

Assimilate transport in the grapevine; carbohydrates, amino acids and potassium

M. Gholami

Dept of Horticulture, Bu-Ali Sina University, Hamedan.

Photosynthetically fixed assimilates translocate from source leaves to sinks via phloem tissue in vascular bundles. The phloem sap composition was analysed for three grapevine cultivars. Phloem sap was collected from the cut end of grape bunch laterals using an EDTA-facilitated exudation-Technique. Samples of phloem sap exudates were collected at different berry developmental stages and also continuously over a few days and nights at berry ripening.

Sucrose, amino acids and mineral ions were analysed in these phloem exudates. The sucrose concentration in the phloem exudates collected from different cultivars was found to be high while glucose and fructose were low. In addition to sucrose, substantial levels of amino acids and potassium were also detected in the exudates. Glutamine was the principal amino acid in the phloem exudates of grapevines followed by glutamic and aspartic acids, and alanine.

Omission of EDTA from the buffer solution of girdling of canes either side of the bunch greatly decreased the levels of all these sugars and amino acids in the exudate. These controls, together with the observed composition of the collected material, suggested that the exudates were predominantly derived from phloem sap entering the berries in the laterals. The metabolites exuded from the phloem of fruit bunch stem showed seasonal and diurnal variations. The diurnal pattern of sucrose exudation showed high levels of sucrose exuded at night. Total amino acids and some individual amino acids also showed diurnal variation. This is the first time that the diurnal pattern of phloem sap flux in grapevines has been reported.