

## A few words on grapevine flower fertilisation

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A few words on grapevine flower fertilization, a prerequisite for berry growth and development.

Grapevine flowers are hermaphroditic, in other words each flower has both male (five stamens) and female (one pistil) organs.

For berry development in seeded cultivars, at least one of the four ovules of the ovary is fertilised to form a normal seed. This will lead to ovary cell multiplication (under complex hormonal control), lasting 8-12 days post fertilisation. Following these initial stages, berry volume increase is due to cell enlargement. In seedless cultivars, berry development occurs without fertilisation (parthenocarpy) or with embryo abortion soon after fertilisation (stenospermocarpy).

The fertilisation of the *Vitis vinifera* flower mostly occurs through self pollination, without the requirement for wind, insects or bees. However, muscadine grape (*Vitis rotundifolia*) fertilisation may also be dependent on insect and cross-pollination. There is some evidence that cross-pollination can improve yield and quality in some *Vitis vinifera* table grape varieties. Pollination and fertilisation in *Vitis* species are highly sensitive to temperature, humidity and rainfall.

Let's have a look at some photos which are worth a hundred words (figure 1):

- (a) The grapevine flower is a pentamer bearing 5 aborted sepals ; 5 petals which are linked and form the cap (calyptra); 5 stamens and one ovary containing four ovules.
- (b) In most situations flower fertilisation occurs prior to the dehiscence of the cap, depending mainly on climatic conditions during flowering.
- (c) When the cap falls, it is possible to observe the stamens. These release the pollen onto the stigma (terminal part of the pistil). The pollen grain germinates and a tube will grow towards one of the four ovules within the ovary.
- (d) Example of a dessicating cap still attached to the ovary which has started to expand
- (e) Within this dehiscent cap it is possible to observe aborted stamens and pollen.
- (f) Example of the pollen remaining on the stigma of an ovary which has started to develop into a berry.
- (g) Some caps are expelled into the inflorescence by the growing ovary. These remaining caps may aggravate Botrytis development around veraison and ripening.
- (h) Example of nectaries at the base of the ovary (orange arrow). During flowering, it is possible to smell in vineyards the delicate perfume of grapevine flowers !

A young cluster of the grapevine variety, Shiraz, at berry set (at the end of flowering and flower fertilisation) is characteristically heterogenous in ovary size. These ovaries will form the future berries (figure 2, a, b, c). The heterogeneity of ovary development (which is due to the different timing of flower fertilisation during flowering) will lead to an asynchronous development of each individual berry on the cluster, continuing up to maturity. This means that at harvest each individual berry will be at a slightly different developmental and ripening stage.

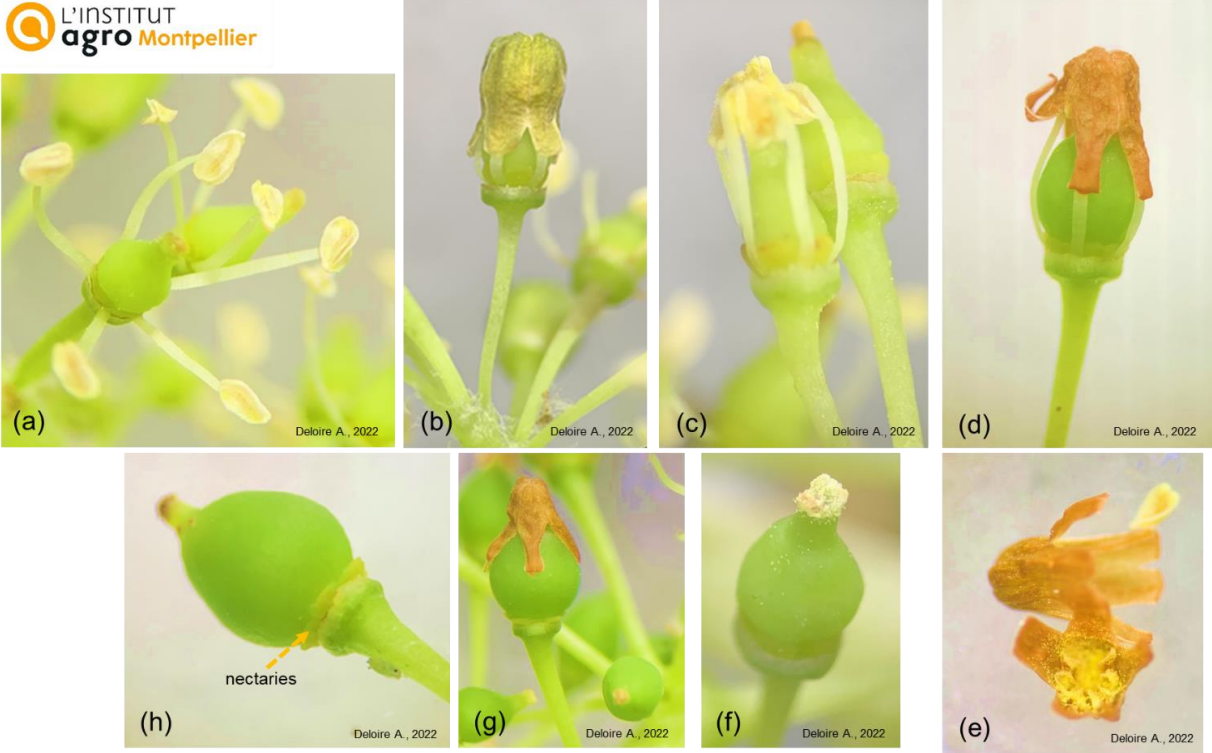


Figure 1 : Example of grapevine flower and fertilisation process.



Figure 2 : (a) Future cluster of Shiraz at berry set ; (b) & (c) : Examples of heterogeneity of ovary growth within a cluster.