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PRODUCTIVITY INDEXES OF SOIL ASSOCIATIONS IN ILLINOIS

DEVELOPING PRODUCTIVITY INDEXES at both basic- and high-management levels for the soil associations of Illinois allows ready comparison of the productivity of the general soil regions of the state. The difference between the basic- and high-management level indexes shows the responsiveness of a soil region to management. This information is useful in formulating public policies of land use and management, and in broad economic planning for efficient utilization of our soil resources.

Information from two sources was used to derive the productivity indexes (PI) for each soil association shown on the general soil map of Illinois published in Bulletin 725, "Soils of Illinois." These sources were Circular 1016, "Productivity of Illinois Soils," and Bulletin 735, "Soil Types and Acreages for Illinois."

Circular 1016 discusses productivity of individual soil types in the state and the factors affecting soil productivity, and defines basic- and high-management levels. Bulletin 735 gives the acreages of the various soil types in Illinois, summarized by slope and erosion conditions from the national Conservation Needs Inventory. These acreages exclude 2.9 million acres (about 8 percent) of the state that is in urban and built-up areas, federal land not leased for crops, and water areas.

Productivity indexes for each soil type were calculated for the slope and erosion combinations shown on page 12 of Circular 1016. These indexes were then weighted by the acreage of each mapping unit to obtain an average productivity index for each soil type in the state. In calculating the average productivity index for a given soil association, the average indexes of each soil type were weighted by their acreage in that association. The acreage of a few widely distributed soils was proportioned among the several soil associations in which these soils occur.

The basic- and high-management level productivity indexes for the various soil associations are given in the following table. The soil associations are ranked according to the high-management productivity index. Average productivity indexes at the two levels of management, weighted by the acreages of the various soil associations, are given for the state and for the five soil groups shown in Figure 1. The table also gives the differences between

the two productivity indexes for each soil association, and for the three soil groups shown in Figure 2.

It should be remembered that the productivity indexes are estimates. The crop yields used in the calculation are based on longtime average yields for several benchmark soils on the Illinois agronomy experiment fields, and the acreages of the various soil types are based on a 2-percent mapping sample.

In general, the basic-management level includes inadequate fertilization, plant populations, and erosion control practices, only partial drainage, and frequently a lack of timeliness in weed and insect control and tillage operations. The high-management level includes high-input levels of those management practices based on present technology that are believed necessary for maximum profit.

In the preparation of Figure 1, soil association W, which includes a wide range of outwash soils, was proportioned into groups I, II, and III. Figure 1 shows the ranges in productivity indexes at both the basic- and high-management levels for groups I, II, III, IV, and V.

The differences between the high- and basic-management productivity indexes shown in the table indicate the degree of responsiveness of the soils in the various associations to management. In Figure 2 the soils are grouped into three classes—high response, medium response, and low response to management.

In general, the soils that were under a prairie vegetation when Illinois was settled are in the most responsive soil group. The forested soils and those that are sandy or shallow to gravel are intermediate in responsiveness, and those areas that contain a high proportion of soils that are shallow to bedrock are least responsive. The high proportion of rolling and eroded soils in the forested soil areas partially accounts for the fact that the average productivity of these associations is lower than that of the prairie soil areas. Within any soil association there may be a rather wide range in productivity among the various soil types present. Input costs needed to achieve high-level productivity differ among the various soil associations, and are not necessarily related to their responsiveness to management.

Productivity Indexes and Response to Management of Soil Associations in Illinois

Soil associations ^{a/}	Total acres ^{b/}	Productivity indexes ^{c/}		
		High manage-ment	Basic manage-ment	Difference or response
Group I, Fig. 1; High response (H), Fig. 2				
B Sidell-Catlin-Flanagan-Drummer	2,405,700	151	97	54
A Joy-Tama-Muscatine-Ipava-Sable	4,287,600	148	94	54
I LaRose-Saybrook-Lisbon	1,034,300	139	89	50
W Littleton-Proctor-Plano-Camden-Hurst-Ginat	3,644,100	134	86	48
<i>Total acreage and average PI of Group I</i>	11,371,700	143	92	
Group II, Fig. 1; High response (H), Fig. 2				
J Elliott-Ashkum-Andres	1,279,000	130	81	49
D Harrison-Herrick-Virden	1,022,200	128	80	48
C Wenona-Rutland-Streator	90,700	127	82	45
Z Lawson-Beaucoup-Darwin-Haymond-Belknap	3,831,200	124	77	47
H Ringwood-Griswold-Durand	102,500	116	71	45
<i>Total acreage and average PI of Group II</i>	6,325,600	126	78	
Group III, Fig. 1; High response (H), Fig. 2				
K Swygert-Bryce-Clarence-Rowe	592,800	114	66	48
E Oconee-Cowden-Piasa	601,500	114	64	50
F Hoyleton-Cisne-Huey	1,751,000	112	59	53
<i>TOTAL ACREAGE WITH HIGH RESPONSE</i>	20,642,600			
<i>AVERAGE OF HIGH RESPONSE (H), FIG. 2</i>				50
Group III, Fig. 1; Medium response (M), Fig. 2				
M Birkbeck-Ward-Russell	478,700	105	61	44
G Warsaw-Carmi-Rodman	170,500	102	67	35
L Seaton-Fayette-Stronghurst	1,811,000	100	60	40
N Clary-Clinton-Keomah	2,128,200	95	57	38
Y Morley-Blount-Beecher-Eylar (Nappanee)	390,500	95	52	43
O Stookey-Alford-Muren	491,500	91	53	38
X Hagerer (Sparta)-Ridgeville-Bloomfield-Alvin	980,800	91	55	36
<i>Total acreage and average PI of Group III</i>	9,396,500	102	59	
Group IV, Fig. 1; Medium response (M), Fig. 2				
U Strawn-Miami	423,000	90	49	41
P Hosmer-Stoy-Weir	1,435,400	87	45	42
Q Ava-Bluford-Wynoose	2,449,500	86	43	43
T McHenry-Lapeer-Pecatonica	335,800	84	48	36
S Fox-Homer-Casco	73,000	82	47	35
<i>Total acreage and average PI of Group IV</i>	4,716,700	86	45	
<i>TOTAL ACREAGE WITH MEDIUM RESPONSE</i>	11,167,900			
<i>AVERAGE OF MEDIUM RESPONSE (M), FIG. 2</i>				40
Group V, Fig. 1; Low response (L), Fig. 2				
Y Channahon-Dodgeville-Dubuque-Derinda	597,400	62	35	27
R Grantsburg-Robbs-Wellston	455,200	55	25	30
<i>Total acreage and average PI of Group V</i>	1,052,600	59	31	
<i>TOTAL ACREAGE WITH LOW RESPONSE</i>	1,052,600			
<i>AVERAGE OF LOW RESPONSE (L), FIG. 2</i>				28
TOTAL ACREAGE AND AVERAGES FOR THE STATE	32,863,100	117	71	46

^{a/} From General Soil Map of Illinois, Bulletin 725, "Soils of Illinois."

^{b/} Acreages exclude about 2.9 million acres of the state in urban areas, water, and some federal land.

^{c/} All indexes for soil associations are weighted by soil type acreages, and the average indexes of soil groups (I, II, III, high response, medium response, etc.) are weighted by soil-association acreages.

Fig. 2. — Soils Grouped By High, Medium and Low Response to Management.





