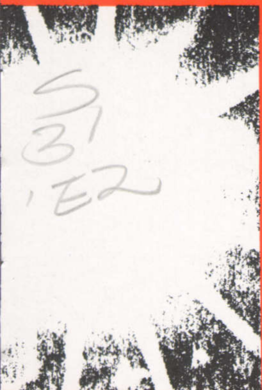
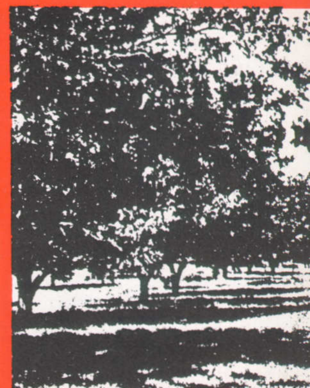




Climatic Features and Length of Growing Season in Alabama

BULLETIN 517 MAY 1980
NOAA/NATIONAL WEATHER SERVICE
AGRICULTURAL EXPERIMENT STATION
AUBURN UNIVERSITY
R. DENNIS ROUSE, DIRECTOR AUBURN, ALABAMA

CONTENTS

TABLES

FIGURES

FIRST PRINTING 3M, MAY 1980

CLIMATIC FEATURES and LENGTH of GROWING SEASON in ALABAMA

JERE R. GALLUP*

INTRODUCTION

THE CLIMATIC INTERVAL during which meteorological conditions permit plant growth is called the growing season. A particular area's geography or climatic classification determines what limitations to plant growth will apply. Usually, temperatures and the amount of dryness are the greatest constraints to growing season.

In temperate climates like Alabama's, annual changes of temperature clearly define the seasons during which plant growth processes can take place. Temperature restrictions to growing season can be closely fixed to freezing (32°F), although other temperature levels become important as well in determining the active growing season.

Besides temperature ranges that may affect growing season, the availability of moisture can be an important influence on seasonal growth patterns. This is most apparent in agriculturally dry areas of the world or where monsoon climates regulate farming practices according to a marked wet and dry season. Since variations of moisture are of less significance to growing season in Alabama, this publication deals only with the temperature factor.

The agricultural growing season is usually interpreted according to the particular crop that is being produced. The farmer with row crops needs to know how to best schedule the planting and harvest operations during the year. Fruit growers time their activities from the first break in dormancy up until picking time. Livestock producers measure growing season as the time of year

*Agricultural Meteorologist, NOAA, National Weather Service, Environmental Studies Service Center, Auburn University, Alabama 36849.

when pastures are green and alive. When selecting among different crop varieties, there is usually a need for the farmer to base at least part of the decision on climatic factors such as growing season.

Predictions of crop size and quality, as well as seasonal variations in the supply of produce, all depend upon the type of growing season. Understanding the effects of weather and climate on growing season, therefore, is necessary when resolving the economic uncertainties of food and fiber production. Besides agriculture, the growing season affects many other areas of commerce such as transportation and storage of agricultural commodities, availability and need for seasonal labor, and general market conditions.

Knowledge of climate that affects the operations of a farm or any weather sensitive business is important when evaluating long-term plans and decisions. This use of climatology helps avoid purely subjective appraisals about weather beyond a period in which day-to-day changes or trends for the immediate term are more evident. This publication's purpose is to provide an interpretation of growing season within Alabama as well as point out and describe some of the State's climatic features.

SOURCE OF DATA AND ANALYSIS

The data concerning growing season analysis were extracted from the Alabama *Climatological Data* minimum temperature records for the past 20-to 35- years ending in 1978. Table 1 lists the localities selected for analysis along with their respective lengths of meteorological record. A base map that follows in figure 1 can be used to identify the approximate location of each of the numbered stations. From these data the average dates of last freeze in the spring, the average dates of first freeze in the fall, and the average length of growing season were calculated. Table 2 summarizes this information. From the analyzed data, maps were drawn to give a visual description of growing season across the State. Isopleths in figure 2 represent the length of average annual growing season in days. For the beginning and end to growing season, average dates are pictured in the analysis of figures 3 and 4. Probable lengths of growing season were also computed for each station based on consecutive years of historical growing season. These are portrayed in the graphs in the Appendix.

TABLE 1. STATION LOCATION AND ELEVATION

Station	County	Latitude		Longitude		Elevation	Length of record
		Deg.	*Min.*	*Deg.*	*Min.*	*Ft.*	*Yrs.*
1. Albertville	Marshall	34	14	86	10	1,140	26
2. Andalusia	Covington	31	19	86	30	242	28
3. Anniston	Calhoun	33	35	85	51	611	28
4. Ashland	Clay	33	15	85	50	1,091	22
5. Athens	Limestone	34	48	86	59	720	24
6. Auburn	Lee	32	37	85	29	652	28
7. Bankhead L&D	Tuscaloosa	33	27	87	21	280	22
8. Bay Minette	Baldwin	30	53	87	47	268	31
9. Belle Mina	Limestone	34	42	86	53	600	28
10. Bessemer	Jefferson	33	22	87	01	540	25
11. Birmingham	Jefferson	33	34	86	45	620	28
12. Brantley	Crenshaw	31	35	86	16	274	23
13. Brewton	Escambia	31	04	87	03	85	31
14. Bridgeport	Jackson	34	57	85	43	615	25
15. Calera	Shelby	33	05	86	47	540	24
16. Camp Hill	Tallapoosa	32	50	85	39	680	26
17. Centre	Cherokee	34	07	85	44	620	23
18. Centreville	Bibb	32	54	87	15	456	31
19. Chatom	Washington	31	32	88	15	285	28
20. Childersburg	Talladega	33	17	86	20	418	22
21. Clanton	Chilton	32	51	86	38	580	28
22. Clayton	Barbour	31	53	85	28	596	23
23. Coden	Mobile	30	23	88	14	12	23
24. Dayton	Marengo	32	22	87	39	230	28
25. Demopolis L&D	Marengo	32	31	87	50	100	28
26. Double Springs	Winston	34	10	87	24	800	22
27. Fairhope	Baldwin	30	33	87	53	23	38
28. Falkville	Morgan	34	22	86	53	625	23
29. Fayette	Fayette	33	41	87	49	365	28
30. Florence	Lauderdale	34	48	87	41	578	25
31. Frisco City	Monroe	31	26	87	24	410	28
32. Gadsden	Etowah	34	02	86	00	565	28
33. Geneva	Geneva	31	02	85	51	110	31
34. Greensboro	Hale	32	42	87	35	220	28
35. Greenville	Butler	31	49	86	38	445	31
36. Guntersville	Marshall	34	20	86	19	578	25
37. Haleyville	Winston	34	15	87	37	950	31
38. Hamilton	Marion	34	06	87	59	435	22
39. Headland	Henry	31	21	85	20	370	28
40. Heflin	Cleburne	33	39	85	36	850	23
41. Highland Home	Crenshaw	31	57	86	19	594	28
42. Lafayette	Chambers	32	54	85	24	830	31
43. Livingston	Sumter	32	35	88	12	160	28
44. Madison	Madison	34	42	86	45	580	29
45. Marion Junction	Dallas	32	28	87	13	200	29
46. Martin Dam	Elmore	32	40	85	55	340	28
47. Minter	Dallas	32	06	87	03	370	22
48. Mobile	Mobile	30	41	88	15	211	28
49. Montgomery	Montgomery	32	18	86	24	221	28
50. Moulton	Lawrence	34	29	87	18	645	22
51. Muscle Shoals	Colbert	34	45	87	37	540	31
52. Oneonta	Blount	33	57	86	29	870	31

Continued

TABLE 1 *(Continued)*. STATION LOCATION AND ELEVATION

Station	County	Latitude		Longitude		Elevation	Length of record
		Deg.	*Min.*	*Deg.*	*Min.*	*Ft.*	*Yrs.*
53. Ozark	Dale	31	31	85	41	470	28
54. Prattville	Autauga	32	29	86	29	295	27
55. Red Bay	Franklin	34	26	88	08	680	22
56. Redstone Arsenal	Madison	34	35	86	36	573	23
57. Robertsdale	Baldwin	30	34	87	44	155	31
58. Rockford	Coosa	32	54	86	14	670	25
59. Rock Mills	Randolph	33	09	85	18	745	31
60. Russellville	Franklin	34	31	87	44	880	25
61. Saint Bernard	Cullman	34	10	86	49	802	28
62. Sand Mountain	DeKalb	34	17	85	58	1,195	28
63. Scottsboro	Jackson	34	41	86	03	615	28
64. Selma	Dallas	32	25	87	00	147	31
65. Sylacauga	Talladega	33	12	86	12	490	24
66. Talladega	Talladega	33	26	86	05	555	31
67. Thomasville	Clarke	31	55	87	44	405	31
68. Troy	Pike	31	49	85	59	580	31
69. Tuscaloosa	Tuscaloosa	33	14	87	37	169	31
70. Union Springs	Bullock	32	06	85	43	460	28
71. Valley Head	DeKalb	34	34	85	37	1,040	31
72. Vernon	Lamar	33	48	88	07	265	23
73. Waterloo	Lauderdale	34	55	88	04	457	20

THE GROWING SEASON

No clear standard for measuring an exact growing season has been established. Shelter temperatures that have reached freezing are more applicable for general use in describing growing season than subjective observations of frost damage to vegetation.

Confusion often results when associating the terms of frost and freeze. Frost forms as a deposit of ice crystals on the ground or other surfaces having cooled to below 32°F. The process involves the conversion of water vapor in the air directly to ice crystals. Air temperatures in the surrounding environment may actually be slightly above freezing. Often there is a problem in determining whether a frost has been severe enough to end a growing season or delay its beginning. Scattered frost damage may occur near the ground even though shelter temperatures are observed several degrees above freezing. Therefore, for a frost to be widespread enough to halt a growing season, temperatures at shelter height as well as at ground level are likely to have reached freezing.

The term freeze applies to air temperatures at standard measurement height (5 feet above ground) that have fallen to 32°F or

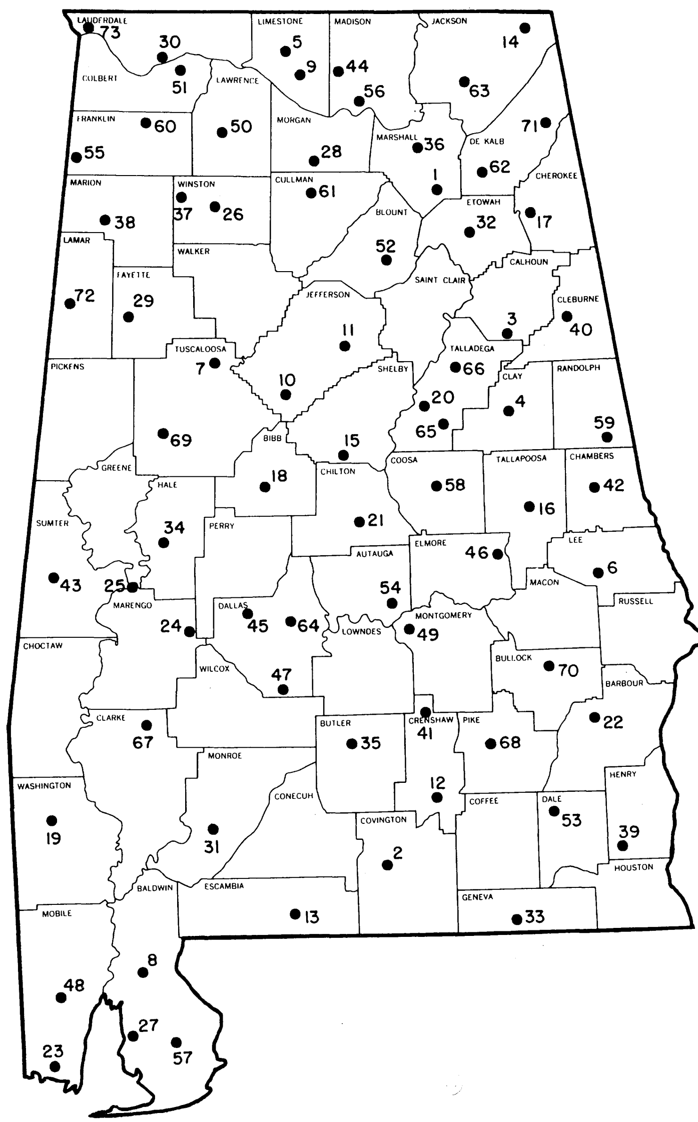


FIG. 1. Locations of 73 temperature reporting stations used in growing season analysis.

TABLE 2. AVERAGE DATES OF THE LAST FREEZE IN THE SPRING, FIRST FREEZE IN THE FALL, AND AVERAGE NUMBER OF GROWING SEASON DAYS

Station	Av. date last freeze in the spring	Av. date first freeze in the fall	Av. growing season
			Days
Albertville	Apr. 3	Oct. 31	211
Andalusia	Mar. 21	Nov. 9	233
Anniston	Apr. 1	Nov. 2	215
Ashland	Apr. 4	Nov. 5	215
Athens	Apr. 8	Oct. 28	203
Auburn	Mar. 28	Nov. 6	223
Bankhead L&D	Mar. 30	Nov. 6	221
Bay Minette	Mar. 5	Nov. 20	260
Belle Mina	Apr. 4	Oct. 30	209
Bessemer	Apr. 3	Nov. 2	213
Birmingham	Mar. 31	Nov. 5	219
Brantley	Mar. 29	Oct. 31	216
Brewton	Mar. 31	Oct. 29	212
Bridgeport	Apr. 12	Oct. 24	195
Calera	Apr. 10	Oct. 28	201
Camp Hill	Apr. 7	Oct. 27	203
Centre	Apr. 4	Oct. 28	207
Centreville	Apr. 2	Nov. 3	215
Chatom	Mar. 30	Nov. 6	221
Childersburg	Apr. 6	Oct. 29	206
Clanton	Mar. 31	Oct. 31	214
Clayton	Mar. 14	Nov. 14	245
Coden	Mar. 5	Nov. 18	258
Dayton	Mar. 20	Nov. 6	231
Demopolis L&D	Mar. 19	Nov. 6	232
Double Springs	Apr. 9	Oct. 30	204
Fairhope	Feb. 27	Nov. 24	270
Falkville	Apr. 9	Oct. 27	201
Fayette	Apr. 7	Oct. 27	203
Florence	Apr. 6	Oct. 24	201
Frisco City	Mar. 17	Nov. 11	239
Gadsden	Apr. 7	Oct. 31	207
Geneva	Mar. 19	Nov. 8	234
Greensboro	Mar. 22	Nov. 9	232
Greenville	Mar. 17	Nov. 14	242
Guntersville	Apr. 2	Nov. 5	217
Haleyville	Apr. 9	Oct. 29	203
Hamilton	Apr. 16	Oct. 21	188
Headland	Mar. 8	Nov. 12	249
Heflin	Apr. 18	Oct. 21	186
Highland Home	Mar. 18	Nov. 11	238
Lafayette	Mar. 30	Nov. 4	219
Livingston	Mar. 30	Nov. 1	216
Madison	Apr. 7	Oct. 30	206
Marion Junction	Mar. 22	Nov. 3	226
Martin Dam	Mar. 26	Nov. 13	232
Minter	Mar. 16	Nov. 12	241
Mobile	Feb. 28	Nov. 26	271
Montgomery	Mar. 12	Nov. 9	242
Moulton	Apr. 7	Oct. 27	203
Muscle Shoals	Mar. 26	Nov. 2	221
Oneonta	Apr. 11	Oct. 26	200
Ozark	Mar. 12	Nov. 14	247
Prattville	Mar. 20	Nov. 7	232
Red Bay	Apr. 3	Nov. 6	217

Continued

TABLE 2 (*Continued*). AVERAGE DATES OF THE LAST FREEZE IN THE SPRING, FIRST FREEZE IN THE FALL, AND AVERAGE NUMBER OF GROWING SEASON DAYS

Station	Av. date last freeze in the spring	Av. date first freeze in the fall	Av. growing season
			Days
Redstone Arsenal	Apr. 6	Oct. 27	204
Robertsdale	Mar. 8	Nov. 19	256
Rockford	Apr. 6	Oct. 30	207
Rock Mills	Apr. 11	Oct. 28	200
Russellville	Apr. 16	Oct. 25	192
Saint Bernard	Apr. 11	Oct. 28	200
Sand Mountain	Apr. 7	Oct. 29	205
Scottsboro	Apr. 10	Oct. 26	199
Selma	Mar. 13	Nov. 11	243
Sylacauga	Apr. 8	Oct. 29	204
Talladega	Apr. 8	Oct. 29	204
Thomasville	Mar. 24	Nov. 8	229
Troy	Mar. 18	Nov. 15	242
Tuscaloosa	Mar. 27	Nov. 3	221
Union Springs	Mar. 20	Nov. 9	234
Valley Head	Apr. 22	Oct. 20	181
Vernon	Apr. 13	Oct. 24	194
Waterloo	Apr. 15	Oct. 21	189

lower. A freeze may be observed with or without the occurrence of frost. For the purposes of our analysis, growing season boundaries will be determined by temperatures of 32°F or lower measured at standard height.

The lines in figure 2 are of equal freeze-free period (growing season length) based on the average year. As one would expect, freezing temperatures occur both earlier in the fall and later in the spring over north Alabama. This produces a shorter growing season that averages around 200 days across the Tennessee Valley. Parts of northeast Alabama experience the shortest growing season.

Southward to the Gulf Coast, the transition from colder to warmer climate occurs with a 50-to 100-day geographic variation in length of growing season. Between Huntsville and Mobile, for example, the climatic difference in growing season is about 70 days. Over interior areas of Alabama, the growing season changes most rapidly along a 30-to 50-mile wide temperature belt that spans the midsection of the State and closely parallels the northern edge of the coastal plain. Possibly because of physiographic changes in elevation along this zone, the growing season may differ by as much as 30 days over a distance of only 30 miles. Only in southwestern counties does the length of growing season change so rapidly toward the coast.

The warmest climate in Alabama is found in the extreme southwestern counties. Near Mobile Bay and the Gulf Coast the yearly

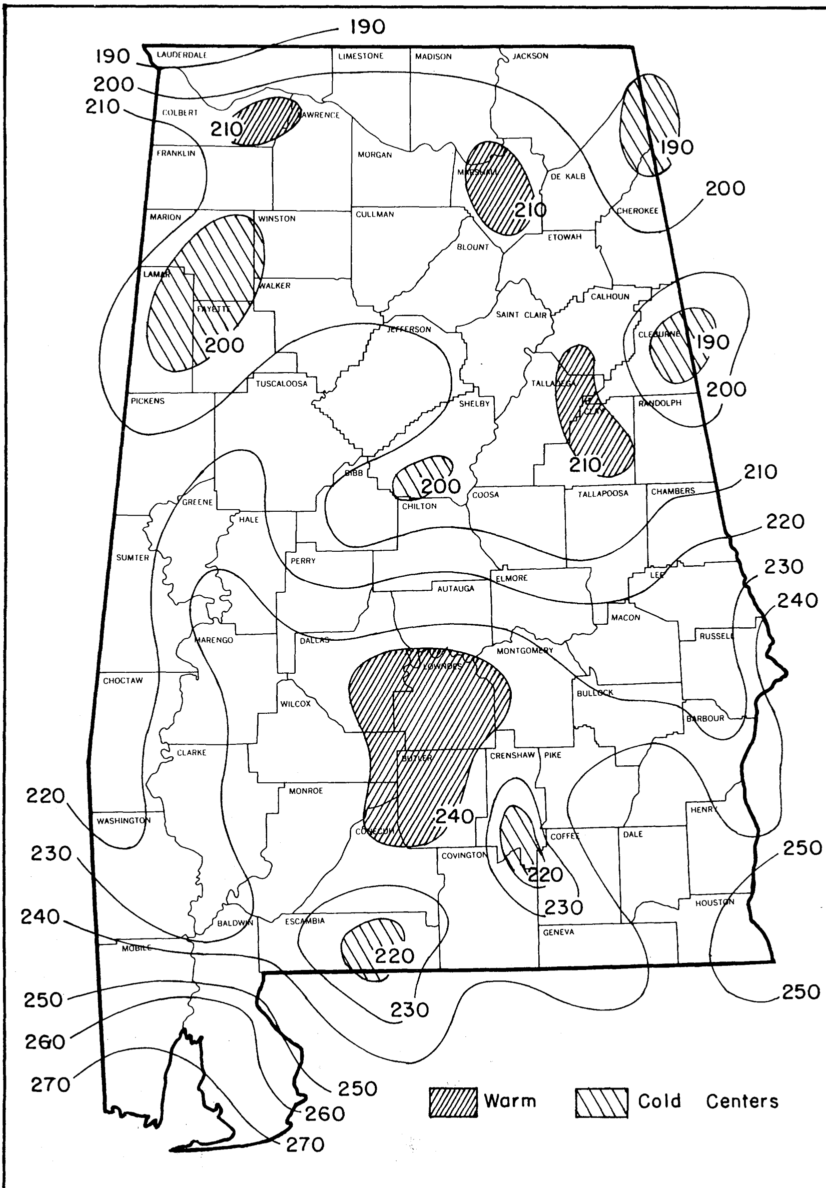


FIG. 2. Average length of growing season (days).

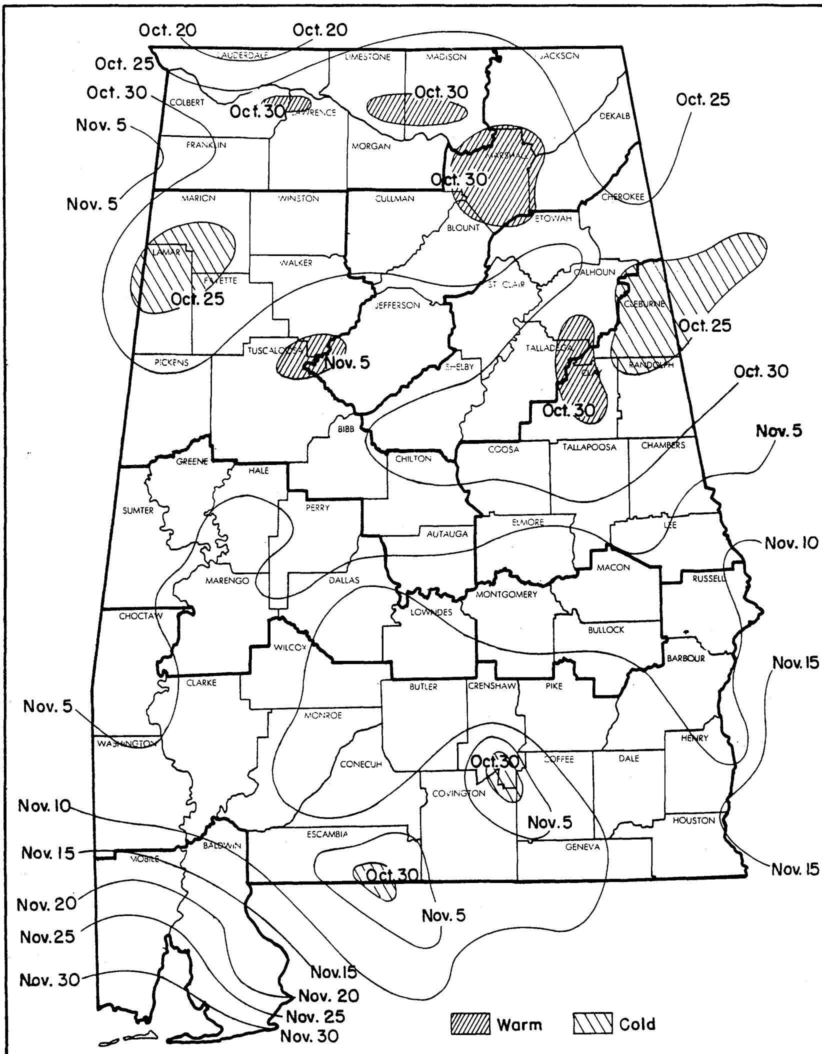


FIG. 3. Mean date of first 32°F freeze in the fall.

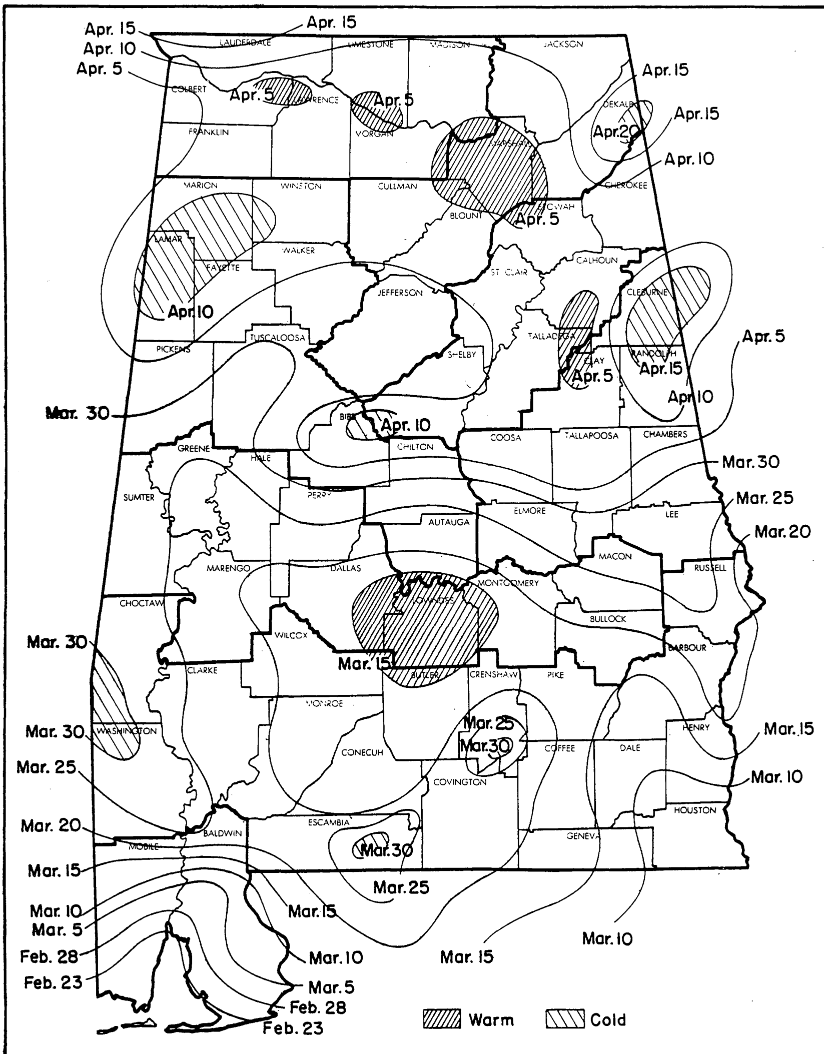


FIG. 4. Mean date of last 32°F freeze in the spring.

growing season averages almost 300 days, and the influence of a warm, marine environment is quite pronounced.

PROBABLE LENGTHS OF GROWING SEASON

Although few years lack some uniformity as to timing of seasonal change, growing seasons naturally vary in length from year to year. Periodic trends or abrupt changes in length of growing season may often occur. Certain farming practices and other activities may need to interpret the risk for such changes as they relate to an analysis of normal climate. To help accomplish this, the figures in the Appendix give probable lengths of growing season for 73 stations across Alabama. These graphs describe the probability of a growing season's length being either shorter or longer than a selected number of days. Probabilities were based on the "normal distribution" of past lengths of growing season taken from each station's climatic record.

These statistics imply the assumption that the growing season climate will continue to have a character in future years similar to that described by the historical record. This assumption may hold true only for most years. Statistics could be based on prior years climatically more stable or uniform. For example, a temporary trend toward shortened growing seasons within an abnormally cold cycle of years may not be properly represented by climatological statistics.

To use the graphs, a station would be selected from the index on page 23 and then referred to in the appropriate figure found in the Appendix. The graphs describe the probable variation of any year's growing season at the particular location chosen. As an example, one can assume the reader needs to know the probability of the growing season at Athens (Appendix figure 1) being longer than 210 days. He would locate the number of days (210 days) along the vertical side of the graph, then move horizontally until intersecting the slanted line given for Athens. Looking vertically from this point of intersection, the scale at the top of the graph gives the probability that a growing season longer than 210 days would occur. In this case, the probability would be 30 percent.

The scale at the bottom of the graph gives the probabilities of growing season being shorter than the selected period of days. In this example, there would be a 70 percent chance of a shorter growing season than 210 days occurring in that particular year.

CLIMATIC FEATURES

Local variations in freeze climate and length of growing season make analysis of Alabama's cold climate interesting. Factors such as topography, air drainage, location of water bodies, soil and vegetation types, as well as radiative characteristics of the terrain, create a complex arrangement of relatively cold and warm areas across the State. The climate of freezing temperatures primarily is influenced by atmospheric processes ongoing during those times of day when temperatures normally approach their lowest point. It is during these nighttime and early morning hours the above mentioned factors have their greatest influence on the local freeze climate and, hence, the character and length of growing season. This is when we need to examine these processes as a basis for climatic interpretation.

Freeze patterns evolving from north to south within Alabama become the basis by which limits to growing season are defined. The prominent climatic features which show up in freeze analysis across the State often result from general changes in topography. Other physical influences that contribute to modifying the temperature environment may be less evident because of their lack of continuity or degree of influence over any geographic distance. The climatic distribution of first and last freeze dates is far from being a uniform and evenly distributed north to south pattern. Instead, considerable variation in the arrangement of low temperatures occurs.

Figure 5 describes the climatic features that show up in growing season analysis within Alabama. Blue and red arrows lie along the axes of these climatic features and point in the direction of their major trends of influence. These are cold and warm anomalies that give a generalized interpretation of how the growing season climate is distributed within the State. It might be inferred from the analysis (based on normal length of growing season) that certain areas of the State have a propensity toward shorter growing season (blue arrows) while in others the threat of an earlier and later freeze may not be as great (red arrows). This assumption can only be made in a general way, however, since defining more localized climatic environments was not the purpose. Each of the climatic features was assigned a number in the text that follows so that during the discussion the reader may relate them to the map (figure 5), also numbered. Figure 6

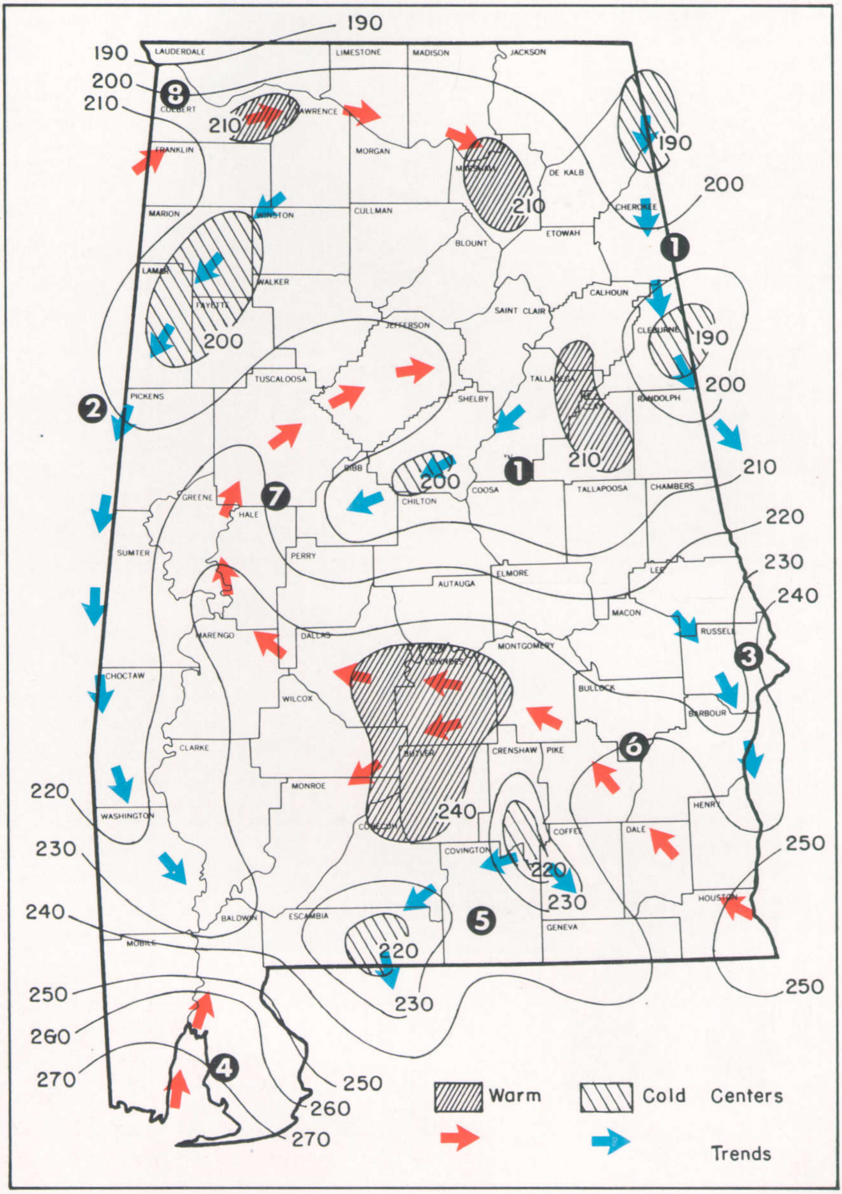


FIG. 5. Climatic features based on geographic variations in normal length of growing season.

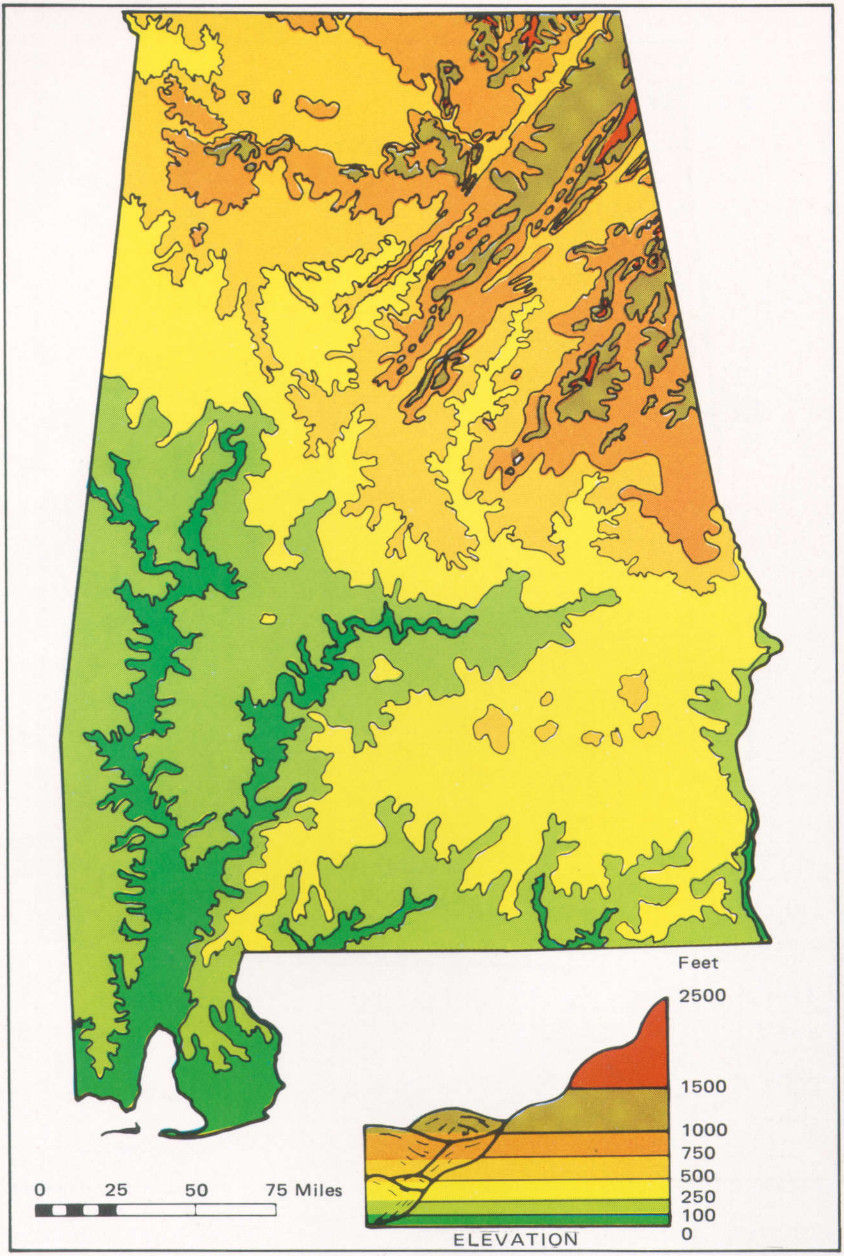


FIG. 6. Topography of Alabama.
Reprinted by permission of The University of Alabama Press from *Atlas of Alabama*, Neal G. Lineback, Director and Editor, Charles T. Traylor, Cartographic Director, copyright 1973, p. 6.

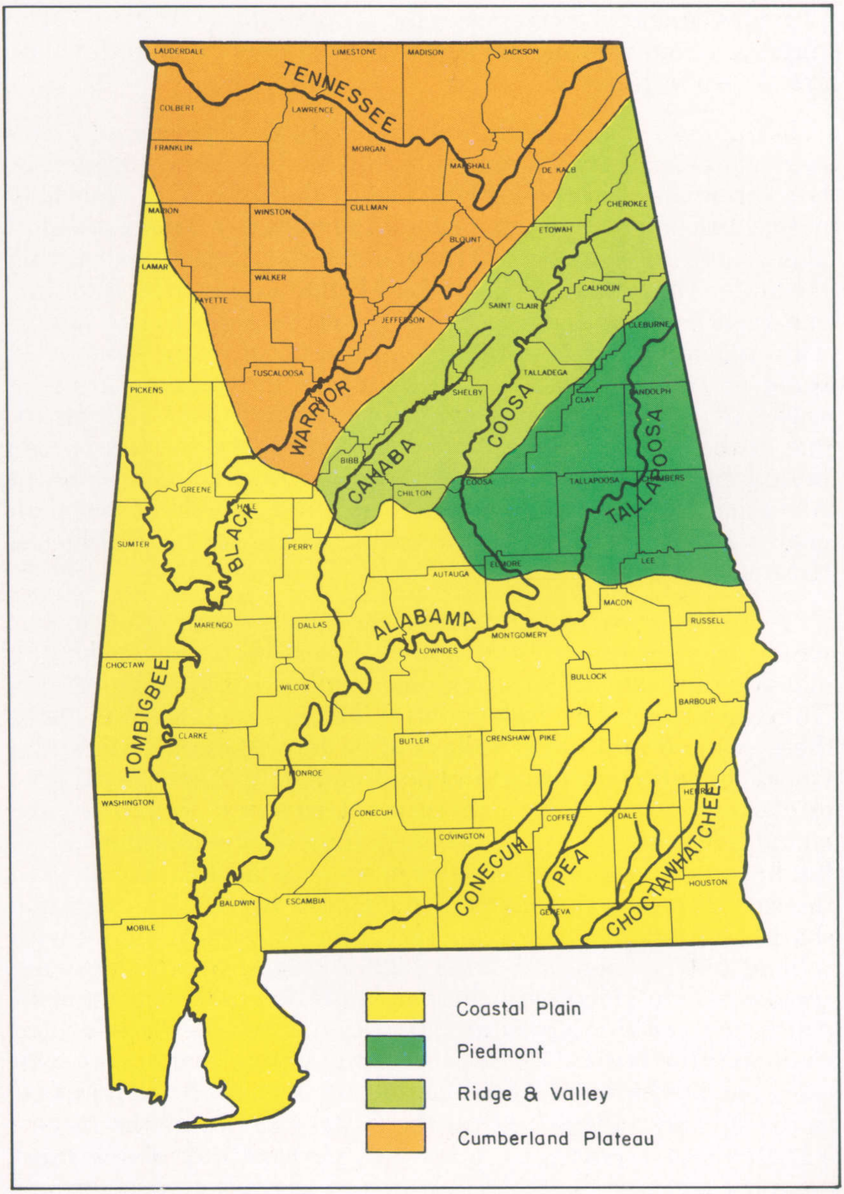


FIG. 7. Physiographic regions and major rivers within Alabama.

provides a general reference to the topography of Alabama. The physiographic regions and major river systems within the State are shown in figure 7.

In both north and south Alabama, cold air drainage into interior valleys and broad topographic lowlands distinctly influences late spring and early fall frosts. This "valley effect" is especially noticeable where anomalies of cold climate are found oriented along some of the important rivers and topographic basins within the State. These become favorable channels down which cold air can feed southward or collectively pool during freeze nights. This phenomenon considerably shortens growing seasons in some of the northeastern valleys where the average growing season may last for a period of less than 190 days. At Valley Head, one of the colder observation sites in the State, the freeze-free period normally lasts only 181 days. Upland areas of north Alabama, like Sand Mountain, often fare much better with growing seasons of a more favorable length for vegetable and field crops.

In northern parts of the State, two major cold regions occur where significantly shorter growing seasons seem to be the climatic rule. One of these regions, number 1 (figure 5), extends from the northeastern valleys and ridgelands southward to cover the piedmont and lower valleys of eastern Alabama. Here, the Coosa River forms a broad and predominately cold valley almost enclosed by higher terrain. Growing seasons are characteristically just over 200 days long throughout the valley, but become considerably shorter in some of the upland valleys to the east. From the lowlands of the Coosa River, elevations rise sharply into western Georgia. This is the eastern Piedmont with rolling, hilly terrain and some higher ridges. Shorter growing seasons are the rule across these uplands due to their prominent exposure to cold temperature advection down the Appalachian chain and the normal decrease of temperature that occurs with more elevated terrain. These factors are even more pronounced in the upland valleys and on the eastern slopes of the ridges. Variations in topography make this perhaps one of the most complex areas of the State in which to conduct freeze analysis and then generalize about local climate.

Across the State, another cold feature, number 2, shows up in growing season analysis along those river valleys which drain southwest from the Cumberland Plateau onto the gently rolling, upper Coastal Plain. In northwest Alabama, the axis of this climatic feature lies closely along those valleys that make up the eastern watershed into the Tombigbee River. Cold air moving down these valleys on freeze nights often results in the lowest temperatures being reported in the State. Some of the colder observation sites are within Marion, Fayette, and Lamar counties near communities situated in lowland areas. Reporting stations at Hamilton and Winfield experience growing seasons during an average year of 190 days or less. For some distance southward and extending across the lower basins of the Alabama and Tombigbee rivers in southwest Alabama, the feature maintains its identity as a local climate susceptible to freeze and shortened growing seasons.

Some of the colder lowlands of south Alabama actually experience earlier and later frosts than in northern parts of the State. At Pittsview, in Russell County, number 3, the growing season is quite often short enough to rival many of the coldest locations in north Alabama. This results from a local terrain favorable to downslope drainage of cold air and the low heat capacity of the area's light textured, sandy-loam soil. In the evening, temperatures fall off both earlier and more rapidly as they respond to more pronounced surface cooling.

Just the opposite effect may occur in poorly drained lowlands during a wet season when abundant soil moisture or areas of standing water alter the radiative character of the surface. Use of infrared satellite imagery suggests that on nights suitable to radiational freeze, wet lowlands may act as sources of warmth in restricting the fall of temperature. The radiative characteristics of wet soils results in their cooling more slowly than would dry soils. This phenomenon at least partially accounts for the longer growing seasons which overlie the braided pattern of streams and swamplands north of Mobile Bay, number 4.

Some of the colder valleys in the State are found on the lower coastal plain. The drainage systems of the Conecuh and Pea Rivers, number 5, form a distinctly cold natured and frost susceptible region in the extreme southern counties. A strong "valley effect" results from long, almost straight-line valleys which serve as channels for cold air. The orientation of the valleys and tributaries along a direction favorable to normal temperature advection is another influencing factor. On the lower flood plain of these rivers, low temperatures are often the coldest in south Alabama on nights favorable to strong surface radiation and cold air drainage. An average growing season of 212 days at Brewton, Alabama, is usually about 20 to 30 days shorter than most other parts of the State south of the Alabama River.

Just as the lay of the land influences cold temperature patterns that conform to lowland areas of the State, elevated terrain usually experiences a comparatively warm climate during the cold season. Freezing temperatures are generally less frequent and severe than in the colder lowlands. Over the southern interior of the State, growing seasons become prolonged where elevated terrain contributes to lessened freeze severity. Warm temperature anomalies show up in freeze analysis as concentric, elongated areas, bending northward and winding along topographic divides or uplands. One such area of broken uplands, number 6, extends from the southeast corner of the State in a westward arc along and paralleling the southern drainage of the Alabama River. It eventually forks into two arms, one bending northward into the Black Warrior River basin and the other turning southward into Monroe County. In the higher terrain throughout this region, growing seasons average from 240 to 250 days.

Another prominent warm feature is located over the basin of the Black Warrior River, number 7. Freeze analysis shows a sharp bending of lines northeastward along this valley indicating the characteristics of a warm local climate. This feature appears to be a contradiction. Basin topographies are most often associated with cold microclimates. Part of the disparity is inherent in the analysis that must allow for pronounced cold anomalies found to either side of the Warrior Basin. Raised topography surrounds much of the upper portion of the valley with considerably higher terrain to the north and northeast. Elevation differences vary between 500 and 1,000 feet from the valley floor to ridge tops within a reasonably short geographic distance. Downslope winds over these ridge tops, as well as the protection they afford the valley from cold winds out of the north and east, may partially explain the effects that result in a longer growing season. Another factor could be the valley's open exposure to southerly winds and a rather broad and elevated valley floor which rises toward the northeast. Other effects may have resulted from observation sites located near water bodies and population centers.

Across the Tennessee Valley, another warm feature shows up in analysis, number 8. Available data only partially supports the presence of this warm anomalie which appears more questionable than those already discussed. The 220-day growing season at Muscle Shoals probably results from the warm exposure of this particular observation site.

In all, there are about eight of these climatic features which appear distinctly on maps of freeze and growing season analysis in Alabama. When using the maps, one can determine whether a location in the State lies within one of these relatively cold or warm regions of local climate. Local differences, however, on a smaller scale of within 300 to 500 square miles might result in an erroneous interpretation of one's particular freeze climate. Therefore, for best results, the maps should be used in this manner only to draw generalized conclusions about the distribution of climate over a larger scale area. The maps are certainly valuable for gaining a regional interpretation of cold climate relationships within the State. We should also mention that any climatic interpretation depends considerably upon the individual characteristics of the meteorological sites chosen for analysis. Official climatological reporting stations, however, are normally situated at locations believed representative of surrounding countryside.

SUMMARY

Probable lengths of growing season have been described in graphs for seventy-three locations within Alabama. These were derived from a normal distribution of past growing seasons taken from each station's climatic record. In addition, the analysis of growing season was broadened to include examination of certain anomalous features found in Alabama's temperature climate. Overall, about eight of these climatic features can be described and related to environmental factors that have affected their formation.

BIBLIOGRAPHY

(1) GALLUP, J. R., 1979. Climate of Freeze in Alabama, Auburn University, (Ala.) Agr. Exp. Sta. Ag Weather Series No. 17, Auburn, Ala., 36 pp.

(2) GEIGER, R., 1965. *The Climate Near the Ground.* Harvard University Press, Cambridge, Mass. 611 pp.

(3) KISH, A. J., 1978. The Length of the Growing Season in South Carolina. S.C. Agr. Exp. Sta. Bull. 611, Clemson, S.C. 23 pp.

(4) LINEBACK, N. G., ET. AL., 1973. *Atlas of Alabama.* University of Alabama Press, University, Ala. 138 pp.

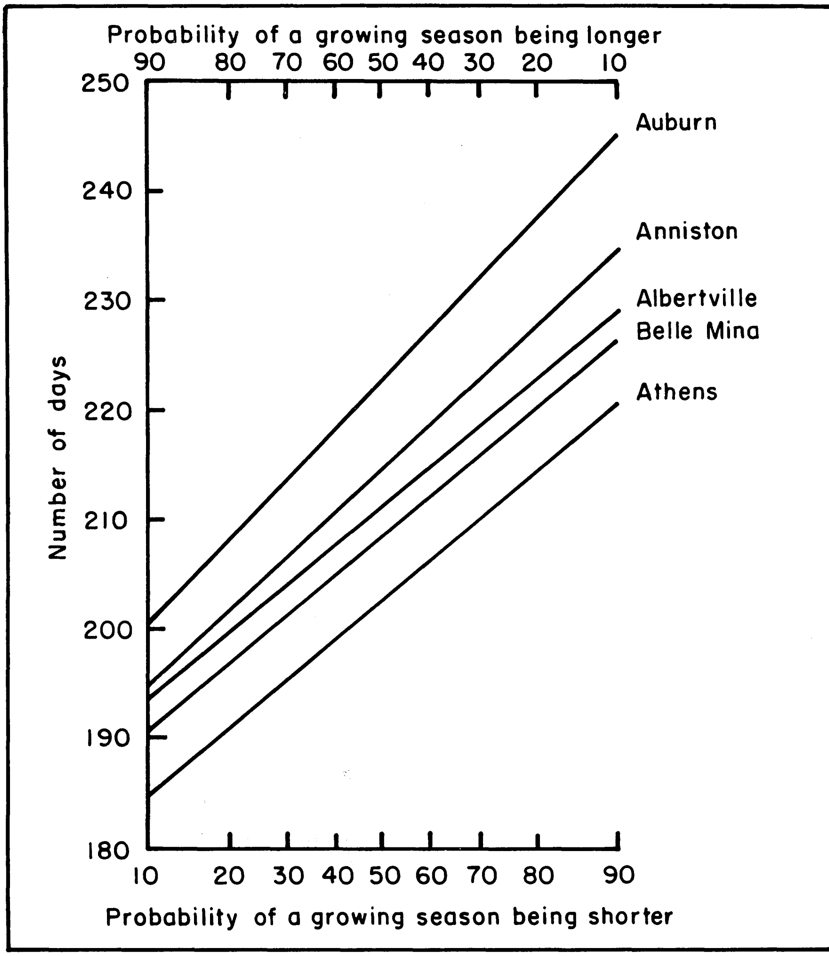
(5) THOM, H.C.S. AND SHAW, R.H., 1958. Climatological Analysis of Freeze Data for Iowa. *Monthly Weather Review,* 86, 251-252.

(6) U.S. DEPT. OF COMM., 1947-1978. *Climatological Data* (Alabama Section). NOAA, Environmental Data and Information Svc., Asheville, N.C.

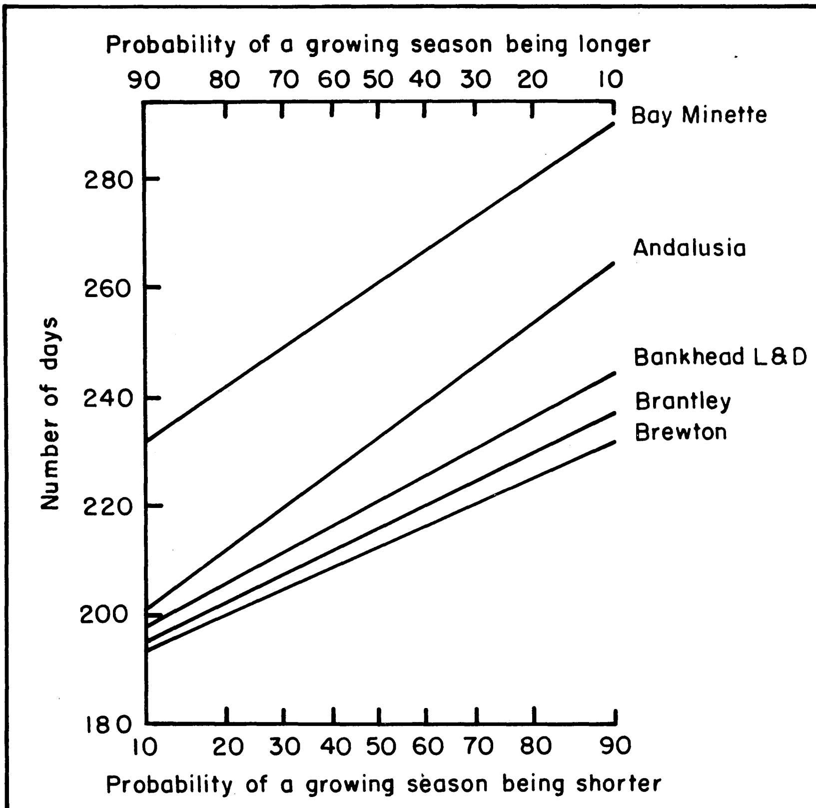
APPENDIX

STATION INDEX
PROBABLE LENGTHS OF GROWING SEASON

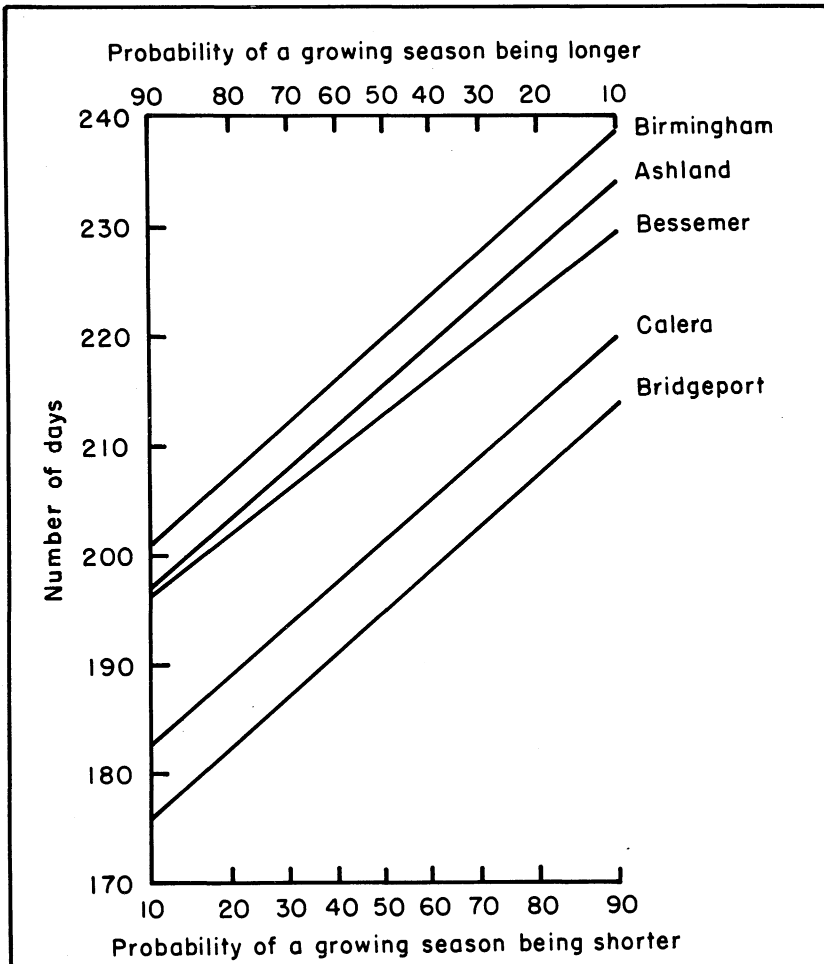
Station	Appendix figure	Station	Appendix figure
Albertville	1	Hamilton	7
Andalusia	2	Headland	8
Anniston	1	Heflin	8
Ashland	3	Highland Home	8
Athens	1	Lafayette	9
Auburn	1	Livingston	9
Bankhead L&D	2	Madison	10
Bay Minette	2	Marion Junction	10
Belle Mina	1	Martin Dam	9
Bessemer	3	Minter	10
Birmingham	3	Mobile	11
Brantley	2	Montgomery	9
Brewton	2	Moulton	10
Bridgeport	3	Muscle Shoals	10
Calera	3	Oneonta	11
Camp Hill	4	Ozark	11
Centre	4	Prattville	11
Centreville	4	Red Bay	12
Chatom	5	Redstone Arsenal	12
Childersburg	5	Robertsdale	11
Clanton	5	Rockford	12
Clayton	4	Rock Mills	12
Coden	6	Russellville	12
Dayton	4	Saint Bernard	13
Demopolis L&D	5	Sand Mountain	13
Double Springs	6	Scottsboro	14
Fairhope	6	Selma	13
Falkville	5	Sylacauga	14
Fayette	8	Talladega	15
Florence	7	Thomasville	13
Frisco City	6	Troy	14
Gadsden	7	Tuscaloosa	13
Geneva	8	Union Springs	14
Greensboro	7	Valley Head	15
Greenville	7	Vernon	15
Guntersville	6	Waterloo	15
Haleyville	9		



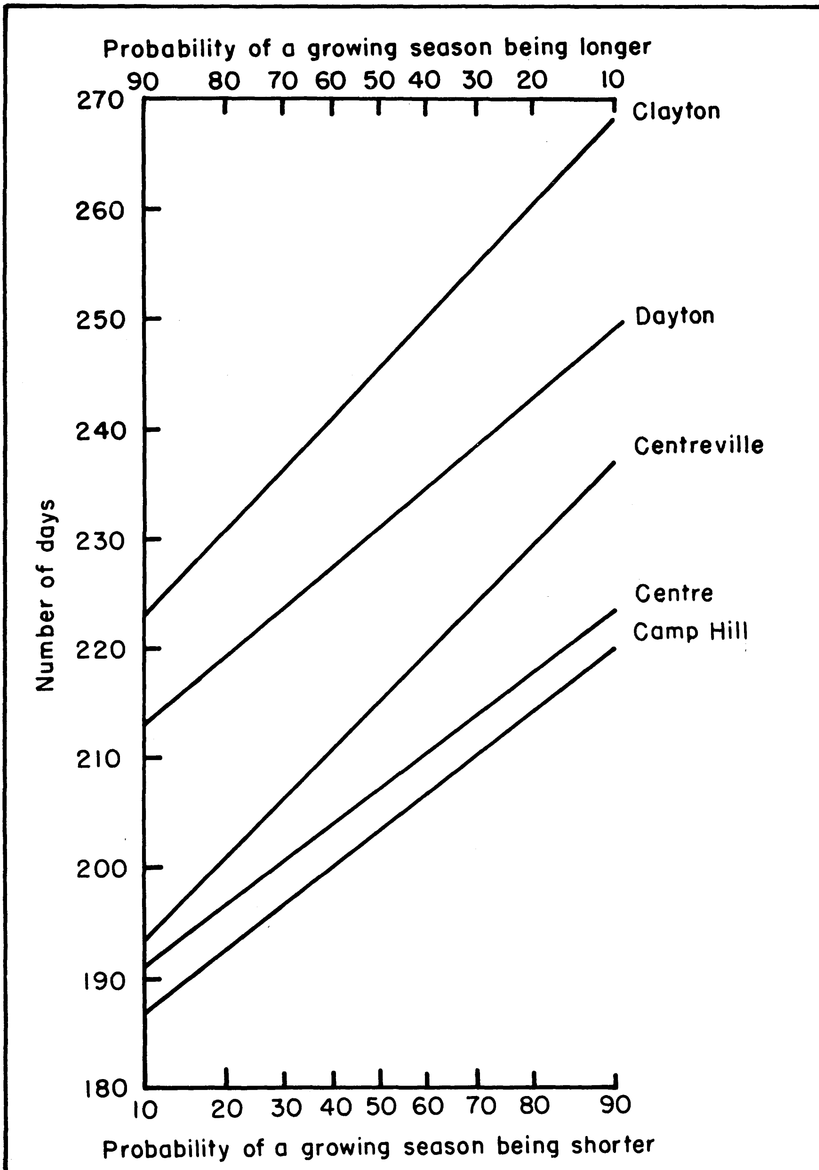
APPENDIX FIG. 1



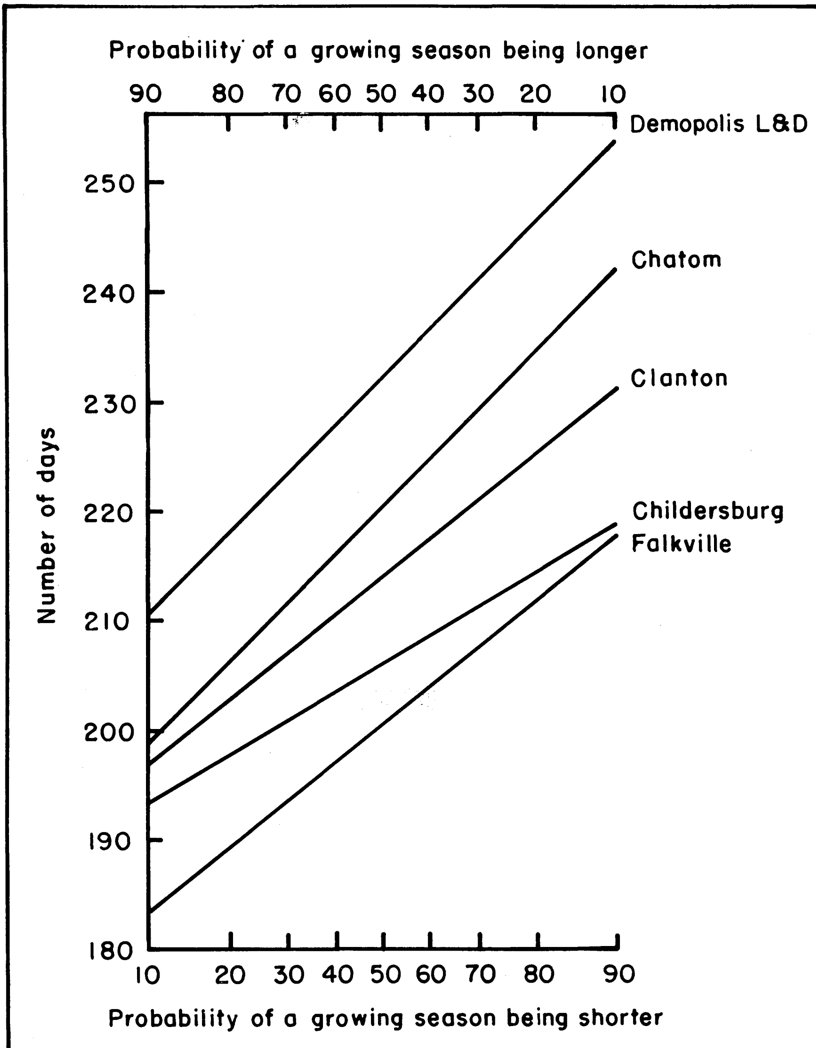
APPENDIX FIG. 2



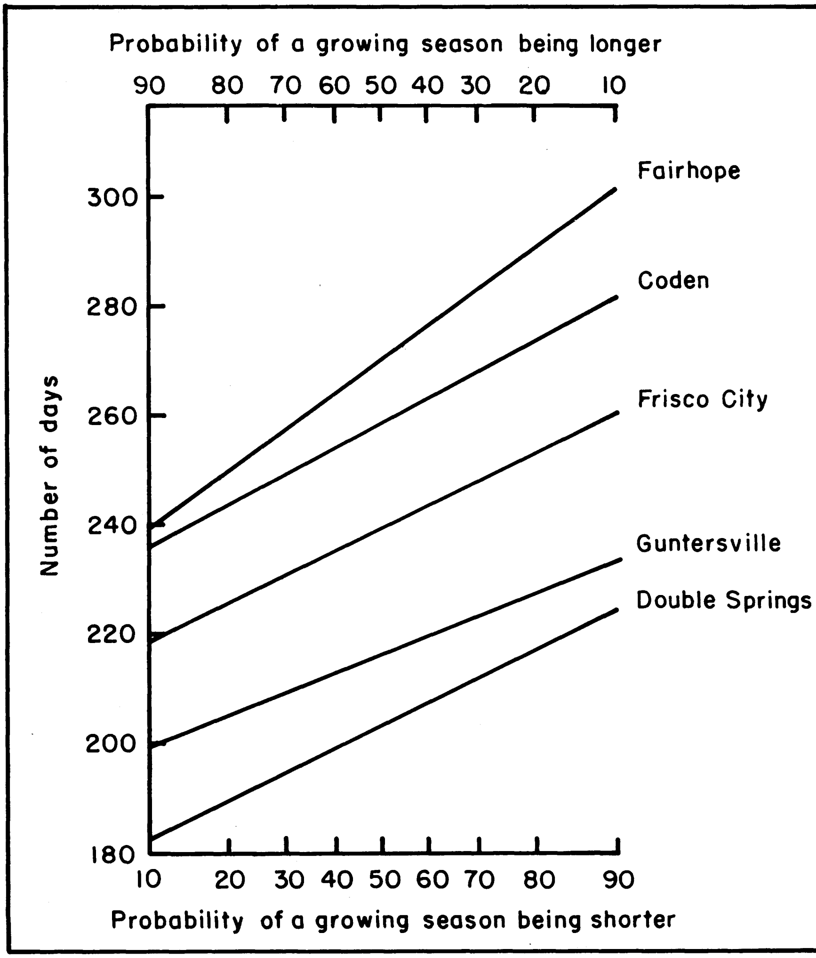
APPENDIX FIG. 3



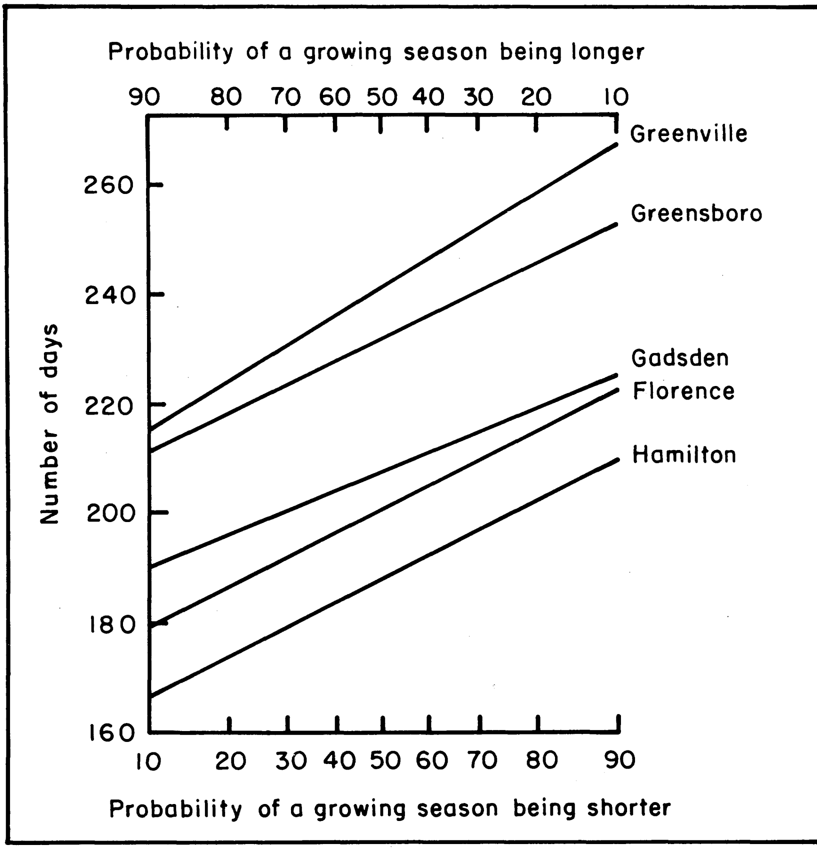
APPENDIX FIG. 4



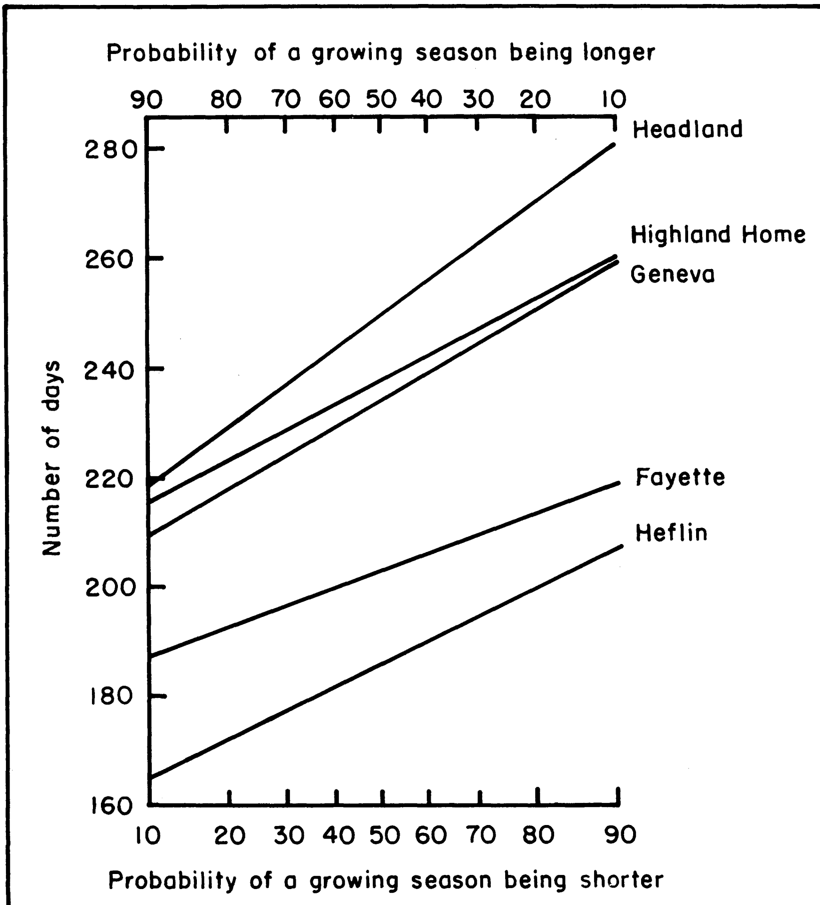
APPENDIX FIG. 5



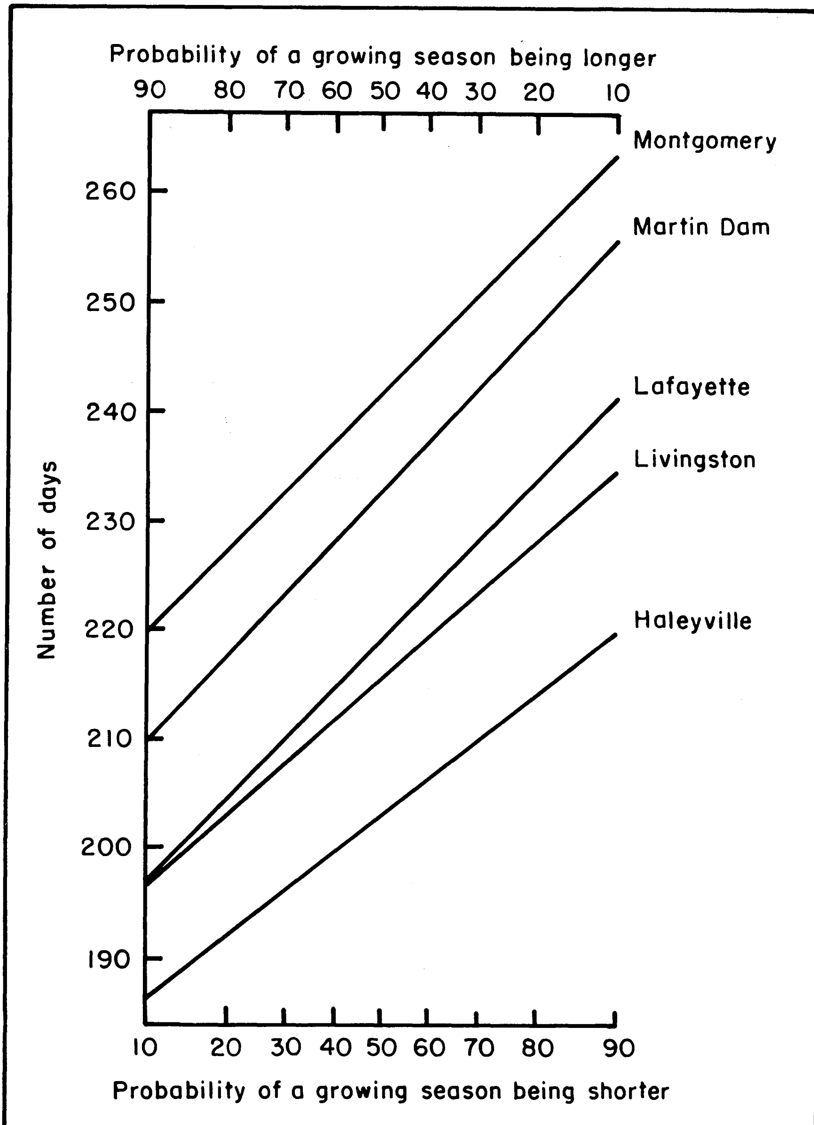
APPENDIX FIG. 6



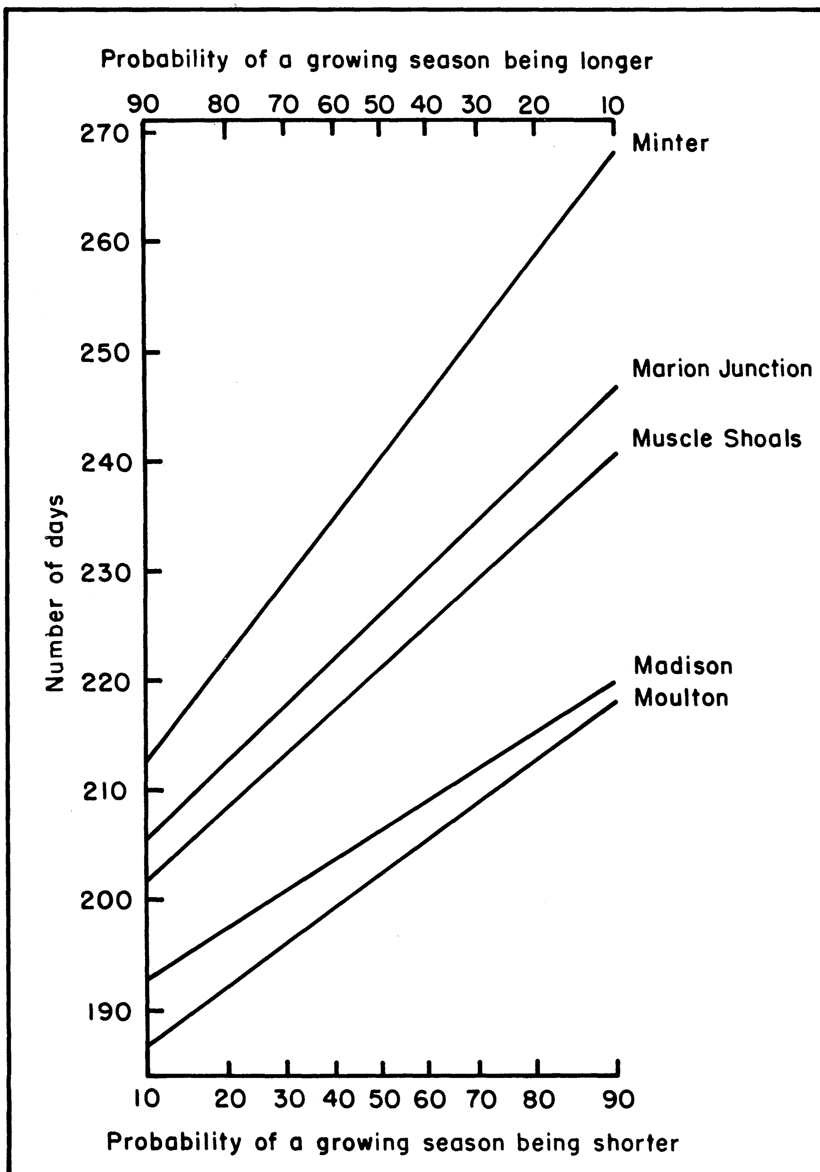
APPENDIX FIG. 7



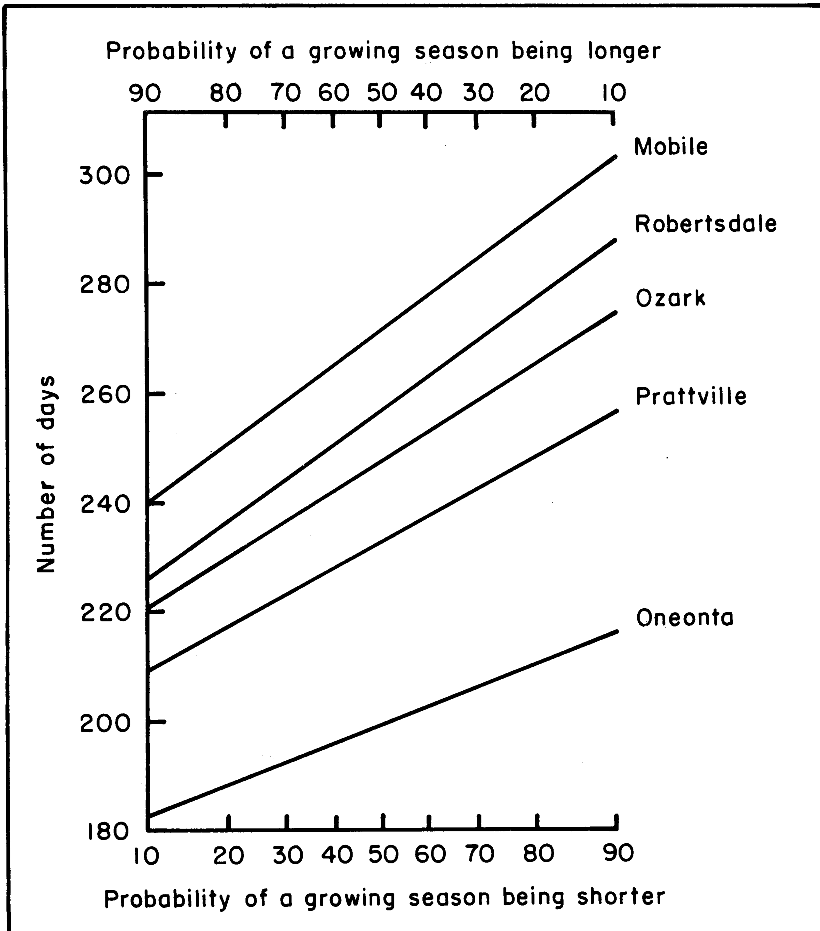
APPENDIX FIG. 8



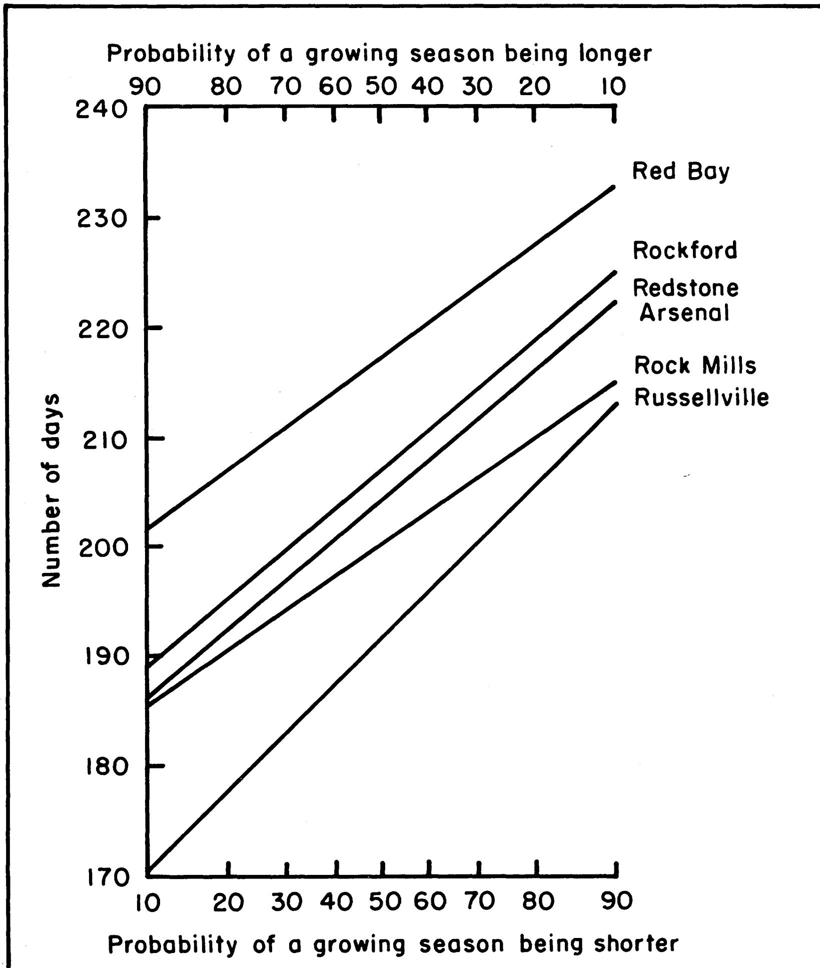
APPENDIX FIG. 9



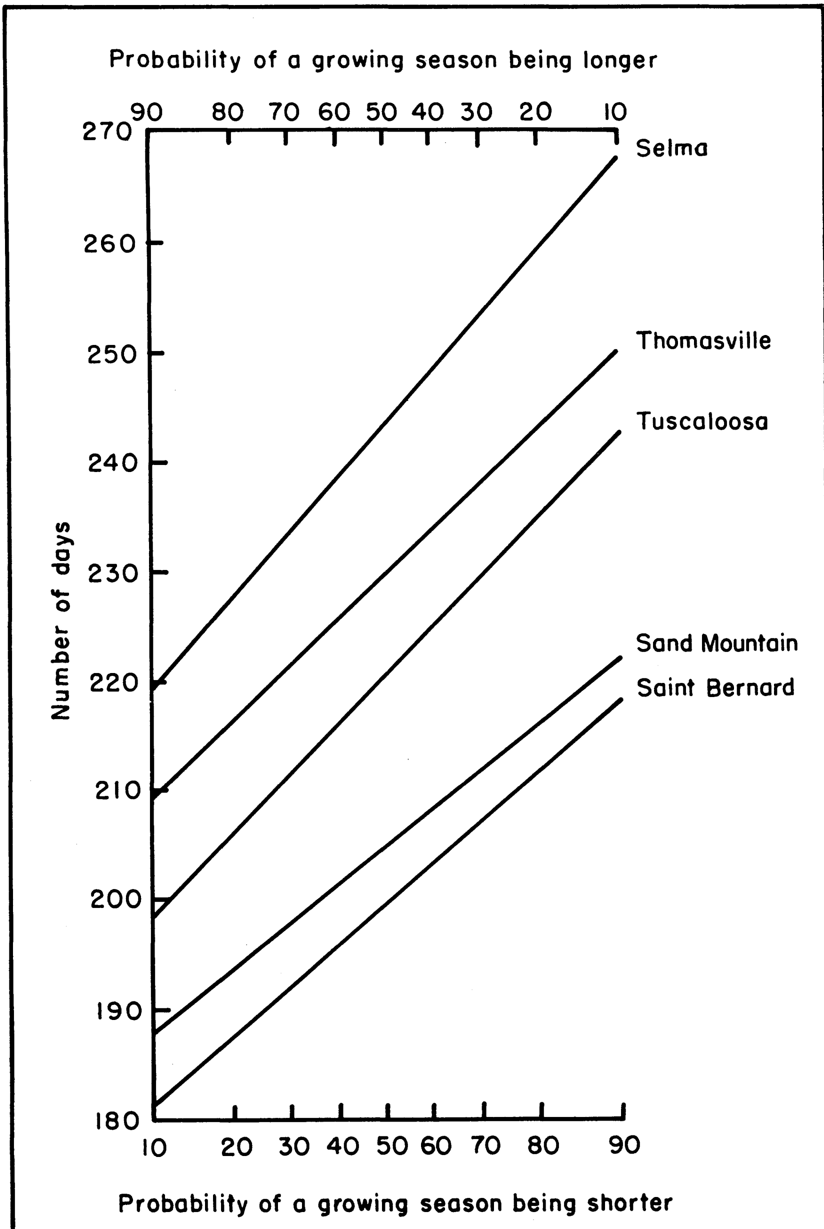
APPENDIX FIG. 10



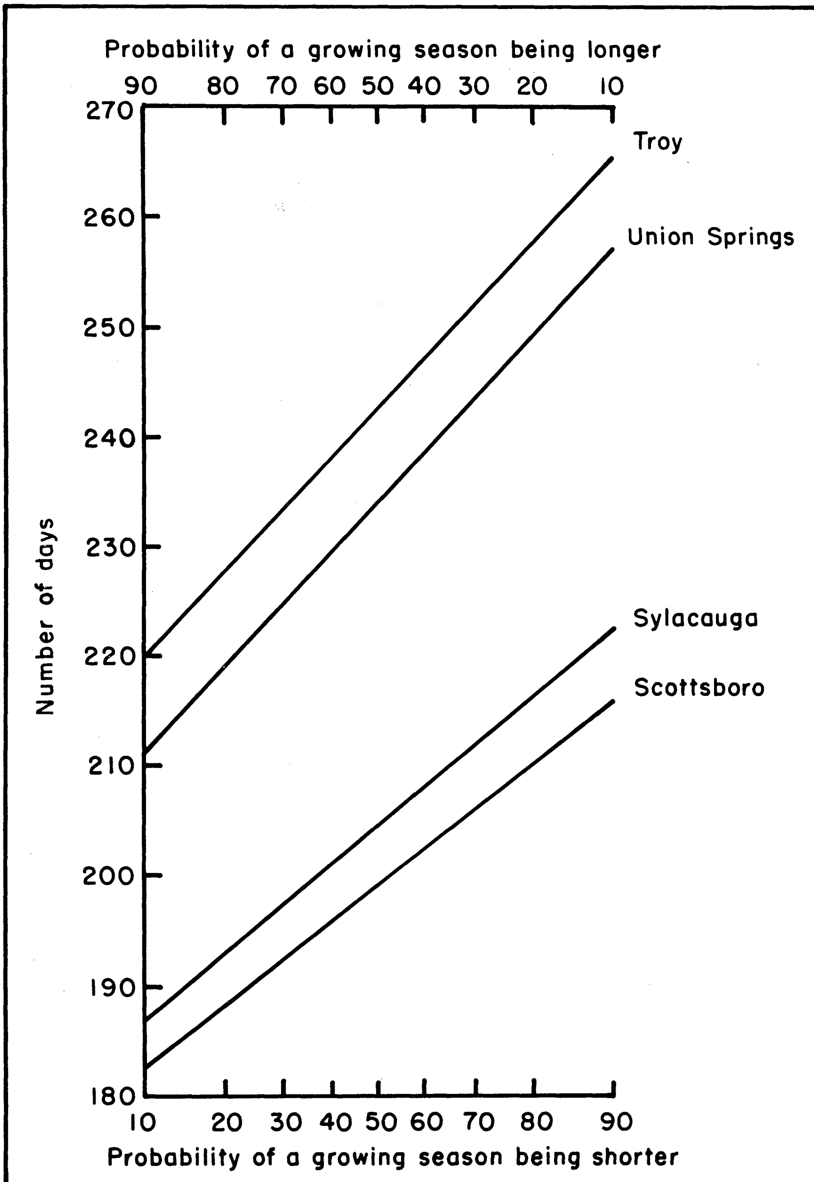
APPENDIX FIG. 11



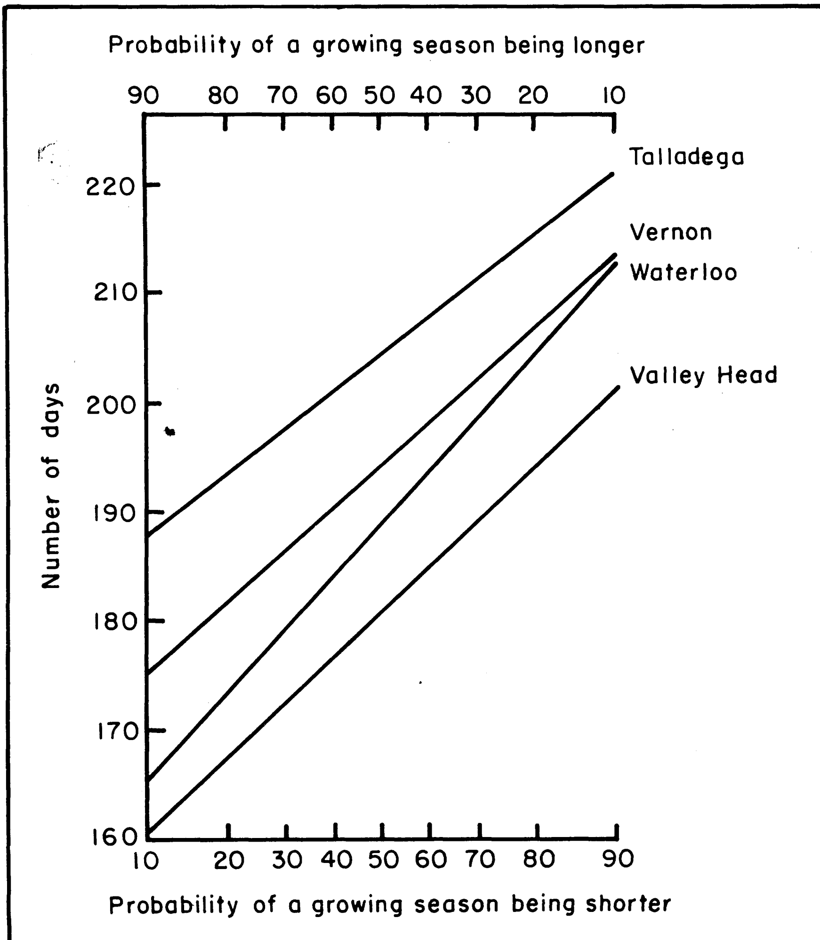
APPENDIX FIG. 12



APPENDIX FIG. 13



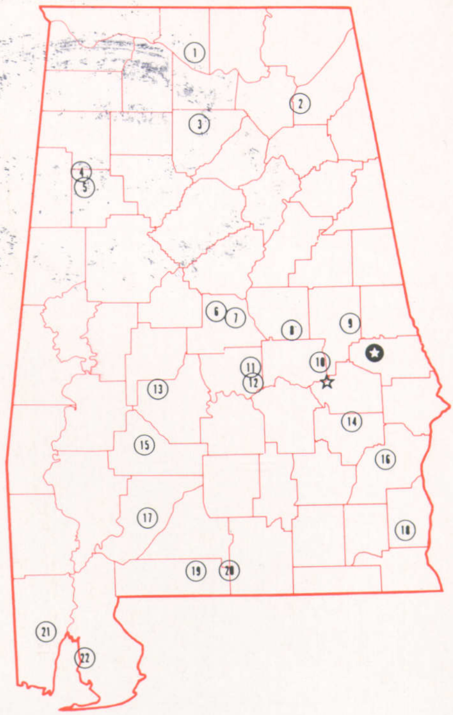
APPENDIX FIG. 14



APPENDIX FIG. 15

Alabama's Agricultural Experiment Station System
AUBURN UNIVERSITY

With an agricultural research unit in every major soil area, Auburn University serves the needs of field crop, livestock, forestry, and horticultural producers in each region in Alabama. Every citizen of the State has a stake in this research program, since any advantage from new and more economical ways of producing and handling farm products directly benefits the consuming public.



Research Unit Identification

⍟ Main Agricultural Experiment Station, Auburn.
☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Foundation Seed Stocks Farm, Thorsby.
7. Chilton Area Horticulture Substation, Clanton.
8. Forestry Unit, Coosa County.
9. Piedmont Substation, Camp Hill.
10. Plant Breeding Unit, Tallassee.
11. Forestry Unit, Autauga County.
12. Prattville Experiment Field, Prattville.
13. Black Belt Substation, Marion Junction.
14. The Turnipseed-Ikenberry Place, Union Springs.
15. Lower Coastal Plain Substation, Camden.
16. Forestry Unit, Barbour County.
17. Monroeville Experiment Field, Monroeville.
18. Wiregrass Substation, Headland.
19. Brewton Experiment Field, Brewton.
20. Solon Dixon Forestry Education Center, Covington and Escambia counties.
21. Ornamental Horticulture Field Station, Spring Hill.
22. Gulf Coast Substation, Fairhope.