  - Provide confirmation of ASDC and CCALM responsible staff at the national level.
- 3) *Continue to provide remote support for ASDC and CCALM maintenance and use, including QGIS, and to deliver related refresher courses/training*
  - To countries: with projects support, ensure delivery of ToT national and briefing sessions including ASDC and CCALM use.
  - To FAO: organize one-day online training sessions for Master-Trainers from all CCA countries to familiarize with the new functionalities of ASDC and CCALM.
- 4) *Create a WhatsApp group including staff responsible for CCALM management and use from the various countries to facilitate direct communication (action: FAO)*
  - To FAO and countries: continue to support and use the Telegram group as needed for easy communication and problem solving.

### **Manuals and guidelines**

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- 5) *Review, update and finalize English and Russian versions of ASDC and CCALM manuals (action: FAO) and translate them into national languages (action: FAO and countries)*
  - To FAO: both manuals to be updated according to new changes introduced in ASDC and CCALM in 2023.
- 6) *Ensure the release of video manuals on the use of ASDC, CCALM and QGIS in Russian and English (action: FAO), subsequently with subtitles in national languages (action: FAO and countries)*
  - To FAO and countries: ensure the translation into national languages of the subtitles of the video "Get started with ASDC" (FAO: to be sent to national experts; Countries: to provide translation).
  - To FAO: issue a video tutorial on CCALM use in English and Russian.
- 7) *Based on available funding sources, print and dispatch a limited number of Monograph on the Italian Locust to CCA countries and publish the Monograph of Moroccan Locust (action: FAO)*

- To FAO: in addition to remaining delivery of the CIT Monograph (Kazakhstan), finalize and publish the DMA Monograph, identify funding for limited print-out and dispatch it to all or most CCA countries in 2023.

### **ASDC functionalities**

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8) *Make available a new ASDC beta version for testing during locust campaign and facilitate its use (action: FAO)*

- To FAO and countries: test the paper ASDC third form of Human Health and Environment monitoring and discuss it during the E-Committee meeting planned in July 2023 for future introduction into ASDC as beta version for testing in 2024.

### **CCALM functionalities expansion**

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9) *In order to expand the possibility of creating CCALM products, prepare and enter into CCALM database relevant historical data, starting from 2000 (if available), on: areas infested by locusts; areas infested by locusts exceeding the economic threshold (ET); and treated area; including for the second administrative level (district)*

- To countries: it is expected that CCA countries share as soon as possible missing data for 2022.

10) *Translate CCALM interface into national languages*

- To FAO: provide the necessary changes in the translation of CCALM interface into national language.

11) *Continue testing of CCALM in national languages (action: users and FAO)*

To countries: feedback to continue to be provided to FAO on CCALM use, whenever relevant.

12) *Improve CCALM functionalities (action: FAO), in particular:*

- To countries and FAO: it is suggested to introduce a soil moisture satellite product for CCA countries in CCALM in 2023.
- To FAO: make available display of ASDC and CCALM outputs on “Locust Watch in CCA”, with realtime data (or on a monthly basis).
- To FAO: provide remote support for ASDC and CCALM maintenance and use, with nominated Information Officers from the ten countries.

13) *Pursue cooperation on importing/exporting data from the Russian Federation system into CCALM; Further explore possibilities to ensure automated import data from Kazakhstan into CCALM*

- To FAO and the Russian Federation: continue the ongoing cooperation on a regular basis;
- To FAO and Kazakhstan: concretize automated data exchange between the Kazakh GIS and CCALM.

### **Development prospects–**

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14) *Convene the E-Committee on CCALM, including representatives from interested CCA countries and FAO experts (Information Officers), to jointly discuss CCALM GIS products (including interpretation of satellite ones) and expand them (action: FAO and countries)*

- To FAO and countries: E-Committee to be convened based on needs – Next proposed meeting in July 2023.

15) *Generally, link the management and use of ASDC/CCALM systems to the discussion on long-term regional cooperation (action: countries and FAO)*

- To countries and FAO: continue an advocacy and steps for the creation of an FAO Locust Commission on CCA which is in progress. ASDC and CCALM management would be part of the attribution of such Commission.

**Closing remarks (Item 15)**

53. The Delegates of all CCA countries thanked FAO and expressed readiness in continuing the development of CCALM and expansion of ASDC use. The Delegate of Georgia underlined that the GIS plays an important role in the practice of National Food Agency. The Delegates of Russian Federation noted that the information received during the Workshop was useful, with big progress in CCALM development and locust management in CCA. The Delegate underlined that at present time many countries try to develop own digital system, this is the modern reality. He recommended to develop a special programme of cooperation for data exchange and reminded about the necessity of an FAO official letter for continuation of exchange of locust data between CCALM and monitoring system of Rosselhozcenter («Agroexpert»).

54. The Agricultural Officer/Locust Management, in his concluding remarks, noted that the work was moving in the right direction, with very good progress with respect to the three previous GIS Workshops held since 2019. He said that Georgia and Uzbekistan had in particular demonstrated how useful CCALM can be. The main point now, in CCA, is to increase the ASDC cover at the national level considering that locusts raise new challenges and that good forecast depends very much on reliable field information.



## ANNEXES

## Annex 1. List of participants

NAME	TITLE & AFFILIATION	FULL ADDRESS
<b>COUNTRIES</b>		
<b>AFGHANISTAN</b>		
<b>Mr Attaullah HANIF</b>	Participant	
<b>ARMENIA</b>		
<b>Mr Artur PETROSYAN</b>	Head, Phytosanitary Division, Food Safety Department, Ministry of Economy (MoE)	12 Erebuni, Yerevan
<b>Ms Rima KARAPETYAN</b>	Chief Specialist, Phytosanitary Division of the Food Safety Department, MoE	
<b>Mr Gharibyan ASHOT</b>	Agronomist, State non-commercial Organization "Center for the provision of services in the field of agriculture"	
<b>AZERBAIJAN</b>		
<b>Mr Fikrat FEYZIEV</b>	Head of the phytosanitary services sector, State Seed Control and Organization of Plant Production Unit, Agrarian Services Agency (ASA) under the Ministry of Agriculture (MoA)	7A, N. Nariman ov str. Baku
<b>Mr Ilham BAYRAMOV</b>	Head of the Organization of Crop Production Sector, State Seed Control and Organization of Plant Production Unit, ASA, MoA	
<b>Mr Asif TAGIEV</b>	Deputy Head of the Center for Plant Protection and Fumigation, ASA, MoA	
<b>Mr Allahverdi MUSTAFAYEV</b>	Head of the Center for Plant Protection and Fumigation, ASA, MoA	

NAME	TITLE & AFFILIATION	FULL ADDRESS
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<b>Mr Lasha NUTSUBIDZE</b>	Deputy Head of the Department of Plant Protection, National Food Agency (NFA), Ministry of Environment Protection and Agriculture (MEPA)	6, Marshal Gelovani Ave., 0159, Tbilisi
<b>Mr Bezhan REKHVIASHVILI</b>	Head, Plant Quarantine Department, NFA, MEPA	
<b>Ms Nana GAGILADZE</b>	Deputy Head of Plant Quarantine Department NFA, MEPA	
<b>Mr Vakhtang METREVELI</b>	Senior Specialist of Plant Quarantine Department, NFA, MEPA	
<b>Ms Khatia TEZELISHVILI</b>	Senior Specialist of Plant Quarantine Department, NFA, MEPA	
<b>Mr Shavlego NONIADZE</b>	Head of the Phytosanitary Monitoring Department, NFA, MEPA	
<b>Mr Papuna ABASHIDZE</b>	Senior Specialist, Phytosanitary Monitoring Department, NFA, MEPA	
<b>Mr Zaza KITESASHVILI</b>	Senior Specialist, Phytosanitary Monitoring Department, NFA, MEPA	
<b>Mr Goga TURASHVILI</b>	Head of Pesticide Control Department, NFA, MEPA	
<b>Mr David MOSULISHVILI</b>	Deputy Head of Pesticide Control Department, NFA, MEPA	
<b>Mr Giorgi NADIRADZE</b>	Senior specialist, Division of the mobile group for risks response, NFA, MEPA	

NAME	TITLE & AFFILIATION	FULL ADDRESS
Mr Avtandil BOSHISHVILI	Freelancer	
<b>KAZAKHSTAN</b>		
Mr Nurlan TLEUBAEV	Chief Agronomist, Methodological Centre, SIC AIC, MoA	
Ms Gulzhan ABDUGALIEVA	Head of the Entomology Department, Methodological Centre, SIC AIC, MoA	
Mr Vladimir PANKOV	Pavlodar	
<b>KYRGYZSTAN</b>		
Mr Salavat MAMBETAKUNOV	Chief specialist, plant protection and pesticide registration unit, Department of Chemicalization, Plant Protection and Quarantine (DCPPQ), Ministry of Agriculture (MoA)	96a, Kievskaya
Mr Bayymet ERKINBEK UULU	Leading Specialist, control of harmful pests and fumigation unit, DCPPQ, MoA	
<b>THE RUSSIAN FEDERATION</b>		
Mr Alexander MALKO	Director, Federal State Budget Enterprise "Russian Agricultural Center", Ministry of Agriculture (MoA)	1/11 Orlikov str., building 1, 107139, Moscow
Mr Dmitriy GOVOROV	Deputy Director of Russian Agricultural Centre	
Mr Andrey ZHIVYKH	Head of Plant Protection Department, Russian Agricultural Centre	
Mr Vladislav UMNIKOV	Plant protection agronomist 1st category, Russian Agricultural Centre	

NAME	TITLE & AFFILIATION	FULL ADDRESS
<b>Mr Kirill LYSENKO</b>	Plant protection agronomist, Russian Agricultural Centre	
<b>Ms Olga KUZNECOVA</b>	Interim director, Branch of the Russian Agricultural Centre for Stavropol Krai	
<b>Ms Natalya LUCHKO</b>	Head of plant protection department, Branch of the Russian Agricultural Centre for Stavropol Krai	
<b>Mr Evgeniy LOGANOV</b>	Levokum district unit, Branch of the Russian Agricultural Centre for Stavropol Krai	
<b>Ms Faina DEREVYANKINA</b>	Chief Agronomist of the Levokum district unit, Branch of the Russian Agricultural Centre for Stavropol Krai	
<b>Mr Alexander BUGAEV</b>	Chief agronomist of the Arzgirsky district unit Branch of the Russian Agricultural Centre for Stavropol Krai	
<b>Mr Valeriy SHARIPOV</b>	Head of plant protection unit, Branch of the Russian Agricultural Centre for Volgograd region	
<b>Mr Alexander AZAROV</b>	Leading crop protection agronomist, Branch of the Russian Agricultural Centre for Volgograd region	
<b>Ms Ekaterina SMIRNOVA</b>	Plant protection agronomist, Branch of the Russian Agricultural Centre for Volgograd region	
<b>Ms Aigul BIKKULOVA</b>	Head of plant protection unit, Branch of the Russian Agricultural Centre for Orenburg region	
<b>Ms Olga VOROBCHENKO</b>	Leading agronomist, Branch of the Russian Agricultural Centre for Orenburg region	
<b>Ms Lyubov TUKHVATULLINA</b>	Leading entophytopathologist, Branch of the Russian Agricultural Centre for Orenburg region	
<b>Ms Makhpuza KARAGULOVA</b>	Head of the Sol-Iletsks Interdistrict Department, Branch of the Russian Agricultural Centre for Orenburg region	

NAME	TITLE & AFFILIATION	FULL ADDRESS
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<b>Mr Aydar KHAMATSHIN</b>	Head of the Branch, Branch of the Russian Agricultural Centre in the Republic of Bashkortostan	
<b>Ms Elma SADYKOVA</b>	Head of plant protection department, Branch of the Russian Agricultural Centre in the Republic of Bashkortostan	
<b>Mr Sergey GAZIZOV</b>	Deputy head of the plant protection department, Branch of the Russian Agricultural Centre in the Republic of Bashkortostan	
<b>Ms Gulfiya NUKHOVA</b>	Leading agronomist, Branch of the Russian Agricultural Centre in the Republic of Bashkortostan	
<b>Mr Alexander KEKESHKEEV</b>	Head, Branch of the Russian Agricultural Centre in the Republic of Kalmykia	
<b>Ms Tamara DENTELINOVA</b>	Deputy Head, Branch of the Russian Agricultural Centre in the Republic of Kalmykia	
<b>Ms Maria BOVAEVA</b>	Head of plant protection department, Branch of the Russian Agricultural Centre in the Republic of Kalmykia	
<b>Ms Bairta MASHTYKOVA</b>	Chief entomologist, Branch of the Russian Agricultural Centre in the Republic of Kalmykia	
<b>Ms Nadezhda KURDYUKOVA</b>	Head of the Tseliniy Interdistrict Department, Branch of the Russian Agricultural Centre in the Republic of Kalmykia	

NAME	TITLE & AFFILIATION	FULL ADDRESS
<b>Ms Tatyana KOROBOVA</b>	Leading agronomist of the Sarpinsky interdistrict department, Branch of the Russian Agricultural Centre in the Republic of Kalmykia	
<b>Mr Evgeny KHARGATAEV</b>	Leading agronomist of the Tseliniy interdistrict department, Branch of the Russian Agricultural Centre in the Republic of Kalmykia	
<b>Mr Ochir BOSKHOMDZHIEV</b>		
<b>TAJKISTAN</b>		
<b>Mr Firdavs KADYROV</b>	Deputy Head, State Entity “Locust Control Expedition” (SE-LCE), Ministry of Agriculture (MoA)	
<b>Mr Dilshodbeg AHMADOV</b>	Deputy Head, SE-LCE, MoA	
<b>Mr Akmal HAITOV</b>	Head of the Survey and Monitoring Unit, SE-LCE, MoA	
<b>Mr Bahodur YOROV</b>	Chief Specialist of the Production Unit, SE-LCE, MoA	
<b>Mr Mirsaid NIGMATOV</b>	Chief Specialist of the Production Unit, SE-LCE, MoA	
<b>Mr Umarali BURIEV</b>	Leading Specialist of the Production Unit, SE-LCE, MoA	
<b>Ms Muhayo ULFATSHOHZODA</b>	Chief Specialist, SE-LCE, MoA	
<b>UZBEKISTAN</b>		
<b>Mr Bakhodir KHUDAYKULOV</b>	Head, Locust and Mulberry Pyralid Control Department, Agency of Plant Protection and Quarantine (AQPP), Ministry of Agriculture (MoA)	2, Universit y st.,

NAME	TITLE & AFFILIATION	FULL ADDRESS
<b>Mr Utkir MIRZAEV</b>	Chief Specialist, Locust and Mulberry Pyralid Control Department, AQPP, MoA	Kibray district, Tashkent
<b>FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)</b>		
<b>Mr Alexandre LATCHININSKY</b>	Agricultural Officer/Locust Management, NSPMD	
<b>Ms Marion CHRIS</b>	Locust Programme Officer, NSPMD	
<b>Ms Nadiya MURATOVA</b>	FAO Consultant, Geographical Information System (GIS) Expert, NSPMD	
<b>Mr Harold van der Valk</b>	FAO Consultant, Environment Expert, NSPMD	
<b>Mr Bahromiddin HUSENOV</b>	Agricultural Officer (Plant Protection/Locusts), NSPMD	
<b>Mr Waheedullah YOUSAFI</b>	Rangeland Management Specialist, FAO-Afghanistan	
<b>Mr Sayed Omar DOST</b>	Geo-Spatial and E-learning Assistant, FAO-Afghanistan	
<b>Mr Muhammad Ishaq SAFI</b>	Professional Officer, FAO-Afghanistan	
<b>Mr Igor IVANOV</b>	Software Developer, Institute of Space Techniques and Technologies (ISTT)	Almaty, Kazakhstan



NAME	TITLE & AFFILIATION	FULL ADDRESS
<b>INTERPRETERS</b>		
Ms Veronika GRUSHEVSKAYA		
Ms Valeriya TRUPANOVA		

## Annex 2. Agenda

### WORKSHOP ON LOCUST DATA COLLECTION, ANALYSIS, FORECAST AND REPORTING IN CAUCASUS AND CENTRAL ASIA (CCA)

16-17 February 2023

8 am – 12.30 am Rome time (UTC +1)

#### PROVISIONAL AGENDA

ITEMS	DOCUMENTS	PRESENTERS	TIMING
<b>Opening</b>			
<b>1. Introduction &amp; Round of presentation</b>	-	Alexandre Latchininsky, Agricultural Officer (Locust Management), Locusts and Transboundary Plant Pests and Diseases (NSPMD) & Workshop Moderator	<b>Thursday 16 February</b>
<b>2. Adoption of the Agenda</b>	Provisional agenda & timetable	Alexandre Latchininsky, Agricultural Officer (Locust Management)	
<b>Session 1: Locust data collection</b>			
<b>3. Use of the Automated System for Data Collection (ASDC) during the 2022 locust campaign: challenges, solutions, etc.</b>	Working Paper - WP (template)	Countries' presentations (up to 10 minutes)	<b>Thursday 16 February</b>
Break (15 minutes)			
<b>4. Discussion on number of GPS points around survey and control sites and saving/coping coordinates into another form</b>	-	Igor Ivanov, Institute of Space Techniques and Technologies (ISST)	

<b>5. New procedure for authorization/registration of smartphones and tablets using QR codes in ASDC</b>	WP	Nadiya Muratova, Geographic Information System (GIS) Expert, NSPMD	<b>Thursday 16 February</b>	
<b>6. Discussion about special test mode of ASDC use during trainings</b>	WP	Nadiya Muratova, GIS Expert		
<b>7. Introduction of new ASDC form for Human Health and Environmental Monitoring Teams</b>	WP	Harold Van der Valk, Environmental Expert, NSPMD		
<b>Session 2: Locust data analysis &amp; forecast</b>				
<b>8. Use of the Caucasus and Central Asia Management System (CCALM) to analyze locust data and make forecast</b>	WP (Template)	Countries' presentations (up to 10 minutes) & Round-table discussions	<b>Friday 17 February</b>	
<b>9. Soil moisture and other satellite products use for analysis of locust situation</b>	WP	Nadiya Muratova, GIS Expert		
<b>10. CCALM use for monthly bulletins</b>	-	Alexandre Latchininsky, Agricultural Officer (Locust Management) and Nadiya Muratova, GIS Expert		
<b>Break (15 minutes)</b>				
<b>11. Transliteration of ASDC field forms in CCALM (if needed)</b>	WP	Igor Ivanov, ISST		
<b>12. Examples of different locust GIS</b>	WP (template)	Presentations by Russian Federation and Kazakhstan		
<b>13. Preparation of CCALM video</b>	-	Nadiya Muratova, GIS Expert		

<b>Closing</b>			
<b>14. Recommendations for ASDC and CCALM improvement and use in 2023</b>	WP	Alexandre Latchininsky, Agricultural Officer (Locust Management), and Nadiya Muratova, GIS Expert	<b>Friday 17 February</b>
<b>15. Any other business, including:</b> <ul style="list-style-type: none"> <li>Confirmation of ASDC and CCALM responsible staff at the national level</li> </ul>	WP	All participants	
<b>16. Closing remarks</b>	-	Alexandre Latchininsky, Agricultural Officer (Locust Management)	

### Annex 3. Overview on the development, introduction and use of the locust GIS in CCA (2013-2022)

The Geographic Information System (GIS) on locusts in Caucasus and Central Asia (CCA) was developed to the benefit of the ten countries participating in the FAO “Programme to improve national and regional locust management in CCA”, under Result 3 of its Roadmap “Locust issues and disasters better anticipated and mitigated” and Activity 3.3 “Develop monitoring and analyzing systems”, for use both at the national and regional levels. This was possible thanks to several funding sources over the past years, including projects funded by USAID, the FAO-Turkey Partnership Programme (FTPP), JICA as well as the FAO Regular Programme.

- **Automated System of Data Collection (ASDC)**

The Automated System of Data Collection (ASDC) was created in 2013 with the objective to facilitate collection and sharing of standardized locust data by Plant Protection/Locust Experts during survey and control operations, using tablets, smartphones and computers. It simulates the FAO standard “Locust Survey Form” and “Spray Monitoring Form” endorsed by CCA countries and serves as a basic data for the locust GIS in CCA, entitled Caucasus and Central Asia Locust Management System (CCALM). After ASDC first testing by Georgia, Uzbekistan and the Russian Federation in 2014-2015, the system was endorsed by CCA countries in October 2015, finalized and made available in eleven languages (Armenian, Azeri, Dari, English, Georgian, Kazakh, Kyrgyz, Russian, Tajik, Turkmen and Uzbek) in 2016/2017.

To support the widespread use of ASDC, as of 30 September 2022 (i.e. up to Programme Year 11 inclusive), FAO delivered or supported the organization of training sessions on ASDC use for a total of 1553 experts from the ten countries, to various extents (from 2017 to 2022)<sup>1</sup> during the trainings, recommendations were formulated to improve the functionalities of the system as well as translations into the national languages of individual ASDC fields. FAO also delivered 354 tablets to CCA countries (from 2014 to 2022)<sup>2</sup>.

As a result, a gradual increased use of the system in the crop protection services of CCA countries was observed overall. The number of ASDC standardized locust survey and spray monitoring forms increased from 165 records from five countries in 2016 to 5 681 reports from nine countries (all except Turkmenistan) in 2022 – more specifically:

YEAR	RECORDS	USERS	COUNTRIES
2016	165	18	5
2017	904	58	7
2018	911	68	7
2019	1481	89	7
2020	4285	100	8
2021	5178 (+ 73 tests)	133	8 (+2 for test)
2022	5681	188	9

<sup>1</sup> This includes: 148 experts from eight countries (Afghanistan, Azerbaijan, Armenia, Georgia, Kyrgyzstan, Russian Federation, Tajikistan and Uzbekistan) in 2017; 225 experts from four countries (Afghanistan, Azerbaijan, Kyrgyzstan and Tajikistan) in 2018; 225 experts from nine countries (Afghanistan, Armenia, Azerbaijan, Georgia, Kazakhstan, Russian Federation, Tajikistan, Turkmenistan and Uzbekistan) in 2019; 95 experts from three countries (Azerbaijan, Kazakhstan and Kyrgyzstan) in 2020; 584 experts from the ten CCA countries in 2021; and 271 experts from the ten CCA countries in 2022

<sup>2</sup> Number of delivered tablets by county is as follows: 43 tablets to Afghanistan, 27 to Armenia, 61 to Azerbaijan, 54 to Georgia, 20 to Kazakhstan, 47 to Kyrgyzstan, one to Russian Federation, 58 to Tajikistan, 15 to Turkmenistan, and 28 to Uzbekistan.

During the three previous Workshops on Locust Data Analysis, Forecast and Reporting in CCA and the annual Technical Workshops (TW) on Locusts in CCA, held in November 2022, delegates reiterated their interest as well as the need for continued technical and/or operational support (training sessions) for full coverage of the national territory with ASDC.

- **Caucasus and Central Asia Locust Management system” (CCALM)**

The “Caucasus and Central Asia Locust Management system” (CCALM) was created in 2016/2017 with the objective to improve data analysis, forecasting and reporting at the national and regional levels. It is filled using ASDC and other sources, i.e. satellite products.

More specifically, CCALM basic functions (data import, query, display, output), i.e. the database and its management system, was developed by the Institute of Space Technique and Technologies (ISTT), Almaty, Kazakhstan, and launched in early 2016. Based on the technical specifications worked out and agreed upon by CCA Forecasting and FAO Experts, the advanced functions (summary, analysis and forecast algorithms) were developed by ISTT in line with the technical standards of FAO. They include a set of output products for analyzing Italian (CIT), Moroccan (DMA) and Asian Migratory (LMI) locusts data and elaborating forecasts. Among them, there are maps of: (a) locust densities, (b) treated areas, (c) areas infested (or treated) with densities above the Economic Threshold (ET). CCALM is fully available since March 2017 in two languages, English and Russian, at [ccalm.org](http://ccalm.org).

During the 2017-2019 locust campaign, CCALM (basic and advanced functions) was gradually introduced to several CCA countries. In-depth training were delivered to staff from Afghanistan, Armenia, Azerbaijan, Georgia, Kyrgyzstan, Russia and Tajikistan as well as, in 2022, from Uzbekistan. Two/three experts per country were designated to be responsible for CCALM management and use at the national level. During this testing phase, they made a number of recommendations for improving the system, which were discussed and endorsed by CCA Delegates during the annual Technical Workshop on Locusts in CCA. As already mentioned, three specific Workshops on Locust Data Analysis, Forecast and Reporting in CCA were also held in November 2019 (Tashkent, Uzbekistan), March 2021 and February 2022 (online). The recommendations formulated at this occasion resulted in a number of improvements of the GIS, including new functionalities.

#### Annex 4. New procedure for authorization/registration of smartphones and tablets using QR codes in ASDC

In 2022, a new module was developed allowing to authorize and register tablets using QR codes in ASDC and CCALM, with a warning in case of absence of authorization on the tablet. This procedure includes the following steps:

- 1) To register new tablets, the Authorized Operator of the country must open the «Administration» tab, click on the "Tablets" button, then on the button with symbol «plus» and then start to fill the registration form (see fig. below)

Name	Value
Country	Kazakhstan (Қазақстан)
Organization	Агентство по карантину и защиты растений
Responsible person for data verification (Inspector)	MURATOVA Nadiya nmuratova@mail.ru
Phone number	
Responsible person for the tablet	
Application ID	
The tablet model	

2) There are three mandatory fields to fill in as follows: the country, the organization and the responsible person for data verification. To get an application ID and to register tablets using the application ID, the Authorized Operator uses the button “Apply and generate QR code”, save this QR code as a picture and send this picture to ASDC user through any communication channel. When this picture (QR-code) is saved in photo archive of the tablet, ASDC user must scan this picture (QR-code) with the help of the specific button in the ASDC «Settings» page. The procedure of tablet’s registration is then completed.

If the tablet is already registered, then the user receives information from the previously completed registration form of the tablet, when he clicks on the “Authorize the tablet by QR-code” button on the “Settings” page.

If Registration is not done, the unregistered tablets will always warn that the tablet is not registered and encourage to do it.

NOTE: To use QR-code function the tablet must have Android operational system version 5.0 and higher.