

Forage Fact # 6

Date:
December, 2001

Alfalfa Varieties Under the Test of Field Scales & Time

Alfalfa Varieties Tested at Field Scales (& distributor):

Rambler: dryland variety, late maturing, drought tolerant (Agricore)

Multistar: standard variety, multifoliate, high leaf:stem ratio, rapid regrowth (Agricore)

Runner: dryland variety, very winter hardy & drought tolerant (Prairie Seeds)

Peace: standard variety, medium regrowth, excellent winter hardiness, (Sewell Seed Farms, Agricore, Prairie Seeds)

PS 95-106: Siberian variety, creeping root system (Pickseed)

Ultrastar: standard variety, rapid regrowth, good winter hardiness (Agricore)



Tom Pittman and Brian Clarke examining alfalfa plants for signs of winter injury.

The Field Scale Challenge (Introduction)

Farmers and researchers alike have difficulty applying information derived from small, well regulated research plots to large scale, realistic farm situations. Researchers try to replicate average field conditions and farmers try to duplicate the conditions at test sites in an effort to get meaningful results. The question remains: where does on-farm testing fit?

The **Clarke family** of Sunrise teamed up with the BC Ministry of Agriculture (BCMAFF) and Peace River Forage Association of BC (PRFA of BC) to evaluate on-farm testing. They recognized the need to see how valuable forage comparisons on a field scale compared to the more familiar small, replicated variety trials. Our goal was to manage a forage comparison that reflected field scales rather than small

variety trials. We felt that removing sources of error by creating the optimum conditions, characteristic of small plots, is not applicable on a farm. Instead, we proposed managing a forage comparison as simply as possible, with everyday farm machinery and in an everyday fashion, as a large farm field might be managed.

Judging the Value of On-farm Testing

We wanted the answers to a number of questions:

- * Are the differences in our comparison easy to judge by collecting only simple information? Does the data from an on-farm test such as this really mean anything?
- * Would the differences we observed be likely to be repeated on other farms in the area; or should each farm stick to making variety decisions based on what is reported from research plots?
- * What are the true economic advantages of field scale trials? If the undertaking itself is costly or if the differences observed really don't allow us to make a decision based on economics, are there any other reasons why field scale testing on farm is of value?
- * Since all of the seeds used were donated, does the on-farm test provide evidence that further partnering with seed companies or others should be explored?

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Published by P.R.F.A. of BC:

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Peace River Forage Association
of British Columbia



Alfalfa stick as a tool for predicting forage quality:

The alfalfa stick was relatively accurate at predicting forage quality. It corresponded especially well with lab test results at earlier stages of maturity.

Available from:

BC Forage Council
c/o BCMAFF
Box 300
640 Borland Street
Williams Lake, BC
V2G 1R8

or telephone: Don Bates
(604) 556-3085

Cost: \$15 per stick

Methods & Protocols



Heather Fossum & Tamara Ross harvesting samples from alfalfa varieties demonstration at Clarke's.

Seeding in 1998

The demo was seeded with a 12' Melroe drill on June 2, 1998. Six varieties of alfalfa including Rambler, Multistar, Runner, Peace, PS 95-106 & Ultrastar were seeded at 10 lb/ac. Fertilizer (12-51-0) was applied at 30 lb/ac. The inoculant was mixed with skim milk powder and water and mixed with the seed. The seed drill was vacuumed between each variety.

Field Management in 1998

The field was swathed on July 28 for weed control and baled on August 3 for use as green feed. No harvest estimates were done in the establishment year.

Reseeding in 1999

Reseeding was done in the strips where seed did not drop through the drill into the soil for the first 200'. To compensate for broadcasting, the seeding rate was 15 to 16 lb/ac. No fertilizer was applied.

Harvest in 1999, 2000 & 2001

Five 1/4 meter square samples were cut in each variety. The samples were weighed using a tarp and tripod scale. Sub samples were taken to the lab and their wet and dry weights were obtained. After drying and weighing, a composite sample was sent to Griffin Lab for nutrient analysis.

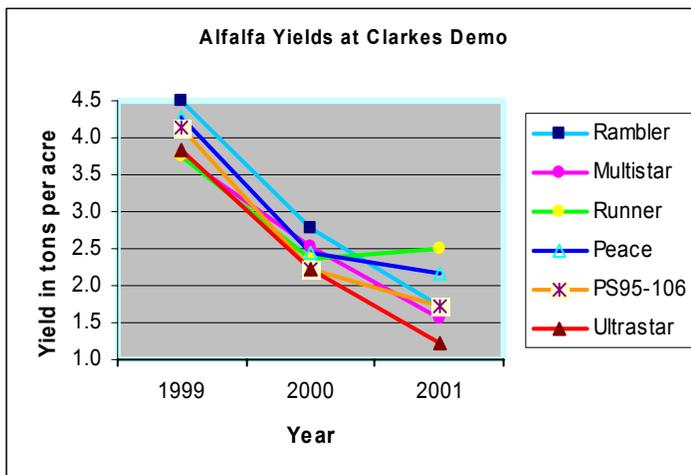
The demo plots were cut with a 9' swather, 3 swaths per variety. After the swaths were dried, they were square baled. Each bale was weighed to obtain its weight. The remainder of the field was cut for silage.

In 2001, weather conditions and equipment availability precluded obtaining field scale yields.

Measurements with the Alfalfa Stick

In 1999, before each 1/4 m sample was cut, the alfalfa stick was used to estimate ADF, CP and TDN.

Results of the Demonstration: Alfalfa Yields by Variety and Year



The higher yielding varieties in 1999, the first production year were Rambler, Peace and PS 95-106. In the second year, after a dry fall and dry spring, the top yielders were Rambler, Multistar and Peace. By the third year, after widespread winter injury problems in our region, Runner and Peace were the highest yielding.

This data seems to indicate that testing varieties at field scales and over a longer period of time, may rearrange the order of highest to lowest yields. Initially the difference in yields among the 6 varieties was about 0.8 ton/ac. However, by the third year the yields varied by 1.3 ton/ac. Some of the higher yielding varieties were not able to withstand the variations in our winter climate and summer precipitation.

Clipped weights and bale weights were quite different in the two years they were compared. In 1999, bale weights were consistently lower. This was probably due to the gap of almost 3 weeks between when they were cut, and may suggest forage harvest losses. In 2000, bale weights were usually higher. There was considerable rain between when the baling was done and when the weighing was done. The aerator may not have dried the bales uniformly, before they were weighed. In 2001, the field was cut for silage and the equipment required for field scale estimates was not available.

Alfalfa Varieties and Quality

All 6 varieties produced high quality hay in 1999. Two indicators of forage quality are discussed here: % dry protein and TDN.

The percentage of dry protein averaged 18.8% and varied only by 1%. Compare this with the average for straight legume hay in Peace of 15% or for grass-legume hay of 12% dry protein.

Total Digestible Nutrients (TDN) or energy is usually the factor in shortest supply. Most hays average 52 to 58%. The TDN for each of the 6 varieties in the demo averaged 65% and only varied by 1.5%. All varieties would supply the requirements for cows, bred heifers and heifer calves. However, 3 varieties would be marginal for supplying enough energy for lactating dairy cows (Multistar, PS 95-106 and Ultrastar).

Alfalfa Varieties and Longevity



Peace alfalfa survived the winter of 2000-2001 better than the neighboring varieties in the field.

Brian Clarke had noticed that some of varieties seemed to be thinning out faster than others over time. Winter injury assessments were done on the 6 varieties of alfalfa in the spring of 2001. The assessments involved:

- * counting plants & stems per 2 sq ft,
- * estimating budding Vigour of crown,
- * noting the ease of root bark peeling, &
- * checking discoloration of the interior root core.

There were dramatic differences among the varieties, in terms of winter injury. Some varieties, such as PS 95-106, had lower plants per sq ft and more discolored or diseased roots and high variability in the stand. Some varieties like Runner were less vigorous but uniform. Multifoliate varieties, such as Multistar had more evidence of winter injury than standard varieties.

The Peace variety was relatively uniform, had the lowest ratings of winter injury and seemed to grow more vigorously than neighboring varieties on either side. This did not surprise a couple of our members who sell seed. They commented that ranchers who bought Peace always came back for more, because it seemed to grow well in our area and survive our winters.

Another factor of longevity is the root system characteristics. Spreading root systems of some of the varieties were less resilient than deep tap rooted varieties, after a winter such as 2000-2001. (see photograph at right).

Balancing the Tradeoffs: Yield & Quality & Longevity

It should be noted that the Clarke family cut earlier for peak quality hay rather than waiting for peak yield. They also manage for the option for a second cut of hay or silage from many of their fields.

Longevity need not be a tradeoff with yield or quality or earlier cutting, provided soil fertility is sufficient and weather conditions are favorable.

Seeding Date & Rate:

June 2, 1998 at 10 lb/ac

Cutting Dates:

1999:

clipped samples	July 5
baled	July 24

2000:

clipped samples	July 21
baled	July 21

2001:

clipped samples	July 12
baled	July 12

Fertilizer history:

1998: 30 lb/ac 12-51-0

1999-2001: no fertilizer



Varieties with a deep tap root had less winter injury than varieties with a creeping root system.



"It is so valuable to get involved in one of these projects. Sometimes you learn something completely different from what you set out to, when you started the project."

Brian Clarke

Lessons Learned

It is very important to consider location for all test areas, including on-farm test areas. Waste or prime areas, corners and edges are confounding influences that can obscure the results. In this demo we saw a rain shadow effect of a tree-line along the field edge which was far deeper into the field than we first expected. Where trees line a field edge, do not make a field test for at least 5 times their height on the leeward side into the field. This should be adequate to remove the large influence that snow or rain capture can have on test results.

The size of plots needs to coincide with the width of the seeding and harvest equipment. For example, a plot width of 36' is more compatible with a 12' seeder and a 9' swather than a 24' plot. Another improvement would have been a space or some kind of delineation between varieties or treatments in a field scale demo.

Another lesson learned was the potential of the alfalfa stick as a quick and easy estimation of forage quality. After some initial calibration with lab testing, it can predict the % protein and % TDN within a few percentages.

Attention to seemingly small details during harvest is important for both the "partners" in the demo. For example, cutting the samples an inch differently with the hand sickle than the cutting height of the hay binder can skew the comparison by up to 1/2 ton per acre. The researcher also needs to take enough small samples to compensate for the field variability (12 to 20 are recommended for each treatment of 10 to 20 acres. Finally, the amount of bale in the chamber when baling starts on each plot can have a significant effect on the comparison.

Whether the test truly reflects a valuable production practice for a farm or not, is a function of planning, communication and execution. Counting on visual only results or last minute 'mistakes' for test plots tend to be a waste of time. Some form of reliable measurement should take place. Many times also, simple production differences are only one of the intended values derived from on farm testing. Part of the success of on-farm testing lies in the cooperative working relationship that develops between the farmer and the agronomic association, agency or researcher.

To test your forage quality

follow these 4 easy steps:

1. borrow a BCMAFF feed sampler.
2. sample several bales by the recommended procedure to get a representative sample.
3. send your samples to Griffin Lab or Norwest Lab through BCMAFF.
4. Contact Jim Forbes for help interpreting results at (250) 784-2225.

Future Opportunities

On farm trials provide a wonderful opportunity to learn how any new variety or technology works under your specific conditions and management. Forage variety trials provide a range of options and some preliminary information, but ultimately the true measure of their performance needs to be fine tuned for individual situations.

There are also opportunities for increasing forage quality and longevity through trying different cutting dates and nutrient management.



Heather Fossum & Tamara Ross measure forage yields and quality with the alfalfa stick.

Compiled by: Sandra Burton, Tom Pittman and Jim Forbes in Fall of 2001

Variety Field Scale Demo Funded by: Clarke Family, PFRA of BC & BC Ministry of Agriculture, Food & Fisheries

Alfalfa Seed Donated by: Agricore, Pickseed Canada Inc.

Student Assistance Enthusiastically by: Heather Fossum, Tamara Ross, Leslie Dampier & Julie Robinson

Forage Facts Project Funded by: the Peace River Agriculture Development Fund, Federal Program, Investment Agriculture Foundation and all the donators and supporters at the Forage Goods & Services Auction on Feb. 5, 2000.