Golf courses that reuse water irrigate too much

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Irrigation is one of the most controversial aspects in the sustainable management of golf courses. Credit: SINC

Irrigation is one of the most controversial aspects in the sustainable management of golf courses. Researchers from the Canary Islands have spent 25 years analysing the practices relating to reclaimed water at one of the oldest golf courses in Spain. The results show that plants on the course receive 83% more water than they need.

"Excessive amounts of water are used, and this cannot be justified from any perspective", María del Pino Palacios Díaz, lead author of the study and a researcher at the Department of Animal Pathology, Animal Production and Food Science and Technology at the University of Las Palmas de Gran Canaria, tells SINC.

Despite the high cost of water (around €0.4 per cubic meter), the amount of water used on golf courses in the Canary Islands continues to be "excessive". On the golf course studied, plants receive more than 83% more water than they need, which reduces the risk of substances accumulating in the soil, but increases the risk of contaminating the aquifer.

The researchers have confirmed this on the basis of a "detailed" analysis of the nutrients and other substances contained in the reclaimed water, and by studying how this is absorbed by the soil and plants, how it travels through the unsaturated area, and the likelihood of it reaching the aquifer.

The research, which has been published in the *Spanish Journal of Agricultural Research*, also looked at the effect of re-using water reclaimed from desalinated urban water on soil fertility and the health of the greens between 1982 and 2007 at the Royal Golf Club of Las Palmas, one of the oldest courses in Spain and a "model" club in terms of how it is managed.

According to Palacios Díaz, although the study focused on a single golf course, the results could be extrapolated "to others in semi-arid or arid areas that are irrigated using water from urban or marine sources, and with similar soil characteristics".

Effects of using treated water

The quality of the water used to irrigate golf courses has improved a great deal since the 1970s. It is also "recommendable" that those that are able and that suffer from salinity problems reuse desalinated water for maintenance purposes. In fact, "permission is not given for new courses if they cannot show that the water used to irrigate them will be reclaimed", the expert explains.

The Royal Golf Club of Las Palmas is irrigated with water that has been desalinated, consumed by the public, treated and once again desalinated before being recycled for reuse. However, "the combination of water with low salinity and a high proportion of exchangeable sodium (which is common in desalinated regenerated water) can have a negative impact on the structural stability of soil, which loses fertility over the medium term because of losing its capacity to drain away water", the researcher says.

To this must be added the possible long-term effects of using it for cultivated plants, the irrigation system and the water of the aquifer. The scientists say it is not only the quality of the water used that could harm the condition of the soil and the aquifer, but "the frequency and amount of the recycled water used in irrigation".

"It is assumed that the consequences only depend on the quality of the water, when in fact the other factors normally have a greater influence", says Palacios Díaz in this study, which is part of the TRAGUA project on Water Treatment and Recycling for sustainable management.

In relation to the negative long-term impacts of the excessive use of desalinated reclaimed water, the researchers propose "adapting the species and varieties watered, instead choosing types that are more tolerant of salinity and thereby reducing the cleaning requirements. Paradoxically, this adaptation has been implemented at the golf course studied, but the amount of water used has not been reduced", explains the scientist.

The study also calls for the amount and frequency of watering to be adjusted to the needs of the plants irrigated in the area in question, and for consumption amounts to be calculated using internationally-accepted experimental equations (evapotranspiration equations). "This is the only way of ensuring sustainable use of reclaimed water", concludes Palacios

Díaz.

However, Spanish legislation does not address the sustainability criteria for reusing water. "Such criteria are poorly understood and, as a result, are generally not fulfilled", warns the researcher.

More information: Estévez, E.; Cabrera, M.C.; Fernández-Vera, J.R.; Hernández-Moreno, J.M.; Mendoza-Grimón, V.; Palacios-Díaz, M.P. "Twenty-five years using reclaimed water to irrigate a golf course in Gran Canaria" *Spanish Journal of Agricultural Research* 8, 2(95-101), 2010.

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