

## SELECTION OF MAINTAINING, METHOD FOR KEEPING OF BIOLOGICAL PURITY, PATTERNSHIP AND HEALTH, REGARDING VIRUSES INFECTION OF DISTINGUISHED POTATO BREEDING LINES

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**Abstract.** A large number of potato varieties and distinguished breeding lines disappeared as an effect of nonfavourable climatic conditions and especially by viruses diseases, as well as other biological and viruses degeneration. To avoid the negative effect of degeneration on potato varieties and distinguished breeding lines, the method of selection for maintaining and multiplication of potato is applying in Romania in the frame of National Center for Maintaining of potato varieties and distinguished breeding lines *Apa Rosie, Covasna County*, which belong to the Station for Research and Development of Potato, Targu Secuiesc, Covasna County.

In this center are maintained and multiplied all distinguished varieties and breeding centers from Romania (National Institute for research and Development of Potato and Sugar beet Brasov, Research and Development Station for Agriculture Suceava, Research and Development Station for Potato Targu Secuiesc, Research and development Station for Potato Miercurea Ciuc).

Using the method of selection for maintaining it is possible an early identification of somatic mutations, disease (especially viruses) infection by visual elimination or by serological testing.

The viruses' infection of potato leads to disturbed the metabolism of plants and produces anatomical – morphological alters as: mosaic, crinkle, rolling, browning of leaves and plants deformation.

The disturbing of plant metabolism has as negative effect the reduction of vegetation period, decreasing the yield capacity, depreciation of physical and chemical quality of tubers.

The genetically complex structure of cultivated potato ( $2n = 4x = 48$ ) and strong segregation of long – expected characters in the obtained future progeny by sexual hybridization, complicated many times by nonfavourable linkage, are the backgrounds for initiation of maintain selection.

**Keywords:** potato, selection of maintaining, biological purity

### INTRODUCTION

The selection of maintaining is defining as an amount of technical and organisational measures in the aim to maintain the biological purity (100%), typical characters and low viruses infection (0.2%) of new potato breeding lines and varieties.

This method offer the possibility of early recognizing of somatic mutation and infected plants with viruses and other diseases and removing of nontypical and infected clones [1].

The aim of the method is to avoid the disappearance of potato varieties or valuable breeding lines through viruses' degeneration and somatic mutation.

The main objective of this method is to maintain in a natural isolation, in the mountains (over 1000 m a.s.l.), the national collection of potato varieties and new breeding lines, and multiplication of the best of them for promotion in the national system for seed potato production [5].

The selection field is situated in a high intermountain's depression (Apa Rosie Depression) in the Nemira Mountains, on the north of Targu Secuiesc Depression and on 5 – 6 km west of the mountain peak Sandru Mare, on the elevation of 1010 – 1025 m a.s.l [6].

The area of the field is 21.39 ha and is protected by fence of iron net.

### MATERIALS AND METHODS

The preparation of biological material for planting in the selection field starts one year before by

harvesting of tubers from descendant field ( $D_2$ ) and testing of each tuber in the green house using ELISA method. Each healthy tuber is a clone.

From the tested tubers, only the healthy tubers are planted in spring in the selection field of Apa Rosie.

The soil preparation starts in autumn by applying calcium carbonate, superphosphate and deep ploughing.

In the spring is applying the complex (15:15:15) fertilizer and nematocides. The planting material is preparing and according to the quantity of material is made the draft of each clonal field. Each clone has a stake with a number and the number of clones / line or variety is mentioned in register [4].

Between clones and lines remain a free space for visiting and elimination of nontypical or infected clones.

**Selection filed** corresponds with first year and is planted with healthy tubers, tested using ELISA method.

According to the new scheme a number of 50 tubers / line, variety are planted in the first year.

In the selection field each tuber / plant means a clone. The distance between rows is 70 cm and distance between tubers / row is 50 cm to avoid the contact between plants and the mixture of tubers in the ridge.

During the vegetation period the most important work is visual biological purification, when all infected and nontypical plant are removed.

After 2 – 3 works of visual purification are harvested leaves for serological testing and identification of PVX, PVY, PVS and PVM.

The activity is done by 3 working teams: harvest of leaves and drafting of serological record, serological testing in the laboratory and elimination of infected clones.

**Harvesting of leaves and drafting the serological record.** From each plant 5 – 6 leaves are harvested for one test. Each test has a number according to serological record, compartment in the case and glass lamella.

In the serological record are included the following:

- Name of laboratory;
- Number of cases;
- Date and hour of leaves harvesting;
- Name of leaves harvester.

**Serological testing** including the following steps:

- Preparation the lamellas with antiserum. The lamellas have a mark, each lamella includes 10 tests with 5 antiserum types (N, X, S, M, Y) diluted with physiological serum [3];
- Obtaining the juice of leaves is done with a special tongs. The tongs is washed up dried after each test. The drops of juice are put carefully on the drops of antiserum, avoiding the mixture of the drops;
- The combination between the juice and antiserum is done with the peak of ampoule, cleaning of ampoule with a great attention [2];
- Putting the lamellas with tests in a incubator with a constant temperature of over 18°C;
- Reading of lamellas above of light source, moving the lamella for drops rotation. After some rotations of the drops you can see the following situation:
  - Drop is clear – the results is negative, no virus infection;
  - If the drop is precipitated means virus infection;
  - The results are mentioned in the serological record.

**Elimination of infected plants**, according to the serological record, together with all tubers. They are put in plastic bags and are destroyed.

During the period July 25 – August 20, every day is done 1500 – 2000 tests.

Around of September 1<sup>st</sup> the vegetation of potato is killed and tubers are harvested.

The tubers (10 - 15) from one hill mean a clone. The tubers are put in a paper bag. On the paper bag is writing the name / cod of breeding line or variety and the number of clone. The paper bags with tuber are put in the wooden cases with lid. The clones are storage in the story from Apa Rosie.

This biological material is planted in the next year as field of A clones.

**The field of A clones** – corresponds of second year of multiplication of potato in the mountain area. In this field all tubers from one paper bag are planted in a row at a distance of 25 cm between tubers. The distance between rows is 75 cm.

Each clone has 10 – 15 plants, from each will be harvested leaves for 3 tests. In the serological record and lamella, for each clone corresponds to 3 compartments. If one test is infected with viruses the clone will be eliminated.

The testing technique is the same for all clonal fields.

The healthy clones are harvested individual. Each clone must have 60 – 100 tubers, which will represent the planting material for next year.

The clones are storage in the story from Apa Rosie.

**The field of B clones** must have minimum 20 clones / breeding line or variety.

From each clone are harvested leaves for 5 tests. If one test is infected the entire clone is removed. In the field of B clones, the activity of potato breeder becomes a pleasure because the area of each clone is bigger, and the breeder can evaluate much better his activity.

The healthy clones are individual harvested and are storage in the story from Apa Rosie.

**The field of C clones** usually have 15 – 16 clones / breeding line or variety with 600 plants.

During vegetation period, from each clones are harvested leaves for 10 testes. If only one test is infected which viruses, the entire clone is removed.

After harvesting, the healthy clones are put together (mixture) and constitutes the biological material for next year, and will have the following destination:

- To take back the activity the maintaining selection;
- Preparation of 5 – 7 samples of 500 tubers for testing in the network of the National Institute for testing and registration of Varieties (I.S.T.I.S.);
- The remaining biological material is destined for seed potato production for multiplication. From this material is selected a sample of 200 tubers for serological testing, using ELISA method, to obtain the document of authenticity and healthy, according to the analysis Bulletin released by the National Institute for Research and Development of Potato and Sugar Beet (I.N.C.D.C.S.Z.) Brasov.

Usually this material frames to prebasic seed class (PB) / D clones.

## CONCLUSIONS

- The material and intelligence effort during the breeding activity, 12 years according to classical scheme, is disturbed by the pressure of viruses' infection which constitutes the viruses' degeneration and decrease of yield capacity of potato.
- With all preventive measures (isolation of potato field from viruses infection sources, chemical treatments against aphids, elimination of viruses infected plants) during breeding process of potato, the viruses infection of biological material is higher and corresponds to A clones and some time to B class or higher. Because of PVS which not produces visible symptoms.
- The vegetative multiplication of potato permits an easier breeding, without modification of genetically base, but it has a strong drawback because of viruses' degeneration and increase of viruses' infection year after year.
- The selection of maintaining represents a pluralism of technical and organisational measures with the aim to maintain the biological purity, typical

characters and low viruses infection of new and valuable breeding lines.

- The results of researches contributed to modernisation and increase of efficiency of National programme for selection of maintaining and multiplication of Romanian breeding lines, in the frame of scientifically system for competition of new varieties, in the same ecological and technological conditions.
- The National Centre for maintain and multiplication of new breeding lines Apa Rosie, can produce the demand material for testing in the network of ISTIS. The planting material of all breeding line will have the same origin and level of viruses' infection.
- The promotion of Romanian potato varieties by selection of maintaining will contribute alongside of other methods for production of initial material, to obtain new performances regarding the quality of seed potato.

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