Comparison between two different sprinkler systems for the “Radicchio” irrigation

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Introduction
Big gun sprinklers are commonly used in Veneto Region (Italy) to irrigate horticultural crops, especially “Radicchio” or red chicory (Cichorium intybus, var. Bishoff, L.). Even though this high-pressure irrigation system allows to irrigate large areas in a short time, it has some major disadvantages: the impact of the drops on the soil and on the crop can be very strong, producing soil crust and low crop sprouting; the high volume of water used tends to increase water and nitrogen losses (especially due to surface runoff). Further, water distribution uniformity is generally low: some areas do not receive enough water, whereas others can be over-irrigated, with negative effects on yield.

Material and methods
In order to evaluate the possibility to apply a portable solid set system using no impact low-pressure (mini) sprinklers on stand, experimental fields were set in two different sites located in the Veneto plain. The locations were chosen both for their environmental importance, being situated inside the Venice Lagoon Watershed, and for the large diffusion of this horticultural crop. The innovative system was compared with the traditional big gun system and the evaluated parameters were: water volumes (measured by water meter for mini sprinkler, estimated for big gun system), water distribution uniformity (CU and DUlq coefficients calculated using data obtained in situ with the catch-can method), crop production (five parcels of 2.4 m$^2$ per sector), and WUE (calculated as ratio between production in kg and water applied in mm).

Results and comments
During 2006 and 2007 the following preliminary results were achieved: with the innovative irrigation system the water distribution uniformity was higher (on average CU 82.8% versus 63.3% and DUlq 0.76 versus 0.43); the average crop production was higher (on average 22.3 t/ha versus 18.5 t/ha) mainly due to the higher number of harvested plants; the seasonal water volume applied was lower with a higher water use efficiency (on average WUE = 180 compared to 143 kg per mm of water applied).

Conclusions
In the two monitored seasons the irrigation system with mini sprinklers on stand allowed to obtain a higher yield with a lower seasonal water volume, which in turn led to a better water use efficiency. In order to improve the comparison between the two irrigation systems, nitrogen losses on deep percolation and surface runoff water will be analysed during 2008.

Bibliography