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The period of drouth in Missouri, accompanied by an almost complete corn crop failure, resulted in the production of much corn which could be used for fodder only. Corn grown in the drouth year of 1934 on the Experiment Station farms and fields was cut for feed and for preparation of silage. The Department of Animal Husbandry collected samples of these materials as they were used for feeding and brought some to the laboratories of the Experiment Station for analysis.* The data obtained are presented in this bulletin. The composition of corn stover produced in a normal year is compared with that produced in a drouth year in Table 1.

TABLE 1.—CORN STOVER, AVERAGE COMPOSITION WHEN CUT.

Description	Total moisture in fresh	Dry matter in fresh	Protein	Ether Extract	Ash	Crude Fiber	Nitrogen-free Extract
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
I. Normal corn stover in shock several months (in normal growth years)	25.00	75.00	6.25	1.41	5.76	22.75	38.83
II. Corn stover grown on river bottom near Labaddie (1934) (produced 30 bu. corn per acre)	25.00	75.00	7.05	0.77	6.10	23.37	37.71
III. Corn stover from Turner Station upland corn (no ears to remove) (drouth year)	25.00	75.00	9.56	0.69	5.72	22.64	36.39

The average composition of 12 samples of corn stover produced in different years when growth was normal is given above (I). All of these stood in shocks for two to six months before sampling. The composition of two lots of corn stover (II and III) produced in the drouth year 1934 are also indicated. Series II was from river bottom corn producing 30 bu. of corn per acre. Series III came from upland corn producing no ears but possibly a few nubbins. This sample is designated as stover, though no ears were removed. The composition of all these samples is given on the

*The chemical analyses were conducted under the direction of E. W. Cowan of the Department of Agricultural Chemistry.

basis of an average moisture content for stover of 25 per cent. The difference we observe is in the higher protein content of the drouth stricken stover. The carbohydrates are practically identical and the other constituents show little if any variation from a normal corn stover.

The data presented in Tables 2 and 3 were obtained by the analysis of immature corn plants cut in the month of August of the drouth year 1934 from plots on Sanborn Field (Series I) and from experimental farms near Columbia (Series II).

In Series I, a distinctly dry sample and a partly green sample were gathered from each plot, and after drying the two parts were combined for analysis. In Series II the samples were made up of a dried-up sample and a partly green sample from each plot which were analyzed separately. Complete data on fresh weights and yields were not obtained for Series II. The effect of drouth conditions is best indicated by considering the composition of these materials on the dry basis.

TABLE 2.—COMPOSITION OF CORN PLANT CUT IN AUGUST 1934 AS DROUTH STRICKEN CORN.

Plot No. and Description	Total moisture in fresh	Dry matter	Composition of Dry Material				
			Protein	Ether Extract	Ash	Crude Fiber	Nitrogen-free Extract
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
			Series I				
Plot 1—Rock phosphate and manure	73.24	26.76	8.59	1.50	6.38	26.41	57.12
Plot 3—Fertilizer	73.47	26.53	10.67	1.18	5.10	24.04	59.01
Plot 13—No treatment	69.76	30.24	8.82	1.35	5.32	24.55	59.96
Plot 17—No treatment	73.42	26.58	5.83	1.32	6.73	25.55	60.57
Plot 18—Manure	74.60	25.40	12.08	1.04	8.22	24.89	53.77
Plot 25—Manure	74.98	25.02	12.23	1.44	6.51	23.42	56.40
Plot C, East—Fertilizer and sweet clover	77.31	22.69	9.78	1.32	5.68	25.29	57.93
Plot C, West—Sweet clover	71.93	28.07	11.32	1.19	4.78	25.75	56.96
			Series II*				
Plot 31—Dried up	-----	-----	9.39	0.97	5.99	25.98	57.67
Plot 31—Partly green	-----	-----	8.63	2.37	4.57	21.07	63.36
Plot 32—Dried up	-----	-----	9.69	0.89	6.55	30.87	52.00
Plot 32—Partly green	-----	-----	7.98	1.03	4.21	22.61	64.17
Plot 33—Dried up	-----	-----	11.92	1.15	6.59	32.01	48.33
Plot 33—Partly green	-----	-----	8.75	1.45	4.91	23.34	61.55
Gauss Farm—Short growth	-----	-----	10.01	1.57	7.98	26.87	53.57
Gauss Farm—Tall growth	-----	-----	11.65	1.20	6.05	25.81	55.29
Hinkson Bottom—Short growth	-----	-----	10.40	1.48	7.88	25.76	54.48
Hinkson Bottom—Tall growth	-----	-----	11.22	1.31	6.65	28.92	51.90

*Record of fresh weights and yields incomplete.

Differences in composition of the samples of Series I, Table 2, at the time of cutting are not conspicuous, with the exception of the crop grown on plot 17 which received no fertilizer treatment. This sample is lower in protein and higher in carbohydrate than the others. Plots 3, 18, and 25 to which manure or fertilizer had

been added, and also sweet clover plot C-West, produced corn of higher protein content than the plots receiving no treatment, or the manure and rock phosphate treatment. Other constituents show little variation due to soil treatments.

Considering the composition of the samples of Series II, Table 2, we note that the samples most completely withered by the drouth tend to exhibit higher protein and crude fiber percentages. The short and tall growth samples from the Hinkson bottom farm are the exception to this statement. Hand in hand with high percentages of crude fiber occur somewhat lower percentages of nitrogen-free extract resulting in a constant value for total carbohydrates in some cases. In others the green material tends to show slightly higher percentages of total carbohydrate than the dried sample.

In Series I, Table 3, the yields per acre show that the plots which received applications of fertilizer or manure gave distinctly

TABLE 3.—YIELDS OF CORN PLANT CUT IN AUGUST 1934 AS DROUTH STRICKEN CORN.

Plot No. and Description	Yield per acre	Dry Yield per acre	Protein per acre	Fat per acre	Ash per acre	Crude fiber per acre	Nitrogen-free extract per acre
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Plot 1—Rock phosphate	10710	2866.0	246.19	42.99	182.85	756.91	1637.06
Plot 3—Fertilizer	15120	4011.3	428.00	47.33	204.58	964.32	2367.07
Plot 13—No treatment	3732	1128.6	99.54	15.24	60.04	277.07	676.71
Plot 17—No treatment	4821	1281.4	74.71	16.91	86.24	327.40	776.14
Plot 18—Manure	8666	2201.2	265.91	22.89	180.94	547.88	1183.58
Plot 25—Manure	10025	2508.3	306.77	36.12	163.29	587.44	1414.68
Plot C, East—Fertilizer and sweet clover	10493	2380.9	232.85	31.43	135.23	602.13	1379.26
Plot C, West—Sweet clover	9673	2715.2	307.36	32.31	129.79	699.16	1546.58

better yields of the corn plant than the plots receiving no treatment. The drouth has of course a large influence on the yield but the effect of fertilizer treatment is plainly evident even in the dry season.

The composition of corn silage produced from the drouth stricken corn is given in Tables 4 and 5. These data are percentages as fed. In order to compare differences the data in Table 5 are calculated to a dry basis.

TABLE 4.—CORN SILAGE, AVERAGE COMPOSITION AS FED.

Description	Total moisture in fresh	Dry matter in fresh	Protein	Ether Extract	Ash	Crude Fiber	Nitrogen free Extract
	per cent	per cent	per cent	per cent	per cent	per cent	per cent
I. Average analysis of numerous lots removed from silo in normal years	75.00	25.00	2.05	0.85	1.51	5.48	15.11
II. Corn silage made with Missouri River bottom drouth corn	71.85	28.15	2.87	0.56	2.87	7.16	14.67
III. Corn silage made from upland drouth corn	78.89	21.11	2.38	0.48	1.55	5.65	11.05
IV. Silage from Atlas sorghum	71.58	28.42	1.88	0.57	1.62	8.15	16.20

TABLE 5.—CORN SILAGE, AVERAGE COMPOSITION, DRY BASIS.

Description	Protein	Ether Extract	Ash	Crude Fiber	Nitrogen-free Extract
	per cent	per cent	per cent	per cent	per cent
I. Average analysis of different lots of corn silage removed from silo in normal years	8.18	3.38	6.3	21.93	60.48
II. Corn silage from Missouri River bottom drouth corn	10.26	2.00	10.20	25.43	52.10
III. Corn silage from upland drouth corn	11.27	2.27	7.36	26.78	52.32
IV. Silage from Atlas sorghum	6.63	2.00	5.68	28.69	57.00

It will be observed that drouth corn silage II and III, Table 5, has a higher protein and lower carbohydrate content than normal corn silage (I). This is the difference one would expect in the composition of the young as compared with the more mature corn plant which is normally used for silage.

The Atlas sorghum used for preparing the above silage (IV) was grown in the drouth year of 1934. It made but a small growth in the dry season but with the onset of fall rains it began to grow vigorously. It was placed in the silo in October and the above sample of the resulting silage was taken from lots removed in November. The composition of this sorghum silage tends to approach the composition of normal corn silage as far as carbohydrate and protein is concerned, but its percentage of crude fiber is distinctly higher. Thus we would infer that it is somewhat inferior to normal corn silage from the standpoint of composition alone.

Timothy and wheat cut in June when growth has been stopped by the drouth was made into silage and used as a drouth feed. Composition of timothy and wheat hay and of the silage produced from the hay may be compared by observing the data in Table 6.

TABLE 6.—TIMOTHY AND WHEAT, HAY AND SILAGE.

Description	Percentages on the Dry Basis				
	Protein	Ether Extract	Ash	Crude Fiber	Nitrogen-free Extract
Timothy and wheat hay	5.76	1.42	6.62	38.86	47.84
Timothy and wheat silage	4.42	2.09	5.19	43.65	44.65

The feeding value of timothy hay is not significantly altered by mixing with the wheat plant which, though grown to maturity, did not produce grain sufficient to warrant cutting and threshing. When made into silage significant amounts of the more readily soluble portions of the mineral matter, protein and carbohydrate have been removed and the percentage of crude fiber increased, thus lowering its food value.