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ORIGINAL PAPER

The effects of a fogging system on the physiological status and rooting capacity of leafy cuttings of woody species

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Abstract The early responses of leafy stem cuttings of *Prunus* and *Castanea* species with differing rooting abilities were assessed in a fog system using fluorescence measurements. Different types of cuttings of each species were used: cherry *Prunus* ('GiSelA 5', *Prunus cerasus x Prunus canescens*—148/2) and chestnut *Castanea* ('Marsol' and 'Maraval', *Castanea crenata x Castanea sativa*). The physiological status of cuttings in the early initiation phase was compared to the rooting results. For all cuttings, fluorescence measurements revealed a close-to-optimum photochemical efficiency, indicating that physiological stress (severance, water, etc.) was minimal. In cherry, the potential photochemical efficiency (Fv/Fm) differed slightly between terminal and basal cherry cuttings, being lower in the basal ones at the time of severance. Later in the propagation process, the differences were smaller. The photochemical efficiency did not differ between two 'difficult-to-root' *Castanea* clones, nor was it dependent on the length of the cuttings. The high rooting capacity of long *Castanea* cuttings (50 cm) indicated that physiological stress could be minimized under a fogging system.

Keywords: Chlorophyll fluorescence . Potential photochemical efficiency . Cuttings . *Prunus* . *Castanea*

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Introduction

Vegetative propagation is used in the horticultural nursery industry to mass-produce selected superior plant genotypes as cultivars (Hartmann et al. 1997). Propagation by leafy stem cuttings is one of the technically most effective propagating techniques, but leafy cuttings are prone to water stress until roots are formed to allow the uptake of water for the maintenance of cell turgor and the initiation and development of roots. Water stress delays or prevents cuttings from rooting, and rooted cuttings typically have fewer roots (Puri and Thompson 2003). Commercially attractive success rates have been reported, even in plants considered impossible to root from cuttings, when propagation systems that provide optimal environmental conditions are used (Harrison-Murray et al. 1988; Mesén et al. 1997, 2001).

Propagation systems, which maintain an atmosphere with low evaporative demand, reduce water loss through transpiration, so avoiding substantial tissue water deficits (Hartmann et al. 1997; Osterc and Spethmann 1998). The methods most usually used to control water loss from the leaves are intermittent mist and fogging systems (Harrison-Murray and Thompson 1988) or high-humidity, non-mist polypropagators (Leakey et al. 1990). Fogging systems raise the ambient humidity by producing very fine water droplets of 5–50 um in diameter, while mist systems produce larger droplets of nearly 100 pm. As long as the droplets are small enough, the fog or mist on the leaf allows evaporative cooling, resulting in humidity of 90–100% (Hartmann et al. 1997; Spethmann 1997). Non-mist propagators maintain high humidity by the evaporation of water from a reservoir below the rooting medium