

IRRIGATION MANAGEMENT FOR ALFALFA HAY PRODUCTION ON BEDS

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ABSTRACT

Alfalfa is a major crop under irrigation in desert regions, and frequently is grown on heavy clay soils. Standing water on alfalfa causes root injury and disease and sometimes ‘scald’ (death of plants due to lack of oxygen) under hot temperatures and therefore growers have developed methods of planting alfalfa on ‘beds’ to allow better drainage and more effective water management. This method has a series of benefits, including avoidance of water damage, longer stand life, better air circulation to the roots, and reduced field traffic effects on plants. Bed planting includes a range of configurations, but is not practical for lighter (sandier) soils. Disadvantages include higher rates of tailwater runoff, increased ground preparation and planting costs, increased weed and pest control costs, and the need for modification of equipment to accommodate the furrows. Several practical strategies and recommendations for management of irrigation for alfalfa on beds are provided.

Key words: irrigation, stand establishment, bedded alfalfa, water management, diseases

BENEFITS OF PLANTING ALFALFA ON BEDS

There are a number of benefits to planting alfalfa on beds.

- The row-beds help keep the plant’s crown from being submerged in water. Because of this, the method is believed to help the crop maintain a longer stand life and improve production on heavy and marginal soils. This is especially beneficial during the months of extreme high temperatures and high humidity, which are common during Imperial Valley summers where the heat index can exceed 130 degrees F.²
- Due to the effect of the raised beds, which allow air to better circulate, growers can bale the alfalfa 1-2 days sooner.
- The row-bed method allows for easier tracking of equipment, reduced soil compaction and less tire damage to plants (which can contribute to plant disease).
- If the field is over-irrigated, row beds are more forgiving because the elevated alfalfa crowns are not submerged in the furrow and standing water.
- Beds are a little more forgiving to irrigate if the field is not exactly level.

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IRRIGATION MANAGEMENT STRATEGIES

- Use the head-end of field with a spud ditch. This allows more ease in turning equipment and the spud ditch can aid irrigation.
- Install row tubes (2-3" diameter) and use with [tablitas](#) (small wood stakes) to control and regulate water flow. This helps all rows in the set advance evenly and regulate flows for the management of different desired set times:
 - SLOW – 24 hour sets are used during periods when weather is cooler but not cold and there's very little chance of rain; planted alfalfa is actively growing. This is generally conducted between February and April and is used to:
 - refill soil profile
 - provide additional water to leach salts
 - observe subsurface drainage tile performance
 - MEDIUM – 12 hour sets are preferred when temperatures are not in the 100-degree ranges and the humidity is low; generally, September/October-November and April-June.
 - FAST – 3-4 hour sets are used when temperatures are high (when air conditioning is needed 24/7); generally from June-September/October.
- With row-beds, it's easier to change irrigation direction and infiltration to match both field slope and soil type.
- Subsurface drainage with tile lines tends to be on 35 to 200 ft spacing between lines, 5-7 ft deep.
- Relatively high-salinity water (salinity level of about 1dS/m) from the Colorado River is the only water available to farm within the Imperial Valley. Imperial Valley farmers are almost the last user on the river, and salinity can be higher than upstream river users in Parker and the Palo Verde valleys. This can require more frequent irrigations, especially on heavy soils where soil salinity may be relatively high (just 2-3 feet below the surface), therefore the active root zones are relatively shallow.
- Today's plant varieties do not have the crown size that varieties did 40-50 years ago, so they are not as hearty and tend to not survive well without irrigating in August.
- High heat units and soil temperatures require short irrigation set times to allow time for oxygen replenishment in the soil for both plant transpiration and soil microbial respiration. Due to high soil temperatures, soil microbial activity increases as there is competition for oxygen.
- Sometimes it is better to irrigate at night due to extreme temperatures to avoid scalding.
- Irrigators needed to keep an eye on the tailwater box 24/7 for plugging or capacity issues.
- Tailwater Return System (TRS) and cascading sometimes are used to minimize tailwater and are often mixed with fresh irrigation water for salinity control and sometimes temperature control.
- Alfalfa is planted on beds primarily on fields where the farmer believes he/she would gain both higher production and higher quality hay than if it were planted on flat or on [border](#) strip.

ROW vs. BORDER STRIP IRRIGATION

- When irrigating rows, wait until all rows are out before you change a set.
- When irrigating flat or **border** strip, change the set long before any tailwater appears. There could be severe consequences if the set is changed too late when the temperature is high and water flow is large.
- I experienced how irrigation intervals, of sooner than 8-9 days during the summer months, does more harm than good even if the soil profile does not get refilled. With more frequent irrigation cycles, the plant can show signs of being deprived of oxygen. So, I work to manage the soil moisture profile prior to the hot summer months, knowing that deficit irrigating occurs during this time.
- When the evapotranspiration (ET_O) exceeds 0.2'' per day, have usually recommended changing from 2 to 3 irrigations between cuttings for those fields planted on heavy soil types.

DRAWBACKS TO PLANTING ALFALFA ON BEDS

- Higher percentage of tailwater.
- Increased ground preparation and planting costs.
- Increased pest control costs.
- Increased weed control (herbicides and cultivation used in furrows).
- Equipment requires wheel spacing adjustments to accommodate row spacing.
- Wheel rows need to be managed for irrigation. (With compaction, water runs faster and infiltrates slower).
- Increased irrigation times result in greater irrigator costs.
- In row structure, less than half the area gets irrigated – so irrigation time usually needs to be increased to offset and get the need for water penetration
- Formula for water infiltration:

$$\text{Water Infiltration} = (\text{Soil's Infiltration Rate}) \times (\text{Irrigated Surface Area}) \times (\text{Time})$$

SUMMARY

Managing irrigation for alfalfa hay production is both an art and a science. The science – irrigation scheduling – helps get one in the ballpark with the numbers of how much water to apply and when it is needed. The art is seeing how the crops react with the different application set times during the seasons as temperatures range from highs above 115 degrees to lows in the 20's. I have come to learn that when certain conditions occur, it is generally time to adjust the frequency and/or duration of my irrigation recommendations on the alfalfa fields I help manage.

Alfalfa hay production never ceases to stop in the Imperial Valley as there always seems to be someone with hay down someplace 52 weeks a year, with rain being the only show stopper. Farmers are usually able to get 7-10 cuttings per year, averaging 7.5 tons/acre Valley wide, with some fields producing 12 tons per acre per year.