UDC:633.15:631.563

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SEED VIABILITY LEVEL OF MAIZE GENEPOOL ACCESSIONS AFTER LONG-TERM STORAGE

Monitored seed germination of maize (*Zea mays* L.) subspecies *everta, indurate*, *indentata*, *semindentata*, *saccharata*. *Z. mays* subsp.*everta* seed storage at 7-8 % moisture content and unregulated temperature does not decrease seed germination during 8-9 years. Most accessions of *Z. mays* subsp. *indurate*, *indentata* seeds, at 6,5-8,0 % moisture content, unregulated temperature conditions does not decrease germination for 10 years or longer. *Z. mays* subsp. *semindentata* seeds accessions at 6,9-7,9 % moisture content, uncontrolled and positive low temperatureare does not decreased seed viability during 10 years storage. *Z. mays* subsp. *saccharata* accessions seeds at moisture content 6,5-7,5 % does not decrease germination during 5-7 storage years. Long-term seed storage is not recommended for *Z. mays* subsp. *semindentata* and *saccharata* at moisture content higher then 8 %. Maize seeds under long-term storage increases viability in all subspecies to 25 % in some cases. Most often, such increasing was observed at low positive or negative temperatures. Seed maize varieties showed no benefits in greater capacity for storage then seed maize lines. Monitoring results of seed viability for *Z. mays* subsp. *everta, indurate, indentata, semindentata, saccharata* which stored at regular conditions showed a satisfactory viability level for seeds stored during 5-17 years, at 6-8 % moisture content in airtight containers.

Key words: *maize, subspecies, seed, storage, moisture, temperature.*

INTRODUCTION

Maize occupies an important place in the world food. Its production in the world is more than 872.07 million tons. Largest producer of maize is the United States (27.38 million tons). Ukraine ranks seventh (20,96 million tons) [1]. There are various programs for the improvement of breeding maize: CIMMYT GlobalMaizeResearchProgramme, International Maize Improvement Network, Bayer Crop Science Compendium - Maize, FAO Agricultural Vocabulary The saurus - AGROVOC, Non-Chemical Pest Management, IITA Research Programme on Maize, CGIAR Research Programme on Maize, GCP Maize Research Initiative, GCP Comparative Genomics Research Initiative [2].

In Ukraine breeders are interested in similar questions, namely, adaptability; grain quality improvement, combine harvesting availability and so on. Decisions of these problems requires providing appropriate germplasm that focuses in genebanks. To maintain the seed germplasm samples in appropriate quality use special storage conditions usually. Seeds storage for a long time in appropriate conditions leads to certain biochemical changes and gradual loss of viability [3].

Maize seeds can be stored under controlled conditions for a long time. Maize seed moisture content plays an important role in this [4, 5]. It is known that maize seeds remain viable during 20 years at 20,3 ± 2,3^{o}C and relative humidity 50,5 ± 6,3 %. After 13 years of storage under these conditions observed the viability is decreasing to 55% only [6]. It is known that seed of *Z.mays* subsp.*everta* are able to maintain viability more then 25 under the initial moisture content 9,1%, and low ambient positive temperature [7].

Moisture content, storage temperature, gas exchange with the environment, some chemicals affect on seed longevity. After removal of excess moisture from seeds they remain physiologically complete. It is known that in dry seeds of all living components, with the exception of insect pests are in anabiosisstate [8].Seed viability is much longer due of slowdown process of livelihood in storage conditions at low temperature.

Seeds storage in unsealed containers can cause variations of the moisture within of 6 %. It is known that seed storage moisture 9-15% in paper bags during two years did not lead to a significant reduction in its germination. Three years later, a store seeds with initial moisture content 15 % seed germination reduced by 6 %, four years– 27 %, 5 years – 60 %. For seed with moisture 9 and 12 % there are reduced seed germination by 38 and 44 %, respectively after storage for five years [9]. When seeds are storage in an airtight container for moisture 9, 12 and 15 % germination declined in the first two versions by 4 and 12 %. Germination of seeds with 15 % moisture content was lost after storage during five years. Seed storage by 8-10 % moisture content and temperature 3-5^{o}C demonstrated better germination indexes due of lower temperature. This confirms similar data [4].

There are general guidelines for conservation of maize seeds accessions in genebank that provide storage at minus 20^{o}C and moisture content 6-8 % [10]. It is recommended drying to moisture content 4-6 % sometimes for long-term storage of maize seeds [4]. Seeds of active collections are stored in genebanks at 8-10 % moisture content, which should provide seeds storage during 20 years. Lower moisture content of seed storage at low positive or negative temperatures extends period of seed viability level maintenance [11].

Samples of maize base collection at the International Centre for Improving Maize and Wheat (CIMMYT) are stored in closed containers at negative temperatures and low relative humidity, which allows them to keep the viability during 50-100 years. Seeds of active collections are stored at temperature 0-2^{o}C [12].

Maize kernels (fruit caryopsis) are covered by pericarp. There is semipermeable no cellular membrane called nucellus membrane between the pericarp and aleuronic layer, derived either from the outer wall of the epidermal cells nucellus or internal integument [13]. In this regard, maize seed gives moisture during drying less and requires mandatory drying for long-term storage [14]. Seed contains endosperm floury part with long intervals between starch grains and horny part with dense grains of starch with intervals filled by protein. There are different subspecies of maize depending from the anatomical characteristics and seed morphology: *Z.mays* subsp. *indurate* Sturt.), *Z.mays* subsp. *indentata* Sturt., *Z.mays* subsp. *semindentata* Kulesh., *Z.mays* subsp. *everta* Sturt., *Z.mays* subsp. *saccharata* Körn. and others.

In some modeling studies have found that different maize subspecies have different ability for long-term storage. So the seeds of *Z.mays* subsp. *saccharata* and *Z.mays* subsp. indentata had less storage ability than *Z.mays* subsp. *everta* and *Z. mays* subsp. *indurate* seeds [15].

The goal of our investigation was to determine the viability level of seed accessions of different maize subspecies after long-term storage under controlled conditions for further optimization of storage conditions.

MATERIALS, CONDITIONS AND RESEARCH METHODS

The materials for the investigation were seeds of four accessions of *Z.mays* subsp. *everta*: varieties Mistseva (UB0102376), Erlykon (UB0100539), Mistseva (UB0102622), lines R16AA (UB0105844), 19 accessions of *Z.mays* subsp. *indurata*: populations C.50 (UB0106215), RD 1116 (UB0101085), varieties Mistseva (UB0102806), Duneremetei 100 nep (UB0101147), Mistseva n.136 (UB0100594), Novosadsky bely (UB0101009), Mestnaya (UB0100254), Mistseva (UB0100180), GR121 (UB0106140), F2(UB0100205), F2 (UB0100205), F7 (UB0100747), lines Ukh 189(UB0100112), 9 (UB0100018), KhLG 132 (UB0100219), KhLG 164 (UB0100223), Ukh 576 (UB0102518), Ukh 52 (UB0100812), Uch29/2 (UB0102696), 27 accessions of *Z.mays* subsp. *indentata*: varieties Mestnaya (UB0103112), Mikulicka (UB0106208), Mestnaya

(UB0101441), Mistseva (UB0102764), Mistseva НК 9 (UB0102687), GR 110 (UB0106132), Mestnaya (UB0102439), lines КС 134 (UB0101761), МАН (UB0100714), CG 17 (UB0102845), Tlaxcala 78 (UB0102825), МАН 44 (UB0102064), UKhK 174-1 (UB0102153), 3 32 (UB0100976), UKhK 27 (UB0101538), W 64-1-1 (UB0101988), Prideoftheword (UB0100271), Peri (UB0100639), LG 144 (UB0101319), UKhK 14 (UB0101532), 151-4-7 (UB0105076), A 12(C1) (UB0105978), МАН 176 (UB0100095), DK 66A (UB0101872), UKhK 367 (UB0102635), KhLG 10 (UB0103003), ИКС 145 (UB0100204), 17 accessions of *Z.mays* subsp. *semidentata*: varieties GR 185 (UB0106174), GR 57 (UB0106090), populations CHIH 216 (UB0102810), ZU502 zm «U» (UB0100952), AS 5 (UB0105087), Muchnystaya (UB0102787), lines UKh 42 (UB0100678), KhLG 33 (UB0100704), МК(МОН) 134 U(UB0100067), Poluzubovydnaya K 248 (UB0102436), (UB0101369), GR 222 (UB0106204), CO113 (UB0100021), A392 (UB0105203), C76 (UB0106219), W 149 (UB0100017),UP 233 (UB0105169), three accessions of Z.mays subsp. *saccharata* Koern. Zhuk.: lines UP 223 (UB0104985), КС 224 (UB0105821), IG 2016 (UB0102621), which were storaged during 4-19 years under controlled conditions.

Before storage seeds were drying at a temperature not above 25°C by dehumidifier Munters (Sweden) to the recommended moisture content (mc) 6-8 %. Then seeds were put to airtight containers. It was sealed glass vessels or multilayer foil packages. In some cases, glass containers were closed by tight lid, so we called it "firmly closed". Seeds were stored in glass containers under initially unregulated temperature conditions, then negative temperature 18-20 ° in the freezer according to the Genebank Standards [see10], or just the low positive temperature 4°C. Seeds viability was tested by ISTA test methods between filter paper paper at 25°C [ISO 4138-2002, 16]. Periodic monitoring of seed viability held on average once every 5 years. The results were processed using the methods of variation statistics. To compare two samples used criterion sampling particles [17].

RESULTS AND DISCUSSION

After monitoring of *Z.mays* subsp. *everta* seed germination stored at moisture content 6,9-8,0 % has been found that seed storage did not led to less of seed germination at moisture content 6,9 % (sample UB0102376), 7,2 % (sample UB0100539) in a sealed container in unregulated temperature conditions during four years storage (Fig. 1). Further UB0102376 accession storage in the freezer during 9 years did not altered seed germination significantly (t = 0,6). Seeds accessions UB0102622, UB0105844, which was stored at 7,6-8,0 % moisture content at low positive temperature 4°C during 8-9 years have showed a tendency of germination increase (t = 1,9) or its significant increase (t = 2, 7).

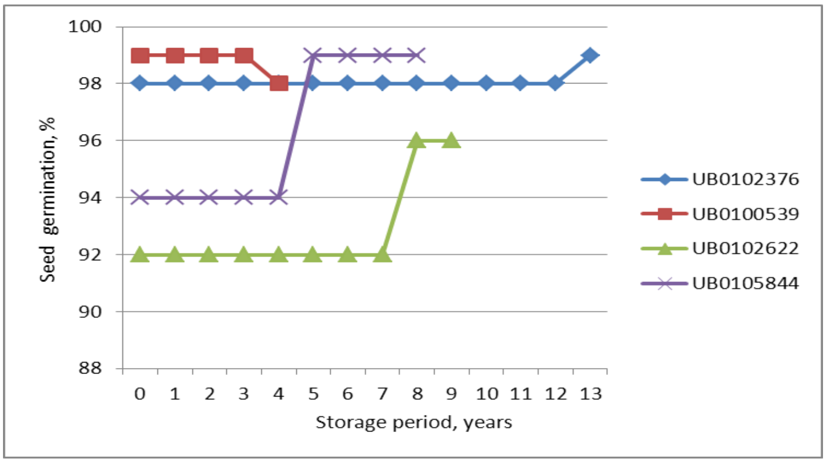

Fig.1. **Seed germination *of Z.mays* subsp.*everta* after storage at 6,9-8,0 % mc.**

These data suggest that the storage of maize seeds of *Z.mays* subsp.*everta* at 7 % moisture content in a sealed container during four years does not affect on its initial germination. Storage of seed at 7-8 moisture content % and low positive and negative temperatures during 8-9 years improves germination.

Z.mays subsp. *indurate* seed storage at 6,7-7,4 % moisture content and unregulated temperature conditions have not resulted to germination decrease of UB0100112, UB0100205, UB0100594, UB0100747, UB0101147, UB0102806 accessions during 7-13 years (t <1,98) (Fig. 2).

The accessions UB0100112 after 9 storage years, UB0101147 after 5 storage years demonstrated a germination increase by 7 % (t = -2,8) and 10 % (t = -4,3) respectively. Significant seed germination increase of UB0106215 accession at 7,4% moisture content and low positive temperature 4^{o}C during 8 years storage observed (t = -2,2). These data suggest acceptable rezimes of storage and possible destruction of growth inhibitors during seeds storage, especially at low positive temperatures.

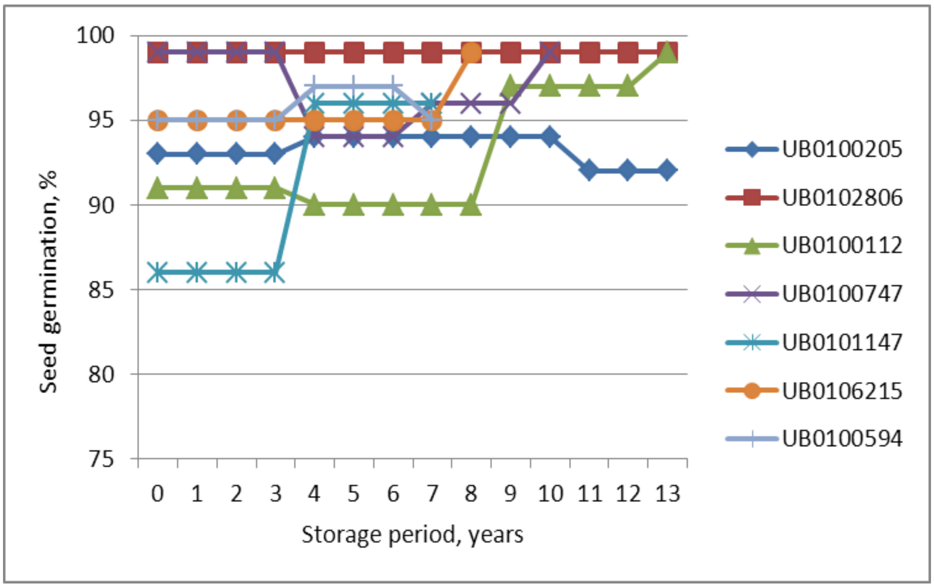

Fig.2. **Seed germination *of Z.mays* subsp.*indurate* after storage at 6,5-7,4 % mc.**

Z. mays subsp. *indurate* seeds at 7,5-7,9 % moisture content and unregulated and temperature during 4-5 years in glass containers demonstrated germination invariability (t <1,98) of UB0100018, UB0100219, UB0100223, UB0100254, UB0101009 accessions (Fig. 3). The accession UB0100205 demonstrated germination increase by 7 % (t = -3,6) during this period. There were invariable germination of accessions UB0101009 (t = 1,2) (airtight containers), UB0100223 (t = 1,7), or decrease by 4 % UB01000205 (t = 2,2) or 5 % sample UB0100254 (t = 3,9) (“firmly closed”) under further storage during 7-8 years. After transferring these samples from the depository with unregular temperature to the freezer with negative temperature 20 ° C led to germination increasing of UB0100205 accession – by 4 % (t = 2,2), UB0100223 – 3 % (t = 1,7), UB0100254 – 7 % (t = -2,9). Storage of UB0102518 accession at low positive temperature during 8 years had no effect on its germination.

The data about storage of *Z.mays* subsp. *indurate* seeds at 7,5-7,9 % moisture content and unregulated temperature during 4-5 years in a glass container, indicate that at a given level of moisture content are optimal in an airtight container. Low positive and negative temperature at 7,5-7,9 % moisture content promotes to a better level of seed germination after seed storage.

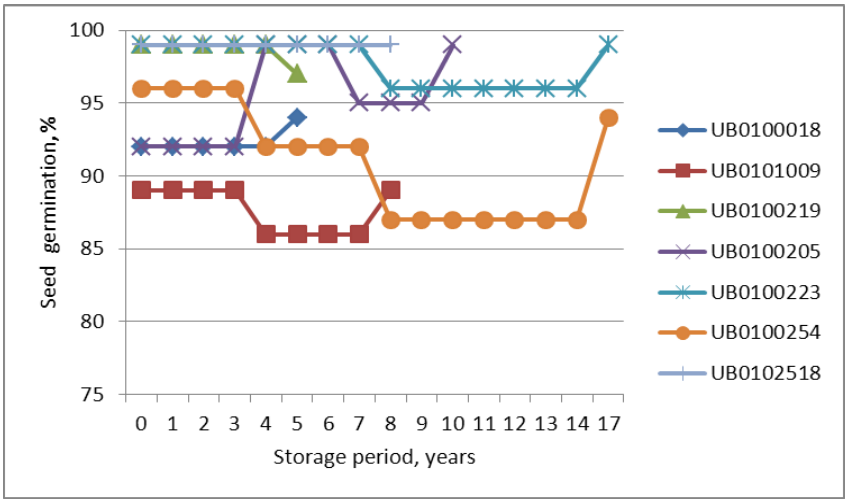

Fig.3. **Seed germination *of Z.mays* subsp.*indurate* after storage at 7,5-7,9 % mc.**

There were no germination decreasing of *Z.mays* subsp. *indurate* seeds after storage of UB0100180, UB0100812 accessions at 8,0-8,5 % moisture content, non-regulated temperature in firmly closed container during 4 years (t <1,98). After 7 years of storage of the UB0100812 accession observed decrease in germination by 23 % (t = 9,1) (Fig. 4). The accession UB0100180 after 9 storage years at the same conditions is not observed decrease in germination. The accessions UB0101085, UB0102696, which were storage in the same conditions in an airtight container during 5 years, also did not demonstrate germination variability, but accession UB0101085 demonstrate germination increase after 9 storage years by 4 % (t = 2,2). These germination increase can be explained by possible collapse of growth inhibitors. A similar trend was observed for the accession UB0100812, wich after dropping to 73 % germination and transfer to freezer, storage there during three years, germination increased by 26 % (t = -11,2). The accession UB0106140 wich stored at low positive temperature during eight years did not show negative changes of germination, which was at 99 %.

Z.mays subsp. *indurate* seed storage at 8,0-8,5 % moisture content and unregulated temperature requires airtight container necessarily. Optimum conditions are low positive or negative temperature and firmly closed or airtight containers.

The analysis of *Z.mays* subsp. *indurate* seed storage at different levels of moisture content and the status of various samples (variety or line) did not found depending from the status of the sample (F = 0,08), or seed moisture within the range (F = 1,9).

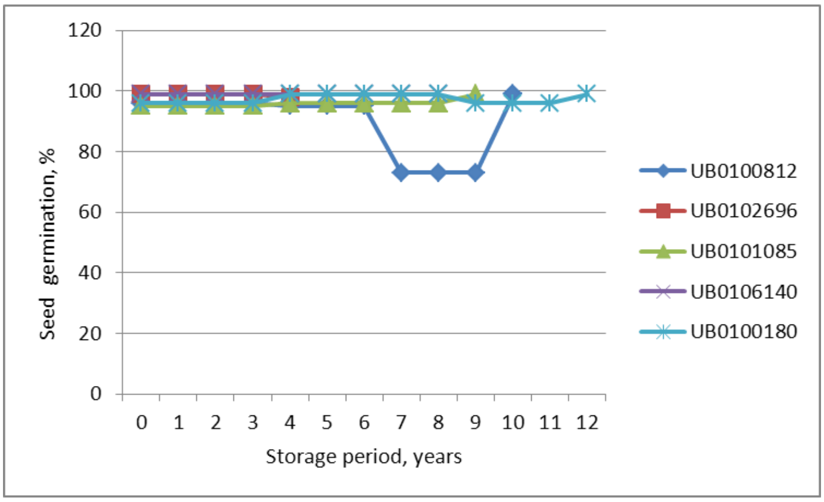

Fig. 4. **Seed germination *of Z.mays* subsp. *indurate* after storage at 8,0-8,5 % mc.**

The storage of *Z.mays* subsp. *indentata* seeds of UB0100043 and UB0102827 accessions with initial germination 94 % and 97 % respectively at 6,4-6,9 % moisture content and unregulated temperature during 4-5 years did not cause significant changes in seed germination (t <1,98).

The storage of *Z.mays* subsp.*indentata* seeds at 7-7,4% moisture content and unregulated temperature conditions in airtight containers during four years did not change the germination level in accessions UB0100714, UB0102825, UB0102153, UB0103112. The accession UB0101761 decreased germination from 99 % to 25 % (t = 10,8), UB0102064 – from 99 % to 4 % (t = 2,2). The accession UB0102845 in contrast, demonstrated germination increase from 75 % to 94 % (t = -7,3) (Fig. 5).

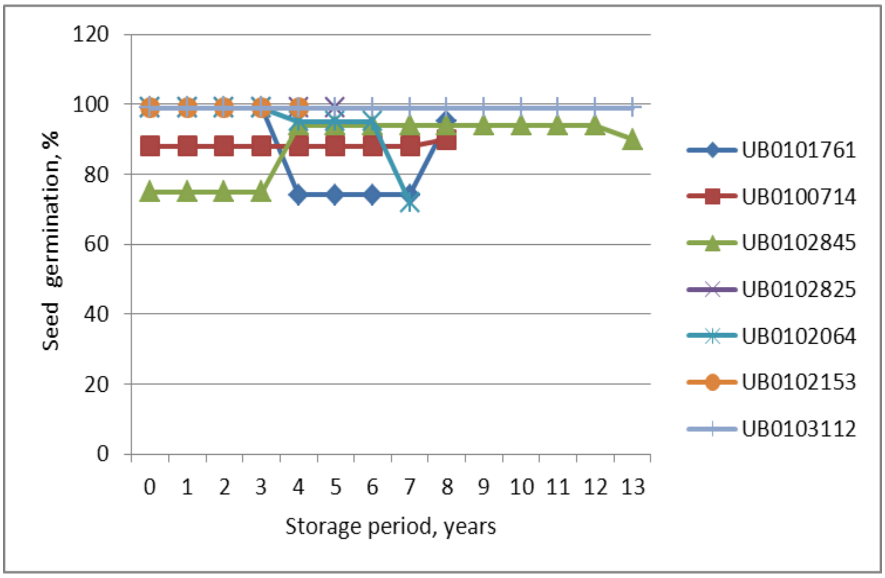

Fig. 5. **Seed germination *of Z.mays* subsp. *indentata* after storage at 7,0-7,4 % mc.**

During further seeds storage at non-regulated temperature conditions did not observe germination changes for UB0100714, UB0102845, UB0103112 accessions. Seed storage of UB0102064 accession during three years has led to germination decrease by 23 %. The analysis of *Z.mays* subsp.*indentata* seed storage of different levels of moisture content and different status did not show advantages depending from the status of the sample (F = 0,02) and seed moisture content (F = 0,6).

Z.mays subsp.*indentata* seed storage at 7,5-7,9 % moisture content during four years led to germination decrease of UB0100976, UB0100271 accessions by 13 and 6 % respectively (t = 7,3; 3,0) (Fig. 6). UB0101538, UB0101988, UB0106208 accessions did not demonstrate germination reduction for the same period (t <1,98). After 7-9 years of storage germination reduction observed for accessions UB0101988 by 4% (t = 2,2) and UB0100271 by 9% (t = 2,0). It should be noted that the decrease in germination was observed in samples that were stored in firmly closed containers, i.e. the initial seed moisture content support the long-term storage, but a slight decrease tightness worsened state of seed anabiosis and led to a decrease in its germination.

After the transferring of the seed samples to the depository with negative temperature there was observed increase germination of UB0100639 accession by 15% (t = 2), UB0100271 accession by 12% (t = -5,7). It shows a positive effect of negative temperature at this moisture content level on maize seed germination. This seed germination can be explained by the change of the balance of phytohormones. It is known that treatment of maize seeds by phytohormones in order to increase the germination is more efficient than processing individual chemicals [18]. We assume that during cooling occurs the destruction of abscisic acid (ABA). It is known data about the low temperature effect on the ABA content and other metabolites [19, 20]. ABA as known plays a role in dormancy and germination of seeds [21]. It is also known that the effect of low temperature on seed causes a different gene expression during its germination [22].

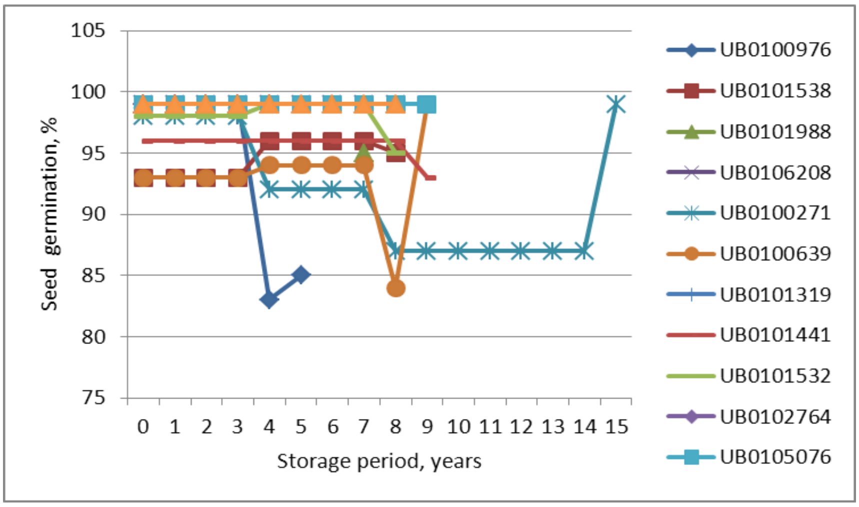

Fig. 6. **Seed germination *of Z.mays* subsp. *indentata* after storage at 7,5-7,9 % mc.**

The maize seed storage at 8-8,6 % moisture content and low positive temperatures during 7-8 years or have no effect on the initial germination (in UB0102687, UB0106132, UB0103003, UB0100204, UB0102439 accessions), or led to its increase (in UB0102635, UB0101872, UB0100095 accessions) by 5-9 % (t = -2,7; -3,6; -4,5) (Fig. 7.). These data suggest the acceptability of the applied seed storage regimes.

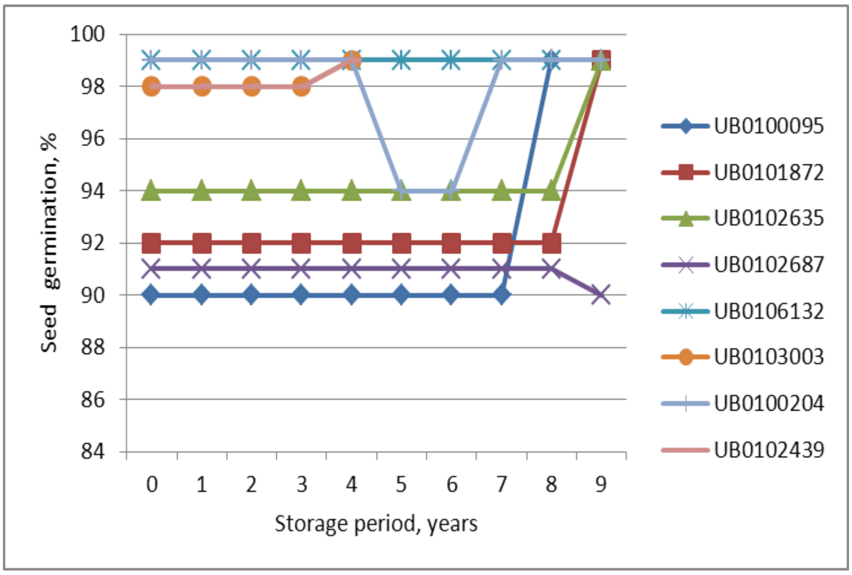

Fig.7. **Seed germination *of Z.mays* subsp. *indentata* after storage at 8,0-8,6 % mc.**

The storage of *Z.mays* subsp. *semindentata* seed during nine years at 6,9-7,4 % moisture content did not cause significant changes in germination (t = 0,6) in UB0100952 accession (unregulated temperature), UB0105203 (low positive temperature) and led to a decrease germination in UB0102787 accession by 20 % (t = 7,4) at low positive temperature (Fig. 8).

The storage of *Z.mays* subsp. *semindentata* seed at 7,5-7,9 % moisture content as at unregulated temperature (UB0100678, UB0100704 accsessions) and at low positive temperatures (UB0106219, UB0106174 accessions) in an airtight container during 4 years did not lead to a germination decrease (Fig. 9) .

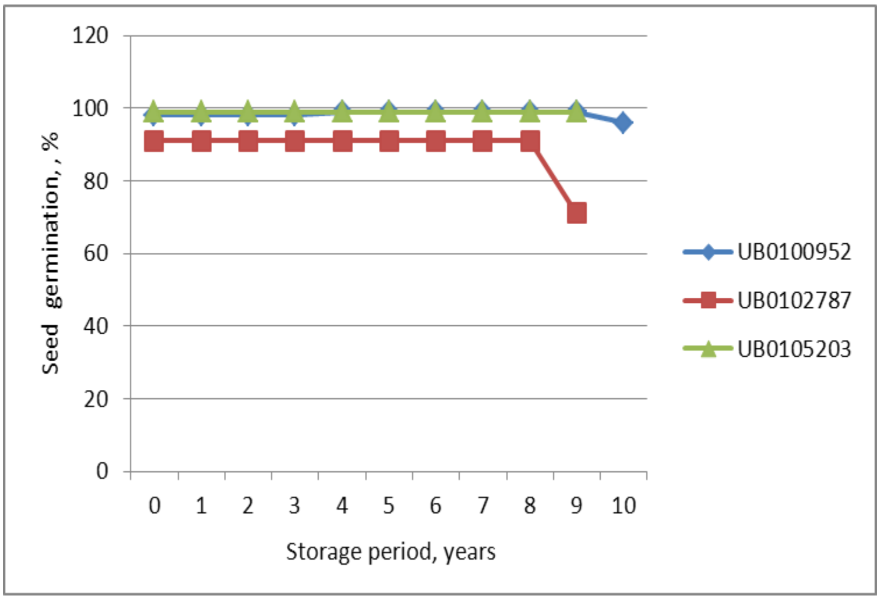

Fig.8. **Seed germination *of Z.mays* subsp. *semindentata* after storage at 6,9-7,4 % mc.**

After nine years of storage there was germination decrease by 6 % for accessions UB0100678, UB0100704 (t = 3,3; t = 3,5) and invariable germination for UB0106219, UB0106174 accessions, which continued storage at the initial temperature. The storage of UB0100017 accession at the same moisture content in firmly closed container and non-regulated temperature during four years has increased the germination by 6 % (t = 2,9) and subsequently did not change it. Thus for samples of *Z.mays* subsp.*semindentata* at 7,5-7,9% moisture content optimal were conditions of the positive low temperature.

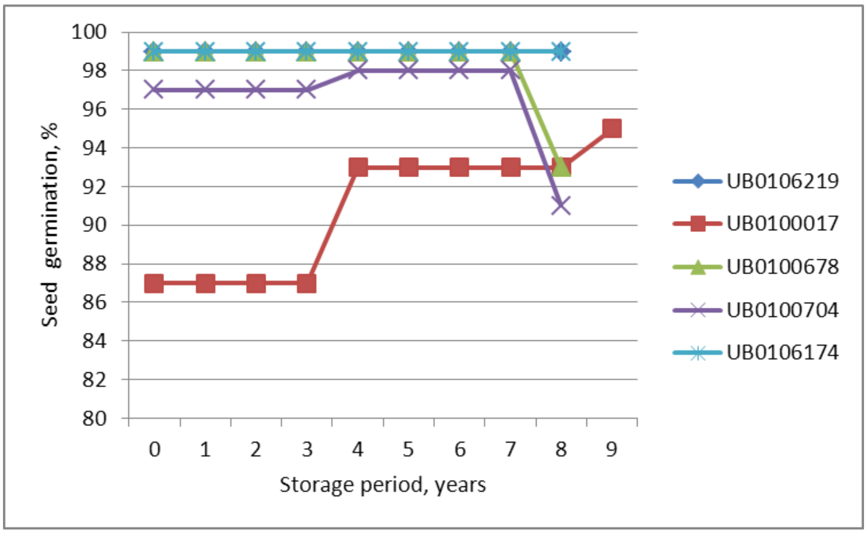

Fig. 9. **Seed germination *of Z.mays* subsp. *semindentata* after storage at 7,6-7,9 % mc.**

There was no germination decrease of *Z.mays* subsp.*semindentata* seeds after four years of storage at moisture 8-8,5 % and low positive temperature for UB0106090, UB0106204 accessions. Under unregulated temperature recorded decrease germination by 2-3 % for UB0100067, UB0102436 accessions (t = 2,3; t = 2,2) and invariable germination for UB0102810 accession (Figure 10). After 5-8 years of storage observed decrease in germination by 6 and 8 % for UB0101369 and UB0106204 accessions, which stored at unregulated and low positive temperature. In firmly closed containers observed seed germination decrease for UB0100021 accession by 9 % only after 17 years of storage (t = 4,5).

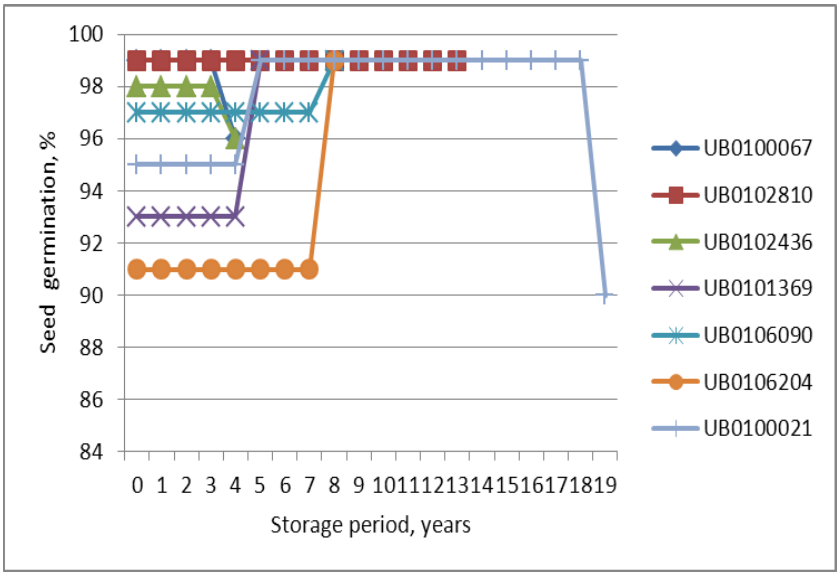

Fig. 10. **Seed germination *of Z.mays* subsp. *semindentata* after storage at 8,0-8,5 % mc.**

Storage of *Z.mays* subsp.*semindentata* seeds at 9,0-9,6 % moisture content and unregulated temperature led to germination decrease by 5% after five years of storage in the UB0105087 accession (t = 2,2) and by 9% after 9 years of storage in the UB0105169 accession (t = 4,5) (Figure 11). This indicates that 9,0-9,6% moisture content is too high for long-term storage of samples of *Z.mays* subsp.*semindentata* seeds under unregulated conditions of temperature, moisture content still recommended to store samples of maize seeds all subspecies, except sugar (8-9%), needs clarification.

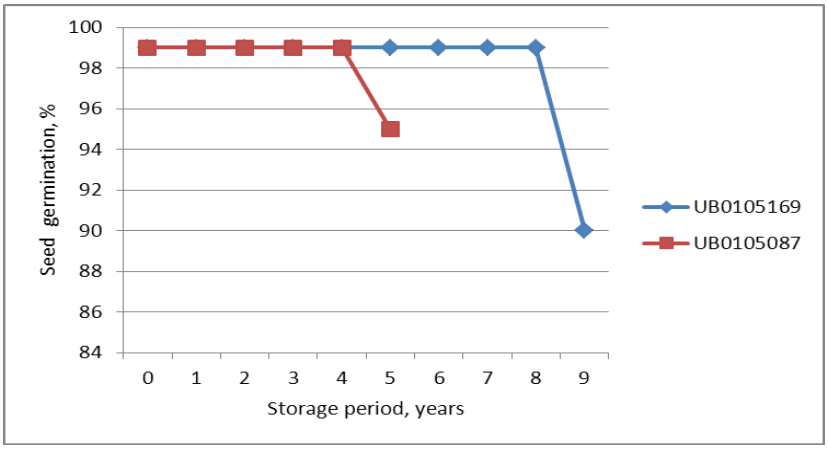

Fig.11. **Seed germination *of Z.mays* subsp. *semindentata* after storage at 9,0-9,6 % mc.**

The seed storage of UB0104985 accession (*Z.mays* subsp.*saccharata)* at 6,6 % moisture content and unregulated conditions during 5 years have resulted germination decrease (Figure 12). The storage of UB0105821 accession at low positive temperature and 7,2 % moisture content after 7 years of storage had the effect of germination increasing by 23 % (t = -8,7). Storing sweet corn Seed storage of sweet maize at 8% moisture sample (UB0102621) and unregulated temperature during five years has led to a germination decrease by 7 % (t = 3,2).

Thus, it is determined to store seed samples of sweet maize gene pool longer then five years better to dry to moisture content about 7 %. Seed storage of sweet maize more than two years at the genetic integrity is possible at 10-14 % moisture content [23].

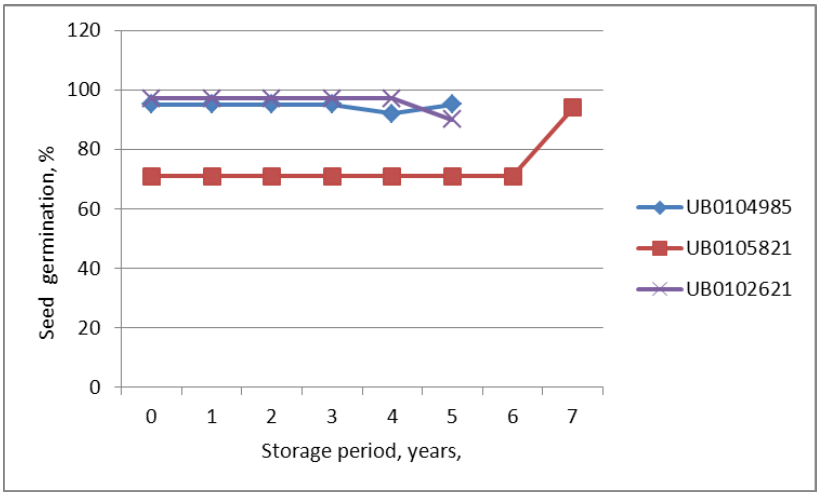

Fig. 12. **Seed germination *of Z.mays* subsp.*saccharata* after storage at 6,8-8,0% mc.**

Monitoring of seeds storage of different maize subspecies with high initial germination level does not show dependence capacity of long-term seeds storage from the reproduction year. There is no dependence of the capacity for long-term seed storage from the place of reproduction if the seed accessions arrived for storage from the forest-steppe and steppe zones (V. Ya. Yuriev, Ustymivka Experiment al Station, Institute of Agriculture steppe zone). Seed accessions which arrived from the zone of mixed forests (Transcarpathian State Agricultural Experimental Station of Institute of Agriculture in the Carpathian region) decrease the germination of seeds in half the samples after five years storage by more than 10%.

CONCLUSIONS

The seed germination monitoring of different maize subspecieses show that seed storage of *Z.mays* subsp.*everta* accessions during 8-9 years at 7-8 % moisture content and unregulated temperature does not decrease seed germination. The most accessions of *Z. mays* subsp.*indurate*, *Z.mays* subsp.*indentata* at 6,5-8,0 % seed moisture content and even non-regulated temperature does not low germination during 10 storage years and longer. *Z. mays* subsp.*semindentata* seeds accessions at 6,9-7,9 % moisture content, uncontrolled and positive low temperatureare does not decreased seed viability during 10 years storage. *Z. mays* subsp.*saccharata* accessions seeds at moisture content 6,5-7,5 % does not decrease germination during 5-7 storage years. Long-term seed storage is not recommended for *Z. mays* subsp.*semindentata* and *Z. mays* subsp.*saccharata* maize at moisture content higher then 8 %. Maize seeds under long-term storage increases viability in all subspecies to 25 % in some cases. Most often, such increasing was observed at low positive or negative temperatures. Seed maize varieties showed no benefits in greater capacity for storage then seed maize lines.

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СОСТОЯНИЕ ЖИЗНЕСПОСОБНОСТИ СЕМЯН ОБРАЗЦОВ ГЕНОФОНДА КУКУРУЗЫ ПОСЛЕДЛИТЕЛЬНОГО ХРАНЕНИЯ

Цель. Определить состояние жизнеспособности образцов семян разных подвидов кукурузы, которые хранились длительное время в контролируемых условиях для дальнейшей оптимизации русловий хранения.

Результаты и обсуждение. Хранение семян кукурузы *everta* в течение 8-9 лет при влажности 7-8 % и нерегулируемой температуре не приводит к снижению всхожести семян. Большинство образцов семян кукурузы *indurate*, *indentata* и при нереулируемой температуре не утрачивает всхожести при влажности семян 6,5-8,0 % в течение10 лет и дольше. Образцы семян кукурузы *semindentata* после хранения около 10 лет при условии влажности 6,9-7,9 %, нерегулируемой и низкой положительной температуре не снизили всхожесть. Образцы кукурузы *saccharata* не изменяливсхожесть в течение5-7 лет хранения при влажности 6,5-7,5%. Длительное хранение обазцов семян кукурузы *semindentata* и *saccharata* с влажностью семян выше 8 % не рекомендуется. При длительном хранении семян кукурузы в отдельных случаях наблюдается повышение всхожести у всех подвидов до 25 %. Чаще такое повышение наблюдали при хранении в условиях низкой положительной или отрицательной температур. Семена сортов кукурузы не выявили преимуществ по лучшей способности к хранению перед семенами линий.

Выводы. Результаты мониторинга всхожости семян кукурузы (*Zea mays* L.*)* подвидов *everta, indurate, indentata, semindentata, saccharata*при условиии хранения образцов в контролиируемых условиях свидетельствуют об удовлетворительном состоянии семян при их хранении в течении 5-17 лет при влажности 6-8 %.

Ключевые слова*: кукуруза,подвиды, семена, хранение, влажность, температура*

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СТАН ЖИТТЄЗДАТНОСТІ НАСІННЯ ЗРАЗКІВ ГЕНОФОНДУ КУКУРУДЗИ ПІСЛЯ ТРИВАЛОГО ЗБЕРІГАННЯ

Мета. Визначити стан життєздатності насіння зразків різних підвидів кукурудзи, які зберігались тривалий час в контрольованих умовах, для подальшої оптимізації умов зберігання.

Результаты и обсуждение. Проведено моніторинг схожості насіння кукурудзи (*Zea mays* L.) підвидів *everta, indurate, indentata, semindentata, saccharata* за умов зберігання в контрольованих умовах. Зберігання насіння кукурудзи *everta* протягом 8-9 років за вологості 7-8 % та нерегульованої температури не призводить до зниження схожості насіння. Більшість зразків насіння кукурудзи *indurate, indentata* за умови нерегульованої температури не змінює схожості за вологості насіння 6,5-8 % протягом 10 років і довше. Зразки насіння кукурудзи *semindentata* не знизили схожість після зберігання близько 10 років за вологості 6,9-7,9 %, нерегульованої та низької додатної температури. Зразки кукурудзи *saccharata* не змінювали схожість протягом зберігання 5-7 років за вологості 6,5-7,5%. Тривале зберігання зразків насіння кукурудзи *semindentata* та *saccharata* з вологістю насіння вище 8 % не рекомендується. При тривалому зберіганні насіння кукурудзи в деяких випадках спостерігається підвищення схожості увсіх підвидів до 25 %. Частіше таке підвищення спостерігали за низької додатної або від'ємної температури. Насіння сортів кукурудзи не виявило переваг у більшій здатності до зберігання над насінням ліній.

Висновки. Отримані результати свідчать про задовільний стан насіння протягом зберігання 5-17 років за умови його вологості 6-8 % та герметичної тари.

Ключові слова: *кукурудза, підвиди, насіння, зберігання, вологість, температура*