CONFERENCE PRESENTS INFORMATION ON WASTEWATER IRRIGATION

Use of effluent wastewater for irrigation is becoming a feasible alternative to paying higher water prices, expected to climb to unreasonable heights. Wastewater can also provide side benefits in the form of nutrients. The only drawback is that not enough information is being disseminated so that a prospective user can determine the economics and feasibility of using the effluent.

Golf course superintendents are especially concerned and have strong organizational support. They have again taken the initiative in holding a "state of knowledge conference on wastewater irrigation of recreational turfgrass".

An audience of over 80 gathered in Arlington Heights, Illinois, to hear officials, architects, superintendents, businessmen, engineers and agronomists brought together by the American Society of Golf Course Architects Foundation (ASGCA), the Golf Course Superintendents Association of America, the National Golf Foundation, and the United States Golf Association Green Section.

According to Richard Nugent, ASGCA, one of the most important aspects of developing a site is the water. For this reason, golf course superintendents in the Chicago area have approached the North Shore Sanitary District and are going to put turf plots there to see what happens to grass under these circumstances.

Nugent (ASGCA) was called in to help with design of the project, workers from Northmoor Country Club, which is nearby, are going to mow and take care of the plots and Dr. Al Turgeon of the University of Illinois is going to monitor them. A check, using potable water, will be run along side the effluent plots.

Organizational initiative is the key to projects such as this and they can be easily duplicated across the country, if properly done. In this case, local contractors and suppliers have also volunteered their help and are donating equipment.

Wastewater falls into three general categories, according to David Gill of the ASGCA. Ranked in order of those most difficult to predict and control, they are: 1) storm wastewater; 2) industrial wastewater; and 3) sanitary wastewater. In the order of difficulty to treat and use, industrial is first, sanitary second, and storm wastewater is the easiest.

A golf course using effluent will receive it at a constant rate, but not all will be used as it is received, Gill says. For this reason, storage volume can be used as a basis for making general estimates of feasibility.

By determining irrigation requirements and comparing them with availability, a system for making feasibility statements can be established.

An empirical formula established by Quackenbush in 1965 can be modified to compute irrigation requirements for lawn grasses. This formula basically states that the evapotranspiration less the amount of precipitation divided by 70 percent irrigation efficiency equals the irrigation requirement.

David Gill, ASGCA

Based on this formula, Chicago fairways would require about an inch of water per week and greens and tees about one and one-half inches per week. Salt Lake City fairways would require two inches and greens and tees about two and one-half.

Figures should be designed to achieve the best quality turf and get the greatest efficiency from the effluent. The inflow rate depends upon water consumption and storage capacity. In determining the inflow rate, Gill uses the weekly water requirement, the length of the irrigation season and the length of the longest nonirrigation period.

These calculations resulted in the establishment of six zones. They cannot be ranked, but rather described, Gill says, because of many interacting factors. For example, zone number one, including southern California, Arizona, New Mexico and Texas, is not considered an effective zone. There is no storage problem there because irrigation can take place almost every day. Storage would only be needed for emergencies.

Storage would be minimal in semi-tropic areas. The plains and mountain states, on the other hand, would have high storage requirements. Zones 5 and 6, including the middle South, then North and Northeast, would have moderate to moderately high storage requirements.

Basically, what he has tried to do, Gill says, is to give an overview for more detailed local studies. There are many local exceptions to a general overview.

It is apparent that time might come when there is competition for available wastewater to irrigate with. When faced with what to do with theirs, Muskegon County Wastewater Management now uses it to irrigate 5000 acres of corn and harvests three or four hundred thousand bushels of corn every year.

Some of the crop gets 80-100 inches of water

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during the growing season at ¾-inches per day. The 1700 acres of lagoons also make a natural migratory bird haven. The Michigan Department of Natural Resources estimated there was 100,000 ducks on the lagoons at one time this fall.

While wastewater provides necessary water to the plant, it also has other elements in it that must be monitored to avoid a harmful buildup. Dr. Boyd Ellis of Michigan State University explained how industrial wastes affect some chemical properties of the soil. He gathered data from 59 treatment plants in Michigan.

The range in pH was 6.3 to 9.3 with a median of 7.5. Sixty percent of the plants had a pH near the median. The pH will change, according to Dr. Ellis, to that of the wastewater that is being applied.

In one example, in one surface soil, the pH rose from 4.4 to 6.6 in two and one-half years. The wastewater being used had a pH of 7.2-7.4. It may take one year, or ten, he emphasized, but it will happen and could lead to heavy metal deficiencies as they become tied up at higher pH's.

The amount of nitrogen ranged from 11-285 parts per million (ppm). The mean was 35, slightly higher than expected. The mean would be about right for Kentucky bluegrass and not too bad for bent. If you got on the low end, at 11ppm, the turf would only get about two pounds per growing season. On the high end, 285 ppm, it would get 47.8 pounds that might even do it in. You might be able to use it if you only applied it about three times during the season at one inch and then quit.

Phosphorus levels were low, .03-8.1 ppm with a mean of 2.2. It might not be too bad unless you were removing the clippings.

The thing to look out for is the extremes. Chromium, for example, had a mean of 2620 ppm which is not too bad because it precipitates in the soil. One sample had 99,000 ppm. Who knows what that might do.

The chances of drawing random effluent that would meet the average needs would be about one in three if you didn't bother to analyze it.

The cation exchange system is one of equilibrium, Ellis warned. You can't expect it to be a sink for all the bases you put in it. It will reach an equilibrium based on the properties of the water you're applying.

Watch SAR, or exchangeable sodium, values. Ellis recommends that SAR values should be less than five for turfgrasses.

In closing, Ellis offered five points to successful use of effluent. Establish the chemical composition of the wastewater you're going to use, before you use it. Find out if it is going to change (at the treatment facility).

Contract only when you can control how much and when you are going to apply it.

Carefully base your fertilizer program on the nutrient content of the soil and the nutrient content of the wastewater you're going to be using. Test the soil frequently.

Keep very close track of the sodium level in your wastewater and your soils. Don't let it become a problem. *Ron Morris* **WTT**

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