Alfalfa Performance Tests in Oklahoma

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Charles E. Denman and James D. Arnold[1]

Alfalfa varieties, clones and selections have been evaluated for forage yield and other agronomic characteristics by the Oklahoma Agricultural Experiment Station for the past several years. Performance tests have been conducted at the Agronomy Research Station near Stillwater and at other stations in the state. Information is available on many of the older varieties that have been grown in the Plains states as well as other areas.

In general, the yield of Oklahoma common sources of alfalfa, when averaged over years, will equal or exceed the yields of named varieties. This is particularly true when stands are left three or more years and is true if disease and insect infestations do not prevail. Performance test sites for the uniformity trials are shown in Figure 1.

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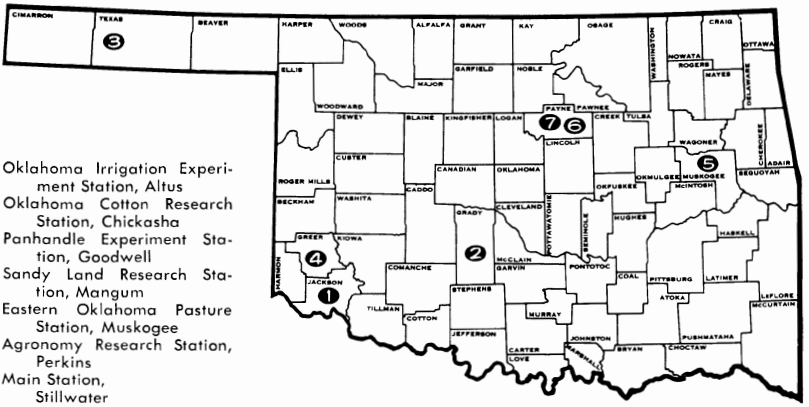

1. Oklahoma Irrigation Experiment Station, Altus
2. Oklahoma Cotton Research Station, Chickasha
3. Panhandle Experiment Station, Goodwell
4. Sandy Land Research Station, Mangum
5. Eastern Oklahoma Pasture Station, Muskogee
6. Agronomy Research Station, Perkins
7. Main Station, Stillwater

Figure 1. Performance test sights for the uniformity trials.

Statewide uniform performance tests were initiated in the fall of 1964 at 7 locations. Some of these plantings required reseeding in the fall of 1965 and subsequent years because of stand failures. Tests have been established recently at Altus, Chickasha, Goodwell, Mangum, and Tipton which include the spotted alfalfa and green pea aphid resistant varieties, Dawson and Kanza. These two varieties have performed well in the early stages of testing but insufficient information is available to draw general conclusions at this time.

Establishment of Test Sites

Individual test sites at each of the locations were summer fallowed prior to fall seeding. Individual plots consisted of five rows 20 feet long with 12 inches between rows. Each entry was replicated four times at each test. The plots were planted with a hand operated Planet Jr. vegetable seed planter at the rate of 20 pounds of seed per acre. All planting seed was inoculated with appropriate strains of nitrogen fixing bacteria at planting time.

Fertilizer Applications

Because of the high inherent fertility of the soil at the Goodwell Station, no fertilizers were applied on those plots. One thousand pounds of lime per acre was plowed down on the plots at Muskogee and 200 pounds each of P_2O_5 and K_2O per acre was plowed down prior to planting. Two hundred pounds P_2O_5 and 160 pounds K_2O were applied and plowed down prior to planting at the Altus, Chickasha, Mangum, Perkins, and Stillwater Stations. Approximately 100 pounds P_2O_5 and 60 pounds K_2O were applied to all plots, except those at Goodwell, in February or early March each year after stands were established.

Time and Method of Harvest

Plots were generally harvested when plants were in mid-bloom but weather conditions sometimes delayed harvest. Plots were harvested 2 to 4 times per year at most locations. Available moisture prior to and during the growing season governed the number of harvests possible at any location.

Plots were harvested with a Jari mower which had a 3 foot sickle blade. Green weights per plot were determined and aliquot samples were placed in forage dryers so that pounds of oven dry forage per acre could be determined.

Varietal Descriptions

There were 14 entries in the test and a brief description of each is presented below.

Zia: A synthetic variety with resistance to the spotted alfalfa aphid and to bacterial and fusarium wilt. The plants grow upright and have a large crown. Zia was developed at the New Mexico Experiment Station from stocks of New Mexico (common type), Turkestan, and Lahontan. This variety suffered some winter injury in the northern part of the state.

Alfa: Developed by Weibullsholm Plant-Breeding Institute, Landskrona, Sweden. It is derived from Flamande alfalfa which is grown extensively in Northern France. Alfa is vigorous and recovers rapidly after cutting. The variety does, however, suffer heavy damage from crown and leaf diseases in Oklahoma and stands thin rapidly.

Du Puits: A Flamande type alfalfa characterized by rapid growth and rapid recovery after cutting but not as persistant as the more winter hardy types.

Lahontan: This variety was developed by the Nevada Agricultural Experiment Station in cooperation with the U.S.D.A. It is a synthetic variety synthesized from five plants selected from Nemastan. Lahontan is an upright purple flowered variety that recovers rapidly after cutting. It is highly resistant to the spotted alfalfa aphid and the stem nematode. It has some resistance to bacterial wilt but is susceptible to a number of leaf diseases.

Resistador: A variety released by Northrup-King Seed Company and described as a tall, vigorous growing alfalfa with medium green foliage and stems. It has resistance to bacterial wilt and common leaf spot. It has some resistance to downy mildew and nematodes and is resistant to the spotted alfalfa aphid.

Resistador makes rapid spring growth and recovery after mowing. Fall growth is moderate. Flower color varies from light to dark blue. It is slightly earlier maturing than Lahontan.

Oklahoma (common type): This alfalfa is a type which has resulted from natural selection of adapted genotypes from many seed sources grown in the state during the past half century. A chief source dates back to seed introduced from Chile into California in 1850. Replantings from this introduction then moved eastward across the southwestern United States. Oklahoma (common type) is winter hardy and well adapted to the climatic conditions of the state. It is, however, susceptible to the spotted alfalfa aphid, bacterial wilt, and various leaf diseases.

Cody: Developed by the Kansas Agricultural Experiment Station and the U.S.D.A. It is derived from a composite of 22 plants selected from Buffalo. It is similar to Buffalo in reaction to bacterial wilt, adaptation

and appearance. In addition, it is resistant to the spotted alfalfa aphid. Some workers state that the plants are somewhat coarser stemmed than those of Buffalo.

Buffalo: This variety originated from a strain of Kansas (common type) that had been established for several years. It has resistance to bacterial wilt and is comparable to Kansas (common type) in resistance to stem and leaf diseases. It is also very similar to Kansas (common type) in growth habit and adaptation.

Kansas (common type): This alfalfa is a type derived in Kansas in a similar way as Oklahoma (common type) and other common type alfalfas.

Cherokee: This variety was developed jointly by the North Carolina Agricultural Experiment Station and the U.S.D.A. by C. H. Hansen and J. W. Dudley and was released in 1961.

Cherokee was developed by seven cycles of recurrent phenotypic selection for disease and insect resistance and general adaptation to North Carolina. In each cycle approximately 90 plants were selected from about 2,000 and recombined. The original material consisted of 400 healthy surviving plants in equal numbers from Buffalo, Williamsburg, Du Puits, 4 Kansas Synthetics, and Oklahoma and Kansas (common types).

Cherokee is susceptible to bacterial wilt, has resistance to alfalfa rust, and tolerance to certain crown and stem rots. Observations at Perkins, Oklahoma show the variety, when in the seedling stage, to be highly susceptible to the spotted alfalfa aphid.

Vernal: A synthetic variety produced at the University of Wisconsin. Parent clones were derived from Cossak, Ladak, Kansas (common type), and *Medicago falcata.* The flowers are highly variegated in color. Vernal is very winter hardy and has some resistance to leafhoppers. It is also wilt resistant and produces high forage yields in the Northern United States.

Ranger: A multiple strain variety derived from Cossak (45 per cent), Turkestan (45 per cent), and Ladak (10 per cent). The flowers are variegated with yellow flowered plants appearing on occasion. The growth is decumbent to erect and recovery after cutting is rapid. Ranger is resistant to bacterial wilt. The variety was developed by the Nebraska Agricultural Experiment Station and the U.S.D.A.

Ladak: This variety was introduced in 1910 from the high mountain region of Ladak in Kashmir, India. It was labelled as *Medicago falcata* but proved to be a mixture of *falcata* and *sativa* types. Reselection was done at Redfield, South Dakota and in successive generations the proportion of yellow flowered types decreased. The variety is tolerant of cold and drought. Hay yield for the first cutting each spring is generally very good, but recovery after cutting is slow and annual yields tend to be

low. Ladak is recommended for areas where winter-hardiness is essential and only one harvest is expected.

Narragansett: This variety was developed by the Rhode Island Agricultural Experiment Station. The parental stock from which it is derived includes several strains and varieties of *Medicago falcata* and of variegated types. The growth habit varies from decumbent to upright. The variety is highly susceptible to bacterial wilt but has good leaf disease resistance. Narragansett is very winter-hardy and is recommended for the Northern United States in areas where bacterial wilt is not a problem.

Rainfall and Irrigation

The plots at Altus and Goodwell were irrigated each season although the amount of available irrigation water was limited at the Altus Station during the 1965 and 1966 growing season. Observation of rainfall and forage yield tables will show some correlation of yield and rainfall received. Rainfall tables show the precipitation for each month, the amount received from April through September, and the yearly totals.

Rainfall distribution, supplemental irrigation, and combined rainfall and irrigation may be observed in Tables 1, 2, and 3 for Altus, Table 5 for Chickasha, Tables 7, 8, and 9 for Goodwell, Table 11 for Mangum, Table 13 for Muskogee, Table 15 for Perkins, and Table 17 for Stillwater.

Results and Discussion

State-wide averages (Table 19) show a difference of approximately 500 pounds per acre of oven dry forage between the top and lowest yielding varieties at seven locations based on two to five years testing.

Kansas (common type) and Oklahoma (common type) along with Cody were top yielding entries. These entries might be expected to do well in Oklahoma. Oklahoma and Kansas common types were selected under local conditions by natural processes over a fairly long period of time. It seems logical that the better adapted genotypes in each case would have multiplied resulting in both Oklahoma and Kansas common types being well adapted to Oklahoma. Cody was selected out of Buffalo and since Buffalo does well in the state one would expect Cody to be well adapted also.

Observation of yield results for the first year at most stations will show the Alfa variety to be the top or near top yielder of forage. However, after the first year, in most instances, forage yields for Alfa declines rapidly and it loses its position of superiority.

The Oklahoma and Kansas common types are not generally recommended for Oklahoma for a number of reasons. Genetic background purity in common types varies among seed lots, therefore one can never be certain of the performance to be expected from a given lot of seed. The common types, as mentioned previously, are susceptible to the spotted alfalfa and green pea aphid among insects and to bacterial wilt and a whole host of leaf diseases. For these reasons it is suggested that Cody, which is resistant to the spotted alfalfa aphid and bacterial wilt, or the newer varieties, Dawson and Kanza, be considered if one wishes to establish new stands. Cody has proven to be a satisfactory variety for hay production in Oklahoma.

Forage yields at the various test sites may be observed in Table 4 for Altus, 6 for Chickasha, 10 for Goodwell, 12 for Mangum, 14 for Muskogee, 16 for Perkins, and 18 for Stillwater. Average yields at all locations may be found in Table 19.

Table 1. Rainfall distribution recorded in inches of precipitation by months, from April through September, and totals for years. Altus.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1965	.26	.65	.87	3.06	4.23	3.54	.82	2.55	7.29	4.35	T	1.46	21.49	29.08
1966	1.24	.92	.96	1.90	.27	.52	1.25	5.81	3.25	.72	.09	.21	13.00	18.14
1967	.00	.11	.58	1.93	1.52	1.35	3.42	.40	2.00	1.39	.09	.65	10.62	13.44
1968	2.56	.81	1.46	1.80	4.03	3.76	3.20	4.59	.64	1.29	2.59	.67	18.02	27.40

* Accumulated rainfall for the months of April through September.

Table 2. Supplemental irrigation water recorded in inches added per month, April through September and total. Altus.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1965	.00	.00	.00	.00	.00	2.00	2.00	2.00	.00	.00	.00	.00	6.00	6.00
1966	.00	.00	.00	.00	.00	2.00	2.00	2.00	.00	.00	.00	.00	6.00	6.00
1967	.00	3.00	3.00	.00	3.00	3.00	.00	3.00	3.00	.00	.00	.00	12.00	18.00
1968	.00	.00	.00	.00	.00	3.00	3.00	3.00	.00	.00	.00	.00	9.00	9.00

Table 3. Rainfall and irrigation combined. Recorded in inches per month, April through September, and total. Altus.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1965	.26	.65	.87	3.06	4.23	5.54	2.82	4.55	7.29	4.35	.00	1.46	27.49	35.08
1966	1.24	.92	.96	1.90	.27	2.52	3.25	7.81	3.24	.72	.09	.21	19.00	24.14
1967	.00	3.11	3.58	1.93	4.52	4.35	3.42	3.40	5.00	1.39	.09	.65	22.62	31.44
1968	2.56	.81	1.46	1.80	4.03	6.76	6.20	7.59	.64	1.29	2.59	.67	27.02	36.40

Table 4. Altus alfalfa yields, 1965—1968 and Average. Soil type: Tillman-Hollister clay loam. Yields given in pounds per acre of oven dry forage.

	Number of Harvests				
	3	4	4	4	
Variety	1965	1966	1967	1968	Average
Zia	5554	10696	12215	9192	9414
Ranger	5460	9681	12107	8683	8983
Oklahoma (common type)	5373	9914	10312	10036	8909
Cody	4566	10003	11116	9744	8859
Kansas (common type)	5233	10665	10826	8393	8779
Cherokee	5948	10357	10647	7356	8577
Lahontan	4741	9378	11348	8338	8451
Resistador	5042	8914	10275	9445	8419
Ladak	4951	9588	10485	8578	8401
Narragansett	4888	9471	9989	8697	8261
Du Puits	5590	9664	9123	8575	8238
Buffalo	4534	9513	10354	8443	8211
Vernal	5228	9786	10306	7473	8198
Alfa	5021	8789	9043	7813	7667

LSD
1965: Variety means not significantly different statistically.
1966: Variety means not significantly different statistically.
1967: .05 = 1750, .01 = 2341
1968: .05 = 1245, .01 = 1666

Table 5. Rainfall distribution recorded in inches of precipitation by months, from April through September, and totals for years. Chickasha.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1966	.49	1.62	1.34	4.84	.77	1.65	2.89	6.58	2.92	.39	.59	.97	19.65	25.05
1967	.26	.04	2.36	5.90	3.18	1.68	2.46	1.84	5.51	1.96	.55	.94	20.49	26.00
1968	2.66	1.12	1.99	1.68	4.26	3.84	3.22	1.53	2.99	2.24	4.24	.77	17.52	30.54
1969	.62	2.30	2.47	1.31	4.97	2.00	.79	2.30	4.17	1.54	.21	.82	15.54	23.50

* Accumulated rainfall for the months of April through September.

Table 6. Chickasha alfalfa yields, 1966—1969 and Average. Soil type: McClain clay loam. Yields given in pounds per acre of oven dry forage.

	Number of Harvests				
	5	5	6	5	
Variety	1966	1967	1968	1969	Average
Oklahoma (common type)	10232	11790	14105	9962	11522
Kansas (common type)	10817	11573	13622	9226	11310
Cody	10788	11901	12393	9381	11116
Cherokee	11349	10988	12410	9116	10966
Buffalo	10161	11508	12034	9707	10853
Lahontan	9838	10790	12979	9541	10787
Ranger	10377	10364	12402	9478	10680
Zia	9623	10703	13003	9162	10623
Ladak	9898	10057	13250	8846	10513
Resistador	10430	10636	10909	9136	10278
Narragansett	10865	9941	11376	8722	10226
Du Puits	10601	10793	11665	7623	10171
Vernal	10195	9679	11073	8567	9879
Alfa	10110	9809	11080	8144	9786

LSD
1966: Variety means not significantly different statistically.
1967: .05 = 1115, .01 = 1491
1968: Variety means not significantly different statistically.
1969: .05 = 939, .01 = 1270

Table 7. Rainfall distribution recorded in inches of precipitation by months, from April through September, and totals for years. Goodwell.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1965	.26	.20	.10	.22	2.61	4.91	3.99	1.30	.68	1.45	T	.65	13.71	16.37
1966	.14	.58	T	.04	.13	1.78	4.16	4.68	1.93	.23	.00	.30	12.72	13.97
1967	.02	.02	.01	1.04	1.87	4.15	4.61	3.04	1.58	.04	.09	.05	16.29	16.52
1968	.71	.13	.18	1.37	4.07	2.14	2.30	2.18	.54	2.34	1.54	.08	12.60	17.58

Table 8. Supplemental irrigation water recorded in inches added per month, April through September, and total. Goodwell.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1965	.00	.00	.00	6.00	.00	2.00	5.00	2.50	.00	.00	.00	.00	17.5	17.5
1966	.00	.00	1.50	.00	1.50	5.00	3.50	3.50	3.50	2.00	2.00	.00	17.00	22.5
1967	.00	.00	2.00	2.00	3.00	.00	.00	3.50	3.00	2.50	.00	.00	11.50	16.0
1968	4.00	.00	4.00	3.50	.00	4.50	3.00	4.00	4.00	.00	.00	.00	19.00	27.0

Table 9. Rainfall and irrigation combined. Recorded in inches per month, April through September, and total. Goodwell.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1965	.26	.20	.10	6.22	2.61	6.91	8.99	3.80	.68	1.45	.00	.65	29.21	31.87
1966	.14	.58	1.50	.04	1.63	6.78	7.66	8.18	5.43	2.23	2.00	.30	29.72	36.47
1967	.02	.02	2.01	3.04	4.87	4.15	4.61	6.54	4.58	2.54	.09	.05	27.79	32.52
1968	4.71	.13	4.18	4.87	4.07	6.64	5.30	6.18	4.54	2.34	1.54	.08	31.60	44.58

* Accumulated rainfall for the months of April through September.

Table 10. Goodwell alfalfa, 1965—1968 and average. Soil type: Richfield silty clay loam. Yields given in pounds per acre of oven dry forage.

	Number of Harvests				
	4	4	5	4	
Variety	1965	1966	1967	1968	Average
Kansas (common type)	13591	14372	11995	12792	13188
Du Puits	13705	13162	12155	12953	12994
Vernal	12681	13450	11295	13099	12631
Lahontan	12348	14609	11007	12533	12624
Ladak	13666	12353	11680	12699	12600
Oklahoma (common type)	13429	13630	11592	11572	12556
Cherokee	13519	12342	11964	12307	12533
Zia	12793	11749	12291	13245	12520
Alfa	14563	11406	11883	12215	12517
Cody	13274	13581	11149	11954	12490
Ranger	12757	12867	11479	12612	12429
Resistador	13057	12217	10982	12630	12222
Narragansett	12169	12725	11191	12284	12092
Buffalo	12643	12193	11419	12029	12071

LSD
1965: .05 = 1016, .01 = 1360
1966: .05 = 1321, .01 = 1738
1967: Variety means not significantly different statistically.
1968: Variety means not significantly different statistically.

Table 11. Rainfall distribution recorded in inches of precipitation by months, from April through September, and totals for years. Mangum.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1965	.27	.64	.66	.92	2.78	4.98	.44	1.81	9.99	4.53	.00	1.32	20.85	28.27
1966	.60	.99	.81	2.26	.38	.71	1.05	6.62	3.61	.74	.15	.53	14.63	18.45
1967	.00	.03	1.00	1.68	2.55	1.21	2.35	.70	2.44	2.06	.27	.77	10.93	15.11
1963	2.03	1.69	1.09	1.27	5.69	4.10	2.41	3.03	.85	3.95	2.92	.86	17.10	29.94
1969	T	1.91	2.11	.39	5.71	3.00	3.23	2.02	4.09	1.99	.22	.28	18.49	25.00

* Precipitation received from April through September.

Table 12. Mangum alfalfa yields, 1965—1969 and average. Soil type; Meno sandy loam. Yields given in pounds per acre of oven dry forage.

	Number of Harvests					
	4	6	4	4	4	
Variety	1965	1966	1967	1968	1969	Average
Oklahoma (common type)	3305	8079	3631	4902	5264	5036
Buffalo	3459	7779	3540	5265	4793	4967
Cody	3385	6980	3395	5165	5201	4825
Lahontan	3295	7341	3576	4919	4875	4801
Kansas (common type)	3203	7861	3423	5092	3985	4713
Zia	3477	7106	3432	4755	4403	4635
Cherokee	3081	7587	2288	4459	4720	4427
Resistador	3059	7197	3059	4230	4493	4408
Du Puits	3086	7079	2233	3150	3296	3769
Ladak	2487	5826	2405	4311	3576	3721
Ranger	2968	5346	2224	3922	3938	3680
Alfa	2606	6209	1742	3214	3930	3540
Narragansett	2350	4883	2351	3776	3549	3382
Vernal	2633	5065	1663	3494	3412	3253

LSD
1965: Variety means not significantly different statistically.
1966: .05 = 1326, .01 = 1774
1967: .05 = 656, .01 = 878
1968: .05 = 1035, .01 = 1384
1969: Variety means not significantly different statistically.

Table 13. Rainfall distribution recorded in inches of precipitation by months, April through September, and totals for years. Muskogee.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1968	3.28	2.94	4.50	5.37	6.58	5.56	1.58	6.49	4.63	2.50	7.77	2.84	30.19	54.04
1969	3.91	3.43	3.76	3.45	4.40	2.76	.43	1.68	1.04	9.09	.84	2.84	13.76	37.63

* Precipitation received from April through September.

Table 14. Muskogee alfalfa yields, 1968, 1969 and average. Soil type: Taloka. Yields given in pounds per acre of oven dry forage.

	Number of Harvests		
	3	2	
Variety	1968	1969	Average
Alfa	6500	4824	5662
Vernal	6600	4533	5567
Ladak	6283	4613	5448
Narragansett	6599	4189	5394
Zia	5775	4747	5261
Du Puits	6140	4331	5236
Ranger	5846	4259	5053
Cody	5785	4100	4943
Kansas (common type)	5841	3732	4787
Resistador	5337	3990	4664
Oklahoma (common type)	4693	3770	4232
Buffalo	4555	3239	3897
Lahontan	4350	2722	3536
Cherokee	3850	3042	3446

LSD
1968: .05 = 708, .01 = 947
1969: .05 = 509, .01 = 680

Table 15. Rainfall distribution recorded in inches of precipitation by months, from April through September, and totals for years. Perkins.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1965	2.16	1.00	1.88	2.34	3.66	4.44	1.77	1.95	10.64	.88	.05	2.43	24.80	33.20
1966	.15	1.50	.20	2.35	3.50	3.80	7.38	3.45	1.45	.41	.12	1.48	21.93	25.79
1967	1.65	.30	1.18	3.48	6.68	6.59	1.29	2.17	5.42	2.89	.81	1.27	25.63	33.73

* Precipitation received from April through September.

Table 16. Perkins alfalfa yields, 1965—1967 and average. Soil type: Vanoss fine sandy loam. Yields given in pounds per acre of oven dry forage.

	Number of Harvests			
	3	3	2	
Variety	1965	1966	1967	Average
Du Puits	4222	2884	3243	3450
Alfa	4075	2579	2962	3205
Resistador	3813	2440	3149	3134
Oklahoma (common type)	3321	2784	3181	3095
Buffalo	3342	2716	2991	3016
Vernal	3760	2274	2848	2961
Narragansett	3446	2303	3104	2951
Cody	3068	2512	3129	2903
Cherokee	3259	2252	3027	2846
Kansas (common type)	3477	2164	2882	2841
Zia	3026	2521	2897	2815
Ranger	3402	2467	2373	2747
Ladak	3311	2290	2630	2744
Lahontan	3234	2194	2701	2710

LSD
1965: .05 = 511, .01 = 683
1966: .05 = 331, .01 = 442
1967: .05 = 469, .01 = Not significant.

Table 17. Rainfall distribution recorded in inches of precipitation by months, from April through September, and totals for years. Stillwater.

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	A-S*	TOTAL
1965	.99	.71	1.38	1.92	3.78	5.28	1.73	2.67	6.50	.52	.04	2.26	21.88	27.78
1966	.18	1.48	.17	2.39	3.48	3.75	7.34	3.32	1.34	.40	.13	1.41	21.62	25.39
1967	2.32	.33	1.46	2.74	6.22	3.93	4.59	1.28	4.60	2.58	.72	.71	23.36	31.48
1968	1.68	.25	2.49	5.71	6.26	3.12	1.70	.99	1.88	2.73	4.52	1.71	19.66	33.04
1969	.75	2.27	2.60	1.93	3.60	4.43	1.43	3.11	3.77	2.63	.08	1.24	18.27	27.84

* Precipitation received from April through September.

Table 18. Stillwater alfalfa yields, 1965—1969 and average. Soil type: Kirkland clay loam. Yields given in pounds per acre of oven dry forage.

	Number of Harvests					
	2	3	3	3	2	
Variety	1965	1966	1967	1968	1969	Average
Cody	1786	3934	3828	6095	4177	3964
Buffalo	1717	3843	3077	6920	4232	3958
Cherokee	1865	3776	3004	6547	4186	3876
Oklahoma (common type)	1590	3726	3223	6266	4005	3761
Kansas (common type)	1698	3550	2773	6653	4044	3744
Resistador	1944	3108	3882	6013	3876	3665
Ranger	2079	2786	2883	6585	3829	3632
Lahontan	1510	3319	3768	5746	3710	3611
Ladak	2023	2886	2884	6035	3991	3564
Vernal	1823	2736	2859	6306	4073	3559
Narragansett	1863	3089	2752	5978	3648	3466
Zia	1215	3512	3230	5156	3767	3376
Du Puits	2036	3257	2697	5411	3203	3321
Alfa	2335	2945	2807	4741	3323	3230

LSD
1965: .05 = 458, .01 = 613
1966: .05 = 781, .01 = Not significant
1967: .05 = 609, .01 = 814
1968: .05 = 884, .01 = 1183
1969: Variety means not significantly different statistically.

Table 19. Average annual alfalfa yields by location. Yields given in pounds per acre of oven dry forage.

Variety	Altus	Chickasha	Goodwell	Mangum	Muskogee	Perkins	Stillwater	Average
Kansas (common type)	8779	11310	13188	4713	4787	2841	3744	7051
Oklahoma (common type)	8909	11522	12556	5036	4232	3095	3762	7016
Cody	8859	11116	12490	4325	4943	2903	3964	7014
Zia	9414	10623	12520	4635	5261	2815	3376	6949
Ranger	8983	10680	12429	3680	5053	2747	3632	6743
Du Puits	8238	10171	12994	3769	5236	3450	3321	6740
Ladak	8401	10513	12600	3721	5448	2744	3564	6713
Buffalo	8211	10853	12071	4967	3897	3016	3958	6710
Resistador	8419	10278	12222	4403	4664	3134	3665	6684
Cherokee	8577	10966	12533	4427	3446	2846	3876	6667
Lahontan	8451	10787	12624	4301	3536	2710	3611	6646
Vernal	8198	9879	12631	3253	5567	2961	3559	6598
Narragansett	8261	10226	12092	3352	5394	2951	3466	6539
Alfa	7667	9786	12517	3540	5662	3205	3230	6515
Station Means	8526	10622	12533	4226	4795	2958	3623	6756