



Sub-surface drip irrigation expected to rebuild soil quality

Osgoode Farms pencils out a return on its investment, plans for expansion

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A cash crop farm south of Ottawa is setting up for more extreme weather events, and banking on the benefits of subsurface drip irrigation (SDI).

Jarrold Dijkema, a graduate of both Guelph University, in Commerce, and Kemptville College, is now the general manager of Osgoode Farms Ltd., which installed the first 53 acres of sub-surface drip irrigation in 2020, and has plans to irrigate 350 acres in total.

“We’re hoping our irrigation system will help speed up the process of strengthening the soil biome and facilitating carbon sequestration,” Dijkema said. The aim is for the irrigated land to increase corn yields by 75 bu an acre, even in a dry year, to equal the average farm yield.

Dijkema explained that some of the farm was formerly sod, so the topsoil can be shallow, and they have been buying chicken manure to help build up organic matter. They also purchased a land shaper to do some contouring for better drainage for winter cereal and cover crops.

The soil is mostly light, sandy, so there’s not a lot of water-holding capacity. While the top soil is shallow, the subsoil is coarse, and the cation exchange capacity is low. “We do have lot of drainage, and the water table is relatively high, but there’s no capillary action,” Dijkema explained, during a presentation for the Innovative Farmers Association of Ontario.

They prepared the field by planting barley into the corn stubble, and tilling it in in the spring. Then, they had to work it a second time, because the barley sprouted after a rain.

Osgoode Farms chose this sub-irrigation to preserve moisture, reduce energy, and improve plant growth because it can deliver both water and liquid nutrients to the root zone at a controlled, slow and steady rate, particularly at the critical growth stages. Application rates and nutrients can be changed with the crop.

Subsurface irrigation should also reduce disease spread by surface irrigation, and there should be less weed



Installing drip lines, one foot deep. (PHOTOS COURTESY OF OSGOODE FARMS LTD.)

growth in the dry area on the soil surface.

Sub-irrigation reduces water use, relative to surface irrigation, as there’s no evaporation and no run-off, and the low flow rates also allows irrigation of a larger area with the same volume of water using less energy.

This system can be automated. Osgoode Farms has installed wiring in the same trench as the water mains, so it can eventually operate the control valves in each zone, remotely.

Dijkema said the fixed, underground irrigation has less mechanical parts, so there should be lower maintenance, and it should be less susceptible to vandalism. The only thing exposed above ground is the control valves. Another plus is that sub-irrigation is not affected by winds.

There are some cautions, however. Dijkema said he’s been advised not to let the soil dry out, because that will cause the roots to go searching for water and plug the drip lines.

If the change in elevation across a zone is more than 10 feet, it will also need a pressure compensating drip line to maintain even water distribution.

Flow rate is also affected by distance. The longest run he anticipates is 2,700 feet, and this will also need a pressure compensating line.

Patience was essential for installation in the summer of 2020. Dijkema had estimated it would take three weeks, and it took three and half months, so the cost escalated accordingly. It helps that the farm is a division of a drainage company, Agrodren Systems Ltd.

Osgoode Farms worked with VandenBussche Irrigation to design and supply the sub-surface drip irrigation system. Planning considered the contours of the land, as well as the field boundaries. They divided the 53 acres into six zones, which can be irrigated



The main line is installed below the frost line.



Osgoode Farms has four sand filters.

independently. The main line was located and sized for future expansion.

“We installed the main lines with a slight slope, as we need to blow out the lines for winter,” Dijkema said. The drip lines are buried 12 to 13 inches deep, and 45 inches apart for the most flexibility in cropping. They plan to plant across the lines, and will need to avoid deep tillage.

The drip lines, made with PVC, are glued, and the six and eight in sub-main and main lines are connected with gasket joints. The system, which runs at 10 psi, was pressure tested at 15 PSI, before backfilling.

There are flush valves at the end of the run, which are oriented to discharge into a ditch, Dijkema said. They can also be discharged like a fountain – which entertained a busload of school children this past fall.

“There is a learning curve with installation,” Dijkema said. “The first zone was the most difficult.” The drip line must be installed with emitters facing up, so they won’t get plugged

with sediment. Keeping the drill bits sharp, and connecting the grommets correctly to the main line is also important.

Osgoode’s sub irrigation system has two diesel pumps: one to move the water from the creek to a settling pond, and one to pump the water from the pond to the field. The system head includes sand filters, automatic back flushing, and a flow metre, as well as a fertilizer pump to inject soluble nutrients.

And, because it’s a relatively large system, there is a pressure-sustaining valve. The main controls are housed in a heated building to protect them from Ottawa’s sub-zero winter temperatures.

The demand for sub-surface deep irrigation systems for cash crops is growing, says Yuriy Gudz, a salesman for Vanden Bussche Irrigation who specializes in agricultural installations.

“I would say there’s 1,500 to 2,000 acres only in sub-irrigation,” Gudz told Ontario Farmer, but he’s

had more than a dozen inquiries about the system over the past two years.

The technology has been available for more than 20 years, but cash crops in Ontario haven’t needed irrigation. Now, farmers are starting to see the impact of climate change, and looking for solutions. While traditional irrigation is most common in southwestern Ontario, for vegetable crops and tobacco, the demand for sub-irrigation is “spread evenly through the agricultural part of the province.”

Gudz estimates the minimum cost is \$2,200 an acre. The value of the US dollar affects the cost because most of the component for the subsurface system come from the U.S.

Gudz also cautioned that sub-surface deep irrigation “is complicated. Not every farmer can do it and it’s not for every soil.” But, where there’s a good fit, will pay for itself.