Embryo rescue of early ripening sweet and sour cherry hybrids

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Sweet and sour cherry breeding starting in the year 1950 has long tradition in the Research Institute for Fruit Growing and Ornamentals.

The purpose of the Hungarian sweet cherry breeding of this time has been to create a wide range of high quality varieties both for fresh consumption and canning industry, producing constantly high yields.

First breeders MALIGA Pál and BRÓZIK Sándor made thousands of artificial crossings year by year, but the germination of the hybrid seeds, especially in case of the early ripening mother plants was very poor. Similar opinion was detected also when the ‘Germersdorfy’, like a late ripening cultivar was used as mother plant.

Brózik, S. examined more than 20 000 seeds and published (1958) that the average germination rate of sweet cherries are lower than 1 %. In spite of this very poor results the first cultivar generation of their breeding work originated from traditional seedlings.

The released varieties of sweet cherry are Margit (1987), Linda (1988), and Katalin (1989), from middle to late ripening cultivars.
The purposes of the second breeding period were
- to extend the maturity time,
- to improve the quality both for fresh market and canning industry,
- to increase auto-compatibility,
- to improve tolerance or resistance to diseases /leaf spot, brown rot, Cytospora sp./.

The valuable self fertile varieties of EMRS were used (Cherry Self fertile 45 and 46) as parents. These crosses resulted the most valuable self fertile cultivars.

The embryo rescue work started also during this breeding period, in the mid seventieth supporting the affectivity of breeding work of APOSTOL, J.

The recent third breeding period concentrate for resistance breeding to diseases using the method of early selection of seedlings according to the results of artificial infection. This work is leading by SZÜGYI Sándor.
Steps of the embryo rescue

1. Determination of the ripening period suitable for the embryo rescue

Fruits suitable for embryo rescue
2. Cleaning the stones as much as possible
3. Disinfection of the seeds
   - 70 % ethanol + tween 1’
   - 20 % commercial bleach (NaClO) at a concentration of 3,5% (v/v) of active chlorine
   - rinse three times in sterile water

Disinfected seeds for cracking
4. Cracking of the stones
5. Removing the seed-coat –flaming
6. Putting the embryos into MS based culture medium
7. Cold treatment – 60-90 days
- + 4 °C
- darkness

Embryo development start under the cold treatment
8. Grow the embryos in a culture room - 22°C  
- 16/8 photoperiod  
- 2000 Lux light intensity

Embryos ready for acclimatization

...or could be propagated further
Abnormal embryo development

Reduced shoot or root growth

Large percent of albino plants arise in case of some combination

No embryo development, but shoot regeneration occur on the cotyledons sometimes
9. Acclimatization in growth chamber under high relative humidity and in the greenhouse - marking each plant is very important - regular plant protection against fungal infection is necessary
The most important self-fertile cultivars originated from embryo rescue

Thank you for your attention!