OCCURRENCE OF FARMING PRACTICES IN IDAHO:

With Special Reference To Remote Sensing

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ABSTRACT

This survey of information was initiated and compiled because of the needs of remote sensing interpreters to identify crops throughout the year on various types of remote sensing imagery. A fairly comprehensive guide to what crops grow in a county and the specific seasonal cropping practices has been developed.

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The authors wish to acknowledge the fine cooperation of the personnel at the Agriculture Extension Office of the University of Idaho, the County Agriculture Extension Agents and the Soil Conservation Service Representatives.

Cover Photo: the cropland area around Lake Lowell (center) and the cities of Caldwell (top) and Nampa (right), Idaho. Photo taken by NASA U-2 aircraft.
Occurrence of Farming Practices in Idaho: with Special Reference to Remote Sensing

by

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INTRODUCTION

This study of cropping practices developed from the needs of another major study in the state of Idaho. In mid-1975, investigators attempted to inventory irrigated lands in selected areas in southern Idaho using remote sensing imagery, including satellite imagery. The Department of Water Resources needed prompt information to fulfill statutory functions of: a) collecting information about water resources and needs; b) authorizing the sale of water rights; and c) approving the formation of irrigation districts.

One sub-study under that project undertook identification of crop types, one factor which would give investigators an indication of irrigation water demand. A significant amount of ground truth was required in the attempt to identify crop types using remote sensing imagery. Information was needed on many variables throughout the year, including cropping practices for each crop, row width, soil types, slope, aspect, field size, and types of irrigation used (Heller et al. 1976, Packard 1976). Project personnel soon realized that this kind of data was not readily available and that little information had been compiled on the occurrence of farming practices, especially on the rapidly expanding crop areas of southern Idaho.

This study, through the aid of a National Science Foundation Undergraduate Research Participant Grant, reports a compilation of occurrence of farming practices throughout the state of Idaho.

This information can be used to determine the best time or times of the year when crops can be discriminated on remote sensing imagery. Certain crops may have one date during the season when they can be singled out as mature, while the other crops are just being planted. Knowing when crops are at different stages will help determine the best combination of dates for discriminating all the crops in an area.

Authors are, respectively, former undergraduate Research Assistant, Department of Entomology; and Professor, College of Forestry, Wildlife and Range Sciences.

METHODS

We searched the literature for information on the occurrence of cropping practices and contacted personnel in the Agricultural Extension Office at the University of Idaho and the Soil Conservation Service for any available data. Although we had little success in finding the needed information, we learned that the best sources for such data were the County Extension Agents and the Soil Conservation Service representatives. These agents and representatives have collected and accumulated similar data for their counties or areas and in most cases are very aware of the present situation. We designed a survey questionnaire which was sent to all county Agricultural Extension agents and Soil Conservation Service (SCS) representatives in Idaho in July, 1976.

We asked them to indicate, for each of the 13 characteristics listed below, those crops occupying 10 percent or more of the total crop area in the county and to describe the characteristics, if appropriate. For items 1-5, we also asked for the dates of occurrence.

1. Plow
2. Plant
3. Fertilize
4. Irrigate
5. Harvest
6. Soil type (sandy loam, loam, silt, sandy, peat, clay, clay loam, silty loam)
7. Slope (0-5, up to 10, up to 20, up to 30 percent)
8. Dominant aspect if significant (all, level, or by direction, e.g., N, NNE, NE, etc.)
9. Row width (6-7, 6-12, 24-30, 30-36 inches)
10. Dryland or irrigated
11. Type of irrigation (flood, furrow, sprinkler, corrugate, rill, gravity dike, sub sprinkler, surface)
12. Average size of fields (1-20, 10-100, 100-160, 160-200, 200-600 acres)
13. If there are no-till fields

We compiled, analysed and summarized the data on maps (Figures 1-11) for ready reference.
We also asked for the following data, which are recorded in Appendix B.

1. Average annual rainfall in area
2. Average annual frost-free days
3. Crop rotation practices

After summarizing the data, we discovered a mimeographed pamphlet of limited distribution which included crop weather calendars for southern Idaho (Huxman and Faubion 1975). The pamphlet was apparently compiled by the Weather Bureau Agriculture Service Office in 1967 and then updated by the National Weather Service Office for Agriculture in 1975. This pamphlet includes crop practice occurrence similar to what we compiled for regions in southern Idaho.

RESULTS AND DISCUSSION

With a little coaxing we received 100 percent coverage for the state either through the county agents or the SCS personnel. Where there was duplicate coverage, we checked and verified the data before use.

Cropping characteristics, such as row width, size of fields, and slope often varied within a particular county. In these cases we generalized the data for the entire county.

The cropping practice data are presented in a series of Idaho county maps, each of which represents one or several crop types. An alphanumeric code on each map is used to designate the applicable data for each county.

When a cropping occurrence, such as plowing, took place in successive months, only the first month was entered in the map data. More specific data on the occurrence times of cropping practices are displayed in Appendix A, Table 1. This appendix includes the most specific information obtained in our survey with respect to times of plowing, planting, fertilization, irrigation, and harvest. In some cases, the actual commencement date (long-term average) of a farming practice is given; in others the months during which it occurs are listed.

Though these occurrences may vary from year to year, the data represent seasonal averages taken over a number of years and can serve as guidelines for prediction of future practices.

The crops represented are alfalfa, spring barley, winter barley, sugar beets, corn, fall grain, spring grain, lentils, beans, peas, potatoes, spring wheat and winter wheat. The alfalfa, sugar beets, corn, fall grain, spring grain, beans, and potatoes only occur in southern Idaho. The fall and spring grains are those other than wheat.

In addition to the crop occurrence maps, we have included other maps useful for determining crop types in an area using remote sensing imagery (Appendix C). A brief explanation follows:

Agricultural Use: includes nonagriculture, grazing land, mountain valleys, dry land farming and irrigated farming.

Elevation: shows elevation levels in feet between 600-1,500, 1,500-3,000, 3,000-6,000, 6,000-9,000, and 9,000-12,000.

Irrigated Areas: distinguishes arable and irrigated land.

Land in Farms: in categories of percentages below 20, 20-40, 41-60, 61-80, and over 80 by county.

Land Use: includes barren, wilderness, forest, grazing, nonirrigated, and irrigated.

Annual Precipitation: generalizes precipitation in inches for under 10, 10-20, 20-30, 30-40, 40-50, 50-60, and over 60.

Major Soils: shows the Great Soils Groups.

Ground Water: indicates where different rock types occur and appropriate depths of wells.

Sutter and Corey (1970) give other information that may be useful to the interpreter of remote sensing imagery, especially the grouping of crops by similarity of water usage, average annual consumptive use by crop, and consumptive irrigation requirements.

LITERATURE CITED


The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations (1) involved and the month (2) of that operation. The denominator lists all other characteristics (3-9).

1. Operation
   1. Plow
   2. Plant
   3. Fertilize
   4. Irrigate
   5. Harvest

2. Month
   a. January
   b. February
   c. March
   d. April
   e. May
   f. June
   g. July
   h. August
   i. September
   j. October
   k. November
   l. December

3. Soil Types
   A. Sandy loam
   B. Loam
   C. Silt
   D. Sandy
   E. Peat
   F. Clay
   G. Clay loam
   H. Silty loam
   I. Clay

4. Slope
   0-5% slope
   up to 10% slope
   up to 20% slope
   up to 30% slope

5. Aspect
   M. All
   N. South
   E. East
   W. West
   S. South
   SW. Southwest
   WSW. West Southwest
   NW. Northwest
   NWNW. North Northwest
   ENE. East Northeast
   ENE. East Northeast
   N. North
   NE. Northeast
   SE. Southeast
   SSW. South Southwest
   WSW. West Southwest
   SW. Southwest
   NW. Northwest
   NE. Northeast
   E. East
   W. West
   S. South
   N. North
   M. All

6. Row Width (inches)
   a. 6-7 inches
   b. 6-12 inches
   c. 24-30 inches
   d. 30-36 inches
   e. 6-12 inches
   f. 10-120 inches
   g. 100-160 inches
   h. 160-200 inches
   i. 200-600 inches

7. Field Size (acres)
   a. 0-10 acres
   b. 10-50 acres
   c. 50-100 acres
   d. 100-160 acres
   e. 160-200 acres
   f. 200-400 acres
   g. 400-600 acres
   h. 600-1000 acres
   i. 1000-2000 acres

8. No-Till Fields
   a. Present
   b. Absent

9. Types of Irrigation
   m. Furrow
   n. Border
   o. Corrugate
   p. Rill
   q. Gravity dikes
   r. Sub-irrigation
   s. Surfacing
   t. Type not specified

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 10-100 acres in size. No-till fields are absent.
The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations (1) involved and the month (2) of that operation. The denominator lists all other characteristics (3-9).

1. Operation
   1. Plow
   2. Plant
   3. Fertilize
   4. Irrigate
   5. Harvest

2. Month
   a. January
   b. February
   c. March
   d. April
   e. May
   f. June
   g. July
   h. August
   i. September
   j. October
   k. November
   l. December

3. Soil Types
   A. Sandy loam
   B. Loam
   C. Silt
   D. Sandy
   E. Pea
   F. Clay
   G. Clay loam
   H. Silty loam

4. Slope
   I. 0-5% slope
   J. up to 10% slope
   K. up to 20% slope
   L. up to 30% slope

5. Aspect
   M. All
   N. South
   O. West
   P. East
   Q. SE
   R. SSE
   S. SW
   T. NW
   U. N & S
   V. NWW
   W. SSW
   X. Level

6. Row Width (inches)
   a. 6-12 inches
   b. 10-120 inches
   c. 24-30 inches
   d. 30-36 inches

7. Field Size (acres)
   a. 1-20 acres
   b. 20-100 acres
   c. 100-160 acres
   d. 160-200 acres
   e. 200-600 acres

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 10-100 acres in size. No-till fields are absent.
The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations [1] involved and the month [2] of that operation. The denominator lists all other characteristics [2-9].

1. Operation
   1. Plow
   2. Plant
   3. Fertilize
   4. Irrigate
   5. Harvest

2. Month
   a. January
   b. February
   c. March
   d. April
   e. May
   f. June
   g. July
   h. August
   i. September
   j. October
   k. November
   l. December

3. Soil Types
   A. Sandy loam
   B. Loam
   C. Silt
   D. Sandy
   E. Peat
   F. Clay
   G. Clay loam
   H. Silty loam

4. Slope
   I. 0-5% slope
   J. up to 10% slope
   K. up to 20% slope
   L. up to 30% slope

5. Aspect
   M. All
   N. South
   O. West
   P. East
   Q. SE
   R. SSE
   S. SW
   T. NW
   U. N & S
   V. NW
   W. SSW
   X. Level

6. Row Width (inches)
   a. 6-7 inches
   b. 6-12 inches
   c. 24-30 inches
   d. 30-36 inches

7. Field Size (acres)
   e. 1-20 acres
   f. 10-100 acres
   g. 100-160 acres
   h. 160-200 acres
   i. 200-600 acres

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 10-100 acres in size. No-till fields are absent.
The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations (1) involved and the month (2) of that operation. The denominator lists all other characteristics (3-9).

1. Operation
   1 Plow
   2 Plant
   3 Fertilize
   4 Irrigate
   5 Harvest

2. Month
   a January
   b February
   c March
   d April
   e May
   f June
   g July
   h August
   i September
   j October
   k November
   l December

3. Soil Types
   A Sandy loam
   B Loam
   C Silt
   D Sandy
   E Peat
   F Clay
   G Clay loam
   H Silty loam

4. Slope
   i 0-5% slope
   j up to 10% slope
   k up to 20% slope
   l up to 30% slope

5. Aspect
   M All
   N South
   O East
   P West
   Q SE
   R SSE
   S SW
   T NW
   U N & S
   V NW
   W SW
   X Level

6. Row Width
   a 6-7 inches
   b 6-12 inches
   c 12-18 inches
   d 24-30 inches
   e 30-36 inches
   f 36-42 inches
   g 42-48 inches
   h 48-54 inches
   i 54-60 inches
   j 60-66 inches
   k 66-72 inches
   l 72-78 inches
   m 78-84 inches
   n 84-90 inches
   o 90-96 inches
   p 96-102 inches
   q 102-108 inches
   r 108-114 inches
   s 114-120 inches
   t 120-126 inches
   u 126-132 inches
   v 132-138 inches
   w 138-144 inches
   x 144-150 inches
   y 150-156 inches
   z 156-162 inches
   A 162-168 inches
   B 168-174 inches
   C 174-180 inches
   D 180-186 inches
   E 186-192 inches
   F 192-198 inches
   G 198-204 inches
   H 204-210 inches
   I 210-216 inches
   J 216-222 inches
   K 222-228 inches
   L 228-234 inches
   M 234-240 inches
   N 240-246 inches
   O 246-252 inches
   P 252-258 inches
   Q 258-264 inches
   R 264-270 inches
   S 270-276 inches
   T 276-282 inches
   U 282-288 inches
   V 288-294 inches
   W 294-300 inches
   X 300-306 inches
   Y 306-312 inches
   Z 312-318 inches
   AA 318-324 inches
   AB 324-330 inches
   AC 330-336 inches
   AD 336-342 inches
   AE 342-348 inches
   AF 348-354 inches
   AG 354-360 inches
   AH 360-366 inches
   AI 366-372 inches
   AJ 372-378 inches
   AK 378-384 inches
   AL 384-390 inches
   AM 390-396 inches
   AN 396-402 inches
   AO 402-408 inches
   AP 408-414 inches
   AQ 414-420 inches
   AR 420-426 inches
   AS 426-432 inches
   AT 432-438 inches
   AU 438-444 inches
   AV 444-450 inches
   AW 450-456 inches
   AX 456-462 inches
   AY 462-468 inches
   AZ 468-474 inches
   BA 474-480 inches
   BB 480-486 inches
   BC 486-492 inches
   BD 492-498 inches
   BE 498-504 inches
   BF 504-510 inches
   BG 510-516 inches
   BH 516-522 inches
   BI 522-528 inches
   BJ 528-534 inches
   BK 534-540 inches
   BL 540-546 inches
   BM 546-552 inches
   BN 552-558 inches
   BO 558-564 inches
   BP 564-570 inches
   BQ 570-576 inches
   BR 576-582 inches
   BS 582-588 inches
   BT 588-594 inches
   BU 594-600 inches
   BV 600-606 inches
   BW 606-612 inches
   BX 612-618 inches
   BY 618-624 inches
   BZ 624-630 inches
   CA 630-636 inches
   CB 636-642 inches
   CC 642-648 inches
   CD 648-654 inches
   CE 654-660 inches
   CF 660-666 inches
   CG 666-672 inches
   CH 672-678 inches
   CI 678-684 inches
   CJ 684-690 inches
   CK 690-696 inches
   CL 696-702 inches
   CM 702-708 inches
   CN 708-714 inches

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 10-100 acres in size. No-till fields are absent.
The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations (1) involved and the month (2) of that operation. The denominator lists all other characteristics (3-9).

1. Operation
   1. Plow
   2. Plant
   3. Fertilize
   4. Irrigate
   5. Harvest

2. Month
   a. January
   b. February
   c. March
   d. April
   e. May
   f. June
   g. July
   h. August
   i. September
   j. October
   k. November
   l. December

3. Soil Types
   A. Sandy loam
   B. Loam
   C. Silt
   D. Sandy
   E. Peat
   F. Clay
   G. Clay loam
   H. Silty loam

4. Slope
   I. 0-5% slope
   J. Up to 10% slope
   K. Up to 20% slope
   L. Up to 30% slope

5. Aspect
   M. All
   N. South
   O. West
   P. East
   Q. SE
   R. SSE
   S. SW
   T. NW

6. Types of Irrigation
   a. Flood
   b. Furrow
   c. Sprinkler
   d. Sub-sprinkler
   e. Surface
   f. Type not specified

7. No-Till Fields
   a. Present
   b. Absent

8. Row Width (inches)
   a. 6-7 inches
   b. 6-12 inches
   c. 24-30 inches
   d. 30-36 inches

9. Field Size (acres)
   a. 0-5 acres
   b. 5-10 acres
   c. 10-100 acres
   d. 100-150 acres
   e. 150-200 acres
   f. 200-600 acres

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June, and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 10-100 acres in size. No-till fields are absent.
The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations (1) involved and the month (2) of that operation. The denominator lists all other characteristics (3-9).

1. Operation
   - 1. Flow
   - 2. Plant
   - 3. Fertilize
   - 4. Irrigate
   - 5. Harvest

2. Month
   - a. January
   - b. February
   - c. March
   - d. April
   - e. May
   - f. June
   - g. July
   - h. August
   - i. September
   - j. October
   - k. November
   - l. December

3. Soil Types
   - A. Sandy loam
   - B. Loam
   - C. Silt
   - D. Sandy
   - E. Peat
   - F. Clay
   - G. Clay loam
   - H. Silty loam

4. Slope
   - I. 0-5% slope
   - J. up to 10% slope
   - K. up to 20% slope
   - L. up to 30% slope

5. Aspect
   - M. All
   - N. South
   - O. West
   - P. East
   - Q. SE
   - R. SSE
   - S. SW
   - T. NW
   - U. W
   - V. NW
   - W. SSW
   - X. Level
   - Y. Not specified

6. Row Width (inches)
   - a. 6-12 inches
   - b. 16-24 inches
   - c. 24-30 inches
   - d. 30-56 inches
   - e. 56-80 inches

7. Field Size (acres)
   - a. 0-2 acres
   - b. 1-10 acres
   - c. 2-5 acres
   - d. 6-10 acres
   - e. 7-10 acres
   - f. 10-30 acres
   - g. 30-60 acres
   - h. 60-100 acres
   - i. 100-200 acres

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 0-10 acres in size. No-till fields are absent.
The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations (1) to that operation. The denominator lists all other characteristics (2-9).

1. Operation
   1 Flaw
   2 Plant
   3 Fertilize
   4 Irrigate
   5 Harvest

2. Month
   a January
   b February
   c March
   d April
   e May
   f June
   g July
   h August
   i September
   j October
   k November
   l December

3. Soil Types
   A Sandy loam
   B Loam
   C Silt
   D Sandy
   E Pea
   F Clay
   G Clay loam
   H Silty loam
   I Clay silt
   J Clay silt

4. Slope
   L 0-5% slope
   K up to 10% slope
   J up to 20% slope

5. Aspect
   M All
   N South
   O West
   P East
   Q SE
   R SSE
   T NW
   V N-S
   W NW
   X Level

6. Row width (inches)
   a 6-12 inches
   b 12-18 inches
   c 18-24 inches

7. Types of Irrigation
   a Flood
   b Furrow
   c Sprinkler
   d Rill
   e Gravity dikes
   f Sub sprinkler
   g Surface
   h Type not specified

8. No-Till Fields
   a Not till fields
   b Preparing
   c Not till fields
   d Not till fields
   e Not till fields
   f Not till fields
   g Not till fields
   h Not till fields
   i Not till fields
   j Not till fields

9. Field Size (acres)
   a 1-10 acres
   b 10-20 acres
   c 20-50 acres
   d 50-100 acres
   e 100-200 acres
   f 200-500 acres
   g 500-1000 acres
   h 1000-2000 acres
   i 2000-5000 acres

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June, and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 10-20 acres in size. No-till fields are absent.
The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations involved and the month of that operation. The denominator lists all other characteristics.

1. Operation
   1. Plow
   2. Plant
   3. Fertilize
   4. Irrigate
   5. Harvest

2. Month
   a. January
   b. February
   c. March
   d. April
   e. May
   f. June
   g. July
   h. August
   i. September
   j. October
   k. November
   l. December

3. Soil Types
   A. Sandy loam
   B. Loam
   C. Silt
   D. Sandy
   E. Peas
   F. Clay
   G. Clay loam
   H. Silty loam

4. Slope
   I. 0-5% slope
   J. up to 10% slope
   K. up to 20% slope
   L. up to 30% slope

5. Aspect
   M. All
   N. South
   O. West
   P. East
   Q. SE
   R. SSE
   S. SW
   T. NW
   U. N & S
   V. NNW
   W. SSW
   X. Level

6. Row Width (inches)
   a. 6-7 inches
   b. 6-12 inches
   c. 24-30 inches
   d. 30-36 inches

7. Field Size (acres)
   e. 1-20 acres
   f. 10-100 acres
   g. 100-160 acres
   h. 160-200 acres
   i. 200-600 acres

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 10-100 acres in size. No-till fields are absent.
The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations [1] involved and the month [2] of that operation. The denominator lists all other characteristics [3-9].

1. Operation
1. Plow
2. Plant
3. Fertilize
4. Irrigate
5. Harvest

2. Month
a. January
b. February
c. March
d. April
e. May
f. June
g. July
h. August
i. September
j. October
k. November
l. December

3. Soil Types
A. Sandy loam
B. Loam
C. Silt
D. Sandy
E. Peat
F. Clay
G. Clay loam
H. Silty loam

4. Slope
J. 0-5% slope
K. up to 10% slope
L. up to 20% slope
M. up to 30% slope
N. Type not specified

5. Aspect
M. All
N. South
O. West
P. East
Q. SSE
R. SW
S. NW
T. NE
U. All
V. All
W. All
X. Level

6. Row Width (inches)
A. 6-12 inches
B. 12-24 inches
C. 24-36 inches
D. 36-48 inches
E. 48-60 inches
F. 60-72 inches
G. 72-90 inches
H. 90-108 inches
I. 108-126 inches
J. 126-144 inches
K. 144-162 inches
L. 162-180 inches
M. 180-216 inches
N. 216-240 inches
O. 240-270 inches
P. 270-300 inches
Q. 300-330 inches
R. 330-360 inches
S. 360-390 inches
T. 390-420 inches
U. 420-450 inches
V. 450-480 inches
W. 480-510 inches
X. 510-540 inches
Y. 540-570 inches
Z. 570-600 inches

7. Field Size (acres)
A. 0-5 acres
B. 5-20 acres
C. 20-50 acres
D. 50-100 acres
E. 100-150 acres
F. 150-200 acres
G. 200-250 acres
H. 250-300 acres
I. 300-350 acres
J. 350-400 acres
K. 400-450 acres
L. 450-500 acres
M. 500-550 acres
N. 550-600 acres
O. 600-650 acres
P. 650-700 acres
Q. 700-750 acres
R. 750-800 acres
S. 800-850 acres
T. 850-900 acres
U. 900-950 acres
V. 950-1000 acres
W. 1000-1050 acres
X. 1050-1100 acres
Y. 1100-1150 acres
Z. 1150-1200 acres

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 10-100 acres in size. No-till fields are absent.
The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations (1) involved and the month (2) of that operation. The denominator lists all other characteristics (3-9).

1. Operation
   A Plow
   B Plant
   C Fertilize
   D Irrigate
   E Harvest

2. Month
   a January
   b February
   c March
   d April
   e May
   f June
   g July
   h August
   i September
   j October
   k November
   l December

3. Soil Types
   A Sandy loam
   B Loam
   C Silt
   D Sandy
   E Peat
   F Clay
   G Clay loam
   H Silty loam

4. Slope
   a 0-5% slope
   b up to 10% slope
   c up to 20% slope
   d up to 30% slope

5. Aspect
   M All
   N South
   O West
   P East
   Q SE
   R SSE
   S SW
   T NW
   U UN
   V NW
   W SW
   X Level

6. Row Width (inches)
   a 6-12 inches
   b 24-36 inches
   c 30-48 inches
   d 48-60 inches

7. Types of Irrigation
   i Flood
   m Furrow
   n Sprinkler
   o Corrugate
   p Rill
   q Gravity dikes
   r Sub sprinkler
   s Surface
   t Type not specified

8. No-Till Fields
   j No-till fields present
   k No-till fields absent

9. Field Size (acres)
   a 1-20 acres
   b 20-100 acres
   c 100-160 acres
   d 160-200 acres
   e 200-600 acres

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 10-100 acres in size. No-till fields are absent.
The code is an alphanumeric fraction with the symbol for each characteristic (i.e., operation, time, soil type, etc.) listed in order of the characteristics given below. Only those symbols for characteristics appropriate to a particular crop are listed. If more than one month was indicated for a particular crop, only the first is listed. The numerator of the fraction indicates all the operations (1) involved and the month (2) of that operation. The denominator lists all other characteristics (3-9).

1. Operation
   A. Plow
   B. Plant
   C. Fertilize
   D. Irrigate
   E. Harvest

2. Month
   a. January
   b. February
   c. March
   d. April
   e. May
   f. June
   g. July
   h. August
   i. September
   j. October
   k. November
   l. December

3. Soil Types
   A. Sandy loam
   B. Loam
   C. Silt
   D. Sandy
e. Peat
   F. Clay
   G. Clay loam
   H. Silty loam

4. Slope
   I. 0-5% slope
   J. up to 10% slope
   K. up to 20% slope
   L. up to 30% slope

5. Aspect
   M. All
   N. South
   O. West
   P. East
   Q. SE
   R. SSE

6. Row Width
   T. 6-12 inches
   U. 24-30 inches
   V. 30-36 inches

7. Field Size (acres)
   a. 1-20 acres
   b. 20-100 acres
   c. 100-160 acres
   d. 160-200 acres
   e. 200-600 acres

This example shows a crop for a county where the normal operations are to plow in April, plant in May, fertilize in June and harvest in August. There is no irrigation. Soils are clay loam, on slopes up to 10% with all aspects. Row width is 6-12 inches in fields of 10-100 acres in size. No-till fields are absent.
Table 1. Specific dates for occurrences of farming practices for the major crops of each county. The data are from the survey questionnaire and are more complete than data included on the crop maps. Indicated in the table is the appropriate month or months of the year. Where a specific date was given, it is indicated by a slash with the date first; e.g., 1/7 is the 1st day of July.

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NA - not applicable; WN - when needed; F - Fall; S - Spring.
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NA - not applicable; WN - when needed; F - Fall; S - Spring.
### Appendix A - Table 1 continued

#### COUNTY: PRACTICE/CROP

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<td>Teton</td>
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<td>5,6,7</td>
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<td>Harvest</td>
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NA - not applicable; WN - when needed; F - Fall; S - Spring.
Appendix A - Table 1 continued

<table>
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<tr>
<th>COUNTY</th>
<th>PRACTICE/CROP</th>
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<td>Valley</td>
<td>Potatoes</td>
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<td></td>
<td>Plow 5,10</td>
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<tr>
<td></td>
<td>Plant 5</td>
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<tr>
<td></td>
<td>Fertilize 5,6</td>
</tr>
<tr>
<td></td>
<td>Irrigate 6,7,8</td>
</tr>
<tr>
<td></td>
<td>Harvest 9,10</td>
</tr>
<tr>
<td>Washington</td>
<td>Alfalfa Sugar</td>
</tr>
<tr>
<td></td>
<td>Plow F 10</td>
</tr>
<tr>
<td></td>
<td>Plant 4 4</td>
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<td>Fertilize 4 4</td>
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<td>Irrigate 5,8</td>
</tr>
<tr>
<td></td>
<td>Harvest 5,6,7,8,9</td>
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</tbody>
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NA - not applicable; WN - when needed; F - Fall; S - Spring.
### APPENDIX B

Table 1. Average annual rainfall and frost-free days, crop rotation practices and other comments.

<table>
<thead>
<tr>
<th>County</th>
<th>Average annual rainfall (inches)</th>
<th>Average annual frost-free days</th>
<th>Crop rotation practices</th>
<th>Other comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ada</td>
<td>11</td>
<td>130</td>
<td>alfalfa-corn-grain; alfalfa-row-crop-grain</td>
<td></td>
</tr>
<tr>
<td>Adams</td>
<td>25</td>
<td>140</td>
<td></td>
<td>some June rains; dry July and August</td>
</tr>
<tr>
<td>Bannock</td>
<td>13</td>
<td>120</td>
<td>annual fallow-wheat; potatoes-grain</td>
<td></td>
</tr>
<tr>
<td>Bear Lake</td>
<td>13</td>
<td>75</td>
<td>2 barley-4-6 alfalfa; wheat-summer fallow-wheat; alfalfa-barley-oats &amp; seed alfalfa</td>
<td></td>
</tr>
<tr>
<td>Benewah</td>
<td>22</td>
<td>130</td>
<td>wheat-lentils</td>
<td>annual cropping</td>
</tr>
<tr>
<td>Blaine</td>
<td>14</td>
<td>95</td>
<td>5-8 alfalfa; 2-3 small grain; permanent pasture</td>
<td>seed potatoes and corn also grown, but make up less than 10% of crop area</td>
</tr>
<tr>
<td>Bingham</td>
<td>9</td>
<td>110</td>
<td>grain-potatoes; 3 alfalfa 1 potatoes-1 grain-1 potatoes-1 grain</td>
<td></td>
</tr>
<tr>
<td>Bonner</td>
<td>31</td>
<td>121</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonneville</td>
<td>9 (valley)</td>
<td>120</td>
<td>potatoes, potatoes-grain; 2 grain-potatoes; alfalfa-potatoes-grain</td>
<td></td>
</tr>
<tr>
<td>Boundary</td>
<td>25</td>
<td>110</td>
<td>wheat-barley</td>
<td></td>
</tr>
<tr>
<td>Butte</td>
<td>9</td>
<td>97</td>
<td>IRRIGATED: 4 alfalfa-1 cereal crop-1 potatoes-1 cereal grain-1 alfalfa-4-7 alfalfa-3 cereal crops and seeded to alfalfa on 3rd year; DRYLAND: wheat-fallow</td>
<td></td>
</tr>
<tr>
<td>Camas</td>
<td>15</td>
<td>85</td>
<td>alfalfa and grain often not rotated for many years</td>
<td></td>
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<tr>
<td>Canyon</td>
<td>9</td>
<td>150</td>
<td>great variation in rotation practices</td>
<td>alfalfa seeded in fall and spring; many other crops grown, but less than 10% of crop area</td>
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<tr>
<td>Caribou</td>
<td>14</td>
<td>70</td>
<td>wheat-wheat-spring grain; alfalfa-potatoes-grain</td>
<td>may freeze every month</td>
</tr>
<tr>
<td>Cassia</td>
<td>15</td>
<td>140</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clark</td>
<td>10</td>
<td>105</td>
<td>alfalfa-grain; alfalfa-potatoes</td>
<td></td>
</tr>
<tr>
<td>Clearwater</td>
<td>26</td>
<td>125</td>
<td>wheat-barley-peas</td>
<td>occasional fallow or lentils</td>
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22
## Appendix B - Table 1 Continued.

<table>
<thead>
<tr>
<th>County</th>
<th>Average annual rainfall (inches)</th>
<th>Average annual frost-free days</th>
<th>Crop rotation practices</th>
<th>Other comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custer</td>
<td>7</td>
<td>90</td>
<td>SEED GROWERS: potatoes-grain-alfalfa; COW-CALF: alfalfa-grain-alfalfa</td>
<td>most grain under sprinkler worked with offset disk and irrigated immediately after harvest; then late in fall volunteer grains disced again; in spring it is disced and ripped 16” deep</td>
</tr>
<tr>
<td>Elmore</td>
<td>11</td>
<td>118</td>
<td>2 potatoes-1 grain; 1 potatoes-1 grain-1 beans; 1 sugar beets-1 grain-3 alfalfa; 1 sugar beets-1 beans-1 grain; 4-6 alfalfa-2 grain; 1 potatoes-1 sugar beets-1 grain</td>
<td>potatoes planted on sandy soils starting in April; 3-4 year alfalfa rotations, except Mudlake area where hay left 8-10 years</td>
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<tr>
<td>Franklin</td>
<td>16</td>
<td>119</td>
<td>potatoes-grain-hay; pasture continuous</td>
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<tr>
<td>Fremont</td>
<td>18</td>
<td>110</td>
<td>corn-grain-alfalfa; sugar beets-grain-alfalfa</td>
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<tr>
<td>Gem</td>
<td>12</td>
<td>165</td>
<td>3 alfalfa-1 beans-1 grain-1 com-1 grain; with pivot sprinklers for potatoes may be: potatoes-grain or potatoes-sweet corn</td>
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<tr>
<td>Gooding</td>
<td>9</td>
<td>120</td>
<td>alfalfa-grain-potatoes</td>
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<tr>
<td>Idaho</td>
<td>10 (Mudlake)</td>
<td>100</td>
<td>alfalfa-grain-potatoes</td>
<td>potatoes planted on sandy soils starting in April; 3-4 year alfalfa rotations, except Mudlake area where hay left 8-10 years</td>
</tr>
<tr>
<td>(Rigby)</td>
<td>120</td>
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</tr>
<tr>
<td>Jerome</td>
<td>10</td>
<td>125</td>
<td>alfalfa-beans-beets; grain-(beans-beets); alfalfa with grain</td>
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<td>Kootenai</td>
<td>23</td>
<td>140</td>
<td>winter wheat-spring barley; lentils or peas-wheat-spring barley; spring wheat-winter wheat-spring barley; bluegrass seed (6-8 years) worked into above systems</td>
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<tr>
<td>Latah</td>
<td>25</td>
<td>145</td>
<td>wheat-peas-fallow; peas-lentils-wheat</td>
<td>not much fallow</td>
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<td>Lemhi</td>
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<td>102</td>
<td>6 hay/pasture-1 grain</td>
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<tr>
<td>Lewis</td>
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<td>110</td>
<td>peas-wheat-barley; peas-wheat-barley-wheat-summer fallow</td>
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<tr>
<td>Lincoln</td>
<td>9</td>
<td>100</td>
<td>beans-grain-hay; grain-hay-corn</td>
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<td>Madison</td>
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<td>100</td>
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<td>Minidoka</td>
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<td>3 hay-1 potatoes-1 grain-1 potatoes-1 grain</td>
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<td>Nez Perce</td>
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<td>180</td>
<td>wheat-peas; wheat-wheat</td>
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Appendix B — Table 1 Continued.

<table>
<thead>
<tr>
<th>County</th>
<th>Average annual rainfall (inches)</th>
<th>Average annual frost-free days</th>
<th>Crop rotation practices</th>
<th>Other comments</th>
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<tbody>
<tr>
<td>Oneida</td>
<td>14</td>
<td>100</td>
<td>continuous grain; grain-fallow; continuous hay; hay-grain</td>
<td>other crops grown but do not comprise 10% of crop land area</td>
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<td>140</td>
<td>3-5 hay-2-3 row crops-1 grain-1 hay</td>
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<td>140</td>
<td>beets-grain-alfalfa-corn; onion-corn-beets-grain; corn-beets-grain</td>
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<td>Power</td>
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<td>118</td>
<td>DRYLAND: wheat-fallow IRRIGATED: wheat-potatoes-sugar beets; wheat-potatoes</td>
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<tr>
<td>Twin Falls</td>
<td>9</td>
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<td>wheat-2 alfalfa-sugar beets; potatoes-sugar beets; wheat-2 alfalfa-2 beans; and others</td>
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<td>pasture-grain-pasture; 2 grain-clover; potatoes-grain-clover</td>
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<td>131</td>
<td>DRYLAND: wheat-fallow-wheat</td>
<td>some fertilizing and most plowing done in fall</td>
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<td>(Cambridge)</td>
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Appendix C - Figure 1

AGRICULTURAL USE

NON AGRICULTURAL USE

GRAZING LAND, FORESTED IN NORTH & GRASSLAND IN SOUTH. CATTLE & SHEEP

MOUNTAIN VALLEYS, IRRIGATED & NON IRRIGATED. HAY, SEED, PASTURES & SMALL GRAINS

DRY LAND FARMING. WHEAT, GRAINS, & SOME PEAS & LENTILS

IRRIGATED FARMING. HAY, POTATOES, SUGAR BEETS & SPECIALIZED CROPS

Appendix C - Figure 4

LAND IN FARMS

OVER 80%  
61-80%  
41-60%  
20-40%  
BELOW 20%

AVERAGE 29.8%

LAND USE

BARREN & WASTE LANDS
LITTLE USE; MINOR RECREATION

WILDERNESS & PRIMITIVE AREA
MAJOR FOREST & RECREATION

FOREST: MAJOR RECREATION, FOREST
MINERAL; MINOR GRAZING

PASTURE & GRAZING
MAJOR LIVESTOCK; MINOR FOREST

NON IRRIGATED FARMLAND
MAJOR CROPLAND; MINOR PASTURE

IRRIGATED FARMLAND
MAJOR CROPLAND; MINOR PASTURE

ANNUAL PRECIPITATION

CANADA

Appendix C - Figure 7

MAJOR SOILS

- VERY LIGHT-COLORED, SEMIARID SOILS WITH SALT DESERT SHRUB VEGETATION (GREY DESERT)

- LIGHT-COLORED, SEMIARID SOILS WITH SAGEBRUSH-GRASS VEGETATION (SEROZEM)

- SLIGHTLY DARK-COLORED, SEMIARID SOILS, SAGEBRUSH-GRASS VEGETATION (BROWN)

- DARK-COLORED SEMIARID SOILS WITH SAGEBRUSH-GRASS VEGETATION (CHESTNUT)

- VERY DARK-COLORED, SEMIARID, SAGEBRUSH-GRASS & GRASSLAND SOILS (CHERNOZEM)

- VERY DARK SUBHUMID GRASSLAND, SAGEBRUSH-GRASS GRASSLAND-FOREST SOILS (PRAIRIE-WESTERN BROWN FOREST, GREY WOODED)

- DARK TO LIGHT-COLORED, SUBHUMID FOREST SOILS (WESTERN BROWN FOREST)

- DARK TO LIGHT BROWN, SUBHUMID TO HUMID FOREST SOILS (BROWN PODZOLIC)

- DARK COLORED, HUMID, COLD ALPINE SOILS (ALPINE MEADOW, ALPINE TURF, ALPINE BOG)

- SOILS CONSISTING OF NEARLY FRESH BASALTIC LAVA

Appendix C - Figure 8

**GROUND WATER**

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<tr>
<th>WELL DEPTHS</th>
<th>ROCK TYPES</th>
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<tr>
<td>200 - 1500</td>
<td>SEDIMENTARY &amp; VOLCANIC AQUIFERS</td>
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<tr>
<td>100 - 1000</td>
<td>OLDER BASALTS</td>
</tr>
<tr>
<td>50 - 500</td>
<td>BASALTS</td>
</tr>
<tr>
<td>0 - 300'</td>
<td>SANDS &amp; GRAVELS</td>
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