

This report is supported by International Visegrad Fund in the frame of „Perspectives of tart cherry (*Cerasus vulgaris* (L.) Mill.) production in the V4 countries”, Project number: 21310134.



Report
about tart cherry (*Cerasus vulgaris* (L.) Mill.) growing in the V4 countries

Introduction

The tart cherry (*Cerasus vulgaris* (L.) Mill.) plays an important role in Eastern Europe mainly in Visegrad 4 (V4) countries' fruit production. Poland is the number one tart cherry producer in Europe, Hungary has the third largest production on the old continent. Czech and Slovakian Republic have smaller tart cherry production compared to previously mention two V4 countries but their production has a determinative place in their national economy.

Goal of our project is to compare tart cherry production of V4 countries to each other on the grounds of their fruit site conditions, tart cherry orchard surfaces, production harvested, orchard system, the most important elements of growing system, usage of fruits, and plans in the future of this sector.

1. Climatic conditions of member countries

However the V4 countries have similar climate conditions (Table 1), which are suitable for tart cherry production; there are a lot of local differences. The most important risk of the production is the late spring frosts. Unfortunately, the tart cherry production is not as valuable fruit species as e.g. apple production, therefore protection against late spring frosts can't be rewarding. Success of the tart cherry production is the safe fruit site conditions.

Table 1. Some important climatic data of the V4 countries (source: own data collection)

	Czech Republic	Hungary	Poland	Slovakia
Average annual temperature (°C)	7 – 8	10 – 11	7 – 9.5	9 – 11
Average temperature in the vegetation period (°C)	14 – 16	16	13 – 15	16
Average yearly sunny hours (h)	1400 – 1700	1 800 – 2 100	1 400 – 1 700	1 400 - 2 000
Average yearly precipitation (mm)	550 – 650	550 – 700	450 – 700	743
Average precipitation in the vegetation period (mm)	350 - 500	350 – 500	250 – 450	300 – 1 200
Soil conditions	brown soils	chernozem soils with high lime content	brown soils, grey brown podsolic soils	degraded chernozem, loessial soil,

2. Important tart cherry growing areas



In the Czech Republic the most important tart cherry producing areas are located in middle and East Bohemia and in the South Moravia.

In Hungary the most important tart cherry producing areas are located in Szabolcs-Szatmár-Bereg country (NE-Hungary) and in Bács-Kiskun county (between Danube and Tisza rivers).

Major areas of tart cherry production in Poland are located in east-central counties: Mazowieckie, Lubelskie, Świętokrzyskie as well as in west-central Poland: part of Wielkopolskie.

The Slovakia largest plantings of tart cherries are at the district of Zlaté Moravce (11.1 ha of tart cherry), Nové Zámky (5.6 ha) and Dunajská Streda (3.5 ha) - south Slovakia region, Rimavská Sobota (4.9 ha) and Lučenec (9.6 ha) - middle Slovak region. The sporadic orchards are situated at East Slovakia region. From the total area of 48.5 hectares of tart cherry orchards is 33.1 ha (68%) older than 15 years. Young plantings and production sets are the only area of 15.3 hectares (32%). From 2007 year to 2013 decrease tart cherries orchards about 179.4 hectares (orchard reduction toward the 2012 year about 57.7 ha). National Register of Orchard Slovakia registered 37 growers and 48.5 ha of tart cherry orchards.

3. Changes in the tart cherry orchard surface

Tart cherry shows an increasing tendency in the V4 countries except Slovakia (Table 2.). Poland has the largest tart cherry orchard surface followed by Hungary, Czech Republic and Slovakia.

This fruit species is important “ingredient” in the consumption of the people living in the V4 countries because its unique taste and excellent health benefits for the human body. Today it is trendy to consume it as a fresh fruit not just in the V4 countries but in other Eastern European countries as well.

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Table 2. Changes in tart cherry orchard surface in the V4 countries in 1 000 ha

	Czech Republic	Hungary	Poland	Slovakia
1970	n.d.	n.d.	n.d.	700*
1980	n.d.	n. d	n.d.	700*
1990	2 100	17 000	23 200	650*
2000	1 600	10 000	39 300	600**
2010	1 800	13 000	31 900	191**
2012	1 900	13 000	33 700	48,5**

(Source: *Sources old Slovak statistical sources, ** National Register of orchard Slovakia)

4. Changes in the tart cherry production harvested

Poland has the largest production harvested among the V4 countries followed by Hungary, Czech Republic, and Slovakia. The Polish production showed strong increasing tendency in the 1990-ties, the Hungarian production is increasing slowly. The Czech and the Slovakian production decreased a lot during the past 10 years, therefore this industry become smaller (Table 3).

The most used varieties in the Slovak tart cherry growing are originated from Hungary, Slovakia have not independent cherries breeding program. From the 2000 year, production and orchard area decreased critically. After 1998 year, the state caning industry was totally closed and the private sector have no interest to develop it. This was the main reason that fruit growers (mainly stone fruit) concluded their activities. Special research institutes and breeding station for fruit, vegetable, grapes, flowers and other reduced their activities had been also closed. At present anybody doesn't work on fruit breeding in the fruit research institutes or at the breeding stations in Slovakia. This is the reason, why the Slovak stone fruit production is very low, there are only 48, 50 ha of tart cherry orchards in the country. Other extensive orchards were excluded from Orchard register but growers have not enough money for liquidation.

Table 3. Tart cherry production harvested in the V4 countries in 1 000 t

	Czech Republic	Hungary	Poland	Slovakia
1970	n.d.	40	30,1	3,02*
1980	n.d.	38	41,9	2,90*
1990	8,2	61	77,4	1,60*
2000	9,3	49	139,5	1,64*
2010	3,5	52	147,2	0,36**
2012	4,3	53	175,3	0,40**

(Source: *The production was calculated at 1 000 tones like the ratio from Czechoslovak production. Source of information was national statistic yearbooks, ** Information from National Register of orchard Slovakia)

5. Characteristics of the orchard systems

In the orchard system database it can be seen that average orchard surface is small, therefore it is hard to grow tart cherries on the profitable level. Growers from the V4 countries are establishing intensive orchards using seedling rootstocks. The Hungarian and German bred cultivars are dominating in this region. In Poland ratio of hand-picked tart cherries is decreasing but this harvesting method dominates. In other countries shaking is the most

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important harvesting method. The rows aren't covered by grass, there is no support system, rain covering, and the orchards mostly aren't irrigated. Largest part of the orchards is harvested by machine (Table 4.).

Table 4. The most important characteristics of the orchard systems of V4 countries' orchards

	Czech Republic	Hungary	Poland	Slovakia
average orchard surface (ha/grower)	4,5	around 1 ha	0,37 (including non-commercial orchards – GUS* 2010)	Around 1,5 ha
the most used rootstock(s)	Seedling rootstocks, <i>Prunus mahaleb</i> , Gisela 5	<i>Cerasus mahaleb</i> seedling rootstocks	<i>Prunus (Cerasus) mahaleb</i>	P-TU-1 (<i>Pr. avium</i>) MH-KL-1 (<i>Cerasus mahaleb</i>)
the most used varietie(s)	Újfehértói Fürtös, Morela pozdní (Chateau Morelle = English Morello?), Fanal, Morellenfeuer (Kelleris), Érdi bötermő	There are 13 Hungarian bred sour cherry cultivars in the production. The most important cultivars are Érdi bötermő and Újfehértói fürtös.	English Morello (Polish: Łutowka)	Fanal, Morela neskora, Érdi bötermő, Újfehértói fürtös, Morellenfeuer
the most used canopies	open vase	open vase	natural, central leader	Open vase, standard free canopy
trunk high used generally (m)	0,7	1,2	0,6	0,80 -1,20
the final tree high (m)	2,5 - 5	4-5	3,0	4-5
the most used spacing between the rows and in the rows (m)	6 x 4 5 x 2,5	7 x 5 6 x 4	4 x 2,5	6 x 4 5 x 3 5 x 4
Are the rows covered? If they are what do you use?	grown without covering	mostly they aren't	no	no
Do they use any support system? If they do what kind of system they use?	usually it is not used, it might be used in case of young trees	no support system, but in the first non-bearing years it is possible to use	no	no support
Are the orchard irrigated? If they	2/3 are without irrigation, 1/3 is	mostly they aren't	no (seldom drip	no, they aren't

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are what kind of system they use?	irrigated by drop irrigation system		irrigation)	
Are the orchards covered by any material? If they are what sort of material do they use?	no, they aren't	no, they aren't	no, they aren't	no, they aren't
ratio of hand-picked and mechanical shaken orchards	approx. 5 – 10 % picked by hands, 90 – 95 % machinery harvested	approx. 20-30 % picked by hands 70-80% harvested by machine	90% hand / 10% mechanical harvest (estimation, no statistical data)	5% mechanical shake, 95% hand picked

* Łączyński, A. 2012. Uprawy Ogrodnicze. Powszechny Spis Rolny. Główny Urząd Statystyczny (Central Statistical Office), Warszawa (in Polish)

Characteristics and phenological data of the most important tart cherry cultivars grown in the V4 countries:

Czech Republic

	Újfehértói Fürtös	Schatten Morelle	Fanal
beginning of blooming time in 2014	04.10.	04.17.	04.17.
main blooming time in 2014	04.12.	04.19.	04.19.
end of blooming time in 2014	04.16.	04.23.	04.23.
ripening time in 2014	07.08.	07.30.	07.08.
fruit characteristics	semi-large	small	semi-large
- fruit diameter (mm)	20-21	15-16	21-22
- fruit weight (g)	5,1	3,9	5,7
- stone size	medium	small	medium
- fruit color	bright red	bright red	bright dark red red
- taste	sweet-acidic,	sweet - acidic	acidic
- total soluble solids (Brix)	19,9	22,3	16,8

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Fanal



Újfehértói fürtös



Schatten Morelle

Hungary

	Érdi bőtermő	Cigánymeggy	Újfehértói fürtös
beginning of blooming time in 2014	03.29.	C.404 clone: 03.29 C7 and C59 clone: 04.03	04.04.
main blooming time in 2014	04.02.	C 404 clone: 04.02 C7 and 59 clone: 04.05.	04.07.
end of blooming time in 2014	04.07.	C 404 clone: 04.07 C7 and 59 clone: 04.12.	04.12.
ripening time in 2014	06.15.	06.19.	06.24.
fruit characteristics	semi-large	small	semi-large
- fruit diameter (mm)	21-23	16-18	18-20
- fruit weight (g)	5-6	3	4-5
- stone size	medium	small	medium
- fruit color	bright dark red	dark wine red	wine red
- taste	sweet-acidic, harmonious	very acidic	midly acidic-sweet
- total soluble solids (Brix)	18,5	17,5	18

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Cigánymeggy 7



Érdi bőtermő



Újfehértói fürtös

Poland

	Lutowka (English Morello)
beginning of blooming time in 2014	04.20
main blooming time in 2014	04.25
end of blooming time in 2014	05.03.
ripening time in 2014	07.17-18.
fruit characteristics	large
- fruit diameter (mm)	21-23
- fruit weight (g)	5-7
- stone size	medium
- fruit color	dark red
- taste	acidic
- total soluble solids (Brix)	15-16

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Photo 1. English Morello (Łutówka), RSGD Przybroda, 31.03.2014



Photo 2. English Morello (Łutówka), RSGD Przybroda, 4.04.2014

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Photo 3. English Morello (Łutówka), RSGD Przybroda, 6.04.2014



Photo 4. English Morello (Łutówka), RSGD Przybroda, 16.04.2014

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Photo 5. English Morello (Łutówka), RSGD Przybroda, 19.04.2014

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Photo 6. English Morello (Łutówka), RSGD Przybroda, 24.04.2014



Photo 7. English Morello (Łutówka), RSGD Przybroda, 30.04.2014

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Photo 8. English Morello (Łutówka), RSGD Przybroda, 8.05.2014



Photo 9. English Morello (Łutówka), RSGD Przybroda, 29.05.2014



Photo 10. English Morello (Łutówka), RSGD Przybroda, 18.07.2014

Slovakia

	Fanal	Morela neskora	Érdi bőtermő	Újfehértói fürtös
beginning of blooming time in 2014	04.12	04.12.	04.04.	04.04.
main blooming time in 2014	04.15.	04.15.	04.08.	04.07.
end of blooming time in 2014	04.21	04.20.	04.12.	04.12.
ripening time in 2014	07.10.	07.15.	07.05.	07.15.
fruit characteristics	semi-large	semi-large	large	semi-large
- fruit diameter (mm)	18-20	18-20	21-22	18-20
- fruit weight (g)	6,3	5,5	6,4	5,6
- stone size	medium	medium	medium	medium
- fruit color	Dark red	Bright red	bright dark red	wine red
- taste	sweet-acidic, harmonious	sweet-acidic, harmonious	sweet-acidic, harmonious	midly acidic-sweet
- - total soluble solids (Brix)	17	17	16,5	18

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Újfehértói fürtös



Fanal

6. Growing techniques

The used growing technology is modern in all V4 countries; it means that it is general to use summer pruning, IPM plant protection method, and annual plant nutrition. The plant protection is mainly against fungal caused diseases and cherry fruit fly (*Rhagoletis cerasi*).

Unfortunately, the prices are low in all V4 countries, the growers can get better prices for the hand-picked cherries but labour costs take the biggest part of the production. The most important problem is the missing cooperation between the growers as well as growers and cooperatives, so lack of information causes unclear situation on the market (Table 5.).

Table 5. The most important elements of the growing technologies in the V4 countries

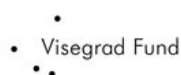
	Czech Republic	Hungary	Poland	Slovakia
time of pruning	after the harvest	end of dormant period or after the harvest	August	Spring, end of dormant period
number of plant protection	4 - 8	3-7	6-9	1-3

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treatment				
important diseases	<i>Monilinia laxa</i> , <i>Blumeriella jaapii</i> , <i>Gloesporium</i>	<i>Monilinia laxa</i> , <i>Blumeriella jaapii</i> , <i>Gloesporium</i>	cherry leaf spot - <i>Blumeriella jaapii</i> (Rehm.) v. Arx.; bacterial canker - <i>Pseudomonas syringae</i> pv. <i>syringae</i> van Hall; brown rot - <i>Monilinia laxa</i> (Aderh. et Ruhl.) Honey	<i>Monilinia laxa</i> ,
important pests	cherry fruit fly, starling birds	cherry fruit fly	Black cherry aphid - <i>Myzus cerasi</i> Fabr.; cherry fruit fly - <i>Rhagoletis cerasi</i> L.	cherry fruit fly
Do the growers use annual plant nutrition?	Yes, in the mixture with protection, fertilisation, fertilizer spreading	Yes, They do.	yes	Yes only for intensive orchard
determination of the ripening	Experience, sugar and acid content	based on experience	visual based on fruit skin color	based on growers experience
cost of hand picking (EUR/kg)	0,14 – 0,22	0,09 – 0,12	0,14	0,27-0,40
cost of shaking (EUR/kg)	0,05 – 0,08	0,02 – 0,03	0,06	*no information
farm gate price (cost of production) (EUR/kg)	0,17 – 0,58	0,16 – 0,4	0,2-0,8 (average production cost 0,34)	1,0 -1,50
other problems related to growing	Problems are usually with selling production when Hungary and Poland have a good yields; old plantings in orchards; late spring frosts	no cooperation btw growers and cooperatives	growers do not own processing facilities – can not affect price policy, fruit cracking in wet seasons	No processing, no interest about planting new orchards

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*Finding of cost of shaking fruits is problematic because any producer of tart cherry this year do not use this type of picking

7. Usage of the fruits

The most important usage of the tart cherries grown in the V4 countries is for industrial purposes, but there is a new trend to pick them by hands for fresh consumption (Table 6.).

Table 6. Usage of tart cherries in the V4 countries

	Czech Republic	Hungary	Poland	Slovakia
ratio of fruits for fresh consumption	Lower than 5 %	20%	18%	5%
ratio of fruits for industrial purposes	More than 95 %	80%	82%	95%

8. Perspectives, plans in the future

Some innovations (new cultivars, marketing, new research approach, and new tart cherry-based products) are needed in this sector in all V4 countries.

In Slovakia there is no breeding and research program on fruit species and there isn't any food processing industry in the country, which is a giant problem. Furthermore, the missing breeding work causes lack of interest producers, lower production means lower interest of distribution cooperatives for marketing of production. In Czech Republic, Hungary and Poland some innovations in the research (inner content value, medical research) are still missing to increase the production level and better request on the market (Table 7.).

Table 7. Plans to do in the future in the tart cherry sector

	Czech Republic	Hungary	Poland	Slovakia
campaigns to improve the fresh consumption	for fresh fruits in general based on medical research; not yet fully specialized in tart cherries	in the frame of 5-a-day and based on medical research	only for limited production of fresh market cultivars	no
campaigns to improve the processed fruits	no	no	more needed	no
more medical research on effects of tart cherry on the human	There is an interest in the research sector, mostly for the inner substances content (antioxidants, melatonin)	there is a keen interest in the research sector in tart cherry inner content	more needed	no
usage of new early ripening	old varieties are used; for earlier	fresh consumption	fresh consumption	In the sporadic cases fresh

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cultivars	harvest than in Poland; for industrial purposes			consumption from the farm gate
usage of new medium ripening cultivars	old varieties are used; for industrial purposes	fresh consumption and industrial purposes	fresh consumption and industrial purposes	Processing in foreign countries (HU, AT) in Slovakia missing
usage of new late ripening cultivars	old varieties are used; for industrial purposes	fresh consumption and industrial purposes	fresh consumption and industrial purposes	no
Which part of the ripening time has big perspective?	the early ripening and late ripening	all stages (early, medium, late)	early (fresh market cultivars)	Processing in foreign countries (HU, AT) in Slovakia missing
increase the organic production's orchard surface	slowly	really slowly	limited	all stages (early, medium, late)
increase the intensive orchard surface for hand picking	Weak growing sector	this is a fast growing sector	yes	No part of tart cherry orchard is organic
new tart cherry-based products	Aroma, fruit juice, fruit concentrate, wine, as a substance for a lot of products	fruit juice, muesli bars, bakery products,	dairy products, dried fruits	The interest for growing of tart cherry is minimal
any fruit thinning used	No	no	no	Home production missing, but special food factory produced from import e.g. muesli bars, bakery products
				no

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