

## Iowa Soil Properties and Interpretation Database, Crop Year 2002

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To bring about improved input management, current and usable soils data must be available to land users in Iowa. The Iowa Soil Properties and Interpretation Database (ISPAID) makes this data available to Integrated Farm and Livestock Management (IFLM) Demonstration Program project coordinators, agricultural producers and service providers, and others in the public and private sector.

### Soil Survey Information That Influences Agronomic Use

Agronomic Use	Soil Properties							
	Organic Matter	Flooding	Texture	Soil Depth	Carbonates	Slope	Available Water	Water Table
Tillage Suitability	X	X	X	X		X		X
Plant Adaptability	X	X	X	X	X	X	X	X
Drainage		X	X	X		X		X
Crop Yield Productivity	X	X	X	X	X	X	X	X
Land Use Capability		X	X	X	X	X	X	X

X Indicates the soil properties listed in the soil interpretations data base

### Demonstration Description

➤ ISPAID now contains 816 soil types (e.g. Tama silty clay loam) to include complex units (e.g. Adair-Shelby) and 2264 unique soil map units (e.g. Tama silty clay loam, 5 to 9 percent slopes, moderately eroded). A total of 111 fields containing soil properties and/or interpretations are listed for each of the 10,650 records in the database.

- Revised and updated soils data for newly completed and correlated soil surveys for Humboldt, Monona, and Van Buren counties, and verified that ISPAID data for these counties is consistent with pending Soil Survey Report publications.
- ISPAID information is now available for all 99 counties.
- Developed system for archiving current data as future county revisions become available.
  - As each county is revised, the old data for that county will be placed in the ISPAID archive, and the new data will be added to the current ISPAID. Each time a county is revised and added to ISPAID, the version number will be incremented. This will ensure that:
    - All data will be available at all times
    - It will be easy to identify which version users are using.
- During this period, responsibility for maintenance, quality control and assurance of the database was transferred to the computer system support specialist located in my office. This position is supported by the IFLM Demonstration Program. Initial effort was a thorough review and reorganization of the database. As a result of this review, the following actions were taken:
  - All soils data fields were reviewed to insure that they were of the proper type, i.e., character or numeric.
  - Numeric and character fields were properly sized for the data contained in each field.
  - Field order was restructured in order of priority of use.

These changes resulted in a reduction in size of the database from 11.4 MB to 5.2 MB and increased efficiency for users.

- ISPAID 7.0 and the ISPAID 7.0 Manual are scheduled for release prior to March 31, 2003.
- The current ISPAID manual is version 6.0. The ISPAID manual was reviewed and updated so that the ISPAID 7.0 manual will conform to the reorganized ISPAID 7.0 database.
  - The ISPAID manual contains a narrative description of the information in each of the 111 data fields.
  - Reviewed field names for consistency (e.g. midpoint/average)
  - The ISPAID 7.0 manual is now consistent with the revised and updated ISPAID 7.0 database and reflects changes made from ISPAID 6.0 to ISPAID 7.0 (e.g. fields changed from character to numeric, and resized and reordered fields).
  - Added web links for sources listed in the ISPAID 7.0 manual, for example, The Soil Survey Manual, US Department of Agriculture (USDA) Handbook No. 18, USDA Soil Survey Division Staff, U.S. Government Printing Office, Washington, DC, 1993.

- Developed an automated process to verify the accuracy of the information in the database, referred to as an integrity check. Fields are reviewed to insure that all values are within acceptable ranges and related fields are not in conflict. As each new version of the database (including ISPAID 7.0) is prepared for release, a full integrity check will be completed before the official release of the new version.

### **Number of Demonstration Sites and Locations**

- The current version of ISPAID available to users is ISPAID 6.0 and was released in July 1996.

### **Education Outreach**

- ISPAID 6.0 is currently available to IFLM project coordinators, agricultural producers and service providers, and others in the public and private sectors. The primary access to the current database is through the Iowa Cooperative Soil Survey web site: <http://icss.agron.iastate.edu/>
- The computer system support specialist employed by this project regularly provides database information, extracts from the database, selected files and analyses for Integrated Farm and Livestock Management (IFLM) Demonstration Program research and education project coordinators, producers, and service providers in a format they can readily use.
  - Requests for abbreviated data
    - Only need certain fields (i.e. CSR's, grain yields, and soil names)
    - May need one or several counties,
    - May need file translated into another database format, a Microsoft Excel spreadsheet, a Microsoft Word Document, or a comma-delimited text file.
    - A few examples include:
      - ◆ Paul Kassel, Field Specialist/Crops, located in North-Central/Northwest Iowa
      - ◆ Craig Tordsen, Coordinator of the Iowa Crop Management Database
      - ◆ Michael Duffy, Professor of Ag Economics & an IFLM Project Coordinator
      - ◆ Brian Peterson, Natural Resources Conservation Service (NRCS) Grassland Conservationist
      - ◆ Lynette Seigley, Iowa Department of Natural Resources (IDNR), Iowa City
      - ◆ Robert Diderikson, NRCS, Williamsburg
      - ◆ Jim Jensen, Iowa State University (ISU) Extension Field Specialist, Farm Management, Mount Pleasant
      - ◆ John Anderson, Site-Specific Technology Development Groups, Stillwater, Oklahoma

- Examples of selected projects requiring extensive analysis of the data include:
  - Assisted John Sawyer and Antonio Mallarino, Department of Agronomy in revising Tables 15A-L in ISU Publication PM-1688, “General Guide for Crop Nutrient and Limestone Recommendations in Iowa” (see Appendix A). In ISPAID, Subsoil P has 10 possible values, and Subsoil K has 8 possible values. This data was translated into “Low” and “High” for each database entry, based on criteria used for the original publication. The resulting data were then added to ISPAID as two new database fields. A tables was created for each MSA listing all soil series which had 5,000 or more acres with a CSR of 30 or greater showing these new SubsoilP and SubsoilK values.
  - Summarized Soil Map Units with the Missouri River Bottomland. Created tables for Fremont, Harrison, Mills, Monona, Pottawattamie, and Woodbury counties as well as a summary composite table. See Appendix B for a partial listing of the summary composite table.
  - Assisted Stewart Melvin, Department of Agriculture & Biosystems Engineering, in categorizing the suitability of possible feedlot sites in Butler, Calhoun, Carroll, Cass, Cherokee, Crawford, Decatur, Dickinson, Emmett, Harrison, Ida, Jones, Lyon, Mahaska, Mills, Montgomery, O’Brien, Osceola, Plymouth, Pottawattamie, Sac, Shelby, Sioux, Story, Taylor, and Woodbury Counties. See Appendix C for a sample. Wrote a computer program to divide soils into 5 categories, from Best Suited to Not Recommended.
  - Produced a report titled “Iowa Soils Requiring Tile Drainage to Achieve Optimal Agronomic Yields or Row Crops”. This report was provided to Jerald Huffman, Dow-Elanco, Inc. The report was later requested by Keith Schilling, Iowa Geological Survey, Department of Natural Resources. See Appendix D for a sample page of this report.

### **Leverage of Other Resources**

- Coordinated ISPAID 7.0 development with NRCS GIS Analyst Gregg Hadish. Hadish assists in the distribution of information about the database to NRCS and soil and water conservation district (SWCD) offices.

## Appendix A—Table 15A from ISU Publication Pm-1688

<b>A. Major soil area 1 that includes the Downs, Fayette, and Fayette-Dubuque-Stonyland soil associations.</b>				
<b>1. Loess derived soils</b>				
<b>Soil Name</b>	<b>Acres in Series</b>	<b>Sub P</b>	<b>Sub K</b>	
Arenzville	19,679	H	L	
Arenzville-Chaseburg Complex	54,144	H	L	
Bertrand	7,871	H	L	
Caneek	9,223	H	L	
Chaseburg	47,346	H	L	
Chelsea-Lamont-Fayette	6,090	L	L	
Colo-Ely Complex	10,234	H	L	
Dinsdale	24,260	L	L	
Dockery	5,430	H	L	
Dorchester	22,927	H	L	
Downs	545,763	H	L	
Downs Benches	6,276	H	L	
Downs-Tama Complex	40,208	H	H	
Eitzen	9,480	L	L	
Exette	27,685	H	L	
Fayette	1,174,150	H	L	
Fayette Benches	5,967	H	L	
Huntsville	6,140	H	L	
Ion	6,560	L	L	
Newvienna	19,125	H	L	
Orion	14,940	H	L	
Orwood	27,947	H	L	
Ossian	6,250	H	L	
Otter Overwash	6,180	H	H	
Otter-Worthen Complex	24,968	H	L	
Rozetta	14,800	H	L	
Rozetta-Eleroy Complex	23,880	H	L	
Sawmill	15,710	H	L	
Tama	19,150	H	L	
Worthen	11,167	H	L	
<b>2. Till derived soils</b>				
<b>Soil Name</b>	<b>Acres in Series</b>	<b>Sub P</b>	<b>Sub K</b>	
Jacwin	5,878	L	L	
Lamont	14,374	H	L	

The full publication (including the other 11 tables) is available at:  
<http://www.extension.iastate.edu/Publications/PM1688.pdf>



## Appendix B—Missouri River Bottom Soils Summary Table

		Fremont 36	Harrison 43	Mills 65	Monona 67	Pottawattamie 78	Woodbury 97	Total	Cumulative %	Cumulative %
Total Acres in County:		335,232	445,310	285,760	447,300	616,448	557,440	2,687,490		
Total Missouri River Bottom Acres:		71,830	123,960	40,950	174,722	54,190	149,700	615,352		
% of County in Missouri River Bottom Acres:		21.43%	27.84%	14.33%	39.06%	8.79%	26.85%	22.90%		
% of Total Missouri River Bottom Acres:		11.67%	20.14%	6.65%	28.39%	8.81%	24.33%	100.00%		
66	LUTON	8480	11745	1780	57371	4205	27175	110,756	18.0%	18.0%
70	MCPAUL	7500	13325	3145	5116	9520	27820	66,426	10.8%	28.8%
156	ALBATON	2940	15890	4355	14148	8295	8735	54,363	8.8%	37.6%
137	HAYNIE	6100	10010	4380	4791	7875	5885	39,041	6.3%	44.0%
146	ONAWA	3320	6090	3695	9907	3715	4770	31,497	5.1%	49.1%
36	SALIX	4840	3350	2585	8877	1155	5565	26,372	4.3%	53.4%
46	KEG	4840	6445	2815	1763	1115	3575	20,553	3.3%	56.7%
144	BLAKE	2930	4330	3535	3078	2460	3825	20,158	3.3%	60.0%
866	LUTON THIN SURFACE		17575					17,575	2.9%	62.8%
67	WOODBURY	1070	2080	225	7034		5760	16,169	2.6%	
44	BLENCOE	1230	3540	1085	6707	530	3025	16,117	2.6%	
553	FORNEY		1330		8106		4480	13,916	2.3%	70.4%
436	LAKEPORT	4860	1015	1560	3671	1050	1555	13,711	2.2%	
887B	MCPAUL-KENNEBEC COMPLEX						13410	13,410	2.2%	
149	MODALE	1550	1685	1215	1919	1780	2275	10,424	1.7%	76.5%
514	GRABLE	2410	800	2115	1900	1540	1080	9,845	1.6%	
255	COOPER	1230	1760	1240	2583	2935		9,748	1.6%	
515	PERCIVAL	720	1125	1230	1980	2185	955	8,195	1.3%	81.0%
275	MOVILLE	1380	2400	910	1375	500	1520	8,085	1.3%	
237	SARPY		1760	1015	1020	3850		7,645	1.2%	
244	BLEND	650	875	465	2577		2700	7,267	1.2%	
552	OWEGO				4052		2155	6,207	1.0%	
538	CARR	1200	1510				3210	5,920	1.0%	
366	LUTON	2100			2283		555	4,938	0.8%	
466	SOLOMON	1390	350				2685	4,425	0.7%	
157	ALBATON	660	2855		542			4,057	0.7%	
66+	LUTON OVERWASH	780	1370	345	523	860		3,878	0.6%	
237B	SARPY	620	1985		402		705	3,712	0.6%	90.1%
147	MODALE				1078		2600	3,678	0.6%	
516	VORE	850	580	1505	675			3,610	0.6%	
238	SARPY		2605	865				3,470	0.6%	
1156	ALBATON SILTY CLAY				3401			3,401	0.6%	
1515	Percival silty clay				2752			2,752	0.4%	
145	ONAWA	380	1145		798		400	2,723	0.4%	
1146	Onawa silty clay				2547			2,547	0.4%	
955	MCPAUL FREQ FLOODED						2345	2,345	0.4%	
636	BUCKNEY	2000		195				2,195	0.4%	94.4%

(Rest of Table Deleted)

# Appendix C—Feedlot Siting Recommendation for Plymouth County

COUNTY: 75, Plymouth

SMS	SOILNAME	ACREAGE	SLOPE RANGE	HYDROLOGIC GROUP	FLOODING FREQUENCY	PERMEABILITY	DRAINAGE CLASS	PARENT MATERIAL
<b>Category 1, BEST SUITED</b>								
1B3	IDA	855	2-5%	B	NONE	M	W	LC
10B	MONONA	3200	2-5%	B	NONE	M	W	L
116	GRACEVILLE	630	0-2%	B	NONE	M	MW	WS
116B	GRACEVILLE	230	2-5%	B	NONE	M	MW	WS
310B	GALVA	116285	2-5%	B	NONE	M	W	L
T10B	MONONA BENCHES	1465	2-5%	B	NONE	M	W	L
T310	GALVA BENCHES	5005	0-2%	B	NONE	M	W	L
T310B	GALVA BENCHES	23165	2-5%	B	NONE	M	W	L
<b>Category 2</b>								
1C3	IDA	19745	5-9%	B	NONE	M	W	LC
10C2	MONONA	10175	5-9%	B	NONE	M	W	L
12C	NAPIER	5840	5-9%	B	NONE	M	W	F
310C2	GALVA	124585	5-9%	B	NONE	M	W	L
212B	KENNEBEC	905	2-6%	B	NONE	M	MW	A
<b>Category 3</b>								
91B	PRIMGHAR	8110	2-4%	B	NONE	MS	SP	L
<b>Category 4</b>								
156	ALBATON	320	0-2%	D	RARE	VS	P	BC

## ❖ Criteria for Categories

➤ Category 1, Best Suited, matching the following criteria:

- Slope Range High <=5, Hydrologic Group B,
- Flooding Frequency 00, Drainage Class 30, 35 or 40,
- Permeability Code ≠ (0,5,10,15,20,25,30,35,58,72,75),
- Parent Material ≠ (D,H,J,R,X,Z,DC,IR,IZ,JR,LD,LR,SR,TR,YR)

➤ Category 2, matching the following criteria:

- Slope Range High between 6 and 9, Hydrologic Group B,
- Flooding Frequency 00, Drainage Class 30, 35 or 40
- Permeability Code ≠ (0,5,10,15,20,25,30,35,58,72,75)
- Parent Material ≠ (D,H,J,R,X,Z,DC,IR,IZ,JR,LD,LR,SR,TR,YR)

➤ Category 3, matching the following criteria:

- Slope Range High <= 9, Hydrologic Group B,
- Flooding Frequency 00, Drainage Class 45 or 50
- Permeability Code ≠ (0,5,10,15,20,25,30,35,58,72,75)
- Parent Material ≠ (D,H,J,R,X,Z,DC,IR,IZ,JR,LD,LR,SR,TR,YR)

➤ Category 4, matching the following criteria:

- Slope Range High <= 9, Hydrologic Group C or D,
- Flooding Frequency 00 OR 10
- Permeability Code ≠ (0,5,10,15,20,25,30,35,58,72,75)
- Parent Material ≠ (D,H,J,R,X,Z,DC,IR,IZ,JR,LD,LR,SR,TR,YR)

➤ Category NR, all others



## Appendix D—Iowa Soils Requiring Tile Drainage to Achieve Optimal Agronomic Yields or Row Crops

The acreage listed for each soil map unit represents the total acreage within the respective county. This report indicates neither that tile drainage is present nor that the land is in row crop production.

Data Source: ISPAID (Iowa Soil Properties And Interpretations Database)

Report includes data for 97/99 of Iowa Counties. (Humboldt and Monona are currently not available)

Criteria: Slope Range High Less than 5%

Drainage Class 45-70 (Moderately well-Somewhat poor through Very Poor)

Subsoil Groups 1 and 2 (Clay < 40% in subsoil)

ISPAID Manual: <http://extension.agron.iastate.edu/soils/PDFs/ispaid.pdf>

SMS	SOILNAME	SLOPE RANGE	ACRES	% OF ACRES IN COUNTY
<b>ADAIR COUNTY</b>				
368	MACKSBURG	0-2%	2,336	0.64%
430	ACKMORE	0-2%	1,744	0.48%
51	VESSER	0-2%	1,215	0.33%
133+	COLO OVERWASH	0-2%	1,660	0.46%
133	COLO	0-2%	4,212	1.16%
369	WINTERSET	0-2%	703	0.19%
269	HUMESTON	0-2%	940	0.26%
428B	ELY	2-5%	1,255	0.34%
368B	MACKSBURG	2-5%	276	0.08%
13B	VESSER-NODAWAY COMPLEX	2-5%	876	0.24%
11B	COLO-ELY COMPLEX	2-5%	<u>47,613</u>	<u>13.07%</u>
<b>(364160 total acres in Adair)</b>			<b>62,830</b>	<b>17.25%</b>
<b>ADAMS COUNTY</b>				
Nn	NEVIN	0-2%	1,055	0.39%
MaA	MACKSBURG	0-2%	5,748	2.11%
Cm	COLO	0-2%	9,483	3.48%
Cn	COLO CHANNELED	0-2%	1,723	0.63%
Co	COLO OVERWASH	0-2%	2,232	0.82%
Br	BREMER	0-2%	637	0.23%
Ca	CHARITON	0-2%	237	0.09%
Wr	WINTERSET	0-2%	925	0.34%
Sp	SPERRY	0-2%	33	0.01%
St	SPERRY BENCHES	0-2%	36	0.01%
MaB	MACKSBURG	2-5%	1,875	0.69%
CxB	COLO-GRAVITY COMPLEX	2-5%	36,152	13.26%
GrB	GRAVITY	2-5%	<u>4,391</u>	<u>1.61%</u>
<b>(272640 total acres in Adams)</b>			<b>64,527</b>	<b>23.67%</b>
<b>ALLAMAKEE COUNTY</b>				
485	SPILLVILLE	0-2%	400	0.09%
484	LAWSON	0-2%	1,570	0.37%
826	ROWLEY	0-2%	210	0.05%
843	ELON	0-2%	1,735	0.41%
930	ORION	0-2%	1,405	0.33%
490	CANEEK	0-2%	835	0.20%
118	GARWIN	0-2%	135	0.03%
589	OTTER	0-2%	305	0.07%
1490	CANEEK CHANNELED	0-2%	10,855	2.57%
291	ATTERBERRY	1-3%	270	0.06%
119B	MUSCATINE	1-4%	880	0.21%
487B	OTTER-WORTHEN COMPLEX	1-4%	<u>1,495</u>	<u>0.35%</u>
<b>(422200 total acres in Allamakee)</b>			<b>20,095</b>	<b>4.76%</b>

(the remainder of the report is not shown)