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“Inflorescence and bunch architecture development in *Vitis vinifera* L.”

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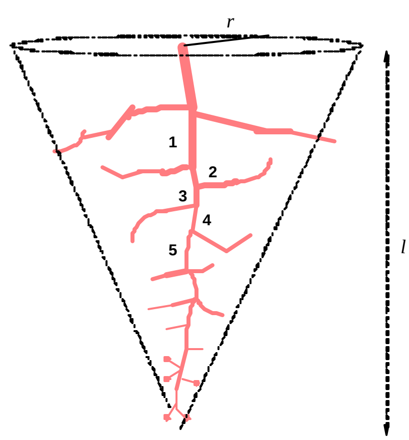
Bunch rot (*Botrytis cinerea*) is closely correlated with cluster architecture, with compact clusters being significantly more sensitive. To understand which features have the greatest influence on cluster compactness, the authors followed the inflorescence development of four grape varieties from budburst to harvest.

• The authors followed 2 varieties with compact clusters (Chardonnay and Riesling), and 2 varieties with loose clusters (Sultana and Exotic). The study took place at the University of Adelaide experimental vineyard, South Australia.

• The authors tagged 3 random shoots for each of the varieties, and measured 1) inflorescence length throughout the season. Immediately before cap fall (anthesis) they measured: 2) the number of nodes per shoot , 3) shoot node number at which inflorescence was present, 4) shoot internode length, 5) shoot internode length flanking the inflorescence, and 6) tendril length. After anthesis was complete, they enclosed inflorescences in a plastic mesh and measured 7) flower number per inflorescence. At harvest they measured these parameters again, along with 8) number of berries per cluster, and 9) rachis length (and rachis internode lengths).



• The authors used an interesting method to calculate cluster openness in a sample of 20 clusters. They resourced resorted to the Principle of Archimedes! By knowing the length (*l*) and radius (*r*) at the base of a cluster, they calculated its *morphological volume* (as the volume of a cone, ? pr^2l). Then – here comes Archimedes- by immersing the cluster in water and measuring the volume displaced, they calculated *actual volume*. The difference between both types of volumes was a measurement of *cluster openness* (how much space in the cone was actually not filled by the cluster).

• Finally, with the help of a scanning electron microscope and a fluorescence microscope, the authors took photographs of the rachis epidermal cells and underlying parenchyma cells, respectively, to see whether their morphology could explain the differences in cluster size observed among varieties.

• **Results**. The authors observed differences among varieties for several of the parameters measured. But most importantly, the comparison of the number of flowers after anthesis with the number of berries at maturity allowed them to conclude that the proportion of berry set was similar in all varieties, regardless of their cluster size. Thus, **the main trait responsible for cluster openness was the rate of elongation of the rachis internodes**, and not the amount of berries in a cluster. Histological examinations (as well as rachis tissue DNA content estimations) allowed the authors to conclude that **cell expansion**, rather than cell division, **is the main factor responsible for the longer rachis internodes** of the loose cluster varieties (Sultan and Exotic).

The authors' findings are not too surprising. But now that they know that rachis elongation is the main factor determining cluster compactness, they hope to be able to identify the genes controlling this character. Similar studies have been conducted with success in the "research model plant" *Arabidopsis*, where a variety of mutants are available displaying a wide array of inflorescence architectures.

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