Productivity of Key Soils in Oklahoma

Fenton Gray
Department of Agronomy

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by

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The rapid increase in crop yields in recent years has stimulated widespread interest in the effects of climate, fertilizers, crop varieties and other management factors on trends in production.

The research reported herein was conducted to determine the productivity of key soils for adapted crops grown under two specified management levels in Oklahoma and to provide a quantitative measurement in comparing one soil with another.

Information concerning the characteristics and distribution of the major soils in Oklahoma was published in Soils of Oklahoma, Oklahoma Agriculture Experiment Station Miscellaneous Publication, MP-56.

Estimated Crop Yields

Crop yield estimates in Tables 2-11 are from soils covering extensive areas in Oklahoma grown under two management levels. These crop yields are ten-year averages, since shorter periods may not reflect the usual range in weather and associated crop yields. The yields may vary from 20 percent above to 20 percent below the averages and occasionally, they may fall outside this range for growing seasons with unusual weather.

To determine soil types and phases on an individual farm, a detailed soil survey should be used. Each soil association includes soils other than those listed. Crop yield estimates for soils not listed in the tables may be obtained from the Agronomy Department, Oklahoma State University.

Management Levels

Since there is no such thing as an "average" farmer, the two management level "averages" must be arbitrarily decided upon, utilizing all available information and experience. The two management levels are defined as follows: **Customary management** (C) is defined as those practices followed by most farmers in the state and which would normally include (1) the use of adapted, recommended crop varieties, (2) proper seeding rates, dates of planting and efficient harvesting methods, (3) sufficient

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control of weeds, insects, and diseases to insure plant growth, (4) fertilizer used only when necessary to establish legumes and (5) cover crops used only on the most sandy lands. Practices may not be adequate for improved management and is practiced by many farmers because of limited capital or lack of experience or knowledge.

The Improved management level (I) is defined as those practices that are designed to alleviate the limiting factors of crop production. All key soils in the state have certain limiting factors (inadequate moisture, weeds, insects, pathogens, etc.) in common, as well as specific limitations unique to themselves. For instance, production can be greatly increased on some soils by the use of fertilizers, and/or lime; on some others by careful residue management; on others by certain cropping systems or by conservation operations designed to conserve moisture and topsoil. The specific practices needed for improved level of management differ not only for various soils but for different crops.

Normally, the improved management level would include all those practices listed under customary management plus (1) fertilizers and/or lime on the basis of soil tests when required for maximum economic production, (2) contour tillage, terraces, and surface drainage where appropriate, (3) return of crop residues and management practices designed to prevent erosion, increase water infiltration and enhance seedling emergence, (4) some recommended cropping system designed to fit the operator's goal and the specific soil's need, and (5) maintenance of optimum soil structure by minimizing tillage operations and traffic and by confining them to periods when soil moisture is favorable.

Limitations of Crop Yield Estimates

The yield data in Tables 2 to 11 will be valid and only until technological improvements change crop yield levels. Soil and crop management research continually adds knowledge and new technology for soil treatment and crop-production. The crop yields in Tables 2-11 will need to be revised periodically to reflect the results of improving crop and soil technology. This requires more and better use of soil maps.

Adjusting Crop Yield Estimates for Situations

The yield estimates in Tables 2-11 cover specific kinds of soil and management levels. They should serve as benchmarks for predicting yields of other soils under various management conditions. Crop yield adjustments can be made for different soil types-slope-erosion, climate and management conditions within a soil series.

Table 1. Texture Groups and Classes of Soil Types.*

Texture Group	Class Name	Abbreviation
Coarse (sandy)	Sand	s
	Loamy sand	ls
Moderately coarse	Sandy loam	sl
Medium (loamy)	Silt	si
	Silt loam	sil
	Loam	l
Moderately fine (clayey)	Silty clay loam	sicl
	Sandy clay loam	scl
	Clay loam	cl
Fine (clay)	Sandy clay	sc
	Silty clay	sic
	Clay	c

*Soil types classification used in Tables 2 to 11.

Effect of Climate

Most soils given in Tables 2-11 occur in a rather limited geographic area and require little if any adjustment for differences in climate within the area. The influence of climate on yield is primarily between rather than within the series. This is true except for the soils that are widely distributed, such as bottomland soils. In these soils, crop yields will be higher (when protected from overflow) in the more favorable climatic areas and lower in the drier areas.

Effect of Management

To obtain sustained high yields, the intensity of cropping, the fertility program, the conservation measures, and the management ability of the operator must be in proper balance with prevailing soil and climatic conditions. When adequate nitrogen is used with other necessary soil management practices, continuous wheat may yield as much or more than wheat grown in the best crop rotations without supplemental nitrogen.

Effect of Slope and Erosion

Some yields are given for several slope classes within the same soil type or series; however, most of the yields are given for only one slope class. Slope influences yields in various ways, such as erosion, the amount of water that infiltrates the soil, and the amount of water that is lost in runoff. As slope increases, usually yields decrease in many Oklahoma soil types. This is especially so in the soil of the drier areas. Both water and wind erosion cause yields to decrease.

Other Adjustments

Other hazards that may influence crop yields listed in Tables 2-11 include: flooding frequency and duration, inadequate drainage, stoniness and rock outcrops, and alkalinity or salinity (slick spots). Crop yields may be doubled in some areas of the state by irrigation.

The Use of Published County Soil Maps

Soil maps are a basic tool for selecting a system of soil management. The maps show the kinds of soil in a field and farm — essential knowledge for selecting from the various available soil-management practices, the combination of practices that is best suited to the soil and to the resources, skills, and desires of the farmer and rancher.

Soils may be grouped into land capability classes, subclasses and units in order to use them properly. Of the eight classes, which normally do not all exist on any single farm or ranch, Classes I through IV are suited to cultivated crops, pasture or range, woodland and wildlife.

Classes V through VIII are suited to pasture or woodland and wildlife and are not generally recommended for cultivation. Some kinds of soil in Classes V, VI, and VII may be cultivated safely with special management, however. For example, strawberries can be produced on Bodine safely with good management.

Because several kinds of soil often occur in the same capability class on the same farm or ranch, the classes are divided into subclasses.

Four kinds of problems in Oklahoma are recognized in the subclasses and are indicated by symbols: (e) — erosion and runoff; (w) — wetness and drainage; (s) — root zone and tillage limitations, such as shallowness, stoniness, droughtiness, and salinity; and (c) — climatic limitations. The subclass therefore provides more specific information about the kind and the degree of limitation for the use of soil than does the capability class.

The land capability unit is the most detailed and specific soil grouping of the capability classification. **Soils that can be used in the same way and which produce about the same crop yield are grouped into a capability unit.** This unit is used most commonly for planning in specific areas.

Other interpretative soil groupings are used in conservation planning. In extensive range areas, the mapping units are grouped into **range sites** which give information about the kind and amount of vegetation the area will produce under favorable conditions. This grouping,

together with range condition, provides the basis needed for sound range planning.

On farms or ranches that are to be used for woodland, range, or pasture and cropland, the soil map is interpreted to show the suitability of the land for those uses. For areas that are to be planned as woodland, the mapping units are grouped into **woodland sites** and interpreted in terms of kinds and amounts of wood crops that can be produced.

Interpretations of soil maps are physical and economic analyses of the alternative opportunities available to the users of the land. They indicate capabilities of the soils for agricultural use, adapted crops, estimated yields of crops under defined systems of management, presence of specific soil-management problems, opportunities and limitations for various management practices and problems in nonagricultural use.

The main bases for interpretations are yield estimates related to specific combinations of practices for soils in their climatic setting. Yield estimates for a soil are predictions of the average production of specific crops that a group of farmers could expect during the following 10 or 15 years if they followed the defined system of soil management. Yield estimates apply less closely to individual farmers, whose skills are variable, than to averages of groups. Sources of information for the yield tables are the results of agronomic research, the experiences of farmers, ranchers, and others who grow plants, and observations of plants growing on different kinds of soils. In some cases, where yield information was lacking, estimates were used.

The definitions and descriptions of the kinds of soil shown on the maps provide information on their characteristics. These are used to infer the qualities of soils such as productivity and erosion hazard. It is possible to make predictions about a soil whose behavior is unknown by comparing its characteristics with those of the soils about which the behavior is known.

Introduction to Tables and Figures

Tables 2-11, show the estimated average yields for wheat, oats, barley, cotton, grain sorghums and alfalfa under two levels of management—customary and improved, for the *key* soils of each soil resource area of Oklahoma. In some areas, yields for strawberries, soybeans, peanuts and broomcorn are included.

Figures 1-15 show the locations of the soil association and correspond to Tables 2 to 11.

Table 2. Estimated Average Annual Crop Yields Under Two Management Levels on Key Soils in the Ozark Highlands Resource Area.

Map Symbol	Soil Type*	Slope Phase	Wheat		Oats		Corn		Alfalfa		Strawberries
			C	I**	C	I	C	I	C	I	
			Bushels per acre						*(tons/acre)*		*(qts/acre)*
	Bodine stony sil	5-15									2760
	Bodine very cherty sil	1-8									2760
BB (See fig. 1)	Huntington sil	0-2	23	29	33	48	46	55	1.0	3.5	
	Craig cherty sil	1-5	12	18	23	35	20	30			
	Dickson cherty sil	0-3	12	18	20	34	23	36			2760
	Dickson sil	1-3	16	23	26	42	27	40			
	Jay sil	0-2	22	30	33	50	33	50		3.0	
HP (See fig. 2)	Sallisaw sil	0-1	21	30	33	50	33	52		3.0	
		1-3	21	30	33	50	30	48		2.7	
	Sallisaw gravelly sil	1-3	17	24	28	44	28	46		2.5	2760
	Hector fsl	1-5	11	17	18	28					2640
	Linker fsl	1-5	15	23	23	37	21	37			2640
	Linker l	2-5	18	26	20	41	23	39			

*See Table 1.
**C = Customary management
I = Improved management

Table 3. — Estimated Average Annual Crop Yields Under Two Management Levels on Key Soils in the Cherokee Prairies Resource Area.

Map Symbol	Soil Type	Phase	Wheat		Oats		Barley		Cotton		Gr. Sorghums		Alfalfa		Soybean	
			C	I*	C	I	C	I	C	I	C	I	C	I	C	I
					Bushels per acre				*(lbs/acre)*		*(bu/acre)*		*(tons/acre)*		*(bu/acre)*	
	Bates fsl	1-3	18	24	29	48	27	41	180	350	26	43		2.0	14	23
		3-5	15	20	23	39	22	35	160	300	24	40			12	19
	Choteau sil	0-1	21	30	33	50	33	48	210	410	33	50	2.0	3.0	15	23
		1-3	20	29	32	48	31	46	200	400	31	48	1.5	2.5	14	22
PDB	Dennis sil	0-1	21	32	33	50	31	48	200	450	33	50	1.5	2.5	13	23
(See		1-3	20	30	30	46	29	43	190	400	31	48	1.5	2.5	12	21
fig. 3)		3-5	17	24	28	41	27	40			27	46			11	19
	Okemah sicl	0-1	22	34	34	50	32	45	220	440	40	55	2.0	3.0	18	24
		1-3	21	32	33	46	30	42	210	430	36	50	2.0	2.7	13	23
	Parsons sil	0-1	17	30	30	40	27	38	150	400	24	44			13	21
		1-3	17	27	28	34	20	34	145	400	27	40			11	19
	Taloka sil	0-1	20	31	28	45	29	43	200	420	24	52	1.5	2.8	14	23
		1-3	18	30	35	45	32	45	200	430	30	50	1.5	2.8	13	21
	Woodson sicl	0-1	12	19	17	27	25	37	150	400	24	35			10	17
		1-3	12	19	14	27	25	37	145	380	21	32			8	14
	Mason sil	0-2	22	31	34	50	33	48	225	450	42	56	2.5	3.5	18	23
	Labette cl	1-3	19	28	30	41	26	36	160	420	30	44	2.0	2.3	12	19
		3-5	16	22	24	35	24	34	150	380	23	30	2.3	2.8	16	21
LSS	Newtonia sil	0-1	23	34	34	48	32	45	180	430	40	55	2.3	3.3	18	24
and		1-3	21	31	30	44	30	42	160	420	36	50	2.0	3.0	15	22
SS		3-5	19	26	25	39	27	38	140	380	30	45	2.0	2.5	12	19
(See	Summit sicl	0-1	23	34	32	46	28	41	180	440	38	52	2.5	3.0	18	24
fig. 3)		1-3	22	31	30	42	26	36	160	420	36	48	2.3	2.8	16	23
		3-5	19	26	24	36	24	34	140	380	30	44	2.0	2.3	12	19
	Kaw sicl sil and sicl	0-1	26	35	40	50	35	45	200	450	40	55	3.0	4.5	18	24

*C = Customary management
I = Improved management

Table 4.—Estimated Average Annual Crop Yields Under Two Management Levels of Key Soils in the Ouachita Highlands Resource Area.

Map Symbol	Soil Type	Slope Phase	Wheat		Oats		Peanuts		Cotton		Gr. Sorghum		Soybeans	
			C	I*	C	I	C	I	C	I	C	I	C	I
			Bushels per acre						*(lbs/acre)*		*bushels per acre*			
	Enders fsl & l	1-3	13	24	25	38			200	300	25	38	12	16
		3-5	10	19	20	30			160	240	20	30	9	15
	Hart ells fsl	1-3	13	23	19	30	20	35	200	350	22	36	10	15
HP (See fig. 2)	Hector fsl	3-5			15	25	12	21	125	300	11	25		
	Vian l	0.3	14	25	21	33	24	44	230	400	30	45	14	20
	Lee sil	0-1	12	18	26	30	20	30	100	175	20	30	10	15
	Muskcgee sil	0-1	13	24	20	31	26	38	220	290	28	40	12	18
	Stidham lfs	0-3			20	30	20	40	140	250	20	32	10	16
ECH (See fig. 2)	Stigler sil	0-1	16	24	27	40	25	37	225	350	23	37	12	18
		1-3	17	27	30	43	26	38	250	400	28	42	13	20
	Wrightsville sil	0-1	12	18	20	30	20	30	100	125	10	16	--	--
	Waynesboro fsl	1-3	13	24	25	38	20	35	200	300	25	38	12	18
		3-5	10	19	25	38	16	30	160	240	25	38	10	15

*C = Customary management
I = Improved management

Table 5.—Estimated Average Annual Crop Yields Under Two Management Levels on Key Soils in the Forested Coastal Plains.

Map Symbol	Slope Soil Type	Phase	Wheat C	Wheat I*	Oats C	Oats I	Barley C	Barley I	Cotton C	Cotton I	Gr Sorghums C	Gr Sorghums I	Peanuts C	Peanuts I
			Bushels per acre						*(lbs/acre)*		*bushels per acre*			
	Bowie fsl	1-3	11	18	19	32	16	32	125	225	18	28	12	30
		3-5	9	15	17	30	15	30	100	200	16	26	12	25
		5-8	7	12	15	25	12	25	75	150	14	20	10	20
BCB (See Fig. 4)	Boswell vfsl	3-5	8	14	16	28	14	28	100	175	14	20	10	15
		5-8	6	12	14	24	12	25	75	150	13	18	8	12
	Caddo sl	0-1	12	17	19	32	16	32	130	250	18	26	12	25
		1-3	11	16	18	30	16	31	100	225	16	25	10	25
	Kirvin sl	1-3	11	18	19	32	16	30	125	225	17	27	12	27
		3-5	9	15	15	30	15	28	100	200	14	20	10	22
		5-8	7	12	14	28	14	25	60	150	10	18	8	15
KCB (See Fig. 4)	Cuthbert fsl	3-5	9	15	17	30	15	26	100	200	14	18	10	22
		5-8	7	12	15	28	14	24	80	150	12	15	8	15
	Ruston lfs	1-3	9	15	16	30	14	30	100	200	16	26	12	25
		3-8	7	12	14	28	12	25	75	150	14	24	16	20
	Ruston fsl	1-3	11	18	22	33	16	32	130	230	18	28	12	30
	Sawyer l	1-3	12	20	22	34	16	32	140	250	20	30	14	32
		3-5	11	18	20	32	14	30	125	225	18	27	12	30

*C = Customary management
I = Improved management

Table 6.—Estimated Average Annual Crop Yields Under Two Management Levels on Key Soils in the Grand Prairies Resource Area.

Map Symbol	Slope Soil Type	Phase	Wheat		Oats		Barley		Cotton		Gr. Sorghums		Alfalfa	
			C	I*	C	I	C	I	C	I	C	I	C	I
			Bushels per acre						*(lbs/acre)*		*(bu/acre)*		*(Tons/acre)*	
DST (See fig. 5)	Denton c	5-8	10	14	18	26	16	30	150	300	16	21	--	--
		3-5	12	17	20	40	18	22	---	---	14	18	--	--
	Durant cl	1-3	15	22	30	50	25	35	165	325	28	50	--	--
	Claremore sil	1-3	12	18	22	34	18	24	160	300	17	23	1.0	2.0
	Gowen cl	0-1	18	26	38	50	32	44	320	390	32	44	2.2	3.2
	Gowen l	0-1	22	28	38	50	32	46	340	420	38	48	2.3	3.4
	Trinity c	0-1	16	22	26	45	25	45	250	380	32	40	1.0	2.0
	San Saba c	0-1	18	28	35	60	25	45	255	400	30	50	1.0	2.0
		1-3	18	28	35	60	25	45	250	380	28	45	1.0	1.5

*C = Customary management
I = Improved management

Table 7.—Estimated Average Crop Yields Under Two Management Levels on Key Soils in the Reddish Prairie Resource Area.

Map Symbol	Slope Soil Type	Phase	Wheat		Oats		Barley		Cotton		Gr. Sorghums		Alfalfa	
			C	I*	C	I	C	I	C	I	C	I	C	I
			Bushels per acre						*(lbs/acre)*		*(bu/acre)*		*(Tons/acre)*	
	Bethany sil	0-1	20	32	35	53	32	48	290	375	28	45	1.5	3.0
		1-3	20	28	39	43	33	43	43		26	40	1.0	2.0
	Kirkland sil	0-1	19	27	32	45	27	40	200	300	24	39	1.0	2.0
		1-3	15	25	28	40	25	37	150	250	22	35	.5	1.0
BTK	Norge l	0-1	19	30	36	53	32	45	300	400	30	48	2.0	3.0
(See		1-3	18	29	34	50	30	42	275	375	28	43	1.7	2.5
Fig. 6)		3-5	16	25	30	45	24	35	200	300	25	35	1.4	2.0
		5-8	12	20	25	35	21	31						
	Tabler sil	0-1	17	28	35	45	30	40			26	40	1.0	2.0
	Waurika sil	0-1	15	23	26	40	25	35	205	280	18	30	0	1.5
	Chickasha l	0-1	18	30	30	45	28	43	270	375	27	42	1.8	2.7
		1-3	16	26	25	40	25	40	230	320	25	38	1.5	2.5
RZV	Kingfisher sil	0-1	19	31	32	46	30	45	235	315	30	45	1.5	3.0
(See		1-3	18	29	28	40	28	40	165	240	28	38	1.0	2.0
Fig. 6)		3-5	14	25	24	36	24	35	150	200	25	34		
	Renfrow sil	1-3	17	26	28	40	25	37	215	260	24	35	1.0	2.0
		3-5	12	19	15	30	15	30	175	215	20	28		
	Vernon cl	1-5	10	14	15	25	15	25			10	16		
	Zaneis l	1-3	16	26	25	40	25	37	225	370	28	38	1.5	2.5
		3-5	14	22	23	38	23	32	170	260	23	31		

*C = Customary management
I = Improved management

Table 7. (continued) Reddish Prairie Soil Resource Area.

	Soil Type	Slope Phase	Wheat C	Wheat I	Oats C	Oats I	Barley C	Barley I	Cotton C	Cotton I	Gr. Sorghums C	Gr. Sorghums I	Alfalfa C	Alfalfa I	Peanuts C	Peanuts I
			Bushels per acre						*(lbs/acre)*		*(bu/acre)*		*(Tons/acre)*		*(bu/acre)*	
	Grant sil	0-1	22	30	32	45	26	46	325	400	30	45	1.5	3.0		
		1-3	19	27	30	42	25	42	300	375	26	42	1.5	2.4		
GPN		3-5	16	23	28	37	20	37	250	300	25	34	0	1.5		
(See	Pond Creek sil	0-1	21	31	30	47	27	48			30	44	1.5	3.0		
Fig. 7)		1-3	19	28	26	44	21	41			26	42	1.2	2.4		
	Nash sil	1-3	13	21	22	32	18	25	210	250	20	30				
VMY		3-5	11	16	18	28	15	22	185	225	16	24				
(See	Minco l	0-1	17	25	26	40	30	42	290	380	30	42	1.6	2.7	27	45
Fig. 8)	or sil	1-3	15	21	22	35	28	40	250	340	23	34	1.5	2.5	23	40
		3-5	13	17	18	30	26	38	225	310	22	32			20	36
	Shellabarger fsl	0-1	15	22	28	42	22	32	200	275	23	34	1.3	2.7	23	40
		1-3	14	20	25	40	18	28	175	250	20	30				
		3-5	12	16	22	35	15	25	250	350	30	42	1.5	3 0	27	45
	Teller l	0-1	18	25	27	42	27	43	275	365	30	44	2 0	3.0	27	45
		1-3	16	22	26	38	25	40	225	340	28	40	1.5	2.5	27	45
		3-5	14	20	24	36	24	35	200	325	25	35	1.4	2.0	23	40
	Vanoss sil or l	0-1	21	31	40	45	35	48	300	4^0	32	48	3.0	4.0	27	47
		1-3	18	30	30		48	30	275	365	28	42	2.5	3.5	27	45

C = Customary management
I = Improved management

Table 8.—Estimated Average Annual Yields Under Two Management Levels on Key Soils in the Cross Timbers Resource Area.

Map Symbol	Soil Type	Slope Phase	Wheat		Oats		Barley		Cotton		Gr. Sorghums		Alfalfa		Peanuts	
			C	I*	C	I	C	I	C	I	C	I	C	I	C	I
			Bushels per acre						*(lbs/acre)*		*(bu/acre)*		*(Tons/acre)*		*(bu/acre)*	
	Stephenville fsl	1-3	12	19	26	36	24	34	175	325	20	34	1.0	2.0	25	45
		3-5	10	17	18	30	23	32	125	275	16	28			23	40
		5-8	9	14	15	24	20	28			12	20				
DS (See Fig. 9)	Windthorst sl	1-5	10	16	16	28	23	30	150	250	17	26	.5	1.5	23	36
		3-5	8	14	14	24	20	28	100	190	13	22				
DTY (See Fig. 9)	Dougherty lfs	0-3	10	17	18	32	22	32	125	275	18	30	1.0	2.0	25	45
		3-5	8	13	14	26	20	30	100	200	14	24			23	40
		5-8	7	10	12	24	18	28								
	Eufaula fs	0-5			14	25					10	15			12	18
	Konawa lfs	1-3	12	18	25	35	23	33	150	285	22	32	1.0	2.0	25	45
		3-5	10	15	18	30	21	31	100	200	15	25			23	40
	Konawa fsl	1-3	12	20	28	38	24	34	200	400	25	40	2.0	3.0	25	50

*C = Customary management
I = Improved management

Table 9.—Estimated Average Annual Crop Yields Under Two Management Levels on Key Soils in the Bottomlands Resource Area.

Map Symbol	Slope Soil Type	Phase	Wheat C	Wheat I*	Oats C	Oats I	Barley C	Barley I	Cotton C	Cotton I	Gr. Sorghums C	Gr. Sorghums I	Alfalfa C	Alfalfa I
			Bushels per acre						*(lbs/acre)*		*(bu/acre)*		*(Ton/acre)*	
	Dale sil	0-1	26	35	40	45	35	45	380	475	35	50	3.0	4.5
	Dale sicl	0-1	22	33	40	55	40	50	400	500	34	46	3.0	4.0
(See	McLain sil	0-1	25	35	35	45	35	45	400	500	35	50	3.0	4.5
Fig. 10)	McLain sicl	0-1	25	33	28	40	35	45	350	475	30	45	3.0	4.0
	Brewer sicl	0-1	25	33	40	45	35	45	350	475	35	45	3.0	4.0
	Reinach sicl	0-1	22	32	35	50	35	45	380	440	30	45	2.5	4.2
VMY		1-3	20	28	30	45	35	40	325	400	28	40	2.0	3.8
(See	Port sil or l	0-1	25	33	40	55	35	50	350	500	35	50	3.0	4.5
Fig. 8)	cl	0-1	22	32	40	55	35	45	350	500	35	48	2.8	4.0
	Canadian fsl	0-1	21	32	30	50	35	55	315	400	34	44	2.2	3.0
	Lela c	0-1	12	21	26	40	26	36	270	350	25	39	1.0	2.0
YPR	Lincoln lfs	0-2	10	16	24	32	24	32	100	250	20	30	.7	1.7
(See	Miller c	0-1	16	22	25	40	25	40	300	350	25	38	1.2	2.8
Fig. 10)	Pulaski fsl	0-2	12	24	25	40	25	40	220	300	20	35	1.7	3.0
	Yahola fsl	0-1	18	26	28	42	30	45	315	385	26	40	2.2	3.0

*C = Customary management
I = Improved management

Map Symbol	Soil Type	Slope Phase	Wheat C	Wheat I	Oats C	Oats I	Soybeans C	Soybeans I	Cotton C	Cotton I	Gr. Sorghums C	Gr. Sorghums I	Alfalfa C	Alfalfa I	Peanuts C	Peanuts I
			Bushels per acre						*(lbs/acre)*		*(bu/acre)*		*(Tons/acre)*		*(bu/acre)*	
	Brazos lfs	0-3			24	32			175	360	12	40			20	40
	Cleora fsl	0-2	25	35	28	55	20	25	200	550	18	50	2.5	4.0	25	55
PDB	Lightning sil	0-1	15	22	20	40			125	380	16	38				
(See	Ennis sil	0-1	20	30	28	55	18	26	240	425	36	52	2.5	3.5	20	32
Fig. 3)	Osage c	0-1	12	15	22	35	12	15	200	500	24	40				
	Verdigris sil	0-1	28	38	30	55	25	30	200	535	25	55	3.0	4.2	30	50
	cl	0-1	28	38	30	55	25	30	200	550	26	58	3.5	4.4		

Table 10.—Estimated Average Annual Crop Yields Under Two Management Levels on Key Soils in the Rolling Red Plains Resource Area.

Map Symbol	Soil Type	Slope Phase	Wheat		Oats		Cotton		Gr. Sorghums		Alfalfa	
			C	I*	C	I	C	I	C	I	C	I
			Bushels per acre				*(lbs/acre)*		*(bu/acre)*		*(Tons/acre)*	
TV	Abilene cl	0-1	16	22	25	38	235	325	22	32	1.4	2.0
(See	Foard sl	0-1	14	20	22	35	175	265	16	25		
Fig. 11)	Hollister sil	0-2	15	22	25	38	215	315	17	31	1.0	2.0
	La Casa l	1-3	14	20	25	35	220	320	20	30		
FHT	Lawton l	0-1	15	22	26	38	250	340	22	32	1.2	2.0
(See		1-3	14	20	25	36	225	325	21	30	1.2	2.0
Fig. 11)		3-5	11	18	20	28	150	230	15	24		
	Tillman cl	0-1	14	21	20	30	200	260	16	26		
		1-3	11	17	18	28	125	185	13	18		

Map Symbol	Soil Type	Slope Phase	Wheat		Barley		Cotton		Gr. Sorghums		Alfalfa	
			C	I	C	I	C	I	C	I	C	I
			Bushels per acre				*(lbs/acre)*		*(bu/acre)*		*(Tons/acre)*	
WCQ	Carey sil	1-3	13	21	22	24	160	250	20	26	.8	1.0
(See		3-5	11	18	19	21	125	200	18	23		
Fig. 12)		5-8	8	13	14	16			15	18		
and	St. Paul sil	0-1	14	22	27	29	250	300	27	30	1.2	1.6
		1-3	13	18	23	25	175	250	25	27	0.8	1.0
		3-5	10	14	19	22	100	175	16	24		
CS	Quinlan l	3-5	5	10	8	10			10	12		
(See	Woodward l	1-3	12	14	19	21	125	175	18	24		
Fig. 12)		3-5	9	12	15	17	50	100	14	18		
	Weymouth cl	1-3	10	14	18	20	200	240	13	18		
		3-5	7	11	14	16			10	13		

*C = Customary management
I = Improved management

Table 10. (continued) Rolling Red Plains Resource Area.

Map Symbol	Soil Type	Slope Phase	Wheat C	Wheat I	Oats C	Oats I	Barley C	Barley I	Cotton C	Cotton I	Gr. Sorghums C	Gr. Sorghums I	Alfalfa C	Alfalfa I
			Bushels per acre						*(lbs/acre)*		*(bu/acre)*		*(Tons/acre)*	
PT&	Altus fs	10-1	14	24	22	35	20	30	225	325	25	38	1.0	2.7
NBM,	Meno lfs	0-1	12	22	22	35	20	30	160	325	20	40	0.8	2.5
(See	Enterpri e vfsl	0-1	15	20	26	36	18	28	250	330	25	35	2.2	3.0
Fig. 13)		1-3	13	18	25	33	17	25	225	330	22	30	2.0	2.8
		3-5	10	15	21	27	15	23	160	240	18	25	1.5	2.2
		5-8	8	13	20	25	13	22			14	22	1.2	1.8
ETY	Tipton l	0-1	17	24	35	45	25	35	270	370	28	38	1.5	2.5
(See		1-3	15	21	27	37	18	28	250	335	23	33	1.2	2.0
Fig. 8)	Spur l	0-1	18	25	28	38	20	30	300	400	32	45	2.5	3.5
	Mangum c	0-1	13	17	14	19	12	17	200	290	20	28		

Map Symbol	Soil Type	Slope Phase	Wheat C	Wheat I	Oats C	Oats I	Peanuts C	Peanuts I	Cotton C	Cotton I	Gr. Sorghums C	Gr. Sorghums I
			Bushels per acre						*(lbs/acre)*		*(bu/acre)*	
WDQ	Cobb fsl	1-3	14	20	24	34	30	50	215	290	20	30
(See		3-5	12	17	18	28	28	42	150	225	17	25
Fig. 14)												
CQ	Dill fsl	1-3	14	19	25	35			200	280	18	24
(See		3-5	12	16	20	30			170	240	15	20
Fig. 14)	Farnum fsl	0-3	16	26	25	36			275	350	35	48

*C = Customary management
I = Improved management

Table 10. (continued) Rolling Red Plains Resource Area.

Map Symbol	Soil Type	Slope Phase	Wheat		Oats		Barley		Cotton		Gr. Sorghums	
			C	I	C	I	C	I	C	I	C	I
			Bushels per acre						*(lbs/acre)*		*(bu/acre)*	
NBM	Nobscot fs	0-4	7	9					75	180	11	18
(See	Brownfield s	0-3	11	16					180	260	16	26
Fig. 13)	Carwile l	0-2	13	20	22	30	20	30	200	300	22	32
	Miles fsl	0-1	15	19	26	34	23	25	200	300	22	30
PT		1-3	13	16	25	32	22	24	175	250	18	28
(See		3-5	10	12	21	27	17	19	125	200	14	24
Fig. 13)		5-8	7	9	19	22	13	15			12	18
	Pratt fsl	0-1	14	19	26	34	24	26	200	250	25	30
		1-3	13	18	22	32	22	24	175	225	24	28
		3-5	10	14	19	26	20	22			20	24
		5-8	7	10	15	20	18	20			15	18
	Pratt lsf	1-3	8	13	20	30	16	18	100	150	16	20
		5-8	6	8	15	20	13	15			14	18
	Springer lfs	0-3	8	11					125	175	14	20
		3-8	6	8					60	150	10	15

*C = Customary management
I = Improved management

Table 11.—Estimated Average Annual Crop Yields Under Two Management Levels on Key Soils in the High Plains Resource Area.

	Soil Type	Slope Phase	Wheat		Gr. Sorghums		Gr. Sorghums*		Alfalfa*		Broomcorn	
			C	I**	C	I	C	I	C	I	C	I
			Bushels per acre						*(Tons/acre)*		*(lbs/acre)*	
RDP	Berthoud l	1-3	7	10	13	16					375	475
(See	Dalhart f-l	0-1	10	12	15	19	47	83	3.0	5.0	400	500
Fig. 15)		1-3	8	10	13	16					400	475
	Mansic cl	1-3	10	13	11	12						
PR		3-5	6	8	10	13						
(See	Pullman cl	0-1	8	12	10	13	55	100	3.5	6.0		
Fig. 15)	Otero fsl	0-5	5	7	6	8					350	400
	Richfield cl	0-1	10	14	13	16	55	100	3.5	6.0		
PM	Richfield fsl	0-1	11	15	15	19	45	100	3.0	5.0	350	450
(See	Ulysses sil	0-1	11	14	14	18	55	100	3.0	6.0		
Fig. 15)		1-3	9	13	10	13						
		3-5	7	9	9	12						
	Mansker cl	0-3	7	10	10	12					200	250

* = Irrigated
**C = Customary management
I = Improved management

Figure 1. (BB) Bodine-Baxter Soil Association

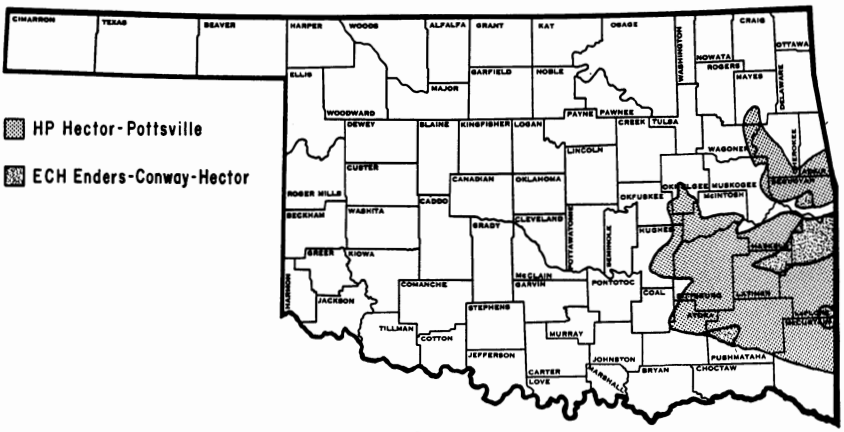


Figure 2. (HP) Hector-Pottsville Soil Association
(ECH) Ender-Conway-Hector Soil Association

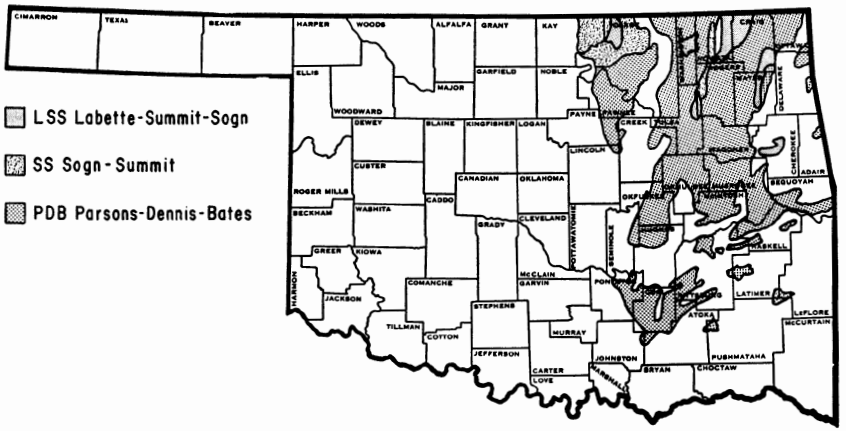


Figure 3. (LSS) Labette-Summit-Sogn Soil Association (SS) Sogn-Summit Soil Association (PDB) Parsons-Dennis-Bates Soil Association

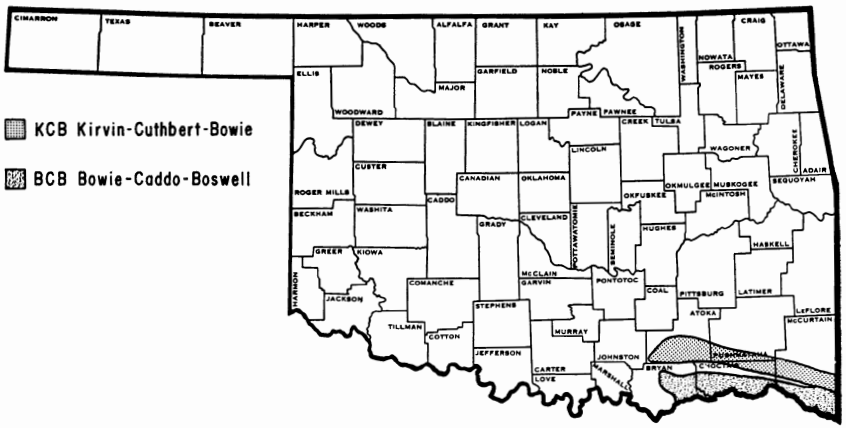


Figure 4. (KCB) Kirvin-Cuthbert-Bowie Soil Association (BCB) Bowie-Caddo-Boswell Soil Association

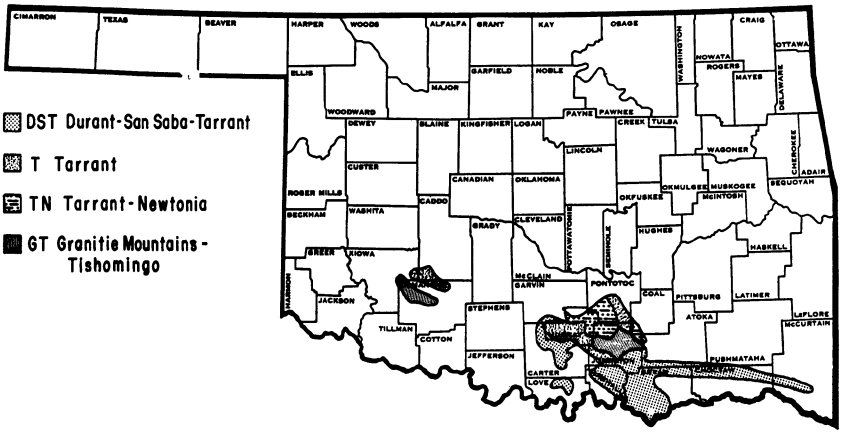


Figure 5. (DST) Durant-San Saba-Tarrant Soil Association
(T) Tarrant Soil Association
(TN) Tarrant-Newtonia Soil Association
(GT) Granite Mountains-Tishomingo Soil Association

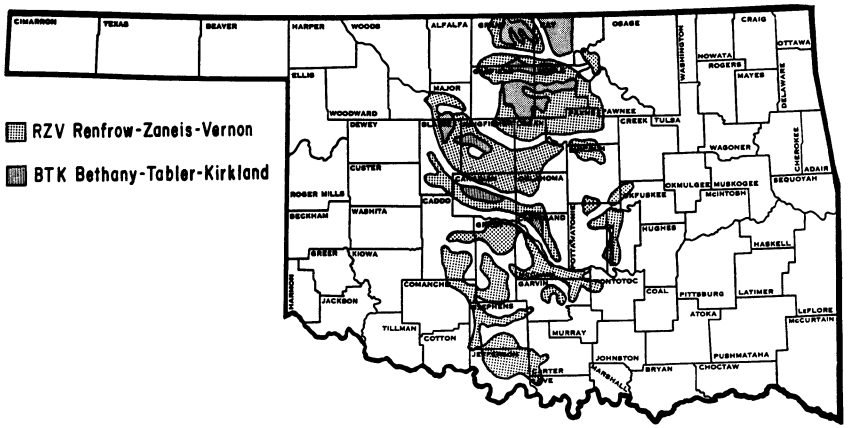


Figure 6. (RZV) Renfrow-Zaneis-Vernon Soil Association
(BTK) Bethany-Tabler-Kirkland Soil Association

Figure 7. (GPN) Grant-Pond Creek-Nash Soil Association

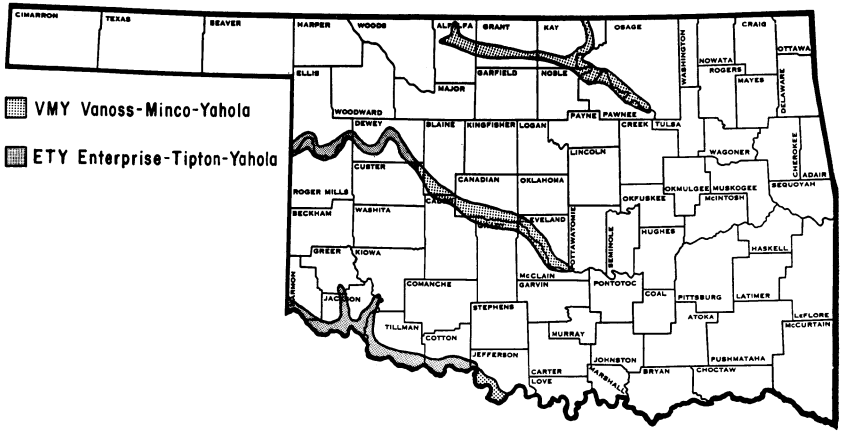


Figure 8. (VMY) Vanoss-Minco-Yahola Soil Association
(ETY) Enterprise-Tipton-Yahola Soil Association

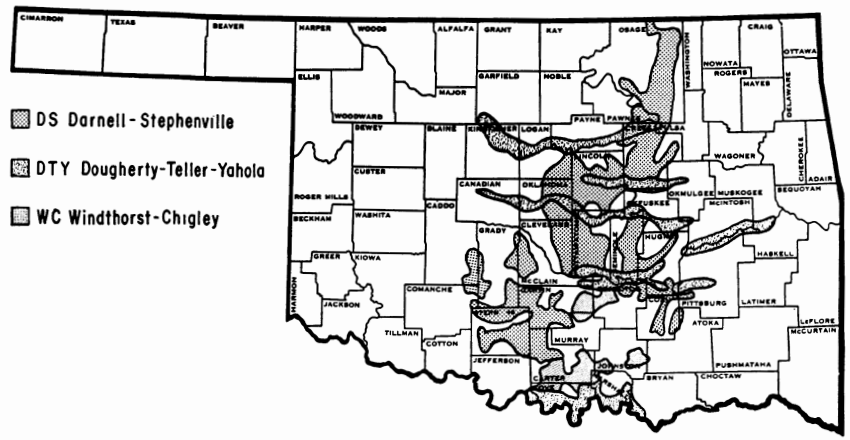


Figure 9. (DS) Darnell-Stephenville Soil Association
(DTY) Dougherty-Teller-Yahola Soil Association
(WC) Windthorst-Chigley Soil Association

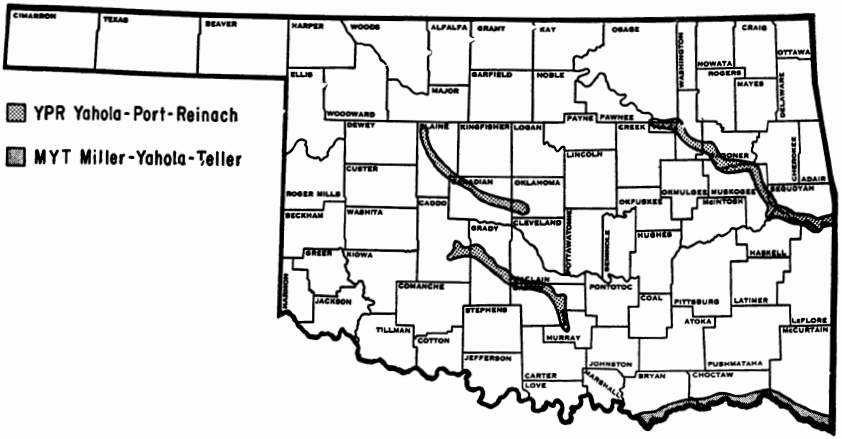


Figure 10. (YPR) Yahola-Port-Reinach Soil Association
(MYT) Miller-Yahola-Teller Soil Association

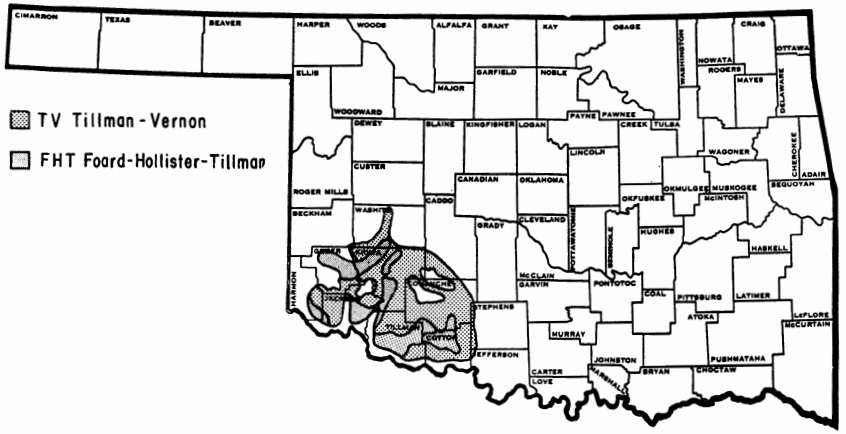


Figure 11. (TV) Tillman-Vernon Soil Association (FHT) Foard-Hollister-Tillman Soil Association

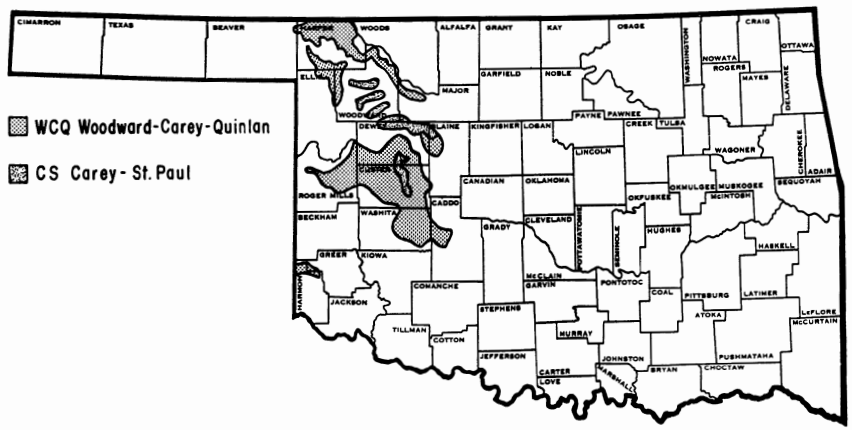


Figure 12. (WCQ) Woodward-Carey-Quinlan Soil Association (CS) Carey-St. Paul Soil Association

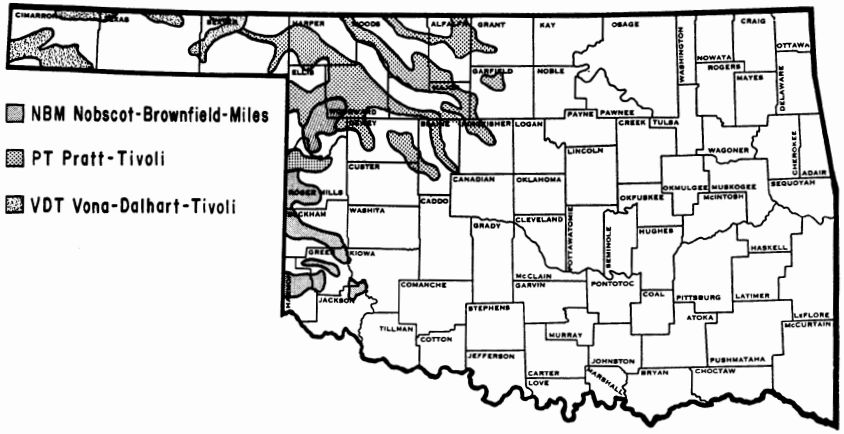


Figure 13. (NBM) Nobscot-Grownfield-Miles Soil Asosciation
(PT) Pratt-Tivoli Soil Association
(VDT) Vona-Dalhart-Tivoli Soil Association

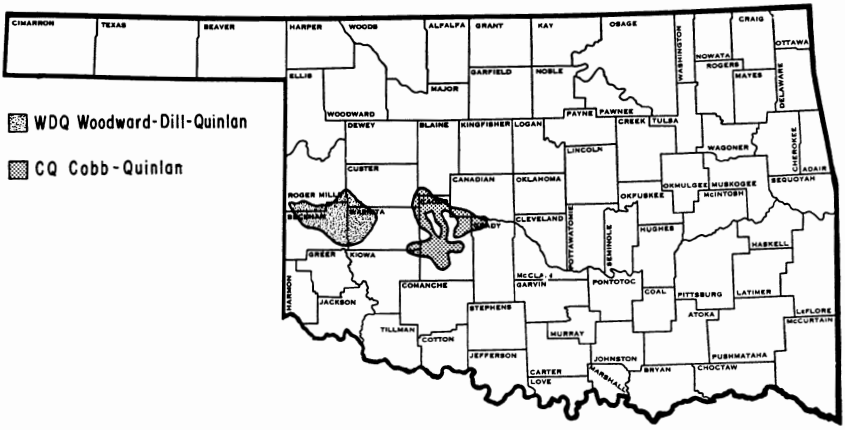


Figure 14. (WDQ) Woodward-Dill-Quinlan Soil Association
(CQ) Cobb-Quinlan Soil Association

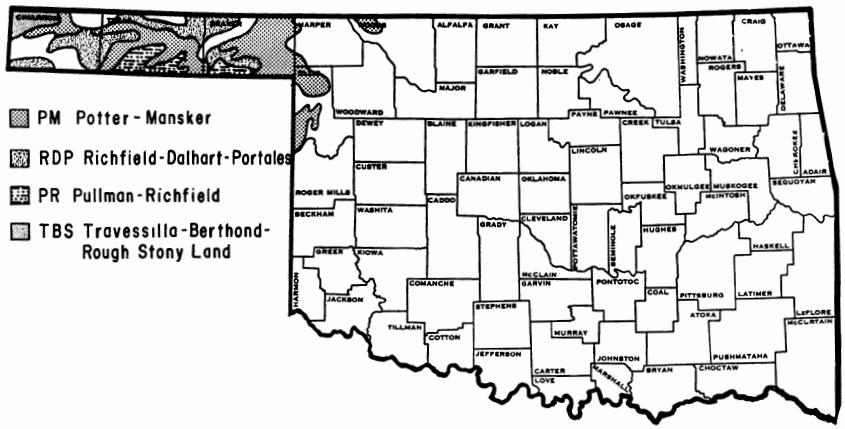


Figure 15. (PM) Potter-Mansker Soil Association
(RDP) Richfield-Dalhart-Portales Soil Association
(PR) Pullman-Richfield Soil Association
(TBS) Travessilla-Berthoud-Rough Stony Land

Appendix

Published Soil Survey Reports for Oklahoma*

1961 Adair	1956 Harper	1952 Pawnee
1933 Alfalfa	1958 Jackson	**1916 Payne
1959 Beaver	**1915 Kay	1931 Pittsburg
**1914 Bryan	1959 Kingfisher	1936 Pontotoc
**1917 Canadian	1931 Kiowa	**1914 Roger Mills
1933 Carter	1931 LeFlore	1960 Stephens
1937 Choctaw	1948 Logan	1930 Texas
1956 Cimarron	1936 Major	1958 Texas
1942 Cleveland	1932 Mayes	1930 Tillman
1960 Cotton	1933 McIntosh	**1906 Tishomingo
1931 Craig	1935 Murray	Area
1950 Creek	**1913 Muskogee	1935 Tulsa
1960 Dewey	1941 Noble	1935 Washita
1935 Garfield	1940 Okfuskee	1939 Woods
1931 Grant	**1906 Oklahoma	1932 Woodward
1932 Greer	1960 Ottawa	1960 Woodward

Future Publication Plans

1966-1970 Blaine, Comanche, Ellis, Garfield, Greer, Hughes, Kay, Love, Major, Okmulgee, Rogers, Washington, Sequoyah.

1970-1975 Caddo, Cherokee, Delaware, Jefferson, Lincoln, Pittsburgh, Pontotoc.

** Out of print and no longer available for distribution
* Supersedes these reports shown on page 11 of Okla. Agr. Exp. Sta. MP 56.

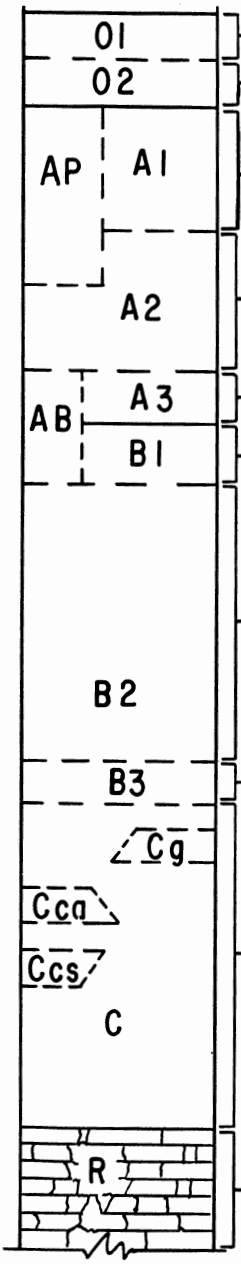
Appendix, Cont'd.

Oklahoma Key Soils

Abilene
Altus
Bates
Brewer
Brownfield
Bowie
Bodine
Bethany
Canadian
Carey
Chickasha
Cobb
Choteau
Craig
Collinsville
Cuthbert
Dalhart
Dale
Darnell
Dennis
Denton
Dill
Dougherty
Durant
Enders
Enterprise
Eufaula
Foard
Grant
Hartsells
Hector
Hollister
Huntington
Kinkfisher
Kirkland
Kirvin
Konawa
Lee
Lela
Lightning
Linker
Mansker
Miles
Miller
McLain
Minco
Newtonia
Nobscot
Norge
Okemah
Osage
Port
Pullman
Pond Creek
Parsons
Pratt
Pulaski
Quinlan
Renfrow
Richfield
Reinach
Ruston
Sawyer
Stephenville
St. Paul
San Saba
Springer
Stidham
Stigler
Summit
Talihina
Taloka
Tabler
Teller
Tillman
Tipton
Trinity
Vanoss
Verdigris
Vernon
Woodson
Woodward
Yahola
Zaneis

Appendix, (Cont'd.)

Hypothetical Soil Profile[1] Showing Principal Horizons[2]



Orgaic horizon of undecomposed organic matter

Organic horizon of partially decomposed organic matter. (01 and 02 usually absent on prairie influenced soils and disturbed soils.)

Surface mineral horizon which has an accumulation of well-decomposed organic matter which coats the mineral particles and darkens the soil mass. With plowing or other disturbances, A1 and A1 or A3 are mixed. The notation Ap is used in this case.

Subsurface horizon which has lost organic matter, clay, iron or aluminum through eluviation with concentration or resistant sand and silt-sized particles. Platy structure common.

Transitional to the B horizon, or C horizon if B is not present, but more like the A than the B or C. If A3 and B1 are present but cannot be separated, AB horizon is designated.

Transitional to the A but more like the B horizon.

Mineral horizon characterized by one or more of the following:

1. Illuvial concentration of clay, iron, aluminum or organic matter.
2. Residual concentration of iron and aluminum oxides or silicate clay
3. Coatings of iron and aluminum oxides which give darker, stronger or redder colors.
4. Alteration of parent material through physical and chemical means with formation of silicate clay minerals, liberation of oxides and formation of granular, blocky or prismatic structure.

Transitional to C horizon, but more like the B horizon.

Mineral horizon, other than bedrock, which may or may not be similar to presumed parent material. Has been little affected by soil-forming processes but may be otherwise weathered.
Roman numeral prefixes are used to designate C horizons unlike presumed parent material as 11C, 111C, etc. This designation is also used with other horizons.

Cg* = C horizon with intense gleying or reduction of iron compounds.

Cca* = C horizon with accumulation of carbonates such as calcium carbonate.

Ccs = C horizon with accumulation of calcium sulfate.

*g, ca, cs designations also may be used in other mineral horizons.

Underlying consolidated bedrock. If unlike presumed parent material, Roman numeral prefix is used as 11R.

[1] "Principal Soils of Iowa", Spec. Re. No. 42.
[2] Supersedes Fig. 1 on page 11 of MP-56.

Agriculture Boosts State Economy

Oklahoma's soil is the backbone of her economy. The state's agriculture is farms and ranches, to be sure, but it is also an ever-growing part of the city which supplies the tools to grow, process and distribute food and other farm products.

Agriculturally-related manufacturing, distributing and servicing industries are vital to Oklahoma's total economy.

The fertilizer industry is booming in Oklahoma. Over ten million acres of wheat, cotton, peanuts, sorghum and bermudagrass are fertilized in the state annually which requires over 400-thousand tons of bulk and bagged fertilizer. More than 700-thousand tons of additional fertilizer will be needed to supply the needs within the next decade.

Oklahoma farmers and ranchers are big users of petroleum products. They spend $30-40 million annually for gasoline, butane and propane, oils and greases.

Oklahoma's truck and equipment dealers also depend heavily upon agriculture. In 1963, more than $66-million dollars was spent by farmers and ranchers for trucks, tractors and related equipment.

10-66/3M