Micro Irrigation

Surface and Subsurface
One of several types of micro-irrigation systems – Conservation Practice code 441.

It is one of the most advanced irrigation methods used today.

Operates at low pressure 10 - 15 psi, low volume and flow rates are measured in gph.

It is a planned irrigation system where water is applied directly to the root zone.

Potentially more efficient than flood or sprinkler irrigation, due to the reduction of evaporation.
Adaptable to fields with slopes and irregular shapes.

Suitable for vegetables, grains and silage crops, as well as orchards and windbreaks.
Micro-irrigation has high application efficiency > 90% and a high distribution uniformity > 85%.

- Reduces wet area to a fraction compared to conventional flood irrigation.
- Weed growth is reduced in arid climates, by keeping much of the soil surface dry.
- This is a 30 acres field that can be irrigated in 4 hours.

For Irrigation Requirements see Section 5 Gross Irrigation Water Requirement Guide.
Nutrients Management

- With proper IWM percolation is controlled.
- Nutrients can be applied at anytime, at any dosage directly to the root zone, without wetting the plant foliage.
- Reading Electrical Resistance Blocks and tensiometers to monitor soil moisture.
When compared to flood irrigation, labor cost is significantly decreased.

If managed properly micro-irrigation decreases water, fertilizer, and pesticide use.

Increases crop yields.

This is an Onion crop where planting area has been increased 15% by reducing the furrow size.
Soil erosion is reduced by eliminating tail water and overland flow irrigated induced erosion.
Many conservation practices are achieved and it may be through default.

- Increasing residue = Increases organic matter (OM) and microorganisms activity in the soil.
There is always apprehension in converting to something new or different.

System requires a heavy initial investment.

Currently cost ranges from $1200-2200/acre.

Equipment needs changes and adjustments.

The process has a steep learning curve.

Requires higher skilled labor than other irrigation systems.
Disadvantages

► Must be carefully designed and installed to ensure proper emitter flow rate, row spacing, and tape depth.

► Requires proper operation and maintenance to ensure the life of the system.

► Filtration is critical, emitter clogging will affect distribution uniformity and it is expensive to replace (sand cannot be dissolved).

► Soil salinity must be addressed, as limited leaching options exist.

► Excess CaCO₃ dissolved in irrigation water will clog emitter if pH is not managed. Too low pH will damage conveyance and emitters.
Disadvantages

- Limited pesticides and fertilizers are available for injection.
- Algae, moss, bacteria slime growth must be controlled using chlorination injection.
- Components can be easily damaged by vandals and rodents.
- Implements, tractor GPS and operator error can cause this kind of problems. GPS may lose reception and tractor moves when injecting the tape.
- Small errors may be manually fixed.
Types of Emitters

- Point Source
- Line Source
- Spray or Mini-Sprinkler
- Bubblers
Point Source Emitters

- Are installed by attaching to the outside of the lateral or distribution line.
- Installer selects the location, installing emitters equally or at variable spacing.
- Water applied to soil forms a small, round wetting diameter.
- They are suited for widely spaced plants like orchards, vineyards, and landscape.
- Most of these types of emitters are designed to be installed above ground.
Line Source Emitters

- Are factory installed emitters either molded or glued internally to the drip line, and equally spaced along the line.

- They are available in two variations: **Thin wall** drip line and **Thick wall** drip hose.

- Water applied to soil forms a continuous wetting pattern.

- These emitters are suitable for row crops, orchards, vineyards, and gardens.
Are emitters that operate by throwing water through the air.

Some have spinners and others contain no moving parts.

This system covers a wide area, with a wetting diameter of 2–7 feet. Some may cover 20-30 ft.

The flow rate varies from 3 to 30 gph, depending on orifice size and line pressure.

Mini-sprinklers are less prone to clogging than point source emitters.
Basin Bubblers

- Single or multiple port.
- Apply water in a small basin or depression in the soil.
- They are more applicable in orchards, greenhouses, and landscaping.
SDI Components & Installation

- Filter station
- Chemigation and fertilization injection
- Drip tape injection
- Mainline, Submain and Manifold
- Valves and Controls
Filter Station Construction

Sand Media Filter Station

Disc Filters

Multi Filtration System

Screen filter and pressure sustaining Valve
Chemigation and Fertigation

Chemical Tanks

Mixing Tank

Injection System

Jar Test
Tape Injection

- Tractor with six rolls unit for tape injecting.

- GPS guided tractor for bedding and tape installation is recommended to minimize row movement.

60” bed
Mainline, Submain and Manifold

Trencher

Mainline trench slices through tape

Manifold, tubing, tape connections
Field Control valves

- Automated Control Valve
- Control Box
- Main and Sub-Main Flush Valve
- Lateral Flush Valves
- Buried Control Valve
- Manual Control

Luis Garcia/Mauro Herrera
This practice will be designed in accordance with all federal, state, and local laws and regulations.

SDI falls under Micro-irrigation - Conservation Practice Code 441.

Must be carefully designed and installed to ensure proper emitter flow rate, row spacing, and tape depth.

Shall consist of pipe size, layout, efficiency calculations to > 90% and distribution uniformity > 85%.

Show all components in design layout, to make checkout much more easy.
► All materials shall be of high quality

► Ensure that fields are measured to exact size or it will cause irrigation efficiency errors.

► When testing the well for production, the well should be tested with back pressure.

► Resource inventories, local conditions and needs must be assessed prior to design (Soil types, crop needs and rooting depths of crops, germination, and climate).

► Drip system will be designed to deliver the maximum water requirements to all fields within 18 hours.
Design Requirements SDI

- Designed for good plant growth without excessive water loss, erosion, reduction in water quality, or salt accumulation.

- Designs will be developed to meet resource needs and the clients goals and objectives.

- Materials and workmanship on the entire system needs to be guaranteed for at least one year.

- Currently most SDI systems are being planned and designed by private contractors with final review and approval from NRCS.

- Don’t forget NM One Call system and document for utilities.
Water quality is a factor in maintaining micro-irrigation systems.

Take a water sample and test it for silt, sand, algae, bacteria, dissolved solids such as iron, sulfur, salts and calcium, and pH of the water.
Contact your supplier to decide what type of acid to apply.

Continually treat system with acid to ensure that calcium carbonate do not precipitate out of solution.

Consult with manufacture to determine pH limits of drip tape, emitters and conveyance line.
Chlorination

- If water has high organic load, chlorinate system continuously 1-2 ppm or bi-weekly with 5-20 ppm.

- End of season chlorinate at 40 ppm for at least four hours, and completely flush and drain all pipes with clean water.

- Also, blow out lateral lines with air not to exceed 15 to 20 psi of pressure.
Monitor your pressure gages.

Protect your components from rodents.

Check for mechanical damage.

Check for rodents and get rid of them.

Repair leaks. There are several ways for repairing.
Replace damaged parts, clean Sand media and Disk filters as required by manufactures.

Irrigation system evaluation by a trained professional is highly recommended.
Earthworms- Chile Crop
Good residue management
Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA’s TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.