

DISTURBANCES IN JOINING OF APRICOT CARPEL

N. Mičić, G. Đurić and R. Cerović,
ARI "SERBIA" Fruit and Grape
Research Centre Čačak
Kralja Petra I br. 9 32000 Čačak, YU

Lj. Radoš
Agricultural Institute
78000 Banja Luka, RS-BH

Keywords: fruit splitting, suture, fruit deformities

Abstract

Various fruit deformities or fruit splitting along the suture during ripening, may occur as a result of irregularity or disturbances in carpel joining. Histological analyses in the first stages of ovule primordium differentiation, as well as at full bloom period, indicate that there are different irregularities in the process of apricot carpel joining, all of which may be classified in three groups. In all three groups of ovary, from which these fruits are formed, there are normally developed ovules with formed embryo sacs.

1. Introduction

The occurrence of fruit with varying degree of deformity, pronounced in the zone of suture or in the form of partially open and split fruit has been observed in some cultivars of stone fruit trees clearly indicating that such fruits are the result of disturbances during carpel coalescence (Mičić *et al.*, 1994). When studying the phenomenon of fruit split in apricot, a distinction should be made between fruit splitting due to the irregularities in carpel coalescence and the one induced by ecological conditions during fruit ripening or various physiological disturbances in the growth dynamics of exocarp and mesocarp as water (Gülšen, 1995).

2. Material and methods

In order to study a cause of fruit splitting along suture line histological analyses of ovaries were done in four apricot cultivars (Hungarian Best, Cehin, Melitopol'skaya Ranyaya and Frühe Kittze) from the orchard near Čačak in 1994 and 1995. The samples were taken from the first stages of ovule differentiation until the embryo was formed, so 30 ovaries, i.e. fruits were taken for each cultivar. Histological sections of 8-12 µm thickness were prepared using paraffin technique. The samples were fixed according to Nawaschin and stained with Delafiled's hematoxylin (Sass, 1958).

3. Results

The process of carpel differentiation includes carpel bending and closing, while carpel margins are turned inside and free. Joining along the zones of carpel submargins occurs at the beginning of the growing season, and at the free carpel margins there is a differentiation of ovules and obturator. In normal joining, connecting carpel zones are placed symmetrically (Fig. 1). The cells of connecting carpel areas which are joined, at the onset keep the form of epidermal cells and they are regularly placed in the ovary wall. By further differentiation of such a carpel normal and symmetrical fruits are formed.

Histological analyses during carpel joining show that various deformities may occur in ovary forming. On the basis of the position of connecting carpel zones in the process of its differentiation, the disturbances may be grouped as follows:

- In the process of carpel bending, connecting zones of carpel submargins are placed at different positions observing from carpel margin, which results in forming a raised fold

along the suture, and, more or less, bent connecting zone in ovary wall. The result of such joining carpel margins is completely joined fruit with various degrees of fruit morphology deformities (Fig. 2).

- There is a disturbances during carpel bending, so carpel margins directly touch one another at different positions, or the process of bending is carried out at different places of submarginal zones. The final results of such carpel joining are fruits with partially joined connecting areas at different places along the suture (partially splitted fruits along suture) or fruits joined at unsymmetrical connecting zones (Fig. 3).
- Carpel is not at all joined along connecting zones, or the connecting areas of carpel submargins are so small, that the fruits are completely open along suture and frequently have split stone - the coalescence was not completed before the endocarp differentiation (Fig. 4).

All the three ovary groups from which fruits like these are formed contain normally developed ovules with formed embryo sacs.

References:

- Gulsen Y., Dumanoglu H., Kunter B. 1995. Fruit cracking in some turkish apricot cultivars. *Acta Horticulturae* 384: 277-280.
- Mičić. N., Cerović, R., Đurić, G. 1994. Ovary deformities in plums due to irregular carpel fusion. The first congress of geneticists, Abstracts p. 156. Vrnjačka Banja, June 8 -11.
- Sass, E.J., 1958. *Botanical microtechnique*. Third edition, The Iowa State College press, Ames, Iowa: 55 - 78.

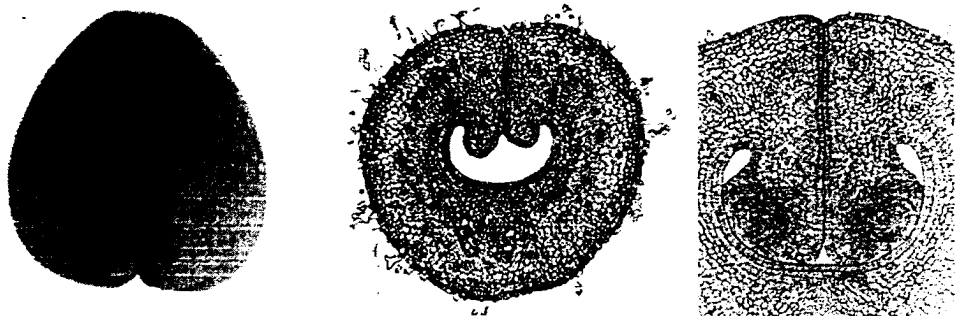


Figure 1. Normal coalescence of carpel margins: a ripe fruit (on the left); histological section of a carpel during the period of coalescence- there is a direct coalescence of submarginal zones, whereas ovules differentiate on the mere margins (in the middle); histological ovary section of differentiation of ovules (on the right).

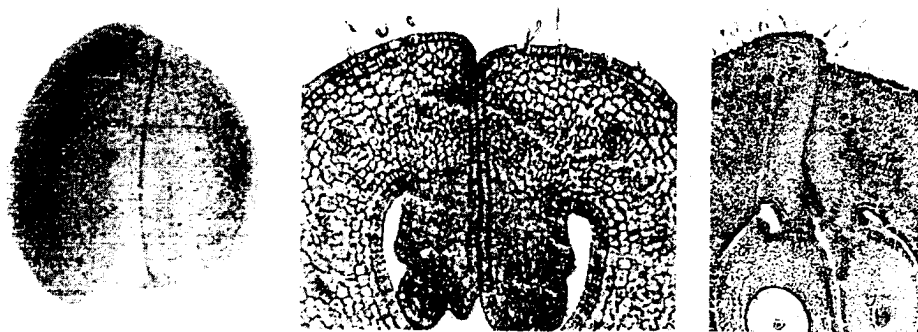


Figure 2. Complete coalescence of carpel margins at different positions along connecting zones: a ripe fruit (on the left); histological ovary section during the time of ovules forming (in the middle); histological ovary section during full flowering phenophase (on the right).

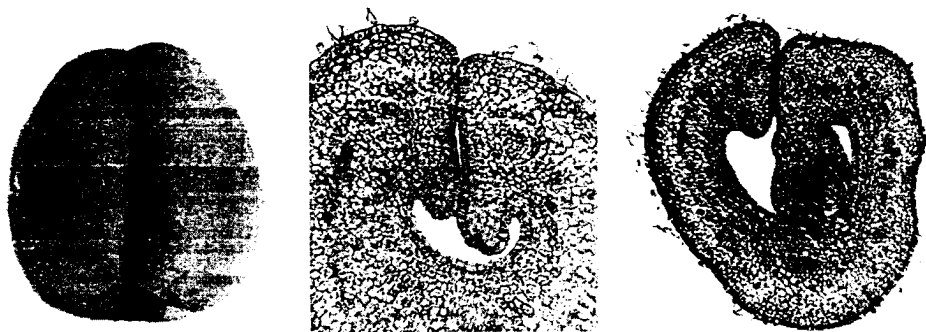


Figure 3. Incomplete coalescence of carpel margins at different positions along connecting zones: a ripe fruit with a partially open fruit suture (on the left); histological section of the carpel with incomplete bending - by coalescing of submarginal zones (in the middle); histological section of the ovary with irregular bending of a carpel margin which apart from deformity of both carpel coalescence in ovule zone and obturator tissue results in failing to form ovules on irregularly bent carpel margin (on the right).

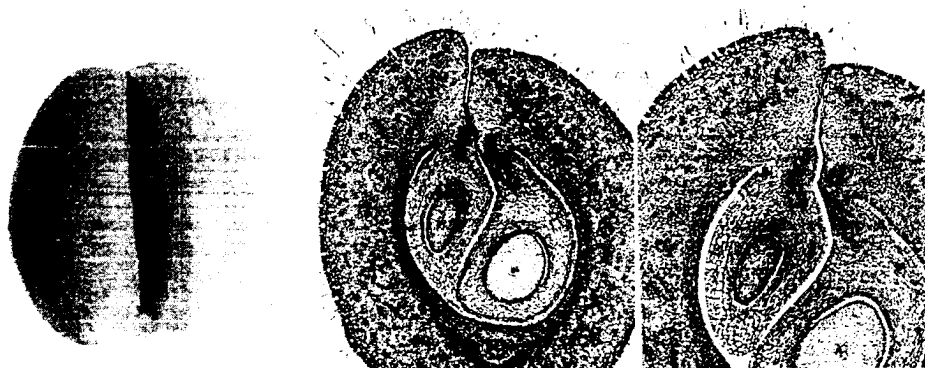


Figure 4. Incomplete coalescence of carpel margins along connecting zone: a ripe fruit with completely open fruit suture (on the left); histological ovary section which coalesced only in the inner part of connecting zone (in the middle); histological ovary section which coalesced only in the peripheral part of connecting zone (on the right).