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ALTERING ALFALA HARVEST TIMING

Situation

Alfalfa hay is the most important crop grown in 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.

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

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

Stand decline blamed on nematodes and diseases may result from plants stressed by insufficient carbohydrate reserves. Stem nematode

Research & Education Grant

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

Project Number: SW02-002

Principal Investigator:
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Regrowth after different harvest timing, fall 2003.

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 manage-

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

Objectives

1. Determine if modification of present late-season alfalfa harvest practices affect 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



Bob Hammon harvests plots at Orchard Mesa, Colorado.

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Western SARE, a USDA organization, funds grants for research and education that develop or promote some aspect of agricultural sustainability, which embraces

- *profitable farms and ranches*
- *a healthy environment*
- *strong families and communities.*

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<http://wsare.usu.edu>

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ALTERING ALFALA HARVEST TIMING

economics of modifying late-season harvest management practices in maintaining alfalfa stands

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 irrigation, 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

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.

At Fruita, dormancy 4 and 6 cultivars yielded more hay than dormancy 2. At Yellow Jacket, Dormancy 2 and 4 cultivars had greater yield than dormancy 6.

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 13 trials with growers (11 in four-cutting systems, two in three-cutting systems), first-cutting yield was 30% greater in unharvested strips than in traditional harvested strips in the four-cutting systems, but there was no yield difference in the three-cutting systems.

Alfalfa stem nematodes were present in all grower fields, but evidence of damage was greater in traditional systems.

Late-fall samples showed higher levels of non-structural carbohydrates in all fields when the final cutting was skipped, but that trend did not carry over to spring samples in which no differences were detected.

Potential Benefits

As this is a long-term study, measurable impacts have yet to be demonstrated, especially on whether altering harvest schedules will extend stand life.

One grower with an on-farm trial has skipped the final cutting on several fields, using the residue to burn



Test plots show regrowth differences.

stubble in the spring, skipping herbicide treatment for winter annual mustards and insecticide treatment for alfalfa weevil. 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 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.