

Days Suitable for Fieldwork in Arkansas

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Several sources of risk influence production decisions and impact yields and profits in production agriculture. Weather risk is of concern to farm decision-makers for timing of applications, machinery management and whole-farm planning. A first step in the farm management decision-making process is to determine the expected number of days suitable for fieldwork. Although the number of good days to conduct field operations varies each year, the probability of having a certain number of days can be estimated from data available from the USDA's National Agricultural Statistics Service, Arkansas Field Office (NASS-AR FO).

Importance of Understanding Days Suitable for Fieldwork

Arkansas row crop farm sizes have increased over time, partly as a result of efficiencies associated with using larger equipment to conduct field operations in a shorter period of time. Conducting field operations such as tillage, planting, spraying and harvesting in a timely manner is important to obtain optimal yields to maximize whole-farm profitability. Too early or too late planting may adversely impact crop yields. Machinery management decisions, such as choosing machine sizes relative to farm acreage, should be made considering equipment efficiency and the likelihood of having sufficient days suitable to operate the machinery. The

farm decision-maker has to evaluate the tradeoff between the added cost of machinery and completing field operations in a timely manner. Additional machinery requires increased capital investment while field operations conducted at non-optimal times lead to reduced yield.

Data for Days Suitable for Fieldwork in Arkansas

The NASS-AR FO releases the weekly Crop Progress and Condition Report from late March through the end of November each year on Monday for the previous week. The Crop Progress and Condition Report includes information on weather, crop development, progress of field operations and condition ratings for the major Arkansas crops based on surveys of University of Arkansas Cooperative Extension Service county agricultural agents from all nine crop reporting districts. Data from 1995 to 2007 assimilated in a single database were sorted such that the first week of April would include six or seven days of April.

The number of days suitable for fieldwork differs each year; however, the probability of having more than or less than a specific number of days can be estimated from historical weather data measurements. If the farm decision-maker has information about the days suitable for fieldwork in an average year or, more specifically, a "bad" year, then farm management decisions can be made

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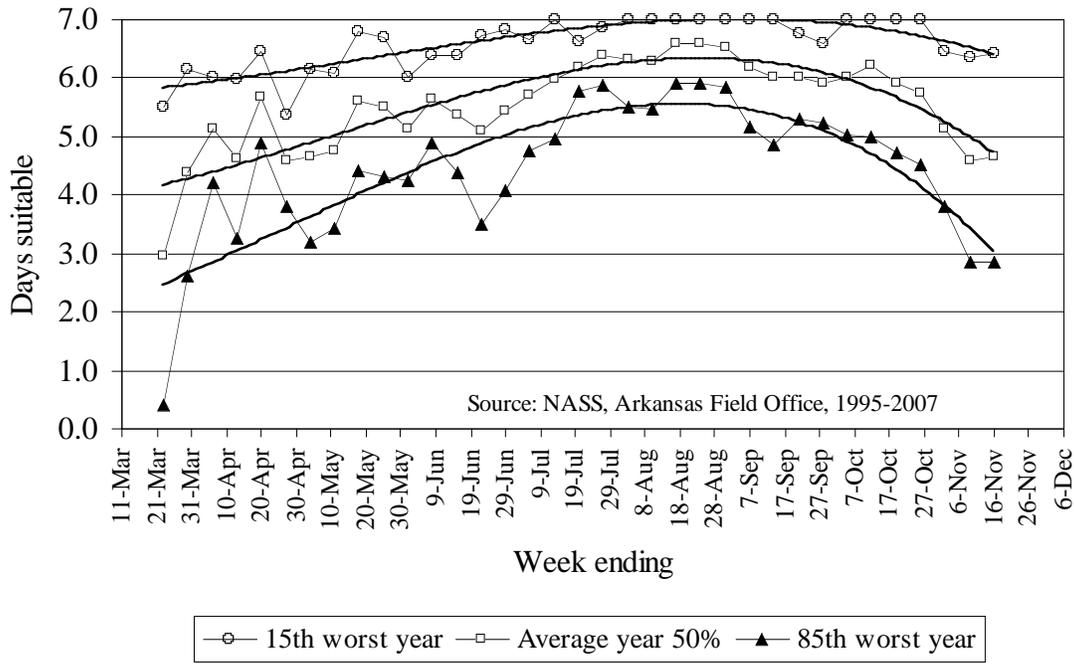


Figure 1. Expected days suitable for Arkansas fieldwork in good, average and bad years

in the presence of uncertainty based upon the probability of days suitable for fieldwork. A bad year may arbitrarily be defined as the 85th percentile worst year or the year with the 85th least number of days suitable for fieldwork out of 100 years with only 15 years having fewer days suitable. The average year may be defined as the 50th percentile worst year, with half of the years having fewer days and half the years having more days suitable for fieldwork. A good year may be defined as the 15th percentile worst year out of 100. Figure 1 shows the weekly estimates for the number of days suitable for fieldwork with a smooth trend line to emphasize the week to week variability for a good, average and bad year.

Application of Information on Days Suitable Example

Table 1 presents the number of days suitable for fieldwork in Arkansas each week at the 15th, 35th, 50th, 65th and 85th percentile worst years. A generic example may be a farmer desiring to plant 3,000 acres of farmland with a given set of equipment which includes one 12-row planter that can cover 20.5 acres in an hour and can be operated 12 hours per day. The planter can plant 246 acres per day (20.5 acres per hour multiplied by 12 hours per day) and will take 12.2 days (3,000 acres divided by 246 acres per day) to complete the planting of 3,000 acres. Assuming the farmer wishes to plant between the dates of April 28 and May 18, there are on average 15.0 days suitable for fieldwork calculated from the 50th percentile, more than the

12.2 days required to finish planting (Table 1). In the event of a bad year, defined as the 85th worst year out of 100, there are only 11.0 days suitable for fieldwork (Table 1), not enough to plant the 3,000 acres. In an average year, the farmer can complete planting operations in the desired time period but has nearly 300 acres left to plant in the “bad” year. Based on the days suitable for fieldwork, farm decision-makers can apply similar analyses to their farm situation.

The number of days suitable for fieldwork during the 56 calendar days during the April to May time period is presented in Figure 2. There is less than a 10 percent chance of having 34 or 35 days suitable during this time period and 23 percent chance of having 42 to 43 days suitable (Figure 2).

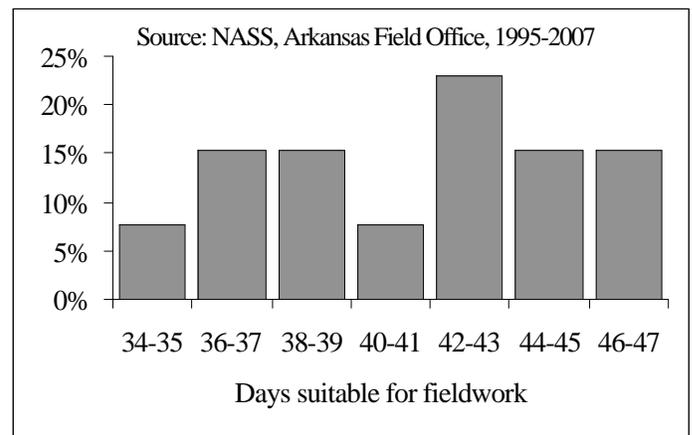


Figure 2. Days suitable during 56 spring calendar days (April and May)

Table 1. Estimated number of days suitable for fieldwork in Arkansas.

Week ending	Percentile probability of days suitable				
	0.85	0.65	0.50	0.35	0.15
23-Mar	0.4	2.0	3.0	3.9	5.5
30-Mar	2.6	3.7	4.4	5.1	6.2
6-Apr	4.2	4.8	5.1	5.4	6.0
13-Apr	3.3	4.1	4.6	5.1	6.0
20-Apr	4.9	5.4	5.7	6.0	6.5
27-Apr	3.8	4.3	4.6	4.9	5.4
4-May	3.2	4.1	4.7	5.2	6.1
11-May	3.4	4.3	4.8	5.3	6.1
18-May	4.4	5.2	5.6	6.0	6.8
25-May	4.3	5.1	5.5	5.9	6.7
1-Jun	4.2	4.8	5.1	5.5	6.0
8-Jun	4.9	5.4	5.6	5.9	6.4
15-Jun	4.4	5.0	5.4	5.8	6.4
22-Jun	3.5	4.5	5.1	5.7	6.7
29-Jun	4.1	4.9	5.4	6.0	6.8
6-Jul	4.8	5.4	5.7	6.1	6.7
13-Jul	4.9	5.6	6.0	6.4	7.0
20-Jul	5.8	6.0	6.2	6.3	6.6
27-Jul	5.9	6.2	6.4	6.6	6.9
3-Aug	5.5	6.0	6.3	6.6	7.0
10-Aug	5.5	6.0	6.3	6.6	7.0
17-Aug	5.9	6.3	6.6	6.8	7.0
24-Aug	5.9	6.3	6.6	6.8	7.0
31-Aug	5.9	6.3	6.5	6.8	7.0
7-Sep	5.2	5.8	6.2	6.5	7.0
14-Sep	4.9	5.6	6.0	6.4	7.0
21-Sep	5.3	5.7	6.0	6.3	6.8
28-Sep	5.2	5.7	5.9	6.2	6.6
5-Oct	5.0	5.6	6.0	6.4	7.0
12-Oct	5.0	5.8	6.2	6.7	7.0
19-Oct	4.7	5.5	5.9	6.4	7.0
26-Oct	4.5	5.3	5.7	6.2	7.0
2-Nov	3.8	4.6	5.1	5.6	6.5
9-Nov	2.8	3.9	4.6	5.2	6.3
16-Nov	2.9	4.0	4.6	5.3	6.4

Source: National Agricultural Statistics Service, Arkansas Field Office: 1995-2007

Typically, there are more days suitable for fieldwork in the fall than in the springtime. There is a 30 percent chance of having 61 or 62 days suitable for fieldwork during the 76 calendar day period from September 1 to November 15 (Figure 3).

Based on the information presented here, farm decision-makers can determine the expected number of days suitable for fieldwork for good, average and bad weather years. Information on the number of expected days can be used to estimate the appropriate size and capacity of machinery for individual farms or, conversely, to choose acreage to fit a given set of equipment if extra acreage is available in the local farmland market.

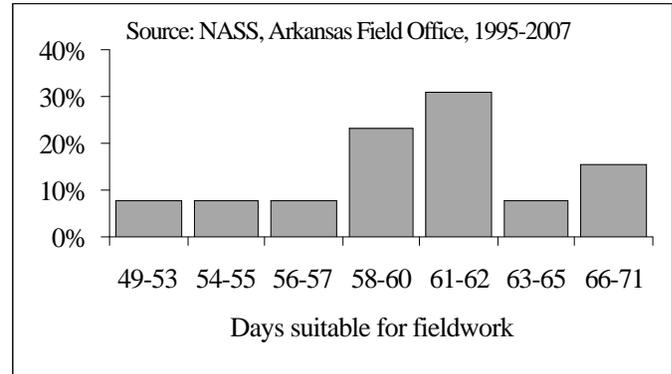


Figure 3. Days suitable during 76 fall calendar days (September, October and first two weeks of November)

Limitations of Days Suitable for Fieldwork

Data presented here are for the entire state of Arkansas and may not adequately represent any single location in a given year. Although 13 years of data are sufficient to estimate probabilities of suitable field days, additional years of data will lead to more robust estimates. The estimation procedures assume that each of the 13 years have an equally likely probability of occurring next year and that the days suitable in a given week are independent of the week before and the week after the week in question.

Bottom-Line Considerations

Although actual number of days suitable for fieldwork varies from year to year, probability of suitable days can be used to make farm management decisions on machinery management, crop allocation and farmland acquisition. Several other factors may influence days suitable for a given location, farmer or field including soil texture, previous tillage management or machinery configuration. Other technologies that do not influence days suitable for fieldwork may increase the likelihood of completing fieldwork such as GPS-enabled navigation technologies which can increase field efficiency and extend the hours per day that machinery can be operated. In making decisions, the farm decision-maker may opt to use data for a year worse than the average year.

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