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RESULTS OF THE ENVIRONMENTAL TEST OF SOUTH KOREAN SELECTION POTATO VARIETIES IN THE CONDITIONS OF THE SOUTHEAST OF KAZAKHSTAN

In article contains results of environmental test of potato varieties of "Potato Valley" selection (Republic of Korea).

Key words: *Potatoes, mini-tubers, productivity, average tuber mass*

The introduction. The Republic of Kazakhstan stands in need for potato varieties adapted to the south-east conditions, timely strain changing and strain renovation, as well as the balanced system of population supply with healthy seed grains.

In the conditions of the southeast of Kazakhstan genetic monitoring of potato collection allows determination of the most perspective genotypes (varieties) for cultivation in a concrete ecological biosystem and preservation of valuable world collection genotypes in a virus-free zone.

Any potato varieties have both negative and positive properties, which manifest themselves in different ways in different, in terms of weather, years [1].

A variety is one of the important means of production. Additional yield from introduction of a new variety can make 30-35% and even more.

In this connection, studying of new varieties in the specific soil and climate conditions is of immediate interest and practical value.

In 2007-2009 8 new potato varieties of Potato Valley Company received from South Korea were tested in the field stations of the Kazakh Scientific Research Institute of Potato and Vegetable Growing in comparison with the varieties allowed for use and recognized in the southeast region of the Republic of Kazakhstan.

2007 weather conditions were as follows: air temperature in April was by 0.9⁰C and in May by 0,1 ⁰C above the long-time annual average, in summer months the temperature was by 1,-2, ⁰C above the long-time annual norms. In April the depth of rainfall was 57, mm which is 33,6 mm less than the long-time annual average, in May the depth of rainfall was 148.3 mm which is 67.1 mm more than the long-time annual average. As for summer months, in June the depth of rainfall was 33.0 mm which is 20.7 mm less than the long-time annual average, and in July the depth of rainfall was 2.0 mm less than the long-time annual average.

During the growing season the depth of rainfall was 296.1 mm which is 8.1 mm more than the long-time annual average.

During the growing season weather conditions were characterized by the high air temperature and moisture deficit.

In 2008 weather conditions were characterized by hot spring and summer. The depth of rainfall was 86.6 mm less as compared to the long-time annual average. Adverse conditions had adverse affect on growth and development of plants.

In 2009 during the growing season weather conditions were as follows: April-September average air temperature was 16.7⁰C which is in line with the long-time annual average (17.1⁰). In May and June air temperature was 15.3-20.0⁰. The depth of rainfall for the period was 72.0-31.0 mm which is less than the long-time annual average data by 9.2-22.7 mm, accordingly, in August the monthly average air temperature was less than the long-time annual average by 0.9⁰. September

was cooler than in previous years. As a whole, weather conditions had positive affect on growth and development of plants.

The soil of the experimental field is liver-colored, loamy, has a fully developed profile clearly differentiated by genetic horizons. Tilth top soil contains 2.9-3.0% of humus; 0.18-0.20% of total nitrogen; 0.19-0.20% of gross phosphorus. Labile phosphorus in the tilth top soil makes 30-40 mg/kg, exchange potassium – 350-390 mg/kg. Total absorbed bases – 20-21 mg-eq per 100 g of soil. Bulk weight of soil varies from 1.16 to 1.32 g/cm², and porosity – within 52-53%. Soil solution reaction is mildly alkaline (pH-7.3-7.4). Bulk weight of soil is 1.1-1.2 kg/cm³, minimum water capacity – 26.6%.

Spring frosts stop in III decade of April, autumn frosts begin in III decade of September – beginning of October. Average frost-free period – 140-170 days. Annual depth of rainfall – 350-600 mm. The depth of rainfall for the warm period – 120-300 mm.

Research methods and materials. Seed grains (155 kg of minitubers) received in 2007 from South Korea were cultivated in field conditions in the primary seed breeding nursery of the Kazakh Scientific Research Institute of Potato and Vegetable Growing located in the piedmont plain of Zailiyskiy Alatau northern slope.

Agricultural methods developed by KazSRIPVG for cultivation of seed potato was applied for trial plantation [2].

The following observations were made during the growing period:

- phenological observations with due account for sprouts, seedling emergence, even sprouts, flower-bud formation, blossom time, top necrosis;
- determination of biometric characteristics (height of plants, quantity of leaves, number of basic and lateral stalks in a bush) was made during blossom time on 20 plants of each sample.

To reveal virus infections of minitubers there was conducted a test using the enzyme multiplied immunoassay method or ELISA-test.

The main subjects of research were virus diseases of potato and their causative agents: rusty leaf mottle and an ordinary mosaic (PVX and PVS), curled leaves (PVM) and streak mosaic (PVY). 20 tubers of each sample were analyzed.

Tubers were planted manually in the third decade of April on ridges, planting scheme 70cm x 25cm, record area is 10 m², four replications. Measurements and observations were made in accordance with the state potato variety trial technique.

The researchers determined the amount of dry matter, starch and vitamin. These analyses were performed in accordance with the standard techniques by the specialists in the mass analyses laboratory of KazSRIPVG.

Research results. Due to large volume of data received it is very difficult to analyze all factors for environmental variability of the studied characteristics of 8 potato genotypes within one article. Therefore we shall enlarge upon the most important characteristics – productivity and starch content.

According to a great number of researchers, the best indicator of agro-climatic resources is productivity itself as it characterizes the result of such resources use in the production process.

Table 2 shows data on productivity variability of South Korean potato collection.

Potato productivity mainly depends on the depth of rainfall, average daily air temperature, soil temperature and humidity. These factors stipulate considerable variability of productivity characteristics.

The research results have shown that early potato productivity varies depending on genotype and fluctuates from 16.9 to 19.0 t/hectare.

In the years with favorable humidity conditions the tested variety has come of second best to a standard variety. On the average productivity for three years of both early varieties slightly differed among themselves.

In the years of favorable humidity conditions (2007, 2009) the productivity of Gui Valley variety, among the group of mid-season varieties, was considerably higher than that of all tested varieties, including standard variety Aksor, by 4.5-6.1 t/hectare or 18-24.4%. In the year with soil

moisture deficit (2008) Gui Valley variety showed the greatest productivity: excess by this characteristic over the standard variety made 1.8-3.2 t/hectare, over Golden Valley variety – 2.2-300 t/hectare.

Table

Productivity and quality of potato tubers (average for 2007-2009)

Variety	Productivity		Average tuber mass, g	Starch content, %	Tasting assessment, mark
	t/hectare	% to control			
Early varieties					
Tokhtar (st)	19.0	-	105.0	17.0	4.5
Early valley	16.9	88.9	165.0	17.0	
Mid-season varieties					
Aksor (st)	25.0	-	150.0	19.5	5.0
Gui valley	31.1	124.4	170.0	19.81	5.0
Dasom valley	24.5	74.0	162.0	18.54	4.0
Cogu valley	22.9	75.6	120.0	11.58	4.0
Taedong valley	20.5	82.0	150.0	16.52	5.0
Bora valley	24.7	98.8	110.0	15.0	4.0
Golden valley	27.2	108.6	110.0	10.68	4.0
Middle-late varieties					
Akzhar (st)	30.0	-	130.0	18.0	4.5
Winter valley	24.0	80.0	150.0	15.63	4.0

Difference in productivity among the group of middle-late varieties was significant and made 6.0 t/hectare or 20.0%.

Tested South Korean varieties are characterized by large-size tubers with the average weight of 1 tuber of 110 – 170 g depending on a variety. The greatest average weight of a tuber was observed with Gui Valley and Early Valley varieties – 170 and 165 g accordingly. The weight of other varieties made 110-150 g.

Starch content is equal among the early group.

In the mid-season group of tested varieties content of starch is below standard by 0.46-8.82%, except for Gui Valley (19.81%).

In the middle-late group starch content of Winter Valley variety is below standard by 2.37%.

Gui Valley and Taedong Valley varieties were distinguished for their eating qualities.

Thus, based on the research results, Gui Valley, Bora Valley, Golden Valley and Early Valley mid-season varieties may be considered the most perspective varieties for the south-east of Kazakhstan.

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Аннотация

Токбергенова Ж.А., Нак-Тae Lim, Бабакв С.А., Жумагали Г., Конеева А., Мамірова Р.
Экологическое испытание сортов картофеля Южно-Корейской селекции на Юго-Востоке Казахстана

В статье приведены результаты оценки коллекции картофеля селекции компании «Potato Valley» (Республика Корея).

Ключевые слова: картофель, миниклубни, продуктивность, масса