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OCCURRENCE AND RECORDS OF OLD VARIETIES OF POME FRUIT IN THE TIŠNOV REGION

Libor Dokoupil[1]

[1] Department of Breeding and Propagation of Horticultural Plants, Faculty of Horticulture, Mendel University in Brno, Zemědělská 1, 613 00 Brno, Czech Republic

Abstract

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The objective of the study was to record the incidence of old varieties of pome fruit in some localities and to evaluate their growth properties and health status; at the same time to evaluate the endangered and oldest apple and pear trees. Samples were taken continuously and after short storage sensory evaluations were carried out. The focus was on fruit tree orchards, home fruit gardens, farmsteads, alleys, trees along roads and field orchards in cadastres of some communities of the Lomnice, Tišnov and Nedvědice regions. We recorded the growth parameters – volume of crown, diameter of the tree trunk, data of the health status and our own classification and pomological description of the variety. The apple variety 'Velník' reached an age of 200 years in Křížovice; the variety 'Kanefl' in Křížovice 150 years. Old pear varieties on seedy rootstocks reach a high age. The age of the pear variety 'Václavka' in Zvole was over 200 years and of the variety 'Neznámka' in Žernůvka it was 195 years.

Keywords: old varieties, pomological determinations, field investigations

INTRODUCTION

Fruit trees are an integral part of the highly developed cultural Czech landscape. The position of the Czech Republic in the heart of Europe and favourable natural conditions gave rise to a varied assortment not only of pome fruit, but of a number of other fruit species.

The function of a fruit tree is not only commercial, its importance is also historic, health, aesthetical, social, to say nothing of wood production. Orchards were mentioned in foundation charters of monasteries and convents; however the real heyday came about during the reign of Emperor Charles IV. In terms of health fruit is an irreplaceable component of a well-balanced diet. Fruit contains important substances, such as sugar, acids, pectin, vitamins, mineral elements and antioxidants which build up disease resistance and which are contained in fruit in a biologically acceptable form and cannot be adequately substituted with synthesised products. Fruit trees, shrubs, orchards, alleys and lines of trees play an important role in the forming of the microclimate. They prevent rapid flow of wind, they moderate climate conditions, reduce water and wind erosion and, above all, they produce oxygen.

From the aesthetical point of view they function as an ornamental complement of the landscape and they have an important role in the green vegetation of the landscape and towns. Their function is biological; reclamation; insulating; sanitation; cultural; aesthetical-educational; and recreational. The social importance of fruit trees lies in the creation of a discipline leading to patience, unselfishness and usefulness for the future generations. The production of wood is marginal; important is wood from the walnut, bird cherry and wild pear. We must not forget the close relationship between the fruit tree and bee-keeping.

Present day intensive fruit growing is focused on modern cultivation methods and on suitable rootstocks and varieties. Breeding of apple trees is focused on varieties resistant against apple scab and powdery mildew, bacterial and virus

infections (Tetera, 1987). In breeding programmes local varieties are used; their advantage is their adaptability to climate conditions particularly in marginal areas. Their importance also lies in their adaptability to soil conditions (Paprštein, 1997). Today such varieties are promoted which fulfil the challenging demands for high qualitative parameters – the breeding objectives. Growing only a small range of improved varieties rapidly reduces the genetic diversity and supports the development and distribution of various kinds of pathogens. The loss of each individual genome and in this way of a certain trait or property is an irreparable loss due to the irreplaceable quality and originality (Bednář, 1997).

From the very beginning the fruit developed by way of selection. Priority was given to trees bearing fruit of interesting quality and so it came about that a number of seedlings bearing high-quality fruit with good traits was retained; this was the beginning of primitive selection. Increased care and sowing out in more suitable climate and soil conditions resulted in seedlings which bore fruit of better characters, with a characteristic shape, colouring and longer shelf life. The origin of many varieties, particularly apple trees, is connected with a number of interesting events, legends and old stark records (Chobotský, 1999).

The fruit often appeared without a name or was given a common name. The objective of one-time fruit growers was to trace the time-tested varieties, to try them out and to define them correctly in pomology terms, give them a name, take care of them and distribute them. In the 18th and 19th centuries various systems appeared classifying the varieties into classes, orders, groups etc. (Tetera *et al*., 2006).

Czech terminology has its historical roots and at the present time the following terminology is used most frequently:

- local seedlings – gave rise to local varieties and are indicated as "random seedling";
- cultural varieties – are the product of specialised pomological description;
- important varieties – develop the market, ecological and self-supplying fruit growing;
- widespread varieties – may be spread on a local, regional, national or worldwide scale;
- new varieties – new varieties, perspective, foreign, imported;
- local varieties – emerged randomly, are spread over a smaller or larger locality;
- old varieties – are several decades old (most frequently 50 years);
- collection varieties – occur in small numbers, in assortments of organisations or private fruit growers;
- disappearing varieties – are not being spread further; this indication may mean endangered or dying out varieties (Tetera *et al*., 2006).

In the past decades we have seen that old fruit trees from various plantations or alleys are vanishing and along with them also unique and extremely variable varieties. With them our cultural heritage is disappearing as well as a valuable source for breeding. The variety of cultural plants is a unique and irreplaceable wealth created by nature and later preserved through the purposeful activities of man. According to Lužný (1999) the importance of the gene pool of plants lies in a package of plant forms, both cultural and semi-cultural and wild. For the development of biological diversity there is no better source than the source from which it comes.

In the past the Tišnov, Lomnice and Bystřice localities were regions important in terms of apple and pear tree growing. Archival records mentioned that the Tišnov region was famous for fruit growing. Fruit was grown not only as table fruit, but also as a source of various methods of processing, pressing, drying, for the production of wine, jam etc. According to Hamerník *et al.* (1960) as the regionalisation of agricultural production came into being, certain species and varieties were recommended to be grown in this region. The dominant apple varieties were 'Boskoopské červené' ('Roter Boskoop'), 'Parména zlatá zimní' ('King of the Pippins') and 'Vilémovo' ('Kaiser Wilhelm'); the dominant pear varieties were 'Boscova lahvice' ('Beurré d'Yelle'), 'Pařížanka' ('Comtesse de Paris') and 'Williamsova čáslavka' ('Bartlett'). Of medium representation were apple varieties 'Matčino' ('Mother', 'Nonnetit'), 'Panenské české' ('Pomme des Vierges'), and pear varieties 'Clappova' ('Clapp's Favourite'), 'Lucasova'('Beurré Alexandre Lucas') and 'Madame Verté'. The apple varieties 'Baumannova reneta' ('Baumann's Reinette'), 'Boikovo' ('Boiken'), 'Ontario' and 'Strýmka' ('Bohnapfel') and the pear varieties 'Hardyho máslovka' ('Beurré de Gellert') and 'Charneuská' ('Fondante de Charneus') were recommended as marginal varieties.

MATERIALS AND METHODS

Basing on our own information of the locality, on literary sources and on contacts with the population and with surviving contemporaries we carried out research and mapping of old trees. During one decade we monitored the species representation (apples, pears) and varietal composition of fruit woody trees in cadastres of 14 villages of the Lomnice, Tišnov and Nedvědice regions. Out of the 14 cadastres of the villages Borač, Deblín, Doubravník, Husle, Jilmoví, Lomnice, Nedvědice, Podolí, Tišnov, Předklášteří, Újezd, Usuší, Železné and Žernůvka we selected 14 localities which were the objects of our research. In other cadastres (Borovník, Kaly, Křídla, Křížovce, Olší, Pejškov, Rakové, Řepka and Synalov) the oldest apple trees were monitored. Very old pear trees were discovered in cadastres of the villages Lomnička, Sejřek, Šerkovice, Štěpánovice and Zvole.

The records were focused on home fruit orchards, farm orchards, alleys, lines of trees and field orchards. We applied methods of historical and professional field research.

As concerns the old trees we determined the variety, the volume of the crown (m^3) according to Neumann's formula:

$$Vk = \frac{(Pp^2 \times v)}{1.91},$$

$$Pp = \frac{(S1 + S2)}{2},$$

where
Vk .... volume of the crown (m^3),
Pp .... average width of crown,
v ..... height of crown measured from the branching of the trunk,
S1 ..... width of crown in the N-S direction,
S2 ..... width of crown in the E-W direction.

The diameter of the trunk (m) was measured at breast height 1.3 m above ground; the overall health status of the tree was monitored taking into account the incidence of dry parts, the health status of the trunk, incidence of fungus diseases and pests; all this was evaluated on a scale of 1 to 9 points, where 9 stands for an entirely healthy tree and 1 stands for a dry remnant of a tree. Pomological evaluations were performed on the one hand in the field and on the other hand by analysing samples in the laboratory. The fruit was stored in a cool store and at the stage of optimal maturity degustation and sensory evaluations were carried out (Classification scale of the Breeding and Research Institute of Pomology Holovousy, Paprstein, 1997). Assessed the age of the trees on the basis of information from the surviving contemporaries. Special attention was devoted to overmature trees – unique trees whose longevity is uncertain and which are frequently removed from alleys and field orchards for no specific reasons.

RESULTS

Apple Trees

The most frequent shape of an apple tree is a half standard or high trunk tree which gives it its typical massiveness and longevity. Significant differences ($p = 0.05$) among the varieties were discovered in the volume of the crown, diameter of the tree trunk and overall health status of the apple varieties (Tab. I).

The variety 'Blenheimská reneta' ('Blenheim Orange') had the significantly ($p = 0.05$) largest **volume of the crown** (276 m^3); also the varieties 'Krasokvět žlutý' ('Yellow Bellflower'), 'Vilémovo' ('Kaiser Wilhelm') and 'Panenské české' ('Pomme des Vierges') had large volumes of the crowns (253 m^3, 248 m^3 and 207 m^3, respectively). The volumes of the crowns were the smallest in varieties 'Strýmka' ('Bohnapfel') (91 m^3), 'Baumannova reneta' ('Baumann's Reinette') (99 m^3) and 'Kardinál žíhaný' ('Geflammter Weisser Cardinal') (104 m^3) (Tab. II). The following varieties had the largest **diameter of the trunk**: 'Blenheimská reneta' ('Blenheim Orange') (0.375 m), 'Panenské české' ('Pomme des

I: *Analysis of variance results for the crown volume, diameter of the tree trunk and overall health*

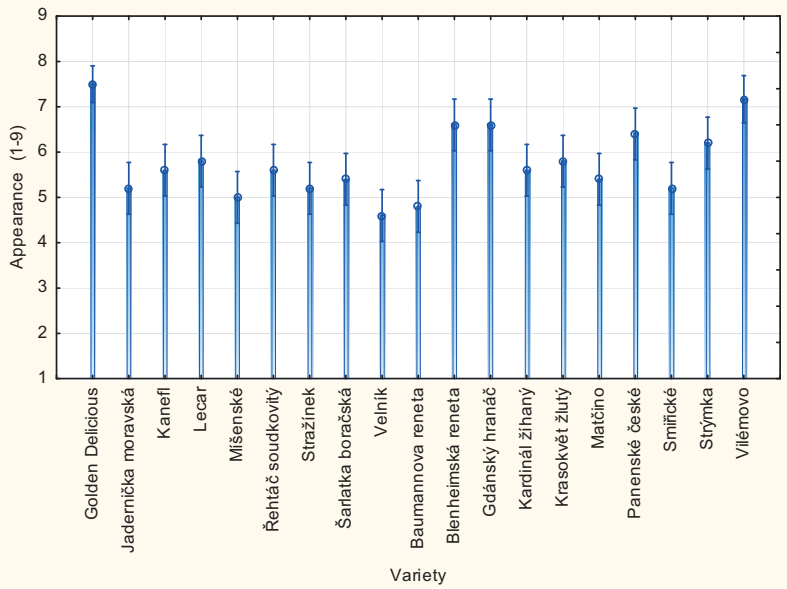
		Crown volume		Diameter of the tree trunk		Overall health	
	df	**MS**	**p**	**MS**	**p**	**MS**	**p**
Variety	11	**110824**	**0.000**	**0.044**	**0.000**	**2.819**	**0.000**
Error	224	12488		0.004		0.789	

II: *Volume of crown, diameter of trunk and overall health status of trees of the found varieties (mean, standard error of the mean, different letters indicate significant differences between varieties, p = 0.05)*

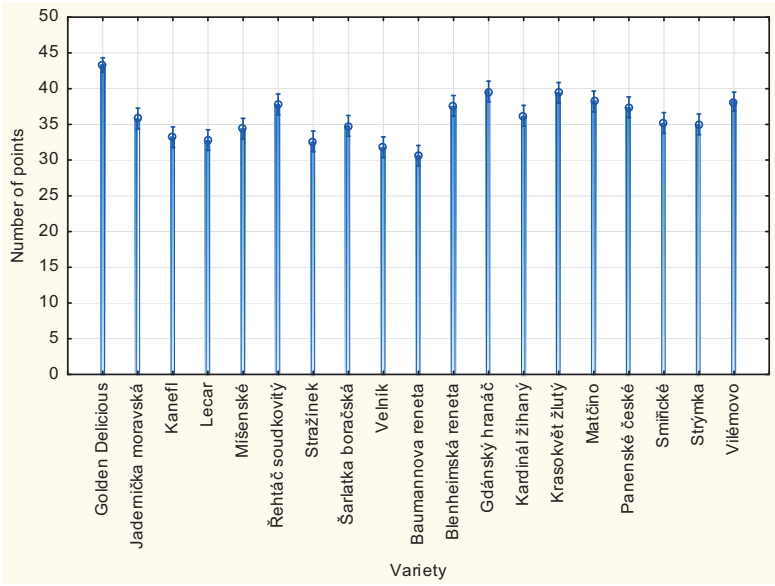
Variety	Cubic crown	Diameter of the tree trunk	Overall health
'Baumannova reneta' ('Baumann's Reinette')	99.14 ± 15.05 a	0.252 ± 0.012 a	6.9 ± 0.2 bcd
'Blenheimská reneta' ('Blenheim Orange')	276.62 ± 18.03 e	0.375 ± 0.009 f	6.8 ± 0.1 bc
'Gdánský hranáč' ('Danziger Kantapfel')	158.40 ± 15.93 abc	0.361 ± 0.013 ef	6.9 ± 0.4 bcd
'Jadernička moravská'	109.04 ± 1.53 ab	0.295 ± 0.002 abcd	7.0 ± 0.4 bcd
'Kardinál žíhaný' ('Geflammter Weisser Cardinal')	103.94 ± 16.00 a	0.282 ± 0.015 ab	6.8 ± 0.3 bc
'Krasokvět žlutý' ('Yellow Bellflower')	253.15 ± 45.17 de	0.330 ± 0.007 bcde	7.0 ± 0.4 bcd
'Matčino' ('Mother', 'Nonnetit')	206.04 ± 18.59 cd	0.293 ± 0.009 ab	6.7 ± 0.1 b
'Míšeňské' ('Edelsborsdorfer')	192.67 ± 2.79 bcd	0.345 ± 0.002 def	7.0 ± 0.1 bcd
'Panenské české' ('Pomme des Vierges')	206.78 ± 14.76 cd	0.362 ± 0.008 f	6.7 ± 0.1 b
'Smiřické vzácné'	133.60 ± 16.16 ab	0.300 ± 0.009 bcde	7.4 ± 0.1 d
'Strýmka' ('Bohnapfel')	90.52 ± 11.66 a	0.293 ± 0.007 abc	5.4 ± 0.2 a
'Vilémovo' ('Kaiser Wilhelm')	247.69 ± 8.14 de	0.338 ± 0.004 cdef	7.0 ± 0.1 bcd

III: *Analysis of variance results for the sensory evaluation of fruit*

		Appearance		Number of points	
	df	**MS**	**p**	**MS**	**p**
Variety	18	**3.977**	**0.000**	**63.5**	**0.000**
Error	114	0.411		2.641	



1: *Score achieved in appearance of the varieties (1–9)*



2: *Points scored for the sensory evaluation of the fruit varieties (1–9)*

Vierges') (0.362 m) and 'Gdánský hranáč' ('Danziger Kantapfel') (0.361 m). The smallest diameter of the trunk was monitored in the varieties 'Baumannova reneta' ('Baumann's Reinette') (0.252 m), 'Kardinál žíhaný' ('Geflammter Weisser Cardinal') (0.282 m), 'Matčino' ('Mother', 'Nonnetit') (0.293 m) and 'Strýmka' ('Bohnapfel') (0.293 m) (Tab. II). The varieties showing the best **overall health status** were 'Smiřické vzácné' (7.4 points); the varieties 'Míšeňské' ('Edelsborsdorfer'), 'Krasokvět žlutý' ('Yellow Bellflower'), 'Jadernička moravská' and 'Vilémovo' ('Kaiser Wilhelm') scored 7 points. The variety 'Strýmka' ('Bohnapfel') showed the worst health status (5.4 points) (Tab. II).

Sensory values (points 1–9) differed significantly among the varieties (Tab. III).

IV: *Age of the oldest live apple trees monitored*

Order	Unique tree varieties	Age of tree (years)	Found in cadastre
1	'Velník'	195–200	Křížovice
2	'Stražínek'	180–185	Křížovice
3	'Kanefl'	150–160	Křížovice
4	'Šarlatka boračská'	85–90	Borač, Řepka, Synalov
5	'Míšeňské' ('Edelsborsdorfer')	80–90	Rakové, Borač
6	'Jadernička moravská'	80–85	Olší
7	'Řehtáč soudkovitý' ('Prinzen Apfel')	75–80	Křídla, Borovník
8	'Lecar'	65–70	Kaly, Šerkovice, Pejškov

The best score in terms of the **appearance** was achieved by the control variety 'Golden Delicious' (7.5 p) followed by the varieties 'Vilémovo' ('Kaiser Wilhelm') (7.2 p), 'Blenheimská reneta' ('Blenheim Orange') (6.6 p) and 'Gdánský hranáč' ('Danziger Kantapfel') (6.6 p). The lowest scores in terms of the appearance were achieved by the varieties 'Velník' (4.6 p), 'Baumannova reneta' ('Baumann's Reinette') (4.8 p) and 'Míšeňské' ('Edelsborsdorfer') (5.0 p), (Fig. 1).

In the **total sum** the score was topped by the control variety 'Golden Delicious' (43.3 p); the next were varieties 'Gdánský hranáč' ('Danziger Kantapfel') (39.6 p), 'Krasokvět žlutý' ('Yellow Bellflower') (39.4 p), 'Matčino' ('Mother', 'Nonnetit') (38.2 p) and 'Vilémovo' ('Kaiser Wilhelm') (38.2 p). The lowest score was achieved by fruit of the varieties 'Baumannova reneta' ('Baumann's Reinette') (30.6 p), 'Velník' (31.8 p), 'Stražínek' (32.6 p) and 'Lecar' (32.8 p), (Fig. 2).

Old apple varieties on seedy rootstocks excel in exceptional longevity. Discovered were live trees of almost 2 centuries of age, e.g. the apple variety 'Velník' in the village Křížovice was 200 years old, the variety 'Kanefl' in the village Křížovice was 150 years old, the variety 'Stražínek' in the village Křížovice was 180 years old, the variety 'Šarlatka boračská' in the village Borač was 90 years old etc. (Tab. IV).

Pear Trees

When grown on a seedy rootstock and of a trunk shape they achieve above-the-standard longevity and a good health status. Significant ($p = 0.05$) differences among the varieties of pear trees were discovered in the volume of the crown, diameter of the tree trunk and overall health status (Tab. V).

The **volume of the crown** ($p = 0.05$) was significantly the largest of trees of varieties 'Charneuská' ('Fondante de Charneus') (133 m^3) and 'Muškatelka šedá' ('Musqué Grise de Bohűeme') (131 m^3). The volume of the crown was the smallest in trees of the varieties 'Křivice' ('Clairgeau de Nantes') (36 m^3) and 'Williamsova čáslavka' ('Bartlett') (79 m^3) (Tab. VI). The largest **diameter of the tree trunk** was monitored in trees of varieties 'Clappova máslovka' ('Clapp's Favourite') (0.329 m) and 'Mechelenská' ('Joséphine de Malines') (0.330 m). The smallest diameter of the tree trunk was monitored in trees of the varieties 'Křivice' ('Clairgeau de Nantes') (0.256 m), 'Děkanka Robertova' ('Doyenné de Comice') (0.265 m) and

V: *Analysis of variance results for crown volume, diameter of the tree trunk and overall health*

		Crown volume		Diameter of the tree trunk		Overall health	
	df	MS	p	MS	p	MS	p
Variety	6	**7716**	**0.006**	**0.007**	**0.020**	**2.285**	**0.020**
Error	39	2142		0.002		0.788	

VI: *Volume of tree crown, diameter of tree trunk and overall health status of pear trees of the monitored varieties (mean, standard error of the mean, different letters indicate significant differences between varieties, p = 0.05)*

Variety	Cubic crown (m^3)	Diameter of the tree trunk (m)	Overall health (1–9)
'Clappova máslovka' ('Clapp's Favourite')	118.55 ± 9.68 bc	0.329 ± 0.016 c	7.14 ± 0.26 bc
'Děkanka Robertova' ('Doyenné de Comice')	79.97 ± 26.20 abc	0.265 ± 0.018 ab	6.00 ± 0.41 a
'Charneuská' ('Fondante de Charneus')	133.33 ± 35.38 c	0.328 ± 0.039 bc	6.67 ± 0.61 ab
'Křivice' ('Clairgeau de Nantes')	35.60 ± 5.21 a	0.256 ± 0.018 a	6.20 ± 0.37 a
'Mechelenská'	100.49 ± 7.28 bc	0.330 ± 0.012 c	7.00 ± 0.01 abc
'Muškatelka šedá'('Musqué Grise de Bohűeme')	131.10 ± 12.30 c	0.327 ± 0.011 bc	6.27 ± 0.23 a
'Williamsova čáslavka' ('Bartlett')	78.95 ± 6.50 ab	0.268 ± 0.006 ab	7.80 ± 0.20 c

VII: *Age of the oldest live pear trees discovered*

Order	Unique tree varieties	Age of tree (years)	Found in cadastre
1	'Václavka'	200–215	Zvole
2	'Neznámka'	195–200	Žernůvka, Jilmoví
3	'Knížatka'	120–125	Tišnov, Sejřek
4	'Ovesnička'	100–105	Lomnička, Šerkovice
5	'Šedulka'	95–100	Štěpánovice, Sejřek
6	'Šídlenka'	90–95	Sejřek, Borač

'Williamsova čáslavka' ('Bartlett') (0.268 m) (Tab. VI). The **overall health status** was significantly the best in trees of the varieties 'Williamsova čáslavka' ('Bartlett') (7.8 points) and 'Clappova máslovka' ('Clapp's Favourite') (7.2 p). The health status of trees of the varieties 'Děkanka Robertova' ('Doyenné de Comice'), 'Křivice' ('Clairgeau de Nantes') and 'Muškatelka šedá' ('Musqué Grise de Bohűeme') scored less points (6.0 p, 6.2 p and 6.3 p) (Tab. VI).

An important feature of old pear varieties is their longevity. The pear variety 'Václavka' discovered in the village Zvole was more than 200 years of age, the variety 'Neznámka' in the village Žernůvka was 195 years old, the variety 'Knížatka' in the village Sejřek was 120 years old, the variety 'Ovesnička' in the village Lomnička was 100 years old etc. (Tab. VII).

Characteristic of the Tišnov region is the occurrence of a number of old varieties of apple trees in the cadastres of the villages in question. The brief characteristics are as follows:

- **'Kanefl'**
  (consumption ripeness of fruit in March and April)
  The fruit is medium-sized to small, roundish to conical shape, regular. The skin is greenish yellow, matte, slightly red on the sunny side. After removing the stem the stem end is shallow; the stem is short, strong and firm. The flesh is whitish, crisp, juicy and tasty. Suitable for storage as well as for drying; the flesh does not turn brown. Grows well in higher altitudes and tolerates fall of temperature. At first growth is luxuriant, later the growth weakens.
- **'Lecar'**
  (consumption ripeness of fruit in February and March)
  The fruit is round to roundish flattened, medium size. The skin is smooth, glossy and green; on the sunny side is splashed with red splash and a bloom. The stem end is shallow; the stem is short and strong. The flesh is white, crisp, juicy and slightly tangy. The advantage of this variety is its long shelf life and great adaptability to site conditions. It forms mighty trees with cascade-like overhanging branches.
- **'Stražínek'**
  (consumption ripeness of fruit in January and February)
  The fruit is round to barrel-shaped. The calyx is small, situated in the rough calyx hollow. The skin is smooth, greenish coloured. The stem end is shallow, rusty and the stem is short. The flesh is greenish and juicy, its consistence is coarse. It forms wide pyramid-like crowns with a great amount of overhanging branches. It is a less demanding variety. Its occurrence is sporadic (Křížovice).
- **'Šarlatka boračská'**
  (consumption ripeness of fruit in March and April)
  The fruit is round to cone-shaped, tapering towards the calyx. The skin is smooth, on the sunny side with dark red stripes. The calyx and stem ends are shallow; the stem is of medium thickness. The greenish flesh is juicy, slightly spicy and pleasant to the taste. It forms a typical wide pyramid-like crown with lush foliage. It is suitable for higher altitudes; it tolerates falls in temperatures and is not prone to fungal diseases.
- **'Velník'**
  (consumption ripeness of fruit in February and March)
  It forms regular, almost round fruit, slightly tapering towards the calyx. The calyx is small, in the shallow calyx end. The stem is short and thick. The skin is smooth, greenish in colour and it gradually turns yellow. The greenish flesh is firm and juicy. The flesh is markedly tough and contains many acids. Grows well in higher altitudes and is undemanding in terms of site conditions. It forms mighty crowns and the trees grow to a great age.
  The oldest pear varieties were described in the same way as the apples.
- **'Knížatka'**
  (consumption ripeness in early August)
  The shape of the fruit is elongated, bottle-shaped; the skin is light green with marked dotting; on the sunny side of the fruit is a bright red splash. The stem is long and thin. The calyx is slightly opened. The whitish flesh is very juicy, good to the taste and on ripening it tends to "go sleepy" (overripe). The pear trees used to be planted in home gardens and backyards; they form stately crowns with an attractive structure.
- **'Neznámka'**
  (consumption ripeness in late September)
  The fruit is bulbous to roundish and has a markedly long stem. The skin is green and is

covered in fine pear rust. The stem is of medium thickness, the stem end is small. The calyx is on the surface of the fruit; it is small. The yellowish flesh is juicy, very sweet and good to the taste with typical spicy flavour. The fruit is suitable for drying and for fresh eating. Old trees are scattered over the cadastres of the villages of the Tišnov region.

- **'Ovesnička'**
  (consumption ripeness in late July to early August)
  The fruit is bulbous shaped; the fruit is relatively small, light green with darker mottling. The skin is smooth, greasy and when fully ripe yellow in colour. The stem is of medium length; the tree bears the fruit in clusters. The calyx is shallow. The flesh is whitish, juicy and slightly tangy, markedly reminiscent of nutmeg. It is suitable for drying; the whole dried fruit has a distinct nutmeg aroma. It occurs sporadically and only in old gardens.
- **'Šedulka'**
  (harvested in late August; ripens very quickly)
  The fruit is small cone-shaped to bulbous; the skin is thick and leathery, yellow-green in colour and covered in fine cinnamon-coloured rust from which small grey-white lenticels protrude. The stem is short and thick and at the end is widened and wedged into an oblique hollow. The calyx is on the surface, relatively large and open. The flesh is yellowish, juicy and when ripe tends to "go sleepy". It forms huge trees with healthy growth; they occur sporadically in cadastres of some villages. The fruit is suitable particularly for fermentation.
- **'Šídlenka'**
  (consumption ripeness in mid-August)
  The fruit is elongated and pear-shaped, mostly regular. The skin is light green, predominating is continuous bright green. When ripe the skin is yellow with no red splashes. The stem is exceptionally long and regularly bent awl-like. The calyx is large, open and sitting on the surface of the fruit. The flesh is white, juicy, very nice, sweetish and slightly reminiscent of nutmeg spice. It forms mighty trees with healthy growth; they grow in field orchards or as solitaires on balks and slopes.

DISCUSSION

Home orchards, related to farmsteads, alleys and lines of trees, formed the face of the cultural landscape. The trees were mostly local varieties of apples, pears, cherries, plums and a number of predominantly deciduous trees. This is what she discovered in the entire region which we monitored: Lomnice, Tišnov and Nedvědice (Jetmarová, 1998). Most of the local and regional varieties occurring in a number of localities came into being randomly, in accordance with the data of Paprštein (1997), and due to their high quality they spread around. These varieties ('Lecar', 'Šarlatka boračská', 'Kanefl' and others) were perfectly adapted to the climate conditions. They find their place in organic farming and breeding; besides, their irreplaceable role is in breeding programmes where they are used as original stock.

A number of authors (Řezníček, 2005; Tetera, 1994; Jetmarová, 1998 and Paprštein, 1997) emphasise that it is important to preserve these local and regional forms of fruit woody species in the Czech Republic. The recently changed soil ownership relations and priorities of agricultural production were the reasons why the old orchards and alleys of trees were liquidated.

The tradition of growing fruit trees in the Tišnov region was confirmed in reports (Vávra, 1957) saying that Borač and Tišnov were communities important not only in fruit production, but also in fruit processing. Vávra (1957) reported that in the period of 1950–1956 the Tišnov district won primacy in the state collection of apples – 2 594.71 t. This amount confirms that conditions for growing apples in the area are suitable. A number of other communities – Březina, Doubravník, Hradčany, Lomnice, Předklášteří, Pejškov, Úsuší and Železné did not keep in the background. In Lomnice, Podolí and other villages there are very old trees as we were informed by owners of these trees.

The variety composition of fruit species has undergone considerable changes and at the present time the following varieties can be found in the localities: 'Panenské české' ('Pomme des Vierges'), 'Blenheimská reneta' ('Blenheim Orange'), 'Kaselská reneta' ('Grosse Casseler Reinette'), 'Boikovo' ('Boiken'), 'Boskoopské' ('Belle de Boskoop'), 'Ribstonský jadernáč' ('Ribston Pippin'), 'Parména zlatá zimní' ('King of the Pippins'), 'Kardinál žíhaný' ('Geflammter Weisser Cardinal'), 'Gdánský hranáč' ('Danziger Kantapfel'), 'Croncelské' ('Transparente de Croncels') and 'Strýmka' ('Bohnapfel'). The most frequently occurring pear varieties are the following: 'Pastornice' ('Vicar of Wackfield'), 'Muškatelka šedá' ('Musqué Grise de Bohűeme'), 'Avranšská' ('Good Lewis Pear'), 'Clappova máslovka' ('Clapp's Favourite'), 'Charneuská' ('Fondante de Charneus'), 'Křivice' ('Clairgeau de Nantes') and 'Williamsova čáslavka' ('Bartlett').

According to the data of Rop *et al.* (2012), Paprštein *et al.* (1981), Decourtye and Latin (1969), and Luckwill (1970), many varieties from this group fail to meet the requirements of new technologies; storability (Harding, 1974) and disease resistance (Kohout, 1960; Dvořák and Vondráček, 1969; Dvořák *et al.*, 1976; Blažek, 1973).

An important area is the characteristics of the fruit – pomological parameters, particularly the external and internal properties. For the most part they comply with the demands for industrial processing. Other varieties can also be used for this purpose; those with small fruit but of high quality suitable for processing – making apple must. This group includes such varieties as 'Panenské české' ('Pomme des Vierges'), 'Šarlatka boračská', 'Lecar', 'Strýmka'

('Bohnapfel'), 'Míšeňské' ('Edelsborsdorfer'), 'Kanefl' and a number of others. In addition to the size of the fruit important are also other consumer aspects – appearance of the fruit with a focus on the colour, attractiveness and appealing shape. Apart from the external properties important are also the internal pomological characters, the flesh – its quality, colour, consistence etc.

An important character is resistance against bruising. In agreement with Paprštein, Blažek, Blažková (1981) we can include the varieties 'Panenské české' ('Pomme des Vierges'), 'Strýmka', 'Vilémovo' ('Kaiser Wilhelm') and other varieties into the group of highly resistant varieties.

Predominant characters of pomologically determined apple and pear varieties fully correspond with descriptions in pomology books (Boček, 1957; Vaněk, 1935, 1940, 1947; Dvořák *et al*., 1976). Most of the trees are tall trunk trees; half-standard trees are not so frequent. In terms of the rootstocks it is probably more the case of wild apple trees than of apple seedlings. In many plantings the height of the graft is still evident and is about 1.0 m. In most cases the trunks of these trees are undamaged and therefore they guarantee successful growing also in the years to come.

CONCLUSION

Growth properties of old varieties are affected by a number of factors; not only by the properties of the variety but also by the site conditions. The largest **volume of the crown** was monitored in trees of the variety 'Blenheimská reneta' ('Blenheim Orange') (276 m^3); very large volumes were seen also in trees of varieties 'Krasokvět žlutý' ('Yellow Bellflower') (253 m^3), 'Vilémovo' ('Kaiser Wilhelm') (248 m^3) and 'Panenské české' ('Pomme des Vierges') (207 m^3). The smallest volume was the volume of trees of the varieties 'Strýmka' ('Bohnapfel') (91 m^3), 'Baumannova reneta' ('Baumann's Reinette') (99 m^3) and 'Kardinál žíhaný' ('Geflammter Weisser Cardinal') (104 m^3). The **diameter of the tree trunk** was the largest in varieties 'Blenheimská reneta' ('Blenheim Orange') (0.375 m), 'Panenské české' ('Pomme des Vierges') (0.362 m) and 'Gdánský hranáč' ('Danziger Kantapfel') (0.361 m). The diameter of the tree trunk was the smallest in trees of the varieties 'Baumannova reneta' ('Baumann's Reinette') (0.252 m), 'Kardinál žíhaný' ('Geflammter Weisser Cardinal') (0.282 m), 'Matčino' ('Mother', 'Nonnetit') (0.293 m) and 'Strýmka' ('Bohnapfel') (0.293 m). The best score in the **overall health status** was achieved by trees of the varieties 'Smiřické vzácné' (7.4 points); 7 points were scored by the varieties 'Míšeňské' ('Edelsborsdorfer'), 'Krasokvět žlutý' ('Yellow Bellflower'), 'Jadernička moravská' and 'Vilémovo' ('Kaiser Wilhelm'). Trees of the variety 'Strýmka' ('Bohnapfel') showed the worst overall health status (5.4 points).

In terms of the **appearance** of the fruit the control variety 'Golden Delicious' had the best score (7.5 p); the next were varieties 'Vilémovo' ('Kaiser Wilhelm') (7.2 p), 'Blenheimská reneta' ('Blenheim Orange') (6.6 p) and 'Gdánský hranáč' ('Danziger Kantapfel') (6.6 p). The worst score in the appearance was monitored in the varieties 'Velník', 'Baumannova reneta' ('Baumann's Reinette') and 'Míšeňské' ('Edelsborsdorfer') (4.6 p; 4.8 p; and 5.0 p, respectively). The highest score in the **overall sum** was achieved by the control variety 'Golden Delicious' (43.3 p), followed by varieties 'Gdánský hranáč' ('Danziger Kantapfel') (39.6 p), 'Krasokvět žlutý' ('Yellow Bellflower') (39.4 p), 'Matčino' ('Mother', 'Nonnetit') (38.2 p) and 'Vilémovo' ('Kaiser Wilhelm') (38.2 p). The lowest scores were achieved by fruit of varieties 'Baumannova reneta' ('Baumann's Reinette') (30.6 p), 'Velník' (31.8 p), 'Stražínek' (32.6 p) and 'Lecar' (32.8 p).

The largest **volume of the crown** of pear trees ($p = 0.05$) was monitored in trees of the varieties 'Charneuská' ('Fondante de Charneus') (133 m^3) and 'Muškatelka šedá' ('Musqué Grise de Bohűeme') (131 m^3). Trees of the varieties 'Křivice' ('Clairgeau de Nantes') and 'Williamsova čáslavka' ('Bartlett') had the smallest volume of the crown (36 m^3 and 79 m^3, respectively). The largest **diameter of the tree trunk** was monitored in trees of varieties 'Clappova máslovka' ('Clapp's Favourite') (0.329 m) and 'Mechelenská' ('Joséphine de Malines') (0.330 m). The diameter of the tree trunk was the smallest in varieties 'Křivice' ('Clairgeau de Nantes') (0.256 m), 'Děkanka Robertova' ('Doyenné de Comice') (0.265 m) and 'Williamsova čáslavka' ('Bartlett') (0.268 m). The best **overall health status** was discovered in trees of varieties 'Williamsova čáslavka' ('Bartlett') (7.8 points) and 'Clappova máslovka' ('Clapp's Favourite') (7.2 p). The health status of trees of varieties 'Děkanka Robertova' ('Doyenné de Comice'), 'Křivice' ('Clairgeau de Nantes') and 'Muškatelka šedá' ('Musqué Grise de Bohűeme') was worse (6.0 p; 6.2 p; and 6.3 p).

Similarly as apple trees, the old varieties of pears grown on seedy rootstocks grow to a very old age. The pear variety 'Václavka' in the town Zvole was over 200 years old; the variety 'Neznámka' in Žernůvka was 195 years old; the variety 'Knížatka' in Sejřek was 120 years old; the age of the variety 'Ovesnička' in Lomnička was 100 years. The apple variety 'Velník' in Křížovice was 200 years old; the variety 'Kanefl' was 150 years old; the variety 'Stražínek' 180 years; the variety 'Šarlatka boračská' in Borač was 90 years old.

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Contact information

Libor Dokoupil: libor.dokoupil@mendelu.cz