

Title Leaf turgescence measurement using Wiltmeter®
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Abstract

The turgidity of leaves is a major quality factor related to the water content and impaired by the loss of water. Despite of the relevance of the leaf turgescence, no descriptions of effective field equipment for objective leaf turgor measurement were recovered and as consequence leaf turgor quality assessment in the market is currently worldwide subjective. The easy to handle instrument named Wiltmeter was developed to objectively do such measurement in the field and during storage. Wiltmeter is a simple and portable instrument to measure the leaf firmness (p_0) caused by cell turgor. It works based on the flattening pressure method in which the firmness of fruits and vegetables is measured as a pressure given by the ratio between the force applied by a plate and the flattened area formed by a small organ deformation, under plate. As a differential the Wiltmeter flattening plate contains small pores through which a low pressure air flow is liberated between the plate and the adaxial leaf surface. The smallest leaf compression that blocks the air passage is taken as an objective estimate of the plant leaf turgor pressure. To validate that the Wiltmeter measures objectively and correctly the leaf turgor it was gauged against the traditional pressure probe method of introducing a micro capillary into the cell to measure its pressure according to a special isovolumetric procedure. Lettuce (*Lactuca sativa*) and Collard greens (*Brassica oleracea* var. *Acephala*) were used as model leaf vegetables in which turgor/wilting was adjusted letting these organs transpiring on the laboratory bench. This induced turgor/wilting range was then evaluated using the Wiltmeter and the pressure probe, and this enabled the fitting of the following equations to the data: $y = 1.087 x$ ($R^2 = 0.849$) for lettuce and $y = 1.18 x$ ($R^2 = 0.954$) for collard greens. This linearity with declivity close to one is indicative that the Wiltmeter not only yields quantitative measurements of leaf firmness, but also that it is a viable pressure probe substitute which opens opportunities for new wilting studies in post-harvest and ecophysiology.