



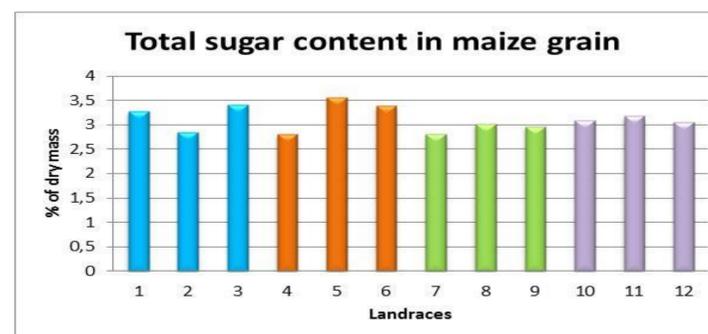
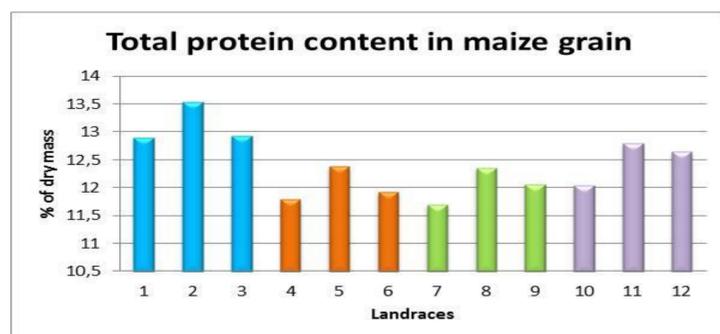
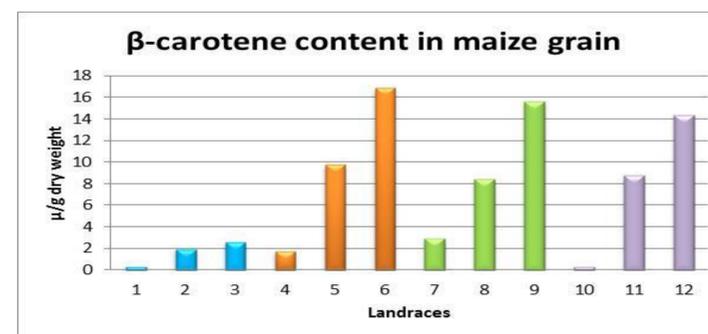
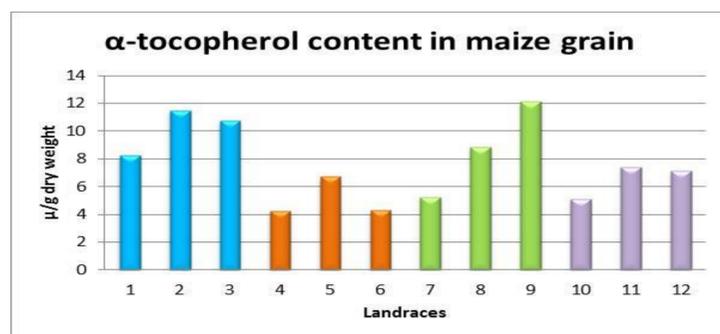
# BIOCHEMICAL CHANGES DURING NATURAL AGEING IN MAIZE SEEDS UNDER *EX SITU* CONSERVATION



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Maize (*Zea mays* L.) has a wide range of kernel colors such as white, yellow, orange, purple, black and mixed varieties. Pigmented maize is attractive and rich in phytochemicals and secondary metabolites such as phenolic compounds, carotenoids and flavonoids. Landraces provide broad natural variation, not only in agronomically important traits, but also in phytonutrients, which have decreased during modern breeding. Long-term conservation in genebanks decrease seed viability due to ageing process.



Correlations between seedling vigor indexes (SVI) and examined traits in maize accessions<sup>a</sup>

SVI-I – Total proteins content	0.65*
SVI-I – Lutein+zeaxantin	0.699*
SVI-II – β-carotene	0.78**
SVI-II – antioxidant capacity	0.72**
Antioxidant capacity – Total bound phenolics	0.72**

<sup>a</sup>\*\*significant at p < 0.05; \*\*, significant at p < 0.01

The study evaluate physiological and biochemical changes in maize seeds under cold storage and natural ageing conditions after two, six and 33 years. Following parameters were measured: germination, seedling length and dry weight, tocopherol and carotenoids content, protein, seed storage proteins, sugar, total phenol and phenolic acids content and total antioxidant capacity.

*Seedling vigor index-I* (SVI-I) - seedling length was expressed as a sum of shoot and root length, and index was calculated as: SVI-I = germination (%) x mean seedling length (cm)

*Seedling vigor Index-II* (SVI-II) – after drying seedling dry weight was recorded, and index was calculated as: SVI-II = germination (%) x mean seedling DW (mg)

Legend:

1, 2, 3 – Landrace 3509, samples from 1985, 2012, and 2016  
 4, 5, 6 – Landrace 3695 samples from 1985, 2012, and 2016  
 7, 8, 9 – Landrace 3687, samples from 1985, 2012, and 2016  
 10, 11, 12 – Landrace 3706, samples from 1985, 2012, and 2016

The highest level of total proteins, sugars and phenols were estimated in accessions regenerated in very dry environmental growing conditions in 2012. Seedling length and dry weight were correlated with total protein, lutein+zeaxantin, β-carotene and antioxidant capacity, while total antioxidant capacity was correlated with total bound phenols.

**Germination rate is not the only parameter to rely on for judging seed vitality and longevity in genebank management. Cold and dry storage (medium-term genebank conditions) for maize accessions could keep seed viability and longevity for more than 30 years.**