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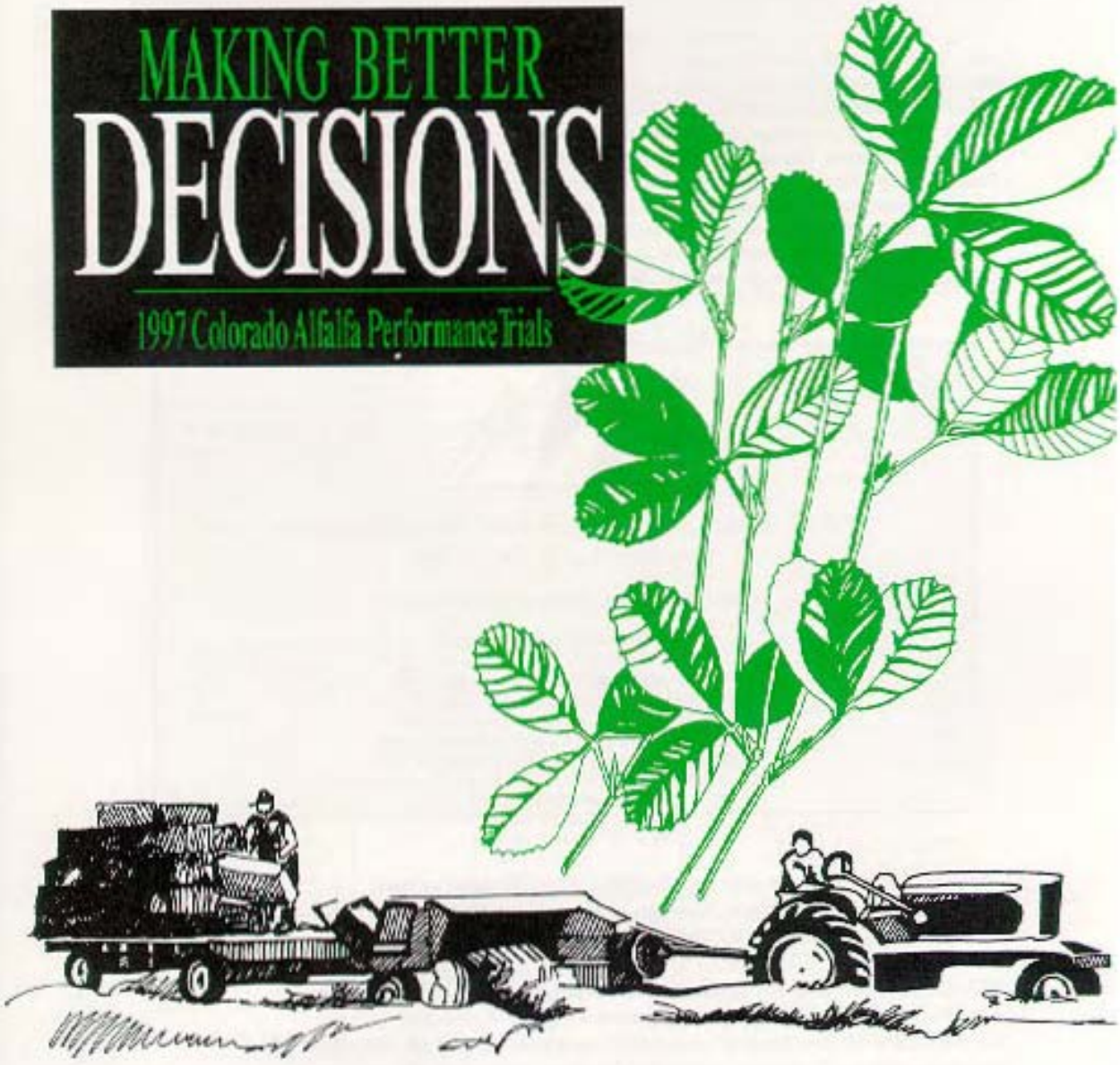
1997 Colorado Alfalfa Performance Trials



Agricultural Experiment Station

Colorado State University

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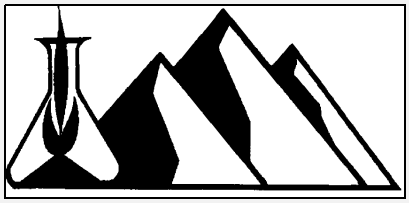

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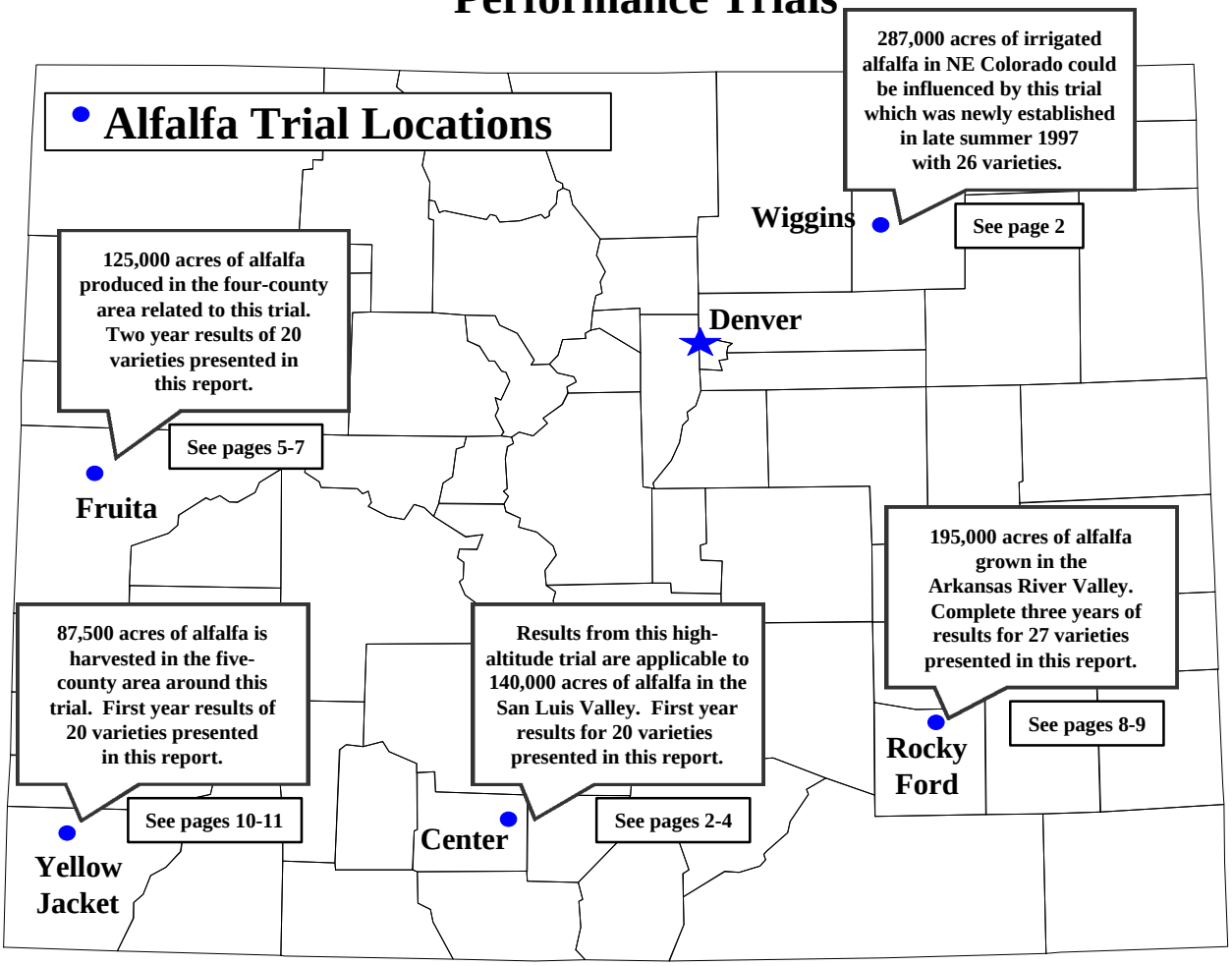
Technical Report TR 98-1

Agricultural Experimental Station	Department of Soil and Crop Sciences	Cooperative Extension	January 1998

1997 Colorado Alfalfa Variety Performance Trials



ACKNOWLEDGMENTS

The authors wish to express their gratitude to the Colorado State University Research Centers who generously contributed the use of their land, equipment, and time to conduct these trials for the good of all Colorado alfalfa producers: Center - San Luis Valley Research Center; Fruita - Fruita Research Center; Rocky Ford - Arkansas Valley Research Center; Yellow Jacket - Southwestern Colorado Research Center.

1997 COLORADO ALFALFA PERFORMANCE TRIALS

Introduction

Colorado alfalfa producers annually harvest 850,000 acres which was valued at over $280 million in 1996. To help hay producers make better alfalfa variety decisions, Colorado State University researchers evaluate alfalfa varieties at multiple locations. The objective of these trials is to provide Colorado hay producers with reliable and unbiased alfalfa variety information obtained from local trials. Participation by the seed companies in the state trials is completely voluntary. All commercial alfalfa seed companies are given the opportunity to enter one or more varieties at any location. Reference to commercial companies or varieties is made with the understanding that no discrimination is intended and no endorsement is implied by Colorado State University.

A randomized complete block design with four replications is used for each of the five alfalfa variety trials conducted in Colorado in 1997. Information on date of planting, fertilization and herbicide or insecticide applications made during the cropping year is provided at the bottom of each table of trial results. Hay yields are calculated on an air-dry basis. The least significant difference (LSD) and coefficient of variation (CV) are reported by cutting and for the total annual yield.

Agriculture Experiment Station at Colorado State University

A Message by Lee Sommers, Director
Agriculture Experiment Station

The Colorado Agricultural Experiment Station (CAES) is an integral component of your land-grant university. About 130 individual research projects are supported by the CAES at Colorado State University. This report addresses research being conducted by CSU scientists on issues facing forage producers in Colorado.

The mission of the Colorado Agricultural Experiment Station is to focus and support research leading to an agriculture that is economically viable, environmentally sustainable, and socially acceptable. Areas of disciplinary and interdisciplinary research emphasis for the CAES include: (a) improvement of plant and animal resources; (b) environmental quality - the interaction of agricultural and natural resource systems; (c) integrated agricultural systems; (d) alternative uses for agricultural commodities; (e) foods - their quality and safety; and (f) enhancing agricultural and rural economies. The CAES supports the concept that agricultural research extends across the entire campus and that colleges within the University work in concert with each other to solve problems through interdisciplinary effort. The CAES is not a single location; rather, it is a statewide system conducting mission-oriented research to meet the needs of Colorado constituents. Work of the CAES is conducted both on and off campus. Currently, CAES supports 22 on-campus departments conducting mission-oriented research that ranges from basic biology of plants and animals to applied field research on crop and animal production. The CAES program likewise includes research on social and economic aspects of issues as well as research to solve agricultural and natural-resource problems that exist in different regions of the state. The eleven off-campus research centers are staffed with professionals dedicated to conducting locally directed, applied research and outreach programs.

We appreciate your feedback on our programs and on this report. Many of you have supported our research programs in a variety of ways. A sincere thank you to all for this support.

Northeastern Colorado Alfalfa Variety Trial at Wiggins (formerly Sterling)

Jerry J. Johnson

Importance of Alfalfa in Northeastern Colorado

Alfalfa is big business in the twenty counties comprising northeastern and east-central Colorado where 287,000 acres of irrigated alfalfa hay and 158,000 acres of dryland alfalfa were cut for hay in 1996. The northeastern Colorado alfalfa hay production in 1996 of almost 1.5 million tons was valued at $137 million and accounts for about one-half of the Colorado's total alfalfa hay production value.

Researcher comments on the variety trial

The northeast Colorado alfalfa variety trial was planted originally near the exposition area of the Colorado Hay Days, about 10 miles west of Sterling, on April 4, 1997. Dry planting conditions resulting from early-season drought in NE Colorado led to weak stands that did not recover with late May precipitation. On July 30 the plots were inundated in the flood and covered by as much as 4 feet of standing water. A new site on the south side of the Platte River Valley was identified in August. New seed was solicited from participating alfalfa seed companies, and the trial was replanted September 3, 1997 on the Martin Smits farm, west of Wiggins. Excellent stands have been obtained and plots were still green as of December 15, 1997. To see the plots, go 4.2 mi west on Hwy 34 from the I-76 and Hwy 34 interchange to Morgan County Road 1 and then go 0.7 mi south to County Road S. Go east ¼ mi to the pivot road and the trial is in the northern half of the circle on the east side of the pivot road. The legal description of the location is: NW ¼ of Section 4, T 3N, R 60W.

Jim Hain (Crops Testing) and Bruce Bosley (Morgan County Cooperative Extension) have worked together to make a success of the new trial. Twenty-six varieties were planted in the trial: 3L171, AlfaLeaf II, ALPHA 2001, Ameriguard 401 + Z, Big Horn, Complete, Depend + EV, DK127, DK142, Evergreen-2, Excalibur II, ICI 630, ICI 631, Innovator + Z, Legacy, Magnum III, NK04, Pioneer brand 5312, Pioneer brand 5396, Shamrock, Spartan, Tahoe, TMF Multiplier II, Total + Z, Webfoot MPR, WL 325HQ.

Researcher

Dr. Jerry J. Johnson has been conducting crop variety trials since 1977. He grew up in the Columbia Basin in eastern Washington and spent his summers cutting, raking, bucking, and stacking alfalfa hay. After Peace Corps, he obtained a B.S. from UC Davis and worked for 10 years in West Africa in agriculture development before returning to Washington State University for an M.S. and Ph.D. in plant breeding.

San Luis Valley Alfalfa Variety Trial at Center

Merlin A. Dillon

High-Altitude Alfalfa in Colorado

Results from the alfalfa variety trial in the San Luis Valley are applicable to other high mountain areas of Colorado and adjacent areas of Northern New Mexico. The San Luis Valley of Colorado is a large, flat intermountain valley surrounded by snow-capped mountains. The elevation of 7600 feet makes for a cool, short growing season. The average annual precipitation in the San Luis Valley is only 7 inches. The average frost-free period is 88 days; from June 10 to September 6. Growers are going more and more to a 3-cut system. Winterhardiness and persistence are important varietal factors to consider as well as yield and pest resistance. Important pests in this area include alfalfa weevil, pea aphids, and *Phytophthera* root rot.

Colorado's high-altitude alfalfa acreage exceeds 200,000 acres. San Luis Valley growers harvested 140,000 acres of alfalfa in 1995 and the trend is for increased acreage as dairy production increases in the High Plains of New Mexico, Texas, and Kansas. Alfalfa stands in the San Luis Valley usually last 5 to 7 years which means about 23,000 acres are seeded each year. About half of the alfalfa acreage is sprinkler irrigated under center pivots and the remainder is flood irrigated. The average yield for the area is 3 to 3.5 tons/acre with typical center pivot yields closer to 5 to 5.5 tons/acre.

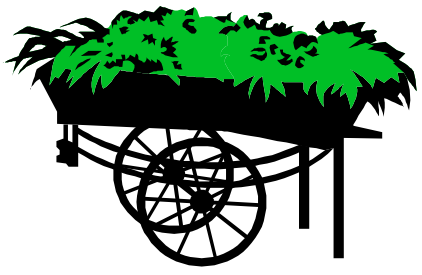
Researcher comments on the variety trial

The 1997 season was normal until mid-July when the rain showers began. The first cutting was slightly earlier than normal and was baled without rain. Rain showers began in late July and most growers suffered reduced yield because of rain-damaged second cutting and delayed regrowth for the third cutting. The plots suffered no second-cutting damage since the forage material was removed at cutting, but the third cutting yield was reduced because of delayed regrowth.

The yield results this year are typical for the area. As usual newer varieties performed better than the old standards as usual. Vernal and Ranger produced only average and below-average yields. The advantage of newer varieties is usually 0.7 tons/acre, more than enough to pay for the higher seed cost of newer varieties.

Researcher

Merlin A. Dillon, Area Agronomy Extension Agent, Agronomy has conducted alfalfa trials in the San Luis Valley for 15 years. Raised on a dryland farm in southeast Colorado (Baca County), Merlin received a B.S. in Agronomy from Panhandle State University in Goodwell, Oklahoma, and an M.S. in Agronomy from Colorado State University. Merlin worked for Kansas State University, as an irrigated farm consultant, and as an independent fertilizer applicator prior to joining the San Luis Valley Research Center in 1982. Research has included small grain variety trials (wheat, barley, and oats) as well as work on quinoa, canola, cucumbers, and sunflowers.



The New Winterhardiness Ratings for Alfalfa Varieties

Merlin Dillon

Fall dormancy, which is measured as plant height in mid-September in a northern climate, used to be a very good indicator for rating alfalfa variety winterhardiness. Plants with low dormancy ratings went dormant early and tended to survive winters better than plants that went dormant later. However, alfalfa breeders, in the 1980's started intentionally selecting plants with atypical relationships between dormancy and winterhardiness. They began looking for varieties that continued fall growth and still survived harsh winters. Recent winterhardiness ratings are completely independent from fall dormancy scores.

The test to compare winter survival involves establishment of a nursery which is clipped at early to mid bud stage with a final clipping in mid September. This clipping regime stresses plants and allows for consistent winter injury in moderate winters. Removal of snow cover increases plant stress. Surviving plants are counted and scored for injury with relative winterhardiness ratings varying from 1 to 6, 1 being the most winterhardy rating. Standard varieties and their winterhardiness ratings include Maverick (1.0), Vernal (2.0), Ranger (3.0), and Fortress (4).

Brand*	Variety	Fall Dormancy Rating	Winter-hardiness Rating
DeKalb	DK 127	3.2	1.9
DeKalb	DK 140	3.7	1.5
Northrup King	Rainier	3	2
Northrup King	Rushmore	3.9	3.1
America's Alfalfa	Innovator+Z	2.8	2.3
A.V. Seeds	LegenDairy 2.0	3	2

High-altitude alfalfa growers should select varieties with good winterhardiness and low-fall dormancy. Growers attempting to obtain three cuttings per year need varieties having fall dormancy ratings of 2 or greater. Other varietal characteristics like disease and insect resistance are also important in variety selection.

*(Data from McCaslin, M.D. 1996. Forage Genetics Marketing Report)

Forage yields of 20 alfalfa varieties at San Luis Valley Research Center, Center, Colorado in 1997.

Variety	Brand/Source	1st Cut June 12	2nd Cut July 24	3rd Cut Sept 30	1997 Total
		tons/acre[1]			
Class	Union Seed Co.	2.3	2.4	1.8	6.5
3L171	Arkansas Valley Seed	2.1	2.4	1.8	6.3
Extend	Grassland West	2.2	2.5	1.6	6.3
Webfoot MPR	Great Lakes Hybrids	2.2	2.3	1.7	6.2
ABI 9142	ABI Alfalfa	2.0	2.4	1.7	6.1
ZN 9540	ABI Alfalfa	2.2	2.3	1.6	6.1
DK 127	DeKalb Genetics	1.9	2.4	1.8	6.1
Innovator+Z	America's Alfalfa	2.2	2.3	1.6	6.1
Rainier	Northrup King	2.1	2.2	1.7	6.1
Affinity+Z	America's Alfalfa	1.9	2.4	1.7	6.0
DK 122	DeKalb Genetics	2.0	2.3	1.7	6.0
AlfaLeaf II	Plains Alfalfa Assoc.	1.8	2.5	1.7	6.0
Vernal	USDA WI-AES	2.0	2.5	1.4	5.9
WL 324	W-L Research	1.9	2.4	1.6	5.9
Depend+EV	Agripro Seeds Inc	2.1	2.2	1.6	5.9
AmerGraze 401+Z	America's Alfalfa	2.1	2.1	1.6	5.9
WL 325HQ	W-L Research	1.9	2.4	1.6	5.8
ZG 9543	ABI Alfalfa	1.7	2.1	1.5	5.3
WL 252HQ	W-L Research	1.5	2.1	1.6	5.2
Ranger	USDA NE-AES	1.8	1.8	1.3	4.9
Average		**2.0**	**2.3**	**1.6**	**5.9**
$LSD_{(.05)}$		0.39	0.21	0.17	0.50
CV%		13.6	6.4	7.4	6.1

[1]Yields were calculated on an air-dry basis.

Planted: August 2, 1996 at 16 lbs seed/acre.

Elevation: 7600 feet. Average annual precipitation 7 inches. Average frost-free days - 88 days.

Fertilizer: 204 lbs P_2O_5/acre plus 22 lbs N/acre broadcast.

Soil series: Norte gravelly sandy loam.

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Note: The third cutting yield was reduced by rain-delayed removal of second cutting.

Hay Production in Western Colorado in 1997

Calvin H. Pearson

Alfalfa is produced on more than 125,000 acres in the four counties of Mesa, Montrose, Delta, and Garfield. These counties represent one of the several major hay-producing areas in the State. Alfalfa is grown in western Colorado under a wide range of environmental and management conditions. Much of the production is in the low valley areas, but alfalfa is also grown at elevations of 7,000 feet and higher. It is not uncommon for an alfalfa field to be surrounded by forest and to be the first field for a mountain stream to provide irrigation water. Environmental conditions vary greatly for growing season, irrigation water availability, diseases, weeds, insect pests, erosion, slope, soil type, soil fertility, and others. Growers are also highly diverse in their knowledge and experience in producing alfalfa. Growers range from the full-time farmer/rancher, who has produced alfalfa for many years, to the part-time producer, who is just getting started and has limited no knowledge or experience in agriculture. Because of this broad mix of alfalfa producers, the management conditions imposed on alfalfa also vary greatly. This diversity in growing conditions and grower experience in western Colorado creates a stark need for local alfalfa production information and technical support. Personnel from the Agricultural Experiment Station and Cooperative Extension are working hard to meet the diverse needs of the alfalfa producers in western Colorado.

Researcher comments on variety trial

The alfalfa variety performance test at Fruita was planted in spring 1996. Yield data were collected from three cuttings in 1996 and four cuttings in 1997. Haymaking in 1997 was a challenge because of the wet summer, but harvest of this trial went smoothly and on schedule. Total yields averaged across all varieties were 7.4 tons/acre and ranged from a high of 8.1 tons/acre for WL323 to a low of 6.4 tons/acre for Lahontan. The 2-yr total yield averaged across all varieties was 12.24 tons/acre and ranged from a high of 13.3 tons/acre for Shamrock to a low of 10.4 tons/acre for Ladak. Many of the varieties during the two years of testing have exhibited excellent yield performance.

Researcher

Dr. Calvin H. Pearson is Professor of Soil and Crop Sciences at Colorado State University. He has been an employee of the Colorado Agricultural Experiment Station for fourteen years at the Fruita Research Center, which is located in western Colorado near Grand Junction. He grew up on a furrow-irrigated, row-crop farm in southern Idaho. Dr. Pearson received a Junior College Degree from Ricks College, B.S. degree from Brigham Young University, M.S. degree from Oklahoma State University, and a Ph.D. from Oregon State University.

His research program focuses on topics related to sustainable crop production and soil management systems on furrow-irrigated cropland in the arid west with crops of interest being corn, alfalfa, pasture grasses and legumes, wheat, barley, oats, dry beans, and new and alternate crops. Research is also conducted on cultural practices, products, and inputs that affect crop production.

Dr. Pearson served as manager of the CSU Foundation Bean Seed Project for twelve years. He has authored or coauthored numerous publications and has co-invented a forage plot harvester and a conservation tillage grain drill for furrow-irrigated conditions. He served as associate editor for *Agronomy Journal*, an international scientific journal, for several years and currently serves as a technical editor for the *Journal*.

Alfalfa Variety Selection Checklist

Calvin H. Pearson

- Yield potential. Obtain yield test results from locations that are similar to your farm/ranch. Varieties that are high yielding across several locations and years indicates performance stability under changing conditions.
- Multiple pest resistance. Select varieties that have resistance to the damaging diseases and pests present in your area.
- Stand persistence. Environmental conditions such as cold temperatures, snow cover, soil fertility, and irrigation water affect stand persistence. Stand persistence is also affected by harvest and other managements. Persistence at higher elevations depends primarily on winterhardiness while stand persistence in low valley areas depends primarily on disease resistance levels. Select varieties accordingly.
- Winterhardiness. Varieties best adapted to Colorado conditions need moderate winterhardiness for low valley areas and increased winterhardiness at higher elevations.
- Forage quality. Variety traits can impact forage quality. Some varieties may be stemmy. Some may be leafy.
- Special conditions. Special conditions may warrant selecting a variety with specific traits, such as tolerance to a high water table or dryland conditions.
- Blends. Know the varieties that are used in a blend and request yield performance data for that blend.
- Price. Don't spend more money than is necessary for a variety that fits your needs. Similarly, don't waste money on an inexpensive variety that doesn't perform.

Decreasing the Time from Swathing to Baling

Calvin H. Pearson

- Harvest at the optimum growth stage. Thick stems and heavy windrows require more drying time.
- Control weeds. Some weeds may cause windrows to dry slowly.
- Make sure the soil is sufficiently dry. Equipment traffic may cause damage in fields with wet soil. Hay also cures more slowly on wet soil.
- Configure windrows correctly. Make the windrow as wide as practical. Hay in windrows should lay as evenly as possible. Avoid making "clumpy" windrows. Adjust the swather for optimum performance.
- Make sure the hay is properly conditioned during swathing. Adjust the hay conditioner for improved performance.
- Possibly manipulate windrows by spreading, moving, or inverting windrows. This will improve drying on the bottom of the windrow. Use good management to minimize leaf loss when manipulating windrows.
- Use an effective hay conditioner product and apply it according to the manufacturer's recommendations.
- Bale as soon as the hay is dry enough. Overdrying hay causes needless delays and leaf loss.

Forage yields of 20 alfalfa varieties at the Fruita Research Center, Fruita, Colorado in 1997.

Variety	Brand/Source	1st Cut May 27	2nd Cut July 3	3rd Cut Aug 15	4th Cut Sep 30	1996 Total	1997 Total	2-Yr Total
		tons/acre[1]						
Shamrock	Sharp Bros. Seed Co.	2.50	2.08	1.91	1.37	5.44	7.86	13.30
WL 323	Germain's	2.72	2.22	1.84	1.30	4.89	8.09	12.98
Stamina	Allied Seed	2.45	2.19	1.97	1.36	4.89	7.96	12.85
Sure	Cenex/Land 'O Lakes	2.66	2.19	1.74	1.24	4.94	7.84	12.77
Innovator+Z	America's Alfalfa	2.61	2.12	1.76	1.09	4.89	7.58	12.47
Loco	Allen Reid	2.34	2.12	1.76	1.30	4.90	7.53	12.43
DK 127	DeKalb Genetics Corp.	2.28	2.25	1.81	1.21	4.87	7.54	12.41
ABI 9352	ABI-Alfalfa	2.16	2.23	1.92	1.16	4.93	7.46	12.40
W133	W-L Research, Inc.	2.21	2.20	1.76	1.36	4.86	7.54	12.40
ABI 9345A	ABI-Alfalfa	1.99	2.20	1.87	1.20	5.10	7.26	12.36
Evergreen	Arkansas Valley Seed Co.	1.97	2.19	1.88	1.25	5.06	7.30	12.35
WL 324	Germain's/W-L Research, Inc.	2.15	2.31	1.89	1.22	4.76	7.57	12.33
WL 325HQ	Germain's/W-L Research, Inc.	2.19	2.24	1.80	1.13	4.91	7.36	12.27
AlfaLeaf II	Sharp Bros. Seed/Plains Alfalfa	2.51	1.92	1.77	1.30	4.77	7.49	12.26
Treasure	Seekamp Seed Co.	2.51	2.05	1.75	1.16	4.79	7.47	12.26
Spartan	Allied Seed	2.28	2.00	1.79	1.26	4.70	7.33	12.04
WL 252HQ	Germain's	2.38	1.85	1.77	1.26	4.78	7.26	12.04
Ranger	public	2.16	1.90	1.65	1.18	4.82	6.89	11.71
Lahontan	public	1.68	1.96	1.67	1.08	4.48	6.40	10.88
Ladak	public	2.38	1.64	1.39	1.00	3.98	6.41	10.38
Average		**2.31**	**2.09**	**1.79**	**1.22**	**4.84**	**7.41**	**12.24**
$LSD_{(.05)}$		NS[2]	0.31	0.20	0.10	NS	0.80	1.14
CV%		20.2	10.5	7.94	6.04	9.14	7.64	6.56

[1]Yields were calculated on an air-dry basis.

[2]NS, not significant.

Planted: May 1, 1996 at 13 lbs seed/acre.

Elevation: 4510 feet. Average annual precipitation 8.4 inches. Average frost-free days - 181.
Last spring frost - May 3, 1997; First fall frost - October 12, 1997; 1997 frost-free days - 162.

Fertilizer: 123 lbs P_2O_5/acre plus 48 lbs N/acre broadcast as 18-46-0 on April 25, 1996.

Soil series: Youngston clay loam.

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Arkansas Valley Alfalfa Variety Trial at Rocky Ford

Frank C. Schweissing

The Arkansas Valley, in southeastern Colorado, extends from the mountains on the west to the Kansas border. The major alfalfa producing area runs for 150 miles along the Arkansas River from Pueblo to the Kansas border. Alfalfa is the most important irrigated crop in the Valley being produced on 195,000 acres. Furrow irrigation predominates in the Valley but about 3,000 acres are produced under sprinklers, and there is an additional 5,000 dryland acres. The elevation varies from 3400 feet in the east to 4700 feet at Pueblo. The average annual precipitation along the Valley is 11 inches, varying from 9 inches at Pueblo to 15 inches at the Kansas border. The average frost free period is 158 days from May 1 to October 6 which makes four cuttings per season a standard practice. Successful varieties need some winterhardiness because temperatures go below 0° F, but they also must take advantage of the relatively long growing season. The average alfalfa yield in the Valley is 3.95 tons/acre. The most persistent pests are the alfalfa weevil, stem nematode, and tansy mustard/flixweed.

Researcher comments on the variety trial

The trial was irrigated prior to the first cutting and after each of the four cuttings. This was a wetter than usual year although growing degree days were normal. Rainfall from April through October was 15.4 inches compared to the long term average of 9.7 inches. Only May received less than average precipitation. Two strong rainstorms knocked down alfalfa and harvest was complicated by lodging and drying problems. The average yield in 1997 was lower than 1996 yields. Significant differences in yield were observed for all cuttings, yearly totals, and the three-year total. Commercial variety performance is better than public variety performance with yields of Vernal substantially lower this year. A new alfalfa variety trial was established at Rocky Ford in August 1997 with 27 varieties.

Researcher

Dr. Frank C. Schweissing, Superintendent-Entomologist, has conducted alfalfa trials at the Arkansas Valley Research Center (AVRC) for 30 years. He received his B.S. and M.S. in Entomology from Colorado State University and his Ph.D. in Entomology from Kansas State University. He began working at the AVRC in 1961 as an entomologist and became Superintendent in 1980. His major research efforts have been with the insect and mite pests of alfalfa, corn, sorghum, and onions.

Protecting the Predators while Controlling the Alfalfa Weevil

Frank C. Schweissing

The insect complex in the alfalfa field is highly interrelated including insect pests and the predators and parasites which act to reduce the pests. Many times, the use of an insecticide to control a pest will also eliminate the predators and parasites. Aphid pests, such as the pea aphid, can recover from an insecticide application more rapidly than their predator and parasite enemies. In Colorado the most common insect pest of alfalfa for which insecticides are regularly used is the alfalfa weevil. The recommended insecticides kill aphid predators and parasites as well as the weevil. Growers can mitigate this problem by:

1. Determining economic injury threshold levels before spraying.
    a. 30% of the alfalfa terminals show feeding damage and/or 20 weevil larvae per 180° arc sweep
    b. 8 larvae per sq. ft. in stubble
2. Using aphid and leafhopper resistant varieties to reduce problems caused by these pests when spraying is unavoidable.

Forage yields of 27 alfalfa varieties in the 3-year irrigated trial at the Arkansas Valley Research Center, Rocky Ford, Colorado in 1997.

Variety	Brand/Source	1st Cut June 2	2nd Cut July 10	3rd Cut Aug 19	4th Cut Oct 3	1997 Total	1996 Total	1995 Total	3-Yr Total
		tons/acre[1]							
Reward	Drussel Seed	2.36	1.54	1.16	1.00	6.06	6.32	5.39	17.77
Tahoe	Northrup King	1.97	1.54	1.49	1.10	6.10	5.99	5.61	17.70
Archer	America's Alfalfas	2.03	1.54	1.17	1.06	5.80	5.88	5.71	17.39
Vernal	USDA WI-AES	1.85	1.39	1.11	0.94	5.29	6.19	5.83	17.31
Rushmore	Northrup King	1.99	1.44	1.19	0.96	5.58	6.02	5.64	17.24
Multi-Plier	Mycogen Plant Sci.	2.11	1.44	1.22	0.97	5.74	5.96	5.54	17.24
Jewel	Wilbur-Ellis	1.92	1.45	1.24	0.93	5.54	5.94	5.63	17.11
Legacy	Grassland West Co.	2.09	1.49	1.19	0.99	5.76	5.78	5.54	17.08
Webfoot MPR	Great Lakes Hybrids	2.05	1.48	1.13	1.01	5.67	5.99	5.36	17.02
Magnum IV	Dairyland Seed	2.17	1.49	1.12	0.97	5.75	5.93	5.31	16.99
Evergreen	Arkansas Valley Seed	1.97	1.60	1.25	1.04	5.86	5.34	5.68	16.88
Ram	Great Plains Research	1.94	1.43	1.17	0.98	5.52	5.96	5.39	16.87
3BO5*	Arkansas Valley Seed	2.00	1.44	1.17	1.04	5.65	5.88	5.25	16.78
Sure	Sharp Bros. Seed	2.04	1.42	1.20	0.92	5.58	5.67	5.44	16.69
ICI630	ICI Seeds	1.98	1.42	1.13	0.97	5.50	5.64	5.48	16.62
5454	Pioneer Hi-Bred	1.96	1.40	1.15	0.91	5.42	5.68	5.49	16.59
ABI 9237*	America's Alfalfas	2.11	1.33	1.17	0.93	5.54	5.98	5.07	16.59
DK133	Dekalb Plant Genetics	1.95	1.44	1.15	1.05	5.59	5.89	5.04	16.52
Evolution	Mycogen Plant Sci.	2.09	1.39	1.11	0.92	5.51	6.05	4.94	16.50
4J12*	Cargill Hybrids	1.99	1.41	1.09	0.93	5.42	5.65	5.42	16.49
Dominator	Agripro Seeds Inc	1.99	1.46	1.13	0.94	5.52	5.86	5.00	16.38
WL 323	Germain's	1.95	1.41	1.13	0.94	5.43	5.54	5.35	16.32
Lahontan	USDA NV-AES	1.95	1.51	1.12	0.96	5.54	6.13	4.54	16.21
ABI 923AA*	America's Alfalfas	1.98	1.33	1.14	0.96	5.41	5.95	4.64	16.00
WL 252HQ	Germain's	1.98	1.29	1.15	0.90	5.32	5.63	5.04	15.99
ABI 9236*	Agripro Seeds Inc	1.97	1.37	1.14	0.92	5.40	5.74	4.53	15.67
Ranger	USDA NE-AES	1.83	1.26	1.08	0.86	5.03	5.77	4.54	15.34
Average		**2.00**	**1.43**	**1.16**	**0.97**	**5.56**	**5.88**	**5.26**	**16.70**
$LSD_{(.05)}$		0.28	0.16	0.12	0.08	0.51	0.50	0.31	1.05
CV%		9.93	8.17	7.07	5.90	6.56	6.10	8.10	4.47

[1]Yields were calculated on an oven-dry basis.

*Indicates experimental entry

Planted: August 30, 1994 at 10.2 lbs seed/acre.

Elevation: 4178 feet. Average annual precipitation 11.62 inches. Average frost-free days - 158.

Fertilizer: 150 lbs P_2O_5 /acre prior to planting and November 12, 1996.

Herbicide: Lexone DF 0.5 lbs + Gramaxone .46 lbs. AI/acre - March 12, 1996 & March 7, 1997.

Insecticide: Furadan 4F 1 lb AI/acre - April 20, 1996

Soil series: Rocky Ford silty clay loam.

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Southwestern Colorado Alfalfa Variety Trial at Yellow Jacket

Abdel Berrada

Southwestern Colorado has a rolling topography with slopes ranging from 1 to 12%. Alfalfa is the main crop in terms of acreage, production, and cash value. In 1995, 87,500 acres of alfalfa were harvested in the five counties of southwestern Colorado (Archuleta, Dolores, La Plata, Montezuma, and San Miguel). Approximately 80% of this acreage is irrigated. The elevation at Yellow Jacket is 6900 feet with an average growing season of about 120 days. The average annual precipitation is near 16 inches with half of it coming as snow. The major soil series is Wittco silty clay loam with a water holding capacity of 1.8 to 2.0 inches per foot and average soil organic matter content of 1%.

Alfalfa yields in southwestern Colorado increased steadily in the last few years, as new lands were converted to irrigation. Alfalfa yields increased in the Dolores Irrigation Project area from about 3.5 tons/acre in 1991 to 4.3 tons/acre in 1995. Individuals have reported yields of up to 8 tons/acre! There are usually three cuttings per year: early to mid-June; early August; and end of September. Prevalent alfalfa varieties have dormancy ratings of 3 or 4.

Alfalfa hay quality in southwestern Colorado is good to excellent due to relatively dry weather and few disease and insect problems. Southwest Colorado hay is in high demand from dairy operations in Texas, New Mexico, and Arizona.

Researcher comments on the variety trial

The alfalfa variety trial was established in May of 1996. Two cuttings totaling 3.26 tons/acre were completed during the establishment year. Soil moisture conditions were excellent at the start of the 1997 growing season which contributed to high first cutting yields. Cool temperatures in the beginning of the growing season and rainy conditions in late July and early August delayed first and second cuttings which also contributed to high 1997 yields. However, these same conditions reduced hay quality in 1997.

Researcher

Dr. Abdel Berrada, a native of Morocco, has been conducting field trials for 21 years. He earned a Ph.D. degree in Agronomy in 1983 from the University of Nebraska. Dr. Berrada has had research responsibilities with the Moroccan National Agricultural Research Institute, Purdue University, Servi-Tech, and the University of Nebraska. He has been the Superintendent of Colorado State University's Southwestern Colorado Research Center since October of 1993, has led crop variety testing at the center, and has been the principal investigator on multiple research projects concerning soil, crop, and water management.

Forage yields of 20 alfalfa varieties at the Southwestern Colorado Research Center at Yellow Jacket, Colorado in 1997.

Variety	Brand/Source	1st Cut June 17	2nd Cut Aug 18	3rd Cut Oct 2	1997 Total
		tons/acre[1]			
Blazer XL	Sharp Bros. Seed Co.	3.90	2.39	1.66	7.95
330	Union Seed Co.	3.74	2.29	1.75	7.78
WL 323	W-L Research	3.55	2.26	1.76	7.57
Rushmore	Northrup King	3.69	2.09	1.70	7.48
Sterling	Cargill Hybrids	3.64	2.24	1.58	7.46
ZX 9345	ABI Alfalfa	3.47	2.20	1.68	7.35
P 5472	Pioneer Hi-Bred	3.52	2.15	1.67	7.34
Affinity+Z	ABI Alfalfa	3.48	2.23	1.58	7.29
AlfaLeaf II	Cal/West Seeds	3.55	2.17	1.54	7.26
P 5454	Pioneer Hi-Bred	3.36	2.16	1.74	7.26
Innovator+Z	ABI Alfalfa	3.56	2.07	1.54	7.17
Evergreen	Arkansas Valley Seed	3.33	2.17	1.66	7.16
Archer	ABI Alfalfa	3.35	2.15	1.65	7.15
Reward	Drussel Seed & Supply	3.27	2.13	1.69	7.09
Vernema	Southwest Seed	3.28	2.17	1.63	7.08
Depend+EV	ABI Alfalfa	3.29	2.22	1.48	6.99
WL 252HQ	W-L Research	3.20	2.15	1.55	6.90
DK 127	Dekalb Genetics Corp.	3.28	2.04	1.57	6.89
WL 325	W-L Research	3.29	2.08	1.49	6.86
Ranger	Arkansas Valley Seed	3.35	2.01	1.35	6.71
Average		**3.46**	**2.17**	**1.61**	**7.24**
$LSD_{(.05)}$		NS[2]	NS	0.12	0.63
CV%		8.80	8.27	5.11	6.2

[1]Yields were calculated on an air-dry basis.

[2]NS, not significant.

Planted: May 15, 1996 at about 20 lbs seed/acre.

Elevation: 6860 feet. Average annual precipitation 15.9 inches. Average frost-free days - 120 days. Cumulative precipitation from May 15 thru September 30, 1996 7.67 inches.

Fertilizer: 65 lbs P_2O_5/acre plus 67 lbs K_2O/acre broadcast as 0-45-0 and 0-0-60 on May 2, 1996.

Contact: Dr. Abdel Berrada or Mark W. Stack
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e-mail: swcaes@coop.ext.colostate.edu

Seed Company Entrants in the 1997 Colorado Alfalfa Performance Trials

BRAND/HYBRID	ENTRANT	ADDRESS	TELEPHONE
AgriPro Seeds, Inc	ABI Alfalfa	2316 259th St., Ames, IA 50014	(515) 292-2432
AgriPro Seeds, Inc	ABI Alfalfa	2323 11th Ave. N. Ext., Nampa, ID 83653-1130	(208) 467-2191
America's Alfalfa	ABI Alfalfa	2316 259th St., Ames, IA 50014	(515) 292-2432
America's Alfalfa	ABI Alfalfa	2323 11th Ave. N. Ext., Nampa, ID 83653-1130	(208) 467-2191
Arkansas Valley	Arkansas Valley Seed Co	4625 Colorado Blvd., Denver, CO 80261	(303) 665-6642
Cargill Hybrid	Cargill Hybrid Seeds	PO Box 5645, Minneapolis, MN 55440	(612) 742-6743
Dairyland Seed	Dairyland Seed Co	PO Box 956, West Bend, WI 53095-0958	(800) 236-0163
DeKalb Genetics	DEKALB Genetics Corp	3100 Sycamore Rd., DeKalb, IL 60115	(815) 758-9323
Drussel Seed	Drussel Seed and Supply	2197 W. Parallel Rd., Garden City, KS 67846	(316) 275-2359
Garst Seed	Garst Seed Co	2369 330th St., PO Box 500, Slater, IA 50244	(800) 831-6630
Germain's	W-L Research, Inc	21029 Rd. 6 S.E., Warden, WA 98857	(509) 349-8864
Grassland West	Grassland West Co	923 D Street, PO Box 1604, Greeley, CO 80631	(970) 356-7002
Great Lakes Hybrids	Great Lakes Hybrids Inc	9915 W. M-21, Ovid, MI 48866	(800) 257-7333
Great Plains	Great Plains Research Co Inc	3624 Kildaire Farm Rd., Apex, NC 27502	(919) 362-1583
ICI Seeds	ICI Seeds	6945 Vista Drive, West Des Moines, IA 50266	(800) 831-6630
Mycogen Plant Sci	Mycogen Plant Sciences	720 St. Croix St., Prescott, WI 54021	(800) 321-2667
Mycogen Seeds	Mycogen Seeds	1340 Corporate Center Curve, St. Paul, MN 55121-1428	(800) 692-6436
Northrup King	Novartis	7500 Olson Memorial Hwy, Golden Valley, MN 55427	(612) 593-7333
Pioneer	Pioneer Hi-Bred Int'l Inc	7100 NW 62nd Ave., Johnston, IA 50131-1150	(515) 334-6763
Pioneer	Pioneer Hi-Bred Int'l Inc	PO Box 287, Johnston, IA 50131	(515) 270-3342
Sharp Bros. Seed	Plains Alfalfa Assoc.	101 East 4th Street Rd., Greeley, CO 80631	(970) 356-4710
Sharp Bros. Seed	Sharp Bros. Seed Co.	101 East 4th Street Rd., Greeley, CO 80631	(970) 356-4710
UAP	Pueblo Chemical	PO Box E, Greeley, CO 80632	(970) 352-4750
Union Seed	Union Seed Co	PO Box 339, Nampa, ID 83653	(208) 466-3568
Wilbur-Ellis	Wilbur-Ellis	PO Box 1017, Lamar, CO 81052	(719) 336-2226

Entry Forms for 1998 Trials

Entry forms for 1998 trial at Fruita may be obtained from the Department of Soil and Crop Sciences, Colorado State University, by contacting Cynthia Johnson, Research Associate, C-4 Plant Science Building, Fort Collins, CO 80523; Telephone (970) 491-1914; FAX number (970) 491-2758; or e-mail *cjohnson@ceres.agsci.colostate.edu.*

Additional Copy Request

Additional copies of this report may be ordered from Crops Testing, Cynthia Johnson, C-4 Plant Science Building, Fort Collins, CO 80523; Telephone (970) 491-1914; FAX number (970) 491-2758; or e-mail *cjohnson@ceres.agsci.colostate.edu* for $3/copy