Sub-surface Drip Irrigation—Alfalfa/Forage Crop Production in Arizona

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March 29, 2017  Patrick Fernandes AG DRM Southwest
Netafim USA
Good Quality Flood Irrigated Alfalfa is Grown Throughout the Southwest US
Typical Flood Irrigated Field Arizona

Water Characteristics
- Source—well or surface
- Availability—district controlled or on-demand
- Quality—total TDS
Flood Irrigated Alfalfa in Arizona - Issues

- Inadequate water availability due to high percolation rates in sandy soils
- Poor uniformity at low end of field
- High labor for delivery ditch and field maintenance
- Weed issues
- Scalding in summer months
Check flood systems for Alfalfa Production

One of the biggest issues with a check flood system for alfalfa hay production is difficulty in improving distribution uniformity over a field.

The problem is due to the greater period of time for water infiltration at the top vs. the middle vs. the bottom of the field.

One of the key advantages of SDI over flood is the ability to quickly apply a uniform irrigation to the entire acreage in a field.
Typical Alfalfa Flood vs. Drip Data

- Yield for flood irrigated alfalfa 6 to 7 tons
- Yield for drip irrigated alfalfa 10 to 15 tons
- Turnkey SDI System cost ~$2500/acre
- Must be proactive with maintenance especially on older SDI systems.
- 8-9 cuttings per year in our zone
- High labor costs for flood system
- Higher level of management necessary for SDI
Settling pond for CAP water
Series of short coupled turbine pumps lifting CAP water from the pond
Sand media filter station with fertilizer/chemical injection system
Tape lateral row spacing 40”
Drip Irrigation Requires More Management

- Repair leaks
- Rodent control
- System repair due to animal and mechanical hits
- Chemical maintenance
- Algae control
- Leaching for salinity control
Better and Longer Stand Life in SDI

Generally, we see a better and longer stand life with SDI alfalfa. Some reasons are:

• Lack of standing water on the surface eliminates scalding and provides an aerobic area for microorganisms
• Less damage to the field from equipment with less tractor and equipment passes
• Better and more uniform stands on the tail end of the field
• No re-plant necessary with SDI
Better Management Can Result in Higher Yields

- Rodent damage can reduce yields by 30% (even if you do not use drip, rodents must be managed)
- Fertilizers are more effective when applied directly to the active root zone
- Fertilization does not require tractor passes
- Can Irrigate right up to harvest day
- Rapid re-growth after cutting
- Labor for preparing fields for flood irrigation is eliminated
- Better crop and water management can give longer more productive stands
High Yielding/High Quality Drip Irrigated Alfalfa
Advantages of SDI in Alfalfa

• Rapid re-growth from irrigating immediately after and during harvest
• Reduces plant stress which increases the quality and yield per cutting
• Reduces intervals between cuttings which can increase the number of cuttings per year
• Fewer weeds with no surface water
• Longer stand life by managing irrigation schedules that produce healthier root systems
• Improved uniformity of growth resulting in more efficient harvests
• No evaporative losses
• No runoff on the lower ends
Rodent Management Strategies

- **Traps**—The Gophinator Gopher Trap
- **Baits**
- **Fumigants**
- **Owls**—Nest box installation; nesting pair
- **Borders**—Keeping flood irrigation as an option and getting benefits of occasional flooding of a field
- **PERC**—Pressurized Exhaust Rodent Controller
Other Rodent Management Options

- Habitat modification—removing vegetation around the field
- Cultivation—Deep ripping pre-plant and pre-install of SDI
- Explosive devices—Propane and oxygen mixture (potential hazards associated with explosive devices)
- Repellants—Not (scientifically) proven effective
District Water-Boosted with dual centrifugal pumps
4000 gpm Filter Battery-16 tanks
Quick pressure relief valve for system protection
Typical Zone Valve configuration
Know your Field and Soil Characteristics

- Field Size/Dimensions
- Soil Texture
- Soil Fertility
- Soil Salinity
- Water Holding Capacity
- Drainage Issues
Dripperline/Tape Installation

Dripperline Specs

- Row Length—1300’ runs
- Dripper Flow Rate—Low flow .18 or .24 GPH/dripper typical
- Dripper Spacing—12” to 16” is typical in desert
- Dripperline Diameter—10mil 875 (7/8”) for ¼ mile runs
- Row Spacing—30” to 40”
- Depth—6” to 10”
Early Stand Establishment
Sprinklers are used for germination
SDI Irrigation Scheduling

- More control over design and implementation of irrigation schedules
- Spoon feeding the crop with water and fertilizer when the crop needs it
- The ability to place water and nutrients directly in the root zone is key
- Schedule by time or by ET
First year crop almost completely filled in.
Quality of stand under drip is excellent
Quality and Yield

Quality and yield go hand-in-hand with SDI produced alfalfa hay. Although it can be argued that quality is not increased, we have seen it at many levels on large commercial farms in Arizona and California.

Historical flood or sprinkler yields—6-8 tons/acre/year

Historical SDI yields—10-15 tons/acre/year

Quality ranges generally supreme to premium
Field Ready for Harvest
Better uniformity in SDI means more tonnage and more control over the crop.
Delivered to the dairy...
Farming SDI Alfalfa in the Arizona Desert with poor water quality and weak soils is so EASY!