Central Asia and Caucasus Regional Expert Consultation on cereals diseases, pests, weeds monitoring and cereals disease resistance breeding

27-28 February 2013
Almaty, Kazakhstan

Report

The Central Asia and Caucasus Regional Expert Consultation on cereals diseases, pests, weeds monitoring and cereals disease resistance breeding was held on 27-28 February 2013 in Almaty, Kazakhstan. The meeting was organized by the Sub-regional office of the Food and Agriculture Organization in Central Asia (FAO-SEC), in cooperation with the Regional Office for Europe and Central Asia (REU), International Maize and Wheat Improvement Centre (CIMMYT) and the International Centre for Agricultural Research in the Dry Areas (ICARDA).

The objective of the meeting was to discuss the results of the monitoring of cereals diseases, pests and weeds by FAO-SEC in collaboration with the International Winter Wheat Improvement Programme (IWWIP), national consultants and agricultural research institutes, as well as get acquainted with the activities of national breeding programs on breeding of disease resistant varieties, development and discussing the activity plans for the new cropping season.

The meeting attracted more than 40 scientists - plant pathologists and breeders from Central Asia and the Caucasus, who carry out the study of cereals diseases, pests and weeds and breeding of resistant varieties, representatives of FAO, CIMMYT and ICARDA.

The first day of the meeting was devoted to discussion of the monitoring of diseases, pests and weeds on cereal crops. An overview of grain production in the region and the outcomes of a study on monitoring and surveillance of diseases, pests and weeds on cereal crops were presented. Participants then reported on the status of diseases, pests and weeds on cereal crops in the region. In addition to that, information was provided on the application of modern approaches to the monitoring and surveillance of pests and diseases, especially cereal rusts, in order to take preventive measures.

The monitoring and surveillance of diseases, pests and weeds on cereals were further discussed in a special session. The meeting proposed to develop a common methodology for monitoring and surveillance of diseases, pests and weeds on cereals, which could be used by colleagues in other countries. It was also suggested during the monitoring take into account not only the number but also the size of fields and the total area the monitoring was undertaken.

While discussing the monitoring questionnaire, developed and used in 2012, the meeting participants noted the comprehensive approach, which not only allowed for the monitoring of diseases, but also to determine the damage caused by pests, weeds infestation, their botanical composition, set the most common varieties and assess the crop management. Defining percentage of areas under registered and unregistered varieties and local and foreign varieties during the monitoring can allow to assess the efficiency of the national breeding programs, variety testing and registration system,

seed quality control and certification. Based on the analysis of the situation the specific proposals for improving the breeding of cereals, variety registration and seed quality control could be developed.

It was proposed to continue monitoring and surveillance of diseases, pests and weeds on cereals and link them to the Borlaug Global Rust Initiative (BGRI), which is mainly aimed at monitoring of the rust diseases. In this regard, FAO has provided to the national partners the GPC equipment, the application of which will more accurately determine the geographical locations of the monitoring of diseases, pests and weeds. Transferring data from the GPC devices to the map will determine the route of spread of disease, especially rust.

On the second day of the meeting the issues of climate change in the region of Central Asia and Caucasus, their effects on breeding and plant protection, an overview and prospects of breeding of wheat and barley in the region with emphasis on resistance to diseases and pests, and the possibility of application of biotechnology techniques in the breeding of cereals for resistance to diseases and pests were discussed. Following that, the participants reported on the status of breeding of cereals for disease resistance in the CAC countries.

During the discussion the national breeding programs were asked to pay attention not only on breeding of varieties resistant to rust, but also to other diseases and pests. The climate change in the region is clearly observed in the melting of glaciers. In this regard, along with selection for resistance to disease, there is a need for breeding of cereal varieties tolerant to drought and high temperatures.

In addition to strengthening of wheat breeding, it was proposed to strengthen barley breeding also, both spring and winter type. In this regard ICARDA is already supplying national breeding programs with diverse options of international barley nurseries. Further, ICARDA is considering winter barley breeding program operating from Uzbekistan, which would provide further opportunities to strengthen cooperation with national breeding programs in the region.

The representatives of Kazakhstan asked the Turkish colleagues the samples of wheat varieties, characterized by resistance to disease in order to study them. In this case, the international arrangements and rules for exchange of plant genetic material and protection of plant breeders' rights were explained and should be obeyed while requesting for a sample, carrying out a study, multiplication and use.

Currently, the area under the zero tillage in Kazakhstan reaches 2 million hectares. With the development of interest, adaptation and promotion of conservation agriculture in other countries in the region the importance of breeding of disease resistant varieties will increase. Therefore, breeders should consider developing varieties suitable under zero-tillage and conservation agriculture.

It was noted that the capacity of the national programs on study of diseases and pests, as well as breeding of varieties is gradually increasing, which promotes a regional cooperation. With this in mind, it was proposed to create a special nursery, similar to the one that was established a few years ago for winter wheat varieties of Central Asia. The nursery must include all commercially important wheat varieties from the region to determine their virulence. In response to this proposal, it was noted that such a nursery is already established by ICARDA-Tashkent. Dr. Ram Sharma coordinates the preparation and distribution of the nursery. One set is on the nursery was already sent for

screening for resistance to yellow rust in Kazakhstan. Help and support of colleagues from the region is needed to share germplasm and the research data.

The scientists using the trap-nurseries were asked to update the nursery. On this occasion, it was noted that there is a problem with returning data to ICARDA, where the trap-nurseries are established. As a result, scientists are faced with the difficulty in identifying relevant genes and developing appropriate trap-nurseries. Therefore it was recommended to all recipient of trap nurseries should return data in timely manner.

The meeting participants asked the organizers to publish the workshop proceedings, but in view of the required funds for the collection of materials and publications, it was agreed to send the manuscript to Gallyaaral Grain Research Institute (Uzbekistan). On the occasion of 100^{th} anniversary of the Institute is scheduled to hold an international conference in May 2013 and the publication of proceedings in which the materials from this workshop could be included.

It was noted that in the 1990s and early 2000s, the international centers CIMMYT and ICARDA have been working more closely and supporting the national agricultural research institutes. CIMMYT and ICARDA, not only were providing a huge amount of plant genetic material for inclusion in the national breeding programs, but also were providing support for training, carrying out research, strengthening the infrastructure of the institutes, organization of scientific conferences, printing of scientific publications, etc. More such trainings are needed for the countries in need of improving capacity of young scientists. In this regard, the meeting participants requested FAO, CIMMYT and ICARDA to conduct regional training programs on plant pathology and plant breeding, to support the participation of young scientists from the region in the international training programs conducted by CIMMYT, ICARDA and centers in developed countries.

Assessment of cereals' management show that some farmers repeatedly use non-certified seed, grow non-registered varieties and there is still a large volume of seed imports. In this regard, there is a need to strengthen and improve national systems for variety testing and registration, seed production, seed quality control and certification. In most countries of the region, except North Kazakhstan, cultivated varieties of cereals crops are facultative or winter habit. But the farmers in highlands mainly grow spring cereals. Thus, this requires strengthening breeding of spring cereals adopted to climatic conditions of highlands.

The meeting called on colleagues in cooperation and application of available molecular markers in evaluating varieties for resistance to diseases. It is necessary to use efficiently the technical and human resources available in the region. The scientists from the Institute of Plant Physiology and Bio-engineering, Academy of Sciences, Kazakhstan offered their assistance in the molecular analysis of varieties and the use of molecular markers in breeding programs. The representatives of the Grain Research Institute from Karshi (Uzbekistan) and the Institute of Plant Protection and Quarantine (Kazakhstan) suggested to colleagues to send the samples of varieties for testing for resistance to diseases and conducting race analysis of pathogens.

It is encouraging to note that at the meeting along with senior scientists was actively participated by young researchers, who presented the results of their studies. All presentations were prepared on a high level and are presented in Russian and English.

In general, the expert consultation allowed to bring some results of monitoring of diseases, pests and weeds on cereal crops, as well as on-going research on breeding of disease resistant varieties, to determine the program and the prospects for regional cooperation. In addition, the meeting enabled colleagues to meet each other, discuss the programs and plans of cooperation between national programs, thereby strengthening the network of regional cooperation in breeding of disease resistant varieties and combating pests and diseases.

The meeting recommended that a report on the meeting and on the monitoring of diseases, pests and weeds on cereal crops to be submitted to the Ministries of Agriculture of the countries in the region.

Based on presented information and discussion the meeting participants concluded to:

- continue supporting the national programs in monitoring and surveillance of diseases, pests and weeds on cereal crops;
- develop and publish a uniform methodology for monitoring and surveillance of diseases, pests and weeds on cereal crops;
- take measures to further strengthen cooperation of the national research programs with CIMMYT and ICARDA;
- based on the analysis of the situation, it is necessary to develop the specific proposals for improving breeding programs, variety testing and registration and seed quality control and certification systems;
- organize the regional training programs on cereals pathology and breeding;
- competitively select young scientists from the region and support their participation in the international training programs;
- contribute to the strengthening of regional cooperation and effective use of the region's technical and professional capacities for breeding varieties of crops that are resistant to diseases and stress factors;
- submit the workshop report and the report on the monitoring of diseases, pests and weeds on cereal crops to the Ministries of Agriculture of the countries of the region report;
- consider providing assistance in strengthening and improving national systems of variety testing and registration, seed production, seed quality control and certification.