Studies on the Varietal Differences and Yearly Deviation of Mesocarp Cell Numbers and Lengths and Fruit Weight among Commercial Peach [*Prunus persica* (L.) Batsch] Cultivars and Selections, Wild Types, and Their Hybrids

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Summary

The relationships among fruit weight, mesocarp cell number, cell length, and fruit development period for the commercial cultivars and selections, wild type peaches, and hybrid peaches were investigated to clarify the anatomical factors involved in fruit size. Fruit weights varied widely with cultivar, ranging from very small wild type peaches of 20 to 80 g to commercial peaches of 60 to 300 g. There were wide variations in cell numbers among cultivars and selections; wild type peaches were characterized by the small cell numbers of the mesocarp. Hybrids between commercial and wild type peaches showed intermediate fruit sizes and mesocarp cell numbers of their parents. These results revealed that the correlation coefficients between cell number and fruit weight of commercial cultivars and selections were highly significant, $r = 0.812$ in 1993, 0.805 in 1994, and 0.728 in 1995, whereas that for all cultivars and selections combined were also highly significant. However, correlation coefficients between cell length and fruit weight were not significant in commercial cultivars and selections, $r = 0.264$ in 1994 and 0.319 in 1995, whereas those for all cultivars and selections combined were $r = 0.564$ in 1994 and 0.679 in 1995. The yearly correlation coefficients between cell number, and cell length versus fruit weight were $r = 0.886$, 0.919 , and 0.543 in the commercial peaches and 0.925 , 0.888 , and 0.672 , in all cultivars and selections combined, respectively. These results revealed that the number of mesocarp cells determines the size of fruit and is relatively stable, whereas, the length of mesocarp cells is not closely related to the weight of peaches as it fluctuates greatly.

Key Words: cell number, cell length, fruit size, *Prunus persica*.

Introduction

In Japan, large peach fruit are favored so that peach prices are affected by fruit sizes. Peach growers aim to produce fruit as large as possible by using cultivars having the potential to produce big fruit and by controlling the number of fruit by flower and fruit thinning. Large fruit size, ripening period, fruit quality, and ease of cultivation are sought by growers. Hence, the selection of promising parents and hybrid seedlings is essential in an efficient peach breeding program.

Most peach cultivars grown in Japan today were developed from cultivars that had been introduced from China, Europe, and USA after the Meiji Period 1870's, however, there are also edible cultivars and flowering peaches developed during the Edo Period (1609–1867). These native and flowering peaches produce small fruit of 10 to 100 g and are rather wild compared to the recent commercial cultivars (Kikuchi, 1949); therefore, they

are called 'wild type peach' hereinafter. The commercial cultivars produce fruit smaller than 100 g as well as some over 500 g. Recently, crosses between commercial cultivars and dwarf or weeping peaches were made to obtain new cultivars with large fruit, and low stature. The causes of such differences in fruit size should be fully understood for efficient breeding of large fruit cultivars.

Peaches and other stone fruits are known to show a characteristic double sigmoid growth curve consisting of Stage I during which a fruit develops after flowering, Stage II when the fruit growth is stagnant, and Stage III when the fruit grows and ripens (Blake, 1925; Davis, 1933; Tukey and Young, 1938). Various studies which have been conducted on fruit growth at each stage (Masia et al., 1992; Lillien-Kipnis and Lavee, 1971; Scorza, 1991), show that the final size of mature peach fruit is determined by the number and size of mesocarp cells and intercellular spaces (Coombe, 1976; Gage and Stutte, 1991).

However, basis for the differences in fruit sizes among cultivars have been somewhat neglected. In a

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previous study (Yamaguchi et al., 2002), we found that the duration of mesocarp cell division differed with cultivar leading to the difference in mesocarp cell number and, therefore, in fruit weight. It was explained that a wild type peach 'Ohatsumomo' produces very small fruit because it has a significantly slower cell division rate than the commercial cultivars, and the cell length of mature fruit is also small.

In this study, the relationship between the number and size of mesocarp cells was investigated in commercial peach cultivars and selections; wild types including flowering and native peaches in Japan, and some hybrids between commercial cultivars and wild types. The results obtained will be useful for analyses on inheritance of fruit size, selection of parent cultivars, and breeding to introduce the weeping or dwarf characteristics from ornamental peaches to commercial cultivars.

Materials and Methods

The investigation was conducted from 1993 through 1995. All trees were planted in Chiyoda Farm, National Institute of Fruit Tree Science, National Agricultural Research Organization (NARO).

In 1993, the differences in fruit weights, fruit ripening periods and mesocarp cell numbers in 24 commercial cultivars and selections, eight wild type peaches consisting the five Japanese native peaches, two weeping flowering peaches and one dwarf peach, and 13 hybrids between commercial and wild type peaches (Table 1) were studied. And the relationship between these indices and ripening period was analyzed.

The number of mesocarp cells was determined for each cultivar by sampling fruit in early June, more than 6 weeks after full bloom for all cultivars and selections, when the stones started to harden and the cell division of mesocarp had finished. The fruit were cut along the equator and the cross sections photographed under a microscope. A line from the stone to the epidermis was drawn on the photograph, and the cell lengths along the line (radial cell length: RCL) measured (Fig. 1). The flesh thickness was calculated by subtracting the stone thickness from the fruit thickness, and the mesocarp cell

Fig. 1. Fruit size measurements and direction of cell length measurement. Flesh (mesocarp) thickness: (fruit thickness)–(stone thickness), cell number: flesh thickness/mean radial cell length (FT/mRCL).

number was obtained from the ratio of flesh (mesocarp) thickness/mean radial cell length (FT/mRCL). The mature fruit of cultivars and selections were harvested and weighed. Fruit development periods were expressed as the number of days from full bloom date to harvest.

In 1994 and 1995, fruit weights, fruit thickness, and stone thickness in 19 commercial cultivars, three native peach cultivars, two flowering peaches, and three hybrids of dwarf and commercial cultivars (Table 2) were determined. The young fruit were sampled from the end of May to the beginning of June, when the mesocarp cell division ceased and stone hardening started. The final cell number (FT/mRCL), fruit weight and thicknesses of fruit and stone in mature fruit were measured to determine the mean radial cell length (mean RCL). The radial cell length of mature fruit was determined by dividing the flesh thickness (fruit thickness minus stone thickness) by the cell number determined in young fruit as in 1993.

The trees were grown under customary Japanese field management. Fruit thinning for all cultivars and selections except wild type peaches were done in mid-May. Five average sized mature and young fruit from each tree were sampled for measurements every year. Radial cell length was measured twice for each fruit. The data of flesh cell numbers (FT/mRCL), radial cell lengths (RCL) and fruit weights obtained in 1994 and 1995 were used to calculate correlation coefficients between years or cultivars. The relationships among the indices are discussed.

Results

The average full bloom in 1993 was April 10. The fruit development periods varied widely among commercial cultivars and selections; it was 66 days after full bloom (DAF) in a very early-ripening selection '171-9', and 136 days in the late-ripening 'Akizora'. The ripening periods of early-ripening 'Saotome', 'Chiyohime', 'Sunagowase', and 'Kurakatawase' were 74, 81, 79, and 93 DAF, respectively. Mid-season ripening peaches 'Hakuho' and 'Akatsuki' ripened in 99 and 109 DAF, respectively. Late-season ripening cultivars 'Hakuto' and 'Yuzora' matured in 129 and 134 DAF, respectively. The days that the peaches needed to ripen were as previously reported (Yamaguchi et al., 1984).

Wild type peaches took longer period to ripen than the commercial cultivars. 'Ohatsumomo' was the latest. It matured in 160 DAF. Hybrids between weeping and dwarf peaches with commercial cultivars showed large individual variations, ripening between 81 and over 150 DAF.

The weights of mature fruit also showed wide variations. Most commercial cultivars produced large fruit, but 'Nyubai', 'Wasemomoyama', '171-9', and 'Robin' produced fruit smaller than 100 g. Flowering peaches and Japanese native peaches produced fruit of 20 to 55 g, which were significantly smaller than the commercial

Table 1. Fruit ripening periods, cell numbers (FT/mRCL) and fruit weight of commercial peach cultivars, wild type peaches and their hybrids in 1993.

Cultivars	Fruit development period (DAF) ^z	Cell number (FT/mRCL) ^y	Fruit weight (g)
Commercial cultivars and selections			
Wasemomoyama	73	121.9	74
171-9	66	150.4	70
Robin	87	160.0	91
Saotome	74	161.9	109
Nyubai	79	164.6	66
Takeihakuho	77	185.8	118
Chiyohime	81	188.1	163
Chiyomaru	79	190.4	157
Yoshihime	106	199.0	220
Hakushu	119	201.6	242
Yuzora	134	207.8	238
Akizora	136	208.7	232
Akatsuki	109	210.8	160
Kurakatawase	93	221.3	213
Hakuto	129	225.0	215
Masahime	107	225.0	240
Sunagowase	79	234.2	212
Kawanakajimahakuto	123	235.7	276
Hakuho	99	236.7	211
Shimizuhakuto	110	248.3	235
Okubo	112	248.8	218
Chinesecling	134	253.8	200
Nakatsuhakuto	118	276.5	251
Nunomewase	75	289.3	227
Wild type			
Japanese native peaches			
Ohatsumomo	160	163.1	27
Akita-2	139	174.0	17
Noto-5	139	183.7	34
Noto-6	137	194.9	45
Naganoyaseito wase	119	180.5	33
Flowering (weeping type) peaches			
Zansetsushidare	139	168.8	55
Genpeishidare	139	180.9	35
Flowering (dwarf type) peach			
Juseito pink single	151	163.1	31
Hybrids ^x			
Offsprings of commercial cultivars and weeping peaches			
G-29-2	109	215.0	196
G-44-2	136	229.8	183
G-45-1	-	212.6	90
G-45-4	118	187.7	117
G-51-5	151	196.2	191
G-51-6	149	181.9	200
G-53-2	81	179.0	125
G-53-3	82	201.0	163
G-55-1	84	183.5	105
Offsprings of commercial cultivars and dwarf peach			
Silver Prolific	135	214.3	60
120-2	153	213.2	190
123-6	114	218.8	181
188-1	112	163.1	27

^z The numbers of days from April 1 to the harvest date.^y The ratio of flesh thickness/mean radial cell length (FT/mRCL).^x The cross combinations of hybrids are as follow. G-29-2 : Zansetsushidare × Akatsuki, G-44-2 : self-pollination of (Zansetsushidare × Akatsuki)-1, G-45-1, 2 : Open pollination of G-29-2, G-51-5, 6 : Open pollination of [(Shiroshidare × Saotome)-5]-1 × Akatsuki, G-55-1- : [Open pollination of (Shiroshidare × Saotome)-5]-4 × Akatsuki, Silver Prolific : (Late Le Grand × Flory Dwarf) F₂, 120-2 : Silver Prolific × [(Koyohakutou × Nunomewase)-2 × Silver Prolific]-1, 188-1 : [(Koyohakuto × Nunomewase)-2 × Silver Prolific]-1 × Silver Prolific × [(Koyohakutou × Nunomewase)-2 × Silver Prolific]-1.

peaches. 'G-29-2', which is an F_1 seedling of 'Zansetsushidare' $\times$ 'Akatsuki', produced fruit that were as large as 196 g. Selfed selections of 'Zansetsushidare' and 'Akatsuki', e.g., 'G-44-2' and 'G-45-1' produced fruit that weighed 90 to 180 g, which were larger than the fruit of 'Zansetsushidare'.

Cultivar differences also occurred in mesocarp cell numbers. Of the commercial cultivars, 'Wasemomoyama', only had 121.9, whereas 'Nunomewase', the

largest, had 289.3. The wild type peaches ranged from 160 to 190. Hybrids of the commercial cultivars and the wild type peaches had 180 to 230 cells, more than their weeping or dwarf parents.

When the mesocarp cell number was plotted against fruit weight (Fig. 2), the commercial cultivars and selections are distributed widely from the bottom left to the top right; the wild type peaches concentrated at the bottom left. The wild type peaches produce small fruit that contain significantly fewer mesocarp cells than most commercial cultivars. The F_1 hybrids and selfed offsprings of 'Zansetsushidare' and 'Akatsuki', and F_1 of 'Shiroshidare' and 'Saotome' with 'Akatsuki', hybrids of 'Silver prolific' and the commercial cultivar, and their progenies had larger mesocarp cell numbers than did the wild type peach cultivars, such as 'Zansetsushidare', 'Juseito pink single', and 'Ohatsumomo'.

The correlation coefficient between mesocarp cell number and fruit weight was $r = 0.706$ for all cultivars and selections combined; it was 0.812 for commercial cultivars and selections. Both were significantly positive which show that mesocarp cell number strongly influences fruit weight.

The correlation coefficient between the fruit devel-

Fig. 2. Distribution of commercial cultivars, wild type peaches and their hybrids by cell number (FT/mRCL) and fruit weight, 1993.

Fig. 3. Correlation between fruit development period and fruit weight of peach cultivars and selections. A: all cultivars and selections combined, B: commercial cultivars and selections. Fruit development periods: days after full bloom (DAF).

Fig. 4. Correlation between fruit development period and cell numbers (FT/mRCL) of peach cultivars and selections. A: all cultivars and selections combined. B: commercial cultivars selections. Fruit development periods: days after full bloom (DAF).

opment period and fruit weight for all the cultivars combined was $r = 0.034$ or insignificant, but that for the commercial cultivars and selections was significantly positive, $r = 0.707$. Thus, the results of correlation analysis showed that the earlier the ripening, the smaller the fruit among commercial cultivars (Fig. 3).

The correlation coefficient between fruit development period and mesocarp cell number of $r = 0.070$ reveal that

the factors are unrelated for all cultivars and selections, whereas it was significant for the commercial cultivars and selections, $r = 0.487$ (Fig. 4). The early-ripening cultivars tend to produce small numbers of mesocarp cells. However, some cultivars deviated from the regression line, such as an early-ripening 'Nunomewase' which has many mesocarp cells; the mid-season ripening 'Yoshihime' and 'Masahime' contained small

Table 2. Cell numbers (FT/mRCL), radial cell length (RCL) and fruit weight of commercial peach cultivars, wild type peaches and their hybrids measured in 1994 and 1995.

Cultivar	1994			1995		
	Cell number ^z	Cell length ^y (μm)	Fruit weight (g)	Cell number ^z	Cell length ^y (μm)	Fruit weight (g)
Commercial cultivars and selections						
Saotome	147.9 ± 9.6 ^x	305.8	120	171.4 ± 8.5 ^x	227.7	112
Robin	153.5 ± 11.2	251.5	90	161.8 ± 12.0	213.8	86
Matsumoriwase	160.1 ± 10.2	301.7	124	186.7 ± 9.8	246.2	130
Nyubai	162.9 ± 8.5	194.0	75	169.8 ± 7.3	172.8	67
203-34	179.7 ± 15.7	188.1	60	160.1 ± 10.7	289.5	119
Yoshihime	196.4 ± 8.6	292.3	209	186.5 ± 7.2	310.2	233
Masahime	193.4 ± 8.0	263.7	175	212.2 ± 11.8	256.2	207
Chiyohime	196.8 ± 7.3	225.1	141	203.1 ± 9.8	211.5	150
Chiyomaru	197.2 ± 11.4	240.8	136	229.4 ± 13.1	199.4	144
Hakushu	206.2 ± 10.1	278.2	205	223.8 ± 9.9	270.1	273
Yuzora	224.7 ± 13.3	272.4	246	236.9 ± 10.5	241.2	215
Hakuho	226.4 ± 13.1	280.5	274	213.7 ± 8.2	275.2	247
Akizora	236.6 ± 8.2	262.1	235	241.4 ± 6.4	256.1	303
Hakuto	242.2 ± 18.2	275.4	304	260.3 ± 10.4	230.1	236
Akatsuki	242.9 ± 10.8	231.4	205	227.2 ± 6.6	242.5	225
Okubo	263.7 ± 12.3	220.3	266	245.3 ± 11.8	235.0	260
Nunomewase	265.4 ± 5.2	190.0	173	284.7 ± 12.1	171.8	184
Kawanakajimahakuto	267.3 ± 7.2	240.1	269	292.7 ± 14.5	193.0	251
Chinesecling	272.8 ± 7.6	202.7	247	292.1 ± 9.9	187.2	245
Wild type						
Japanese native peaches						
Akita-2	150.7 ± 10.0	174.7	30	169.5 ± 11.4	165.9	77
Ohatsumomo	156.8 ± 8.9	163.4	30	172.5 ± 8.0	115.2	20
Noto-5	165.1 ± 15.6	153.9	34	181.7 ± 11.5	97.1	24
Flowering (weeping type) peach						
Zansetsushidare	154.9 ± 7.1	235.7	76	161.5 ± 12.5	186.1	63
Flowering (dwarf type) peach						
Juseitou pink single	148.2 ± 5.7	246.1	83	157.6 ± 8.9	141.9	35
Hybrids (Offsprings of commercial cultivar and dwarf peach) ^w						
Silver prolific	198.4 ± 11.6	138.9	49	178.5 ± 13.7	168.7	73
120-2	188.9 ± 11.7	260.8	150	205.4 ± 10.5	237.2	185
123-6	205.7 ± 13.5	-	-	227.6 ± 9.5	-	-

^z Cell number was calculated by (ratio of flesh thickness) / (mean radial cell length) in young fruits.

^y Cell length of mature fruits was calculated as (flesh thickness of matured fruit) / (cell number of young fruit).

^x Confidence intervals at $P=0.95$.

^w The cross combinations of hybrids are as follows. Silver Prolific : (Late Le Grand × Flory Dwarf) F₂, 120-2 : Silver Prolific × [(Koyohakutou × Nunomewase)-2 × Silver Prolific] - 1, 123-6 : Open pollination of [(Koyohakutou × Nunomewase)-2 × Silver Prolific] - 1.

Table 3. Correlation coefficient (r) among cell number (FT/mRCL), radial cell length (RCL) and fruit weight.
Upper : r values of all cultivars and selections combined, lower : those of commercial cultivars and selections, for two years measurements in 1994 and 1995.

	Cell length ^y in 1994	Fruit weight in 1994	Cell number ^z in 1995	Cell length ^y in 1995	Fruit weight in 1995
Cell number ^z 1994	0.020 ^{ns} (-0.354) ^{ns}	0.805** (0.769)**	0.888** (0.919)**	0.243 ^{ns} (0.225) ^{ns}	0.794** (0.747)**
Cell length ^y 1994		0.564** (0.264) ^{ns}	-0.078 ^{ns} (-0.040) ^{ns}	0.672** (0.543)*	0.515** (0.217) ^{ns}
Fruit weight 1994			0.742** (0.735)**	0.547** (0.117) ^{ns}	0.925** (0.886)**
Cell number ^z 1995				0.073 ^{ns} (-0.416) ^{ns}	0.728** (0.667)**
Cell length ^y 1995					0.679** (0.319) ^{ns}

^z Cell number : ratio of flesh thickness/mean radial cell length.

^y Cell length : mean radial cell length.

^{ns}, *, ** Nonsignificant or significant at $P=0.05$, 0.01 , respectively.

numbers of mesocarp cells. Thus, no close relationship between the fruit development period and cell number exists.

The mesocarp cell numbers, radial cell lengths, and fruit weights in 1994 and 1995 are shown in Table 2.

The result in 1994 showed varietal differences in fruit weight, from 60 g of very early-ripening '203-34' to over 300 g of 'Hakuto'. Differences in 1995 ranged from 67 g of the smallest 'Nyubai' to 303 g of the largest 'Akizora.' In both years, the wild type peaches produced small fruit of 20 to 80 g. The correlation coefficient between 1994 and 1995 in fruit weights was $r = 0.9254$ for all the cultivars and selections and 0.886 for the commercial cultivars.

The mesocarp cell numbers also differed with cultivar ranging from 150 to 270 in 1994 and 160 to 290 in 1995. The correlation coefficient between these years was $r = 0.888$ for all the cultivars and selections combined; it was 0.919 for the commercial cultivars and selections. These significant r values demonstrate that the relationship is stable.

The radial cell lengths showed wide variations. The difference was especially notable in the commercial cultivars and selections, which ranged from 170 μm to 300 μm . 'Juseito Pink Single' and 'Akita-2' had RCL of 246 and 236 μm in 1994, whereas that of the wild type peaches ranged from 100 to 170 μm . The data clearly show that the latter were smaller than the commercial cultivars and selections. The yearly correlation in radial cell length was $r = 0.672$ for all the cultivars and selections combined, which was significantly positive, but it was only 0.543 for the commercial cultivars and selections. Thus, RCL of the commercial peaches are less constant than their cell numbers and

fruit weights.

The correlation coefficients between cell number and fruit weight, and between radial cell length and fruit weight of the commercial peaches which were $r = 0.805$ and 0.564 in 1994 and $r = 0.728$ and 0.697 in 1995 respectively, are significantly positive. The correlation coefficients of all cultivars and selections combined were $r = 0.769$ and 0.264 in 1994 and $r = 0.667$ and 0.319 in 1995. Hence, there was no clear relationship between mean radial cell length and fruit weight (Table 3).

The correlation coefficients between mesocarp thickness and fruit weight were $r = 0.974$ in 1994 and $r = 0.970$ in 1995 and significantly positive.

Discussion

A peach fruit is composed of the lignified stone, pit or endocarp, the seed inside it, mesocarp, and the exocarp. The number and size of mesocarp cells are some factors that determine the size of a mature fruit. The flesh (mesocarp) thickness along the equator was measured to represent fruit size, and the relationship between fruit weight and the number and size of mesocarp cells was investigated. Therefore, the number of mesocarp cells is the number of cells from the stone to the skin at the equatorial or cheek diameter of a peach fruit; the size of the mesocarp cell is the mean cell length from the stone to the skin. The product of the two elements corresponds to the flesh thickness. The flesh thickness of a peach fruit reflects the volume and weight of the fruit (Gage, 1991). There is a very high, significant correlation coefficient between flesh thickness and fruit weight, so that the flesh thickness used in our analyses is an effective means of expressing fruit size.

The differences among cultivars in mesocarp cell numbers as well as in fruit weight were confirmed. The significant positive correlation coefficient between them indicates that fruit weight is a function of the number of mesocarp cells. Although there were differences among cultivars, the commercial peaches as a whole had more mesocarp cells than had the wild type peaches; those of the weeping and dwarf hybrids and their progenies were intermediate, suggesting that mesocarp cell number is a quantitative character. The yearly correlation coefficients of mesocarp cell numbers were higher than those of cell length, suggesting that the former is a better index for predicting fruit weight than the latter.

Of the two elements that determine the size of a peach fruit, cell number is likely the more fundamental and influencing factor than cell length in the commercial cultivars. Scorza (1991), who estimated the number of mesocarp cells along the fruit equator for large and small peach cultivars, recorded that large peach cultivars contained several times more cells than small ones. Yamaguchi et al. (2002) found that there are differences of cell division cessation periods and cell division rates among several peach cultivars and that these differences affected the final mesocarp cell numbers and fruit size.

The time and degree of flower and fruit thinning are known to affect the size of peaches and other fruit (Davis, 1933; Dorsey and McMunn, 1926). Grossman and DeJong (1995a, b), who investigated the effects of fruit thinning on fruit growth, reported that fruit thinning during the flowering period produced the largest fruit and that the inhibition of fruit growth was due to non- or late- fruit thinning and was attributable to insufficient photosynthates. This source-limited growth was observed 4.5 weeks after flowering in early-ripening cultivars and 3.5 to 12 weeks and 18 to 20 weeks after flowering in late-ripening cultivars. According to Yamaguchi et al. (2002), these periods correspond to the period after the cessation of cell division for the early-ripening cultivars and overlap with the cell division period of late-ripening cultivars by 2 to 3 weeks. Therefore, insufficient photosynthates is most likely is a factor in the inhibition of mesocarp enlargement which explains our discovery of stability of mesocarp cell number but not of cell length with respect to fruit weight.

Among factors that determine the size of a fruit, the number of mesocarp cells is the stable index, whereas cell length is not. However, the contribution of cell number in fruit size is only 53 to 65%, and the differences in cell numbers alone cannot explain the differences in fruit size. The number of cells also varied by year, and besides genetic factors, those such as flower

bud sizes, healthiness of leaves in the previous autumn, amount of reserve food in the trunk and roots, etc. affect cell numbers. The wild type peaches consistently produce fruit with a few, small cells, indicating that their sizes are not only the result of fruit numbers and climatic conditions but also heredity.

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モモ栽培品種、野生タイプおよびその交雑個体の果実重、中果皮細胞数および
細胞径の品種間差異と年次変動について

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摘 要

栽培モモ、野生タイプおよびこれらの交雑個体について、果実重と中果皮細胞の数および大きさ、成熟期等との関係を検討した。果実重は野生タイプで極めて小さく20~80 g、栽培品種・系統では60~300 gと品種による差が大きかった。また、細胞数、細胞径にも品種による大きな差異が認められた。野生タイプは小さな細胞数を示すことで特徴づけられた。栽培品種と枝垂れ性またはわい性花モモ品種との雑種およびその後代系統は両親の中間的な数値を示した。これらの結果から、中果皮細胞数は量的形質であると推定された。栽培品種・系統の中果皮細胞数と果実重の相関係数は、1993年には $r=0.812$ 、1994年には0.805、1995年には0.728と高い有意な値を示した。しかし、中果皮細胞径と果実重の相関は、栽培品種系統では1994年に0.264、1995年に0.319と低く、関係は明瞭ではなかった。全ての品種・系統について中果皮細胞

数と果実重、および細胞径と果実重の相関を求めると、その係数は高くなり、細胞径と果実重の間にも有意な相関が認められた。栽培品種・系統の成熟期と果実重、細胞数との間では、有意ではあるが比較的低い正の相関が認められた。供試品種・系統全体で果実重、細胞数、細胞径について年次間の相関をみると、それぞれに $r=0.925$ 、0.888、0.672の値が得られたが、栽培品種・系統に限定するとこれらの相関は $r=0.886$ 、0.919、0.543と細胞径の相関係数が他の2つの係数に較べて低くなった。これらの結果から、果肉の細胞数が品種毎の果実の大きさに大きな影響を及ぼし、その値も比較的安定していること、これに対して細胞の大きさは果実重には大きな影響を及ぼすものの変動が大きく、不安定であることが明らかになった。