An investigation on pollen germination rates of some selected male trees at Ceylanpinar State Farm

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An investigation on pollen germination rates of some selected male trees at Ceylanpınar State Farm

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SUMMARY - This experiment was conducted on twenty four male trees at Ceylanpınar State Farm. In this experiment, the rates of pollen germination were tested in different germination media. Saturated Petri Dishes method was used to determine germination rate of pollen. Different doses of sucrose (0, 5, 10, 15 and 20%) and sucrose (10%) + boric acid (20 and 70 ppm) combinations were used as media. The best germination rate was in 10 to 20% sucrose solutions.

Key words: Pistachio, pollen, germination, sucrose.

RESUME - *"Recherches sur les taux de germination du pollen chez quelques arbres mâles sélectionnés à la Ferme d'Etat de Ceylanpınar". Cette expérience a été menée sur vingt-quatre arbres mâles à la Ferme d'Etat de Ceylanpınar. Dans cette étude, on a testé les taux de germination du pollen pour différents milieux de germination. La méthode des boîtes de Pétri saturées a été utilisée pour déterminer le taux de germination du pollen. Différentes doses de sucrose (0, 5, 10, 15, et 20%) et des combinaisons de sucrose (10%) + acide borique (20 et 70 ppm) ont été utilisées comme milieux. Les résultats obtenus ayant donné le meilleur taux de germination correspondaient aux solutions à 10 et 20% de sucrose.*

Mots-clés : *Pistache, pollen, germination, sucrose.*

Introduction

Pistachio trees are dioecious. That means male and female flowers on separate trees. Pollination and fertilization are necessary to obtain seeded fruit. In this species, it is necessary to know the germinating ability of pollen. This can be understand performing pollen germination tests *in vitro* conditions. Because of this reason, many researches made experiment on pollen germination rate, storage, germination media, etc.

Most of the researches advised sucrose solution as pollen germination media. Beside of this boric acid, calcium, gibberellik acid, agar, etc. may be used as media (Johri and Vasıl, 1961). Ülkümen (1945), reported that the highest germination rate was obtained from 10 and 15% sucrose solution in *P. vera, P. terebinthus* and *P. atlantica.* Therios *et al.* (1985) maximum germination obtained at 35, 20, and 25% sucrose for the clones A, B and C respectively. This experiment shows that sucrose concentrations may change from male type to type.

Atlı *et al.* (1995), worked on germination of *Pistacia* pollen with using different germination method. According to results, pollen germinating rate obtained with the Saturated Petri Dish method was slightly higher than the tube method. While the highest pollen germination rate was observed using 15% sucrose solution in tube method, the highest pollen germination rate was obtained 10% sucrose solution in Petri Dish Method.

Crane *et al.* (1974) reported that The highest germination rate obtained as 94% using sucrose solution for 10% at Peters pollen. Beside of this, 72% germination rate was obtained 15% sucrose solution.

Mlika (1991), reported that pollen germination rate was obtained in pistachios between 57 to 59% using 10 -20% sucrose solutions.

Ak *et al.* (1995), mentioned that the best pollen germination rate had been obtained from using 10-15% sucrose solution. After comparing different germination method the best result was obtained by the saturated petri dish method.

The aim of this study was to investigate pollen germination rate pistachio male trees which are selected Ceylanpınar State Farm.

Material and methods

Material: In this experiment 24 male types grown at Ceylanpınar State Farm in Şanlıurfa were used as material.

Obtaining of pollen: The branches of selected male pistachio trees are taken to the laboratory conditions before the cluster dehisced pollen and put in a glass water after waiting one night, pollen had been taken and sowed with brush to the different germination media.

Germination test: In order to determine pollen germination rate "Saturated Petri Dish" method was used (Eti, 1991).

Germination media:

(i) Sucrose solutions: 0 (control), 5, 10, 15 and 20%.

(ii) Sucrose and boric acid combinations: sucrose 10% + 20 ppm H_3BO_3; sucrose 10% + 70 ppm H_3BO_3.

Germination temperature: 20-23ºC laboratory conditions.

Experimental design: Two petri box were used each application. Three dropped lam put into each petri box. The pollen grain counting was performed 24 hours incubation at 23ºC. So this experiment had been arranged six replications.

Results and discussion

Effect of different sucrose solutions on the germination rate of selected 24 male types at Ceylanpınar State Farm were given Table 1. Different sucrose solutions were compared to each others. Generally germination rates were better than control. When the averages are compared, 20% sucrose was better (87.78%) than others. Control was 20.40%. Germination rate of pollen increased when the percentage of sucrose increased. There is a parallelism with solution percentage.

The pollen germination rate was better male No. 8 than other male types. Germination rate was changed between 41.33% to 91.39%.

Boric acid (H_3BO_3) is known increases germination rate of pollen (Therios *et al.*, 1985; Ak, *et al.*, 1995). At this experiment 20 and 70 ppm H_3BO_3 added to sucrose 10% media. The obtained results were given Table 2. According to average of media addition of H_3BO_3 have been increased the germination rate. While the control (Sucrose 10%) was 32.56%, adding H_3BO_3 20 and 70 ppm pollen germination rate obtained over 80%.

According to results, generally 10-15% sucrose affected positively on the pollen germination. Adding boric acid affected positive on pollen germination as well.

Table 1. Effect of different sucrose solutions on the germination rate (%) of pistachio pollen

Male No.	Sucrose					Average
	0%	5%	10%	15%	20%	
1	42.17	66.21	76.24	92.25	93.72	74.12
2	21.36	35.42	35.43	77.63	93.68	52.70
3	13.64	50.54	57.62	72.18	65.71	51.94
4	16.21	46.18	49.82	62.74	74.18	49.83
5	2.08	19.26	41.47	75.73	87.23	45.15
6	23.19	57.43	91.17	90.08	97.36	71.85
7	3.82	18.86	30.63	82.05	84.16	43.90
8	92.17	87.14	90.05	93.19	94.39	91.39
9	26.33	75.23	75.62	92.26	95.63	73.01
10	10.27	32.45	50.18	66.17	92.54	50.32
11	2.63	37.61	40.76	67.87	92.63	48.30
12	5.44	11.48	22.17	73.18	85.72	39.60
13	17.28	29.13	50.26	72.26	75.16	48.82
14	24.15	52.69	47.38	78.15	92.27	58.93
15	40.34	71.16	86.83	92.73	92.18	76.65
16	3.62	30.75	18.27	55.69	92.69	40.20
17	62.63	74.82	89.16	87.93	95.03	81.91
18	15.64	40.67	44.23	72.91	90.15	52.72
19	17.26	40.75	39.18	68.13	84.12	49.89
20	21.14	46.84	48.26	81.72	89.35	57.46
21	12.26	30.25	33.35	54.18	76.63	41.33
22	6.03	8.73	38.63	73.72	80.73	41.57
23	19.17	49.72	69.35	75.16	95.18	61.77
24	10.71	55.14	35.13	82.27	86.13	53.88
Average	20.40	44.94	52.56	76.68	87.78	56.47

Table 2. Effect of different sucrose + boric acid combinations on the germination rate (%) of pistachio pollen

Male No.	Sucrose 10%	Sucrose 10% + 20 ppm H_3BO_3	Sucrose 10% + 70 ppm H_3BO_3	Average
1	76.24	91.24	88.93	84.47
2	35.43	86.42	91.26	71.04
3	57.62	91.48	92.18	80.43
4	49.82	90.16	90.34	76.77
5	41.47	75.81	87.51	68.26
6	91.17	76.61	94.50	87.43
7	30.63	83.12	78.35	64.03
8	90.05	95.03	84.73	89.94
9	75.62	91.03	90.18	85.61
10	50.18	32.74	50.56	44.49
11	40.76	91.16	96.23	76.05
12	22.17	45.93	55.25	41.12
13	50.26	85.76	74.67	70.23
14	47.38	76.84	76.14	66.79
15	86.83	75.18	87.25	83.09
16	18.27	90.29	85.15	64.57
17	89.16	93.71	83.23	88.70
18	44.23	80.63	77.82	67.56
19	39.18	85.81	72.19	65.73
20	48.26	87.43	84.23	73.31
21	33.35	68.17	62.02	54.51
22	38.63	68.81	81.09	62.84
23	69.35	93.18	94.23	85.59
24	35.13	85.73	87.61	69.49
Average	52.56	80.52	81.91	71.79

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