The next leap in irrigation technology may happen under ground

By DAVID F. ZOLDOSKE

Sprinklers have traditionally provided the valuable link between lush landscapes and arid conditions throughout much of the golf world. The sprinkler industry continues to work on improving water application efficiency, thus better utilizing our precious resources. However, the practice of distributing water through the air and onto the turf has its limitations. The answer to some of these limitations may come in the form of subsurface drip irrigation.

Placing water beneath the soil surface via buried drip lines is slowly becoming the "preferred choice" of some urban irrigators. The reasons are many, including the absence of surface evaporation, as well as reduced weed growth, maintenance, injury, and vandalism found with using more conventional water application systems. The advantages of subsurface drip can add up to reduced cost for water, labor, chemicals, and liability for property owners.

Additionally, critical timing of sprinkler irrigation practices is eliminated because play or landscaped areas can be entered on foot or by vehicle during or immediately after an irrigation event. It no longer requires letting the field dry down or turning the system off during planned or special activities.

The idea of burying drip irrigation lines is not new. In the past, root intrusion and other problems have caused this approach to be limited in its application or abandoned all together. However, new strategies currently being explored at the Center for Irrigation Technology (CIT) appear to have overcome or successfully dealt with this obstacle, making subsurface drip irrigation an emerging alternative.

The use of subsurface drip irrigation technology may well be the future of irrigation in the coming years and decades. It begins to treat large scale irrigation projects as hydroponic environments. It touches on such issues as groundwater contaminates, drainage problems, water resource management, chemical use, etc.

WHAT IS SUBSURFACE DRIP IRRIGATION?

Subsurface drip irrigation is a variation of traditional drip irrigation where the tubing and emitters are buried beneath the soil surface, rather than laid on the ground. Products being used today in subsurface drip irrigation on turf areas come in two basic configurations: hard hose and porous tubing.

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Hard hose products generally have wall thicknesses of 30 to 50 mils, with nominal inside diameters around one half inch. The emitter is either manufactured as an integral part of the tubing or is inserted later, and is typically placed at a repeated spacing interval of between 12 and 24 inches. The advantages to hard hose products are: strength and resistance to kinking, punctures, and rodent damage. Also, pressure-compensating emitters may be incorporated into hard hose products.

Porous pipe products emit water all along the length of the tubing. There are literally thousands of places per meter where water weeps out of the tubing. This design has shown resistance to plugging by roots. The disadvantage is its flow path is by far the smallest of the two configurations. This increases the likelihood of plugging by fine particles. It typically has the largest coefficent of manufacturing variability of the two configurations, which can be a major detriment because it prevents high distribution uniformities and high efficiencies.

Other design components of subsurface drip irrigation such as filtration and valving are very similar to those found in conventional drip applications. Proper filtration only protects the emitter from contamination from the inside of the emitter. Unfortunately, soil particles and other contaminants can be drawn into the emitter from the outside. This generally occurs at system shutdown, when a vacuum can develop in the lines and draw water and inorganic particles back into the emitter. To keep this from happening, many subsurface irrigation

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pesticide use as an "apple pie & motherhood" issue — meaning it's easy to get behind.

In other words, simply endorsing the 75 percent reduction in pesticide use may achieve the desired results. Enforcement is a sticky business that too often goes unrecognized in the polls.

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The editorial staff here at *Golf Course News* bids a belated but heartfelt farewell to Simone Marstiller, who handled the Marketplace section and kept our publisher in line since the newspaper launched nearly five years ago.

Simone has already enrolled at Stetson Law School in St. Petersburg, where she's begun the business of torts and *prima facie*.

We've no doubt she will take the law world by storm, but we wish her the best of luck just the same.

Subsurface drip irrigation: A peek at the future?

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designs incorporate vacuum relief-valves that break the vacuum and keep water and inorganic particles from moving back into the emitter.

FERTILIZATION THROUGH DRIP IRRIGATION

Subsurface drip irrigation has the ability to apply precise amounts of irrigation water directly to the plant roots. When fertilizers are injected into the water supply they too are delivered directly to the plant roots. In this manner, subsurface drip irrigation has the potential to deliver low fertilizer rates over extended time periods, with increased nutrient efficiency.

When chemicals are added to the water supply there is a potential for undesirable chemical reactions, particularly with phosphorus and some micronutrients. It is always recommended that an adequate water analysis be done before injecting any chemicals containing phosphorus. The introduction of these fertilizers into the irrigation water can lead to the precipitation of phosphates, particularly when high levels of calcium or magnesium are present. This precipitation will instantly clog emitter pathways and will cause a premature death to the subsurface irrigation system and of course, lead to the collapse of the turf.

CONCLUSION

With all the environment and economic pressures facing urban water users, subsurface irrigation holds the promise for answering many of these concerns. High water use efficiency of subsurface drip irrigation systems leave water available for allocation to other uses, such as enhancing environmental goals. It also reduces the deep percolation and associated ground water contamination and drainage problems.

In the urban environment, the reduction in risk of injury due to wet sidewalks or tripping on sprinkler heads may be enough to warrant its adoption. Maintenance expenses due to vandalism or breakage from heavy equipment can also be significantly reduced.

Finally, for urban applications, the ability to use effluent water without contact to the surface environment promises to be both an effective way to dispose of this water and provide water for turf and lush ladscape. California is currently adopting legislature which will permit the use of graywater from urban dwellings to be used in subsurface drip irrigation systems. It seems clear that the adoption of subsurface technology should be cautiously, but enthusiastically, pursued as an appropriate technology to deal with increasing water, environmental, and economic concerns.

Leslie comment

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foot green fit into the existing grades of the lawn. Next to it was a depression for a bunker. But flat is "in" with the new administration. If it doesn't watch out it will be a "flat-liner" itself in three years — especially if it continues to treat golf so shabbily and loses the golfing vote.

Its statisticians ought to compare numbers — golfers to volleyballers. Who represents the most votes?

Mr. Gore, my advice is, go ahead and tinker with the economy, mess with the environmental regulations, fiddle with your "rebuilt" government, but please keep your hands off the **real** national treasures.

Come-on, get serious...