AN INNOVATIVE APPROACH TO WASTEWATER TREATMENT AND WATER CONSERVATION

ADAM MOWERY

Managing Member
Mowery Environmental, LLC

adam@moweryenviron-mental.com

Editor's Note: Growers should follow all state and federal environmental laws and regulations related to water usage, especially for water applied to crops for human consumption. Water used for these purposes should be confirmed by approved laboratory procedures to be free of pathogens, heavy metals and other toxins.

ENVIRONMENTAL ISSUE

The term 'mushroom wastewater' encompasses wash-down water from inside the growing houses, dirty water runoff from loading wharfs, runoff from mushroom substrate wharfs, peat moss effluent and water generated as a result of equipment washing. Traditional methods for treating this mushroom wastewater have included land application on grassed spray fields and reuse on farms that make mushroom substrate.

Both of these outlets are effective and acceptable forms of treatment; however, from time to time, another alternative is needed. When land application limits have been reached and reuse isn't practical because of excessive rainfall and/or the cost to pump and haul the effluent offsite is restrictive, treating the mushroom wastewater at its source so it can be recycled back on the farm as clean water or safely discharged is an additional practical approach.

A mushroom farm in Kennett Square, PA, has been seeking to accomplish this task over the past few years. In October 2015, they partnered with a company that manufactures both a mobile and stationary unit that is capable of producing drinking water-quality effluent from various types of wastewater. The purpose of the trial was to determine whether the system could be effective at treating the mushroom wastewater generated on this farm. Prior to the trial, wastewater samples were collected from the farm and analyzed in order to have baseline data. During the demonstration, samples of the product water, i.e., clean, treated water, were collected and sent to the lab for analyses as well. When the results of the analyses came back, it was evident that the wastewater treatment technology was up to the task, as the product water was of very high quality and most of the major components in the mushroom runoff were drastically reduced.

Wastewater treatment, using this particular technology, is achieved using a multi-step process that exists within a self-contained unit. Initially, the water is pumped through a gradient filter to remove larger particles. Then, based upon the application, the water is filtered through sand and carbon media or a microfiltration system. Next, there is the opportunity to inject two chemicals, a biological inhibitor and anti-scalant, into the effluent. After this step, the water is subject to ozone and, lastly, a high-pressure pump forces the water through reverse osmosis (RO) membranes for final treatment. Again, depending on the particular application, there's the opportunity to add additional treatments such as chlorination and ultra-violet (UV) disinfection.

There are two discharge streams from the unit. One stream is the reject water, which is the result of membrane backwash; this comprises about 30 percent of the total output. The product water is the other discharge stream and this makes up the remaining 70 percent. On a mushroom farm, the reject stream should be transferred back into the waste storage facility, i.e., concrete tank and/or lined lagoon. From here, it can be handled as before, either land applied or reused to make mushroom substrate. Each individual mushroom farmer will have to determine for themselves how they would like to handle the product water. If the operator desires to recycle it back on the farm, then it should be transferred from the unit into a fresh-water storage tank. If not, then it can be safely discharged through land application.

This particular technology has received a Gold Seal Certification from the Water Quality Association (WQA), which certifies products to industry standards and is accredited by the American National Standards Institute (ANSI). It has also received a NSF/ANSI-61 International Standard Certification, which establishes minimum health effects requirements for the chemical contaminates and impurities that are indirectly imparted to drinking water from product components, and materials used in drinking water systems. Moreover, it holds a ORD0902 certification from the WQA; this establishes the minimum

requirements for the evaluation of lead content in drinking water products, material, and components for compliance with laws, regulations, or other restrictions for lead contents. In keeping with state and federal requirements, all agricultural water must be safe and of adequate sanitary quality for its intended use.

There are various means in which the product water can be utilized back on the farm. It can be used for sanitation purposes inside the growing houses or on the loading wharf, to water the growing beds, and in steam boilers, among others. Being able to repurpose the water in these capacities will reduce the demand on groundwater resources for farms that are dependent on well water. If the farm obtains water from a public utility company, then being able to recycle the product water will allow operators to save money on their water bills. Incorporating this kind of technology into a farm's daily operations will not only improve the farm's environmental footprint, but it will virtually eliminate the challenge farmers sometimes face when trying to find appropriate outlets for their wastewater. ***mn***