

Sweet chestnut burr daily growth in its final stages

Perulli G.D., Boini A., Bresilla K., Morandi B., Corelli Grappadelli L., Manfrini L.

giulio.perulli@unibo.it

DISTAL - Department of Agricultural and Food Sciences, University of Bologna, V. le Fanin 46, 40127 Bologna, Italy

The daily growth dynamics of *Castanea sativa* Mill. (cv. “Marrone di Castel del Rio”) burrs, were monitored for 12 continuous day at the end of September (98-109 days after full bloom; DAFB) with automatic fruit gauges connected to a wireless data-logger system. Thanks to this system the relative contributions of xylem, phloem, and transpiration to burr growth were determined at 102 DAFB as well. This phenological stage of burr development was chosen to deepen our understanding of burr growth in a fundamental period for nut enlargement and starch accumulation. The burr growth pattern showed a linear daily increment, generally characterized by a rapid shrinkage in the early afternoon corresponding to the highest vapour pressure deficit (VPD), followed by nocturnal swelling until the early morning. Daily absolute growth rates were positively influenced by high relative humidity (RH) values and precipitation events while negatively affected by VPD. Vascular flows confirm that the daily shrinkage was due to high water losses by transpiration. The xylem was fully active and able to replenish the high amount of water lost during the day by the transpiration process. Phloem inflow was the major component for the net daily burr growth. These observations, coupled to the increase in dry matter content typical of this stage, suggest a passive model of burr phloem unloading, able to persist at high levels of RH, likely energized by the high burr epidermal transpiration. This preliminary study aimed first to identify the model of vascular flows supporting burr growth during a period of strong demand by the fruit; and second to establish the influence of weather conditions on its growth pattern. Knowing and monitoring burr daily growth patterns could be used to trigger precise and tailored irrigation management strategies, especially in areas characterized by water shortages.

Keywords: *Castanea sativa* Mill., burr daily growth, vascular flows, chestnut physiology.