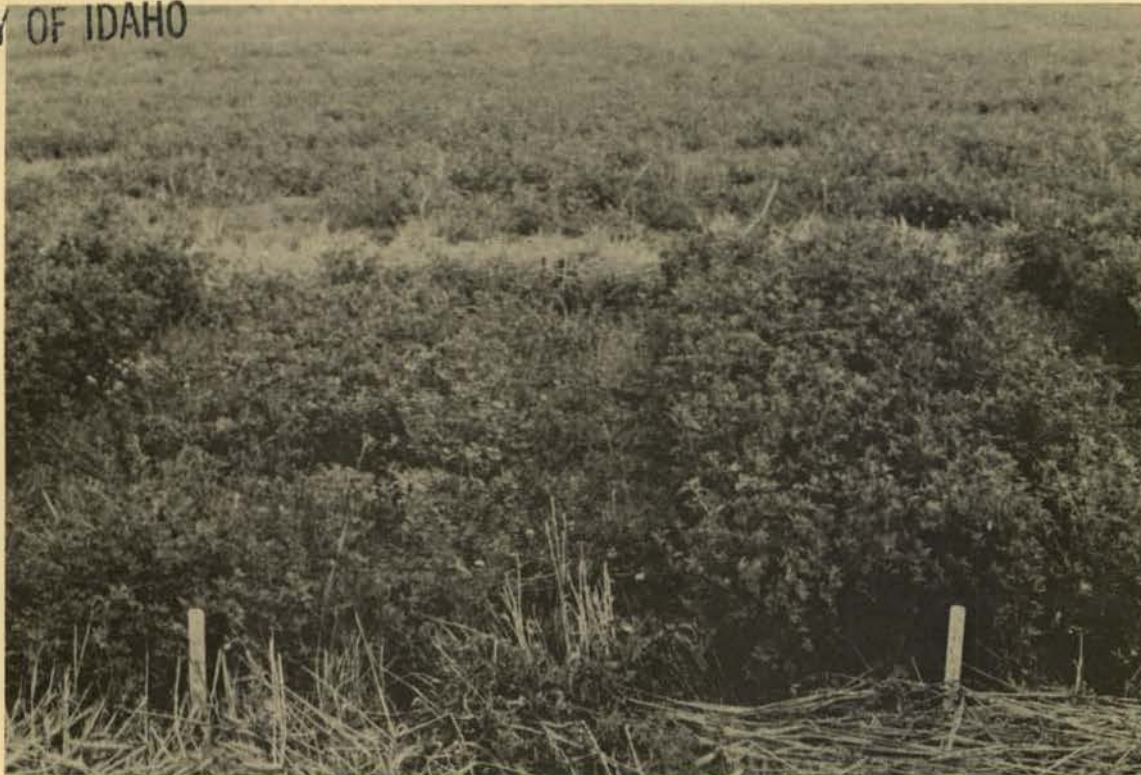


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H. A. Menser and C. J. Mancuso



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Cover Photo

Variety hardiness trials conducted at the University of Idaho Research and Extension Center in Sandpoint in 1986 show yield differences between the very winter hardy variety Spredor II (left) and the moderately winter hardy variety Super 721 (right). VWH varieties become dormant earlier in the fall and resume growth later in the spring as compared with MH varieties. Lower yields of the VWH varieties are the result, as seen in these second cutting plots.

The Authors

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**Published and distributed by the
Idaho Agricultural Experiment Station
Gary A. Lee, Director
University of Idaho College of Agriculture
Moscow, Idaho 83843**

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Varietal Performances of Forage Crops In Northern Idaho

H. A. Menser and C. J. Mancuso

Economic production of adequate amounts of high quality hay is one of the chief requirements for a successful livestock business. In northern Idaho, livestock operations are major components of the agricultural industry. Beef cattle, dairy and sheep enterprises of this region must contend with an unpredictable and often adverse environment as they attempt to provide enough forage to meet winter needs.

Alfalfa is one of the forages most preferred by livestock producers. Idaho ranks high among western states and nationally in alfalfa hay production. Birdsfoot trefoil and red clover also are quality hay legumes, but neither crop, grown under the most ideal conditions, can match the superior nutritive value, palatability and yield of alfalfa. Grasses supplement legumes by promoting better curing and a diversified roughage. Grasses become dormant during summer drouth, however, so they provide little or no second harvest.

Forage trials have been historically important at the University of Idaho Research and Extension Center at Sandpoint. Alfalfa varieties grown at Sandpoint from 1970 through 1976 averaged about 4.5 tons per acre. Average yields for the state were 3.4 tons per acre in 1982 (Ensign et al. 1982).

In northern Idaho, Grimm and Ladak 65 have been the traditional varieties of choice. Both are classified very hardy (Table 1). Dormancy and winter hardiness are associated traits, so very hardy varieties generally have lower potential yield. The climate of the northern Idaho panhandle is extremely varied and may range widely. Because conditions are so varied, the potentially lower yielding, very hardy varieties may not be the best choice for every grower.

The research reported here evaluated the adaptation and yield of selected varieties of legumes and legume-grass combinations. Emphasis was placed on testing varieties that have been released to growers during the last 5 to 10 years. Most of the legume varieties commonly grown now are recent releases (Hannaway 1984).

Experimental Procedures

Alfalfa Varieties — Experimental plots were planted in 1983 and 1985 at the Sandpoint R&E Center. The

Table 1. Alfalfa varieties, seed source, winter hardiness traits and year of establishment at Sandpoint, Idaho, Research and Extension Center.

Variety	Source	Hardiness	Year of planting
Apollo II	NAPB	MH	1983
Armor	NAPB	MH	1983
Arrow	NAPB	H	1985
Blazer	LO'L	H	1983
Challenger	CG	MH	1985
Classic	CNX	MH	1983
Commander	NK	MH	1985
Drummor	NK	MH	1985
Endure	CG	H	1985
Grimm	CNX	VH	1985
Hi-Phy	CNX	MH	1983
Ladak	CNX	VH	1983
Maverick	NAPB	VH	1985
Pacer	LO'L	MH	1983
Pike	NK	MH	1985
Phytor	NK	H	1983
Spectrum	CNX	MH	1985
Spredor II	NK	VH	1985
Super 721	CNX	MH	1985
Thor	NK	MH	1983
Thunder	NAPB	H	1985
Trumpetor	NK	MH	1983
Vancor	NK	H	1985
Weevlchek	CNX	H	1983

CG = Cargill Seeds; CNX = Cenex; LO'L = Land O'Lakes; NAPB = North American Plant Breeders; NK = Northrup King.

VH = very winter hardy; H = winter hardy; MH = moderately winter hardy.

experiment started in 1983 included 11 varieties, and the trial established in 1985 contained 14 varieties selected chiefly for hardiness characteristics. The variety hardiness trial also was planted in 1985 in Boundary County on a dairy farm north of Bonners Ferry. Table 1 lists the varieties, seed sources, hardiness and year of establishment of each trial.

Alfalfa-grass Mixtures — Apollo II alfalfa was seeded with either bromegrass, tall fescue, orchardgrass or timothy.

Birdsfoot Trefoil Varieties — A field trial with four varieties of birdsfoot trefoil was planted in April 1985. The names and sources of these varieties are shown in Table 2.

Table 2. Birdsfoot trefoil variety evaluation established in 1985 at the Sandpoint R&E Center.

Variety	Seed source
Dawn	North American Plant Breeders, Nampa, ID
Fergus	North American Plant Breeders, Nampa, ID
Leo	University of Guelph, Guelph, Ontario
Norcen	Beachley-Hardy Seed Co., Camphill, PA

Soils — Sandpoint trials were planted on Mission silt loam, a volcanic ash soil about 18 to 30 inches thick that overlies sediments from ancient glacial Lake Missoula. The organic matter content (3.2 percent), moderate acidity (pH 5.9) and relatively low exchange capacity of this soil are less than ideal for alfalfa production. Borated gypsum is regularly used to fertilize alfalfa on Mission soil while superphosphate benefits the establishment of alfalfa.

The Boundary County experiment was planted in soil of the Rubson-Porthill Association that is found on the North Bench, a high terrace above the Kootenai River flood plain. These silt loam soils, formed from glacial lake sediments, are mildly acid to neutral and typically are used for dryland crops.

Seeding Practices — All tests were planted in April as early as climatic conditions permitted soil preparation. Alfalfa and birdsfoot trefoil were inoculated with Rhizobia bacteria and drilled at rates of 10 pounds per acre. Alfalfa-grass mixtures were seeded at 6 pounds per acre

of alfalfa and 9 pounds per acre of each grass. At Sandpoint, 100 pounds of superphosphate and 190 pounds per acre of borated gypsum were applied to the soil surface and incorporated by disking.

Harvesting Schedule — Two cuttings have been taken annually from these trials beginning in 1984 for the first alfalfa trial and in 1986 for the alfalfa hardiness, alfalfa-grass mixtures and birdsfoot trefoil experiments. The first cutting usually was made late in June and the second cutting in mid-August. Cuttings were done at full-bloom stage. Samples were dried to 13 to 15 percent moisture.

Results

Alfalfa Varieties — Blazer and Pacer varieties consistently outperformed nine other alfalfa varieties in non-irrigated production (Fig. 1). These two varieties averaged 4.5 to 5 tons per acre during the 4 years, superior to the 4-ton average yield of Ladak, a variety traditionally grown by northern Idaho ranchers. None of the other yield comparisons was significantly different. With production costs likely to be the same, growers would have found Blazer and Pacer more profitable to grow than Ladak.

Plant breeders developed Blazer as a winter-hardy, pest-resistant variety. Pacer originated in the same breeding program and features several of the same traits as Blazer. Pacer seed is no longer commercially available because

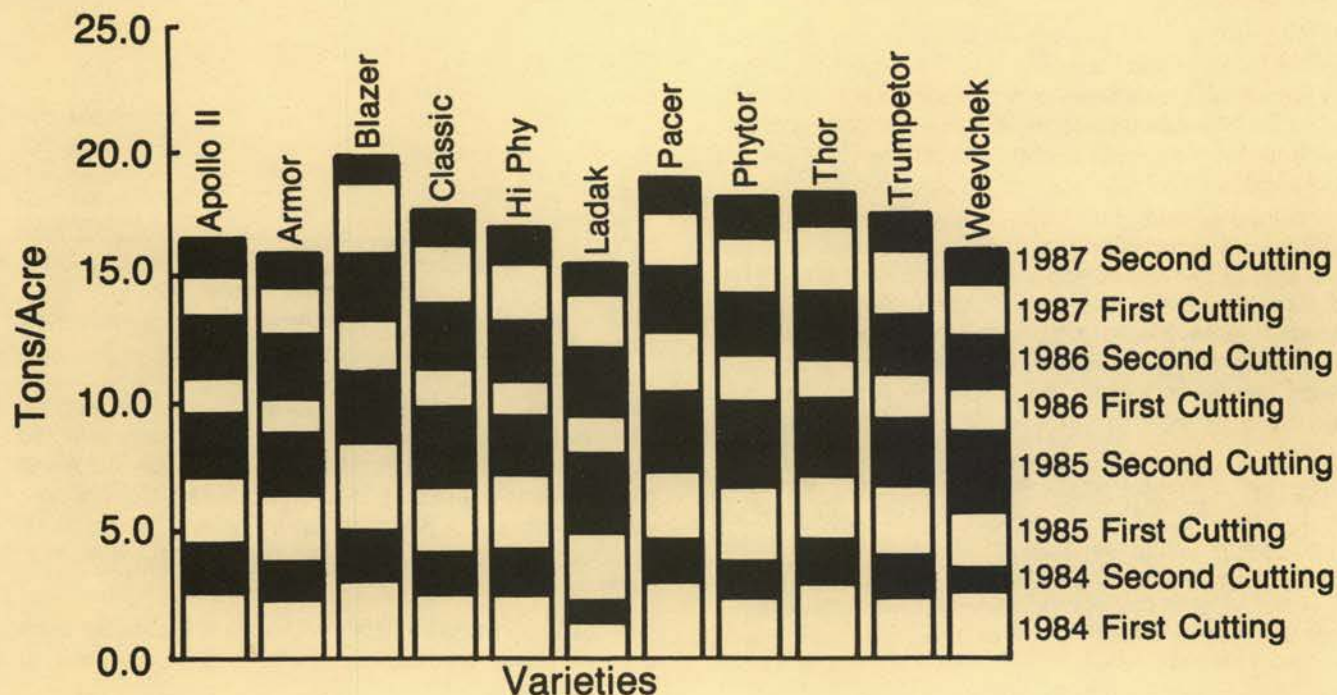


Fig. 1. Four years of alfalfa variety performances at Sandpoint, Idaho, 1984-87.

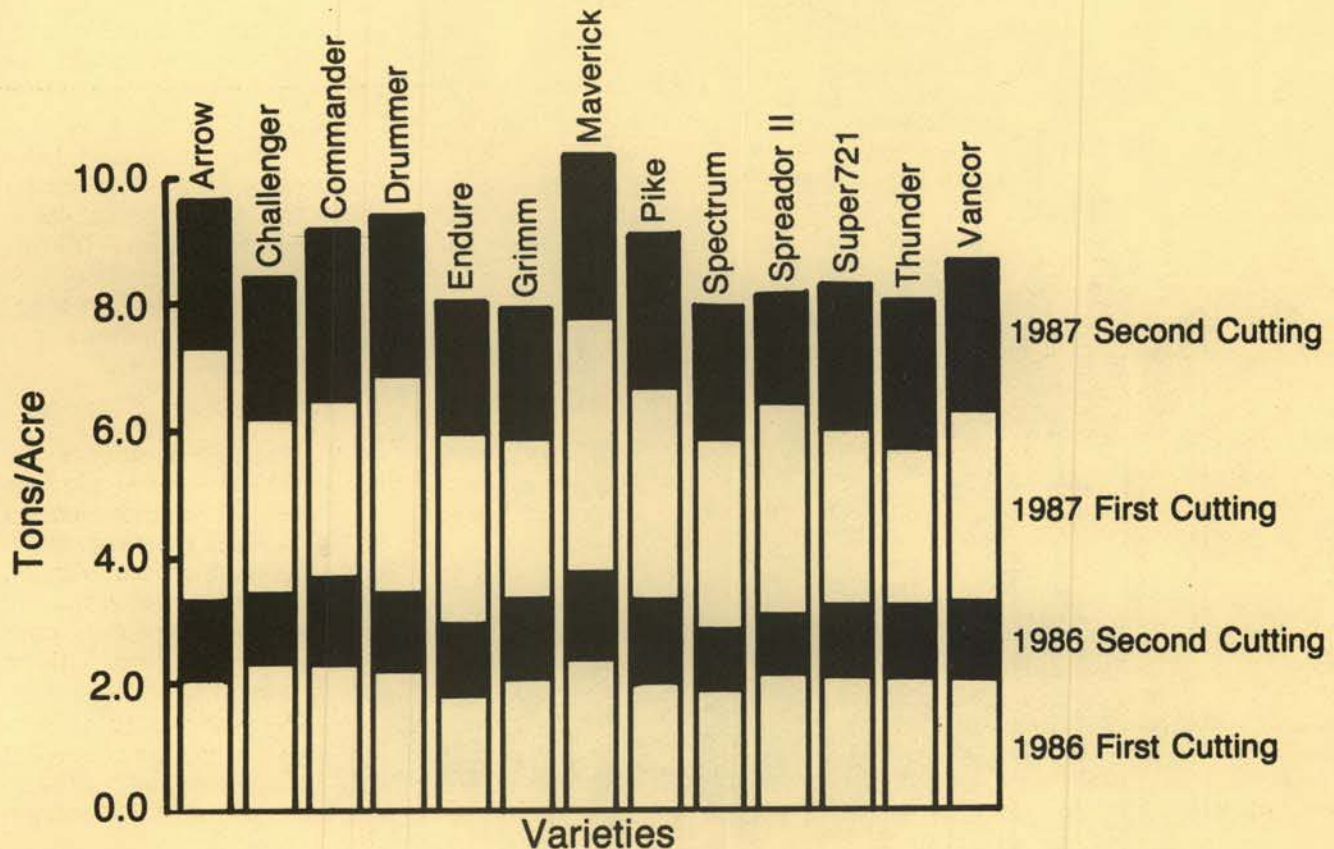


Fig. 2. Two-year results of alfalfa varieties evaluated for winter hardiness at Sandpoint, Idaho, 1986-87.

it has been replaced by Sparta, a close relative that also is more disease-tolerant. Blazer has been a top yielder in trials in other parts of Idaho.

Overall, the alfalfa varieties in the hardiness trial at Sandpoint averaged about 5 tons per acre in 1986 and 4 tons per acre in 1987 (Fig. 2). The smaller yields of Grimm and Spredor II, two varieties classified as very winter hardy, suggest a possible relationship between hardiness, dormancy and productivity. Very hardy varieties become dormant earlier in the fall and resume growth later in the spring than varieties that are less hardy. This characteristic could limit yields.

Alfalfa regrowth was measured in late September 1987, about a month after the second cutting and before heavy frost. Plant heights ranged from 6 to 14 inches. Moderately hardy varieties were 12 to 14 inches high; hardy varieties including Vancor, Endure and Thunder were 10 to 12 inches high, and the very hardy varieties Maverick and Spredor II had only 6 inches of regrowth. Grimm, also a very hardy variety, measured about 10 inches.

Maverick was the top producer in the Boundary County hardiness trial, where yields for the 2 years averaged from 4 to 5.5 tons per acre. Grimm and Spredor II were at the low end, each averaging about 4 tons per acre (Fig. 3). Hay production of every variety in this trial was greater in 1987 than in 1986.

Persistence is as important as dormancy in the consideration of alfalfa hardiness. At Sandpoint and generally in Bonner County, the lack of persistence has prevented successful alfalfa production. The "sick alfalfa" syndrome of chlorotic, spindly plants and diminished stands has been widely observed for many years. Despite intensive study, no clear single cause could be identified as the principal cause for this problem. Grimm and Ladak became varietal choices, presumably because of greater persistence. Sick alfalfa has not been reported recently because affected ranchers have avoided alfalfa production.

Alfalfa-grass Mixtures — Alfalfa planted with either brome grass, tall fescue or timothy averaged about 3 tons per acre in the 1986 and 1987 trials (Fig. 4). Alfalfa plus orchardgrass averaged about 2.5 tons per acre. These plantings produced a first-cutting mixture of about two thirds grass and one-third alfalfa. The second cutting contained mostly alfalfa because grasses became dormant during the usual summer drought.

Alfalfa-grass mixture trials at the Sandpoint Station in the 1950's yielded from 5 to 5.5 tons per acre. Orchardgrass had the highest yields from first cuttings in these tests, and timothy had the lowest.

Many ranchers prefer mixtures for hay and pastures in Bonner County. Advantages include erosion control, improved soil structure, easier curing and less likelihood of bloat.

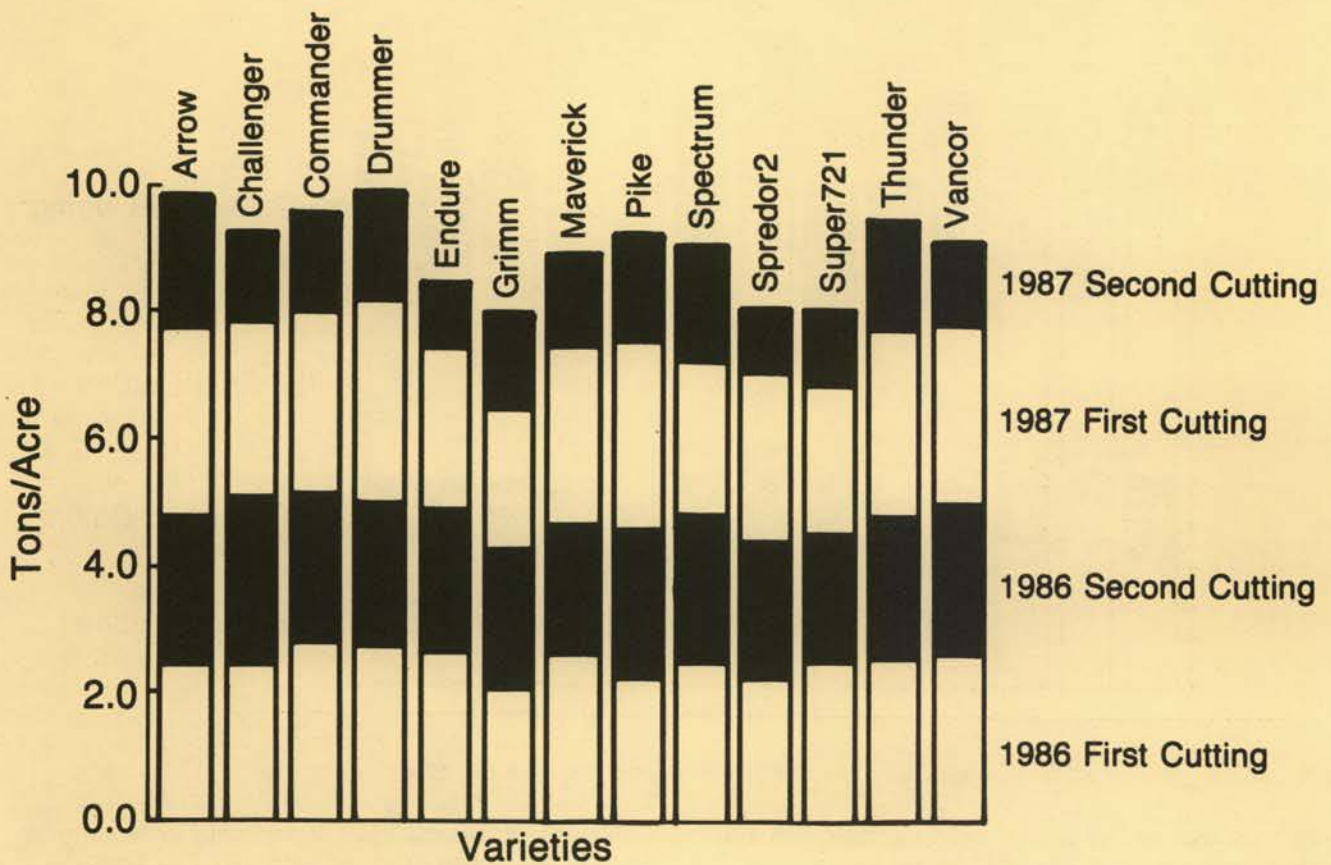


Fig. 3. Two-year results of alfalfa varieties evaluated for winter hardiness on the North Bench of the Kootenai River Valley in Boundary County, Idaho, 1986-87.

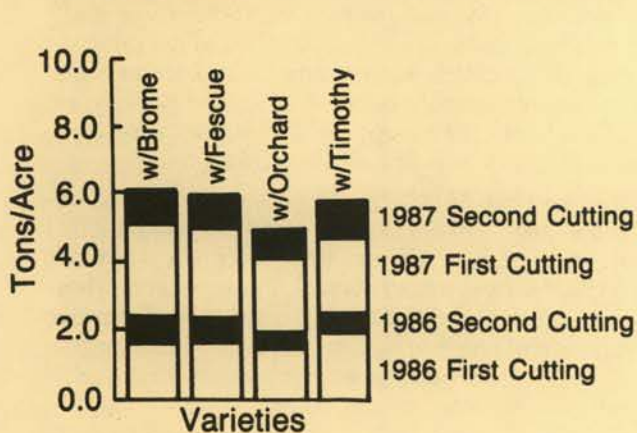


Fig. 4. Two-year results of alfalfa-grass mixture evaluations at Sandpoint, Idaho, 1986-87.

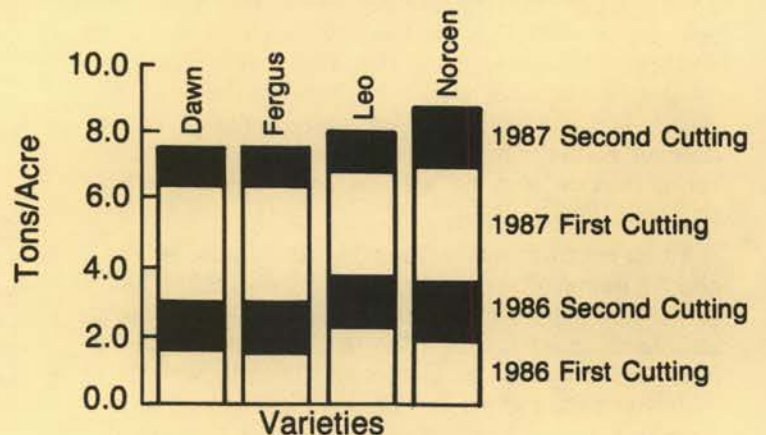


Fig. 5. Two-year results of birdsfoot trefoil evaluations at Sandpoint, Idaho, 1986-87.

Birdsfoot Trefoil Varieties — Birdsfoot trefoil produced about twice as much hay in 1987 as in 1986 (Fig. 5). Average yield over the 2 years was about 4 tons per acre, or about half a ton less than the average yield

of alfalfa during the same 2 years. Norcen and Leo appear to be a little more productive than Dawn and Fergus. Trefoil variety tests conducted about 20 years ago at Sandpoint yielded about 3 tons per acre with two cuttings.

Influence of Precipitation On Forage Yields

Seasonal precipitation has ranged widely since 1983 (Table 3). Total rainfall was substantially greater in 1983 than in any other year. Unseasonably warm temperatures during the first 6 months of 1987 appeared to have stimulated growth of first cuttings in all trials. Summer drought in 1986 did not appreciably affect the second cutting of alfalfa. Birdsfoot trefoil yields were suppressed during the same period, however.

Conclusions

Forage performance trials can provide useful information to livestock producers. The evaluation of species and varieties for adaptability and yield is a valuable service to the livestock industry in northern Idaho. The chief objective of these studies was to compare relatively new varieties with old standards Grimm and Ladak.

Production from plots cut twice each year showed that several varieties outperformed Ladak. Over a 4-year period, Blazer averaged about 5 tons per acre of alfalfa compared to about 4 tons per acre for Ladak. Pacer, Thor and Phytor yielded nearly as well as Blazer.

Table 3. Seasonal precipitation record for 1983, 1984, 1985, 1986 and 1987 at Sandpoint R&E Center.

Year	Season				Total
	Winter	Spring	Summer	Fall	
1983	15.22	8.27	9.31	10.78	43.58
1984	9.44	10.62	4.15	11.51	25.72
1985	7.64	5.61	2.96	10.54	26.75
1986	8.27	6.79	2.85	11.81	29.72
1987	7.69	8.37	6.37	3.39	25.82

Winter - December of previous calendar year, January and February; Spring - March, April, May; Summer - June, July, August; Fall - September, October, November.

In trials to evaluate hardiness, most alfalfa varieties outyielded Grimm at Sandpoint and in Boundary County. Over a 2-year period, average yields were about 5 tons per acre for Arrow, Drummor and Thunder at Sandpoint compared with 4 tons per acre for very hardy varieties Grimm and Spredor II. Arrow also was a high yielder in Boundary County where Maverick, a very hardy variety, had the best production. Fall season regrowth of Maverick and Spredor II lagged considerably behind less hardy varieties but regrowth of Grimm was relatively vigorous compared with other varieties.

Yields of alfalfa-grass mixtures for 1986 and 1987 were about one-third less than the average yields of the 14 alfalfa varieties in the hardiness test. Dry weather may have hindered grasses during 1986. Bromegrass, tall fescue and timothy were equally productive when grown with alfalfa. Each yielded more hay than the alfalfa-orchardgrass mixture.

Birdsfoot trefoil yields were 1 to 2 tons per acre less than alfalfa after 2 years. Norcen appeared to be more productive than Leo, Fergus and Dawn. Dry weather at a critical time was more adverse to the growth of trefoil than to alfalfa. In northern Idaho, wet, acid soils that are not suited to alfalfa should support birdsfoot trefoil.

We conclude from these experiments that several alfalfa varieties of recent development may offer higher yield potentials than the old standards Grimm and Ladak. More time will be required to evaluate the adaptations of newer varieties in terms of persistence. Alfalfa-grass mixtures and birdsfoot trefoil are alternative forage choices that may be suitable to livestock interests.

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- Hannaway, David B. 1984. Selecting alfalfa varieties for the Pacific Northwest. Pacific Northwest Cooperative Extension Bull. 244.



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