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Sampling experience in a cherry plantation

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Summary: Experiments in a cherry plantation were performed to find out that samples taken from various parts of the foliage of the tree what extent represent the whole tree. One tree from three different cherry varieties was selected. In the selection, we tried to form a good representation of the foliage of the orchard. 8 sampling locations were designated on each tree, in two different heights and four different directions according to the points of the compass. We measured the main sizes of the fruits in three orthogonal dimensions with a digital slide gauge with an accuracy of 0.01 mm; the mass of each cherry by an analytical balance, with an accuracy of 0.001 g; the mass of the stones with the same analytical balance, and then calculated the stone-pulp ratio. The measured and calculated data are used to characterize the sample in question.

Keywords: sampling, sampling location, orientation, physical properties

Introduction

Experiments in a cherry plantation were performed to find out that samples taken from various parts of the foliage of the tree what extent represent the whole tree. One tree from the ***Linda***, ***Germersdorfi*** and ***Stella*** varieties were selected for the tests. The selection of trees tried to form a good representation of the foliage of the orchard. 8 sampling locations were designated in two different heights and four different directions according to the points of the compass.

The samples were marked as follows:

1. Lower North (L/N);
2. Upper North (U/N);
3. Lower West (L/W);
4. Upper West (U/W);
5. Lower South (L/S);
6. Upper South (U/S);
7. Lower East (L/E);
8. Upper East (U/E).

The samples, which were identified by the date, were taken in 3 stages of the maturation.

15–15 fruits were selected from each sample, taking the rules of sampling from a set into consideration. Consequently, the characteristics of $3 \times 3 \times 8 \times 15 = 1080$ pieces of fruit were measured.

The following data were recorded:

1. the main sizes of the fruit in three orthogonal dimensions with a digital slide gauge with an accuracy of 0.01 mm;
2. the mass of each sweet cherry by an analytical balance, with an accuracy of 0.001 g;
3. the mass of the stones with the same analytical balance;
4. The samples, for subsequent image processing, were photographed together *(Fig. 1)* and separately *(Fig. 2)*. Photos taken from the ***Germersdorfi*** variety are given here.

Fig. 1: Samples of Germersdorfi from 8 different sampling locations

Fig. 2: The sample marked as (U/W)

From the measured data we determined the following characteristics of the fruits for each sampling points:

- the smallest and largest values of the size;
- the average value of the size;
- the standard deviation of the size;
- the average mass of the fruit;
- the average mass of the stone;
- the average stone-pulp ratio.

The deviations found between the sampling locations were compared.

Results

The fruit sizes has been identified that the *height* was determined as the size parallel with the stem, i.e. the long axis (y coordinate); perpendicularly to that, the *width* was measured at the largest diameter (x coordinate); and perpendicularly to that, the *thickness* (z coordinate).

The maximum and the minimum size, the average value and standard deviation of these three sizes were determined for each sample.

Width

The values of the widths of the samples, taken from two different heights and four different directions, for three varieties of cherry are given in *Table 1*. Whereas other studies

Table 1: The values of the widths of the samples

Linda							
			North	West	South	East	Diff.
14 June	Lower	Min.	20,80	21,16	21,16	23,61	
		Max.	24,67	25,63	25,21	25,43	
		Mean	23,58	**23,30**	23,99	24,57	5%
		Std. dev.	1,21	1,27	0,81	0,55	
	Upper	Min.	22,50	21,36	22,73	21,53	
		Max.	25,67	26,23	24,53	25,31	
		Mean	24,28	**24,30**	23,78	**23,68**	3%
		Std. dev.	0,94	1,30	0,47	1,04	
		Diff.(L;U)	3%	4%	1%	4%	
17 June	Lower	Min.	22,83	24,54	23,69	24,26	
		Max.	27,96	27,05	28,14	28,76	
		Mean	**25,24**	25,52	25,28	**26,36**	4%
		Std. dev.	1,50	0,70	1,17	1,28	
	Upper	Min.	22,83	25,02	22,42	23,15	
		Max.	27,21	28,44	26,06	26,97	
		Mean	25,05	**26,12**	**24,86**	25,10	5%
		Std. dev.	1,13	1,00	0,79	0,84	
		Diff.(L;U)	1%	2%	2%	5%	
21 June	Lower	Min.	25,52	23,42	22,60	24,29	
		Max.	29,28	29,81	28,03	28,89	
		Mean	**27,91**	26,68	**25,46**	27,12	10%
		Std. dev.	0,98	1,63	1,56	1,20	
	Upper	Min.	24,30	24,20	20,68	23,61	
		Max.	27,86	28,20	25,68	28,32	
		Mean	26,44	**26,50**	**23,45**	25,57	13%
		Std. dev.	1,16	1,21	1,32	1,18	
		Diff.(L;U)	6%	1%	9%	6%	

Germersdorfi							
			North	West	South	East	Diff.
14 June	Lower	Min.	22,21	21,78	21,75	20,37	
		Max.	25,48	26,39	25,96	25,70	
		Mean	23,51	23,84	**23,95**	**23,46**	2%
		Std. dev.	0,86	1,24	1,30	1,51	
	Upper	Min.	21,54	22,17	21,19	22,45	
		Max.	24,68	26,41	25,64	26,85	
		Mean	**23,14**	**24,74**	23,98	24,40	7%
		Std. dev.	1,03	1,03	1,41	1,33	
		Diff.(L;U)	2%	4%	0%	4%	
17 June	Lower	Min.	23,59	23,09	23,94	22,14	
		Max.	27,02	26,02	27,60	25,99	
		Mean	**25,58**	24,69	25,23	**24,55**	4%
		Std. dev.	0,92	0,88	1,07	0,99	
	Upper	Min.	22,73	23,44	23,14	23,33	
		Max.	26,37	28,45	26,60	26,09	
		Mean	25,15	**25,19**	25,08	**24,44**	3%
		Std. dev.	1,03	1,26	0,89	0,80	
		Diff.(L;U)	2%	2%	1%	0%	
21 June	Lower	Min.	24,64	22,21	24,97	21,76	
		Max.	29,42	28,00	28,88	27,38	
		Mean	26,08	**24,72**	**27,00**	24,95	9%
		Std. dev.	1,30	1,61	1,13	1,65	
	Upper	Min.	22,64	22,60	23,77	22,64	
		Max.	27,34	28,35	27,80	28,11	
		Mean	25,73	25,83	**26,02**	**25,26**	3%
		Std. dev.	1,43	1,40	0,98	1,30	
		Diff.(L;U)	1%	5%	4%	1%	

Stella							
			North	West	South	East	Diff.
14 June	Lower	Min.	20,04	19,22	19,15	19,66	
		Max.	22,79	22,11	23,35	23,43	
		Mean	21,45	**21,01**	**21,79**	21,32	4%
		Std. dev.	0,85	0,70	1,03	1,19	
	Upper	Min.	19,64	19,92	19,36	17,04	
		Max.	23,24	23,06	22,68	21,45	
		Mean	**21,98**	21,26	21,04	**19,91**	10%
		Std. dev.	0,99	0,95	0,99	1,20	
		Diff.(L;U)	2%	1%	4%	7%	
17 June	Lower	Min.	20,81	21,16	21,31	20,61	
		Max.	24,92	24,16	23,22	23,81	
		Mean	**22,32**	22,54	22,35	**22,66**	2%
		Std. dev.	1,24	0,97	0,65	0,94	
	Upper	Min.	19,13	19,96	19,92	20,39	
		Max.	22,07	23,58	22,33	23,44	
		Mean	**20,38**	**21,72**	21,02	21,27	7%
		Std. dev.	0,78	0,98	0,70	0,83	
		Diff.(L;U)	10%	4%	6%	7%	
21 June	Lower	Min.	22,38	19,66	21,29	21,75	
		Max.	27,37	23,67	23,98	24,37	
		Mean	**24,73**	**21,58**	22,86	23,17	15%
		Std. dev.	1,75	1,01	0,82	0,83	
	Upper	Min.	20,56	20,37	19,41	20,35	
		Max.	24,26	23,49	23,62	24,00	
		Mean	22,19	22,10	**22,05**	**22,23**	1%
		Std. dev.	1,07	0,86	1,06	1,15	
		Diff.(L;U)	11%	2%	4%	4%	

attribute a significant role to the diameter of the cherries (here *width*), so the size of the widths of the three size-related results are presented. According to the data, shown in the table, it can be generally concluded, that there is a substantial difference in sizes of samples taken from different heights and different directions.

Analysing the certain varieties, the differences of the average widths of ***Linda*** varied between 3–13% in the function of orientation. The maximum deviation was measured at the last sampling time, i.e. when the cherries were ripe. The differences of the average widths varied between 1–9% when the lower and upper sampling locations were compared.

The changes can be seen clearly in *Fig. 3,* considering the sampling time, the orientation and the height of the foliage. This figure consists of three parts, and shows the values of widths for ***Linda*** in three sampling dates. During the assessment of the diagrams it must be taken into account that the sizes, generated in each part of the figure, are different, so the reference to the same values is essential. It can be easily followed with the help of the dimensioning and the given values. It is important to stress this, because disregarding this, from the illustrations it might seem as if the size of the fruit would have been greater at the earlier dates of sampling.

However, taking into account the actual dimensions of the width, the change of the size of the width illustrates the parallel increase of the fruit with the maturation, and also that this increase may be different for each orientation.

In the case of ***Germersdorfi*** the differences of the average widths varied between 3–13% in the function of orientation. The maximum deviation was measured at the last sampling time, i.e. when the cherries were ripe. The differences of the average widths varied between 0–5% when the lower and upper sampling locations were compared.

The changes can be seen clearly in *Fig. 4,* considering the sampling time, the orientation and the height of the foliage.

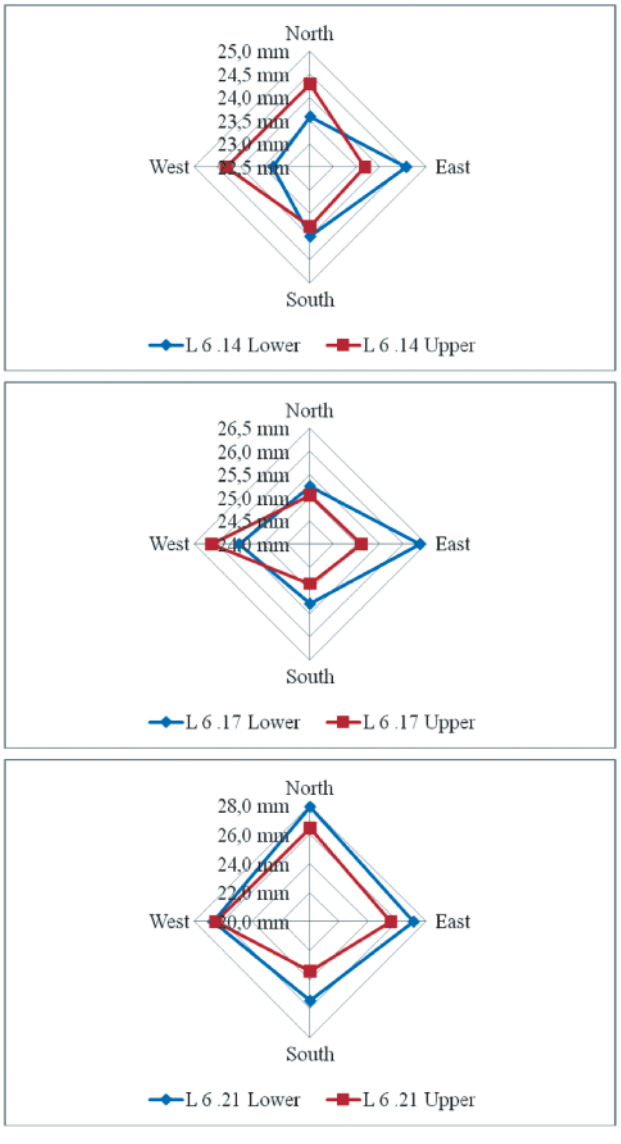

Fig. 3: The width in the function of time, orientation and height in the case of *Linda* [mm]

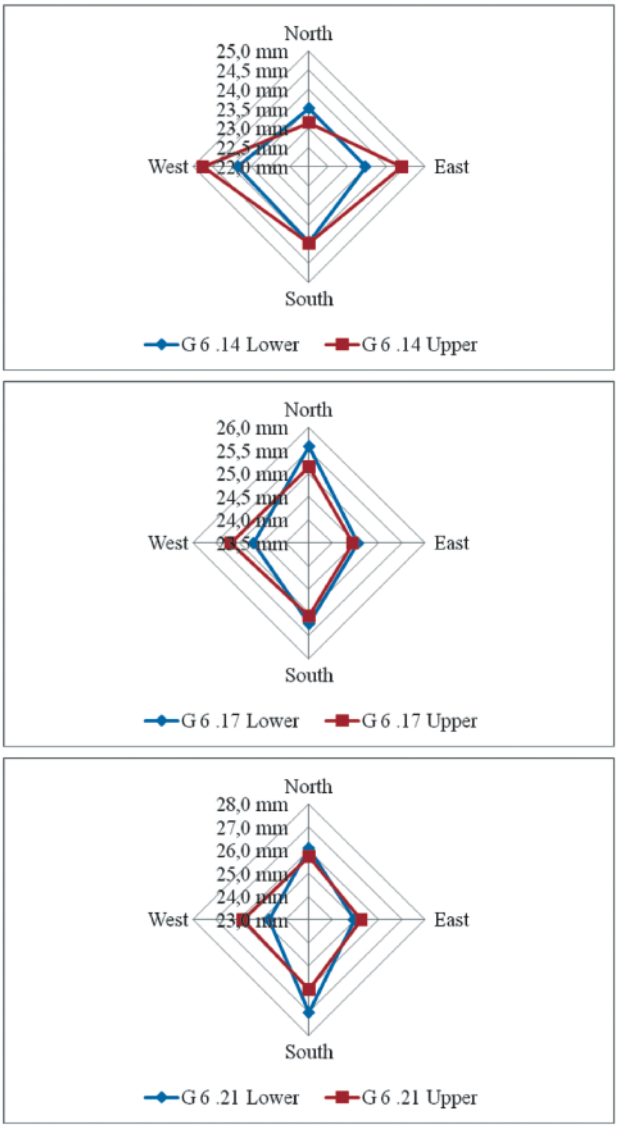

Fig. 4: The width in the function of time, orientation and height in the case of *Germersdorfi* [mm]

This figure consists of three parts, too, and shows the values of widths for *Germersdorfi* in three sampling dates.

In the case of ***Stella*** the differences of the average widths varied between 2–15% in the function of orientation. The maximum deviation was measured at the last sampling time, i.e. when the cherries were ripe. The differences of the average widths varied between 1–11% when the lower and upper sampling locations were compared.

The changes can be seen clearly in *Fig. 5*, considering the sampling time, the orientation and the height of the foliage. This figure also consists of three parts, and shows the values of widths for ***Stella*** in three sampling dates.

Individual fruit mass

The values for the individual fruit mass for the three varieties of cherry are given in *Table 2*. The samples were collected from two different heights and four different directions according to the points of the compass.

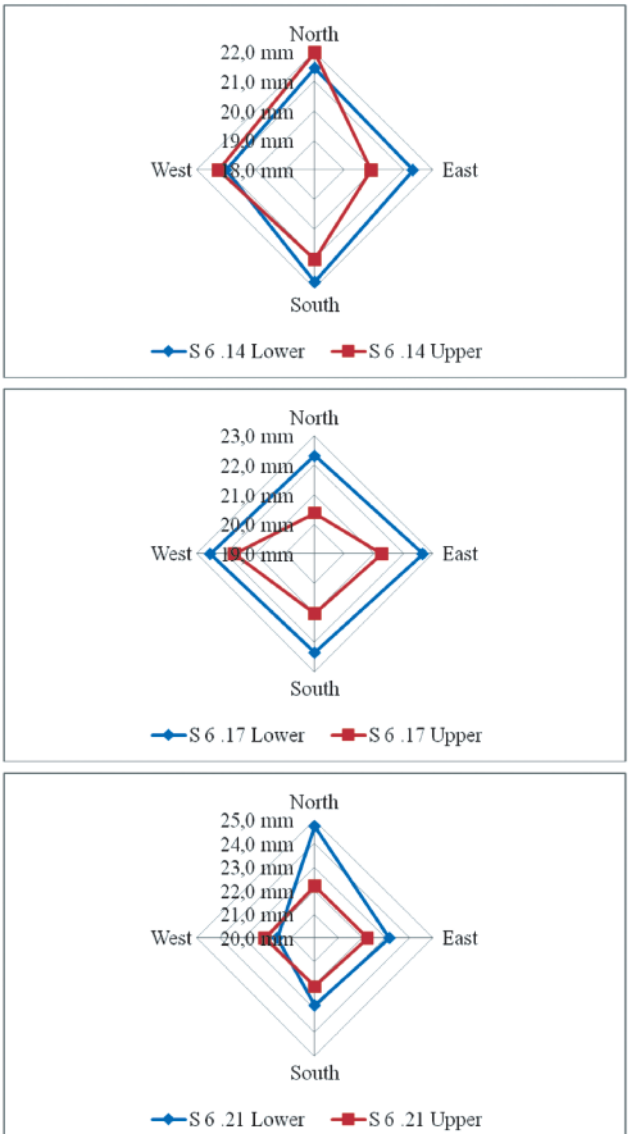

Fig. 5: The width in the function of time, orientation and height in the case of *Stella* [mm]

Table 2: The values for the individual fruit mass

Linda							
			North	West	South	East	Diff.
14 June	Lower	Min.	5,19	5,13	5,13	6,61	
		Max.	7,56	8,47	7,87	8,19	
		Mean	6,60	**6,32**	7,07	**7,44**	18%
		Std. dev.	0,70	0,89	0,59	0,51	
	Upper	Min.	6,02	5,31	5,95	5,39	
		Max.	8,26	9,00	7,62	8,30	
		Mean	7,22	**7,24**	7,03	**6,95**	4%
		Std. dev.	0,69	0,99	0,44	0,84	
		Diff.(L;U)	9%	15%	1%	7%	
17 June	Lower	Min.	6,29	7,06	6,31	7,63	
		Max.	9,91	9,24	10,80	10,59	
		Mean	**7,76**	8,01	8,12	**8,85**	14%
		Std. dev.	1,15	0,61	1,12	0,89	
	Upper	Min.	6,41	7,63	6,49	6,89	
		Max.	9,27	10,43	9,04	9,18	
		Mean	7,86	**8,73**	**7,81**	7,90	12%
		Std. dev.	0,70	0,89	0,59	0,60	
		Diff.(L;U)	1%	9%	4%	12%	
21 June	Lower	Min.	8,29	6,47	6,18	7,26	
		Max.	11,72	12,13	10,52	11,72	
		Mean	**10,25**	9,15	**8,22**	9,84	25%
		Std. dev.	0,92	1,51	1,23	1,08	
	Upper	Min.	7,70	7,75	5,10	7,58	
		Max.	10,58	11,29	8,29	10,65	
		Mean	9,38	**9,48**	**6,70**	8,57	42%
		Std. dev.	0,93	1,07	0,94	0,78	
		Diff.(L;U)	9%	4%	23%	15%	
Germersdorfi							
			North	West	South	East	Diff.
14 June	Lower	Min.	5,74	6,03	5,63	4,87	
		Max.	7,92	8,38	8,54	8,22	
		Mean	6,64	6,91	**7,01**	**6,49**	8%
		Std. dev.	0,68	0,76	0,91	1,02	
	Upper	Min.	5,18	5,39	5,34	6,35	
		Max.	8,12	8,52	8,03	9,02	
		Mean	**6,59**	**7,38**	7,05	7,37	12%
		Std. dev.	0,88	0,75	0,89	0,86	
		Diff.(L;U)	1%	7%	1%	14%	
17 June	Lower	Min.	6,67	6,50	6,94	6,01	
		Max.	9,75	8,67	8,97	9,42	
		Mean	**8,35**	**7,63**	8,03	7,70	9%
		Std. dev.	0,90	0,71	0,63	0,83	
	Upper	Min.	6,20	6,69	3,97	6,46	
		Max.	9,14	9,70	8,62	8,57	
		Mean	**8,17**	8,09	7,53	**7,32**	12%
		Std. dev.	0,74	0,90	1,23	0,64	
		Diff.(L;U)	2%	6%	7%	5%	
21 June	Lower	Min.	7,34	5,75	7,94	5,43	
		Max.	10,96	10,69	11,58	10,41	
		Mean	8,92	**7,78**	**9,66**	7,91	24%
		Std. dev.	1,12	1,32	0,98	1,45	
	Upper	Min.	5,71	6,25	6,56	5,83	
		Max.	10,91	10,85	10,46	11,41	
		Mean	8,80	8,73	**9,06**	**8,53**	6%
		Std. dev.	1,35	1,11	0,98	1,35	
		Diff.(L;U)	1%	12%	7%	8%	

Stella							
			North	West	South	East	Diff.
14 June	Lower	Min.	4,59	4,35	4,21	4,28	
		Max.	6,49	6,02	6,95	7,42	
		Mean	5,69	**5,41**	**6,16**	5,93	14%
		Std. dev.	0,56	0,50	0,73	0,86	
	Upper	Min.	5,32	4,49	4,43	3,74	
		Max.	8,08	7,23	6,71	5,60	
		Mean	**6,74**	5,61	5,67	**4,72**	43%
		Std. dev.	0,79	0,82	0,71	0,54	
		Diff.(L;U)	18%	4%	9%	26%	
17 June	Lower	Min.	5,33	5,32	6,36	5,62	
		Max.	8,31	8,16	7,89	7,99	
		Mean	**6,50**	6,74	**7,01**	6,88	8%
		Std. dev.	0,89	0,91	0,48	0,76	
	Upper	Min.	4,34	5,10	4,75	5,34	
		Max.	6,68	7,58	6,72	7,42	
		Mean	**5,27**	**6,25**	5,85	5,99	19%
		Std. dev.	0,66	0,72	0,58	0,63	
		Diff.(L;U)	23%	8%	20%	15%	
21 June	Lower	Min.	6,31	5,13	6,03	5,95	
		Max.	10,35	7,42	8,77	8,75	
		Mean	**8,53**	**5,98**	7,21	7,37	43%
		Std. dev.	1,28	0,64	0,72	0,67	
	Upper	Min.	5,21	4,77	4,91	5,06	
		Max.	9,05	8,18	7,89	7,81	
		Mean	**6,80**	**6,56**	6,73	6,65	4%
		Std. dev.	0,99	0,88	0,78	0,88	
		Diff.(L;U)	26%	10%	7%	11%	

According to the data, shown in the table, it can be generally concluded, that there is a substantial difference in the values of mass of samples taken from different heights and different directions.

Analysing the certain varieties, the differences of the average mass of ***Linda*** varied between 4–42% in the function of orientation. The maximum deviation was measured at the last sampling time, i.e. when the cherries were ripe. The differences of the average mass varied between 1–23% when the lower and upper sampling locations were compared.

The changes can be seen clearly in *Fig. 6,* considering the sampling time, the orientation and the height of the foliage. This figure consists of three parts, and shows the values of mass for ***Linda*** in three sampling dates.

In the case of ***Germersdorfi*** the differences of the average mass varied between 6–24% in the function of orientation. The maximum deviation was measured at the last sampling time, i.e. when the cherries were ripe. The differences of the average mass varied between 1–14% when the lower and upper sampling locations were compared.

The changes can be seen clearly in *Fig. 7*, considering the sampling time, the orientation and the height of the foliage. This figure also consists of three parts, and shows the values of mass for ***Germersdorfi*** in three sampling dates.

In the case of ***Stella*** the differences of the average mass varied between 4–43% in the function of orientation. The maximum deviation was measured at the last sampling time, i.e. when the cherries were ripe. The differences of the

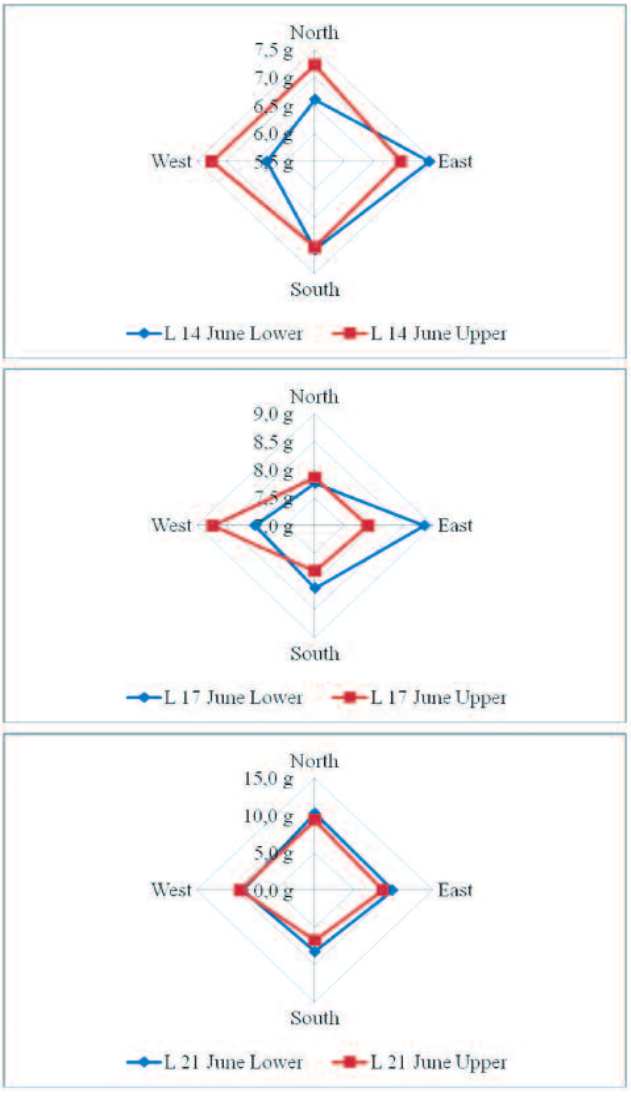

Fig. 6: The mass in the function of time, orientation and height In the case of *Linda* [g]

average mass varied between 4–26% when the lower and upper sampling locations were compared.

The changes can be followed in *Fig. 8,* considering the sampling time, the orientation and the height of the foliage. This figure also consists of three parts, and shows the values of mass for ***Stella*** in three sampling dates.

Stone mass

In order to determine the stone-pulp ratio, we have to measure the stone mass of the ripe cherries. These samples were collected on 21 June.

The values of the stone mass of the samples, taken from two different heights and four different directions, for three varieties of cherry are given in *Table 3.*

According to the data, shown in the table, it can be generally concluded, that there is some difference in the values of stone mass of samples taken from different heights and different directions.

Analysing the certain varieties, the differences of the average stone mass of ***Linda*** varied between 14–25% in the

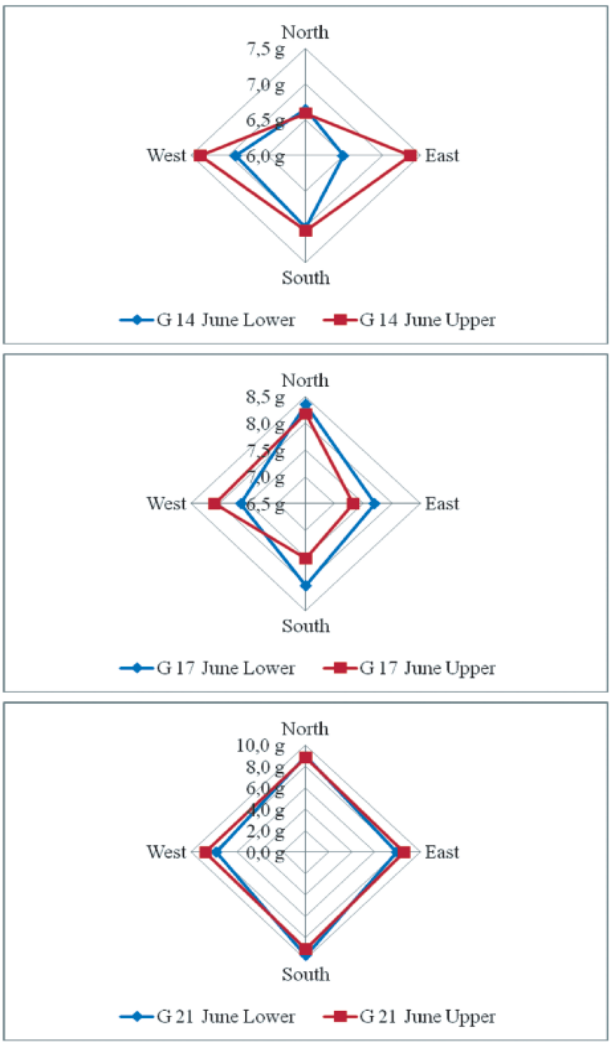

Fig. 7: The mass in the function of time, orientation and height in the case of *Germersdorfi* [g]

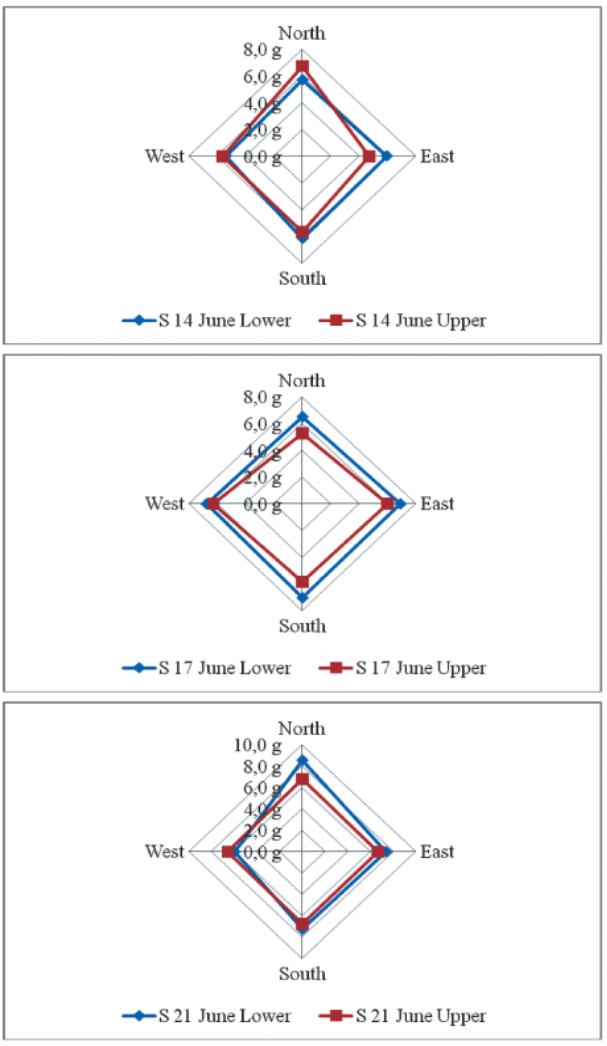

Fig. 8: The mass in the function of time, orientation and height in the case of *Stella* [g]

function of orientation. The differences of the average stone mass varied between 4–12% when the lower and upper sampling locations were compared.

The changes can be seen clearly in *Fig. 9*, considering the orientation and the height of the foliage, and make it possible to analyse the changes of the stone mass.

In the case of ***Germersdorfi*** the differences of the average stone mass varied between 6–13% in the function of orientation. The differences of the average stone mass varied between 1–15% when the lower and upper sampling locations were compared.

The changes can be seen clearly in *Fig. 10,* considering the orientation and the height of the foliage, and make it possible to analyse the changes of the stone mass.

In the case of ***Stella*** the differences of the average stone mass varied between 16-30% in the function of orientation. The differences of the average stone mass varied between 3-14% when the lower and upper sampling locations were compared.

Fig. 11 shows the changes of stone mass, considering the changes of foliage height and orientation, and makes it possible to analyse the changes of the stone mass.

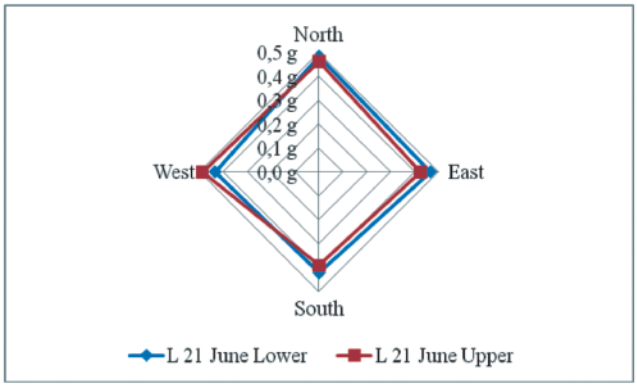

Fig. 9: Stone mass in the function of orientation and height in the case of *Linda* [g]

Stone-pulp ratio

The values of the stone-pulp ratio of the samples, taken from two different heights and four different directions, for three varieties of cherry are given in *Table 4.*

In general it can be concluded that the average values of

Table 3: The values of the stone mass

Linda							
			North	West	South	East	Diff.
21 June	Lower	Min.	0,36	0,32	0,36	0,39	
		Max.	0,58	0,51	0,47	0,52	
		Mean	0,48	0,43	0,42	0,47	14%
		Std. dev.	0,06	0,06	0,03	0,04	
	Upper	Min.	0,37	0,36	0,31	0,33	
		Max.	0,50	0,57	0,45	0,49	
		Mean	0,46	0,49	0,39	0,42	25%
		Std. dev.	0,03	0,05	0,05	0,04	
		Diff.(L;U)	4%	12%	8%	10%	
Germersdorfi							
			North	West	South	East	Diff.
21 June	Lower	Min.	0,32	0,28	0,32	0,31	
		Max.	0,43	0,42	0,47	0,44	
		Mean	0,38	0,35	0,39	0,37	13%
		Std. dev.	0,03	0,04	0,05	0,03	
	Upper	Min.	0,32	0,34	0,35	0,28	
		Max.	0,44	0,49	0,45	0,45	
		Mean	0,38	0,40	0,39	0,37	6%
		Std. dev.	0,03	0,05	0,03	0,05	
		Diff.(L;U)	1%	15%	0%	2%	
Stella							
			North	West	South	East	Diff.
21 June	Lower	Min.	0,32	0,30	0,30	0,26	
		Max.	0,51	0,44	0,52	0,49	
		Mean	0,40	0,36	0,41	0,36	16%
		Std. dev.	0,05	0,04	0,05	0,05	
	Upper	Min.	0,37	0,30	0,29	0,23	
		Max.	0,49	0,44	0,43	0,38	
		Mean	0,41	0,38	0,36	0,32	30%
		Std. dev.	0,04	0,04	0,03	0,05	
		Diff.(L;U)	4%	3%	14%	12%	

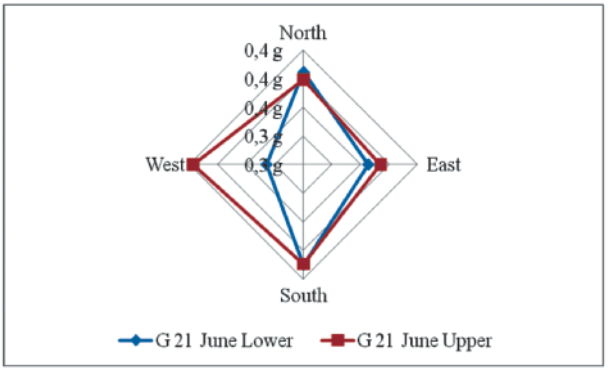

Fig. 10: Stone mass in the function of orientation and height in the case of *Germersdorfi* [g]

stone-pulp ratio of the samples are different in different heights and directions according to the points of the compass.

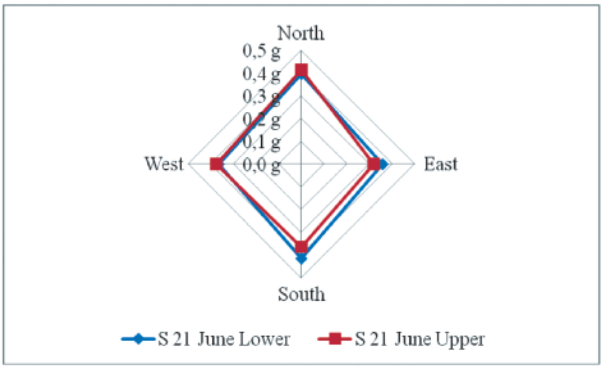

Fig. 11: Stone mass in the function of orientation and height in the case of *Stella* [g]

Analysing the certain varieties, the differences of the average stone-pulp ratio of ***Linda*** varied between 11–20% in the function of orientation. The differences of the average stone mass varied between 4–14% when the lower and upper sampling locations were compared.

These differences can be seen clearly in *Fig. 12,* considering the orientation and the height of the foliage.

Table 4: The values of the stone-pulp ratio

Linda							
			North	West	South	East	Diff.
21 June	Lower	Min.	3,60	4,39	4,58	3,96	
		Max.	6,06	6,16	7,29	5,99	
		Mean	**4,97**	5,02	**5,52**	5,01	11%
		Std. dev.	0,70	0,51	0,83	0,55	
	Upper	Min.	4,11	4,63	5,14	4,35	
		Max.	6,35	6,59	9,44	6,13	
		Mean	5,24	5,46	**6,28**	**5,22**	20%
		Std. dev.	0,64	0,58	1,05	0,47	
		Diff.(L;U)	5%	9%	14%	4%	
Germersdorfi							
			North	West	South	East	Diff.
21 June	Lower	Min.	3,33	3,79	3,61	4,10	
		Max.	5,61	5,72	4,83	6,89	
		Mean	4,57	4,74	**4,21**	**4,97**	18%
		Std. dev.	0,65	0,71	0,34	0,83	
	Upper	Min.	3,61	3,88	3,99	3,59	
		Max.	6,34	6,16	5,64	5,67	
		Mean	4,61	**4,82**	**4,53**	4,66	7%
		Std. dev.	0,81	0,67	0,42	0,64	
		Diff.(L;U)	1%	2%	7%	7%	
Stella							
			North	West	South	East	Diff.
21 June	Lower	Min.	4,09	4,95	4,10	3,67	
		Max.	6,50	8,38	6,95	7,46	
		Mean	**4,93**	**6,55**	6,10	5,13	33%
		Std. dev.	0,61	0,88	0,70	0,89	
	Upper	Min.	4,87	5,28	4,83	4,01	
		Max.	9,68	6,96	8,63	6,30	
		Mean	**6,60**	6,11	5,80	**5,05**	31%
		Std. dev.	1,27	0,59	0,99	0,62	
		Diff.(L;U)	34%	7%	5%	2%	

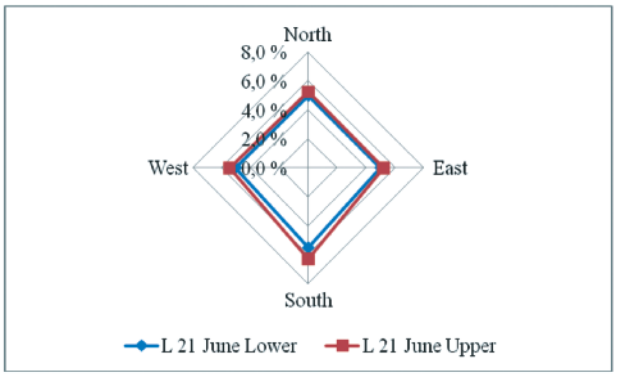

Fig. 12: Stone-pulp ratio in the function of orientation and height in the case of *Linda* [%]

In the case of ***Germersdorfi*** the differences of the average stone-pulp ratio varied between 7–18% in the function of orientation. The differences of the average stone-pulp ratio varied between 1–7% when the lower and upper sampling locations were compared *(Fig. 13).*

In the case of ***Stella*** the differences of the average stone-pulp ratio varied between 31–33% in the function of orientation. The differences of the average stone-pulp ratio varied between 2–34% when the lower and upper sampling locations were compared *(Fig. 14).*

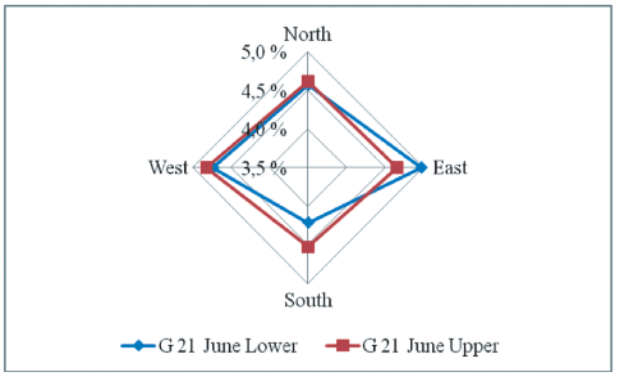

Fig. 13: Stone-pulp ratio in the function of orientation and height in the case of *Germersdorfi* [%]

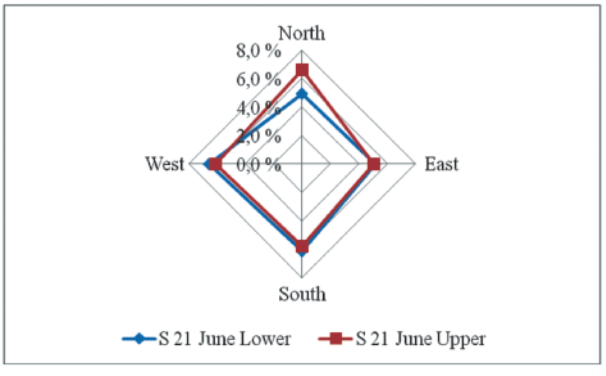

Fig. 14: Stone-pulp ratio in the function of orientation and height in the case of *Stella* [%]

Conclusions

1. There are differences in the size of cherries sampled from different directions according to the points of the compass. The differences are sometimes close to 20%.
2. There are also differences in the size of cherries sampled from different heights of the foliage. The differences are sometimes close to 15%.
3. The differences are greater when samples taken from different orientations of the foliage were examined, than samples from different height.
4. There are differences in the individual mass of the cherries sampled from different directions according to the points of the compass. The differences are sometimes greater than 40%.
5. There are also differences in the individual mass of cherries sampled from different heights of the foliage. The differences are greater than 25%.
6. The differences in individual mass are greater when samples taken from different orientations of the foliage were examined, than samples from different height.
7. The stone-pulp ratio of cherries sampled from different orientations is different; the differences are sometimes greater than 30%.
8. There are also differences when the samples were collected from different height of the foliage. These differences can be over 30%.
9. There are not significant differences when samples taken from different orientations of the foliage were examined, than samples from different height.
10. Overall, therefore, it can be concluded that a representative sample in a cherry orchard can only be obtained if the samples are collected from different orientations and heights of the foliage.

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