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AgRISTARS

A Joint Program for Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing

August 1980

Supporting Research

NORMAL CROP CALENDARS

VOLUME 1: ASSEMBLY AND APPLICATION OF HISTORICAL CROP DATA TO A STANDARD PRODUCT

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16. Abstract

This volume deals with the approach used in the collection, collation, and compilation of normal crop calendars for the Foreign Commodity Production Forecasting (FCPF) project of the Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing (AgRISTARS) program.

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NORMAL CROP CALENDARS
VOLUME 1: ASSEMBLY AND APPLICATION OF HISTORICAL CROP DATA TO A STANDARD PRODUCT

Job Order 73-332

This report describes activities of the Supportive Research project of the AgRISTARS program.

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For

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August 1980

LEMSCO-15033

PREFACE

This volume is the first of a series of volumes which will chronicle the development of normal crop calendars for the Foreign Commodity Production Forecasting project of the Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing, both domestic and foreign. The first volume deals with the approach used in collection, collation, and compilation. Subsequent volumes will contain the completed calendars, generally by specific areas, and identify those problems which occurred during compilation.

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ACRONYMS

AgRISTARS	Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing
CRD	crop reporting district
FCPF	Foreign Commodity Production Forecasting
LACIE	Large Area Crop Inventory Experiment
MAP	most active period
USDA	U.S. Department of Agriculture
USDA/ESCS	Economics, Statistics, and Cooperatives Services

1. INTRODUCTION

The normal crop calendars being developed for the Foreign Commodity Production Forecasting (FCPF) project of the Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing (AgRISTARS) program are the result of work done initially during the Large Area Crop Inventory Experiment (LACIE) multilabeling task in 1978. At that time, the calendars in use were considered to be deficient in a number of areas, principally length of the crop record used, use of estimated stages, use of averages, missing crops, and the lack of an indication as to the equality of data used in compilation.

Calendars were compiled manually for the multilabeling task using an entirely different format from that used previously in LACIE. Each crop's stage is displayed as a series of horizontal bar graphs through time with their extremes of occurrence, their most active period (MAP), and, what was called at the time, a dependability factor. The length of the historical record used in compilation increased, and the use of averages (where possible) and estimates were eliminated.

FCPF project calendars have the same format as those developed during the multilabeling task with some changes. It was observed that certain crops had differences in functional use other than those normally associated with the crop. For example, corn has three functional uses: grain, forage, and silage. The differences which do appear in the phenological growth pattern (the earliest harvest of corn used for silage and forage compared to corn used for grain) could become a confusion factor to the users. Historical records also indicated that though information was given as applicable to a large area, the actual crop was limited to a small area. This type of information was noted and included when the historical data were extracted.

2. APPROACH

The main purpose of developing historical normal calendars is to display and delineate in a simple manner the significant features of a crop's normal sequence and its development during the growing season. The normal sequences are based on the summaries of the available historical record for each reported stage. The state-level records of each state are initially used as the geographical level of detail for a standard crop calendar product. As records of lower political or statistical levels within the state become available, they will be incorporated into the calendar.

Development of a standard crop calendar product within the United States is based on published and unpublished statistics and material of the individual state agricultural services and the U.S. Department of Agriculture (USDA), supplemented by nongovernmental reports and publications. No crop stage is estimated; each stage is determined and evaluated solely on the basis of reported data. Where data are not available for a stage or exist in an amount insufficient as to leave doubt as to the correct length of the time line, the data are not included.

A 5/95 criterion is used to start and end each stage. The 5 percent point is the start of the stage, and the 95 percent point is the end of the stage. [This is basically the same that is used by the USDA in reference 1; i.e., a stage starts and ends "... when 5 percent and 95 percent of the acreage is involved ..."] The USDA uses an average for determining the 5 and 95 percent points. The standard product uses the earliest and latest occurrence as determined by plotting to establish the extremes of occurrence of a stage at the 5 and 95 percent points. The MAP is based upon a subjective assessment of the model dates as determined from a plot of the individual years of record for the 5 and 95 percent points of stage.

Primary sources for stage development statistics are (a) the Weekly Weather and Crop Bulletins or Reports published by the USDA/Economics, Statistics and Cooperatives Services (ESCS) in cooperation with the individual state agency or

department tasked with agriculture, (b) unpublished USDA/ESCS statistics, and (c) state agricultural publications. The data presented in these publications vary considerably as to content and completeness, but generally compliment each other in that each may report a different set of stages for each crop.[1]

Information is extracted from each type of report for date, stage, and percent of stage for all crops mentioned in the report. The principal reason for extraction of all crop data (major and minor crops) is to ensure against omission of a possible confusion crop. During extraction, particular attention is paid to textural material contained in the bulletin which may indicate double cropping, multiple harvest, or items which would indicate a change from the normal. Items of this nature are summarized and then passed to the user in the form of explanatory or limiting notes on the calendar.

After extraction, crop information is plotted for each crop by stage for each year in the record.[2] As the information is plotted, a definite pattern emerges illustrating the crop's development. A typical multiyear single-stage manual plot is illustrated in figure 1, whereas figure 2 shows a single-year single-stage computer plot. To determine the extremes, the MAP, and the 50 percent point of a stage, a multiyear single-stage plot is used. For example, refer to figure 1 and note the determination of the time line was based on 12 years of data. Except for two years, 1974 and 1975, the data were complete; that is, data were available for plotting from below the 5 percent point which is the start of the stage to above the 95 percent point, the end of the stage.

The turning stage in 1973 is shown occurring earlier than normal, whereas in 1974, turning is normal until August 5 when it was delayed and finished later

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[1]Foreign sources will include governmental reports, reports of international organizations, and unofficial reports and publications.

[2]During the initial period, all portions of crop calendar development were done manually. Future calendars will be derived using the computer for most of the compilation and calculations.

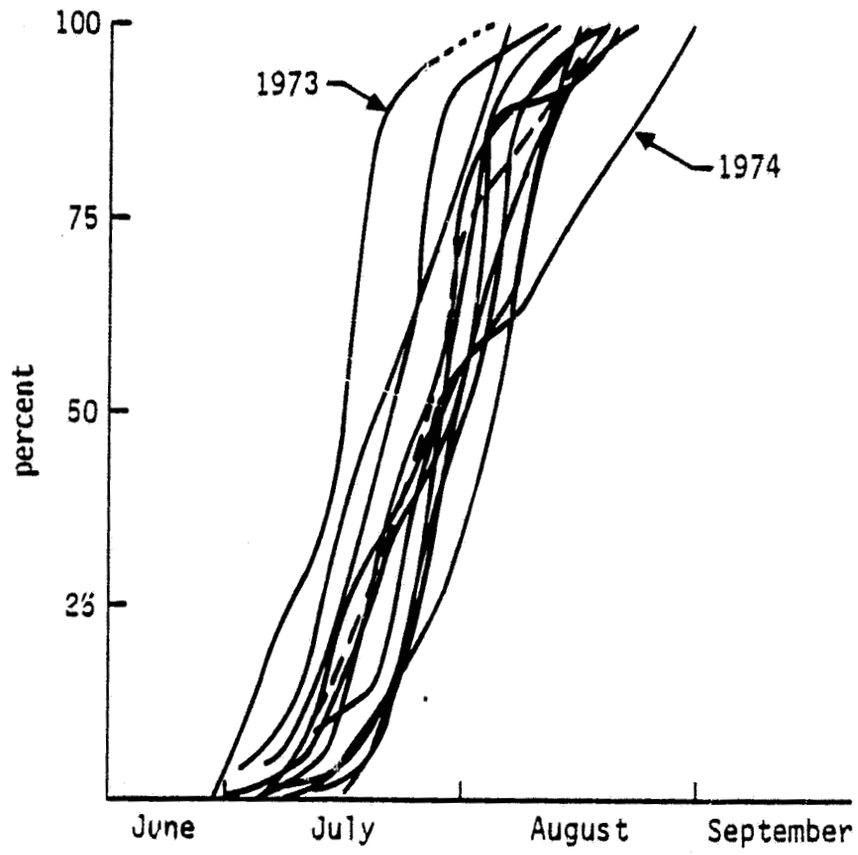


Figure 1.— A multiple-year manual plot of the statewide Minnesota spring wheat turning stage.

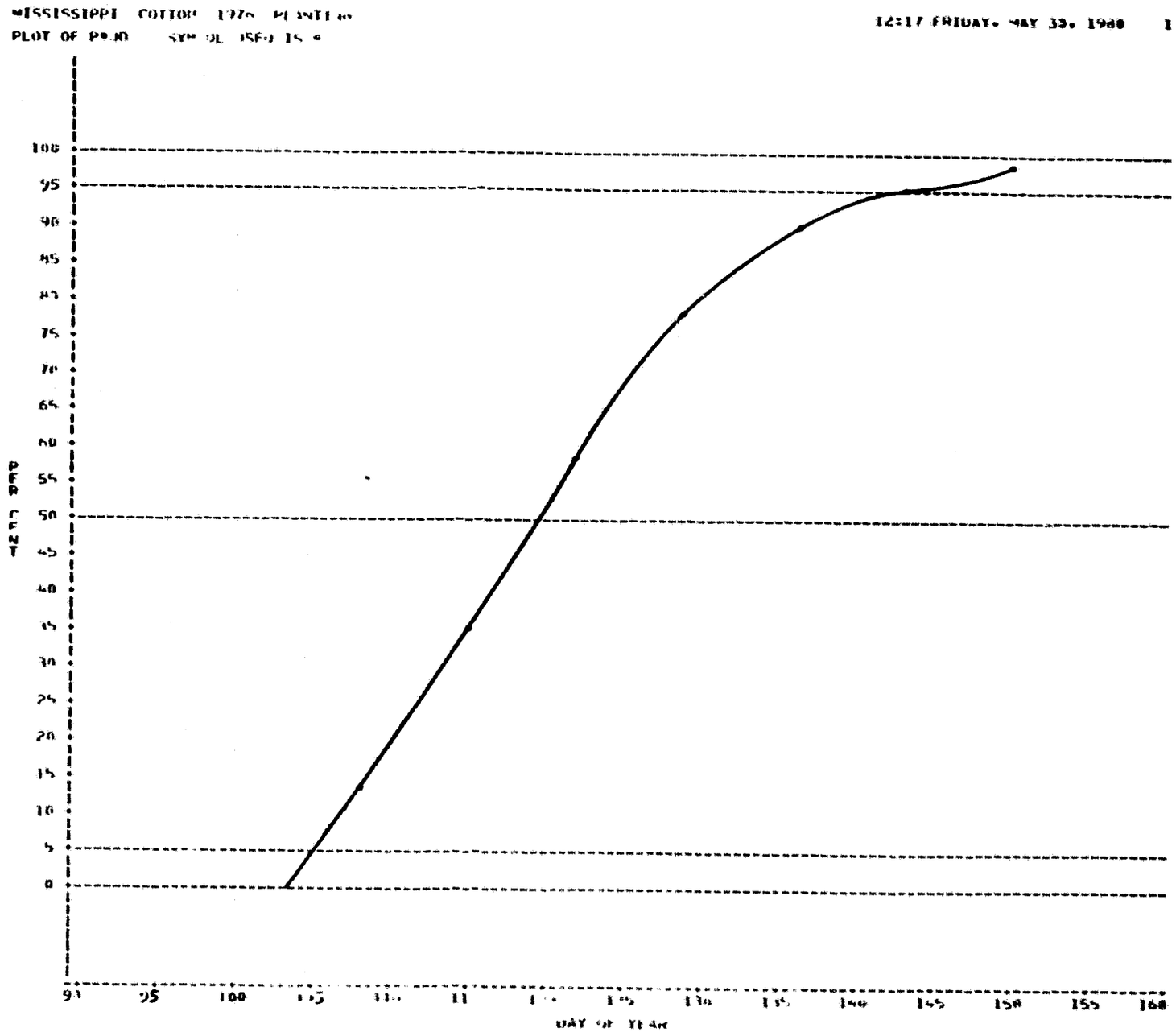


Figure 2. A single-stage and single-year computer plot, 1976 statewide Mississippi cotton planting.

than normal. The turning stage data of years 1960, 1961, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, and 1975 are plotted for the months June, July, August, and September (fig. 1). Using the 5/95 criterion, the earliest turning which started during these 12 years was on July 1 and the latest turning ended on August 28. The grouped data show that the MAP started on July 5 and ended on August 17.

Data quality assigned to this stage is a 9 on a scale of 1 to 9 (fig. 3), indicating a good data base for stage determination. If the data base had consisted of 1 year or parts of 2 or more years, the factor would have been rated as a 1 or a 2, possibly a 3, depending upon the completeness of the years used. It is possible to have 5 years of complete data rated as good and 12 years of incomplete data rated as average or poor. The data quality factor assigned to each stage is empirically derived from analysis of the completed plot, the number of years plotted, the completeness, and the interpretation experience. This factor tends to be conservative. Inclusion of the data quality factor is to indicate to the user how much confidence he should apply to a particular stage time line during the interpretation process.

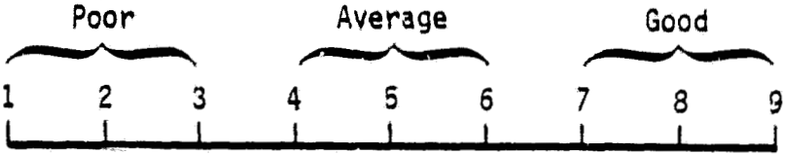


Figure 3.— The data quality and factor scale.

As each year is plotted, the day when a stage reaches 50 percent of occurrence is recorded. Upon completion of the plot, the average 50 percent point of the stage is calculated. In the crop calendars, stages with a data quality factor of 1 or 2 and, in some cases, 3 or higher will not have a 50 percent or stage indicator ▼. Whether or not the indicator is included depends on the data. An excellent example of this would be where the start and end of a stage are reported, but for some reason, the middle portion is missing or unreported.

Drawing the crop calendar is simply an exercise in putting the stage development plots, the 50 percent point, and the quality factor into the format illustrated in figure 4. The crop calendar format now includes: (a) extremes of occurrence, (b) MAP, (c) 50 percent point for each stage, (d) crop functional use differences, (e) notes to explain and/or limit the stage or crop data, (f) a factor to indicate to the user the quality of the data used to compile each stage, and (g) data source(s).[3] Table 1 is an explanation of the time lines and crop stage codes; additionally, some explanatory notes are also given.

[3]Data sources are given only on the first page of each calendar.

TABLE 1.- LEGEND AND NOTES FOR THE CROP CALENDAR

TIME LINES

= Time line based on insufficient data to establish a reliable MAP and 50 percent point of stage

= Heavy line indicates the MAP (5/95 criterion). Thin line shows the earliest and latest the stage has occurred. The ▼ shows average 50 percent of stage.

CROP STAGE CODES

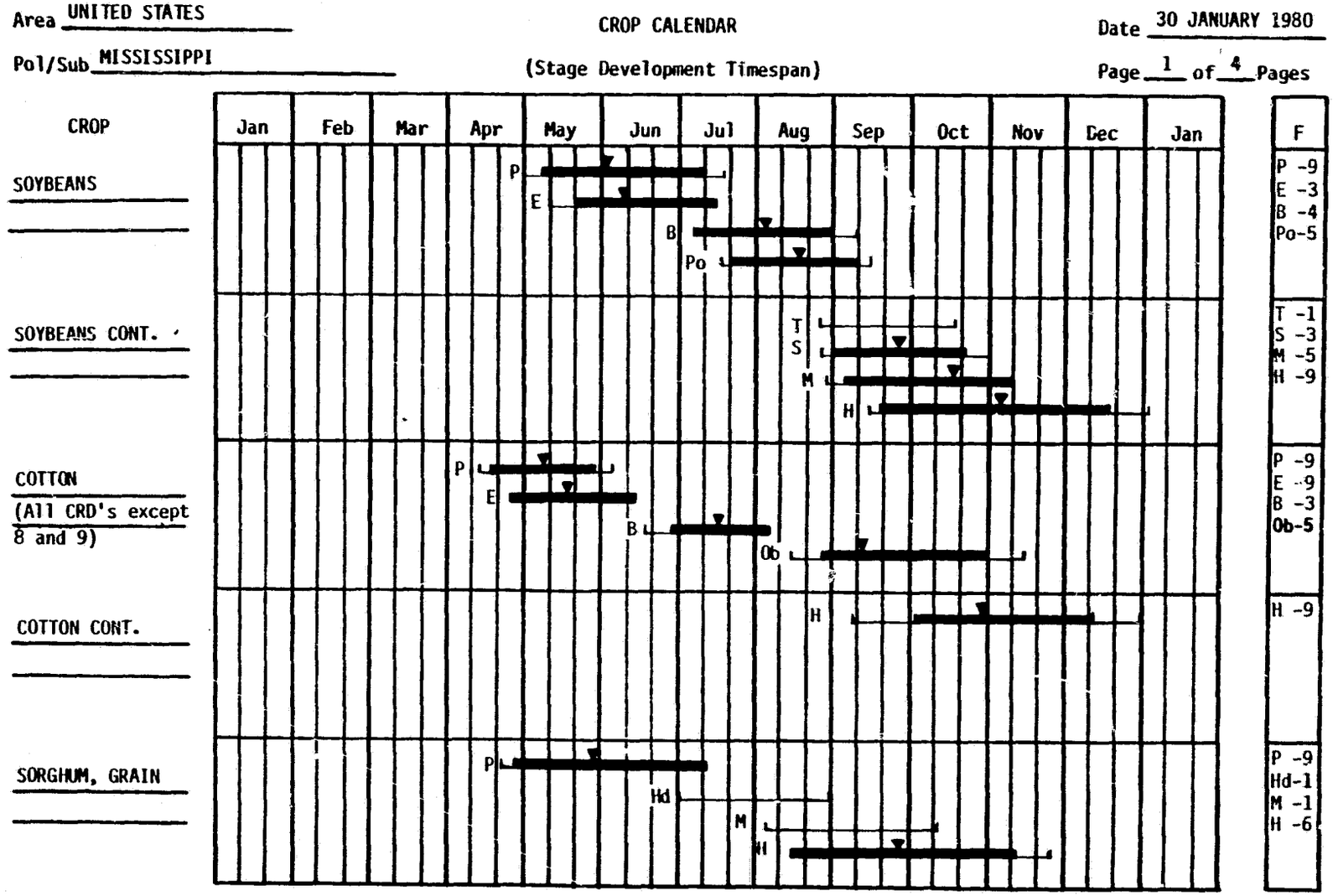
B - Bloom
Bo - Boot
C - Cut (hay crops only)
D - Dent
E - Emergence
H - Harvest (includes synonymous terms - dug, picked, etc.)
Hd - Head
J - Joint
M - Mature (ripe)
P - Plant (includes transplanted crops)
Po - Pod
S - Shed (natural or man-made)
T - Turning
Ta - Tassel
Ti - Tillering
VC - Vines cut
Ob - Open bolls

NOTES

1. E/TI - Stages given in this format indicate the available information was given in a combined form.

2. It is possible to have multiple harvests from a single crop. When and where this occurs will be indicated by a numeral in front of the code to indicate which harvest.

3. Where a crop is area specific, either as deviating significantly from the normal or is limited to a specific crop reporting district (CRD), an area indicator will be shown directly beneath the crop name. This area indicator denotes that the time line applies to that area only; it does not mean that the crop is not grown elsewhere.



Sources: Field and Seed Crops Usual Planting and Harvest Dates. Agriculture Handbook No. 283, USDA/ESCS; also published and unpublished USDA/ESCS statistics and state agriculture statistics.

Figure 4.- The crop calendar for Mississippi (ref. 3).

Area UNITED STATES

CROP CALENDAR

Date 30 JANUARY 1980

Pol/Sub MISSISSIPPI

(Stage Development Timespan)

Page 2 of 4 Pages

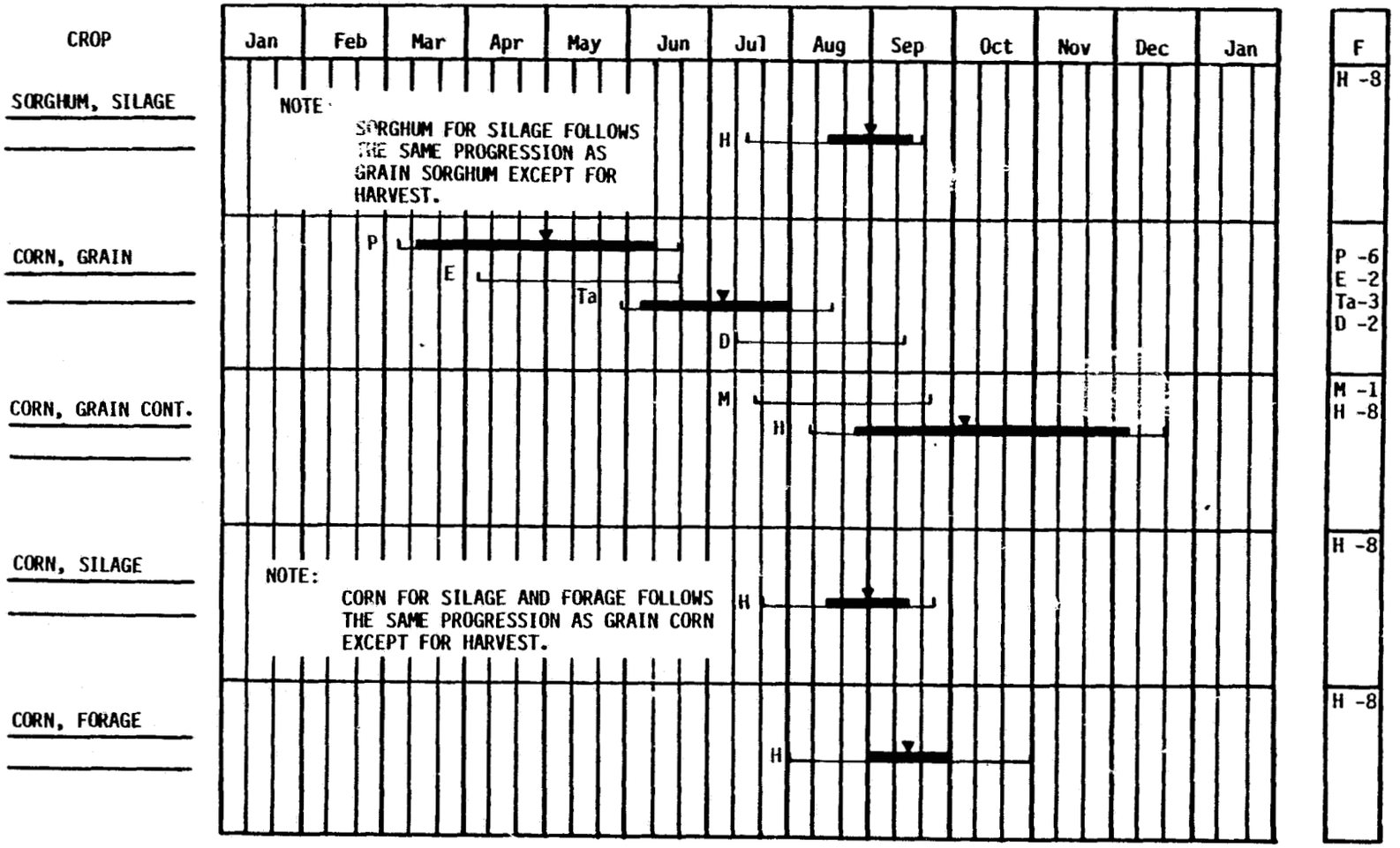


Figure 4.- Continued.

Area UNITED STATES

CROP CALENDAR

Date 30 JANUARY 1980

Pol/Sub MISSISSIPPI

(Stage Development Timespan)

Page 3 of 4 Pages

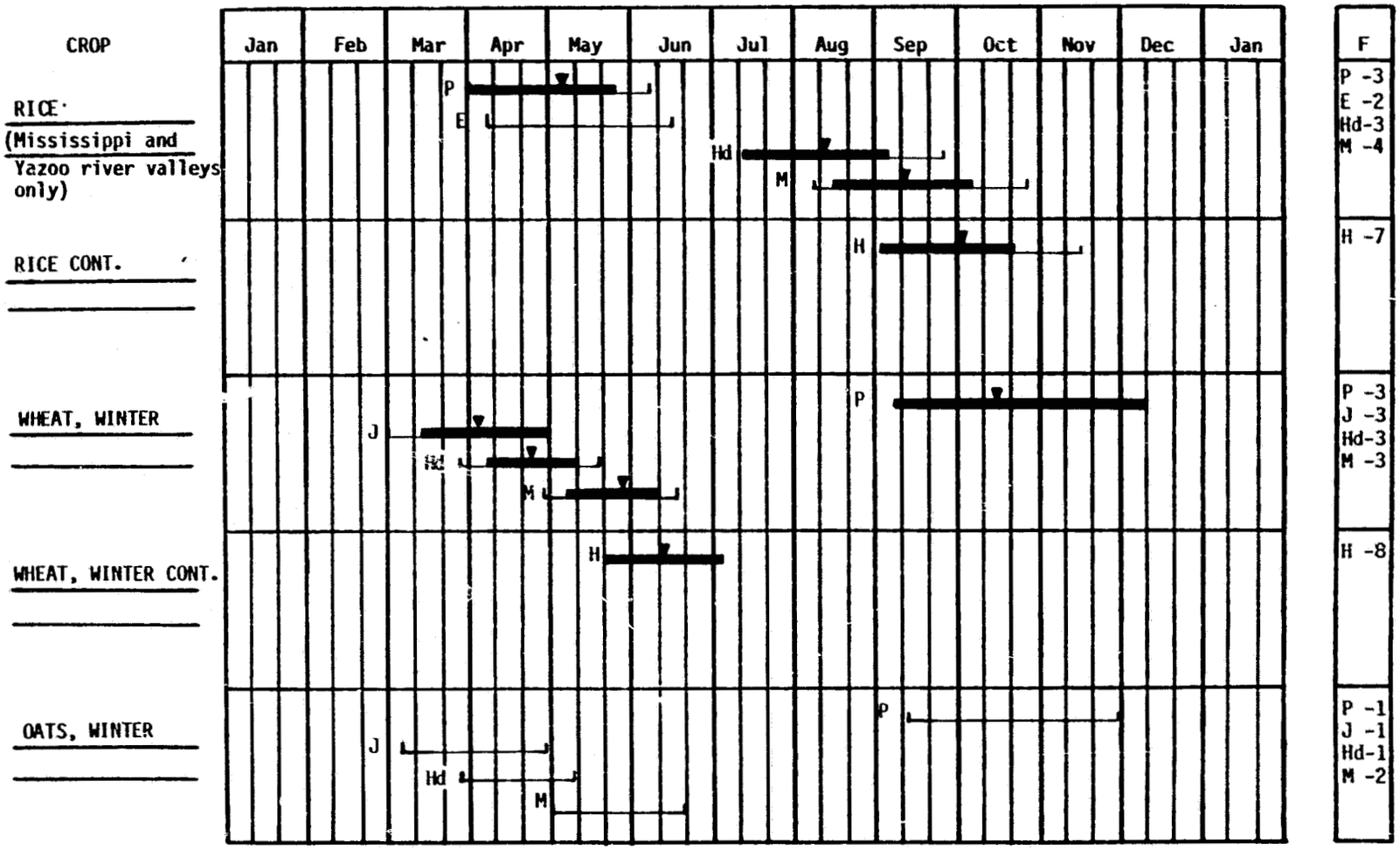


Figure 4.- Continued.

Area UNITED STATES

CROP CALENDAR

Date 30 JANUARY 1980

Pol/Sub MISSISSIPPI

(Stage Development Timespan)

Page 4 of 4 Pages

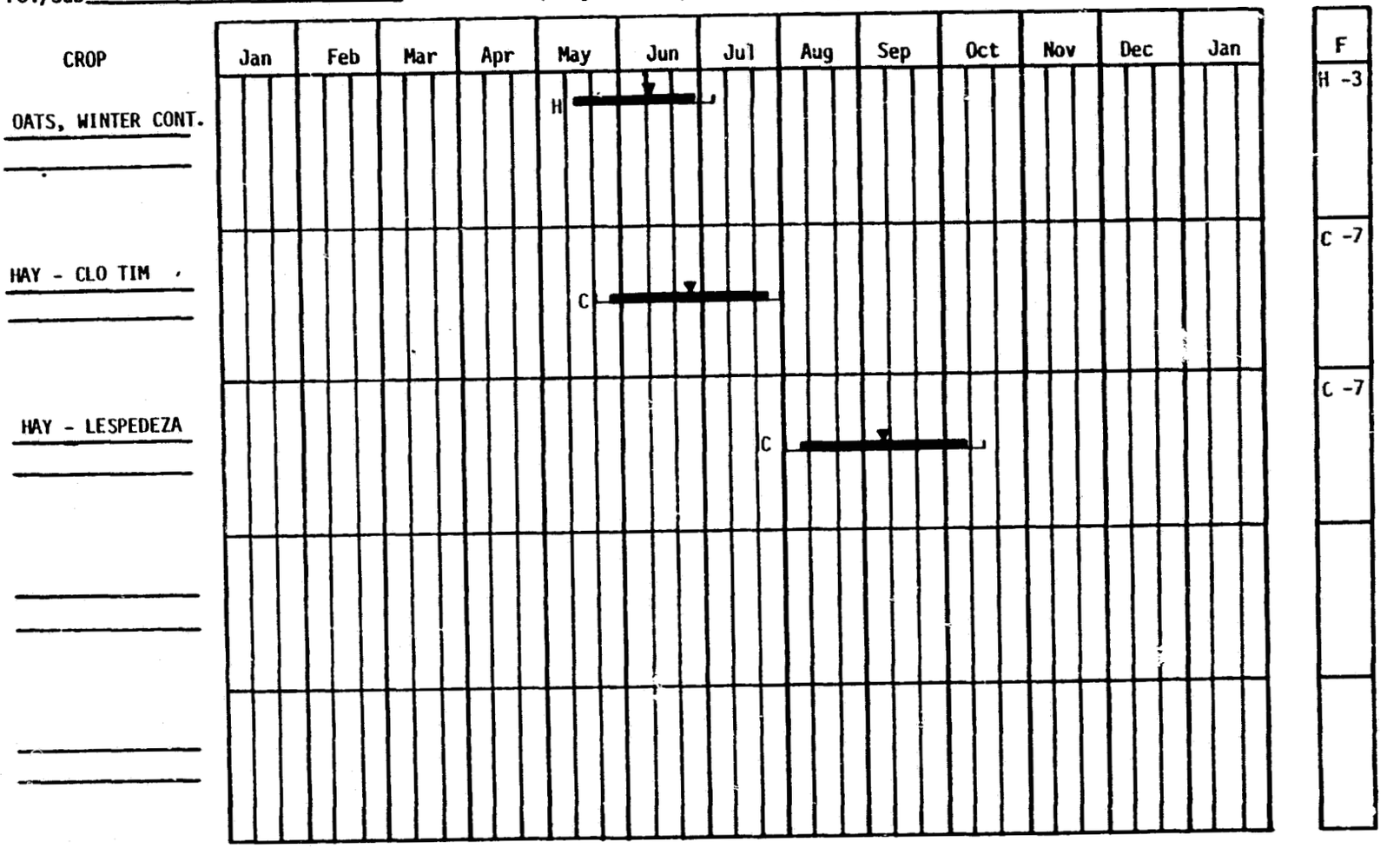


Figure 4.- Concluded.

3. CONCLUSIONS

The development of a standard crop calendar product is an intermediate step in the evolution of crop calendars. In order to take advantage of improvements, the standard crop calendars in use will be revised and updated as more information is introduced, data bases are built and expanded, better methods are employed, and user inputs are received. An accurate and reliable product for the user and a system which can be used for any crop and any method of crop statistical reporting are the desired goals.

4. REFERENCES

1. Field and Seed Crops Usual Planting and Harvesting Dates. Agriculture Handbook No. 283, U.S. Department of Agriculture/ESCS, Washington D.C., 1972.

2. Minnesota Crop & Livestock Reporting Service. U.S. Department of Agriculture and Minnesota Department of Agriculture, St. Paul, Minnesota, 1960-61 and 1966-77.

3. Mississippi Crop & Livestock Reporting Service. The Mississippi Cooperative Extension Service, U.S. Department of Agriculture, and U.S. Department of Commerce, Jackson, Mississippi, 1974-79.