

RESEARCH CONCERNING THE STORAGE CONDITIONS UPON POTATO STOLONIZATION AND TUBERIZATION

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Abstract. The researchers conducted within the vegetation house of UASVM Cluj-Napoca aimed to observe the reaction of potato stolonization and tuberization to storage conditions of normal temperature (2 - 4°C) and higher temperature, in which case sprouts emerge; in the second case, during the 6 – 7 months of storage, the sprouts are broken twice, following a third generation of sprouts which will evolve into tuber producing plants. The number of tubers and stolons was observed at 20 and 45 days from plant emergence. The total number of tubers formed at 45 days from emergence was considered the total number of tubers/plant.

Keywords: storage conditions, stolonization, tuberization, stolons and tubers number.

INTRODUCTION

The study of tuber formation (tuberization) is a very important process not only because of their complex genesis phenomena, but also because of the high understanding value of the process involved in the potato plant development. The distribution of the tubers on size fractions within the crop is influenced both by the tuberization period and the stolon number formed on a plant. It is the key element of the destination and the quality of the yield for commercialization (P. H. Brown, 2008).

Scientific research proved that around a half (50%) of the productivity potential of the potato is determined by the biological value of the seed (G. Morar, 2011). Storage conditions of seed potato influences the physical quality and seed yield of potato. Potato ability of forming tubers is influenced by sprouting date and by braking of the sprouts during storage, which confirms the importance of the storage conditions upon yielding ability (physiological degeneration). Seed yields obtained in this way are a consequence of the physiological degeneration of potato (Erica Bulucz, 2011).

MATERIAL AND METHOD

To underline the influence of storage conditions upon the biological processes of tuberization and stolonization, an experiment was conducted in 2012, in UASVM Cluj-Napoca greenhouse. Pots were used and the experiment had the following factors and graduations:

- Factor A- Storage conditions
 - a₁= optimum, planting of sprouted tubers without breaking the sprouts
 - a₂= inappropriate, planting of sprouted tubers after cutting off the sprouts twice
- Factor B- The biological category having the graduations:
 - b₁= B Class Certified
 - b₂= Base class Super elite

The biological material use in the experiment was Christian variety coming from INCDCSZ Brașov. The seed tubers were sorted and calibrated on the same size keeping in

count the existing correlation between tuber size and the number of sprouts emerged through springing. The tubers were sprouted in darkness, and then they were exposed to light after the classical technology. When planting, only three sprouts were left per tuber, to uniform the experimental factors. The tubers were planted in vegetation vases, in a substrate composed of 60% fallow soil, 30% peat and 10% sand.

The irrigation was made at a minimal level of 80% from AUI, by using a portable soil tensiometer for differential wetting according to the needs of the plant.

Calculation and data rendering were done through usual statistical methods like variance analysis. „t” test was used for the significance of the differences, with the calculation of the limit differences for the significant thresholds of 5, 1 and 0.1%. The Duncan multiple comparison test was also used, in which each variant was considered a control sample for the others.

RESULTS AND DISCUSSION

Within the interaction of storage conditions with the biological category of seed tubers at 20 days from potato plant emergence, though the number of stolons is a variety characteristic, by planting seed tubers kept in different conditions, the stolon number was significantly influenced (Tab. 1).

On a biological category average, storage conditions determine a decrease of the number of stolons/plant when the sprouts are broken twice. The differences that appeared are negatively distinctly significant.

On a storage method average, the biological category of the planting material influences the number of stolons/plant with distinctly significant differences (Tab. 1).

Unfit storage conditions and breaking the sprouts twice from seed potatoes determined a decrease of the tuberization ability of potato with distinctly significant differences.

The inappropriate storage conditions influence the number of tubers/plant, the differences being negatively distinctly significant (Tab. 2).

An influence of the biological category upon the number of tubers/plant can be observed even on a storage condition average. By using high quality seed when planting, the tubers/plant number differences that appear are significant (Tab. 2).

At 45 days from plant emergence, the number of stolons/plant is influenced by both the storage conditions and the quality of the seed potato.

After removing the sprouts twice on the biological category B class certified during storage, distinctly significant differences appear in the stolon number, while for the biological category of Base SE class significant differences appear between storage in optimum conditions and unfit storage.

Both at 20 days and 45 days from potato plant emergence high stolon differences are obtained (4.00 and 5.00 respectively) by breaking the sprouts twice at B class certified biological category up against Base SE class biological category (tab. 1 and 3).

The influence of storage conditions in relation to biological category upon the number of tubers/plant is obvious at 45 days from emergence as well (tab. 4).

Tuberization ability of the potato is influenced with distinctly significant differences by sprouts breaking during storage at B class certified biological category and

Table 1

The influence of the storage conditions in relation with upon biological category the stolons number at 20 days from potato plant emergence

Biological category	Storage conditions	N ⁰ of stolons/pl.	Percentage	Dif./Signif.	Duncan test	Average storage conditions		
						N ⁰ of stolons/pl.	Dif./Signif.	Duncan test
Certified classe B	Sprouted	14,33	100	Ctr.	B	12,33	Ctr.	A
	Twice broken sprouts	10,33	72	-4,00 ⁰⁰	A			
Base classe SE	Sprouted	16,33	100	Ctr.	C	15,00	2,67**	B
	Twice broken sprouts	13,67	84	-2,67 ⁰	B			
Average	Sprouted	15,33	100	Ctr.	A			
	Twice broken sprouts	12,00	78,3	-3,33 ⁰⁰	B			
LSD (p 5%) biological category							0,72	0,72
LSD (p 1%) biological category							1,66	
LSD (p 0,1%) biological category							5,27	
LSD (p 5%) storage conditions				1,23	1,23			
LSD (p 1%) storage conditions				2,03				
LSD (p 0,1%) storage conditions				3,80				
LSD (p 5%) biological category x storage conditions				1,73	1,73-1,78			
LSD (p 1%) biological category x storage conditions				2,87				
LSD (p 0,1%) biological category x storage conditions				5,37				

Table 2

The influence of the storage conditions in relation with biological category upon the tubers number at 20 days from potato plant emergence

Biological category	Storage conditions	N ⁰ of tubers/pl.	Percentage	Dif./Signif.	Duncan test	Average storage conditions		
						N ⁰ of tubers/pl.	Dif./Signif.	Duncan test
Certified classe B	Sprouted	12,00	100	Ctr.	B	9,83	Ctr.	A
	Twice broken sprouts	7,67	64	-4,33 ⁰⁰	A			
Base classe SE	Sprouted	14,33	100	Ctr.	C	12,50	2,67*	B
	Twice broken sprouts	10,67	74	-3,67 ⁰⁰	B			
Average	Sprouted	13,17	100	Ctr.	B			
	Twice broken sprouts	9,17	70	-4,00 ⁰⁰	A			
LSD (p 5%) biological category							1,43	1,44
LSD (p 1%) biological category							3,31	
LSD (p 0,1%) biological category							10,53	
LSD (p 5%) storage conditions				1,31	1,31			
LSD (p 1%) storage conditions				2,17				
LSD (p 0,1%) storage conditions				4,06				
LSD (p 5%) biological category x storage conditions				1,85	1,85-190			
LSD (p 1%) biological category x storage conditions				3,07				
LSD (p 0,1%) biological category x storage conditions				5,74				

Table 3

The influence of the storage conditions in relation with upon biological category the stolons number at 45 days from potato plant emergence

Biological category	Storage conditions	N ⁰ of stolons/pl.	Percentage	Dif./Signif.	Duncan test	Average storage conditions		
						N ⁰ of stolons/pl.	Dif./Signif.	Duncan test
Certified classe B	Sprouted	16,00	100	Ctr.	BC	13,50	Ctr.	A
	Twice broken sprouts	11,00	69	-5,00 ⁰⁰	A			
Base classe SE	Sprouted	17,67	100	Ctr.	C	16,17	2,67**	B
	Twice broken sprouts	14,67	83,0	-3,00 ⁰	B			
Average	Sprouted	16,83	100	Ctr.	B			
	Twice broken sprouts	12,83	76	-4,00 ⁰⁰	A			
LSD (p 5%) biological category							0,72	0,72
LSD (p 1%) biological category							1,66	
LSD (p 0,1%) biological category							5,27	
LSD (p 5%) storage conditions				1,39	1,39			
LSD (p 1%) storage conditions				2,30				
LSD (p 0,1%) storage conditions				4,31				
LSD (p 5%) biological category x storage conditions				1,97	1,97-2,02			
LSD (p 1%) biological category x storage conditions				3,25				
LSD (p 0,1%) biological category x storage conditions				6,09				

Table 4

The influence of the storage conditions in relation with biological category upon the tubers number at 40 days from potato plant emergence

Biological category	Storage conditions	N ⁰ of tubers/pl.	Percentage	Dif./Signif.	Duncan test	Average storage conditions		
						N ⁰ of tubers/pl.	Dif./Signif.	Duncan test
Certified classe B	Sprouted	12,67	100	Ctr.	B	9,50	Ctr.	A
	Twice broken sprouts	6,33	50	-6,33 ⁰⁰	A			
Base classe SE	Sprouted	16,00	100	Ctr.	C	14,83	5,33***	B
	Twice broken sprouts	13,67	85	-2,33 ⁰	B			
Average	Sprouted	14,33	100	Ctr.	B			
	Twice broken sprouts	10,00	70	-4,33 ⁰⁰	A			
LSD (p 5%) biological category							0,72	0,72
LSD (p 1%) biological category							1,66	
LSD (p 0,1%) biological category							5,27	
LSD (p 5%) storage conditions				1,54	1,54			
LSD (p 1%) storage conditions				2,54				
LSD (p 0,1%) storage conditions				4,76				
LSD (p 5%) biological category x storage conditions				2,17	2,17-2,23			
LSD (p 1%) biological category x storage conditions				3,60				
LSD (p 0,1%) biological category x storage conditions				6,73				

with significant differences in the case of Base SE class biological category.

On average, within the biological category of seed potato, the effect of sprouts breaking twice during storage is manifested through distinctly significant differences upon potato capacity of forming tubers.

The effect of an inappropriate storage is also felt at 45 days after plant emergence; the differences of the tuber number/plant are negatively distinctly significant (tab. 4).

CONCLUSIONS

➤ Potato ability of forming tubers is directly correlated with storage conditions and biological category.

➤ Tuberization and stolonization ability is influenced by sprouts breaking during storage with significant differences and distinctly significant differences, which confirms the importance of storage conditions.

➤ The effect of sprouts breaking upon potato ability of forming stolons and tubers is more pronounced (according to the level of inferiority of the biological category) at B class certified biological category, the number of tubers decreasing with up to 50%.

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