Effect of training system, planting density and rootstock on intensive cherry production

Prof. dr Vladislav Ognjanov
Dr Mirjana Ljubojević
Dušica Dorić, dipl. inž. Master
Goran Barač, dipl. inž. master
Jovana Dulić, dipl. inž. master
Maja Miodragović, dipl. inž. Master
Sweet Cherry production in Serbia

Traditional:
- Tree is large, tall, spreading and inefficient to harvest and prune
- Training and pruning cherry trees is not even a regular practice
- Production moved to the top of the tree with central part of the crown and bottom limbs dying due to excess shade
- 400 trees per ha

Cv. Napoleon

Open-vase system

560 kg/tree
Ritopek
Nearly 1000 ha
8 km x 3 km

Ašlama     XVIII century
Ranica
Adapija

1905 10 ha dr Jovan Jovanović
Napoleon
Germersdorfer
Sweet Cherry production in Serbia

New high density orchards!

- Planting distance 4 x 1.8m
- Vigorous rootstocks/scion interaction
  
  In function of:
  - Excellent fruit quality
  - Environmental condition
  - Cultural practice - Impossible without specific type of manipulation
  - Fruiting zone lowering - 70% of the fruit to be harvested from the ground
  - 1350 trees per ha

Specific crop load management strategies to balance fruit number with canopy area

Quality in front of quantity

Canopy architecture have significant effect on the tree vigor and fruit yield!
Productivity has to be controlled by cultural practice
Sweet cherry production system

- Genetic constitution of rootstock
- Genetic constitution of cultivar
- Rootstock/cultivar interaction!!!
- Cultural practice– training system, summer and winter pruning, irrigation and mineral nutrition
- Environmental conditions - abiotic i biotic faktors
Training systems

Spanish bush

Trees up to 2.5 m
Not precocious - multiple heading cuts
Very dance crown
Laterals are main fruiting branches
Insufficient light penetration
Spanish bush- nursery trial
Natural branching angle

Early star

Vera

Seleste
Training system

Vertical-axis spindle system

- Easy to grow and maintain
- Early yields
- Tree shape encourages good light penetration throughout the tree
- Reduce canopy volume
- Lowering the fruiting zone to a height where a high percentage of fruit may be harvested without ladders

**Picking cost is the biggest expense**

- Reasonable tree height on vigorous rootstock – 3.2 m
Whip nursery trees

- Tree is cut back to 110 cm
- Trunk is 70 cm
- Three emerging shoots below the cutting point are removed
- Procedure is repeated up to year three
- Distance between fruiting levels is 50-60 cm
Notching
- Along the leader
- Time of bud burst, only in second year
- Above a bud
- Metal saw
- Length (half circumference)
- Cut through bark and phloem
Knip young trees
Summer and dormant pruning

Increase lateral vegetative growth
Leaf-to-fruit ratio

Heading new shoot growth back to 45 to 50 cm in the beginning of July and during the dormant season.
Sweetheart

Sweet cherry tree vigor is inversely proportional to tree density.

- **Rootstock**
- **Variety**
- **Rootstock/variety interaction**
Relationship between fruit weigh and whole tree yield efficiency is close and strongly negative!!!

Crop value is strongly related to fruit quality!!!

Katalin

Sweetheart
Summer and dormant pruning to limit vegetative extension growth and fruiting sites

- Summer pruning – maintain a pyramid shape to the tree
- Renewal cuts – to keep fruiting wood young (existing or adventitious buds)
- Thinning cuts to remove entire branches at the point of origin, to open the tree to better light
- Limb manipulation (90°)
- Reduce leader tips to one side shoot
Light interception

Final height of the tree stopped at 3.2 m

Floral bud induction
Fruit quality
Dormant pruning

- **Reduce leader height**
- **Renewal cut**
Rootstock

Gisela 5

- The size-controlling properties of Gisela 5 were not apparent until several years after planting
- Very precocious
- With significant yield increase, tree crown volume decreased up to 48% compared to Mahaleb
- Fruit size and quality problems entering full productivity
Colt

- Vigorous rootstock in the irrigated conditions similar in size to Mahaleb
- Sensitive to drought
- Late acclimatization in fall/winter
- Sensitive to cold winter temperatures
- Sensitive to crown gall
Mahaleb

High density orchards

Root competition

Girdling

- Deep root sistem
- Difficult to control in high-density plantings
- The most drought-tolerant rootstock
- Sensitive to water-logged soils or anaerobic conditions
Oblačinska sour cherry

- Adapted to wide range of soil type
- Adapted to cold climate
- Moderately vigor
- Advanced fruit ripening
- Good fruit quality
- Insufficient anchoring, need support
- Root suckering
Genetic diversity in rootstock breeding (*Prunus cerasus* and *Prunus fruticosa*)
To improve economic returns

**Quality in front of quantity**

- **Fruit yield**
  - In early maturing varieties the less the better (7 t/ha)
  - Self compatible varieties with high fruit set not suitable (Sweetheart)
- **Quality (size, over 26 mm)**
- **Price/1 kg**
  - Early fruit sales:
    - Rita up to 4 Euro
    - Burlat up to 2.5 Euro
    - Hedelfingen 1.5 Euro

**Expenses (harvesting)**

- High yield of lower quality fruit
- Low yields of top-quality fruit
- High cost of hand picking for large volume of small fruit compared to lower volumes of large fruit
- Swift in price structure in favor of larger, higher quality fruit
Thank you for your attention!