

Extending Irrigated Alfalfa Stand Life and Long-Term Profitability by Alteration of Late-Season Harvest Schedules

Robert Hammon (Colorado – Research & Education Grant)

Project Number: SW02-002

Title: Extending Irrigated Alfalfa Stand Life and Long-Term Profitability by Alteration of Late-Season Harvest Schedules

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Project Participants:

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Mark Stack, Manager
SW Colorado Research Center
Yellow Jacket, Colorado

Grower Cooperators:

Fry Farms, Fruita CO
K Bar T Farms, Grand Junction CO
Denham Farms, Olathe CO
Soderquist Farms, Delta CO
Ute Mountain Ute Farm & Ranch Enterprise, Towaoc CO

Western SARE Grant: \$61,270

Situation:

Alfalfa hay is the most important crop grown in western Colorado, both in acreage and gross financial return. Some growers plant alfalfa planning to rotate to other crops in three years. Others hope to extend the stand as long as possible, often up to 10 years to maximize hay production.

In recent years, alfalfa stand lives have declined, possibly because of:

- Pests – alfalfa stem nematode
- Diseases – verticillium wilt, crown rot, stem rot
- Shift to intensive management requiring more frequent harvesting

Stand decline blamed on nematodes and diseases may result from plants stressed by insufficient carbohydrate reserves. Stem nematode clearly causes poor first cutting growth and plant death. But the solution may lie less in controlling nematodes than in managing the plant environment in a way that minimizes nematode damage.

Understanding the interactions among harvest management, stored non-structural carbohydrates, alfalfa stem nematodes and plant pathogenic fungi could pave the way to a simple change in late-season harvest management.



Studies were conducted at the Western Colorado Research Centers to determine the impact of the number of cuttings as well as the timing of the final cutting harvest in the subsequent crop year.

Objectives:

1. Determine if modification of present late-season alfalfa harvest practices affects stand persistence
2. Determine relationships and interactions between late-season harvest management practices and alfalfa varieties on non-structural carbohydrates
3. Conduct an economic analysis of traditional and modified late-season harvest practices to determine how long-term profitability is affected by management change
4. Demonstrate to growers the effectiveness and economics of modifying late-season harvest management practices in maintaining alfalfa stands



Growers who cooperated in the project left a small plot of alfalfa standing in the field when the final cutting was taken. Yield was estimated from these areas in the fall and again in the subsequent first cutting.



Spring green-up was earlier and more uniform in the areas in which the final cutting was skipped. There was greater first cutting yield in uncut areas, although the difference was not great enough to justify skipping the final cutting entirely.

Actions:

The impact of harvest management on stand persistence was studied under long-term investigations at research centers and in on-farm trials with grower cooperators.

Long-Term Studies

Location: Western Colorado Research Center, Fruita, 4,500-foot elevation, furrow irrigated, four cuttings, and Southwestern Colorado Research Center, Yellow Jacket, 7,000-foot elevation, sprinkler irrigated, three cuttings

Design: Randomized complete block, split plots, with final harvest arranged as the main plot and alfalfa varieties arranged as sub-plots

Varieties: Dormancy ratings of 2, 4 and 6; within each dormancy rating, a variety highly resistant, and one less resistant, to alfalfa stem nematode

Harvest: Traditional – early October; modified – after first killing frost and growth cessation

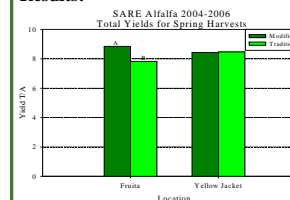
On-Farm Trials

Location: 13 trial strips on seven grower farms

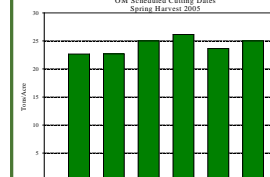
Design: To fit grower needs and equipment

Harvest: Compared traditional late-season harvest with modified harvest after a killing frost. Growers left a small strip uncut during the final harvest

Results:



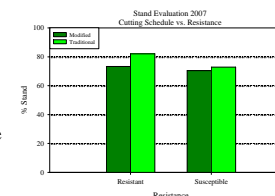
Stem nematode resistant varieties had 1.13 tons per acre greater yield at Yellow Jacket than susceptible varieties, and 3.6 tons per acre greater at Fruita over the four years data were collected.



In the four-cutting system at Fruita, delaying final harvest until growth ended significantly increased yield of the following year's first harvest. The modified practice did not increase yield in the three-cutting system at Yellow Jacket.

Later final harvest dates led to greater carbohydrate levels going into the winter. Carbohydrate levels in plots that were cut after Oct. 15 did not differ from those in which the final cutting was skipped.

Planting alfalfa varieties with pest resistance is very important. The extra cost of seed for varieties with multiple pest resistance is small when the extra yield over the life of the stand is considered.



Impacts:

- ◆ One cooperator skipped the final cutting on several fields. He used the residue as fuel to burn the field in the spring. The burn allowed skipping first cutting herbicide and insecticide treatments. Pesticide savings, coupled with increased yield from skipping the final cutting, paid for the lost cutting.
- ◆ Fall rains during two of the study's four years, which made October harvest difficult, prompted several growers to skip the final cutting based on their new knowledge of the potential beneficial impact on spring growth.
- ◆ Workshops at which the program was discussed were attended by 300+ people, 175+ of whom were growers representing 5,000 acres.
- ◆ Among potential economic benefits:
 - ◆ Switching from baling a fourth cutting to grazing would increase four-year profit to \$951.49 from \$775.68, or \$175.81, primarily owing to reduced harvest costs.
 - ◆ Grazing standing crop after growth stops increased net income by \$167.22 per acre over four years compared with the traditional harvest system. Factoring in the increase in first cutting yield raised net income by \$225.30 per acre.