**EC/FAO Programme on Information Systems to Improve Food Security Decision-Making in the European Neighbourhood Policy (ENP) East Area**

**Training on introduction of potato disease forecast and prevention to improve crop-forecasting system in Armenia**

ARMSTATEHYDROMET Service, Yerevan, Armenia  
13-16 March 2012

- REPORT -

1. **Background**

A four day training was jointly organized by the ARMSTATEHYDROMET (hereinafter: Hydromet), MoA and FAO under the “EC/FAO Programme on Information Systems to Improve Food Security Decision-Making in the European Neighbourhood Policy (ENP) East Area” from 13 to 16 March 2012. The Programme is financed by the European Commission and implemented by FAO. The Programme aims at improving food security by enhancing the national capacity to generate, analyse, communicate and mainstream more relevant and reliable information into policies and programmes. The training took place at Hydromet.

2. **Training objective**

The objective of the training was to develop capacity of Hydromet and Ministry of Agriculture in predicting and preventing potato crop diseases. Besides, Head of Hydrometeorological Operational Centre introduced the latest developments in crop forecasting and agrometeorological data to the representatives of Agricultural Support Marz centres.

The training provided both theoretical and practical knowledge and skills in potato diseases identification and prevention. The knowledge and skills acquired will be immediately applied for the improvement of crop forecasting system and will be incorporated in Agromet Bulletin as potato was identified by the Crop Forecasting Working Group as one of the three crops for real forecast. The training was conducted by an international consultant, Jean-Louis Rolot, Centre for Agricultural Research, Belgium.

3. **Participation**

The training was attended by 21 participants from Hydromet and MoA.

The training was organised for the stakeholders of the Programme concerned with crop forecasting, including mainly staff from Hydromet (Agrometeorological and Climatology Units, 8), Ministry of Agriculture (Science and Education Dpt, 1 participant; Agricultural Support Marz Centres, 12 participants). The training was also attended by some members of the Crop Forecasting Working
Group, 2 members. The objective of the Crop Forecasting Working group is to improve crop forecasting system in Armenia by providing decision-makers with reliable agrometeorological information.

The list of participants is provided in Annex 1.

Training sessions and group picture

4. Process

Introductory speeches

The participants were welcomed by Zara Petrosyan, Head of Hydrometeorological Operational Centre. Ms. Petrosyan noted that improvement of crop forecasting system in Armenia requires new approaches and application of new technologies. The new experience for different components of crop forecasting is being actively introduced to different levels of national institutions by involving different structures.
The training itself was very practical. A total of 5 presentations were delivered by the international consultant. All of them were translated into Armenian before the training and distributed to each participant on CDs.

Main topics of the training were:

- General information on potato diseases
- The Late Blight Cycle and relations to the weather parameters
- Fungicides use against Potato Late Blight
- The Late Blight Modeling Software
- The Potato Micropropagation

In particular:

1. Prediction of diseases in potato crop, in particular late blight (Phytophthora infestans), based on the monitoring of climatic conditions.

The consultant presented the late blight disease cycle and explained the relations between the weather parameters and the development of the disease; explained how to predict the occurrence of the disease by monitoring and analyzing the weather parameters (temperature, relative humidity, rainfall), using a model which has been developed in Belgium since the seventies; trained the participants in using a specific software which was given to the participants for future use after the training.

2. Prevention of potato crop diseases which are caused by climatic conditions.

The consultant presented the main active substances commonly used against the development of late blight: type, mode of action, application

3. Recognition of foliage and tuber potato diseases.

The consultant presented the main potato diseases: recognition, pathogen involved, epidemiology, methods to eliminate them

4. Disease-free propagation and cultivation of potato seeds.

The consultant presented all the information required to implement potato seed production system based on the use of the *in vitro* micropropagation techniques.

Each presentation was followed by an active Q&A session. Participants were very much interested in using the new techniques on potato disease identification and prevention.

The training was designed and organized in such a way that all participants were involved in discussions and reflected on appropriate recommendations for all state institutions involved in crop forecasting in Armenia.
On the last day of the training, Ms. Zara Petrosyan, Head of Hydrometeorological Operational Centre, provided additional information to the participants regarding the activities of Armhydromet. In particular, improved and specific meteorological and agro-meteorological information will be soon available on the website for the use of farmers.

An additional, more detailed training session on the Pameseb software for potato disease forecast was conducted by the Consultant for several participants who plan to use it.

The training was concluded with distribution of certificates of participation.

The training agenda is provided in Annex 2.

5. Evaluation of the training

Participants were asked to assess the relevance and effectiveness of the training at the end of the training. The evaluation forms and the results of the surveys are presented in Annex 3.

6. Conclusions and follow-up actions

The training was successful in meeting its objectives. At the end of training:

- Trainees are knowledgeable about the methods to predict and prevent the occurrence of potato diseases triggered by climatic conditions;
- Trainees are able to use the late blight forecasting model;
- Trainees are able to recognize foliage and tuber potato diseases;
- Trainees are knowledgeable about the techniques for disease-free propagation and cultivation of potato seeds.

The discussions during the training demonstrated that there is strong interest from the national institutions in improving crop forecasting in Armenia. The training was successful in gathering both users and producers of information. It is worthwhile noting that the Ministry of Agriculture (MoA) is both producer of information (providing operational data) and user of the Agromet Bulletin for policy-making. There was excellent collaboration between the institutions involved in crop forecasting, in particular Hydromet and MoA. The training clearly demonstrates that this collaboration is indispensable for improving crop forecasting and will need to be institutionalized for sustainable results.

Participants have acknowledged that for the last year the collaboration between MoA and Hydromet have been strengthened. The agrometeorological data is provided every 10 days to Agricultural Support Marz centres.
Annex 1. List of participants for potato disease training (Hydromet, MoA, Agricultural Marz Support centres)

1. L. Grigoryan  Agrometeorological forecast Unit, Head armstate@meteo.am
2. N. Arakelyan  Agrometeorological forecast Unit, First category specialist armstate@meteo.am, nelliarakel@gmail.com
3. A. Sahakayn  Agrometeorological forecast Unit, Leading specialist armstate@meteo.am
4. R. Ghmboyan  Agrometeorological forecast Unit, Second category specialist armstate@meteo.am
5. S. Shindyan  Climate survey Unit, Leading specialist armstate@meteo.am
6. L. Simonyan  Agrometeorological Survey Unit, Head armstate@meteo.am
7. V. Badalyan  Agrometeorological Survey Unit, Chief specialist armstate@meteo.am
8. M. Mkhitaryan  Agrometeorological Survey Unit, Leading specialist armstate@meteo.am
9. A. Chobanyan  MoA, Science and Education Dpt., Chief Specialistgitutjun1@rambler.ru

12 representatives from Agriculture support Marz centres (6 Marzes)

Note: Preference was given to those Marzes where potato is one of the main crops (based on MoA Deputy Minister’s letter No. AP/05.2/746-12 from February 22, 2012)

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<th>Institution</th>
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<td>Vahagn Khachatryan</td>
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<td>Rafik Hovhanisyan</td>
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Annex 2. Training agenda

TRAINING TOPIC: Potato Disease Forecast and Prevention

Instructor: Jean-Louis Rolot
E-mail: rolot@cra.wallonie.be

Training objective
The objective of the consultancy is to develop capacity of Armstatehydromet and Ministry of Agriculture in predicting and preventing potato crop diseases.

Target group
8 staff of Hydromet and 13 staff of Ministry of Agriculture (centralized and decentralized levels).

The candidates for participation to the training were nominated by Hydromet and MoA.

Venue and resources
Training took place in ARMSTATEHYDROMET Service. The room was furnished with tables, 2 computers and overhead projector. All this was provided by ARMSTATEHYDROMET Service free of charge. Some other technical staff, e.g. stationery, CDs with the presentations of the training were provided by the Programme.

Training outline

Lecture 1 (March 13): The Potato Disease, an overview.
For the main potato diseases (fungi, viruses, bacteria) and pests (Nematods), to provide information on symptoms, causal organism, epidemiology and control tools.

Lecture 2, 3, 4 (March 14):

- **The Late blight Cycle and Relations to the Weather Parameters for its Development.** What are the main steps in the Late Blight (*Phytophthora infestans*) cycle, and their relations with the weather parameters.

- **Fungicides use against Potato Late Blight.** What are the basic measures to be taken before the use of fungicides? How to use fungicides in a good way? Fungicides classification according to their mobility on and in the plant, mode of action, effectiveness and rainfastness. What are the characteristics of the main active substances used against late blight.

- **The Potato Micropropagation.** Advantages of the use of the *in vitro* micropropagation techniques for the seed potato chain in comparison with the traditional method. Description of all the techniques used to introduce *in vitro* a potato variety, to maintain the potato varieties *in vitro*, to produce by *in vitro* multiplication the vitroplantlets, to execute the intermediate productions before transfering the *in vitro* material to the field (minitubers, vitrotubers, rooted acclimatized vitroplants techniques of production). To give practical results in field by using minitubers, vitrotubers and rooted plantlets.
Lecture 5 (March 15, 16): The Late Blight Modeling Software “Pameseb Late Blight”.
Introduction on the software: contents, how it runs, practical exercises on the usage of the system.

On the fourth day of the training Zara Petrosyan, Head of Hydrometeorological operational centre, presented all activities undertaken so far by Hydromet. The activities included:

- International agrometeor expert mission to review the current situation on crop forecasting
- Introduction of a new model on crop forecasting to MoA and Gydromet staff
- Establishment of a Crop Forecasting Working Group
- Training in application of new model
- Training in Geographic Information System (GIS) in agrometeorology
- Procurement of 3 agrometeorological automatic stations, data loggers and soil moistures
- Training in application of new equipment
- Development of updated Agromet Bulletin
- Development of agropage
- STATISTICA software procurement

Further activities to improve crop forecasting system and to strengthen data distribution:

- Training on prevention of wheat diseases
- Training on prevention of fruit trees diseases
- Publication of 1st updated Agromet Bulletin, including agricultural conditions for crops
- Trial on first real crop forecasting
Annex 3. Evaluation results

Evaluation Form

At the end of the training a survey was carried out among the participants to assess the results of the training in terms of developing the capacity of Armstatehydromet and Ministry of Agriculture on predicting and preventing potato crop diseases. A questionnaire has been developed for this survey which is presented below.

Training Programme on Potato (March 13 to 16, 2012)

1. What is, according to you, the level of concordance between the training programme and the objective which is to develop the capacity of Armstatehydromet and Ministry of Agriculture on forecast and prevention of potato crop diseases.

Overall:
☐ Excellent ☐ very good ☐ good ☐ middle ☐ bad

Specifically:
The potato diseases
☐ Excellent ☐ very good ☐ good ☐ middle ☐ bad
The Late Blight Cycle and relations to the weather parameters
☐ Excellent ☐ very good ☐ good ☐ middle ☐ bad
Fungicides use against Potato Late Blight
☐ Excellent ☐ very good ☐ good ☐ middle ☐ bad
The Late Blight Modeling Software
☐ Excellent ☐ very good ☐ good ☐ middle ☐ bad
The Potato Micropropagation
Give your comments:
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2. Do you estimate that your training will be beneficial to the activities of your Service or Institution?
☐ Yes ☐ No

3. Estimate how this training programme will serve in your activities in your country?
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4. Evaluate the level of this training according to your own instruction level and your experience.
☐ appropriate ☐ level too high ☐ level too low

If the level did not suit you, give explanations : .................................................................
5. Do you estimate that the length of your training was sufficient?

☐ Yes  ☐ No

If no, what is according to you, the length that is the more suitable?

6. How was the training programme organization?

☐ Excellent  ☐ very good  ☐ good  ☐ mediocre  ☐ bad

Comments: ……………………………………………….

7. Please indicate any comments that appears important and relevant on any non-didactical aspects that was not mentioned above.

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8. Do you have some recommendation for FAO and EC for the improvement of such kind of training session?

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9. Estimate the quality of translation during the training

☐ Excellent  ☐ very good  ☐ good  ☐ mediocre  ☐ bad

Date :  ………………………

Survey Results

The survey questionnaire was filled out by all 21 participants of the workshop. The results of the survey among the respondents were as follows.
The participants were asked to evaluate each separate component of the training delivered and provide comments/feedback on the training as a whole. Of the 21 surveyed participants, between 9 and 12 respondents (43-51%) evaluated the various parts of the training as “Excellent”. No respondents evaluated any of the components as “Bad”, and the lowest evaluation was “Medium” given only by one participant to the “Fungicides use against Potato Late Blight” and by three participants to the “Potato Micropropagation”. The results are presented graphically below.

Level of concordance to the objective of developing the capacity of Armstatehydromet and Ministry of Agriculture on predicting and preventing potato crop diseases

Most comments/feedbacks provided by the participants were positive and encouraging, exemplified by the following phrases:

“Please organize more such trainings (including for other crops/topics)” and similar comments from 5 participants. “The trainer has an excellent command of the material and presents it in an understandable manner”. “Very useful and appropriate”, “All points were exposed well”, “Excellently/very well/top quality organized and conducted.”

Other comments, which can be considered neutral, included: “Any specialized training is a good chance to learn something new.” “This needs to be applied in practice”. “In any case here in Armenia we need our own approaches to deal with the potato diseases”.

It is quite important that one hundred percent of the respondents gave an affirmative answer to the question whether the training was beneficial to the activities of their Service or Institution.
Similarly, every single participant thought that the level of the training corresponded to their own instruction level and experience. This confirms that the selection of the training participants, the trainer and workshop topics was carried out in an appropriate way.

The respondents were not as unanimous in evaluating the length of the training. About 24% of them considered that the length of the training was insufficient (see the pie chart below). On the other hand, there is significant progress in this aspect of the training compared to the previous one delivered under the programme (FAO Training in Crop Yield Forecasting), where the length of the training was viewed as insufficient by the majority of the participants.

![Pie chart showing estimate of whether the length of the training was sufficient]

It has to be noted that the organizational aspect of the training program was appraised quite positively. As shown in the figure below, not a single respondent appraised it as mediocre or bad, whereas 76% of respondents thought it was excellent. The high professionalism in translating the materials and interpreting between the trainer and participants was especially noted by the respondents, as 20 out of the 21 respondents rated it “excellent” and only 1 as “good”.

![Diagram showing organizational aspect of the training program]
As the survey included some open-ended questions to enable the participants express their own opinions, it is worth mentioning some of the most frequent and interesting thoughts:

1. With the knowledge gained (during the workshop), I will be able to perform my work in a more targeted manner, provide better/more effective/more knowledgeable advice to the farmers.
2. This training for potato disease forecast and prevention: may positively affect crop yield and quality / help reduce losses
3. I will now pay more attention to the temperatures and choice of the fungicides in relation to late blight.
4. I suggest that the trainings should be accompanied by practical work.
5. Exchange of experience is very desirable and it would be good to do that also by visiting other countries.
6. It would be beneficial to organize this type of trainings also for other crops / cereals / fruits.