Thesis.

Subject.

A Study of the Adaptation of Cereals and Forage-crops in Kansas.

Sources of Information.

Fourteenth Biennial Report of the

Kansas State Board of Agriculture.

Written by

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## Outline.

## Introduction:

- 1. Statement of object.
- 2. Source of information.
- 3. Manner of presentation.

## Discussion:

- 1. Adaptation of wheat.
- 2. " " corn.
- 3. " " oats.
- 4. " flax.
- 5. " " sorghum.
- 6. " " millet.
- 7. " kafir-corn.
- 8. " " alfalfa.
- 9. " prairie grass.

## Conclusion:

- 1. Agriculture in the past in Kansas.
- 2. Future prospects.

The object of this study is to determine what crops are best adapted to the conditions existing in the different sections of the state. The accompanying tables which have been compiled from data found in the "Fourteenth Biennial Report of the Kansas State Board of Agriculture," give the acreage and value per acre in each county of the state for the year 1904, of each of the several more important crops, viz.; wheat, corn, oats, flax, sorghum, millet, kafir-corn, alfalfa and prairie hay. As alfalfa is classed with other tame grasses it is impossible in most cases to determine its value per acre.

Wheat - As spring wheat is not raised to any great extent, and only in a few of the western counties, it has been entirely ignored in this paper. Wheat is grown in each and every county in the state, the entire acreage for 1904 being 5,816,495 acres, with an average value of \$8.75 per acre, or a total value of \$51,149,917.12. The Central and west central portion of the state shows the greatest acreage and the greatest value per acre. Sumner County heads the list with 294,434 acres, yielding an average value of \$10.66 per acre. Barton County is second, with 262,667 acres and an average value per acre of \$10.40. Harper County comes third, with 171,240 acres, and an average value of \$13.94 per acre. Wheat seems to be especially adapted to Kansas soil and climate and there is a growing tendency, especially in the western portion of the state, to increase the acreage at the expense of the other cereals. In the last four years the acreage for the state has been increased over 900,000 acres. It is true however, as must necessarily be the case where crop after crop is taken from the land and nothing given in return, that the yield per acre is steadily decreasing.

corn - Of the cereals corn stands next to wheat in importance, with a total acreage of 6,494,158, and an average value of \$7.80 per acre. Corn, as well as wheat is grown in every county in the state, but the corn belt is virtually included in the eastern half of the state, and west of the looth Meridian very little corn is grown.

Jewell the banner corn county, with an acreage of 213,356, yielded an average value of \$10.50 per acre; and Smith county came second, with 166,271 acres yielding an average of \$12.60.

Corn is best adapted to the rich loam soils of the river bottoms, and in many parts of the state is confined almost exclusively to the lower lands. This land is admirably adapted to the growing of corn, and large profits have been derived from the crop, but the soil has been greatly exhausted by the continued growing of corn year after year. The farmers are beginning to realize this fact, and are gradually installing a system of rotation in which alfalfa has a prominent place, and as a natural consequence the acreage planted to corn is being gradually diminished each year.

Oats - This crop is grown in practically every part of the state, but it is not usually so profitable a crop to grow as wheat or corn, and consequently it is not as extensively raised. The reports show only 1,265,043 acres grown in the state in 1904, with an average value of \$5.43 per acre. The central portion of the state is best adapted to the growth of oats, as the eastern portion generally has too much rainfall and the western portion too little.

Summer, the banner county shows 45,088 acres, with an average of \$7.04 per acre,; and Sedgwick comes second, with 48,742 acres yielding an average value of \$5.95 per acre.

Oats cannot be profitably grown for market, and are as a rule raised only for home use, as they are an excellent feed for horses,

as well as for all kinds of young stock.

Flax - Flax is not extensively grown in this state, only the eastern half being at all adapted to its growth. In 1904 the acreage was 65,595 acres, with an average value of \$5.13 per acre. Coffey county stands first in the production of flax, with 8,539 acres, yielding an average value of \$4.75, and Linn county comes second, with 6,565 acres, yielding an average value of \$5.40.

Flax is usually grown on the high prairie lands where wheat and corn are not profitable; and there is at present a growing tendency to decrease the acreage of this crop in favor of the forage crops, as the production of live stock is rapidly assuming greater proportions, the tendency being to market the products of the soil through this channel.

Sorghum - This is another crop that is profitably grown in all parts of the state. Especially is it adapted to the semiarid western portion, as it does well in spite of drouth and hot winds. In 1904 we find the total acreage was 571,033 with an average value of \$5.84 per acre. Stevens was the banner county with 47,622 acres, yielding an average value of \$6.00 per acre, and Butler came second, with 16,723 acres valued at \$5.50 per acre.

This crop is an excellent feeder, growing readily on land that is considered too poor for wheat, corn, or alfalfa. It makes excellent roughness for all kinds of stock, when properly cured, and is very easily kept over winter, ordinarily keeping very well if put up in medium sized cocks. The acreage in the state is steadily increasing as the farmers are coming to a realization of its value as a forage plant.

Millet - Millet is also profitably grown in all parts of the

state, the eastern half however showing the greater acreage and yield. The reports of the state for 1904 show a total acreage of 245,824, with an average value of \$6.50 per acre. Marshall county heads the list with 18,186 acres, valued at \$8.00 per acre, and Nemaha comes second, with 16,120 acres valued at \$6.00 per acre.

Millet is an excellent feed for cattle and sheep, also for horses, if fed with discretion. To make the best hay it should be sown very thickly and cut just when in bloom. In the eastern part of the state millet is frequently sown late in the season after the failure of some other crop to make a stand, and in some instances it has been known to make a good crop when sown as late as July 1st.

Millet is not so extensively raised in the state as it formerly was, probably on account of the increased acreage of alfalfa and sorghum.

Kafir-corn - This is a profitable crop throughout the state; it is especially profitable in the semi-arid region of the western portion of the state. In 1904 518,372 acres were grown, yielding an average value of \$9.72 per acre. Butler the banner county produced 27,891 acres, with an average value of \$9.00 per acre, and Lyon county came second, with an acreage of 18,572 acres and an average value of \$9.00 per acre. The acreage in the state has almost doubled in the last decade, the farmers of the western portion of the state are now coming to a realization of the fact that they may raise grain for the fattening of cattle and hogs as economically or more so, than the farmers on the higher priced land of the eastern section; and the farmers of the eastern portion now realize that kafir-corn is a much surer crop than corn, and almost as valuable for feeding pur-It is true however that kafir-corn is a more difficult crop to cultivate and care for after growing than corn, but a few more years of experience may enable our farmers to care for this crop with

little danger of loss.

Alfalfa - This crop is extensively grown over the greater portion of the state. The land along the rich river valleys throughout the different portions of the state is especially adapted to the growth of this crop; while its deep-penetrating root system enables the crop to do well on the higher ground and uplands. As alfalfa is figured in with the other tame grasses in Secretary Coburn's report I have been unable, except in a few instances, to determine the average value of the crop per acre. However the acreage in 1904 is given as 557,569, almost seven times as great as in 1894. Jewell, the banner county, has 35,794 acres, and Butler, which comes next, has 28,712 acres.

Where figures can be obtained giving the value of this crop per acre the valuation is much higher than for wheat or corn, and this, coupled with the fact that alfalfa is an excellent feed, containing a high percentage of nitrogen, which makes it a favorite crop with the stock grower. Also the fact that the plant has the power of fixing free nitrogen from the air gives it great value in a rotation; this fact alone would give it a large degree of popularity in Kansas, as the better class of farmers now realize the fact that some method must be employed to maintain the fertility of the soil.

Prairie hay - The native grass is, and will continue for some time to be used for hay in all parts of the state, however the returns per acre are very small as compared with other hay crops, and the natural consequences will be that as the value of land increases, as it eventually must, all land smooth enough for cultivation will be broken up and farmed to the domestic crops. It is true that the native or prairie grasses make excellent hay for horses, but the time

is not far distant when prairie hay will be too expensive to feed to any great extent, and the horseman will learn to use some other hay, which when properly made and fed, will probably give the same results as prairie hay does today.

In conclusion it may be said that Kansas today is as well adapted to the scientific and intelligent practice of agriculture as she was suited to the hit or miss farming of fifty years ago, when corn would grow with little or no cultivation, and when cattle and horses would do well the entire year on the plains. But conditions have changed since that time, and the methods that met with a degree of success then are sure to result in utter failure if put in practice today. Already the soil which was thought to contain sufficient plant food to produce vast crops of wheat and corn for indefinite years to come, without care or the addition of fertilizers, shows signs of depletion, and the land that once produced sixty to seventy-five bushels of corn per acre now gives a paltry yield of twenty to forty bushels per acre.

Where the soil and climate are so admirably adapted to the production of such a variety of crops, how easy it will be to preserve, yes, and increase, the fertility of our land. With the advent of a system of rotation the acreage of our wheat and corn crops will undoubtedly be decreased, but the thoughtful intelligent farmer of the future, by a judicious system of tillage, may be enabled to raise as many bushels on the reduced acreage as the farmer of the present raises by the careless method, or lack of method, now employed.

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Harvey 90997 9/2 625/0 861 27365 490 1274 530 842 800 1803 760 1142 77546,  Haspell 4487 400 322 500 445 400 3655 400 65 400 2446 800 110.940  Hodgeman 39,869 300 9886 844 2/02 300 12529 450 2161 400 4270 800 775 960 92625.  Juckson 4496 790 111525385-10535-420 70 775 995-800 5:962 700 1885-1050 1:145- 44781	1.00	12.962		2080	6.00	2076	4.00	23	350	4.623							1 10			1
Haskell 4437 400 322 500 445. 400 3655 400 65 400 2446 8.00 110.940  Holganar 39369 300 9886 344 2/02 300 12529 450 216/ 400 4270 800 775. 960 92625.	13	111.014 .		5.44	9,00	9858	800	75-2	8.00	5.262									11/	7
Ancheson 4496 790 1/15:5585-10535-420 70 775- 995-800 5:962 700 1885-1050 1.145- 44781	46	77.5.46		11192	7.60	1.803	8.00	842	530	1274									1, (1)	-
Jackson 4496 790 1.115.55.85-10535-420 70 7.75- 995-8.00 5:962 700 1.885-1050 1.145- 44781		110.940			8.00	2446	4.00	65	4.00	3655			1					1	11 0	
eckson 4496 790 1/13:5585-10535-420 70 775- 995-8.00 5.902 700 1885-1050 1.145- 44781	0	92625-1	950																	4
	00	44.781		1.145-	10,50	1885	700	5:962	8.00	995	7.75	70	420	10535-	5.85	111,525	790	4496	1 00	1
exferson 14248 (263 89888 697 12966 538 537 570 1389 800 2808 525 1251 1850 1650 22616 2	50	22616 2		1650	18.50	1251	625	2.808	8.00	1389	5.70	537	5.38	12,966	697	89888	10.63	14248	efferson	
148509;	8	1485043																		
Johnson 26513 1131 64572 722 18955- 690 1957 680 449 800 228 875 338 1050 604 4155-85	40	1115-83										1957	680	18955	7,22	64572	11.31	265/3	ohnson	
Dearney 484 960 906 1040 932 1040 7010 415 82 4724 664 402 1065 950 4180	64	4.180 1.	9,50	6065	192								Inus	332	10.40	.906	9.60	489	Mearney	4
Kingman (3680811065 7.790 1080 13,564 5:89 5:066 5:50 384 800 11318 1112 1.845 116726													1.00	13571	1080	57.790	11.06	136808	Kingman	4

County Wheat Com Flax Sorghum Millet Pats Robicom alfalfa Prairie grass acres value acres Rignary 56474 1089 17.566 860 2408 832 3893 600 90 600 9.260 1345 288 Labette 46823 533 89,190468 57547264 11 02 475 1252 8,00 1628 8,00 2431 1050 594 46.987 1.48 Lanes 44686 150 3519 559 1.999 384 10 475 64/0 300 6410 300 2015 800 1.097 541 7057506 Leavenword 33068 860 54993 9.88 10086 8.64 265 6.65 1.03 8 6.00 1.03 8 6.00 5/6 20 1.129 6.970.89 5267 750 5.267 750 9886 10,00 5.570 91500 948 51168 1953 2269825 10,40 84.061. 11.049 8.00 90.647 652 11.504 527 6525 540 573 7.00 974 8.00 2479 700 4.1.402 .93 7633 500 1640 300 879 800 1396 16609 380 3919 1008 876 660 4390 902/11.704 5.04 6.390 663/193 4.25 3.87 2 8.00 4,12575.25/8572 900 851827.70 93706 729 3688 450 10 510 7451 650 8782 600 7214 900 16308 122837 .63 428hall 51483 936 194796 760 32325570 2/6 760 2383 10,00 18/86 800 2232 9,00 5627 115 Pherson 173,337 7,60 75,837 7,80 34,878 496 3432 550 17/3 800 4523 1110 12694 124,820,60 Meado 18450 160 1286 720 507 100 4 475 6534 400 315 3.00 4906 6.00 6348 1205 47,125 30 12628 1008/01.498 5/6 21.093 538 6014 532 556 700 16.032 252 Mitchell 110893 1039 84:960 1040 9.748 759 3524 700 1683 875 6362 900 15011 Montgomery 44.590 5:88 65635 5:46 27.363 380 253 4.75 2096 8,00 2562 700 4531 12.01.230 45.883 1.54 Morris 3.540 869 76248 546 7873 494 208 475 6407 500 6.7736,00 12654 800 6.032 Morton 245 800 25 4.00 5 150 3.665 5.00 15.300 405 800 1120 1120 90 Nemaha 2.840858 194200 7.00 17210 640255 651 1240 1000 16/206,00 1940 600 3.680 61.480.44 21091 774 87529 484 26616 202 8265450 72 5 10,00 3,068 600 4067600 349 Ness 87,752 458 8849 4.50 3785 400 10 475 11446 550 3227 4,00 3617 800 1201 668 27283 36 Norton 65:089 880 108:69 684 7.425- 780 11346 500 2851 700 3360 1050 15792 1721 10.725 25 Usage 3.828 753/3/267480 8886 120,577 .66 660 4423 540 3284. 600 7,965 4,50 7,202 9.00 4/1/ borne 107.862 912 72.691 980 2.82 2 9.61 7262 650 1.646 8.00 1/696 9.00 12.114 102441 .37 Ottawa 94187 960 63112 962 6934 682 469 998 9153 900 7329 8256 6.00 100169 40

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	County	When	at	Cors	1	Pats		Elax		Sorghum		Millet		Kaffire		en Alfelfer				
	Paumee	iveres	per acre	acres	per acre	acres	per	acres	per agre	acres	fu	anes	per	acres	per acre	acres	per	120527	per acre	
										5229	6.00	2706	8.00	7.225	12.00	1752	62.86	120527	<b>.6</b> 6	-
	Philips	91.179	8.00	130374	1330	7.941	830			6,035	6,00	3075	6.00	5-130	6.00	16.696		94.686	.54	
	Pottawatan	7035	11.48	122.3/1	8.19	10358	651			1678	10,00	7.297	600	5.653	750	10,355		182076	.70	
	Pratt	150426	13,26	40476	1064	7.349	690								13	228	1 76			
	Rawlins							1		C	1		100			2605-	1 1/2 -	67.469		
	<b>\</b>	20695%								1					-	12.174		240868	Mail 1	
	Republic							- 1						0	1	21.979		93:965	100	
	Rice						1						1			10584	1 3/5			
	Riley							11	665							9.485-		116/11		
		116,183								-	1						Wan	85:030		
	Rush			14583				1	ケクロ		1				1			115996		
	D 00										1				100			82,450		
	Saline	143088	9/10	4.2797	MAG	7.77	2.76				100							86,000		
	Scott-	111511	1111	0 445 4	71.02							h EALS						86910		
										9.181	5:00	75-3	9.00	439	800	855	5.65	59.670	.18	
	Sedgwich	151635	0.40	132,374	10,66	48.742	5.95			6.858	700	1193	10,00	3/85	12.00	15.830		14.3053	.72	
	Seward	1192	4.00	/33	500	80				3,924	500	16	400	1.5.93	6.00	47		6065	4.25	
	Shaunee Sl.	4.565	12.00	86450	819	6.7/7	8//	56	640	3,230	8.00	3516	7.00	4048	1050	6,405		100.982	1.27	
	Sheridan	57.696	314	32386	6/2	4.485	700			7843	6.00	2.968	4.50	3,717	9.00	6.547	16,00	131,549	.15-	
	Therman	4.360	3,20	11.709	200	373	3,50			25-26	50	2.329	6.00	606	7.00	777	58.80	70673	09	
	Smith	67033	836	166971	1260	10295	780			5263	800	7228	8:10	9677	800	19308	,	132415	29	
	Mafford	172343	184	50,296	1080	2844	7.75			6223	7.00	59	10,00	4.314	14.00	1.107		71.006	30	
(	- Carlina	T in the country		176						5:358				660				22800		
	Stevens	114	7.20	35	5.00	30.	300			47622		67	5.00	2440		,		32570	156	
	Summer.	294434/	0,66	798081	oone	45:460	714									4.000				
						2000	7		- 3	175	1.00	1.046	8.00	4.1161	6.00	6038		118007	-8 Ca.	

and the same of th	1																		-
County.	Wheat		Corn		Oats		Flax		Sorghum		Millet		Kafiscou		alfalfa		Prairie	gras	
0									U.						1			valve	
Thomas	59639	dere 2.16	18891	acre 4.94	2.276	5:80		per	9.795	GOD	2.646	per acre Gon	2.836	dere 800	1.112	per	121,835	per acre .13	
Trego	62.369	380	/2.341	6.72	5:579	630			8.720	4,50	3294	4.50	2343	640	4.645	225.7	32156	.30	
Wabunsec	8.783	936	92.888	720	4/372	5:28	6/6	7,20	2.976	8.00	6361	600	81.00	1050	11515-		116,674	.80	
Wallace	869	468	1571	6,02	46	3.85			2055	<u>5.30</u>	991	3.00	66/	7.00	1,414		3.497	3.00	
Washington	57.700	9.72	175.807	629	45-235	5.70	31	6.65	1.841	8110	6050	Bus	3246	9.00	9,365		13/850	.65	
Wichita	12.398	5:60	3,206	7.31	499	4,00			6469	4.00	639	6.00	926	600	57	46.48	67.259	05	
Wilson	17.889	2,15	86.049	378	11.677	2.96	1.434	450	1.716	6,50	9339	4.50	5-699	12.00	4.143		67.783	1.20	
Woodsen.	2.834	3.40	56818	3.20	35.06	280	895	4.25	1.5-11	550	1299	4,50	6338	800	1.977		1/6,087	167	
Wyandolle	9481	10.66	12.294	9.24	1957	8.3 8			77	500	43	8.00	48	1200	6/6		19		
V																		- 1	