Reclaimed Irrigation Water Recycles More Than Just Water

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Irrigating with recycled water, or reclaimed water, reduces reliance on the potable water system and can help meet a course's nitrogen fertility requirements.

As we move into late spring, the amount of irrigation water applied each month will steadily rise with longer days and higher temperatures. Many courses in the West Region use recycled water for irrigation, which can come with a substantial amount of both wanted and unwanted elements. Some compounds in recycled water, like ammonium (NH_4) and nitrate (NO_3) can reduce nitrogen fertilizer requirements. Other elements, like sodium (Na), might require the addition of amendments to mitigate their harmful effects. Managers will want to monitor the amount of nitrogen (N) included in their recycled irrigation water as they plan their fertility programs this growing season.

How do you know how much nitrogen is in your recycled water? The following calculation, provided by Mike Huck of Irrigation and Turfgrass Services, can determine the amount of nitrogen supplied monthly or annually by recycled water. Multiply the parts per million (ppm) of total actual nitrogen in the water by 2.72, which will yield the amount of nitrogen in pounds per acre-foot (AF) of water. Ammonium and nitrate should be converted to nitrogen forms, and reported as NO3-N and NH4-N. You may need to specifically request a water test for ammonium-derived nitrogen because some labs test only for nitrate-derived nitrogen, which is the usual form found in natural water.

The amount of total nitrogen in recycled water can vary seasonally depending on residential water conservation, which can lead to a lack of nutrient dilution, and how much nitrogen is removed at the treatment plant to meet seasonal disposal requirements. To gain an accurate understanding of the annual nitrogen content in recycled water, it is recommended to perform water tests on a quarterly or biannual basis and during high and low irrigation demand seasons.

Next, adjust the pounds per acre-foot of nitrogen in the water for the amount of water used each month or for the current year. For example, 20 ppm of N in recycled water equals 54.4 pounds of N per AF of water. This equals 1.25 pounds of N per 1,000 square feet per 12 inches of water. When 4 inches of water is supplied in one month, the plants will receive 0.42 pounds of nitrogen. If the annual water volume applied to the course is 4 AF per acre, the total N input from irrigation will be 5 pounds per 1,000 square feet. The same calculations expressed as a formula would be:

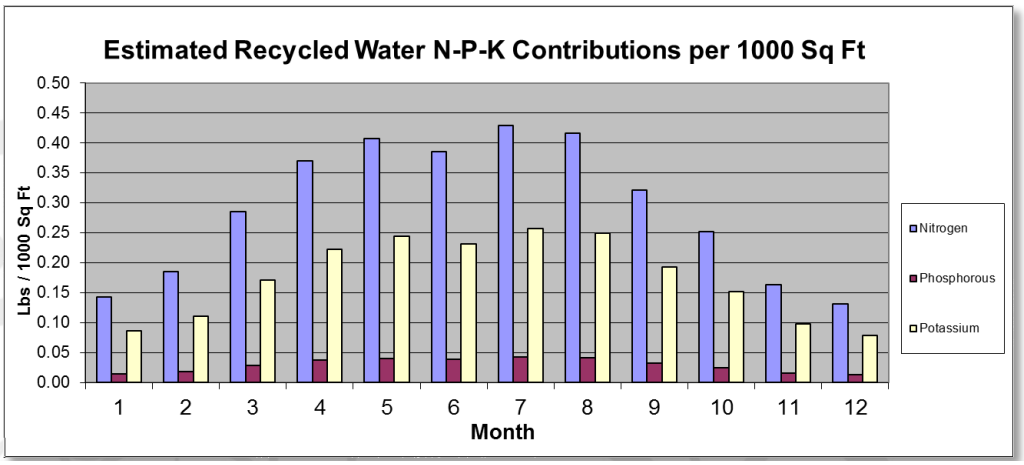
Estimated Total N = (N(ppm) x 2.72 / 43.56) x (Estimated Irrigation Demand in Inches per Month or Year / 12 Months)

Estimated Total N = (20 x 2.72 / 43.56) x (48 / 12)

Estimated Total N = 5 pounds per 1,000 square feet per year

This amount of nitrogen could meet a course's requirement for the entire year depending on the grass species and number of rounds played. Furthermore, the high amounts of irrigation water (and thus nitrogen) supplied during summer months can have unwanted effects. Excess summer fertility in warm-season grasses will likely over-stimulate shoot growth, requiring an increase in vertical mowing, regular mowing and turbine blowing. Excess nitrogen applied to cool-season turf may stimulate lush growth and increase the risk of disease.

If you are irrigating with reclaimed water, use the above calculation to develop a better understanding of how much nitrogen is being applied along with that water. Having this information will improve resource management and help avoid the negative effects of over-fertilization, such as excessive shoot growth. In the words of Mike Huck, "You can always add fertilizer if needed, but you cannot wish it away after the fact."



This bar chart shows that the nutrient content of recycled water adds a significant amount of nitrogen to the soil, especially during the summer when more water is applied. The amount of nitrogen that will be supplied by the irrigation water can be estimated, but only after a Water Budget has been established.

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Information on the USGA's Course Consulting Service

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