

CERCETĂRI PRIVIND INFLUENȚA PARTENERILOR DE COMBINAȚII HIBRIDE ASUPRA GERMINĂRII SÂMBURILOR DE PRUN (*PRUNUS DOMESTICA* L.)
STUDY OF THE INFLUENCE OF GENITORS FROM THE CROSS COMBINATIONS ON THE GERMINATION OF PLUM STONES (*PRUNUS DOMESTICA* L.)

Madalina Butac¹, Madalina Militaru¹, Sergiu Budan¹, Valentina Bozhkova²

¹Research Institute for Fruit Growing Pitesti, Romania

²Fruit Growing Institute Plovdiv, Bulgaria

Abstract

Study on germination of stones obtained from 46 cross – combinations between different parental genitors of plum, performed in the field of the Genetic and Breeding Department, of the Research Institute for Fruit Growing Pitesti, in the springs of 2005 – 2006 were conducted in the nursery fields. The highest average germination has been observed in crossings made in spring of 2005 (18.89%). The greatest number of germinated stones has been registered in four cross – combinations made in 2005: Stanley x Agen (54.04%); Agen x Diana (38.51%), Tuleu gras x Grase romanesti (33.34%), Tuleu gras x Stanley (22.54%), and in eleven combinations made in 2006: Record x Stanley (50.0%), Minerva x Agen (46.16%), Record x Anna Spath (42.86%), Tita x Agen (35.72%), Minerva x Bluefree (32.0%), Tuleu gras x Diana (31.25%), Tuleu gras x Silvia (27.0%), Record x Early Rivers (25.0%), Albatros x Bluefree (25.0%), Record x Diana (22.23%), Tita x Anna Spath (20.0%). These data show a different potential for obtaining a great number of hybrid offsprings according to the used genitors and give valuable information of the best parental cross combinations in the plum breeding program.

Key words: *Prunus*, parental, cross combination, stone, germination

Cuvinte cheie: *Prunus*, parteneri, combinatii hibride, samburi, germinare

1. Introduction

From the point of view of flowers pollination and fertilization, the plum cultivars are classified as: **self-fertile** (such as: Stanley, Anna Späth, Vinete romanesti, Oul galben), **partly self-fertile** (Agen, Grase romanesti, Silvia, Early Rivers), **self-sterile** (Renclod Althan, Renclod negru, Renclod violet, Montfort, Kirke, Peche) and **male-sterile** (for instance, Tuleu gras and its progenies, which have atrophied stamens without pollen and it absolutely needs pollinators).

The data reported with the plum species have proved the low of the biological vitality, of crossing as well as the damaging process of self-pollination discovered by Darwin Ch. (1900) and subsequently verified by other scientists. Therefore, Cociu et collaborators (1997) asserted that the self-fertility is an involutive process for the cultivars while the self-incompatibility is an evolutive process allowing thus a pollination with foreign pollen which results in oofsprings with a larger genetic background and moreover being an invaluable reservoir for a richer genetic diversity.

Sometimes, following sexuete controlled crosses, the stones of hybrid fruit may not spring. (Butac, 2004). That is due to the phenomenon of compatibility or biological affinity between the pollinating cultivars (male parent) and pollinated ones (female parent) knowing that between the sexual elements can be rejection, attraction or neutral reactions. Therefore, a study on the germination capacity of the hybrid stones and on the springing of hybrid offsprings is needed for further recommendations of possible genitors involved in the controlled crosses and to avoid the intersterile combinations.

2. Material and methods

The study regarding the cultivar influence on the germination capacity of the hybrid stones involved 46 hybrid combinations between various parental genitors, crossings performed in the experimental fields of the Genetic and Breeding Department of the Research Institute for Fruit Growing Pitesti, between 2005 – 2006. The hybrid fruits were harvested at full ripening, then the hybrid stones were extracted, washed in distilled water and stored at a room temperature for about 3 months until their stratification. In November, these stones were dusted by Topsin for disinfection, then they were stratified in sand cases as hybrid combinations, until next February when they were sown in the nursery.

3. Results and discussions

In 2005, 9 hybrid combinations were done pollinating 8,761 flowers, of which 1,350 hybrid stones resulted. Following their sowing in the nursery, 255 seedlings sprang, recording a springing percentage of 18.89%. The best results were recorded with the following hybrid combinations: Stanley x Agen (54.04%

sprung seedlings), Agen x Diana (38.51%), Tuleu gras x Stanley (22.54%) și Tuleu gras x Grase romanesti (33.34%). (Table 1)

In 2006, 37 hybrid combinations were performed, pollinating 12,167 flowers, of which 3,744 hybrid stones resulted; 258 seedlings sprang in the nursery, representing 14.77%.

High springing percentage in the nursery showed the following hybrid combinations: Record x Stanley (50.0%), Minerva x Agen (46.16%), Record x Anna Spath (42.86%), Tita x Agen (35.72%), Minerva x Bluefree (32.0%), Tuleu gras x Diana (31.25%), Tuleu gras x Silvia (27.0%), Albatros x Bluefree (25.0%), Record x Early Rivers (25.0%), Record x Diana (22.23%), Tita x Anna Spath (20.0%). (Table 2)

These data confirm the observations of other researchers (Lewandowski, Zurawicz, 2007), reported at Eucarpia meeting, Zaragoza (Spain) showing a different behavior in the some year, related to the parent involved in crossing. This fact is also emphasized by the number of hybrid stones resulted from each hybrid combination, which highly varied from 0 to 362 pieces. In all, 3,097 plum hybrid stones were extracted which were conditioned for post maturation, resulting 513 hybrid seedlings in the selection field.

4. Conclusions

Following the investigations on the influence of the parents involved in the cross combinations on the stones germination, the following hybrid crosses may be recommended in further breeding work: Stanley x Agen (54.04% sprun seedlings), Record x Stanley (50%), Minerva x Agen (46.16%), Record x Anna Spath (42.86%), Agen x Diana (38.51%), Tita x Agen (35.72%), Tuleu gras x Grase romanesti (33.34%), Minerva x Bluefree (32.0%), Tuleu gras x Diana (31.25%), Tuleu gras x Silvia (27.0%), Record x Early Rivers (25.0%), Albatros x Bluefree (25.0%), Tuleu gras x Stanley (22.54%), Record x Diana (22.23%), Tita x Anna Spath (20.0%).

The above mentioned data proved a various potential in obtaining a great deal of hybrid offsprings related to the genitors involved and gave useful information about the best parental cross combinations to be used in the plum breeding program.

5. References

1. Cociu V., Botu I., Minoiu N., Pasc I., Modoran I, 1997. *Prunul*. Ed. Conphys, Vâlcea, pg. 75-82.
2. Butac Madalina, 2004. *Biologia înfloritului și fructificării soiurilor de prun din sortimentul național în scopul stabilirii celor mai buni polenizatori*. Teză de Doctorat, București, pg. 117-118.
3. Lewandowski Mariusz, Zurawicz Edward., 2007. *The influence of genotype on germination of apple seeds*. Abstract. EUCARPIA. XII Fruit Section Symposium. Zaragoza, Spania.

Tables and figures

Table 1. Germination capacity of the hybrid stones (2005)

Hybrid combination	No. pollinated flowers	No. of fruits resulted (Ctrl II)	% fruits resulted	Hybrid stones resulted	Hybrid seedlings resulted	% springing in the nursery
Cross combination (series 2005)						
Centenar x Early Rivers	946	227	24.00	147	15	10.21
Carpatin x Silvia	1,053	550	52.24	350	34	9.72
Tuleu timpuriu x Early Rivers	1,941	269	13.86	227	19	8.37
Tuleu timpuriu x Ruth Gerstetter	1,924	235	12.22	191	19	9.95
Stanley x Agen	876	230	26.26	124	67	54.04
Agen x Diana	781	252	32.27	161	62	38.51
Tuleu gras x Stanley	588	92	15.65	71	16	22.54
Tuleu gras x Grase romanesti	419	81	19.34	57	19	33.34
Tuleu gras x amestec polen	233	29	12.45	22	4	18.19
TOTAL	8,761	1,965	22.43	1,350	255	18.89

Table 2. Germination capacity of the hybrid stones (2006)

Hybrid combination	No. pollinated flowers	No. of fruits resulted (Ctrl II)	% fruits resulted	Hybrid stones resulted	Hybrid seedlings resulted	% springing in the nursery
0	1	2	3	4	5	6
Cross combination (series 2006)						
Centenar x Silvia	2,595	289	11.14	214	29	13.56
Tita x Early Rivers	1,736	443	25.52	170	15	8.83
Tita x Diana	61	10	16.40	10	1	10.00
Tita x Agen	75	32	42.67	14	5	35.72
Tita x Stanley	68	39	57.36	39	6	15.39
Tita x Anna Spath	84	39	46.43	5	1	20.00
Tita x Ruth Gerstetter	49	22	44.90	6	1	16.67
Tuleu gras x Diana	116	42	36.21	16	5	31.25
Tuleu gras x Silvia	1,460	559	38.29	325	88	27.08
Stanley x Bluefree	157	4	2.55	0	0	-
Tuleu timpuriu x Stanley	2,333	536	22.98	362	43	11.88
Tuleu timpuriu x Agen	175	70	40.00	53	1	1.89
Tuleu timpuriu x Vision	117	64	54.70	22	3	13.64
Pitestean x Agen	1,081	213	19.71	104	0	-
Minerva x Early Rivers	159	76	47.80	25	1	4.00
Minerva x Agen	162	112	69.14	13	6	46.16
Minerva x Anna Spath	212	165	77.83	20	1	5.00
Minerva x Stanley	166	122	73.50	16	2	12.50
Minerva x Bluefree	166	109	65.67	25	8	32.00
Minerva x Vision	193	130	67.36	9	1	11.12
Record x Silvia	44	34	77.28	28	2	7.15
Record x Diana	56	22	39.29	9	2	22.23

0	1	2	3	4	5	6
Record x Early Rivers	34	20	58.83	8	2	25.00
Record x Ruth Gerstetter	66	28	42.43	19	3	15.79
Record x Ialomita	70	35	50.00	16	2	12.50
Record x Agen	57	34	59.65	26	4	15.39
Record x Anna Spath	37	30	81.09	7	3	42.86
Record x Stanley	98	61	62.25	20	10	50.00
Record x Bluefree	80	54	67.50	44	2	4.45
Record x Vision	53	38	71.70	19	3	15.79
Albatros x Bluefree	81	18	22.23	4	1	25.00
Albatros x Vision	100	58	58.00	16	1	6.25
Pescarus x Bluefree	86	64	74.42	34	2	5.89
Diana x Agen	155	90	58.07	28	2	7.15
Carpatin x Ruth Gerstetter	60	20	33.34	7	1	14.29
Centenar x Bluefree	91	62	68.14	14	1	7.15
TOTAL	12,167	3,744	30.78	1,747	258	14.77
TOTAL GENERAL	20,928	5,709	27.28	3,097	513	16.57



**Hybrid seedlings
in the nursery**

