

Partial rootzone drying (PRD): strategic irrigation management as viticultural tool affecting plant physiology and berry quality.

Gerhard du Toit

Department of Viticulture and Oenology, Institute for Wine Biotechnology, Stellenbosch University,
Victoria Street, ZA 7600 Stellenbosch, South Africa
E-mail: pgdt@sun.ac.za

Partial rootzone drying (PRD) is an irrigation management technique designed to reduce water use in grapevines without a decline in yield, thereby increasing water use efficiency (WUE). The principle of PRD is to keep part of the root system at a constant drying rate to produce soil derived signals to above-ground plant organs to induce a physiological response resulting in viticultural effects. Major PRD effects include a reduced canopy size and greatly increased WUE with possible improvements in fruit quality. Experiments conducted under Australian conditions consisted of field-grown grapevines irrigated at variable rates to elucidate a true PRD effect. The effects of PRD on the assimilation and partitioning of C and N in grapevines are reported and the sustainability and economic potential of the PRD system are discussed. Major findings include the effects of PRD on grapevine physiology on the biochemical level where the source:sink relationship between plant organs influences dry matter accumulation and nitrogen assimilation that will influence fertilization needs. Finally, the effects of PRD on berry growth and quality are discussed, especially the accumulation of hexose, amino acids and inorganic ions such as K^+ , that may have an influence on wine quality.