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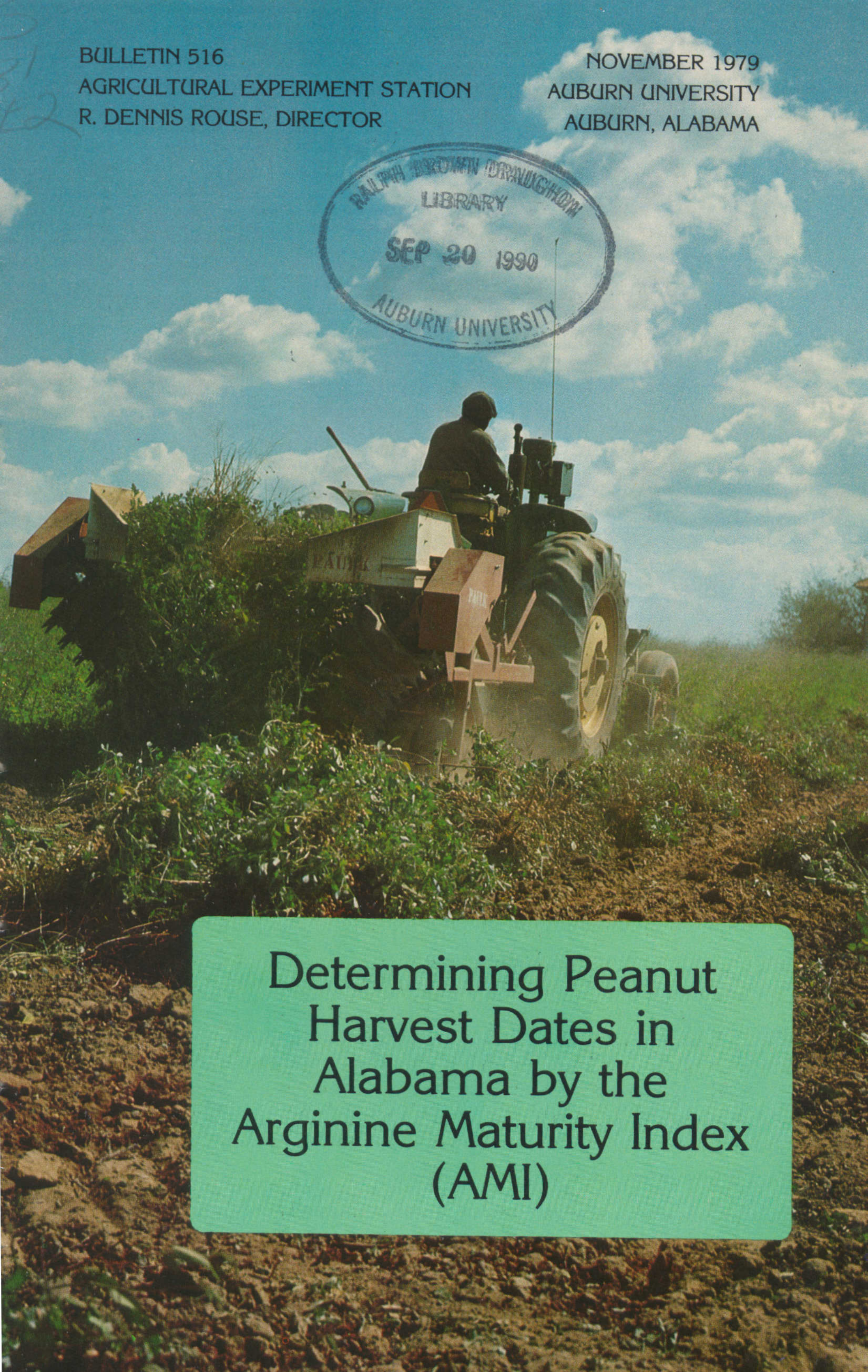

Determining Peanut Harvest Dates in Alabama by the Arginine Maturity Index (AMI)

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Determining Peanut Harvest Dates in Alabama by the Arginine Maturity Index (AMI)[1]

J. D. WEETE, W. D. BRANCH, and T. A. McARDLE[2]

INTRODUCTION

AVERAGE PEANUT YIELDS in Alabama have increased steadil over the past 20 years, from approximately 1,100 pounds pe acre to 2,700 pounds per acre *(1)*. This progress in peanu production has been due primarily to improved varieties an cultural practices, such as pest control measures (fungi, ir sects, nematodes), crop rotation, irrigation, and weed contro Although there are some climatic and soil factors that ma limit peanut production in this State, the potential averag yield of peanuts is not known and has certainly not bee reached. This is illustrated by the fact that some Alabam growers consistently produce 4,000 to 4,500 pounds per acre and this level is routinely obtained under controlled cond tions at the Agricultural Experiment Station's Wiregrass Sub station, Headland, Alabama.

One of the most important problems in peanut farming i deciding when to harvest because pods of cultivated peanu plants do not mature at the same time. If peanuts are harveste too late, many pods detach from the pegs and remain in th soil; if harvested too early, the abundance of immature see would be too high for the desired optimum yield and grade Consequently, variable proportions of mature and immatur

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[1]Mention of firm names or trade products does not imply that they are endorsed o recommended by Auburn University over other firms or similar products not men tioned.

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seeds are obtained when the crop is harvested any time after fruit set, making the time of harvest a critical factor in obtaining high yield, grade, and price return.

Traditional methods for determining optimum peanut maturity and harvest time are subjective and generally unreliable. The number of days from planting, degree of darkening on the inside of the pod, certain seed and plant characteristics, and environmental conditions are often used as criteria for deciding when to harvest peanuts *(2, 3, 7, 9, 10, 14, 17, 19, 20, 21)*.

One of the most popular subjective means of determining peanut harvest dates is called the shellout technique *(7, 9, 11, 17)*. Determining harvest dates by this method requires the removal of all pods from several plants collected from different areas in a field. The pods are then opened and classified according to maturity based on the degree of darkening inside the hull and the color of the testa, Appendix I. Peanuts of the Florunner variety are considered mature and ready for harvest when approximately 60 percent of the pods are dark inside the hull, or when 70 percent of the seed show a deep pink color *(3, 4, 7)*.

During the past several years there has been considerable interest in developing objective methods of determining maximum peanut maturity so that more accurate estimates of harvest dates can be made. It was recently shown that there is an inverse relation between peanut seed free arginine (amino acid) content and maturity *(8, 25)*. An automated method of determining the arginine content of peanuts and forecasting harvest dates was subsequently developed *(24)*. This method is based on the change in the ratio of free arginine to dry matter content of peanut pods during development and is called the Arginine Maturity Index (AMI). This ratio progressively decreases during pod development until a minimum value is reached. The time at which the AMI value of a representative sample from a particular field reaches a minimum is correlated with a high proportion of mature peanuts and time of harvest. A graph of AMI values taken during pod development over a period of several years, figure 1, can be used to estimate harvest dates from AMI data taken in subsequent years. This is possible because the pattern of pod development, and hence the change in AMI values, is similar from year to year unless altered by unusual environmental conditions.

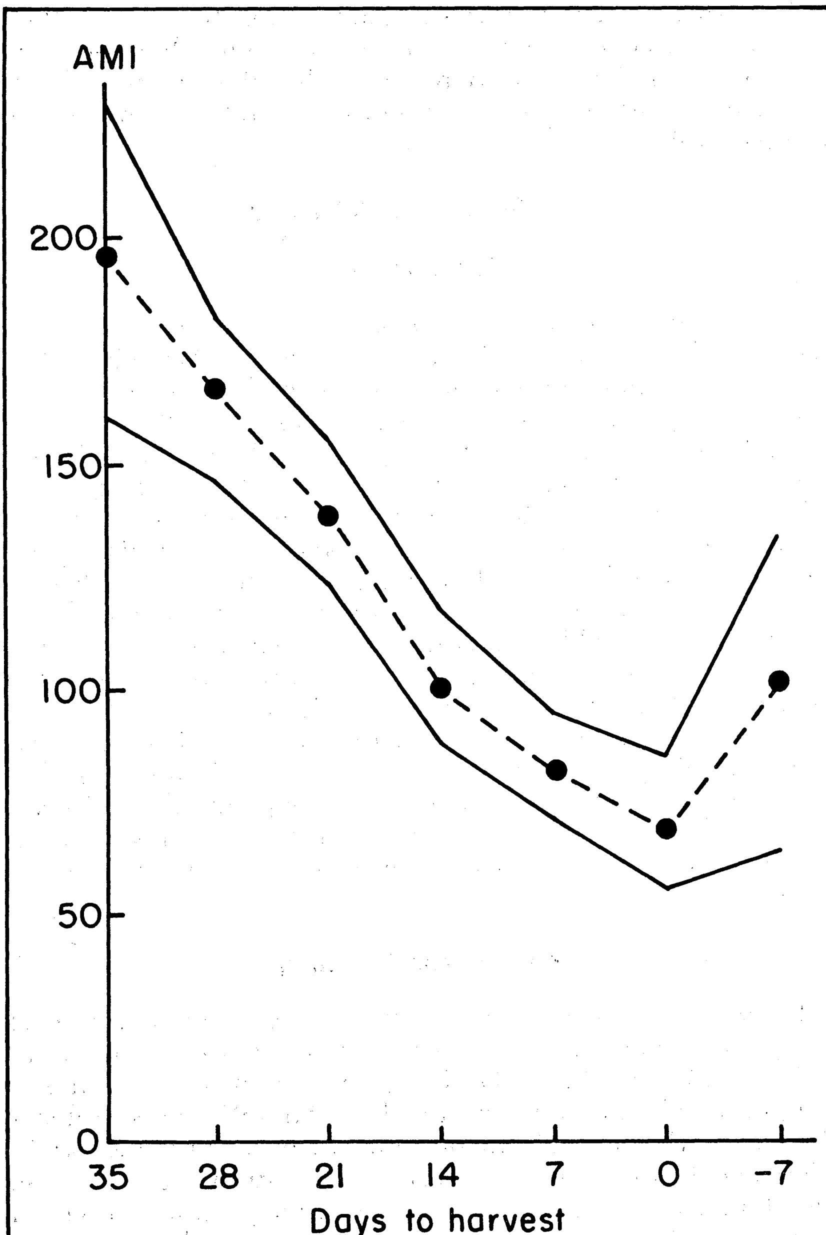


FIG. 1. Relation between AMI values of developing peanuts and time of harvest is shown by the dotted line. Solid lines represent standard deviation. (Georgia data supplied by Dr. Clyde T. Young.)

In 1976, a 2-year study was initiated to test the AMI method in Alabama. The results of this study were obtained from experimental plots at the Wiregrass Substation and from fields of participating Alabama peanut growers and are summarized in this publication.

MATERIALS AND METHODS

Baseline Data

Determining peanut harvest dates by the AMI method is based on known and predictable changes in AMI values during pod development that were established for peanuts of the same variety during previous years. To establish this baseline data, three to four representative pod samples are taken from a field of less than 30 acres, analyzed separately, and the AMI values averaged to obtain a figure representing the maturity condition for the field at the particular sampling date. The sampling procedure is initiated approximately 120 days after planting (5 to 6 weeks prior to an estimated harvest date) and is continued at weekly intervals until a week after optimum maturity. The AMI values are plotted against days to harvest to obtain the AMI curve, figure 1, and the lowest point on the curve represents optimum maturity. Because of the general reproducibility of this curve from year to year, it can be used to determine peanut harvest dates in subsequent years with averaged AMI values from only three to five samplings per field taken between 2 and 4 weeks prior to an estimated harvest date.

Planting and Sampling

Each year of this study, samples were taken for AMI analyses between about August 1 and September 30, or about 101 to 122 days after planting (DAP). During this time, a temporary laboratory was established at the Wiregrass Substation. Since Florunner is the principal peanut cultivar grown in Alabama, it was the only one tested in this study. Baseline data developed in this study were taken from peanuts grown on maturity test plots at the Wiregrass Substation differing only by planting date and crop (corn or peanuts) planted the previous year. Beginning April 7 and 15, peanuts were planted at about 1-week intervals resulting in five and four planting dates (plots) per field in 1976 and 1977, respectively. In 1976, the maturity plots were in a field planted to corn the previous year; and in 1977, two sets of maturity plots were used, one planted to corn and the other to peanuts the previous year. Irrigation was used only in 1976 and standard practices were used each year for the control of leafspot and insects. Samples were also taken from irrigation test plots at the Substation. In addition, samples were taken from fields of participating growers in 10 counties in 1976 and 5 in 1977.

Sample Preparation

Pods for each sample sufficient to fill a quart container, regardless of size, were picked by hand. The pods were then washed with water and prepared for analysis. Laboratory procedures for sample preparation and analytical methods were previously described by Young *(24)*.

Determining Harvest Dates by AMI

AMI data used for determining harvest dates in this study were supplied by Dr. Clyde T. Young and were taken from peanuts grown in Georgia.

RESULTS AND DISCUSSION

Maturity Test Plots

Although recommended planting of peanuts in Alabama is between April 1 and 20, the average planting date is about May 1 *(3)*. Early April planting permits a longer growing season, with the pod development stage occurring at the peak of the summer rainfall period beginning in late June *(4)*. In each year of this study, peanuts were planted at 1-week intervals for 5 weeks beginning April 7 to include the range of planting dates commonly used by Alabama growers.

AMI values of peanuts from the maturity plots followed the expected declining and leveling off pattern with pod development and maturity, figure 2. In 1976, for example, the pattern was similar regardless of planting date.

The number of days from planting to optimum maturity differed according to planting date; later planting dates resulted in correspondingly shorter intervals between planting

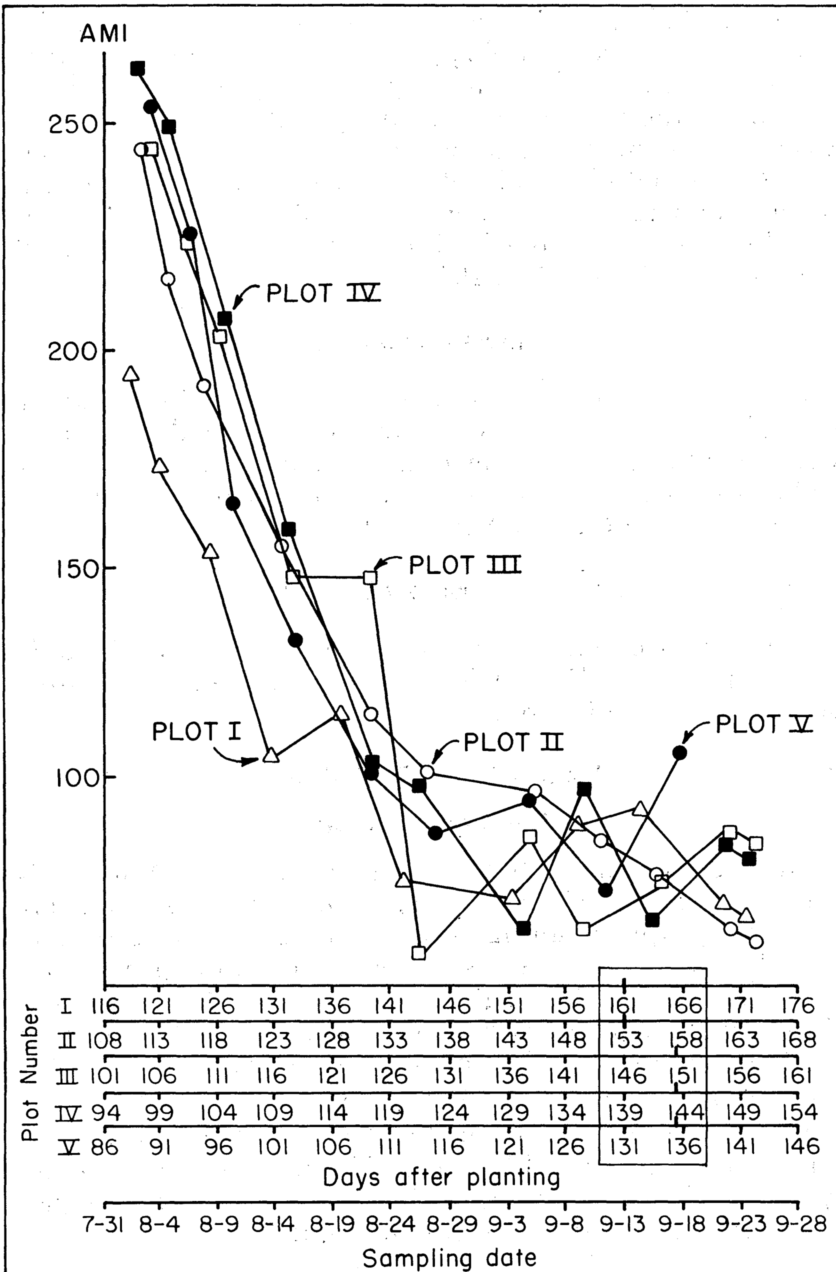


FIG. 2. AMI values as a function of number of days from planting, for peanuts from the maturity plots in 1976. Highest yield for each plot is indicated on the abscissa.

TABLE 1. SUMMARY OF RESULTS FOR MATURITY PLOTS, 1976

Test plot (planting date)	Harvest[1] date	Days from planting to harvest	Yield[2], lb./acre	Pct. TSMK[3]
I (4-7-76)	9- 1-76	147	3,127	—
	9-13-76*	159	3,422	77
	9-17-76	163	2,812	73
II (4-14-76)	9- 1-76	140	3,194	—
	9-13-76*	152	3,557	75
III (4-21-76)	9-13-76*	145	3,011	75
	9-17-76	149	—	—
IV (4-28-76)	9-13-76	138	2,878	74
	9-17-76*	142	3,594	73
V (5-5-76)	9-17-76*	134	3,572	74
	9-20-76	137	3,422	69

[1]Dates marked with an asterisk are those closest to the AMI predicted date.
[2]Unless otherwise specified, yield values are the mean of three replications.
[3]Percent total sound mature kernels. Each value is based on the average of three to five samples.

and optimum maturity, table 1. This supports the recognized fact that later planting dates result in a faster rate of peanut maturity and discounts the number of days from harvest as a reasonable method for determining time of harvest.

Although planting dates were staggered at 7-day intervals, there was only a 4-day difference in reaching optimum maturity between plots planted 29 days apart (plots I and V). However, it should be taken into account that the five adjacent plots collectively represented a single field that experienced common environmental conditions. The relation between planting and harvest dates would not necessarily be expected to hold true for fields at different locations planted at the same time. Similar results were obtained in 1977.

Peanut yields in Alabama during the period of this study (1976 and 1977) averaged about 2,600 pounds per acre. However, yields of peanuts grown at the Wiregrass Substation annually fall in the range from 3,500 to 4,500 pounds per acre, with individual plots sometimes reaching 5,800 pounds (personal communication, J. G. Starling). Except for plot I in 1976, where three samples were taken, samples for yield determinations were taken from each of the remaining plots on two dates. Because of the small number of yield determinations from these plots, it is not certain that the highest yields were the maximum that could have been obtained if harvests had been made at other times. However, the highest yields (3,572 to 4,109 pounds per acre) fall within the range of those for peanuts grown at the Substation and are considered to be at least near optimum, table 1. Regardless of whether these yields are optimum, sampling dates resulting in the highest yields were near those dates determined by the AMI method in four of the five plots compared to peanuts sampled at another time. Percent total sound mature kernels (TSMK) was also higher for peanuts sampled nearest the AMI date from two of the five plots, with no determination made for the other two compared to plots sampled at another time, table 1.

For the data of figure 2 (listed in Appendix II) to be of future use in determining peanut maturity and harvest dates, it must be related to time to maturity rather than from planting. This relationship was established, taking into consideration the known correlation between low AMI values and optimum maturity *(6)* and the date highest yields were obtained in the maturity plots. These plots were sampled at 2- to 8-day intervals over a period of 6 weeks and AMI values for the peanuts were arranged according to days to maturity, Appendix II. When the AMI values for each level of maturity in each plot were averaged and graphed, figure 2, a pattern similar to that obtained for peanuts grown in Georgia *(24, 26)*, figure 1, was obtained.

Experiments at the maturity test plots were repeated in 1977, but with modifications. For example, three to four samplings for yield determinations were made for each plot. Also one sampling date was selected according to the AMI method another according to the shellout technique, and a third at date estimated to be 1 week prior to optimum maturity according to the AMI method. Peanut maturity in these plots (corn peanuts rotation) was reached 2 to 3 weeks later than in 1976 tables 1 and 2. This was attributed to a drought period occurring in the early months (April through July) of the 1977 peanut growing season. However, postpegging rainfall was 5.77 and 7.62 inches in August and September, respectively compared to a 14-year average of 5.77 and 3.37 inches at the Wiregrass Substation.

In spite of the severe early drought in 1977, overall best average peanut yields for the maturity plots were higher (4,473±316 pounds per acre) than in 1976 when there was a late drought (3,665±304). The average yield (4,413±413) and price return from peanuts from plots harvested according to the AMI procedure were significantly higher than for peanuts

TABLE 2. YIELD, GRADE, AND PRICE RETURN FOR PEANUTS FROM MATURITY PLOTS AT THE WIREGRASS SUBSTATION, 1977[1,2]

Test plots (planting date)	Type of harvest	Type of digging[3]	Digging date	Days from planting to digging	Yield, lb./acre	Grade, pct. TSMK	Return, $/acre
Following corn:							
Plot II (4-15-77)	early	H	9-26	164	4,311	68	903
	AMI	M	10-4	172	4,311	69	913
	shellout	M	10-4	172	4,311	69	913
Plot III (4-21-77)	early	H	9-27	159	4,401	68	925
	AMI	M	10-4	166	4,492	70	965
	shellout	M	10-4	166	4,492	70	965
Plot IV (4-27-77)	early	H	9-27	153	4,175	70[4]	897[4]
	AMI	M	10-4	160	4,538	68	947
	shellout	M	10-10	166	4,265	72	936
Plot V (5-3-77)	early	H	9-27	147	4,265	71	926
	AMI	M	10-4	154	4,901	69	1,038
	shellout	M	10-10	160	4,447	71	966
Following peanuts:							
Plot II (4-15-77)	early	H	9-27	165	3,585	67	738
	AMI	M	10-4	172	3,630	68	760
	shellout	M	9-30	168	3,902	69	824
Plot III (4-21-77)	early	M	9-12	144	4,247[5]	73	954
	AMI-1	M	9-22	153	3,494	70	755
	AMI-2	M	9-30	162	4,038	72	889
	shellout	M	9-12	144	4,247[5]	73	954
Plot IV (4-27-77)	early	M	9-12	138	4,029[5]	71	886
	AMI-1	H	9-19	145	4,429	69	954
	AMI-2	M	9-30	156	4,628	71	1,008
	shellout	M	9-12	138	4,029[5]	71	886
Plot V (5-3-77)	early	H	9-19	139	3,267[5]	64	652
	AMI	H	9-26	146	4,764	68	1,001
	shellout	M	9-30	150	4,084	71	890

[1]Each value represents an average of three samples per type of harvest.
[2]Plot I was not part of the maturity plots in 1977.
[3]Dug by hand (H) or machine (M).
[4]Percent damage, foreign material, and sound splits were not deducted in the calculations.
[5]Values based on one sample.

harvested early (1 week prior to the AMI forecasted date), but there was no statistically significant difference between the early harvested peanuts (4,035±400 pounds per acre) and those harvested according to the shellout technique (4,222±204 pounds), table 3. Although peanut yields from six to eight maturity plots harvested according to the AMI method were higher than those harvested according to the shellout technique, there was no significant difference in high yield averages for peanuts harvested by the two methods, table 3. This is consistent with a previous report that showed a 0.96 correlation coefficient for maturity estimates of peanuts harvested by the AMI and shellout methods *(5)*.

TABLE 3. SUMMARY OF YIELD, GRADE, AND PRICE RETURN FOR THREE TYPES OF HARVEST ON MATURITY PLOTS, WIREGRASS SUBSTATION, 1977 [1,2]

Type of harvest	Yield, lb./acre	Grade, pct. TSMK	Return, $/acre
Early	4,035a	69a	860a
AMI[3]	4,413b	69a	940b
Shellout	4,222ab	71b	917ab

[1]The eight planting dates were used as replications in the statistical analysis.
[2]Values within columns with a common letter are not different at the 0.05 significance level according to Duncan's New Multiple-Range Test.
[3]The second AMI harvest was used for the following plots: Planting dates 2 and 3 following peanuts.

Although the yields for peanuts from the maturity plots were higher in 1977 than in 1976, the reverse was true for percent TSMK. The average high grade for peanuts for plots in 1976 was 75.3±1.3 percent TSMK and in 1977 was 69.6±1.7 percent TSMK. In 1977 there was no difference in TSMK for peanuts harvested early and according to the AMI method, but the percentage was significantly higher for peanuts harvested according to the shellout technique, table 3. The price return (dollar value per acre) for AMI harvested peanuts was higher than that for peanuts harvested early, but not for those harvested by the shellout technique. Classification data for two sampling dates according to the shellout technique are given in Appendix IV.

Planting peanuts in a field where peanuts were grown the previous year is not recommended because the populations of peanut pests will be higher than if the field had been previously planted to another crop *(22, 23)*. In Alabama, peanuts are most often alternated with corn in a crop rotation program although a peanut-peanut program is common. It is generally believed by farmers that peanuts following peanuts mature earlier than peanuts following another crop. For these reasons, two fields were subdivided into plots differing by planting date and used as maturity test plots in 1977, one planted the previous year to corn and the other to peanuts. There appeared to be little difference in the rate of maturity in peanuts planted in the two fields at the early date (April 15), but the later planted peanuts appeared to mature about 2 weeks sooner when planted behind peanuts, table 2. Similar results were obtained for other fields at the Wiregrass Substation. Higher yields were obtained from fields planted at the later dates. However, higher yields are generally obtained from peanuts planted early *(19)*. In spite of the differences in dates and rates

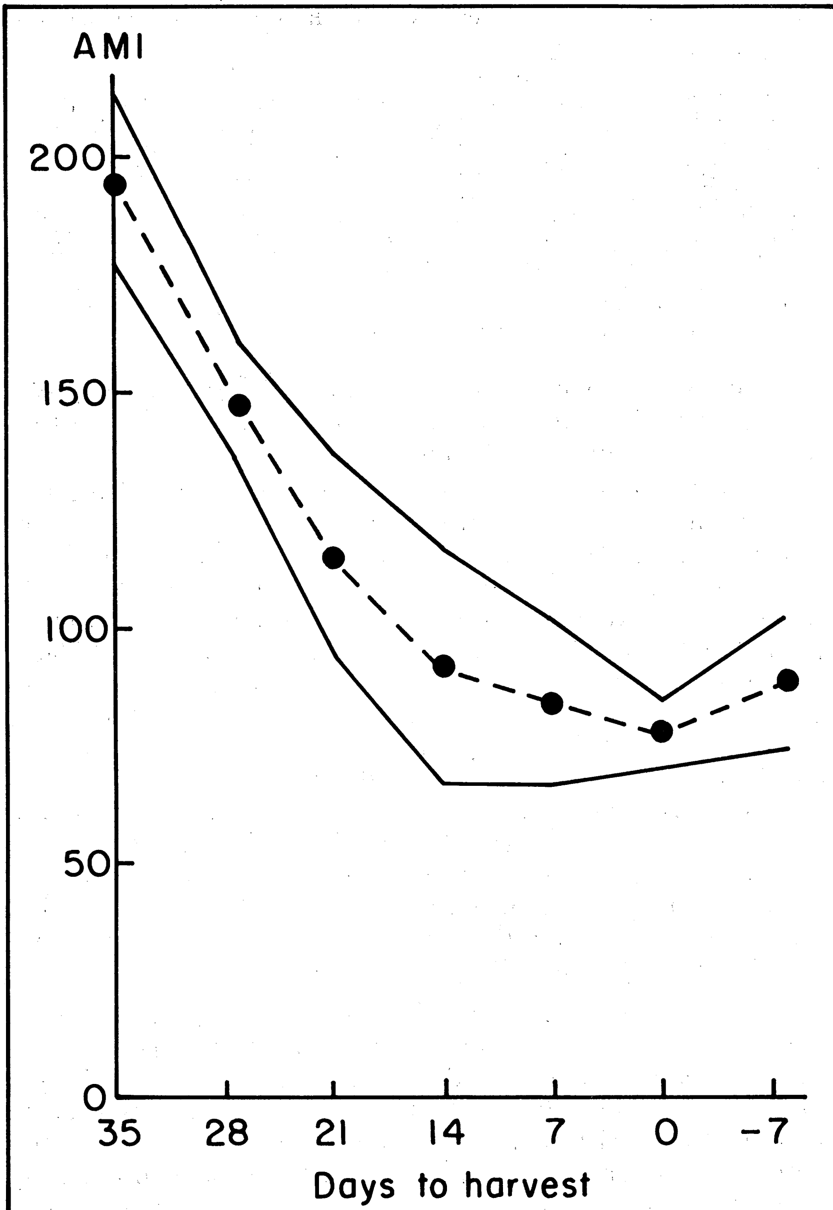


FIG. 3. Relation between AMI values and time of harvest for the maturity test plots at the Wiregrass Substation is shown by the dotted line. Solid lines represent standard deviation.

TABLE 4. SUMMARY OF YIELD, GRADE, AND PRICE RETURN FOR PEANUTS FROM THE TWO MATURITY TEST PLOTS, 1977[1]

Test plot (planting date)	Following corn			Following peanuts		
	Yield, lb./acre	Grade, pct. TSMK	Return, $/acre	Yield, lb./acre	Grade, pct. TSMK	Return, $/acre
Plot II (4-15-77) ...	4,311	69	913	3,902	69	824
Plot III (4-21-77) ..	4,492	70	965	4,247[2]	73	954
Plot IV (4-27-77) ..	4,538	68	947	4,628	71	1,008
Plot V (5-3-77)	4,901	69	1,038	4,764	68	1,001
Mean[3]	4,561±247	69±0.8	966±52.8	4,385±39	70±2.2	947±85.3

[1]Each value represents an average of three samples.
[2]Value based on one sample.
[3]Means of yield, grade, and price return for peanuts following peanuts and corn are not significantly different according to the student T Test.

of maturity, there were no significant differences in yield, quality, or dollar return for the peanuts from plots previously planted to corn or peanuts, table 4.

The ability of the AMI method to provide prior indication of peanut maturity for determining optimum harvest dates was generally good. In some cases, however, considerable judgment based on knowledge of environmental factors and condition of the field was required to reach a final decision on harvest dates. With one exception, optimum harvest dates determined for the five maturity plots in 1976 fell 2 to 3 days short of the date the highest yields were obtained, table 5. The AMI determined date for peanut maturity in plot V, planted May 5, was 10 days short of the highest yield obtained for that plot. However, the harvest date calculated from peanuts taken at later sampling dates (September 8 or 13) was close to the date the highest yield was obtained. In plot V, the peanut yields for samples taken September 17 and 20 were similar, but the percent TSMK (kernel quality) was considerably reduced at the later sampling date, table 1.

In 1977, three samplings for yield determination were made, one according to the AMI method. In five of six plots, highest yields were obtained for samplings made according to the AMI method, table 6. In plot II, previously planted to peanuts, the AMI forecast was 4 days over the date optimum maturity was reached. In plots III and IV, also previously planted to peanuts, continuous cropping made interpretations of AMI data difficult.

The most accurate dates for peanut maturity were determined with peanut samples taken 3 to 4 weeks prior to harvest, or when the AMI values of these samples ranged from about

TABLE 5. FORECASTING HARVEST DATES OF PEANUTS IN THE 1976 MATURITY PLOTS AT THE WIREGRASS SUBSTATION

Plot number, date sampled	Days after planting	AMI value	AMI estimated[1] days to maturity	AMI estimated harvest dates	Final AMI determined harvest date	Date highest yield obtained
Plot I						
8-6	121	171.3	29	9-4	9-10	9-13
8-9	124	153.7	25	9-3		
8-16	131	106.3	15	8-31		
8-25	140	118.4	18	9-12		
8-30	145	73.1	1	8-31		
9-8	154	68.9	0	9-8		
9-13	159	91.6	10	9-23		
9-20	166	94.7	12	10-1		
Plot II						
8-9	117	191.3	34	9-12	9-12	9-13
8-16	124	154.1	26	9-11		
8-25	133	115.2	17	9-11		
8-30	138	100.5	14	9-13		
9-8	147	98.6	12	9-20		
9-13	152	83.7	7	9-20		
9-20	159	76.3	4	9-24		
Plot III						
8-9	110	203.5	37	9-15	9-15	9-17
8-16	117	148.5	25	9-10		
8-25	126	148.9	25	9-19		
8-30	131	57.6	0	8-30		
9-8	140	88.1	9	9-17		
9-13	145	65.6	3	9-16		
9-20	152	77.5	10	9-30		
Plot IV						
8-9	107	208.5	38	9-16	9-14	9-17
8-16	110	159.2	27	9-12		
8-25	119	102.7	15	9-9		
8-30	124	97.9	14	9-13		
9-8	133	63.3	0	9-8		
9-13	138	97.7	14	9-27		
9-20	145	67.7	0	9-20		
Plot V						
8-9	90	169.6	29	9-7	9-7 or 9-17	9-17
8-16	110	129.0	20	9-5		
8-25	119	100.0	14	9-8		
8-30	124	84.8	7	9-6		
9-8	133	92.8	10	9-18		
9-13	138	73.9	2	9-15		
9-20	145	107.6	16	10-6		

[1]Values in the column were calculated from AMI values ranging from 97 to 210 using the following relation: Days $= \frac{7\,(\text{AMI} - 36)}{32}$. For AMI values below 97, estimated days to harvest were determined using the AMI curve.

TABLE 6. FORECASTING HARVEST DATES OF PEANUTS IN THE MATURITY PLOTS, 1977

Plot number, date sampled	Days after planting	AMI value[1]		AMI estimated days to maturity[2]		Date of AMI forecasted harvest		Final AMI determined harvest date		Date highest yield obtained	
		FC	FP	FC	FP	FC	FP	FC	FP	FC	FP
Plot II											
9-5	143	159.0	174.7	27	30	10-2	10-5	10-4	10-4	10-4	9-30
9-12	150	128.7	135.6	20	21	10-2	10-3				
9-19	157	103.6	129.4	15	20	10-4	10-9				
9-26	164	87.6	86.3	8	8	10-4	10-4				
Plot III											
9-5	136	176.9	—[3]	31	—	10-6	—	10-4	—	10-4	—
9-12	143	134.8	—	22	—	10-4	—				
9-19	150	102.6	—	15	—	10-4	—				
9-26	157	87.2	—	8	—	10-4	—				
Plot IV											
9-5	129	163.1	—	28	—	10-3	—	10-4	—	10-4	—
9-12	136	131.1	—	21	—	10-3	—				
9-19	143	107.5	—	16	—	10-5	—				
9-26	150	82.7	—	7	—	10-3	—				
Plot V											
9-5	122	196.5	122.0	35	19	10-10	9-24	10-4	9-26	10-4	9-26
9-12	129	135.6	97.9	20	14	10-2	9-26				
9-19	136	112.7	87.7	17	8	10-6	9-27				
9-26	143	90.7	87.0	9	8	10-5	10-4				

[1]FC = following corn, FP = following peanuts.
[2]Estimates made from AMI data supplied by Dr. C. T. Young.
[3]Continuous cropping occurred in these plots (see text).

100 to 160. A curve developed from AMI data from the maturity plots at the Wiregrass Substation during 1976 and 1977 (Appendix V and VI) is given in Appendix VII. These data support claims that accurate peanut harvest dates can be determined 2 to 3 weeks prior to optimum maturity *(24)* and is consistent with recent data obtained in Georgia *(16)*.

A new method of determining peanut maturity was recently reported, the seed-hull weight ratio method *(13)*. This ratio, obtained by dividing the fresh or air-dried weight of the seeds by the corresponding hull weight, gives the fresh weight seed-hull maturity index (FMI) or dry weight seed-hull maturity index (DMI), respectively. AMI values, which decrease with maturity, were negatively correlated ($r = 0.905$) with DMI. Values of 2.62 DMI to 2.79 FMI corresponded to maturity according to a rigid physiological maturity classification system *(11)*.

FMI and DMI values were determined for peanut pods separated according to the five maturity classifications (for the shellout technique) given in Appendix I. Deciding optimum maturity and time of harvest by the shellout technique requires judgment in making the maturity classification. When 60 to 70 percent of the pods fall into the mature and intermediate categories the field is considered at optimum maturity and it is time to harvest. The upper FMI and DMI values of 2.72 to 2.83 and 3.87 to 4.17, respectively, correspond to the maturity classifications acceptable for harvest, table 7. There is a large transition in maturity between the large seeded

TABLE 7. RELATIONSHIP BETWEEN AMI, FMI, DMI, FRESH AND AIR-DRIED WEIGHT PER SEED, AND MATURITY CLASSIFICATION FOR PEANUTS FROM MATURITY TEST PLOTS, WIREGRASS SUBSTATION, 1977[1]

Maturity classification	AMI[2]	FMI[2]	Fresh weight per seed, gram	DMI[2]	Air-dried weight per seed, gram
Small seeded immature	356.3	0.32±0.20	0.20±0.12	0.52±0.24	0.05±0.03
Large seeded immature	202.2	1.46±0.49	0.61±0.16	2.41±0.88	0.28±0.12
Intermediate	44.3	2.73±0.30	0.83±0.08	4.17±0.44	0.52±0.06
Mature $^-$	42.3	2.83±0.39	0.85±0.11	4.13±0.56	0.58±0.07
Mature$^+$	27.2	2.72±0.45	0.79±0.11	3.87±0.58	0.58±0.09

[1]Values are averages of six samples taken from the two samplings for the shellout technique (see Appendix IV).

[2]Arginine maturity index (AMI); fresh weight seed-hull maturity index (FMI); air-dried weight seed-hull maturity index (DMI).

immature and intermediate classifications according to the AMI, table 7. In another study, FMI and DMI values of 2.15 and 3.67, respectively, corresponded to the highest yield obtained over several sampling dates and the AMI forecasted date *(16)*.

The AMI method was also used to determine harvest dates for experimental plots involving irrigation at the Wiregrass Substation. There were four plots differing by the amount of irrigation water added. In one plot, no irrigation water was added and in the other three 0.7 inch of water was added when the soil tension reached 20, 40, and 60 centibars, respectively *(15)*. Samples were taken for yield determinations from each plot at three dates, one according to the AMI, table 8. Optimum maturity was reached at an earlier date in the plot maintained at a higher moisture level (20 centibars) where the highest yield was obtained. The highest yield obtained in this plot was with the date of sampling determined by the AMI method. High yields obtained for the plots maintained at reduced moisture tensions were less than those at 20 centibars. As might be expected, peanut maturity was delayed with increasing soil moisture tension (drought). Highest yield for the plot maintained at 40 centibars and for the no-irrigation plot did not occur at the sampling date determined by the AMI. However, highest yields were obtained at the AMI forecasted sampling dates in plots maintained at 60 centibars. Although yields did not differ greatly between the first and second samplings for the 60-centibar plot and the second and third samplings of the dry plots, the AMI forecasted date was later than that on which highest yields were obtained. The delay in

TABLE 8. YIELD FOR THREE HARVESTS ON THE IRRIGATION TEST, WIREGRASS SUBSTATION, 1977[1]

Treatment	Yield/acre, by harvest		
	I (Sept. 19)	II (Sept. 27)	III (Oct. 8)
	Lb.	*Lb.*	*Lb.*
20 centibars	3,845[2]	3,234	1,683
40 centibars	3,383	3,284[2]	1,815
60 centibars	3,218	3,366[2]	2,261
Nonirrigated[3]	2,592	3,589	3,447[2]
Nonirrigated[4]	2,765	3,581	3,489[2]

[1]Yield values based on two to four replications were obtained from Dr. Paul Backman.
[2]Harvest determined by AMI.
[3]Yield values based on three replications.
[4]Yield values based on six replications.

maturity due to reduced soil moisture was detected by the AMI method.

Harvest dates for other experimental plots at the Wiregrass Substation were determined by the AMI method. Although determining the accuracy of the method was not possible because usually no more than two samplings for yield determinations were made, yields from samples taken according to the AMI were consistently high.

Participating Growers

In 1976, the AMI laboratory at Headland was operating on a limited scale, with the work being restricted mainly to plots at the Wiregrass Substation. However, approximately 188 Alabama peanut growers, representing nine counties, brought an average of four samples each on two to three occasions to the laboratory for analysis and a date on which to harvest their fields. This presented two problems. First, in most cases the growers had not been sufficiently instructed on how to take samples for the AMI and, second, determining accurate harvest dates by the AMI requires first-hand knowledge of the field condition by the AMI personnel. Nevertheless the samples were analyzed, and estimated harvest dates were pro-

TABLE 9. SUMMARY OF QUESTIONNAIRES TO UNSOLICITED GROWERS WHO BROUGHT SAMPLES TO THE AMI LABORATORY, 1976

Number of growers visiting AMI lab	188
Number of questionnaires sent	125
Number of responses	33
Percent response[1]	26.4
Average per acre yield of peanuts harvested according to AMI	3,036±666 lb.
High	4,440 lb.
Low	1,958 lb.
Average percent TSMK of peanuts harvested according to AMI	72.2±4.7
High	84
Low	63.8
Total acres not harvested according to AMI	1,910
Average per acre yield of peanuts not harvested according to AMI	2,835±548 lb.
High	3,735 lb.
Low	2,000 lb.
Average percent TSMK of peanuts not harvested according to AMI	70.9±3.3
High	74.6
Low	64.1

[1]Only about 125 questionnaires were sent because addresses were not available for some of the growers.

vided with the caution that they should be used only as a guide since the method was in an experimental stage. To follow up on the results, however, questionnaires were sent to 125 of these growers with only 26 percent responding. Of 8,295 acres planted to peanuts by responding growers, 1,707 acres were harvested according to the AMI forecasted date. In many cases yields and grades were higher for fields harvested according to the AMI forecasted date, whereas in other cases fields not harvested by the AMI made equal or higher yields and grades. Although the average yields and grades tended to be higher for peanuts from AMI harvested fields, they did not differ significantly from fields not harvested according to the AMI, table 9.

The AMI program was expanded in 1977 to work more closely with Alabama growers. Seven growers each from Barbour, Henry, Houston, Geneva, and Coffee counties were selected by county agents of the Alabama Cooperative Extension Service. Peanut samples by AMI personnel were taken for analysis from designated fields averaging about 22 acres each on farms of the participating growers. Sampling began August 3 to 19 and continued at weekly intervals to the approximate time of harvest. Yields and grades of peanuts from these fields were compared to the remaining acreage of farms of the participating growers. Although the values tended to be higher, average yield and grade for peanuts was not significantly different from those of peanuts harvested according to growers' judgment, table 10. Two problems were encountered that should be taken into consideration in evaluating these results. While the participating growers were generally cooperative, some found it difficult to delay harvest if in his judgment the field was ready to harvest, but was not ready according to the AMI. On the other hand, some growers tended to use the AMI information for harvesting all their acreage, rather than just that sampled for AMI analysis.

TABLE 10. AVERAGE YIELD AND GRADE FROM PARTICIPATING GROWERS IN FIVE ALABAMA COUNTIES, 1977[1,2]

Fields	Total acreage	Yield, lb./acre	Grade, pct. TSMK
Harvested according to AMI	754	3,274a	73a
Harvested not according to AMI .	4,448	3,149a	72a

[1]Data based on response from questionnaires using 27 fields as replications in the statistical analysis.

[2]Values within columns with a common letter are not different at the 0.05 significance level according to Duncan's New Multiple-Range Test.

CURRENT STATUS OF THE AMI AND OTHER METHODS FOR DETERMINING PEANUT MATURITY AND HARVEST DATES

After 2 years of testing in Alabama, the AMI method is considered a valuable approach to determining peanut maturity and estimating harvest dates. Under controlled conditions and followup in the field, use of this method should result in high yields and good quality peanuts. In this study, peanut yields tended to be higher when harvested according to the AMI method as compared to other methods, although not always significantly higher. When conducted carefully, the shellout technique compared favorably with the AMI method. Probably the greatest advantage of the AMI method over other methods is that it can estimate within 2 to 4 days the optimum harvest date 2 to 4 weeks prior to that date. This allows growers to prepare a harvest timetable and take into consideration environmental factors (rain) that may interfere with harvest. Also, changes in the rate of peanut development due to environmental factors (rain, drought, disease) can also be taken into consideration in deciding harvest dates. A plot of the AMI data obtained during this 2-year study is shown in Appendix VIII.

In addition to the AMI, there are other recently developed objective methods for determining peanut maturity being tested. The AMI, methanolic extract, seed-hull, and shellout methods, Appendix IX, are being tested at the National Peanut Research Laboratory in Georgia *(16)*. Although inconclusive after only 1 year, none of the methods was completely accurate. Forecasts of harvest dates by the AMI method using samples taken 2 to 3 weeks prior to the high yield period were fairly accurate. Prediction according to the methanolic extract method using samples taken in the early part of the high yield period was acceptable. It was concluded that the shellout method may be useful but may lead to erroneous conclusions. In a similar study in Texas, it was concluded that none of the methods performed better than the shellout technique *(18)*. In a study of the seed-hull ratio method as an estimation of optimum harvest dates in North Carolina, it was decided that firm conclusions could not be drawn about its potential until a maximum yield level is reached in that state *(12)*.

LITERATURE CITED

(1) BACKMAN, P. A., R. RODRIGUEZ-KABANA, J. M. HAMMOND, E. M. CLARK, J. A. LYLE, H. W. IVEY, II, AND J. G. STARLING. 1977. Peanut Leafspot Research in Alabama 1970-1976. Auburn Univ. (Ala.) Agr. Exp. Sta. Bull. 489. 38 pp.

(2) BARRS, H. D. 1962. The Relationship between Kernel Development and Time of Harvesting of Peanuts at Katherine, N.T. Austrialian J. Exp. Agr. Anim. Husb. 2:106-109.

(3) BOND, D. 1972. Peanut Production Guide for Alabama. Ala. Coop. Ext. Ser. Cir. P-82. 28 pp.

(4) ______. 1975. Peanut Production Handbook. Ala. Coop. Ext. Serv. Cir. P-7. 24 pp.

(5) GILMAN, D. F. AND O. D. SMITH. 1977. Internal Pericarp Color as a Subjective Maturity Index for Peanut Breeding. Peanut Sci. 4:67-70.

(6) HAMMONS, R. O., P. Y. P. TAI, AND C. T. YOUNG. 1978. Arginine Maturity Index: Relationship with Other Traits in Peanuts. Peanut Sci. 5:68-71.

(7) HENNING, R. J. AND J. F. MCGILL. 1974. When to Dig Peanuts. Ga. Coop. Ext. Ser. Peanut Release No. 53-74.

(8) MASON, M. E., J. A. NEWELL, B. R. JOHNSON, P. E. KOEHLER, AND G. R. WALLER. 1969. Nonvolatile Flavor Components of Peanuts. J. Agr. Food Chem. 17:728-732.

(9) MILLER, O. H. AND E. E. BURNS. 1971. Internal Color of Spanish Peanut Hulls as an Index of Kernel Maturity. J. Food Sci. 36:669-670.

(10) MILLS, W. T. 1964. Heat Unit System for Predicting Optimum Peanut-Harvesting Time. Trans. ASAE 7(3):307-309, 312.

(11) PATTEE, H. E., E. B. JOHNS, J. A. SINGLETON, AND T. H. SANDERS. 1974. Composition Changes of Peanut Fruit Parts during Maturation. Peanut Sci. 1:57-62.

(12) ______, J. C. WYNNE, AND C. T. YOUNG. 1978. Seed-Hull Maturity Index—Optimum Sample Size and Effect of Harvest Date, Location, and Peanut Cultivar in North Carolina. Proc. Amer. Peanut Res. Educ. Assoc. 10:54.

(13) ______, J. H. YOUNG, AND F. R. COX. 1977. The Seed-Hull Weight Ratio as an Index of Peanut Maturity. Peanut Sci. 4(2):47-50.

(14) PICKETT, T. A. 1950. Composition of Developing Peanut Seed. Plant Physiol. 25:210-224.

(15) ROCHESTER, E. W., P. A. BACKMAN, S. C. YOUNG, AND J. M. HAMMOND. 1978. Irrigation Policies for Peanut Production. Auburn Univ. (Ala.) Agr. Exp. Sta. Cir. 241.

(16) SANDERS, T. H. AND E. J. WILLIAMS. 1978. Comparison of Four Peanut Maturity Methods in Georgia. Proc. Amer. Peanut Res. Educ. Assoc. 10:11-15.

(17) SCHENK, R. U. 1961. Development of the Peanut Fruit. Ga. Agr. Exp. Sta. Tech. Bull. NS 22. 53 pp.

(18) SCHUBERT, A. M. AND C. L. POHLER. 1978. Comparison of Maturity Test on Three Peanut Cultivars in South Texas. Proc. Amer. Peanut Res. Educ. Assoc. 10:55.

(19) STURKIE, D. G. AND G. A. BUCHANAN. 1973. "Cultural Practices." *In:* Peanuts—Culture and Uses. American Peanut Res. Educ. Assoc., Inc., Stillwater, Okla.

(20) ———— AND J. T. WILLIAMSON. 1951. "Cultural Practices." *In:* The Peanut—the Unpredictable Legume (a Symposium). The Nat. Fert. Assoc., Washington, D.C.

(21) VALLI, V. J. 1965. Biometeorological Factors as Predictors of Agronomic Maturity of Peanuts. Tech. Note 6, Agr. Meterology Rept. No. 2. 10 pp.

(22) WOODROOF, J. G. 1966. Peanuts: Production, Processing, Products. The AVI Publishing Co. Inc., Westport, Conn.

(23) YORK, E. T., JR. AND W. E. COLWELL. 1951. "Soil Properties, Fertilization and Maintenance of Soil Fertility," *In:* The Peanut—the Unpredictable Legume. Nat. Fert. Assoc., Washington, D.C.

(24) YOUNG, C. T. 1973. Automated Colorimetric Measurement of Free Arginine in Peanuts as a Means to Evaluate Maturity and Flavor. J. Agr. Food Chem. 21:556-558.

(25) ———— AND M. E. MASON. 1972. Free Arginine Content of Peanuts (*Arachis hypogaea* L.) as a Measure of Seed Maturity. J. Food Sci. 37:722-725.

(26) ————, Y. P. TAI, AND J. F. MCGILL. 1973. Sampling Techniques and Potential Use of the Arginine Maturity Index (AMI) Method for Determining the Maturity Level of Peanuts. Ga. Agr. Exp. Sta. Dept. of Food Sci. Memo. Rep. June. 17 pp.

APPENDIX I

CHARACTERISTICS USED IN PEANUT MATURITY CLASSIFICATION

Classification	Description
Mature$^+$	Dark brown interhull coloration with some black splotches. Dark pink colored testa with brown splotches.
Mature$^-$	Brownish interhull without any black splotches. Pink testa with very few brown splotches.
Intermediate	Light or very faint brownish interhull coloration. Light pink colored testa without brown splotches.
Large seeded immature	Whitish interhull. Large round kernel with faint pinkish colored testa.
Small seeded immature	Soft, thick, spongy white interhull and very watery. Small kernel with whitish testa.
Pops	Whitish interhull with a void space between interhull and kernel. Small kernel with whitish to brownish colored testa.
Small pods	Very small pod with a maximum length of 1.5 centimeters. Small kernel.

APPENDIX II

PERCENT DRY MATTER (DM) AND ARGININE MATURITY INDEX (AMI) FOR SAMPLES TAKEN FROM MATURITY TEST PLOTS, 1976[1]

Sampling date	Maturity test plots									
	I		II		III		IV		V	
	DM[2]	AMI	DM	AMI	DM	AMI	DM	AMI	DM	AMI
8-3-76	24.5	194.0	18.6	243.9	21.7	244.2	20.3	266.0	22.9	254.5
8-6-76	28.6	171.3	21.5	218.6	22.5	222.2	22.1	249.0	24.4	229.5
8-9-76	29.6	153.7	26.4	191.3	25.8	203.5	25.9	208.5	28.3	169.6
8-16-76	36.7	106.3	27.9	154.1	30.3	148.5	31.4	159.2	31.0	129.0
8-23-76	*41.4	118.4	40.8	115.2	37.6	148.9	43.8	102.7	44.0	100.0
(8-25-76)*										
8-30-76	42.4	73.1	37.8	100.5	43.4	57.6	37.8	97.9	38.9	84.8
9-8-76	42.1	68.9	35.5	98.6	42.0	88.1	45.8	63.3	38.8	92.8
9-13-76	39.3	91.6	40.6	83.7	44.2	65.6	39.9	97.7	40.6	73.9
9-20-76	43.3	94.7	47.2	76.3	50.3	77.5	51.7	67.7	43.7	107.6
9-27-76	44.3	67.7	45.7	65.6	44.3	92.6	43.2	87.9	—	—
9-29-76	50.8	63.0	51.9	63.6	46.3	95.0	50.1	81.8	—	—

[1]Each value represents one sampling per test plot and an average of three analyses per sampling.
[2]DM expressed as percent of fresh weight.

APPENDIX III

AMI VALUES OF PEANUTS FROM THE MATURITY PLOTS DURING 1976

Days to maturity	AMI values					Average AMI
	Plot I	Plot II	Plot III	Plot IV	Plot V	
Mature plus 7	94.7	76.3	77.5	87.9	107.6	88.8±13.0
0 (mature)	68.9	83.7	65.6	67.7	73.9	72.0± 7.2
7	73.1	98.6	88.1	63.3	92.8	83.1±14.6
14	118.4	100.5	57.6	97.9	84.8	91.8±22.6
21	106.3	115.2	148.9	102.7	100.0	114.6±20.0
28	153.7	154.1	148.5	159.2	129.0	148.9±11.8
35	194.0	191.3	203.5	208.5	169.6	193.4±15.0

APPENDIX IV

POD PERCENTAGE AND MATURITY CLASSIFICATION BY THE SHELLOUT METHOD ON SAMPLES TAKEN FROM MATURITY TEST PLOTS, WIREGRASS SUBSTATION, 1977[1]

Maturity[2] plots	Sampling date	Maturity classification							Total no. pods
		Mature+	Mature−	Intermediate	Large seeded immature	Small seeded immature	Pops	Small pods	
PD_1FC	9/23	13 ± 3.8	12 ± 2.3	23 ± 7.4	15 ± 6.8	15 ± 5.3	8 ± 9.5	13 ± 4.9	171
	9/29	17 ± 3.0	22 ± 3.8	18 ± 4.0	18 ± 1.2	10 ± 2.9	7 ± 3.1	10 ± 9.0	146
PD_2FC	9/23	15 ± 6.0	16 ± 3.6	34 ±15.9	14 ± 9.1	11 ± 4.6	7 ± 5.3	5 ± 2.1	139
	9/29	16 ± 5.6	20 ± 1.2	16 ± 3.2	18 ± 2.3	8 ± 4.7	12 ± 3.5	11 ± 3.5	143
PD_3FC	9/23	4 ± 2.7	7 ± 4.1	48 ±12.4	18 ±10.0	9 ± 2.3	2 ± 2.1	14 ± 7.5	123
	9/29	15 ± 8.2	25 ± 3.8	17 ± 1.5	22 ± 4.1	12 ± 4.5	5 ± 4.2	5 ± 3.5	129
PD_4FC	9/23	2 ± 1.5	13 ± 7.9	34 ±17.7	18 ± 1.2	12 ± 3.5	2 ± 1.5	20 ±10.5	155
	9/29	12 ± 4.0	14 ± 4.4	15 ± 7.6	20 ± 3.1	18 ± 3.2	7 ± 4.2	14 ± 8.5	181
PD_1FP	9/23	20 ± 2.1	12 ± 5.0	23 ± 6.5	17 ± 6.7	11 ± 3.8	5 ± 3.1	12 ± 4.4	146
PD_2FP	9/01	20 ±11.0	7 ± 2.5	13 ± 4.6	23 ± 6.4	21 ± 2.5	4 ± 1.7	12 ± 5.1	151
	9/05	18 ± 7.2	11 ± 4.4	18 ± 4.4	17 ± 1.2	19 ± 3.6	2 ± 1.5	16 ± 4.6	151
PD_3FP	9/01	15 ± 3.2	9 ± 1.7	21 ± 1.0	21 ± 4.2	14 ± 2.5	1 ± 0.6	20 ± 3.5	173
	9/05	18 ± 1.5	15 ± 1.5	16 ± 0.6	17 ± 2.1	17 ± 5.6	2 ± 2.5	15 ± 5.6	176
PD_4FP	9/16	11 ± 3.6	11 ± 4.1	17 ± 3.6	16 ± 3.1	29 ± 2.5	2 ± 0.6	14 ± 3.1	203
	9/23	17 ± 3.6	22 ±10.0	16 ± 7.0	21 ± 5.5	21 ± 7.6	2 ± 2.1	3 ± 2.7	109

[1]Each value is a percentage of total sampled and represents an average of three samples.
[2]Planting dates (PD) following corn (FC) or following peanuts (FP).

APPENDIX V

PERCENT DRY MATTER (DM) AND ARGININE MATURITY INDEX (AMI) VALUES FOR PEANUT SAMPLES TAKEN FROM MATURITY PLOTS PREVIOUSLY PLANTED TO CORN OR PEANUTS, 1977[1]

Sampling	Plot I		Plot II		Plot III		Plot IV		Plot V	
date	DM	AMI	DM	AMI	DM	AMI	DM	AMI	DM	AMI
Following corn:										
8- 8-77	—	—	22.1	99.7	19.1	118.2	17.1	129.7	12.7	204.7
8-15-77	29.9	144.1	23.9	138.1	24.2	195.4	20.8	232.9	18.1	266.7
8-22-77	27.2	179.9	26.0	201.6	23.2	241.9	25.4	216.8	18.5	321.5
8-29-77	33.4	153.1	30.2	205.8	28.5	223.6	27.2	259.3	26.6	236.8
9- 5-77	38.7	115.2	36.4	159.0	33.4	176.9	34.6	163.1	31.9	196.5
9-12-77	38.3	107.3	38.1	128.7	38.3	134.8	38.1	131.1	35.4	135.6
9-19-77	38.4	112.2	40.1	103.6	40.4	102.6	37.1	107.5	37.0	112.7
9-26-77	40.9	96.6	42.2	87.6	41.3	87.2	41.5	82.7	39.7	90.7
Following peanuts:										
8- 8-77	—	—	24.3	91.8	30.8	112.0	29.1	127.6	20.2	236.8
8-15-77	27.1	168.1	23.9	162.8	37.1	97.7	34.4	149.0	27.5	203.7
8-22-77	26.8	214.8	23.7	252.7	38.7	121.4	38.4	121.8	28.5	190.5
8-29-77	29.9	169.0	29.2	235.3	40.1	114.5	41.2	119.0	34.7	161.6
9- 5-77	35.2	163.5	35.3	174.7	42.4	108.0	44.0	97.8	38.3	122.0
9-12-77	37.2	118.6	48.5	135.6	45.0	88.0	45.1	85.9	43.1	97.9
9-19-77	39.2	119.9	40.3	129.4	44.9	93.4	46.9	85.5	44.9	87.7
9-26-77	41.5	104.7	44.2	86.3	44.4	76.8	44.4	82.5	44.1	87.0

[1]Each value represents an average of two to three samples per sampling date.

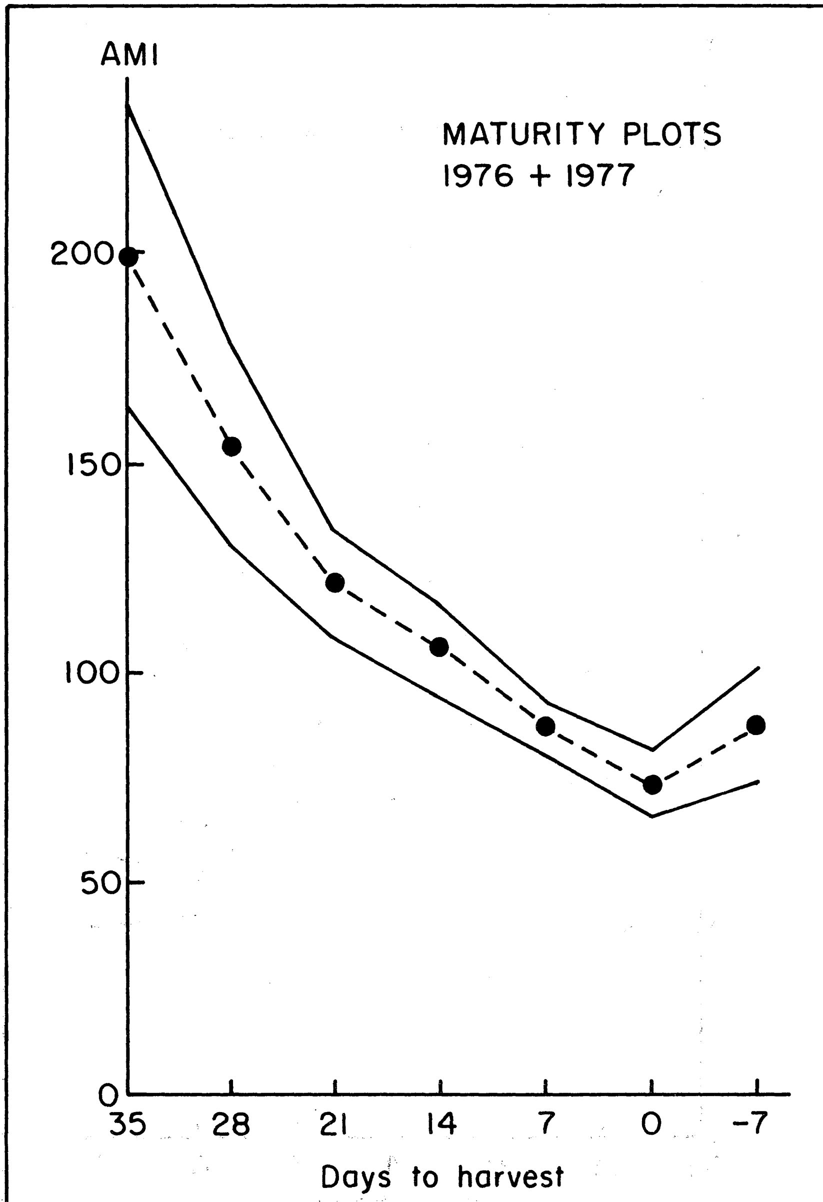
APPENDIX VI

AMI VALUES FOR PEANUTS FROM MATURITY PLOTS AT THE WIREGRASS SUBSTATION, 1977

Days from maturity	AMI values											
	Plot I[1,2]		Plot II		Plot III		Plot IV		Plot V		Average AMI[3]	
	FC[4]	FP	FC	FP	FC	FP[5]	FC	FP[5]	FC	FP	FC	FP
0	—	—	—	—	—	88.0	—	85.5	—	87.0	—	87.0
7	96.6		87.6	86.3	87.2	108.0	82.7	85.9	90.7	87.7	87.5± 3.3	87.0± 1.0
14	112.2	104.7	103.6	129.4	102.6	114.5	107.5	97.8	112.7	97.9	106.6± 4.6	113.7±22.3
21	107.3	119.9	128.7	135.6	134.8	121.4	131.1	119.0	135.6	122.0	132.6± 3.2	128.8± 9.6
28	115.2	118.6	159.0	174.7	176.9	97.7	163.1	121.8	196.5	161.6	173.9±16.9	168.2± 9.3
35	153.1	163.5	205.8	235.3	223.6	112.0	259.3	149.0	236.8	190.5	231.4±22.5	212.9±31.7
42	179.9	169.0	201.6	252.7	241.9		216.8	127.6	321.5	203.7	245.5±53.4	228.2±39.6

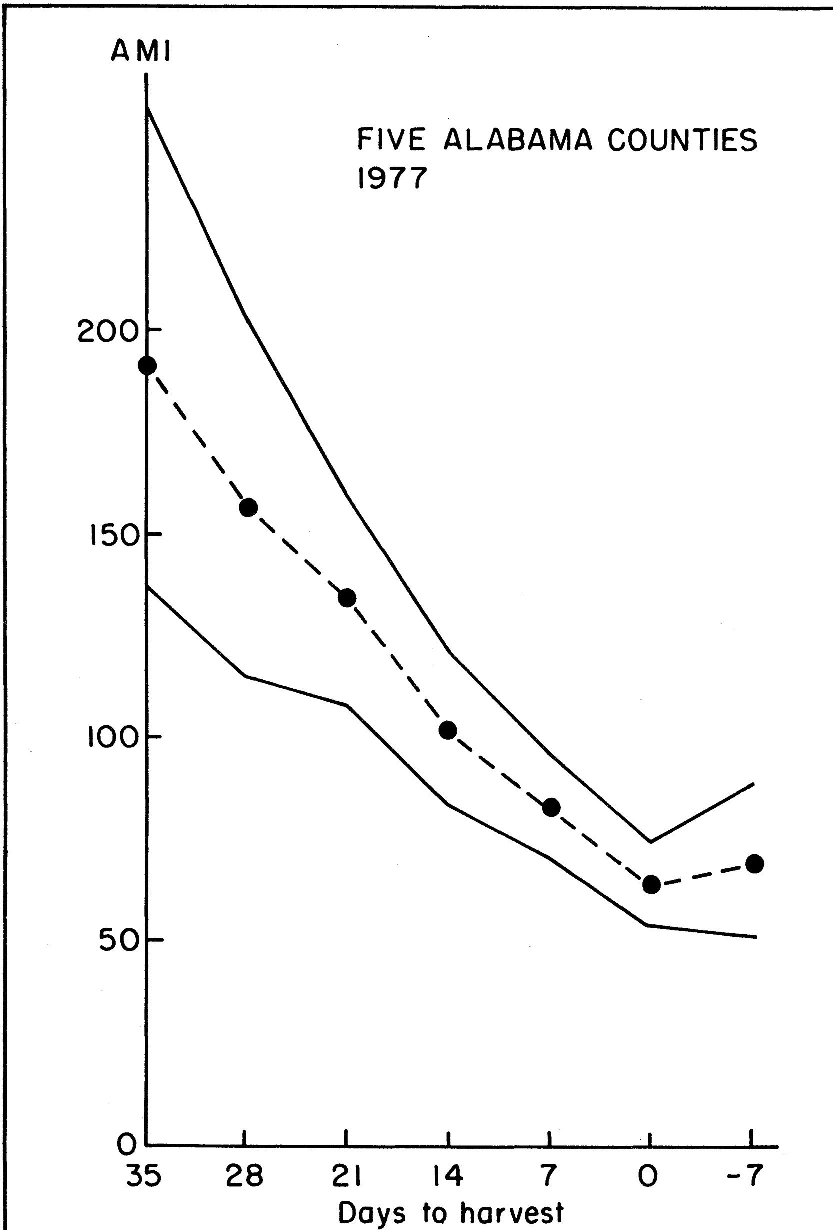
[1]Peanuts planted 4-7-77 at the Wiregrass Substation were not part of the maturity plots.
[2]Each value represents an average of two to three samplings.
[3]Averages do not include AMI values from Plot I (see footnote 1).
[4]See table 6 for meaning of abbreviations.
[5]Values not used in calculating AMI averages because "continuous cropping" was occurring (see text).

APPENDIX VII



Relation between AMI values and time of harvest for the maturity test plots at the Wiregrass Substation in 1976 and 1977 is shown by the dotted line. Solid lines represent standard deviation.

APPENDIX VIII



Relation between AMI values and time of harvest for the maturity test plots at the Wiregrass Substation and for fields of participating growers in 1977 is shown by the dotted line. Solid lines represent standard deviation.

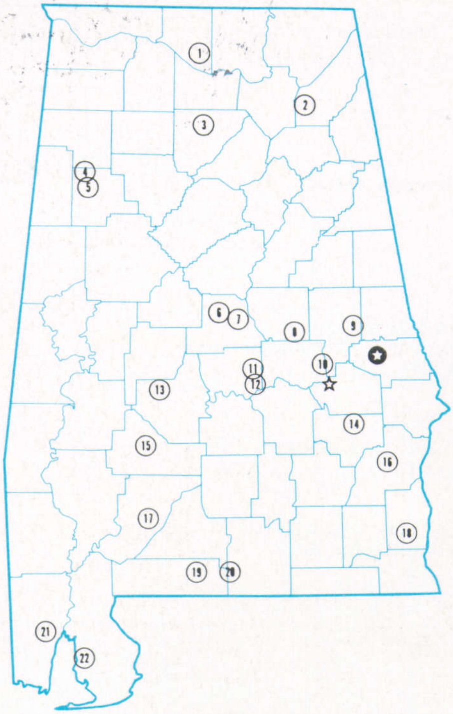
APPENDIX IX

METHODS OF DETERMINING PEANUT MATURITY

Method (abbreviation)	Description
Arginine maturity index (AMI)	Based on the relation between the seed free arginine content-dry matter ratio and maturity; AMI values decrease with increasing peanut maturity.
Methanolic extract (ME)	Based on the change in color (light transmittance) of a methanol extract of peanuts; the percent transmittance of this extract decreases with increasing maturity.
Seed-hull ratio	
fresh weight maturity index (FMI)	Based on the ratio of seed and hull fresh weights; ratio increases with increasing maturity.
dry weight maturity index (DMI)	Based on the ratio of seed and hull air dried weights; ratio increases with increasing maturity.
Shellout technique	Based on a change (darkening) of the internal pericarp color; increased darkening with increasing maturity.

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.