

## TRANSMISSION OF THE SHELLING PERCENTAGE TRAIT TO HYBRID DESCENDANTS OF ALMONDS

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### **Abstract**

*The shelling percentage involves two major genes, D – dominant – hard shell and d – recessive – soft shell. It was determined that hard shelled genotypes are homozygous DD, whereas soft shelled ones are heterozygous dd. Dd heterozygotes generally create soft shelled hybrids.*

**Key words:** hybrid, genotype, shelling percentage.

### **INTRODUCTION**

Before starting the crossing procedures, a study was conducted regarding the germplasm resources, in order to choose potential genitors depending on the traits that were to be transmitted to descendants (Șcheau V., 1998),(Branîște N. et al., 2006),(Șcheau V. et al., 2006),(Șcheau V., 1990),(Șcheau V. et al., 1996),(Șcheau V. et al., 1994),(Șcheau V., 1989),(Șcheau V., 1987).

A complex study of 10 traits was performed in two hybrid lots with 1274 and 647 individuals, in order to establish the manner in which these traits are inherited by the hybrid descendants (Gîtea M. et al., 2010),(Gîtea M. et al., 2010),(Șcheau Al. et al., 2010),(Șcheau Al. et al., 2010),(Gîtea M. et al., 2004),(Șcheau V. et al., 2002),(Șcheau V., 2002),(Șcheau V., 1992),(Șcheau V. et al., 2001),(Șcheau V., 2001),(Șcheau V., 2001).

Shelling percentage has a direct influence on the production of kernel per ha.

### **MATERIAL AND METHOD**

The hybrids were obtained in 2004 at SCDP Oradea and the research was carried out in the year 4 and 7 from planting. The material consists of 326 almond hybrids from two hybrid series, namely Texas and Primorski, used as maternal genitors.

Shelling percentage was monitored for each individual, per hybrid families, starting with year IV and until year VI. The average of genitors and hybrids, the standard deviation and the coefficient of variability were calculated, and the resulting data were processed through the method of variance analysis.

## RESULTS AND DISCUSSIONS

Table 1 presents the shelling percentages for almond genotypes and hybrids.

Table 1

Shelling percentage (% kernel) in almond genotypes and hybrids  
(average values for 3 years)

Nr. Crt.	Hybrid crossing	No. of analyzed hybrids (items)	Genitors' average (% kernel)	Hybrids' average (% kernel)	Standard deviation (s)	Coefficient of variability (s%)	Hybrid limits (% kernel)	Hybrids with higher shelling percentage than genitors (%)
1	Texas x Amestec Polen	58	44.47	46.90	12.5	26.6	20.3 - 71.9	75.86
2	Texas x Nikitski 62	19	45.40	43.28	8.3	19.6	25.3 - 52.8	47.37
3	Texas x H1/9-1fa	43	43.00	36.27	8.4	23.1	20.7 - 58.8	13.95
4	Texas x Mari de Stepa	43	31.65	30.65	6.5	20.2	19.9 - 55.2	30.23
5	Texas x Preanai	25	45.30	49.82	11.5	23.0	33.3 - 70.5	88.00
6	Texas x Tetenyi Botermo	4	43.90	47.63	9.5	19.9	30.2 - 60.0	50.00
7	Texas x Saucaret	12	38.90	45.88	11.2	24.4	30.0 - 69.4	75.00
8	Primorski x Texas	21	33.65	37.34	7.6	20.4	22.8 - 58.2	38.09
9	Primorski x Saucaret	17	34.15	38.80	10.2	26.3	20.5 - 64.2	58.82
10	Primorski x Mari de Stepa	32	26.90	53.80	14.5	26.9	21.5 - 75.0	78.12
11	Primorski x Tetenyi Botermo	52	39.15	38.34	10.0	26.1	18.9 - 62.5	44.23
	Average (Mt.)	-	38.77	42.61	-	-	-	-

Regarding the series of crossings with the Texas cultivar, four of the combinations, namely Texas x Pollen Mixture, Texas x Preanâi, Texas x Tétényi bötermő and Texas x Saucaret, the averages of the hybrids are higher than those of the genitors.

As to the Primorski series of crossings, except for the Primorski x Tétényi bötermő combination, the other three reveal higher averages for hybrids than for genitors.

The standard deviation for the Texas series of crossings shows values ranging from 6.5 for Texas x Preanâi to 12.5 for Texas x Pollen Mixture, whereas in the case of the Primorski series the values range between 7.6 for Primorski x Texas and 14.5 for Primorski x Mari de stepă.

Except for the Texas x Nikitski 62 and Texas x Tétényi bőtermő crossings, which had hybrids classified as variable within medium limits, all the other combinations have a coefficient of variability ranging between 20.2 for Texas x Mari de stepă and 26.9 for Primorski x Mari de stepă, that is to say the hybrids are very variable within admissible limits.

Hybrids with a higher shelling percentage than their genitors can be found especially in the case of Texas x Pollen mixture with 75.86%, Texas x Preanâi with 88%, Texas x Saucaret with 75% and Primorski x Mari de stepă with 78.12%.

Table 2 presents the comparative results regarding the shelling percentage of almond genotypes and hybrids.

*Table 2*

Comparative results regarding shelling percentage in almond genotypes and hybrids  
(average values for 3 years)

Nr. Crt.	Hybrid combination	X genitors		±d (%)	Significance	X hybrids		±d (%)	Significance
		% kernel	%			% kernel	%		
1	Texas x Amestec Polen	44.47	114.7	+5.70	xx	46.90	110.1	+4.29	-
2	Texas x Nikitski 62	45.40	117.1	+6.63	xx	43.28	101.6	+0.67	-
3	Texas x H1/9-1fa	43.00	110.9	+4.23	-	36.27	85.1	-6.34	oo
4	Texas x Mari de Stepă	31.65	81.64	-7.12	oo	30.65	71.9	-11.96	ooo
5	Texas x Preanai	45.30	116.8	+6.53	xx	49.82	116.9	+7.21	xx
6	Texas x Tetenyi Botermo	43.90	113.2	+5.13	X	47.63	111.8	+5.02	x
7	Texas x Saucaret	38.90	100.3	+0.13	-	45.88	107.7	+3.27	-
8	Primorski x Texas	33.65	86.8	-5.12	o	37.34	87.7	-5.27	o
9	Primorski x Saucaret	34.15	88.1	-4.62	o	38.80	91.1	-3.81	-
10	Primorski x Mari de Stepă	26.90	69.4	-11.87	ooo	53.80	126.3	+11.19	xxx
11	Primorski x Tetenyi Botermo	39.15	101.0	+0.38	-	38.34	90.0	-4.27	-
12	Average (Mt.)	38.77	100.0	0.0	-	42.61	100.0	0.0	-

LSD<sub>5%</sub> = 4.26

LSD<sub>5%</sub> = 4.69

LSD<sub>1%</sub> = 5.60

LSD<sub>1%</sub> = 6.16

LSD<sub>0,1%</sub> = 7.18

LSD<sub>0,1%</sub> = 7.90

Regarding the Texas series of crossings, the Texas x Tétényi bőtermő combination is statistically positive and significant, Texas x Pollen Mixture, Texas x Nikitski 62 and Texas x Preanâi are positive, while Texas x Mari de stepă is negative, distinctly significant regarding the averages of genitors.

As to the series of crossings with the Primorski cultivar, the Primorski x Texas and Primorski x Saucaret combinations are negative and significant, whereas Primorski x Mari de stepă is negative and very significant.

Regarding the averages of the hybrids, the following are negative: Primorski x Texas - significant, Texas x H 1/9-1 fa - distinctly significant and Texas x Mari de stepă - very significant. The following were positive: Texas x Tétényi bőtermő – significant, Texas x Preanâi – distinctly significant and Primorski x Mari de stepă – very significant.

Figure 1 presents the polynomial correlation between the genitors' average x the hybrids' average regarding shelling percentage, without taking into account the number of hybrids, with a coefficient  $r^2=0.4352^{***}$ , which is statistically very significant.

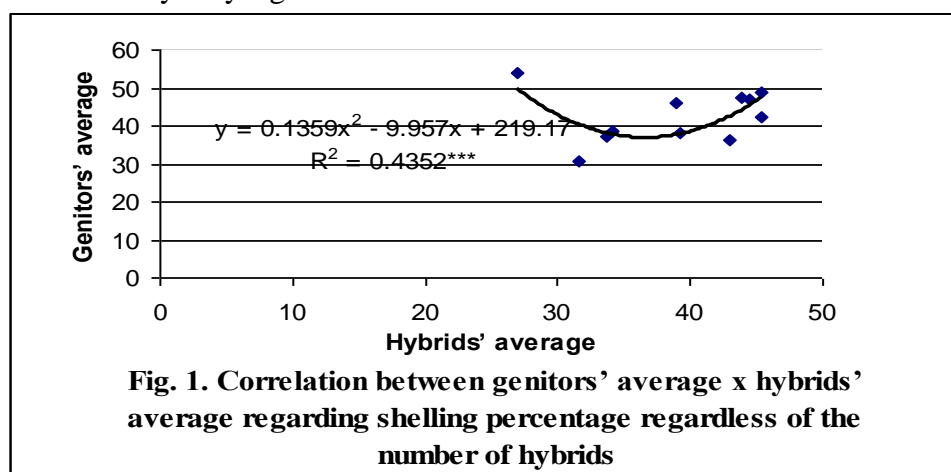
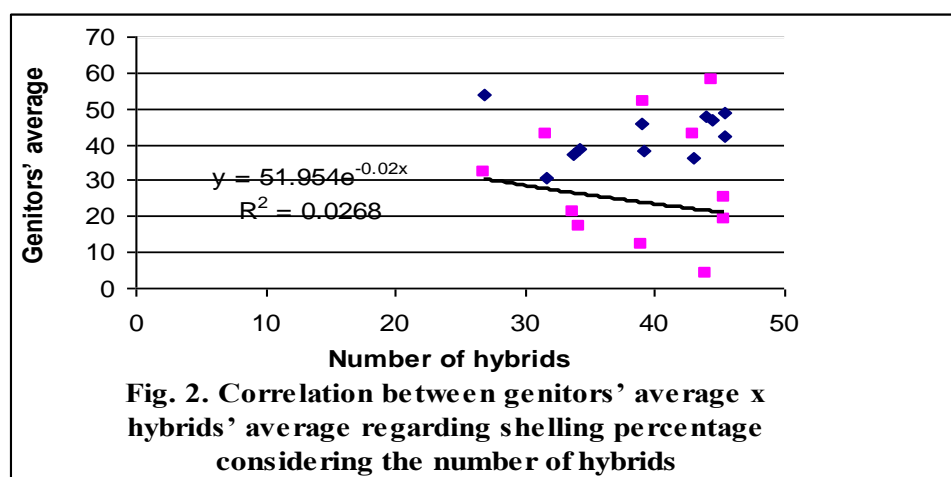


Figure 2 present the exponential correlation between the genitors' average x the hybrids' average, taking into account the number of hybrids, with a coefficient  $r^2=0.0268^{***}$ , which is not ensured statistically.



## CONCLUSIONS

All the crossings produced hybrids with higher shelling percentages than their genitors, but especially the Texas x Pollen Mixture combination with 75.86%, Texas x Preanâi with 88%, Texas x Saucaret with 75% and Primorski x Mari de stepă with 78.12%.

The shelling percentage involves two major genes, D – dominant – hard shell and d – recessive – soft shell. It was determined that hard shelled genotypes are homozygous DD, whereas soft shelled ones are heterozygous dd. Dd heterozygotes generally create soft shelled hybrids.

## REFERENCES

1. Braniste N., Madalina Butac, V. Cociu, V. Șcheau, Ioana Zaharia – Fondul de germoplasma la speciile pomicele de arbuști fructiferi și capsuni din colecțiile din România, - Migdal, Ed. Pamantul - Pitesti, ISBN (10) 973-8280-87-7; (13) 978-973-8280-87-8, pp 207-218; 318 pg. – 2006.
2. Gîtea M., Șcheau V., Laslo V., Bucurean Eva, Cărbunar M. - Transmiterea în descendență (F1, F2) a calității producției la migdal Fascicula Agricultură – Horticultură vol. X Anul 10 , Analele Universității din Oradea ,ISSN 1453-9470, pp 279–284 -2004.
3. Gîtea Manuel, Șcheau Viorel, Șcheau Alexandru - Transmission of fruit weight to hybrid descendants of almonds Analele Universității Oradea Fascicula Protecția Mediului, Vol XV Anul 15, 2010, ISSN.2064-3476(Ed.Română),ISSN.2065-3484(Ed. Engleză) (B+).
4. Gîtea Manuel, Șcheau Viorel, Șcheau Alexandru - Transmission of fruit abundance in July to hybrid descendants of almonds ,Analele Universității Oradea Fascicula Protecția Mediului, Vol XV Anul 15, 2010, ISSN.2064-3476(Ed.Română),ISSN.2065-3484(Ed. Engleză) (B+).
5. Roman R., N. Andrieș, N. Braniște, I. Botu, Reveca Balaci, Viorica Bălan, S. Budan, M. Coman, Liana Dumitru, I. Diaconu, I. Dușu, V. Ghidra, Antonia Ivașcu, D. Iftimie, Alexandra Indrieș, G. Mazilu, Gh. Mladin, Paulina Mladin, N. Orlae, Mariana Nicolescu, N. Popescu, Irina Popescu, L. Petre, P. Parnia, I. Roman, N. Stanciu, Ileana Stoian, T. Slamnoiu, V. Șcheau , L. Serboiu, I. Ștefan, Monica Ștefan, Elena Topor, I. Viscol, Doina Vlădeanu, Ioana Zaharia, V. Vasilescu -Realizări în ameliorarea genetică a sortimentelor de pomi, arbuști fructiferi, căpșun, portaltui și plante dendrologice, Lucrări științifice ale ICPP Pitești Mărcineni, Vol. XIX , Bucuresti, pp 19-35 -1999.
6. Șcheau Viorel - Migdalul-taxonomie, bioecologie, portaltui, sortiment, ameliorare, Ed. Imprimeriei de Vest Oradea, ISBN 973-9329-28-4, 237 pg. – 1998.
7. Șcheau V., Gîtea M., Laslo V., Buie F., Aurora Venig, Oneț C., Aurelia Oneț - Almond varieties at oradea development- Oradea- Debrecen.. ISBN 10-963-9274-99-2; HU-ISBN 13-978-693-9274-99-0, PP 363-370 -2006.
8. Șcheau V. - Soiuri și hibrizi de migdal, de perspectivă, pentru vestul țării, Horticultură nr. 2, ISSN 1221-6135, pp 23-25 -1990.
9. Șcheau V., Cheregi V., Sarca Gh. – Evoluția sortimentului de migdal pe plan mondial și în România, Buletin științific al ICPP Pitești Mărcinei, nr 53(9), pp 20-21 -1996.

10. Șcheau V., Gal T., Bunea A., Violeta Șcheau –rezultate de cercetare privind îmbunătățirea sortimentului la migdal, agricultură-silvicultură, tom i, analele universității din oradea, ISSN 1453-9470, PP 81-98 -1994.
11. Șcheau V.- Îmbunătățirea sortimentului de migdal în zona Oradea, Lucrări științifice ale ICPP Pitești - Maracineni, Vol. XIII, pp 179-183 -1989.
12. Șcheau V.- Sortimentul de migdal în bazinul pomicol Oradea, Lucrările științifice ale ICPP Pitești - Maracineni, Vol.XII, pp 91-97 -1987.
13. Șcheau Alexandru, Șcheau Viorel, Gîtea Manuel, - Transmission of flowering phase to hybrid descendants of almonds,Analele Universității Oradea Fascicula Protecția Mediului, Vol XV Anul 15, 2010, ISSN.2064-3476(Ed.Română),ISSN.2065-3484(Ed. Engleză) (B+).
14. Șcheau Alexandru, Gîtea Manuel, Șcheau Viorel - Transmission of flowering abundance to hybrid descendants of almonds ,Analele Universității Oradea Fascicula Protecția Mediului, Vol XV Anul 15, 2010, ISSN.2064-3476(Ed.Română),ISSN.2065-3484(Ed. Engleză) (B+).
15. Șcheau V., Laslo V., Gîtea M,Violeta Șcheau, Pantea St. - Variabilitatea gustului sîmburilor de migdale în descendențele hibride (F1,F2)- Tom.VIII, Analele Universității din Oradea, ISSN 1453-9470, pp 199-202 -2002.
16. Șcheau V. - Transmiterea caracterului”sensibilitatea la boli și dăunători”la descendențe hibride de migdal – Revista Hortinform nr. 1/113, ISSN 1221-4728, pp 84-86 -2002.
17. Șcheau V. - Comparatie între descendenții proveniți din încrucișări interspecifice la migdal privind epoca de înflorire și calitatea fructelor, Revista de Horticultură nr. 7-8; ISSN 1221-6135, pp 12 -1992.
18. Șcheau V., Violeta Șcheau - Transmiterea caracterelor ”abundența de fructe în iulie” și “greutatea unui fruct”în generațiile hibride de migdal.-Lucrări științifice ale ICPP Pitești–Mărăcineni Vol. XX, pp 39-43 -2001.
19. Șcheau V. - Transmiterea caracterului „greutatea a 50 sâmburi” la descendențe hibride de migdal, 24-26 mai, Tom. VII, Analele Universității din Oradea, ISSN 1453-9470, pp 181-188 -2001.
20. Șcheau V. - Transmiterea caracterului „randamentul de decojire” la descendențe hibride de migdal, Tom VII, Analele Universității din Oradea, ISSN 1453-9470, pp , 173-180 -2001.