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Abstract

At present and more so in the future, irrigated agriculture will take place under water scarcity. Insufficient water supply for irrigation will be the norm rather than the exception, and irrigation management will shift from emphasizing production per unit area towards maximizing the production per unit of water consumed, the water productivity. To cope with scarce supplies, deficit irrigation, defined as the application of water below full crop-water requirements (evapotranspiration), is an important tool to achieve the goal of reducing irrigation water use.

While deficit irrigation is widely practised over millions of hectares for a number of reasons—from inadequate network design to excessive irrigation expansion relative to catchment supplies—it has not received sufficient attention in research. Its use in reducing water consumption for biomass production, and for irrigation of annual and perennial crops is reviewed here. There is potential for improving water productivity in many field crops and there is sufficient information for defining the best deficit irrigation strategy for many situations.

One conclusion is that the level of irrigation supply under deficit irrigation should be relatively high in most cases, one that permits achieving 60–100% of full evapotranspiration. Several cases on the successful use of regulated deficit irrigation (RDI) in fruit trees and vines are reviewed, showing that RDI not only increases water productivity, but also farmers' profits.

Research linking the physiological basis of these responses to the design of RDI strategies is likely to have a significant impact in increasing its adoption in water-limited areas.