

RAMBLER ALFALFA

by

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and

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Development and spread of creeping-rooted plants, found abundantly in Rambler; original spacing of plants in the nursery is 6 feet each way. Plants are 5 years old.

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RAMBLER ALFALFA

D. H. HEINRICHS¹ AND J. L. BOLTON²

Introduction

Rambler alfalfa was licensed for sale in Canada on February 1, 1955. This action was the climax of a successful breeding program at the Experimental Farm, Swift Current, Sask., begun in 1938 and completed in 1954. During the entire period emphasis was placed on selecting for greater hardiness and drought resistance than was characteristic of the varieties Grimm and Ladak.

The first selections were made from populations of Ladak (*Medicago media* Pers.) and Siberian (*M. falcata* L.), which had survived the "Great Drought" of the thirties in a test seeded in 1934. In this test the relative stand in 1938 was: Grimm 5 per cent, Ladak 25 per cent, and Siberian 100 per cent. The Ladak originated from foundation seed grown at the Range Experimental Farm, Manyberries, Alta., and the Siberian from seed obtained from the South Dakota State College, Brookings, S.D. The latter was one of N. E. Hansen's introductions but its exact origin is unknown.

During the breeding program evaluation of selected plants was based on performance in combining-ability tests. Hardiness, creeping-rootedness, seed yield, and forage yield were the main characters considered although resistance to bacterial wilt and crown rot received some attention. A more detailed description of the breeding method employed was reported by Heinrichs (2); and Murray (4) has described the development of adventitious stems on the creeping roots. As a result of the tests for combining ability, a number of synthetics were formed between the years 1949 to 1951. Seed of these synthetics was multiplied under isolation and later tested in mixture with grass at several locations across Canada. The best synthetic among these was named Rambler and since 1953 it has been tested extensively against standard varieties.

Parentage

Rambler is a synthetic variety resulting from the combination of seven clones, all of which had good combining ability for creeping-rootedness, winter hardiness and forage yield, and fair combining ability for seed production. All the clones were resistant to bacterial wilt and were of the following parentage.

3 clones: Ladak × (Ladak × Siberian)

2 clones: (Ladak × Siberian) × (Ladak × Siberian) Ladak

1 clone : (Rhizoma* × Ladak) × Siberian (Ladak × Siberian)

1 clone : Siberian (Ladak × Siberian) × Siberian (Ladak × Siberian)

None of the parental plants was related and hence the genetic base of the variety is broad.

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* Parent stocks of the variety Rhizoma (*M. media*) (5) were used to a limited extent during the breeding program and one clone going into the make-up of Rambler had some germ plasm of this stock in it.

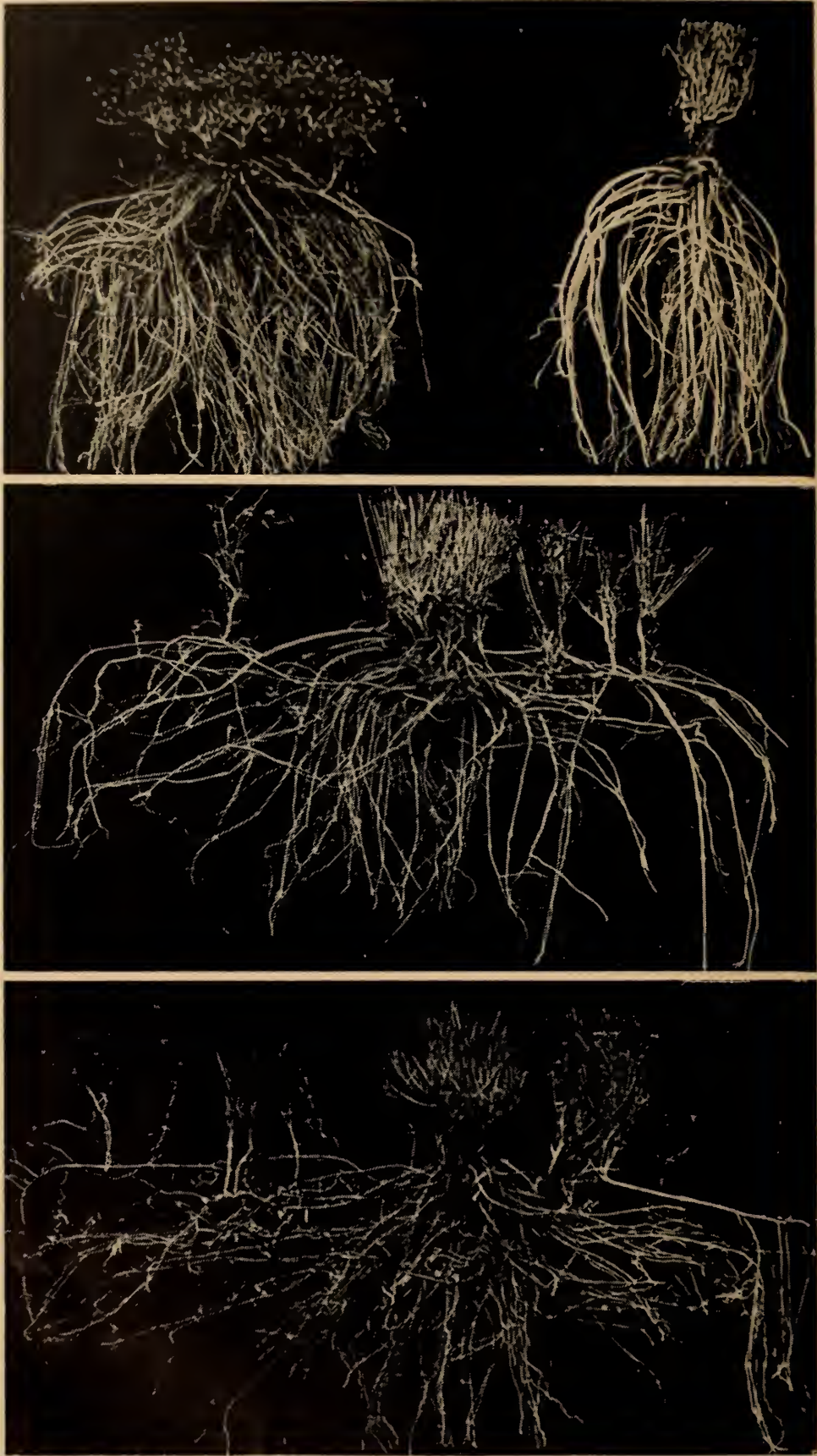


Figure 1—Root types in Rambler alfalfa. Upper: parental—Left, Siberian; right, Ladak. Center and lower: creeping-rooted types of which there are 65% in Rambler. The plant in the center illustrates a lax creeper in which vegetative shoots appear at relatively long intervals, while the lower one illustrates a dense creeper in which the vegetative shoots occur at short intervals.

Varietal Characteristics

The creeping-rooted character in about 65 per cent of the plants conspicuously differentiates Rambler from other existing varieties (Fig. 1). It is superior in drought resistance and winter hardiness to Ladak and Grimm, but is generally somewhat slower to recover after cutting or grazing than either variety. This slow recovery characteristic appears to be closely associated with drought resistance.

Rambler grows erect and is medium tall. Under dry conditions it yields as well as Ladak and persists longer. It has proved to be especially persistent with grasses and grows intermixed with them to a greater extent than ordinary tap-rooted alfalfa varieties.

In seed production Rambler ranks below Ladak, Grimm, or Vernal in tests but the yield is adequate for commercial purposes. It is possible, however, that Rambler seed will need to command a slight premium in price so that growing it will be as profitable as growing seed of other varieties.

Rambler is slightly more resistant to bacterial wilt than Ladak but not nearly so resistant as Vernal or Ranger. However, wilt is not a problem in the drought areas of Western Canada except under irrigation and lack of wilt resistance is therefore of little concern in a variety for dryland use. Rambler is known to have some resistance to winter crown rot, attributable mainly to its low crown.

Results from Comparative Tests

Data from comparative tests on the performance of Rambler have been obtained at various locations across Canada. All of the tests were of the randomized block design with either 4 or 6 replications. Seeding was done in rows one foot apart for hay or pasture, and three feet apart for seed production. In one uniform test the alfalfa varieties were overseeded with a grass commonly used in the area.

The results from the various tests are presented under three headings, (1) Forage Yield, (2) Seed Yield, and (3) Winter Hardiness.

Forage Yield

The yield data from the uniform test of alfalfa varieties overseeded with grass are presented in Table 1. Rambler yielded especially well at locations in Saskatchewan, Alberta, and Manitoba where precipitation is generally low, but yielded poorly in comparison with other varieties on Vancouver Island in British Columbia, and at Ottawa and Nappan in Eastern Canada. Nomad yielded very poorly compared with Rambler and other varieties at practically all locations. However, relative to Rambler, it performed better in Eastern Canada than at locations in Western Canada.

The relative stand of alfalfa to grass was determined by the point quadrat method at three locations in Saskatchewan and one in Alberta in 1954, 1956, and 1957. (Table 2). The persistence and competitive ability of Rambler showed up especially well in 1957 at Saskatoon and Swift Current after a dry fall and spring, and a severe winter. Nomad lacked winter hardiness and began to disappear from the stand after the first season. The tests also showed that Vernal did not persist so well as Ladak at most locations.

Yield summaries from a uniform test seeded at 13 locations in Western Canada in 1954 are presented in Tables 3, 4, and 5. Locations were: Saanichton, Smithers, and McBride, British Columbia; Beaverlodge, Lacombe, and Leth-

Table 1—Dry Matter Yields of Grass-Alfalfa Mixtures, Harvested by Clipping to Simulate Grazing
Uniform Test—Seeded 1953

Station	Dry Matter Yield—lb./ac.; av. 3 years, 1954-55-56					
	Nomad	Rhizoma	Grimm	Vernal	Ladak	Rambler
Saanichton, B.C.....	2.29	3.08	3.11	3.03	2.75	2.62
Lacombe, Alta.*.....	1.48	1.86	1.53	1.49	1.68	1.87
Melfort, Sask.....	1.22	1.48	1.66	1.56	1.46	1.79
Saskatoon, Sask.....	1.67	2.17	1.91	1.96	2.25	2.21
Swift Current, Sask.....	1.14	1.52	1.51	1.62	1.59	1.61
Brandon, Man.....	2.09	2.31	2.63	2.89	2.64	2.39
Ottawa, Ont.*.....	2.74	3.57	3.25	3.18	3.22	2.69
Nappan, N.S.....	1.54	2.34	1.92	2.13	1.70	1.69
All Station Average: percentage of Ladak	82	106	90	101	100	97
Alberta, Saskatchewan and Manitoba. Average: percentage of Ladak.....	79	97	96	99	100	103
British Columbia, Ontario and Nova Scotia, Average: percentage of Ladak	86	117	108	109	100	91

* Average 2 years only; in the Ottawa test alfalfa was seeded alone.

bridge, Alberta; Swift Current, Saskatoon, Melfort, and Indian Head, Saskatchewan; and Brandon, Winnipeg, and Morden, Manitoba. No winterkilling occurred during the first winter and yields were obtained at all locations except Saskatoon in 1955 (Table 3). A second cutting was harvested at only 8 of the 12 locations. At the first cutting Rambler significantly outyielded all varieties, while at the second cutting it was outyielded by all. In total seasonal yield Rambler, Ladak, Vernal, and Rhizoma produced about the same amount of forage, while Grimm yielded from 5 to 6 per cent less and Ranger from 12 to 13 per cent less.

During the winter of 1955-56 severe winter injury occurred at 5 of the 13 locations (Table 10). The yield data at 8 stations where no winter injury occurred, are presented in Table 4. It will be noted that at the first cutting

Table 2—Basal Ground Cover of Alfalfa in Relation to Grass

Uniform Test Seeded in 1953

Station and Year	Percentage Alfalfa of Total Stand (Weeds Excluded)					
	Nomad	Rhizoma	Grimm	Vernal	Ladak	Rambler
Lacombe, Alta.....1954	19	37	52	43	50	42
.....1956	18	39	35	26	29	30
.....1957	19	34	34	20	23	25
Melfort, Sask.....1954	54	54	57	59	51	54
.....1956	20	47	44	36	55	62
.....1957	11	57	56	56	57	67
Saskatoon, Sask.....1954	6	18	10	25	15	18
.....1956	5	24	15	16	23	23
.....1957	1	10	5	3	19	24
Swift Current, Sask.....1954	43	57	52	51	51	55
.....1956	16	47	43	43	47	54
.....1957	1	15	4	15	24	33
All Station Average.....1954	30	41	43	44	42	42
.....1956	15	39	34	30	38	42
.....1957	6	31	27	19	25	29

Rambler again was the top yielding variety and at the second cutting it was the lowest. In total seasonal yield it fell somewhat behind Ladak and Vernal, the latter yielding the most.

In the five tests where winter injury was severe Rambler yielded very much better than other varieties and Grimm yielded next best.

Table 3—Dry Matter Yields—1955 at Twelve Stations

Uniform Alfalfa Variety Test Seeded 1954

Variety	Yield in Tons Per Acre			Total Yield percentage of Ladak
	1st cutting Av. 12 Stations	2nd cutting Av. 8 Stations	Total Av. 12 Stations	
Rambler.....	2.17	1.00	2.83	101
Ladak.....	2.02	1.18	2.81	100
Vernal.....	2.03	1.23	2.85	101
Grimm.....	1.90	1.16	2.67	95
Rhizoma.....	2.05	1.14	2.81	100
Ranger.....	1.72	1.13	2.47	88
L.S.D. (P = .05).....	.09	.07	.11	

NOTE:—No second cutting was made at 4 of the 12 stations.

Table 4—Dry Matter Yields—1956 At Eight Stations where no Winter Injury Occurred

Uniform Alfalfa Variety Test—Seeded 1954

Variety	Yield in Tons Per Acre			Total Yield Average 8 Stations percentage of Ladak
	1st cutting Av. 8 Stations	2nd cutting Av. 6 Stations	Total Av. 8 Stations	
Rambler.....	1.99	1.05	2.89	97
Ladak.....	1.86	1.25	2.97	100
Vernal.....	1.91	1.30	3.09	104
Grimm.....	1.80	1.23	2.90	98
Rhizoma.....	1.81	1.22	2.90	98
Ranger.....	1.82	1.13	2.86	96
L.S.D. (P = .05).....	.11	.08	.16	

NOTE:—No second cutting was made at 2 of the 8 stations.

Table 5—Dry Matter Yields—1956 At Five Stations

Where Winter Injury Occurred

Variety	Yield in Tons Per Acre			Total Yield Average 5 Stations percentage of Ladak
	1st cutting Av. 5 Stations	2nd cutting Av. 2 Stations	Total Av. 5 Stations	
Rambler.....	1.07	1.00	1.47	179
Ladak.....	.57	.62	.82	100
Vernal.....	.60	.84	.93	113
Grimm.....	.91	1.06	1.33	162
Rhizoma.....	.55	.75	.85	104
Ranger.....	.51	.70	.79	96

NOTE:—No second cutting was made at 3 of the 5 locations.

Figure 2 shows the two-year average yields of two cuttings per year from five locations where no winterkilling occurred. Rambler performed well and at the time of the first cutting outyielded the other five varieties. Although Rambler yielded less than any other variety at the second cutting, in total seasonal yield it was only slightly behind Ladak and Vernal and ahead of the other three varieties.

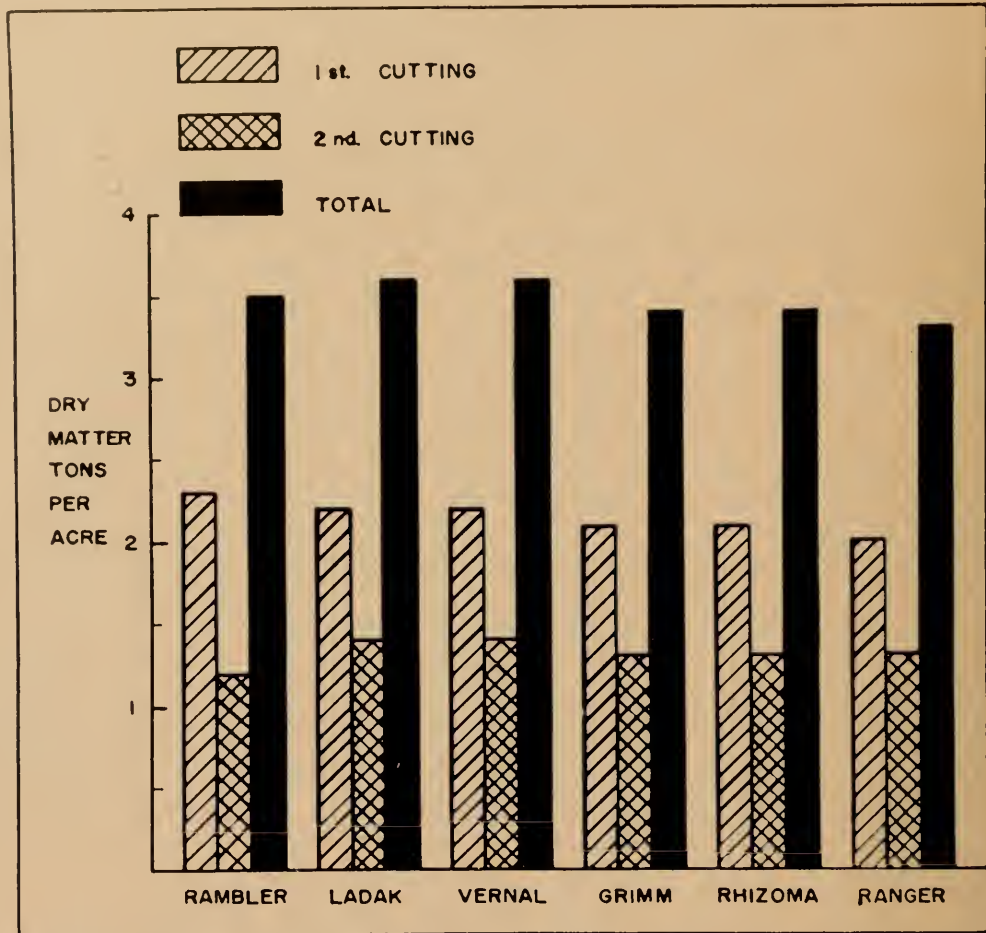


Figure 2—Dry matter yield: average 1955-56 at five stations, Morden, Winnipeg, and Brandon, Man.; Lethbridge, Alta. (irrigation); and Saanichton, B.C. Two cuttings were made at each station in both years and no winter injury occurred to the stand of any variety

Table 6 shows the yields in two tests at Swift Current during two very dry years following seeding in 1955. Rambler gave a good account of itself in these two tests. Only one cutting was made and very little winter injury was noted in any variety.

Seed Yield

Seed yields obtained at locations in Western Canada in 1955 and 1956, are presented in Table 7. The data show clearly that Rambler yields less seed than other varieties, at least when competing with them where pollinating bees are present in small numbers.

Two-year results from a test seeded in Logan, Utah, in 1953, under fair seed-setting conditions, corroborate the results obtained in Canada that Rambler produces about 60 per cent as much seed as Ladak (Table 8).

Table 6—Dry Matter Yield at Swift Current in Two Very Dry Years 1956 and 1957

Alfalfa Variety Tests Seeded in 1955

Variety	Dry Matter Yield—Tons Per Acre					
	Test 1 Alfalfa Seeded Alone			Test 2 Alfalfa Seeded with Intermediate Wheat Grass		
	1956	1957	2-Year Av.	1956	1957	2-Year Av.
Rambler.....	.80	.59	.70	.73	.50	.62
Ladak.....	.59	.67	.63	.74	.52	.63
Vernal.....	.73	.59	.66	.73	.54	.64
Grimm.....	.66	.51	.59	.76	.49	.62
Rhizoma.....	.65	.54	.60	.70	.47	.58
Ranger.....	.53	.52	.52	.75	.55	.65
L.S.D. (P = .05).....	.11	.12		N.S.	N.S.	

Table 7—Seed Yields at Stations in Western Canada in 1955 and 1956

When Seed Setting Conditions Were Generally Poor.

Variety	Seed Yields—Pounds Per Acre			Seed Yield percentage of Ladak
	Av. 6 Stations 1955	Av. 5 Stations 1956	2-Year Average	
Rambler.....	46	68	57	59
Ladak.....	97	97	97	100
Vernal.....	87	67	77	79
Grimm.....	102	144	123	127
Rhizoma.....	82	97	90	93
Ranger.....	81	41	66	68
L.S.D. (P = .05).....	8	15		

Table 8—Seed Yields at Logan, Utah, Under Fair Seed-Setting Conditions

Test Seed in 1953

Variety	Seed Yields—Pounds Per Acre			Seed Yield percentage of Ladak
	1954	1955	2-Year Average	
Rambler.....	188	231	210	61
Ladak.....	261	431	346	100
Vernal.....	246	350	298	86
Grimm.....	239	439	339	98
Rhizoma.....	296	343	320	92
Ranger.....	223	371	297	68
L.S.D. (P = .05).....	114	107		

The seed yielding ability of Rambler under isolation at various locations is shown in Table 9. Apparently if bees are present in sufficient numbers under the right conditions, Rambler can be expected to yield a fair amount of seed.

Table 9—Rambler Seed Yield on Isolated Plots

Location	Year	Lb./ac.	Pollinating Insects
Seven Persons, Alberta.....	1953	522	Wild bees—leaf cutter and bumble bees—numerous
	1954	201	Wild bees—leaf cutter and bumble bees—late
	1955	100	Wild bees—bumble bees—very late after August 1
	1956	35	Wild bees—practically none
Zealandia, Sask.....	1955	37	Honeybees only—much competitive flora
	1956	37	Honeybees only—much competitive flora
	1957	25	Honeybees only—much competitive flora
Stewart Valley, Sask.....	1956	72	Wild bees—mostly bumble bees—very late—after mid-August
	1957	120	Wild bees—mostly bumble bees—July and August
Patterson, California.....	1956	375	Honeybees—3 hives per acre
	1957	325	Honeybees—3 hives per acre

Winter Injury

There was considerable winter injury at a number of locations during the winter of 1955-56. Complete killing occurred at some places while at others there was severe damage but with a fair recovery.

Data on winter injury in the uniform alfalfa variety test for hay at six locations are shown in Table 10. Rambler suffered little winter injury at any location, while some of the varieties were almost eliminated at a number of them. The type of winter injury that occurred during this particular winter damaged Grimm to a lesser extent than Ladak, Vernal, and Rhizoma. There is no clear-cut explanation for this as Grimm is generally considered to be less hardy in Canada than Ladak. A possible explanation for the apparent greater hardiness of Grimm, however, might be the source of seed. The Grimm seed used in the test came from a plot at Saskatoon that was over 25 years old and it is quite possible that natural selection has improved this strain of Grimm for hardiness over the strains in commercial production.

Table 10—Winter Injury at Six Locations 1955-56

Uniform Alfalfa Variety Test for Hay—Seeded 1954

Variety	Winter Injury percent						All Stations Average
	British Columbia		Alberta		Saskatchewan		
	McBride	Smithers	Lacombe	Beaverlodge	(Irr.) Swift Current	Indian Head	
Rambler.....	0	2	12	10	3	17	7
Ladak.....	15	13	91	68	43	62	49
Vernal.....	5	30	92	65	18	72	47
Grimm.....	0	1	23	10	8	35	13
Rhizoma.....	5	42	88	60	48	72	53
Ranger.....	35	47	100	68	35	100	64

Severe winter injury occurred in several seed production tests (Table 11 and Fig. 3). Rambler suffered little damage even at Swift Current and Saskatoon where the other varieties were almost eliminated.



Figure 3—Winter injury in alfalfa 1955-56 at Swift Current, Sask. Seed production test seeded in 1954. Photograph taken May 30, 1956. Upper: left to right, Rambler 5%, Grimm 60%, Vernal 95%. Lower: left to right, Ranger 100%, Ladak 80%, Rambler 5%.

Table 11—Winter Injury at Five Locations 1955-56

Uniform Alfalfa Variety Test for Seed—Seeded 1954

Variety	Winter Injury percent					All Stations Average
	Alberta			Saskatchewan		
	Athabasca	Ft. Vermilion	Fallis	Swift Current	Saskatoon	
Rambler.....	0	10	0	9	28	9
Ladak.....	4	43	0	82	95	45
Vernal.....	5	54	0	94	93	49
Grimm.....	1	19	0	65	83	34
Rhizoma.....	2	38	0	88	93	44
Ranger.....	13	49	40	98	98	60

In a test seeded at two locations on irrigated land in 1956 severe winter-killing occurred the first winter (Table 12). Rambler suffered less killing than other varieties.

Table 12—Winter Killing at Two Locations 1956-57

Alfalfa Variety Test on Irrigated Land—Seeded 1956

Variety	Winter Killing percent		
	Swift Current, Sask. Clay Soil	Outlook, Sask. Sandy Soil	Average
Rambler.....	40	25	32
Ladak.....	30	55	42
Vernal.....	65	64	64
Alfa.....	90	83	86
Du Puits.....	90	91	90

Discussion

Rambler is well adapted for forage production on dryland in Alberta, Saskatchewan, and Manitoba. It produces more than other varieties at the first cutting but less at the second cutting, and consequently is especially suitable for hay production in areas where only one cutting is normally taken. The slow recovery characteristic of Rambler makes it less suited for hay production under irrigation and in the more humid areas of Eastern Canada and along the West Coast. This same characteristic gives Rambler an advantage under pasture use in the dry areas of the Prairie Provinces. Its regrowth approximates that of the grass in a grass-alfalfa mixture. Thus it suffers less and persists longer than other varieties that outstrip the grass component in regrowth and consequently are grazed more severely. In addition, there are indications that the slow regrowth of Rambler provides a true mixture of grass and alfalfa and thus reduces the dangers of bloat.

The most outstanding attributes of Rambler are its superior drought resistance, winter hardiness, and resulting longevity. The creeping-rooted characteristic is unique in this variety and is partly responsible for the other characters. It is the creeping-rooted character that makes it possible for the alfalfa stand to increase in density if a poor stand was originally obtained or if



some killing out occurs during extremely dry spells. In addition to being a good alfalfa under intensive farming conditions in the Northern Great Plains, Rambler promises to be useful under range conditions.

It is extremely important to grow alfalfa with grass in the Prairie Provinces since mixtures of grasses and alfalfa yield at least twice as much as grasses alone. Some idea of this increase in yield can be gained from two Canada Department of Agriculture bulletins by Kilcher *et al.* (3), and Clark and Heinrichs (1). Rambler promises to be the alfalfa that persists with the grass, ensuring a continuing high yield of hay and pasture.

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