

**DETERMINATION OF SOME MORPHOLOGICAL AND PHYSIOLOGICAL
PROPERTIES OF POLLENS OF BLACKBERRY (*Rubus fruticosus* L.)
AND MULBERRY (*Morus* spp) CULTIVARS**

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Abstract

*Mulberry growing is common in all regions of Turkey but growing of blackberry limited. Recently, adaptation and selection researches on domestic and foreign blackberry cultivars in some cities have started and positive results were obtained. In this study, viability, germination and some morphological properties of pollens of white mulberry (*Morus alba* L.), black mulberry (*Morus nigra* L.) and blackberry (*Rubus fruticosus* L.) grown in Korkuteli, Antalya-Turkey were determined. Potassium Iodine (IKI) and 1% 2,3,5-triphenyl tetrazolium chloride (TTC) stain tests were used for viability of pollens and germination of pollens were made in 5% agar containing 10% sucrose and 0.01% boric acid. Some morphological properties of pollens such as pollen dispersal unit, symmetry positions, pollen size, pollen shape, pollen aperture number and pollen pore shape and type were also evaluated. The highest pollens viability from TTC and IKI stain tests were determined in white mulberry with 58.12% and 51.42%, respectively. Results of germination rate were the same with viability of pollens in species. The highest germination rate was occurred in white mulberry with 63.26 and black mulberry and blackberry were followed with 53.02% and 46.78%, respectively.*

Key words: Blackberry, mulberry, pollen, flower

1. INTRODUCTION

Berry fruits, have wide spread on the world are grown in bad conditions that many other species are not grown. Although berry fruits were generally grown in temperate zone regions, they were grown on high mountain ridges and plateau in warm regions (Ağaoğlu, 1986). In addition to the use fruits of mulberry for various purposes, mulberry has great importance for silkworm cultivation in Turkey (Gökmen, 1973). Mulberries are grown almost everywhere in the Turkey but, wild blackberry types were mostly spread in the Marmara Region of Turkey.

The mulberries are a gendered tress in terms of flower structure and species may be either monoecious or dioecious, depending on whether male and female flowers occur on the same plant (monoecious) or on separate plants (dioecious). Male and female flowers occur in axillary bud of leaves of a new shoots on one-year old shoots. Female flowers has stalk and they are gathered on the greenish and cylindrical axis as a cluster. Each drupelets of cluster has four sepals and two female organs. Stigma has thin hairs, style is too short or not available. The male flowers located on an axis as cluster. Stalked each male flower has 4 male organs (Gökmen, 1973).

Colors of blackberry flowers vary white to red. Flowers are 2 cm in width and have a cluster containing a large number of flowers. Male organ is little shorter than female organ. Sepals are united and they are formed a single calyx. The flowers have some difficulties in fertilization since they have genetically polyploidy. Therefore fertilization capacity must be well known cultivated cultivars (Güleryüz, 1977).

Some factors such as pollen amount, viability, germination rate has important features on fertilization and fruit set in a fruit type (Özbek, 1977). Therefore, reliable information about the cultivars is to be obtained by the pollen viability and germination tests under laboratory conditions (Eti, 1991).

Pırlak and Güleriyüz (1997) determined viability and germination rates of pollens in *Ribes aureum*, *Ribes petraeum*, *Ribes rubrum* and *Ribes nigrum* with by TTC, IKI and safranin tests.

Pollen viability, germination, uniformity and production quantities experiments were done in many fruit types, but number of these experiments on mulberry and blackberry were limited. For this reason, in this experiment, some morphological and physiological properties of pollens of blackberry and white and black mulberry types were searched by stain and *in vitro* germination tests and results of the methods were compared to find suitable one.

2. MATERILAS AND METHODS

This research was conducted in physiology laboratory of Department of Horticulture, Akdeniz University. Blackberry (*Rubus fruticosus* L.) pollens from wild types and mulberry (*Morus alba* L. and *Morus nigra* L.) pollens were collected from cultivated types. Morphological features of pollens were evaluated according to the Straka (1975). Pollen dispersal unit, symmetry positions, pollens size, pollens shape, pollen aperture number and pollen pore shapes and types were searched. Levels of viability of pollens were determined according to Stanley and Linskens (1974) with 1% TTC and Gatenby and Beams (1950) with IKI tests. The pollens were germinated in agar containing 10% sucrose and 0.01% boric acid in petridishes (Charles and Harris, 1972). The pollens were incubated at 25 C°, stained 2 hours later to determine viability and germinated pollens were counted 24 hours later. Viability and germination was determined ten different zones in petridishes and than viability and germination rates were calculated. Analyses were repeated five times.

3. RESULTS AND DISCUSSION

Some pomological pollen properties of white mulberry, black mulberry were found as followed; pollen dispersal unit is monad, symmetry positions is isopolar-symmetric. Pollen shape of white and black mulberry and blackberry was determined as oblat and suboblat, respectively. Shape of pollen pore was found as colporat in blackberry and porat in white and black mulberry. Pollen aperture number was identified 7 (politrem) in white and black mulberry which belong to *Moraceae* family and in blackberry 3 (tritrem) which belong to *Rosaceae* family. The large pollen size was in white mulberry and pollen size changed between 62.10 mμ and 69.28 mμ. The smallest pollen size was in blackberry and pollen size changed between 22.10 mμ and 33.52 mμ (Table 1).

The highest viability rate in TTC and IKI tests was obtained in white mulberry with 58.12% and 51.42% respectively. Viability rate was ranked high to low as white mulberry, black mulberry and blackberry in both stain tests. Blackberry pollens were shown lower viability rate from mulberry pollens in TTC and IKI tests. Pırlak and Güleriyüz (1997) was obtained pollen viability by TTC test with 50.53% in *Ribes nigrum* and 47.33% in *Ribes rubrum*.

The highest pollen germination rate was in white mulberry with 63.26% and it was followed by black mulberry with 53.02% and blackberry with 46.78% respectively. TTC test and pollen germination was showed close relation in white and black mulberries whereas IKI test was given close relation in blackberry (Table 2).

Table 1. Some morphological properties of pollens of mulberry and blackberry.

Pollen criteria	Blackberry	White mulberry	Black mulberry
Pollen dispersal unit	Monad	Monad	Monad
Symmetry positions	Isopolar symmetric	Isopolar symmetric	Isopolar symmetric
Pollen size	Medium 22.10- 33.52 mμ	Large 62.10- 69.28 mμ	Large 59.23- 65.46 mμ
Pollen shape	Suboblate	Oblate	Oblate
Pollen aperture number	3 (tritrem)	7 (politrem)	7 (politrem)
Pollen pore shapes and types	Colporat	Porat	Porat

Table 2. Pollen viability and germination rate of blackberry and mulberry.

Fruit Types	Viability test		Germination rate (%)
	TTC (%)	IKI (%)	
White mulberry	58.12	51.42	63.26
Black mulberry	54.66	50.27	53.02
Blackberry	42.16	45.52	46.78

4. CONCLUSION

The results indicate that mulberry and blackberry have to be some similar pollen properties as pollen dispersal unit and symmetry positions although they have belong to different families. On the other hand many pollen properties of mulberries were found different than blackberry such as pollen size, pollen shape, pollen aperture number and pollen pore shape and types. A close relation was determined between pollen viability and pollen germination. TTC test was given best results for mulberries but IKI test for blackberries in terms of pollen viability and germination relations.

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