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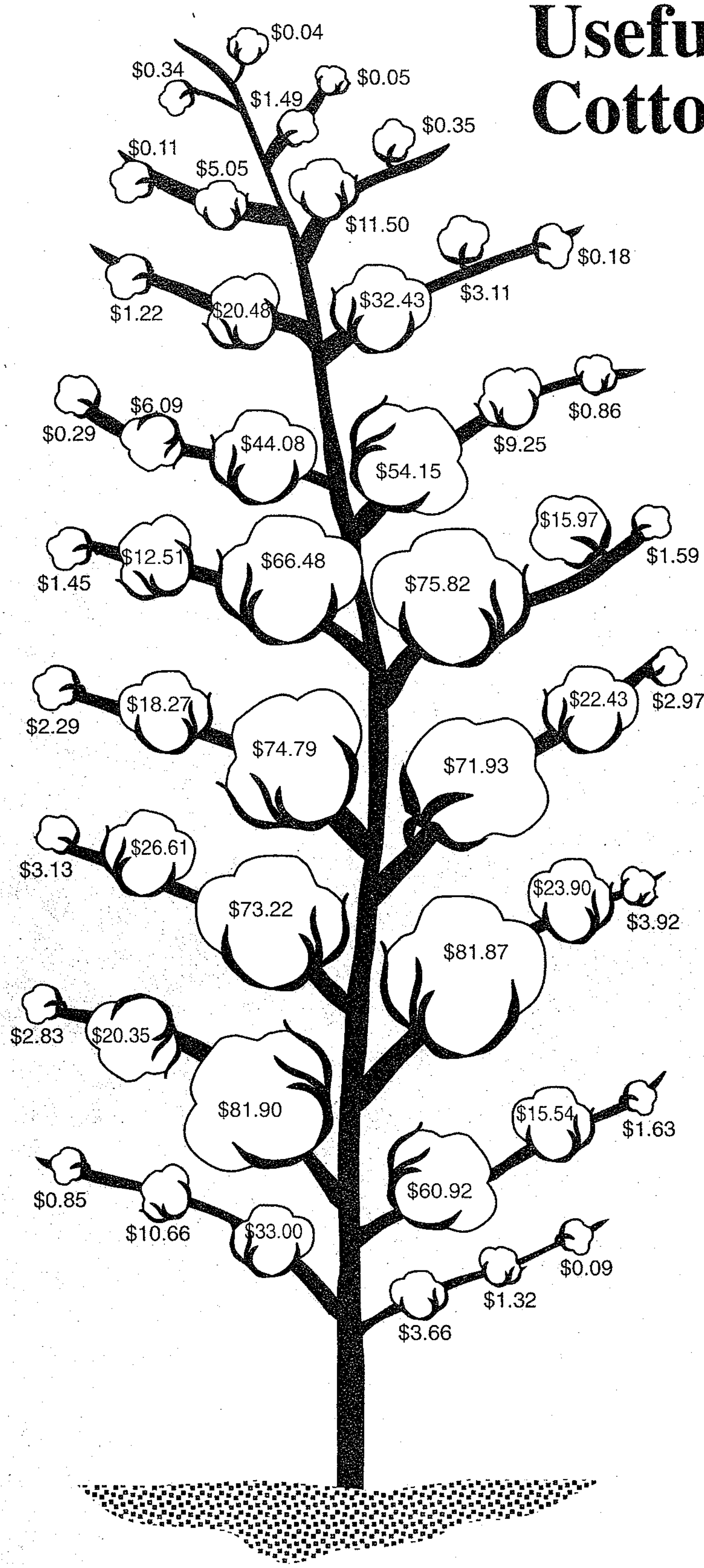
Useful Tools in Managing Cotton Production:

End of Season Plant Maps



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Useful Tools in Managing Cotton Production:

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Abstract

Each square on the cotton plant does not contribute equally to yield. We compared 12 cotton lines for fruiting sites that produced an open, harvestable boll. Contributions varied among cotton lines, nodes, and positions. We grew the lines for 2 years in a randomized, complete block design with six replications. All plants in a 10-foot section of each plot were plant mapped in a manner that recorded the number of bolls and the weight of seed cotton by fruiting site. Lint yield averaged 1,535 pounds per acre when averaged over all lines and the 2 years. There was no significant difference in mean lint yield except for the experimental line DH 126, which was significantly lower than any other line. Two-year means showed that 73.8%, 17.1%, 2.1%, and 6.6% of the lint was produced from bolls at positions 1, 2, 3, and on the vegetative branch, respectively. There was very little variation among cotton lines for the percentage of lint produced at the three positions. The mean amount of lint produced by nodes varied significantly among cotton lines, reflecting their differences in maturity. Detailed data by fruiting site and cotton line are presented, which can be useful in managing cotton production and particularly useful in managing cultivars that vary in maturity. Data from this study, which averaged slightly more than three bales per acre in yield, were compared to a previous study with eight cotton lines, which yielded about two bales per acre. These comparisons indicate that good season-long management is required to produce three bales per acre. A longer growing season was not required to produce the three-bale crops. There were three additional open bolls per plant in the three-bale cotton compared to the two-bale cotton. One of these additional bolls was produced between nodes 5 to 8, one between nodes 9 to 12, and one from all nodes above node 12.

Introduction

Research has shown that each square on the cotton plant does not contribute equally to yield. Bolls from first position squares contribute 66 to 75%, and bolls from second position squares 18 to 21%, to total yield of modern cultivars when plants are spaced three to four per row foot, (Jenkins et al., 1990a,b; Kerby et al., 1987).

Modern cultivars, compared to obsolete cultivars, make an earlier transition from vegetative to reproductive development during the time when maximal leaf mass and area are present (Wells and Meredith, 1984a,b). A wide choice of cultivars is available to growers in the Midsouth, and the cultivar choices are changing more rapidly than in previous years. In 1972, two cultivars, 'Stoneville 213' and 'Deltapine 16', accounted for more than 50% of the U.S. acreage (Bridge and McDonald, 1987). In 1994, there were 50 cultivars in the state cultivar trials in Mississippi (Calhoun et al., 1995). Additionally, there is a useful range of maturities among cultivars offered for sale in most cotton-growing regions.

Management of cotton growth and development can be greatly aided by a quantification of the contribution of various fruiting sites to yield in cultivars of various maturities.

The weight of seed cotton in a boll also varies among fruiting sites on a cotton plant. In a study of eight cultivars, bolls from position 1 were 14% larger than bolls from position 2 and 21% larger than bolls from position 3 (Jenkins et al., 1990b). Boll weights at each fruiting position also varied among nodes in a curve linear fashion. Weight of bolls at position 1 increased from node 6 to node 12 and then decreased for the remaining nodes (Jenkins and et al., 1990b). Meredith and Bridge (1973) reported that as the season progresses, the bolls that set and mature are smaller. The present studies compared selected current cultivars, experimental lines, and selected F_2 's from hybrid lines for the contribution of each fruiting site to yield using data generated from plant maps of plants at harvest.

Materials and Methods

The terms sympodium, monopodium, node, position, and fruiting site are defined as follows:

1. Sympodium–a fruiting branch.

2. Monopodium–a vegetative branch.

3. Node–the place on the main stem where sympodia or monopodia arise. We numbered the nodes beginning with the cotyledonary node as number one.

4. Position–refers to the order in which buds (potential bolls) are produced on a sympodium branch. In this bulletin, we refer to bolls as being produced at positions 1, 2, or 3. Bolls with position numbers greater than 3 were classified as 3. Thus, the term position is not branch specific; for example, position 1 refers to the first potential boll on all sympodia.

5. Fruiting site–a specific node-position combination.

Nine cotton lines currently (1990-1991) offered for sale in Mississippi and three experimental lines were included in this study. The F_2 lines from hybrids in this study were Chembred 1135 (CB 1135), Chembred 219 (CB 219), Chembred 232 (CB 232), and Chembred 407 (CB 407). Cultivars were 'DES 119', 'Deltapine 51' (DP 51), 'Deltapine 5415' (DP 5415), 'Deltapine 5690' (DP 5690), and 'Deltapine Acala 90' (DP 90). Experimental lines DH 126, La 850082FN, and Stoneville 69132 (ST 69132) were also included in the test because they each have a useful level of resistance to *Heliothis virescens* Fab., tobacco budworm, and thus, may be useful in cultivar development (Mahill et al.,1984; Bourland and Bridge, 1988; Calhoun et al., 1992; and Calhoun et al., 1994).

Seed was obtained from the developers of cultivars and the F_2 's from hybrid lines. Seed of DH 126 was from our breeding program (Mahill et al., 1984). ST 69132 and La 850082FN seeds were originally obtained from the developers. The cotton strain ST 69132 was developed by Jim Mitchell of Stoneville Pedigreed Seed Company, Stoneville, MS, by reselection in MT8-27 developed by Bourland and Bridge (1988). ST 69132 was subsequently released as a cultivar in 1992 by Stoneville Pedigreed Seed Company. La 850082FN, developed by Jack Jones at the Louisiana Agricultural Experiment Station, expresses the morphological traits of nectariless and frego bract and is reported to be resistant to tobacco budworm (Calhoun et al., 1992).

The cotton lines were planted in two row plots, spaced 38 inches apart and were 30 and 43 feet in length in 1990 and 1991, respectively. The experimental design was a randomized complete block with six replications on a Marietta sandy clay loam (fine-loamy, siliceous, thermic Fluvaquentic Eutrochrept) soil. Planting dates were April 25, 1990 and May 21, 1991. The delayed planting in 1991 was because of the very wet spring; May 21 was the earliest we could plant. Mean plant stand, at harvest, over the 12 entries was 47,000 in 1990 and 30,000 in 1991. Plots were fertilized with 120 pounds of K_2O per acre (lb/A), and 50 lb/A of N per acre on April 25 and 75 lb/A of N sidedress June 15, 1990. In 1991, plots were fertilized with 120 lb/A of K_2O on April 25, and 50 lb/A N May 20 and 80 lb/A of N as sidedress June 10. Terraclor Super X (5-Ethoxy-3trichloromethyl-1-1,2,4--thiadiazole) at 10 lb/A and aldicarb [2-methyl-2 (methylthio)propionaldehyde O-(methycarbamoyl) oxime] at 0.30 lb a.i./A were applied in furrow at planting. Insects were controlled by timely applications of insecticides. Plots were drip irrigated with 2 inches of water June 3, July 22, and Aug. 9 in 1990, and July 3, 12, and 19 in 1991. Plots were defoliated with DEF® (S,S,S,Tributyl phosphorotrithioate UPAC) and PREP® (2-chlorethyl) phosphonic acid on Sept.4, 1990 and Sept. 16, 1991. Even though the planting date was about one month later in 1991 than in 1990, the temperatures were higher in 1991 than in 1990 and the crop developed and matured well.

When the bolls in all of the lines were open, we mapped all the plants in a 10-foot section of row in each plot following the technique of Jenkins et al. (1990a). Thus, all entries were mapped after the latest maturing entry was open. The number of plants in each 10-foot sample was recorded, plants were cut between nodes 4 and 5, and monopodial branches were cut off and saved.

The plants were then taken to the edge of the field and the bolls on sympodial branches from all nonaborted plants were hand-harvested by fruiting site using a harvest box constructed for this purpose (McCarty et al., 1994). The number of bolls harvested on monopodial branches was recorded. All cotton on the monopodial branches from all plants in the sample was harvested in bulk, placed into a labeled bag, transported to the laboratory, and weighed. The number of bolls harvested was recorded by fruiting site and the seed cotton from each fruiting site was placed into labeled bags, taken to the laboratory, and weighed. From these data, we calculated the number of bolls, the weight of seed cotton, and the weight per boll for seed cotton produced at each fruiting site. The weight of seed cotton and number of bolls were then converted to percentages for each sympodial fruiting site and the monopodial branch based upon the nonaborted plants in each sample. We thus produced a fruiting site map that showed the percentage of the total seed cotton weight produced at each sympodial fruiting site and on the monopodial branches. We also calculated the percentage of the total number of bolls produced at each sympodial fruiting site and the monopodial branches.

The terminals in a few plants in each mapped sample were damaged during the growing season and these aborted terminal plants could not be mapped accurately. In order to account for the yield of these plants in the total yield, we harvested all the bolls on these aborted plants without recording fruiting site; but we recorded the number of bolls and weight of the cotton from these plants. The weight of seed cotton and number of bolls from aborted plants were then distributed across fruiting sites and the monopodial branches based upon the percentage of yield and bolls from the nonaborted plants in the sample. Thus, data from aborted plants did not influence yield distribution. This gave an accurate accounting of all cotton in terms of number of bolls and weight of seed cotton produced in each plot.

We hand-harvested a 50-boll sample from the nonsample portion of the row, weighed and ginned these samples, and calculated mean boll weight and lint fraction. The plots were machine-harvested and the seed cotton weighed. We used the mean lint percentage from the 50-boll samples from six replications of each entry to convert each replication of an entry into lint cotton. We are aware that lint percentage varies among fruiting sites; however, because of the small amount of seed cotton produced at some fruiting sites, it was not feasible to obtain accurate lint percentages by fruiting sites. The machine-harvested weights were converted to weight of lint per acre and this was distributed across fruiting sites according to the percentage distribution from the mapped plants from the 10-foot sample for each plot. Thus, the yields we report are machine-harvest yields from the mean of the two rows. The yield distributions reported are based upon all nonaborted plants in the 10-foot samples, and the percentages of plants with a boll reported are based upon all plants in the 10-foot samples.

Data were analyzed over years with a mixed model (random years and fixed entries) as described by McIntosh (1983). A separate analysis was also conducted for each fruiting site across years and entries. The data for total lint yields were also analyzed as cumulative yield by node. For some presentations we computed dollar values for the amount of lint produced per acre at selected fruiting sites using an average 1994 cotton price of $0.70 per pound of lint. Analyses of variances were conducted using SAS version 6.07. The LSD at 0.05 level was used to separate means from the analysis of variance. Some of the data are presented as means and standard errors. These were calculated by SAS version 6.07 using PROC MEANS, or by Sigma Plot for Windows version 1.02.

Results and Discussion

Total lint yield was significantly different among cotton lines and between years (Table 1). Yields in 1991 were significantly lower than in 1990 for each entry. The year-by-line interaction was also significant. When cotton line means were plotted by years, this interaction was caused by three lines: DES 119, DH 126, and ST 69132, which all had greater reductions in yield in 1991 than the other entries in the test. Average 2-year lint yields among cotton lines, except DH 126, ranged from 1,488 to 1,704 lb/A, with no significant difference among the entries with the exception of DH 126, which yielded 825 lb/A, significantly below any other entry. With the exception of DH 126, no significant differences were detected among the entries in 1990. In 1991, both DH 126 and and ST 69132 were significantly lower in yield than other entries.

Mean boll weight was significantly different among lines and between years with a significant year-by-line interaction (Table 1). Each line, except DH 126, had heavier bolls in 1991 than in 1990. This accounted for the significant year-by-line interaction. The heavier bolls in 1991 were associated with lower average lint yields. We would expect that lower yields resulting in fewer bolls per plant would be associated with heavier bolls as observed. As expected, boll weights varied significantly among entries from 4.14 grams (g) for DH 126 to 5.42 g for ST 69132 based upon 2-year means (Table 1). Lint percentages were significantly different among entries, as expected, ranging from 36.2 to 40.3% among 2-year means (Table 1).

Weather data for each of the years are shown in Table 2. Planting date in 1991 was 26 days later than in 1990. The weather data show about the same total rainfall each year from planting to defoliation. With the supplemental irrigation we applied, water was adequate each year. Degree days above 60 (DD 60's) were greater in 1991 than in 1990, with 2,154 and 2,293 DD 60's accumulated from planting to defoliation in 1990 and 1991, respectively (Table 2, Figure 1). The DD 60's accumulated faster in 1991 than in 1990, resulting in plants ready for defoliation at 119 days after planting in 1991, but requiring 133 days in 1990. Solar radiation during the growth of the plants was similar, with 67,816 and 55,766 langleys accumulated from planting until defoliation in 1990 and 1991, respectively (Table 2, Figure 2).

The vertical flowering interval (VFI) and horizontal flowering interval (HFI) are temperature-dependent as well as dependent upon the number of maturing fruit on the plant. Mauney (1986) cites several studies that showed a VFI range of 2.2 to 4.0 days and a HFI range of 5.8 to 8.5 (Hesketh et al., 1972; McClelland and Neely, 1931; McNamara et al., 1940; Kerby and Buxton, 1978). Cotton cultivars in Mississippi generally have about 3- and 6-day VFI and HFI. Under the growing conditions in this experiment, the plants produced a mean of 23 nodes with the first sympodial branch at node 5. Each entry produced about one monopodial branch per plant. The

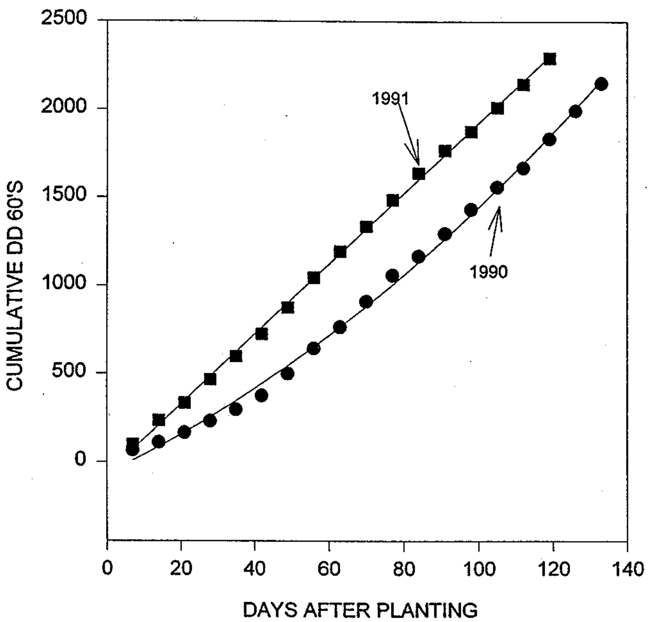

Figure 1. Cumulative Degree Day 60's for 1990 and 1991.

1990 Y = -61.54 +9.88X +0.05X²; R² = 99.7.

1991 Y = -68.05 + 19.77X + 0.001X²; R² = 99.9.

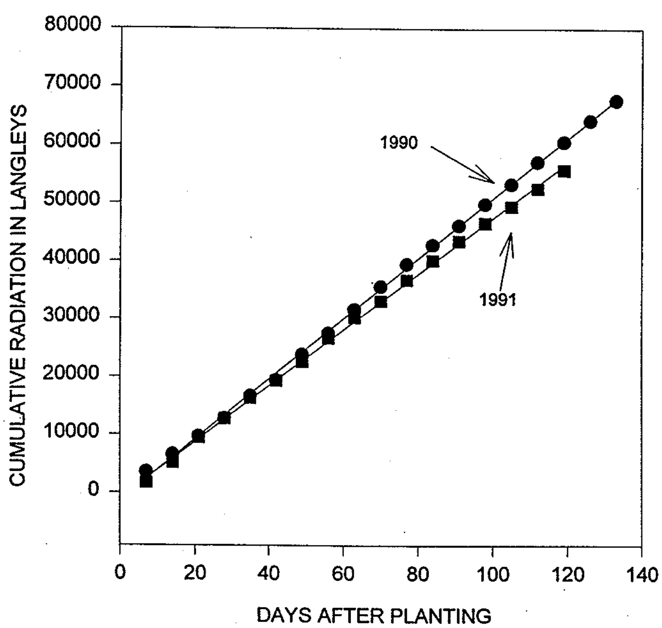

Figure 2. Cumulative radiation in langleys for 1990 and 1991 growing season.

1990 Y = −1159.2 + 519.4X; R² = 99.9.

1991 y = −891.1 + 1482.7X; R² = 99.9.

modopodial branch usually flowers about midseason, which is the same flowering time as for first position fruit at nodes 10 to 12.

We were interested in evaluating the relative contribution of fruiting sites to yield in these cultivars that have been bred and developed to express a range of maturities. It was readily apparent that all fruiting sites did not make an equal contribution to yield. We obtained significant differences in boll weight, lint yield, and percent of plants with an open boll among fruiting sites.

Plant stand was lower in 1991 than in 1990 (Table 1). This was reflected in the distribution of lint across positions each year (Table 3). Each line except DH 126 had a smaller percentage of the lint produced from bolls at position 1 in 1991 than in 1992. Averaged over all lines, 80.5% and 65.7% of the total bolls were first-position bolls in 1990 and 1991, respectively. This shows the effect of plant stand on distribution of lint. The lower plant stand in 1991 was reflected in a lower contribution of position 1 fruit to yield. The smaller proportion of the total lint produced at position 1 in 1991 was offset by an average 5% increase in contribution from position 2, and a 2% and 7.4% increase in contribution of position 3 and monopodial branches.

The distributions by positions, across lines, and years were similar among entries each year, except for DH 126. Thus, the 2-year averages by fruiting sites are valid and can be used to describe how these cotton lines fruit. The 2-year averages showed that 73.8%, 17.5%, 2.1%, and 6.6% of total lint was produced from position 1, 2, 3, and monopodium, respectively (Table 3). This agrees with Kerby and Buxton (1981), who found 76% of the bolls at position 1. Kerby et al. (1990a,b) reported that spacing and plant genotype were both important in boll set and size.

Figure 3 shows the percent of plants with an open boll at positions 1, 2, and 3 when averaged over 2 years. The contribution of first-position bolls to total lint yield increased steadily from node 5 through node 13 and then decreased steadily. A graph of percentage of plants with a boll by nodes forms a bell-shaped curve (Figure 3). A similar, but smaller, curve with a peak boll set at node 10 was found for bolls at position 2.

When the yield is distributed across nodes by years, we note that in 1991 there was less contribution of position 1 bolls to yield below node 14 and a slight increase in contribution of nodes above 15. However, the distribution curves by years are remarkedly similar (Figure 4). For crop management, we can consider the distribution of lint across fruiting sites as in Figure 5 and Tables 4, 5, and 6. This figure shows the percentage of plants with an open boll at each fruiting site. Another way to consider these data is to consider these numbers as the probability that an

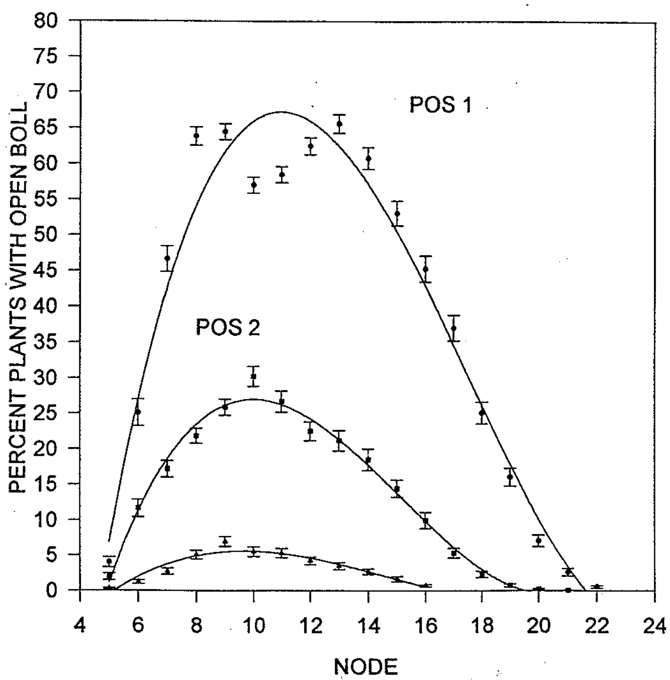

Figure 3. Percentage boll set by position (± SEM). Mean of 12 cotton lines over 2 years.

Position 1 $Y = -176.7 + 52.4X - 3.47X^2 + 0.06X^3$; $R^2 = 96.4$.
Position 2 $Y = -101.6 + 30.77X - 2.3X^2 + 0.05X^3$; $R^2 = 98.7$.
Position 3 $Y = -26.88 + 8.0X - 0.61X^2 + 0.01X^3$; $R^2 = 90.7$.

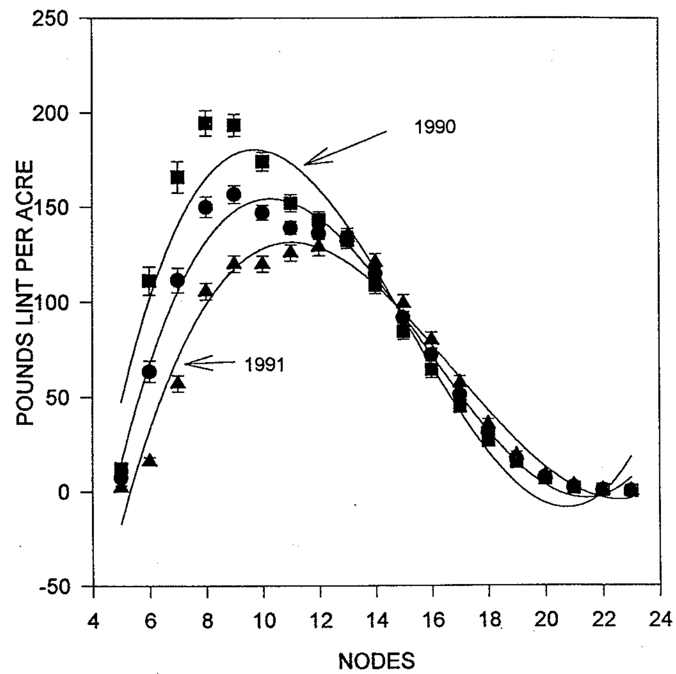

Figure 4. Lint yield (²SEM) by years and mean of 2 years. Mean of 12 cotton lines.

Lint yield 1990 $Y = -517.63 + 170.25X - 12.86X^2 + 0.28X^3$; $R^2 = 95.0$.
Lint yield 1991 $Y = -472.93 + 130.98X - 8.84X^2 + 0.17X^3$; $R^2 = 97.0$.
Lint yield 2-year mean $Y = -495.29 + 150.62X - 10.85X^2 + 0.22X^3$; $R^2 = 98.5$.

open boll will be available for harvest at the various fruiting sites. For all first-position sites, the probability of an open boll available for harvest is more than two times greater than from second-position sites at every node. This chart should be very useful to growers for crop management. For example, at midseason when most all the fruiting branches are on the plant, a consideraton of which of the many squares and bolls on the plant are likely to be available at harvest can be very helpful in making management decisions such as those relative to irrigation or pest control.

Careful consideration of Figure 5 is needed. These data are from the mean of all 12 entries in the test averaged over 2 years. The plants that produced the data for Figure 5 averaged 10.33 bolls per plant with 9.65 of those bolls from positions 1, 2, and 3. (If one adds up the numbers on Figure 5, the total is 965, which represents the total number of bolls at positions 1, 2, and 3 from 100 plants.) Although each plant in the crop only produced 10.33 bolls (9.65 on fruiting branches), these bolls were distributed over all the plants in the stand in such a way that the average distribution shown in Figure 5 was produced. For example, 4% of the plants had an open boll at node 5, position 1 (fruiting site 5-1). At fruiting sites 7-1 and 12-1, there were 46.7% and 62.5% of the plants with an open boll. Notice that very few plants had an open boll at any position 3 fruiting sites. In fact, the highest was 6.9% of the plants with an open boll at fruiting site 9-3. This is an indication that one should not spend much management time and money attempting to set position 3 fruit. Or, putting it another way, n o

Figure 5. Probability of an open harvestable boll at various fruiting sites. Mean of 12 cotton lines over 2 years.

POS 3	POS 2	POS 1	NODE	POS 1	POS 2	POS 3
			21	2.6	0.1	
	0.2	7.1	20			
			19	16.0	0.7	
	2.3	25.1	18			
			17	37.0	5.3	
0.7	9.9	45.3	16			
			15	53.1	14.4	1.7
2.7	18.5	60.8	14			
			13	65.6	21.2	3.5
4.2	22.5	62.5	12			
			11	58.5	26.7	5.3
5.5	30.2	57.0	10			
			9	64.5	25.9	6.9
5.1	21.9	63.8	8			
			7	46.7	17.2	2.8
1.2	11.6	25.1	6			
			5	4.0	2.0	0.3

matter how well one manages the crop, not many plants are going to produce an open boll at any position 3 fruiting site.

Thus far, we have considered the boll set data as averages over 12 cotton lines and 2 years. Data for individual cotton lines by positions and nodes are shown in Tables 4, 5, and 6. These tables show the percentage of plants (±SEM) that produced an open boll at each fruiting site for each cotton line. The data reflect the maturity differences among the lines. They show, for example, that DES 119 had more plants with a boll at nodes 5-12 than DP 90 and more plants of DP 90 had a boll above node 12 than those of DES 119 (Table 4). This accurately reflects the maturity differences between these two cultivars.

The weight of bolls also varies by node and position (Figure 6). First-position bolls are larger than second, which are larger than third. Bolls at nodes in the center of the plant are larger than bolls lower or higher on the plant for a given position. This agrees with previously reported research on boll size (Jenkins et al., 1992b). Meredith and Bridge (1973) reported that as the season progresses, bolls that set tend to be smaller. Our data agree with these authors for bolls above node 10. Thus, in addition to fewer bolls at positions 2 and 3, these bolls are generally smaller than bolls at position 1. Regression equations for boll weight by fruiting site are shown in Figure 6.

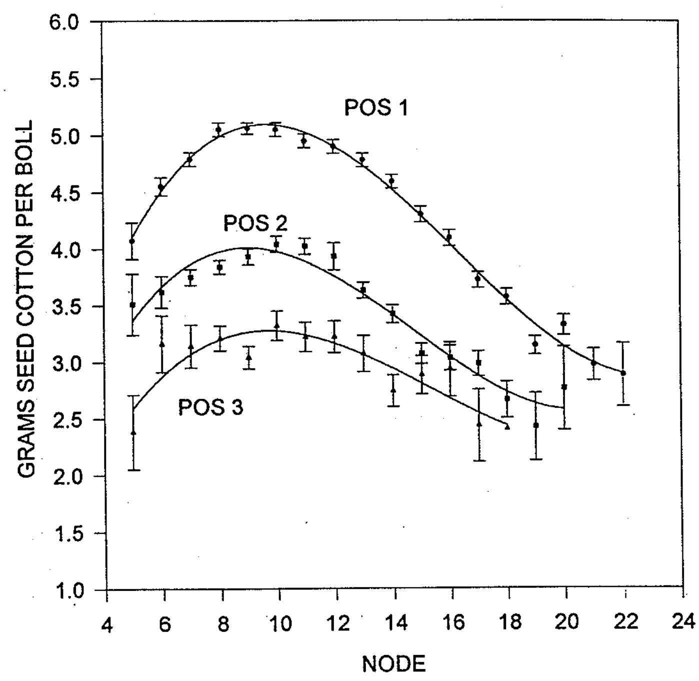

Figure 6. Boll weight (±SEM) by node and position. Mean of 12 cotton lines over 2 years.

Boll size Position 1 $Y = -0.12 + 1.26X - 0.09X^2 + 0.002X^3$: $R^2 = 99.0$.

Boll size Position 2 $Y = -0.07 + 1.07X - 0.09X^2 + 0.002X^3$; $R^2 = 94.4$.

Boll size Position 3 $Y = -0.36 + 0.89X - 0.07X^2 + 0.001X^3$; $R^2 = 77.6$.

Boll weight and boll set percentage followed similar patterns, with boll weights at position 1 increasing from node 5 to nodes 10-12 and decreasing thereafter. Boll set increased at position 1 from nodes 5 through node 13 and decreased thereafter. These correlations are similar to those in our previous research (Jenkins et al., 1990b). This is an indication that boll weight and boll set percentage are both related to partitioning of available photosynthate. The highest value for percentage of plants with a open boll was at node 13 for position 1. This general reduction in percentage of plants with a mature boll after node 13 and the smaller bolls at the higher nodes are primarily a reflection of the boll load and photosynthetic demand on the plant.

Thus far, we have discussed the general distributions of lint when averaged over 12 cotton lines. We know that the relative value of fruiting sites that mature harvestable bolls varies among cultivars, especially among cultivars of different maturities. Cultivars similar to DP 90 mature later than cultivars such as DP 51 or DES 119. This can be seen by comparing the amount of lint produced at various fruiting sites for each of the lines in this experiment. To make these data more easily understood, they are shown in dollar per acre values, calculated by multiplying the pounds of lint per acre produced at each fruiting site by $0.70 per pound. These 2-year mean data are shown in Tables 7, 8, 9, and 10. Total lint yields were in the three-bales-per-acre range, except for DH 126, which was significantly lower than any other line. Among the other lines, values ranged from $1,041 to $1,193 per acre, with no significant differences among lines except for DH 126 (Table 7).

There were significant differences among cotton lines in total value of lint produced at each node except nodes 6, 21, and 23 and on monopodial branches (Table 7). Most of these differences were because of the value of lint from position 1 bolls, with significant differences among lines expressed at all nodes except nodes 6, 7, 21, and 23 (Table 8). When the lint from position 2 was considered by nodes, among lines, only nodes 5, 6, 7, 9, 12, and 13 showed significant differences (Table 9). Lint from position 3 bolls contributed very little to total value; however, values among lines by nodes are shown in Table 10.

When DES 119, representing early maturing cultivars, is compared with DP 90, representing late maturing cultivars, the differences in where the lint is produced are readily apparent. Total value of lint was $1,121 and $1,158 for DES 119 and DP 90, respectively (Table 7). These are not significantly different. Cumulative lint values (± SEM) by nodes are shown in Figure 6. It is easily seen that DES 119 acumulates

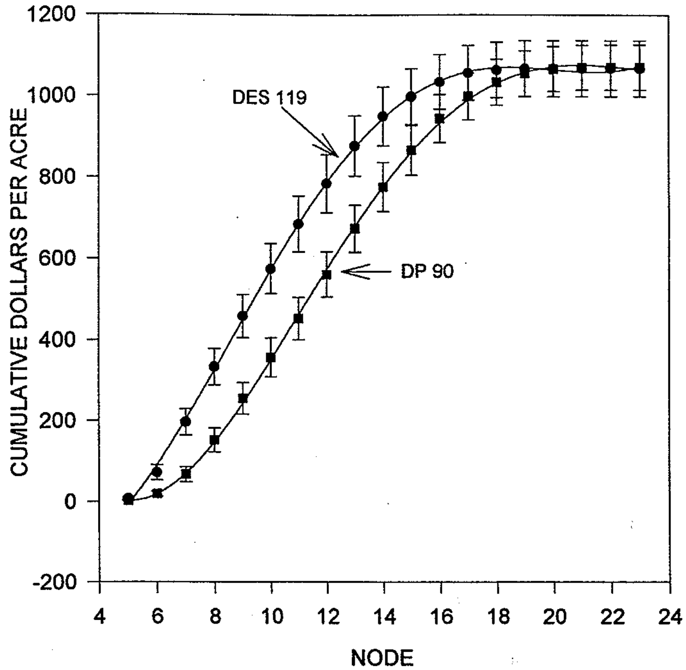

Figure 7. Cumulative dollar value (±SEM) per acre for DES 119, an early season cultivar, and DP 90, a full season cultivar. Mean of 2 years.

DES 119 $Y = 96.05 - 174.89X + 41.60X^2 - 2.35X^3 + 0.004X^4$; $R^2 = 99.97$

DP 90 $Y = 832.34 - 378.00X + 53.72X^2 - 2.43X^3 + 0.04X^4$; $R^2 = 99.97$

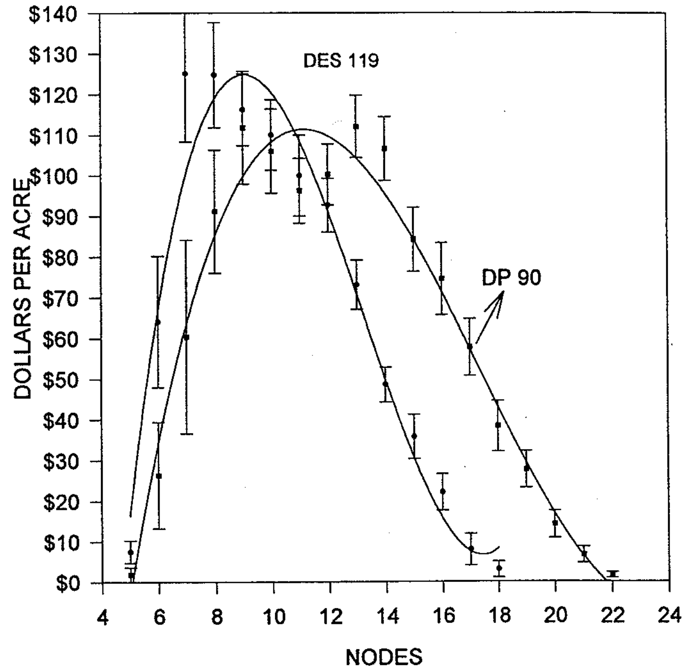

Figure 8. Dollar value (±SEM) per acre by node for DES 119, an early season cultivar, and DP 90, a full season cultivar. Mean of 2 years.

DES 119 $Y = -581.9 + 188.9X - 15.9X^2 + 0.4X^3$; $R^2 = 96.0$.

DP 90 $Y = -341 + 96.6X - 6.4XD2 + 0.1X^3$; $R^2 = 97.1$.

lint value at a faster rate than DP 90. For example, lint at nodes 10 and below is worth $574 for DES 119 but only $355 for DP 90. By node 16, these values are much closer at $1,034 and $943. By node 20, the two cultivars have equal values of lint set on the plant.

In Figures 7 and 8, the lint value is plotted by nodes for the two cultivars. Notice that at nodes 8 and below, DES 119 lint is significantly higher in value than DP 90 and about equal in value at nodes 9 through 12. Lint values above node 12 are significantly higher in value for DP 90 than for DES 119. This shows that DES 119 makes its lint at the lower and middle nodes on the plant and DP 90 makes its lint at the middle and higher nodes. This also shows how DES 119 produces as an early-maturing cultivar and DP 90 as a full-season cultivar. Since these two cultivars mature different amounts of bolls at different nodes, they should be managed accordingly. DES 119 needs nutrients, water, sunlight, and everything necessary to produce cotton at different times in the season than does DP 90.

Another way to consider the maturity differences between these two cultivars is shown by plotting the percentage of plants with an open boll for first and second positions at each node (Tables 4 and 5, Figure 9). In DP 90, more bolls are matured at higher nodes for positions 1 and 2 than in DES 119. Figure 10 shows the probability of producing a harvestable boll

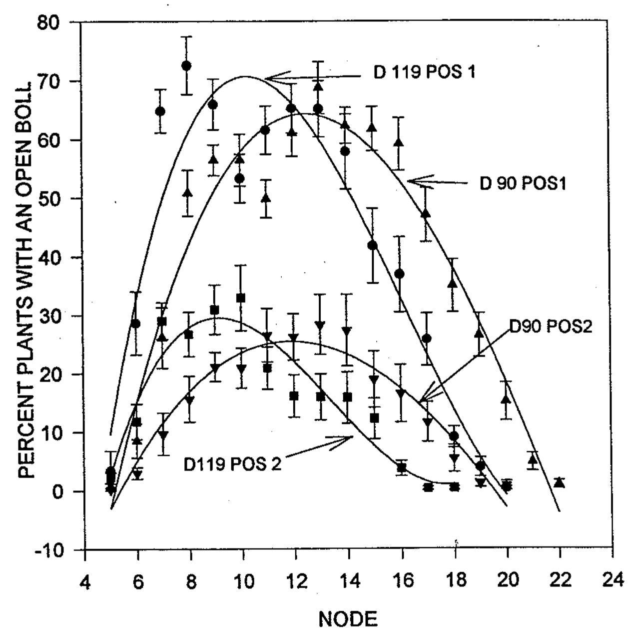

Figure 9. Percentage (±SEM) of plants with an open boll at harvest, by node for position 1 and two for DES 119, an early season cultivar, and DP 90, a full season cultivar.

DES 119 Position 1 $Y = -212.71 + 65.45X - 4.68X^2 + 0.09X^3$; $R^2 = 90.0$.

DES 119 Position 2 $Y = -139.43 + 44.67X - 3.71X^2 + 0.09X^3$; $R^2 = 90.2$.

DP 90 Position 1 $Y = -144.57 + 37.74X - 2.02X^2 + 0.03X^3$; $R^2 = 95.1$.

DP 90 Position 2 $Y = -67.52 + 17.24X - 0.92X^2 + 0.01X^3$; $R^2 = 94.0$.

at any fruiting site for DES 119 and DP 90. Considering first position bolls, where most of the lint is produced, there is a significantly higher probability of setting and maturing a boll for nodes 5-8 in DES 119 than in DP 90; whereas, for nodes in the top of the plant, DP 90 has a significantly higher probability of maturing a boll at any fruiting sites.

The equivalent data are plotted as dollars per fruiting site for DES 119 and DP 90 in Figure 11. For each cultivar, first-position lint was the most valuable and third-position bolls were almost worthless. Some interesting management options can be provided by data in Figure 11. For example, suppose that one chooses to defoliate both cultivars when harvestable bolls are open at nodes 17 and below. For DES 119, only $11 worth of lint would be sacrificed; whereas, $79 worth of lint would be sacrificed for DP 90. The decision to defoliate at this time would cost significantly more (in terms of lost yield) for the DP 90 cultivar than for the DES 119 cultivar. This is but one management application for which these data can be used. The data in Tables 7-10 can be used to compare other cultivars.

We mapped eight cultivars in 1987 and 1988 (Jenkins et al., 1990a,b). Mean yield across cultivars was 980 pounds of lint per acre. In the present experiment with 12 entries, the mean lint yield was 1,535 lb/A. These two data sets represent 2.0 and 3.2 bales per acre cotton crops. We converted the lint per acre, by nodes, to dollars at $0.70 per pound for each of these crops and plotted the data (Figure 12).

It is instructive to notice how the two sets of data differ. The three-bale crop set more lint at each node than the two-bale crop (range from $2 to $46 more). It did not require more nodes to produce the three-bale crop; thus, it did not require a longer growing season. At every node, more lint was set in the three-bale crop than in the two-bale crop. This was particularly true for nodes in the lower and middle part of the plant where the values ranged from $20 to $46 per node more lint in the three-bale crop. This has considerable implications for the type of crop management practices required for a two-bale and a three-bale crop. These increases in lint value occurred at each node because a higher percentage of plants set and matured a boll in the three-bale crop than in the two-bale crop. The average number of bolls per plant in the two-bale crop was 7 and in the three-bale crop it was 10.33. All nutritional and management requirements are needed at different times of the season for the three-bale crop than for the two-bale crop.

A comparison of the number of open bolls by fruiting site for the two-bale and three-bale cotton crops is shown in Table 11. The two-bale crop made 6.6 bolls per plant on the fruiting branches, whereas, the three-bale crop made 9.6 bolls per plant on the fruiting branches.

At which fruiting sites were the additional three

Figure 10. Probability of an open boll at harvest, by fruiting site on DES 119, an early season cultivar, and DP 90, a full season cultivar. Mean of 2 years.

DELTAPINE 90				DES 119		
POS 3	POS 2	POS 1	NODE	POS 1	POS 2	POS 3
		4.8	21			
	0.8	15.1	20	0.3		
	1.1	26.4	19	3.9		
	5.4	34.9	18	9.0	0.3	
0.4	11.6	47.0	17	25.7	0.3	
1.5	16.5	59.1	16	36.8	3.7	
3.8	18.9	61.7	15	41.7	12.2	
3.6	27.3	62.3	14	57.8	15.8	1.7
3.6	28.3	68.7	13	65.1	15.9	2.0
6.4	26.2	61.0	12	65.2	16.1	4.7
3.8	26.5	49.8	11	61.5	20.9	4.1
6.9	20.9	56.4	10	53.3	32.9	4.4
8.7	21.1	56.4	9	65.9	30.9	1.5
1.4	15.6	50.8	8	72.5	26.7	2.9
1.3	9.7	26.1	7	64.8	29.0	5.3
0.5	3.0	8.5	6	28.6	11.8	0.5
0.0	0.2	0.8	5	3.4	2.2	0.0

Figure 11. Dollar value per acre per fruiting sites on DES 119, an early season cultivar, and DP 90, a full season cultivar. Mean of two years.

DELTAPINE 90				DES 119		
POS 3	POS 2	POS 1	NODE	POS 1	POS 2	POS 3
		$3	21			
		$11	20			
	$1	$21	19	$3		
	$3	$32	18	$8		
$1	$8	$47	17	$22		
$1	$12	$65	16	$33	$3	
$2	$15	$73	15	$40	$8	
$2	$21	$79	14	$62	$10	$1
$2	$25	$86	13	$80	$12	$1
$4	$26	$79	12	$84	$14	$2
$3	$24	$69	11	$85	$22	$3
$4	$20	$77	10	$80	$33	$3
$5	$22	$75	9	$92	$31	$1
$1	$16	$68	8	$103	$32	$2
$2	$9	$38	7	$93	$29	$3
$1	$3	$14	6	$47	$16	
		$1	5	$5	$3	

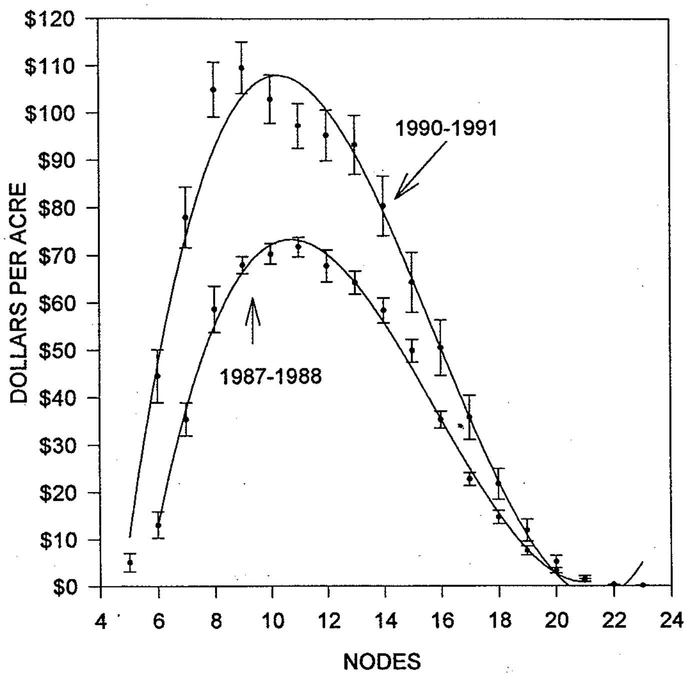

Figure 12. Comparison of lint value per acre (±SEM) by node for 12 cotton lines with a yield of 1,535 pounds lint per acre (data from 2-year mean from 1990, 1991) with 8 cotton lines with a yield of 980 pounds lint per acre (data 2-year mean from 1987, 1988). Data shown in dollars with lint priced at $0.70 per pound.

1990-1991 mean $Y = -346.47 + 105.37X - 7.59X^2 + 0.16X^3$; $R^2 = 98.6$.

1987-1988 $Y = -331.7 + 91.1X - 6.4X^2 + 0.13X^3$; $R^2 = 99.4$.

bolls made per plant in three-bale crop?

There were 0.9, 1.0, and 1.1 more bolls per plant on the three-bale crop than on the two-bale crop, from nodes 5-8, 9-12, and 13-21, respectively. Thus, about two of these bolls were made on the first eight fruiting branches and one on the last nine fruiting branches. Of the three additional bolls, 2.2, 0.7, and 0.3 were from fruiting positions 1, 2, and 3, respectively.

Considering these data, it seems that proper management is needed throughout the growing season to produce top yields. The additional bale in the three-bale crop did not require a longer growing season. In fact, two-thirds of the additional lint was made at nodes 5-12. Thus, early season management was critical for higher yields. It is interesting that about 59% of the total yield of both the two-bale and the three-bale cotton was made from nodes 5-12 and 77% was made from nodes 5-14. Thus, 77% of the total yield of both crops was made on the first 10 fruiting branches whereas the last seven fruiting branches only contributed 23% of the total yield. It should be remembered that these data are from an average of 8 and 12 cultivars, respectively, which covered a range of maturities. The importance of individual fruiting branches will vary some with cultivars of different maturities. However, the difference between two- and three-bale cotton crops of the same cultivar should follow the same trends as these average data.

We suggest that a careful study of the fruiting curves and data in this bulletin should be very helpful in managing cotton production. Cultivar maturity differences, yield expectations, plant spacing, agronomic practices, pests, and weather conditions are all important in making crop management decisions. We believe the data we have presented can be useful in making these decisions.

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Appendix

Tables 1 through 11

Table 1. Mean lint yield, boll weight, and lint fraction of 12 cotton lines grown for 2 years at Mississippi State, MS. Boll weight and lint percentage from 50-boll hand-harvested samples.

Line	Lint Yield			Plants per Acre			Boll Weight			Lint Percentage		
	1990	1991	Mean	1990	1991	Mean	1990	1991	Mean	1990	1991	Mean
	Lb per Acre			Number			Grams			%		
CB 1135	1,684	1,503	1,594	56,629	30,492	43,561	4.80	5.24	5.02	39.0	40.1	39.5
CB 219	1,708	1,464	1,586	44,707	32,556	38,632	5.17	5.63	5.40	39.2	39.3	39.3
CB 232	1,667	1,465	1,566	45,166	31,180	38,173	4.61	5.23	4.92	38.1	37.5	37.8
CB 407	1,797	1,538	1,668	49,292	32,327	40,810	4.72	5.06	4.89	39.2	40.6	39.9
DES 119	1,879	1,324	1,602	52,878	29,117	40,998	4.73	4.82	4.77	40.6	39.4	40.0
DH 126	1,058	592	825	34,619	25,907	30,263	4.55	3.73	4.14	36.4	36.1	36.2
DP 51	1,666	1,473	1,570	45,853	29,805	37,829	4.62	5.18	4.90	38.2	38.5	38.5
DP 5415	1,646	1,579	1,613	49,522	28,658	39,090	4.37	4.92	4.65	39.9	40.8	40.3
DP 5690	1,854	1,555	1,704	56,858	32,097	44,478	4.74	5.15	4.95	39.6	40.7	40.1
DP 90	1,752	1,558	1,655	40,809	33,931	37,370	4.51	4.97	4.74	39.4	40.9	40.2
La 850082FN	1,719	1,371	1,546	44,019	26,366	35,193	5.19	5.25	5.22	39.8	39.2	39.5
ST 69132	1,838	1,136	1,488	44,019	23,385	33,702	5.37	5.47	5.42	40.4	40.2	40.3
MEAN	1,689	1,380	1,535	47,031	29,652	38,341	4.78	5.05	4.92	39.2	39.4	39.3
LSD 0.05	203	154	281				0.43	0.34	0.61	0.9	1.0	1.4

Table 2. Weather data for 1990 and 1991 growing seasons.

			Daily										Cumulative by month						Cumulative from Day of Planting					
			Solar Radiation		Max Temp		Min Temp		Rainfall		DD60		Solar Radiation		Rainfall		DD60		Solar Radiation		Rainfall		DD60	
Julian Day	Mo.	Day	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991
			--Langleys--		°F				In		°F		Langleys		In		°F		Langleys		In		°F	
110	4	20	255	261	74	63	58	51	0.01	0.00	6	0	255	261	0.01	0.00	6	0						
111	4	21	307	483	79	64	63	47	0.01	0.16	11	0	562	744	0.02	0.16	17	0						
112	4	22	569	108	82	56	59	49	0.00	0.15	11	0	1,131	852	0.02	0.31	28	0						
113	4	23	517	350	83	70	57	50	0.00	0.01	10	0	1,648	1,202	0.02	0.32	38	0						
114	4	24	564	592	84	78	57	48	0.00	0.00	11	3	2,212	1,794	0.02	0.32	48	3						
115	4	25	543	357	81	74	59	58	0.00	0.00	10	6	2,755	2,151	0.02	0.32	58	9	543		0.00		10	
116	4	26	613	92	82	71	56	64	0.00	0.00	9	8	3,368	2,243	0.02	0.32	67	17	1156		0.00		19	
117	4	27	187	207	72	74	60	65	0.99	1.92	6	10	3,555	2,450	1.01	2.24	73	26	1,343		0.99		25	
118	4	28	612	66	74	69	53	62	0.00	1.66	4	6	4,167	2,516	1.01	3.90	77	32	1,955		0.99		29	
119	4	29	610	12	84	69	50	60	0.00	2.68	7	5	4,777	2,528	1.01	6.58	84	36	2,565		0.99		36	
120	4	30	553	389	87	76	66	60	0.00	0.00	17	8	5,330	2,917	1.01	6.58	100	44	3,118		0.99		52	
121	5	1	494	566	88	83	64	62	0.00	0.00	16	13	494	566	0.00	0.00	16	13	3,612		0.99		68	
122	5	2	349	662	79	79	61	51	0.00	0.00	10	5	843	1,228	0.00	0.00	26	18	3,961		0.99		78	
123	5	3	392	161	86	75	66	56	0.00	0.72	16	6	1,235	1,389	0.00	0.72	42	23	4,353		0.99		94	
124	5	4	239	347	78	82	67	66	0.76	0.04	13	14	1,474	1,736	0.76	0.76	55	37	4,592		1.75		107	
125	5	5	328	148	69	75	50	61	0.00	1.05	0	8	1,802	1,884	0.76	1.81	55	45	4,920		1.75		107	
126	5	6	581	688	72	70	45	50	0.00	0.11	0	0	2,383	2,572	0.76	1.92	55	45	5,501		1.75		107	
127	5	7	664	656	76	77	47	46	0.00	0.00	2	2	3,047	3,228	0.76	1.92	56	47	6,165		1.75		108	
128	5	8	431	35	76	67	52	57	0.35	1.43	4	2	3,478	3,263	1.11	3.35	60	49	6,596		2.10		112	
129	5	9	240	376	79	81	62	63	0.05	0.30	11	12	3,718	3,639	1.16	3.65	71	61	6,836		2.15		123	
130	5	10	693	258	69	79	48	67	0.00	0.01	0	13	4,411	3,897	1.16	3.66	71	74	7,529		2.15		123	
131	5	11	297	180	68	74	46	67	0.04	0.55	0	11	4,708	4,077	1.20	4.21	71	84	7,826		2.19		123	
132	5	12	128	213	69	83	56	64	1.12	2.46	3	14	4,836	4,290	2.32	6.67	73	98	7,954		3.31		125	
133	5	13	572	555	82	87	61	61	0.00	0.00	12	14	5,408	4,845	2.32	6.67	85	112	8,526		3.31		137	
134	5	14	633	584	88	89	59	64	0.00	0.00	14	17	6,041	5,429	2.32	6.67	98	128	9,159		3.31		150	
135	5	15	533	517	87	88	68	69	0.00	0.00	18	19	6,574	5,946	2.32	6.67	116	147	9,692		3.31		168	
136	5	16	527	518	86	88	68	68	0.01	0.11	17	18	7,101	6,464	2.33	6.78	133	165	10,219		3.32		185	
137	5	17	646	481	80	88	54	72	0.00	0.00	7	20	7,747	6,945	2.33	6.78	140	185	10,865		3.32		192	
138	5	18	604	354	82	81	50	68	0.00	0.16	6	15	8,351	7,299	2.33	6.94	146	199	11,469		3.32		198	
139	5	19	485	524	84	85	63	67	0.00	0.00	14	16	8,836	7,823	2.33	6.94	159	215	11,954		3.32		211	
140	5	20	315	172	86	75	59	69	0.58	0.00	13	12	9,151	7,995	2.91	6.94	172	227	12,269		3.90		224	
141	5	21	219	221	77	77	63	66	0.54	0.00	10	12	9,370	8,216	3.45	6.94	182	239	12,488	221	4.44	0.00	234	12
142	5	22	311	360	65	81	55	69	0.00	0.00	0	15	9,681	8,576	3.45	6.94	182	254	12,799	581	4.44	0.00	234	27
143	5	23	589	258	67	78	50	71	0.00	0.05	0	15	10,270	8,834	3.45	6.99	182	268	13,388	839	4.44	0.05	234	41
144	5	24	645	298	79	82	50	70	0.00	0.00	5	16	10,915	9,132	3.45	6.99	186	284	14,033	1,137	4.44	0.05	238	57
145	5	25	635	298	85	83	59	70	0.00	0.59	12	17	11,550	9,430	3.45	7.58	198	301	14,668	1,435	4.44	0.64	250	74
146	5	26	533	81	87	78	66	68	0.57	2.77	17	13	12,083	9,511	4.02	10.35	215	314	15,201	1,516	5.01	3.41	267	87
147	5	27	298	217	81	79	65	68	0.56	0.01	13	14	12,381	9,728	4.58	10.36	228	327	15,499	1,733	5.57	3.42	280	100
148	5	28	485	318	78	83	63	69	0.00	0.39	11	16	12,866	10,046	4.58	10.75	238	343	15,984	2,051	5.57	3.81	290	116
149	5	29	660	427	81	88	56	72	0.00	0.00	9	20	13,526	10,473	4.58	10.75	247	363	16,644	2,478	5.57	3.81	299	136
150	5	30	492	543	81	89	54	69	0.38	0.00	8	19	14,018	11,016	4.96	10.75	254	382	17,136	3,021	5.95	3.81	306	155

Table 2. Weather data for 1990 and 1991 growing seasons, continued.

Julian Day	Mo.	Day	Daily: Solar Radiation 1990	Daily: Solar Radiation 1991	Daily: Max Temp 1990	Daily: Max Temp 1991	Daily: Min Temp 1990	Daily: Min Temp 1991	Daily: Rainfall 1990	Daily: Rainfall 1991	Daily: DD60 1990	Daily: DD60 1991	Cumulative by month: Solar Radiation 1990	Cumulative by month: Solar Radiation 1991	Cumulative by month: Rainfall 1990	Cumulative by month: Rainfall 1991	Cumulative by month: DD60 1990	Cumulative by month: DD60 1991	Cumulative from Day of Planting: Solar Radiation 1990	Cumulative from Day of Planting: Solar Radiation 1991	Cumulative from Day of Planting: Rainfall 1990	Cumulative from Day of Planting: Rainfall 1991	Cumulative from Day of Planting: DD60 1990	Cumulative from Day of Planting: DD60 1991
			--Langleys--		°F				In		°F		Langleys		In		°F		Langleys		In		°F	
151	5	31	77	600	71	89	63	70	0.57	0.00	7	20	14,095	11,616	5.53	10.75	261	402	17,213	3,621	6.52	3.81	313	175
152	6	1	360	551	82	90	66	68	0.02	0.00	14	19	360	551	0.02	0.00	14	19	17,573	4,172	6.54	3.81	327	194
153	6	2	462	450	88	90	69	70	1.03	0.13	19	20	822	1,001	1.05	0.13	33	39	18,035	4,622	7.57	3.94	346	214
154	6	3	103	550	77	94	65	71	0.59	0.00	11	23	925	1,551	1.64	0.13	44	62	18,138	5,172	8.16	3.94	357	236
155	6	4	614	623	82	92	62	68	0.00	0.00	12	20	1,539	2,174	1.64	0.13	56	82	18,752	5,795	8.16	3.94	369	256
156	6	5	690	596	82	87	55	69	0.00	0.00	9	18	2,229	2,770	1.64	0.13	64	100	19,442	6,391	8.16	3.94	377	274
157	6	6	546	547	89	82	63	65	0.00	0.00	16	14	2,775	3,317	1.64	0.13	80	113	19,988	6,938	8.16	3.94	393	288
158	6	7	612	640	91	82	73	62	0.00	0.00	22	12	3,387	3,957	1.64	0.13	102	125	20,600	7,578	8.16	3.94	415	300
159	6	8	632	650	91	82	71	58	0.00	0.00	21	10	4,019	4,607	1.64	0.13	123	135	21,232	8,228	8.16	3.94	436	310
160	6	9	613	638	92	84	69	59	0.02	0.00	21	12	4,632	5,245	1.66	0.13	144	147	21,845	8,866	8.18	3.94	457	321
161	6	10	618	619	88	85	67	61	0.00	0.00	18	13	5,250	5,864	1.66	0.13	161	160	22,463	9,485	8.18	3.94	474	334
162	6	11	704	440	85	86	63	71	0.00	0.00	14	19	5,954	6,304	1.66	0.13	175	178	23,167	9,925	8.18	3.94	488	353
163	6	12	689	290	88	86	59	70	0.00	0.17	14	18	6,643	6,594	1.66	0.30	189	196	23,856	10,215	8.18	4.11	502	371
164	6	13	609	303	90	87	62	70	0.00	0.26	16	19	7,252	6,897	1.66	0.56	205	215	24,465	10,518	8.18	4.37	518	389
165	6	14	455	578	88	89	71	69	0.05	0.00	20	19	7,707	7,475	1.71	0.56	224	234	24,920	11,096	8.23	4.37	537	408
166	6	15	472	557	91	88	74	73	0.00	0.00	23	21	8,179	8,032	1.71	0.56	247	254	25,392	11,653	8.23	4.37	560	429
167	6	16	354	575	90	90	71	70	0.15	0.06	21	20	8,533	8,607	1.86	0.62	267	274	25,746	12,228	8.38	4.43	580	449
168	6	17	506	553	91	86	71	69	0.00	0.00	21		9,039	9,160	1.86	0.62	288	292	26,252	12,781	8.38	4.43	601	466
169	6	18	557	432	95	89	71	70	0.58	0.00	23	20	9,596	9,813	2.44	0.62	311	311	26,809	13,434	8.96	4.43	624	486
170	6	19	692	557	92	89	70	67	0.00	0.00	21	18	10,288	10,370	2.44	0.62	332	329	27,501	13,991	8.96	4.43	645	504
171	6	20	645	432	97	90	67	71	0.00	0.02	22	21	10,933	10,802	2.44	0.64	354	350	28,146	14,423	8.96	4.45	667	524
172	6	21	532	506	97	89	71	69	0.52	0.00	24	19	11,465	11,308	2.96	0.64	378	369	28,678	14,929	9.48	4.45	691	543
173	6	22	418	485	89	86	70	70	0.05	0.04	20	18	11,883	11,793	3.01	0.68	398	387	29,096	15,414	9.53	4.49	711	561
174	6	23	687	511	85	90	64	69	0.00	0.00	15	20	12,570	12,304	3.01	0.68	412	406	29,783	15,925	9.53	4.49	725	581
175	6	24	629	343	85	86	61	70	0.00	0.25	13	18	13,199	12,647	3.01	0.93	425	424	30,412	16,268	9.53	4.74	738	599
176	6	25	566	155	85	78	61	70	0.00	0.18	13	14	13,765	12,802	3.01	1.11	438	438	30,978	16,423	9.53	4.92	751	613
177	6	26	610	218	88	77	62	68	0.00	0.02	15	13	14,375	13,020	3.01	1.13	453	451	31,588	16,641	9.53	4.94	766	625
178	6	27	576	255	91	80	65	68	0.00	0.63	18	14	14,951	13,275	3.01	1.76	471	465	32,164	16,896	9.53	5.57	784	639
179	6	28	549	551	93	89	66	70	0.00	0.00	20	20	15,500	13,826	3.01	1.76	491	484	32,713	17,447	9.53	5.57	804	659
180	6	29	621	627	93	91	70	69	0.00	0.00	22	20	16,121	14,453	3.01	1.76	512	504	33,334	18,074	9.53	5.57	825	679
181	6	30	614	624	93	94	72	71	0.00	0.00	23	23	16,735	15,077	3.01	1.76	535	527	33,948	18,698	9.53	5.57	848	701
182	7	1	618	591	93	96	74	73	0.00	0.00	24	25	618	591	0.00	0.00	24	25	34,566	19,289	9.53	5.57	871	726
183	7	2	390	580	95	97	69	75	0.38	0.00	22	26	1,008	1,171	0.38	0.00	46	51	34,956	19,869	9.91	5.57	893	752
184	7	3	616	545	90	95	69	73	0.00	0.00	20	24	1,624	1,716	0.38	0.00	65	75	35,572	20,414	9.91	5.57	913	776
185	7	4	671	409	90	89	69	71	0.00	0.02	20	20	2,295	2,125	0.38	0.02	85	95	36,243	20,823	9.91	5.59	932	796
186	7	5	533	453	88	89	69	70	0.00	0.00	19	20	2,828	2,578	0.38	0.02	103	114	36,776	21,276	9.91	5.59	951	815
187	7	6	519	478	92	88	72	73	0.00	0.00	22	21	3,347	3,056	0.38	0.02	125	135	37,295	21,754	9.91	5.59	973	836
188	7	7	572	289	94	82	76	72	0.00	0.02	25	17	3,919	3,345	0.38	0.04	150	152	37,867	22,043	9.91	5.61	998	853
189	7	8	645	542	97	93	70	73	2.37	0.00	24	23	4,564	3,887	2.75	0.04	174	175	38,512	22,585	12.28	5.61	1,021	876
190	7	9	391	604	87	94	71	76	0.00	0.00	19	25	4,955	4,491	2.75	0.04	193	200	38,903	23,189	12.28	5.61	1,040	901
191	7	10	572	628	92	95	72	76	0.00	0.00	22	26	5,527	5,119	2.75	0.04	215	225	39,475	23,817	12.28	5.61	1,062	926

Table 2. Weather data for 1990 and 1991 growing seasons, continued.

			Daily										Cumulative by month						Cumulative from Day of Planting					
			Solar Radiation		Max Temp		Min Temp		Rainfall		DD60		Solar Radiation		Rainfall		DD60		Solar Radiation		Rainfall		DD60	
Julian Day	Mo.	Day	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991
			--Langleys--		°F				In		°F		Langleys		In		°F		Langleys		In		°F	
192	7	11	572	527	92	95	72	74	0.00	0.00	22	25	6,099	5,646	2.75	0.04	237	250	40,047	24,344	12.28	5.61	1,084	951
193	7	12	386	600	89	95	70	75	0.63	0.00	20	25	6,485	6,246	3.38	0.04	256	275	40,433	24,944	12.91	5.61	1,104	976
194	7	13	500	543	84	96	69	75	0.02	0.00	17	26	6,985	6,789	3.40	0.04	273	300	40,933	25,487	12.93	5.61	1,120	1,001
195	7	14	535	565	79	94	62	74	0.00	0.00	11	24	7,520	7,354	3.40	0.04	283	324	41,468	26,052	12.93	5.61	1,131	1,025
196	7	15	606	561	82	91	58	71	0.00	0.00	10	21	8,126	7,915	3.40	0.04	293	345	42,074	26,613	12.93	5.61	1,141	1,046
197	7	16	399	521	84	89	64	70	0.04	0.00	14	20	8,525	8,436	3.44	0.04	307	365	42,473	27,134	12.97	5.61	1,155	1,066
198	7	17	329	484	82	89	67	70	0.23	0.00	15	20	8,854	8,920	3.67	0.04	322	384	42,802	27,618	13.20	5.61	1,169	1,085
199	7	18	486	490	86	91	67	71	0.00	0.19	17	21	9,340	9,410	3.67	0.23	338	405	43,288	28,108	13.20	5.80	1,186	1,106
200	7	19	581	531	87	90	67	68	0.00	0.00	17	19	9,921	9,941	3.67	0.23	355	424	43,869	28,639	13.20	5.80	1,203	1,125
201	7	20	388	605	86	93	70	73	0.04	0.00	18	23	10,309	10,546	3.71	0.23	373	447	44,257	29,244	13.24	5.80	1,221	1,148
202	7	21	430	454	90	94	70	73	0.00	0.00	20	24	10,739	11,000	3.71	0.23	393	471	44,687	29,698	13.24	5.80	1,241	1,172
203	7	22	518	512	90	96	73	73	0.39	0.00	22	25	11,257	11,512	4.10	0.23	415	495	45,205	30,210	13.63	5.80	1,262	1,196
204	7	23	365	409	84	94	71	76	0.00	0.06	18	25	11,622	11,921	4.10	0.29	432	520	45,570	30,619	13.63	5.86	1,280	1,221
205	7	24	581	248	86	91	70	70	0.00	0.38	18	21	12,203	12,169	4.10	0.67	450	541	46,151	30,867	13.63	6.24	1,298	1,242
206	7	25	588	264	87	87	67	69	0.00	0.95	17	18	12,791	12,433	4.10	1.62	467	559	46,739	31,131	13.63	7.19	1,315	1,260
207	7	26	636	309	89	84	64	68	0.00	0.79	17	16	13,427	12,742	4.10	2.41	484	575	47,375	31,440	13.63	7.98	1,331	1,276
208	7	27	540	560	92	88	67	71	0.00	0.00	20	20	13,967	13,302	4.10	2.41	503	594	47,915	32,000	13.63	7.98	1,351	1,295
209	7	28	553	505	91	90	70	69	0.00	0.00	21	20	14,520	13,807	4.10	2.41	524	614	48,468	32,505	13.63	7.98	1,371	1,315
210	7	29	509	548	93	90	69	74	0.00	0.00	21	22	15,029	14,355	4.10	2.41	545	636	48,977	33,053	13.63	7.98	1,392	1,337
211	7	30	430	604	94	91	69	71	0.00	0.00	22	21	15,459	14,959	4.10	2.41	566	657	49,407	33,657	13.63	7.98	1,414	1,358
212	7	31	444	602	92	92	69	68	0.18	0.00	21	20	15,903	15,561	4.28	2.41	587	677	49,851	34,259	13.81	7.98	1,434	1,378
213	8	1	545	511	89	92	68	68	0.00	0.05	19	20	545	511	0.00	0.05	19	20	50,396	34,770	13.81	8.03	1,453	1,398
214	8	2	325	417	82	91	71	71	0.01	0.17	17	21	870	928	0.01	0.22	35	41	50,721	35,187	13.82	8.20	1,469	1,419
215	8	3	463	507	91	94	69	72	0.05	0.00	20	23	1,333	1,435	0.06	0.22	55	64	51,184	35,694	13.87	8.20	1,489	1,442
216	8	4	503	517	94	94	72	73	0.00	0.00	23	24	1,836	1,952	0.06	0.22	78	88	51,687	36,211	13.87	8.20	1,512	1,465
217	8	5	429	531	90	96	69	70	0.23	0.00	20	23	2,265	2,483	0.29	0.22	98	111	52,116	36,742	14.10	8.20	1,532	1,488
218	8	6	572	536	87	95	69	73	0.00	0.00	18	24	2,837	3,019	0.29	0.22	116	135	52,688	37,278	14.10	8.20	1,550	1,512
219	8	7	637	409	79	94	63	73	0.00	0.52	11	24	3,474	3,428	0.29	0.74	127	158	53,325	37,687	14.10	8.72	1,561	1,536
220	8	8	649	594	83	94	61	73	0.00	0.00	12	24	4,123	4,022	0.29	0.74	139	182	53,974	38,281	14.10	8.72	1,573	1,559
221	8	9	617	482	86	91	59	71	0.00	1.57	13	21	4,740	4,504	0.29	2.31	151	203	54,591	38,763	14.10	10.29	1,585	1,580
222	8	10	591	398	87	88	63	72	0.00	0.38	15	20	5,331	4,902	0.29	2.69	166	223	55,182	39,161	14.10	10.67	1,600	1,600
223	8	11	561	367	89	89	63	72	0.00	0.08	16	21	5,892	5,269	0.29	2.77	182	243	55,743	39,528	14.10	10.75	1,616	1,621
224	8	12	523	586	92	89	64	68	0.00	0.00	18	19	6,415	5,855	0.29	2.77	200	262	56,266	40,114	14.10	10.75	1,634	1,639
225	8	13	480	414	87	87	64	67	0.00	0.00	16	17	6,895	6,269	0.29	2.77	216	279	56,746	40,528	14.10	10.75	1,650	1,656
226	8	14	436	445	91	85	70	69	0.11	0.00	21	17	7,331	6,714	0.40	2.77	236	296	57,182	40,973	14.21	10.75	1,670	1,673
227	8	15	576	549	92	88	69	67	0.00	0.00	21	18	7,907	7,263	0.40	2.77	257	313	57,758	41,522	14.21	10.75	1,691	1,691
228	8	16	527	561	95	90	69	68	0.00	0.00	22	19	8,434	7,824	0.40	2.77	279	332	58,285	42,083	14.21	10.75	1,713	1,710
229	8	17	486	450	96	90	71	72	0.00	0.01	24	21	8,920	8,274	0.40	2.78	302	353	58,771	42,533	14.21	10.76	1,736	1,731
230	8	18	528	404	97	90	71	72	0.00	0.16	24	21	9,448	8,678	0.40	2.94	326	374	59,299	42,937	14.21	10.92	1,760	1,752
231	8	19	521	529	99	90	72	66	0.00	0.01	26	18	9,969	9,207	0.40	2.95	352	392	59,820	43,466	14.21	10.93	1,786	1,770
232	8	20	416	639	99	85	75	59	0.00	0.00	27	12	10,385	9,846	0.40	2.95	379	404	60,236	44,105	14.21	10.93	1,813	1,782

Table 2. Weather data for 1990 and 1991 growing seasons, continued.

Julian Day	Mo.	Day	Daily: Solar Radiation 1990	Daily: Solar Radiation 1991	Daily: Max Temp 1990	Daily: Max Temp 1991	Daily: Min Temp 1990	Daily: Min Temp 1991	Daily: Rainfall 1990	Daily: Rainfall 1991	Daily: DD60 1990	Daily: DD60 1991	Cumulative by month: Solar Radiation 1990	Cumulative by month: Solar Radiation 1991	Cumulative by month: Rainfall 1990	Cumulative by month: Rainfall 1991	Cumulative by month: DD60 1990	Cumulative by month: DD60 1991	Cumulative from Day of Planting: Solar Radiation 1990	Cumulative from Day of Planting: Solar Radiation 1991	Cumulative from Day of Planting: Rainfall 1990	Cumulative from Day of Planting: Rainfall 1991	Cumulative from Day of Planting: DD60 1990	Cumulative from Day of Planting: DD60 1991
			--Langleys--		°F				In		°F		Langleys		In		°F		Langleys		In		°F	
233	8	21	381	460	96	85	72	57	0.14	0.00	24	11	10,766	10,306	0.54	2.95	403	415	60,617	44,565	14.35	10.93	1,837	1,793
234	8	22	560	595	95	89	71	64	0.00	0.00	23	17	11,326	10,901	0.54	2.95	426	432	61,177	45,160	14.35	10.93	1,860	1,809
235	8	23	579	529	91	89	70	63	0.00	0.00	21	16	11,905	11,430	0.54	2.95	446	448	61,756	45,689	14.35	10.93	1,880	1,825
236	8	24	497	475	92	89	69	67	0.00	0.00	21	18	12,402	11,905	0.54	2.95	467	466	62,253	46,164	14.35	10.93	1,901	1,843
237	8	25	585	44	95	75	66	71	0.00	2.20	21	13	12,987	11,949	0.54	5.15	487	479	62,838	46,208	14.35	13.13	1,921	1,856
238	8	26	495	381	99	87	66	72	0.00	0.00	23	20	13,482	12,330	0.54	5.15	510	498	63,333	46,589	14.35	13.13	1,944	1,876
239	8	27	466	280	99	85	71	72	0.00	0.00	25	19	13,948	12,610	0.54	5.15	535	517	63,799	46,869	14.35	13.13	1,969	1,894
240	8	28	509	290	101	86	72	73	0.00	0.32	27	20	14,457	12,900	0.54	5.47	561	536	64,308	47,159	14.35	13.45	1,995	1,914
241	8	29	490	382	100	90	75	74	0.00	0.73	28	22	14,947	13,282	0.54	6.20	589	558	64,798	47,541	14.35	14.18	2,023	1,936
242	8	30	548	463	93	89	72	70	0.00	1.08	23	20	15,495	13,745	0.54	7.28	611	578	65,346	48,004	14.35	15.26	2,045	1,955
243	8	31	475	383	91	86	64	71	0.00	0.00	18	19	15,970	14,128	0.54	7.28	629	596	65,821	48,387	14.35	15.26	2,063	1,974
244	9	1	498	530	92	90	68	69	0.00	0.00	20	20	498	530	0.00	0.00	20	20	66,319	48,917	14.35	15.26	2,083	1,993
245	9	2	479	510	96	90	69	70	0.00	0.00	23	20	977	1,040	0.00	0.00	43	40	66,798	49,427	14.35	15.26	2,105	2,013
246	9	3	512	465	97	85	70	69	0.00	0.00	24	17	1,489	1,505	0.00	0.00	66	57	67,310	49,892	14.35	15.26	2,129	2,030
247	9	4	506	507	99	86	71	66	0.00	0.00	25	16	1,995	2,012	0.00	0.00	91	73	67,816	50,399	14.35	15.26	2,154	2,046
248	9	5	401	462	96	89	72	65	0.00	0.00	24	17	2,396	2,474	0.00	0.00	115	90	68,217	50,861	14.35	15.26	2,178	2,063
249	9	6	446	509	99	94	76	69	0.00	0.00	28	22	2,842	2,983	0.00	0.00	143	111	68,663	51,370	14.35	15.26	2,205	2,085
250	9	7	436	417	97	92	76	70	0.00	0.00	27	21	3,278	3,400	0.00	0.00	169	132	69,099	51,787	14.35	15.26	2,232	2,106
251	9	8	446	478	97	91	72	70	0.00	0.00	25	21	3,724	3,878	0.00	0.00	194	153	69,545	52,265	14.35	15.26	2,256	2,126
252	9	9	335	290	92	86	70	72	0.05	0.00	21	19	4,059	4,168	0.05	0.00	215	172	69,880	52,555	14.40	15.26	2,277	2,145
253	9	10	423	454	92	87	68	68	0.00	0.00	20	18	4,482	4,622	0.05	0.00	235	189	70,303	53,009	14.40	15.26	2,297	2,163
254	9	11	402	511	93	91	69	65	0.29	0.00	21	18	4,884	5,133	0.34	0.00	256	207	70,705	53,520	14.69	15.26	2,318	2,181
255	9	12	237	464	87	94	70	70	0.33	0.00	19	22	5,121	5,597	0.67	0.00	274	229	70,942	53,984	15.02	15.26	2,337	2,203
256	9	13	221	476	86	93	69	72	0.02	0.00	18	23	5,342	6,073	0.69	0.00	292	252	71,163	54,460	15.04	15.26	2,354	2,225
257	9	14	317	425	88	94	70	71	0.18	0.00	19	23	5,659	6,498	0.87	0.00	311	274	71,480	54,885	15.22	15.26	2,373	2,248
258	9	15	434	432	91	93	69	72	0.00	0.00	20	23	6,093	6,930	0.87	0.00	331	297	71,914	55,317	15.22	15.26	2,393	2,270
259	9	16	514	449	88	93	60	73	0.00	0.00	14	23	6,607	7,379	0.87	0.00	345	320	72,428	55,766	15.22	15.26	2,407	2,293
260	9	17	520	488	88	95	59	70	0.00	0.00	14	23	7,127	7,867	0.87	0.00	358	342	72,948	56,254	15.22	15.26	2,421	2,316
261	9	18	490	455	91	95	55	69	0.00	0.00	13	22	7,617	8,322	0.87	0.00	371	364	73,438	56,709	15.22	15.26	2,434	2,338
262	9	19	327	408	89	71	67	56	0.04	0.03	18	4	7,944	8,730	0.91	0.03	389	368	73,765	57,117	15.26	15.29	2,452	2,341
263	9	20	459	508	92	71	68	47	0.00	0.00	20	0	8,403	9,238	0.91	0.03	409	368	74,224	57,625	15.26	15.29	2,472	2,341
264	9	21	413	435	93	76	69	49	0.00	0.00	21	3	8,816	9,673	0.91	0.03	430	370	74,637	58,060	15.26	15.29	2,493	2,344
265	9	22	197	471	78	82	61	53	0.36	0.00	10	8	9,013	10,144	1.27	0.03	440	378	74,834	58,531	15.62	15.29	2,502	2,351
266	9	23	530	318	70	85	52	64	0.00	0.00	1	15	9,543	10,462	1.27	0.03	441	392	75,364	58,849	15.62	15.29	2,503	2,366
267	9	24	524	47	71	71	44	65	0.00	2.05	0	8	10,067	10,509	1.27	2.08	441	400	75,888	58,896	15.62	17.34	2,503	2,374
268	9	25	508	433	80	72	43	55	0.00	0.04	2	4	10,575	10,942	1.27	2.12	442	404	76,396	59,329	15.62	17.38	2,505	2,377
269	9	26	499	516	86	74	47	53	0.00	0.00	7	4	11,074	11,458	1.27	2.12	449	407	76,895	59,845	15.62	17.38	2,511	2,381
270	9	27	484	519	88	71	54	48	0.00	0.00	11	0	11,558	11,977	1.27	2.12	460	407	77,379	60,364	15.62	17.38	2,522	2,381
271	9	28	432	478	90	78	54	45	0.00	0.00	12	2	11,990	12,455	1.27	2.12	472	409	77,811	60,842	15.62	17.38	2,534	2,382
272	9	29	356	483	88	82	57	51	0.00	0.00	13	7	12,346	12,938	1.27	2.12	484	415	78,167	61,325	15.62	17.38	2,547	2,389
273	9	30	351	436	87	82	63	51	0.07	0.00	15	7	12,697	13,374	1.34	2.12	499	422	78,518	61,761	15.69	17.38	2,562	2,395

Table 3. Distribution of lint across fruiting positions by years and cotton line.

Line	POS 1			POS 2			POS 3			Monopodial		
	1990	1991	Mean	1990	1991	Mean	1990	1991	Mean	1990	1991	Mean
	Percentage											
CB 1135	84.9	67.5	76.7	12.7	20.7	16.5	0.7	3.3	1.9	1.8	8.4	4.9
CB 219	77.1	71.9	74.7	17.4	18.7	18.0	1.0	2.6	1.7	4.5	6.8	5.6
CB 232	82.0	68.9	75.9	13.0	18.6	15.6	1.4	2.6	2.0	3.6	9.8	6.5
CB 407	81.0	66.4	74.3	14.3	19.7	16.8	1.0	2.5	1.7	3.7	11.4	7.2
DES 119	80.0	67.0	74.7	17.4	21.5	19.1	0.4	2.9	1.4	2.1	8.5	4.8
DH 126	62.3	61.5	62.4	22.4	18.7	21.1	3.8	2.7	3.4	11.0	17.0	13.2
DP 51	82.5	62.4	73.1	15.0	20.8	17.1	1.3	4.2	2.7	1.1	12.6	6.5
DP 5415	81.8	64.5	73.4	12.7	21.5	17.0	0.4	2.4	1.4	5.1	11.5	8.2
DP 5690	87.3	64.3	76.8	11.5	19.9	15.3	0.2	3.2	1.5	1.0	12.7	6.4
DP 90	79.3	64.4	72.3	14.8	21.1	17.8	1.4	3.3	2.3	4.4	11.1	7.6
LA850082FN	78.3	63.0	71.5	16.7	21.6	18.8	1.4	3.5	2.3	3.6	11.9	7.3
ST 69132	81.6	63.2	74.6	15.7	21.2	17.8	1.3	6.0	3.1	1.4	9.6	4.6
Mean All	80.5	65.7	73.8	15.1	20.4	17.5	1.1	3.2	2.1	3.3	10.7	6.6

Table 4. Percentage of plants with an open boll at position one (POS1), by cotton line and node. Mean of 2 years.

Node	CB 1135		CB 219		CB 232		CB 407		DES 119		DH 126	
	POS1	SEM	POS1	SEM	POS1	SEM	POS1	SEM	POS1	SEM	POS1	SEM
	Percentage											
22	0.0	0.0	0.3	0.4	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
21	0.6	0.4	1.0	1.0	0.3	0.3	3.9	1.6	0.0	0.0	0.0	0.0
20	2.5	0.9	3.1	1.5	6.4	3.1	11.8	2.6	0.3	0.3	0.4	0.4
19	10.4	2.1	11.2	3.3	12.5	3.6	18.8	4.0	3.9	1.6	1.3	0.7
18	22.1	4.9	19.3	4.6	22.6	4.1	29.3	4.4	9.0	1.8	3.7	1.3
17	32.2	5.3	32.0	5.6	37.4	5.4	42.0	5.8	25.7	4.5	7.6	2.2
16	37.1	5.0	39.8	5.8	43.9	5.7	53.9	5.7	36.8	6.4	13.9	2.6
15	45.2	5.6	47.4	6.2	56.9	6.5	61.6	4.4	41.7	6.4	24.4	3.7
14	58.9	6.3	51.6	5.4	63.1	5.2	68.0	5.1	57.8	6.4	46.7	3.4
13	62.8	5.1	64.1	5.5	67.8	3.8	65.9	4.6	65.1	4.8	55.8	3.8
12	64.3	6.0	63.3	4.3	68.2	4.5	59.5	4.1	65.2	4.2	57.4	2.6
11	54.9	4.1	60.2	3.5	62.8	4.4	51.8	3.0	61.5	4.1	63.0	3.8
10	50.9	4.3	57.8	2.1	59.7	2.9	51.5	3.1	53.3	4.1	65.6	5.3
9	64.9	2.5	66.1	3.9	60.5	3.8	58.0	4.7	65.9	4.3	73.8	2.8
8	59.4	3.0	65.2	3.2	69.9	3.2	57.6	2.9	72.5	4.9	67.0	5.2
7	45.2	3.5	42.4	4.0	52.9	4.5	36.8	4.8	64.8	3.7	76.3	3.8
6	20.4	3.6	22.6	4.7	24.7	4.5	15.6	3.3	28.6	5.4	68.7	4.7
5	0.8	0.4	0.7	0.4	2.1	1.1	1.2	0.5	3.4	0.9	29.2	3.1

Node	DP 51		DP 5415		DP 5690		DP 90		LA 8500		ST 69132		Mean	
	POS1	SEM	POS1	SEM	POS1	SEM	POS1	SEM	POS1	SEM	POS1	SEM	POS1	SEM
	Percentage													
22	0.8	0.6	0.8	0.6	1.8	0.7	1.0	0.7	0.7	0.5	0.6	0.6	0.5	0.1
21	5.4	2.1	1.3	0.6	11.2	4.6	4.8	1.5	2.6	1.1	0.0	0.0	2.6	0.5
20	12.0	2.8	6.3	1.9	17.4	4.7	15.1	3.2	7.5	2.5	1.5	1.2	7.0	0.8
19	25.6	6.0	19.6	3.3	30.9	6.0	26.4	3.8	22.2	3.3	9.3	2.1	16.0	1.3
18	39.0	5.8	37.1	5.7	35.2	6.0	34.9	4.5	31.8	3.8	17.2	4.1	25.1	1.5
17	47.5	5.3	52.6	6.9	46.2	5.9	47.0	4.6	45.8	4.2	27.7	6.3	37.0	1.8
16	54.6	4.9	58.4	6.6	52.5	5.7	59.1	4.5	54.4	4.5	39.1	6.9	45.3	1.8
15	66.3	5.6	57.3	4.7	60.9	5.2	61.7	3.8	60.6	2.7	53.5	6.9	53.1	1.7
14	67.5	4.7	67.2	5.9	63.3	5.4	62.3	3.1	67.5	4.8	56.3	5.4	60.9	1.5
13	72.4	4.4	73.2	3.5	62.9	4.3	68.7	4.4	69.8	4.3	59.2	4.7	65.6	1.3
12	67.8	2.9	70.3	3.1	52.0	3.3	61.0	4.0	62.5	4.1	58.9	4.2	62.5	1.2
11	59.9	3.3	63.6	3.5	47.5	3.8	49.8	3.2	66.3	3.6	60.5	3.8	58.5	1.1
10	52.3	3.2	60.1	3.0	51.5	3.9	56.4	4.4	58.9	3.7	65.8	3.3	57.0	1.1
9	65.0	3.9	65.6	3.4	62.4	4.5	56.4	2.6	69.8	3.8	65.7	4.1	64.5	1.1
8	72.9	4.2	69.6	4.3	52.2	4.5	50.8	3.9	62.8	4.5	66.3	4.9	63.9	1.3
7	45.5	4.4	47.5	4.5	25.6	7.3	26.1	5.2	39.5	4.7	57.3	6.0	46.7	1.8
6	27.3	6.1	20.8	5.3	10.7	4.4	8.5	2.9	15.6	4.1	37.2	8.4	25.1	1.9
5	2.8	1.2	1.0	0.5	0.6	0.6	0.8	0.4	1.3	0.5	4.3	1.4	4.0	0.7

Table 5. Percentage of plants with an open boll at position two (POS2) by cotton line and node. Mean of 2 years.

	CB 1135		C 219		CB 232		CB 407		DES 119		DH 126	
Node	POS2	SEM	POS2	SEM	POS2	SEM	POS2	SEM	POS2	SEM	POS2	SEM
	Percentage											
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4
19	0.4	0.4	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0
18	0.6	0.4	1.3	0.7	1.2	0.6	2.7	1.5	0.3	0.3	0.4	0.4
17	4.2	1.6	3.1	1.4	5.3	2.3	5.5	2.2	0.3	0.3	0.4	0.4
16	6.3	1.5	6.2	2.8	8.9	2.7	15.7	4.4	3.7	1.3	1.0	0.7
15	13.2	3.3	10.5	4.1	13.7	3.5	17.8	3.6	12.2	3.5	2.4	0.9
14	15.1	4.1	12.7	4.1	21.4	7.3	18.6	4.0	15.8	4.4	6.1	1.2
13	16.6	4.0	19.7	3.4	22.8	7.0	21.4	4.1	15.9	3.9	7.0	1.3
12	19.6	4.2	18.3	4.2	21.3	6.4	24.8	4.3	16.1	3.6	13.2	2.1
11	22.4	4.2	26.1	4.9	25.4	6.5	28.9	6.2	20.9	3.6	24.1	2.5
10	30.8	6.6	28.5	3.6	32.8	5.7	27.9	4.4	32.9	5.6	28.3	3.3
9	26.1	4.0	31.8	2.9	22.7	3.9	24.6	3.5	30.9	4.2	26.2	3.3
8	16.1	2.8	23.6	3.1	20.8	3.1	14.5	2.8	26.7	3.8	36.6	3.0
7	14.5	2.4	15.8	3.3	13.4	2.2	9.1	2.2	29.0	3.1	43.1	4.1
6	7.6	1.2	10.0	2.9	8.8	2.2	3.8	1.3	11.8	3.0	48.7	4.9
5	0.2	0.2	0.0	0.0	0.3	0.3	0.4	0.3	2.2	0.9	17.6	3.4

	DP 51		DP 5415		DP 5690		DP 90		LA 850082FN		ST 69132		Mean	
Node	POS2	SEM	POS2	SEM	POS2	SEM	POS2	SEM	POS2	SEM	POS2	SEM	POS2	SEM
	Percentage													
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
21	0.5	0.5	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
20	1.0	0.7	0.0	0.0	0.8	0.4	0.8	0.8	0.0	0.0	0.0	0.0	0.3	0.1
19	2.4	1.6	0.0	0.0	2.3	1.1	1.1	0.6	1.8	0.7	0.6	0.6	0.8	0.2
18	5.4	2.6	1.9	0.7	6.3	2.3	5.4	2.3	2.2	1.4	0.0	0.0	2.3	0.4
17	11.5	3.7	4.3	1.2	12.0	3.7	11.6	3.4	3.7	1.8	1.5	0.8	5.3	0.7
16	19.0	6.8	11.3	3.3	16.0	5.8	16.5	4.9	7.1	2.9	6.9	2.7	9.9	1.1
15	18.8	4.7	19.9	4.9	18.3	5.4	18.9	4.8	15.0	3.9	12.5	4.0	14.4	1.2
14	23.3	6.9	23.9	7.0	23.7	6.8	27.3	6.1	17.0	3.9	15.5	3.8	18.4	1.5
13	23.3	4.6	26.1	6.0	26.5	6.2	28.3	5.1	24.6	4.8	22.3	5.3	21.2	1.4
12	26.9	5.2	28.1	6.0	21.6	3.9	26.2	4.0	30.6	5.4	23.4	4.5	22.5	1.4
11	27.6	5.2	32.1	6.7	23.5	5.7	26.5	4.6	34.0	6.5	28.7	5.0	26.7	1.5
10	33.2	4.0	35.8	5.9	23.1	3.7	20.9	3.4	36.6	6.0	31.8	5.0	30.2	1.4
9	26.2	4.3	27.7	3.6	14.9	2.1	21.1	2.5	36.3	4.7	21.8	4.0	25.9	1.1
8	23.6	3.0	18.7	1.2	8.2	1.8	15.6	3.9	33.0	3.7	24.8	3.3	21.9	1.1
7	13.2	2.8	12.3	3.4	5.0	1.9	9.7	3.6	18.6	3.8	22.3	2.7	17.2	1.2
6	12.8	3.3	6.3	2.6	1.3	0.9	3.0	1.0	8.4	2.7	16.3	3.8	11.6	1.3
5	0.6	0.4	0.3	0.3	0.0	0.0	0.2	0.2	0.0	0.0	1.6	0.8	2.0	0.5

Table 6. Percentage of plants with an open boll at position three (POS3), by cotton line and node. Mean of 2 years.

Node	CB 1135		CB 219		CB 232		CB 407		DES 199		DH 126	
	POS3	SEM	POS3	SEM	POS3	SEM	POS3	SEM	POS3	SEM	POS3	SEM
	Percentage											
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	0.3	0.4	0.7	0.5	0.0	0.0	0.0	0.0	0.0	0.0
16	0.4	0.4	0.0	0.0	0.3	0.3	0.6	0.5	0.0	0.0	0.0	0.0
15	0.8	0.6	1.2	0.8	2.0	1.1	1.4	0.8	0.0	0.0	0.4	0.4
14	3.2	1.1	2.5	1.5	2.8	1.2	2.5	1.3	1.7	0.9	0.0	0.0
13	1.8	0.8	3.2	1.6	4.1	2.2	3.0	1.4	2.0	0.7	0.4	0.4
12	2.7	0.7	2.8	1.0	4.4	2.0	3.4	1.9	4.7	1.8	1.4	0.8
11	4.8	2.0	4.0	1.5	7.4	4.3	5.9	2.1	4.1	2.0	3.4	1.4
10	3.5	1.6	5.8	2.9	4.7	2.9	4.1	1.8	4.4	2.5	4.5	1.2
9	7.1	2.6	4.8	2.1	6.5	2.2	3.9	1.1	1.5	0.6	8.8	2.4
8	6.5	2.8	4.6	1.8	3.6	1.7	2.2	0.9	2.9	1.2	9.7	2.1
7	2.6	1.9	0.6	0.4	2.9	1.0	0.8	0.5	5.3	2.5	10.0	2.7
6	0.0	0.0	0.9	0.5	0.9	0.6	0.2	0.3	0.5	0.5	7.5	2.0
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	1.1

Node	DP 51		DP 5415		DP 5690		DP 90		LA 850082FN		ST 69132		Mean	
	POS3	SEM	POS3	SEM	POS3	SEM	POS3	SEM	POS3	SEM	POS3	SEM	POS3	SEM
	Percentage													
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
17	1.6	1.1	0.0	0.0	0.4	0.4	0.4	0.4	0.8	0.6	0.0	0.0	0.4	
16	2.2	1.1	0.9	0.6	0.7	0.5	1.5	0.7	0.6	0.6	0.6	0.6	0.7	0.2
15	5.4	3.7	1.5	0.8	2.0	1.1	3.8	1.1	0.3	0.3	1.0	0.7	1.7	0.4
14	5.2	2.3	1.9	1.0	3.5	1.8	3.6	1.4	2.3	1.3	3.0	1.4	2.7	0.4
13	4.2	1.8	4.4	2.2	2.7	1.5	3.6	1.4	3.9	1.6	8.7	3.4	3.5	0.5
12	7.3	3.2	3.7	1.6	4.3	1.8	6.4	2.2	4.6	1.7	4.8	1.6	4.2	0.5
11	5.4	2.3	4.2	1.6	4.8	1.7	3.8	1.6	6.7	2.5	9.0	3.8	5.3	0.7
10	8.4	3.3	4.1	1.9	3.7	1.3	6.9	2.3	6.5	1.8	10.4	3.9	5.6	0.7
9	7.6	1.6	4.7	1.4	5.7	2.9	8.7	2.2	11.9	3.3	10.6	3.8	6.8	0.7
8	5.8	1.8	2.8	1.2	2.1	1.0	1.4	0.6	10.4	3.8	7.8	2.8	5.0	0.6
7	2.6	1.0	0.4	0.4	0.0	0.0	1.3	0.7	1.8	0.8	4.8	1.5	2.8	0.4
6	0.7	0.4	0.5	0.3	0.3	0.3	0.5	0.3	0.4	0.4	1.5	0.7	1.2	0.3
5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1

Table 7. Mean lint value (at $0.70 per pound) by node for 12 cotton lines. Mean of 2 years.

Node	CB 1135	CB 219	CB 232	CB 407	DES 119	DH 126	DP 51	DP 5415	DP 5690	DP 90	LA 850082FN	ST 69132	F Test	LSD 0.05
	Dollars per Acre													
23	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	NS	0.25
22	0.00	0.29	0.15	0.00	0.00	0.00	0.46	0.38	1.65	0.81	0.29	0.00	**	0.63
21	0.36	0.58	0.13	2.14	0.00	0.00	3.45	0.56	6.64	3.24	1.43	0.00	NS	3.94
20	2.14	2.33	3.51	8.06	0.39	0.28	8.63	4.53	14.21	11.36	5.95	0.59	**	6.69
19	7.99	7.51	9.13	15.15	3.08	0.34	17.91	13.02	27.76	21.58	14.51	4.33	**	7.81
18	18.09	16.79	19.43	27.69	7.93	1.36	31.77	28.12	38.37	35.29	25.37	10.16	**	11.81
17	30.59	29.12	35.67	45.69	22.11	3.13	46.36	45.87	57.80	54.93	39.50	17.95	**	15.75
16	44.21	44.00	46.68	68.44	35.83	6.85	62.73	60.93	74.48	78.16	53.39	29.74	**	16.63
15	59.96	57.44	66.97	89.39	48.59	11.51	77.75	70.43	84.21	90.49	65.22	49.23	**	22.19
14	84.46	70.73	82.96	101.13	73.14	24.69	86.24	87.18	106.55	102.34	80.63	65.34	**	21.63
13	96.81	98.99	98.61	106.36	92.59	30.84	93.73	102.86	112.03	112.98	92.74	82.07	**	19.38
12	108.34	101.03	100.42	102.31	99.91	39.08	93.89	106.20	100.18	108.53	98.11	86.27	**	21.44
11	105.28	113.98	103.16	103.38	110.01	48.65	91.09	98.46	96.16	95.59	100.95	101.32	**	21.44
10	114.53	116.48	108.40	105.51	116.24	52.91	86.31	107.96	105.99	101.38	102.91	116.91	**	18.31
9	132.27	130.26	103.17	109.72	124.68	60.34	100.34	109.46	111.74	102.58	120.36	111.38	**	21.69
8	118.29	124.64	116.64	100.11	136.81	61.11	105.61	100.33	91.13	84.96	106.34	114.88	**	27.00
7	90.19	84.62	83.49	66.13	125.03	69.17	68.86	65.39	60.31	48.35	65.04	110.46	*	39.69
6	45.69	48.76	43.38	29.46	64.09	67.13	47.54	32.79	26.29	17.05	28.36	83.60	NS	45.69
5	1.63	0.86	3.05	2.68	7.49	24.34	4.68	1.59	1.78	1.45	1.74	9.54	**	8.50
Mono.[1]	54.83	61.88	71.61	84.50	53.34	76.05	71.63	93.14	75.83	87.82	79.22	47.46	NS	57.19
TOTAL	1,115.63	1,110.54	1,096.56	1,167.83	1,121.27	577.76	1,098.98	1,129.18	1,193.27	1,158.88	1,082.06	1,041.23		
F Test	**	**	**	**	**	**	**	**	**	**	**	**		
LSD 0.05	52.13	55.00	45.31	47.31	59.00	24.25	57.31	48.44	69.75	45.00	39.69	75.31		

*, ** Significant at the P=0.05 and 0.01 levels respectively with F statistic.

[1] Monopodium

Table 8. Mean lint value (at $0.70 per pound) by node for position one (POS1) for 12 cotton lines. Mean of 2 years.

Node	CB 1135	CB 219	CB 232	CB 407	DES 119	DH 126	DP 51	DP 5415	DP 5690	DP 90	LA 850082FN	ST 69132	F Test	LSD 0.05
	Dollars per Acre													
23	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	NS	0.31
22	0.00	0.29	0.15	0.00	0.00	0.00	0.46	0.38	1.65	0.81	0.29	0.00	**	0.63
21	0.36	0.58	0.13	2.14	0.00	0.00	3.09	0.56	6.39	3.24	1.43	0.00	NS	4.13
20	2.14	2.18	3.51	8.06	0.39	0.16	8.29	4.53	13.48	11.36	5.95	0.59	**	6.88
19	7.89	7.51	9.13	14.90	3.08	0.34	16.75	13.02	26.58	20.71	13.89	4.26	**	7.56
18	17.69	15.98	18.98	26.25	7.69	1.23	29.42	27.08	34.53	32.18	24.59	10.16	**	11.19
17	28.04	27.29	32.29	42.06	21.74	2.93	39.54	43.58	50.05	46.68	37.57	17.46	**	16.13
16	39.25	39.83	40.79	58.44	32.84	6.56	52.04	52.98	64.26	65.19	50.03	26.71	**	18.06
15	50.73	51.19	57.99	75.24	40.38	10.28	64.33	56.44	70.14	72.59	57.73	42.80	**	19.06
14	70.11	59.71	69.45	86.06	61.73	22.27	69.54	71.62	85.17	79.13	67.47	55.58	**	17.19
13	80.99	82.84	80.59	86.29	80.16	27.68	75.41	82.24	88.01	86.03	74.75	64.86	**	16.81
12	88.73	82.14	83.33	77.51	83.64	32.36	71.21	83.63	76.72	78.67	73.28	66.34	**	18.00
11	78.82	86.16	79.76	71.33	85.29	36.69	65.52	70.74	72.27	69.16	72.34	75.13	**	15.06
10	80.76	82.78	77.51	76.34	80.24	38.24	56.76	75.03	79.45	77.29	68.78	85.44	*	20.25
9	103.09	93.36	78.75	81.42	92.46	43.62	73.42	82.14	90.69	75.09	82.00	86.40	*	21.94
8	97.26	94.61	93.09	82.09	102.80	38.68	82.29	82.11	79.14	67.54	73.73	89.43	*	28.31
7	71.91	66.38	69.86	54.51	92.78	45.30	55.66	54.24	51.40	37.54	47.89	83.54	NS	36.00
6	36.65	35.48	33.91	22.86	47.29	39.36	35.47	26.63	24.29	13.55	20.33	60.17	NS	34.69
5	1.31	0.86	2.58	2.06	4.72	14.66	4.21	1.39	1.78	1.20	1.74	7.43	*	6.31
TOTAL 1st	855.71	829.42	831.80	867.56	837.24	360.36	803.41	828.31	916.15	837.96	773.78	776.31		
Mono.[1]	54.83	61.88	71.61	84.50	53.34	76.05	71.63	93.14	75.83	87.82	79.22	47.46	NS	57.19
F Test	**	**	**	**	**	**	**	**	**	**	**	**		
LSD 0.05	49.25	42.00	38.38	42.63	51.25	15.44	52.69	44.44	65.00	38.19	37.13	64.75		

*, ** Significant at the P=0.05 and 0.01 levels respectively with F statistic

Table 9. Mean lint value (at $0.70 per pound) by node for position two (POS2) for 12 cotton lines. Mean of 2 years.

Node	CB 1135	CB 219	CB 232	CB 407	DES 119	DH 126	DP 51	DP 5415	DP 5690	DP 90	LA 850082FN	ST 69132	F Test	LSD 0.05
	Dollars per Acre													
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
21	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.26	0.00	0.00	0.00	NS	0.44
20	0.00	0.14	0.00	0.00	0.00	0.11	0.33	0.00	0.73	0.00	0.00	0.00	NS	0.44
19	0.09	0.00	0.00	0.24	0.00	0.00	1.16	0.00	1.18	0.87	0.62	0.08	NS	1.00
18	0.39	0.81	0.46	1.45	0.23	0.13	2.35	1.04	3.84	3.11	0.78	0.00	NS	3.44
17	2.56	1.79	3.00	3.64	0.37	0.19	5.90	2.29	7.52	7.75	1.81	0.49	NS	6.00
16	4.73	4.18	5.77	9.63	2.98	0.29	9.81	7.59	9.78	12.19	3.26	2.88	NS	7.94
15	8.79	5.71	7.88	13.19	8.21	1.07	11.20	13.36	12.75	15.47	7.28	6.09	NS	9.19
14	12.27	9.66	12.26	13.49	10.35	2.43	14.59	14.62	19.08	21.20	11.74	8.44	NS	11.56
13	14.79	15.05	15.87	18.24	11.51	3.04	17.09	18.54	22.20	24.73	16.61	13.96	*	9.19
12	17.81	16.53	14.92	22.68	14.15	6.26	19.04	20.79	20.72	25.91	22.88	17.54	*	9.06
11	23.26	25.47	19.79	28.23	21.58	10.53	22.64	25.14	21.33	23.64	25.76	21.83	NS	11.13
10	31.24	29.75	28.33	26.96	33.42	12.89	25.15	30.93	23.94	20.30	30.93	25.54	NS	13.81
9	24.91	34.41	20.74	25.18	31.46	13.18	21.66	24.26	17.93	22.23	31.01	19.85	*	10.94
8	16.87	26.61	21.11	15.56	31.84	18.33	20.14	16.63	11.06	16.42	27.42	22.16	NS	11.00
7	16.64	17.87	11.82	10.84	29.29	20.45	11.40	11.04	8.90	9.29	15.82	23.07	**	6.19
6	9.04	12.09	9.07	6.44	16.36	24.27	11.31	5.78	1.68	2.87	7.92	21.14	*	12.50
5	0.33	0.00	0.48	0.61	2.78	8.64	0.46	0.20	0.00	0.26	0.00	2.11	**	2.63
TOTAL	183.73	200.07	171.48	196.38	214.52	121.79	194.60	192.20	182.88	206.22	203.81	185.19		
F Test	**	**	-	**	**	**	**	**	-	**	**	**		
LSD 0.05	13.25	16.44	16.19	12.75	16.81	9.75	14.63	17.25	17.06	16.06	11.88	15.63		

*,** Significant at the P=0.05 and 0.01 levels respectively with F statistic.

Table 10. Mean lint value (at $0.70 per pound) by node for position three for 12 cotton lines. Mean of 2 years.

Node	CB 1135	CB 219	CB 232	CB 407	DES 119	DH 126	DP 51	DP 5415	DP 5690	DP 90	LA 850082FN	ST 69132	F Test	LSD 0.05
	Dollars per Acre													
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
17	0.00	0.04	0.38	0.00	0.00	0.00	0.93	0.00	0.24	0.50	0.13	0.00	NS	0.50
16	0.22	0.00	0.13	0.37	0.00	0.00	0.87	0.36	0.44	0.78	0.11	0.16	NS	0.50
15	0.44	0.53	1.11	0.96	0.00	0.15	2.22	0.63	1.32	2.43	0.21	0.34	NS	2.06
14	2.09	1.37	1.24	1.58	1.06	0.00	2.11	0.94	2.30	2.01	1.42	1.31	NS	2.25
13	1.03	1.11	2.14	1.83	0.93	0.13	1.23	2.08	1.82	2.21	1.38	3.24	NS	2.94
12	1.81	2.36	2.18	2.11	2.13	0.47	3.65	1.78	2.74	3.94	1.97	2.38	NS	3.06
11	3.20	2.36	3.60	3.81	3.13	1.43	2.93	2.58	2.56	2.79	2.85	4.36	NS	3.38
10	2.53	3.94	2.56	2.21	2.59	1.77	4.41	2.01	2.60	3.80	3.21	5.93	NS	4.06
9	4.27	2.49	3.68	3.13	0.77	3.54	5.26	3.06	3.13	5.26	7.35	5.13	NS	4.75
8	4.15	3.41	2.44	2.46	2.17	4.12	3.18	1.59	0.94	1.01	5.19	3.28	NS	4.81
7	1.64	0.37	1.81	0.78	2.96	3.42	1.80	0.11	0.00	1.52	1.33	3.85	NS	3.00
6	0.00	1.19	0.39	0.17	0.44	3.49	0.76	0.39	0.33	0.63	0.12	2.29	NS	2.88
5	0.00	0.00	0.00	0.00	0.00	1.04	0.00	0.00	0.00	0.00	0.00	0.00	**	0.25
TOTAL 3RD	21.38	19.16	21.66	19.40	16.16	19.56	29.34	15.52	18.42	26.88	25.26	32.27		
F Test	NS	**	**	*	NS	**	*	NS	NS	NS	**	NS		
LSD 0.05	3.00	1.88	1.81	2.38	2.63	2.31	3.31	2.38	3.25	3.25	2.81	5.06		

*,** Significant at the P=0.05 and 0.01 levels respectively with F statistic.

Table 11. Comparison of number of open bolls by nodes and zones for two-bale and three-bale cotton yields.

Two Bales per Acre							Three Bales per Acre					
	No. Open Bolls Per 100 Plants						No. Open Bolls Per 100 Plants					
			Position				Position					
Zone Cum No. Bolls/ Plant	Cum. Node Sum	Node Sum	3	2	1	Node	1	2	3	Node Sum	Cum. Node Sum	Zone Cum No. Bolls/ Plant
2.8	658.1	4.6		0.1	4.5	21	2.6	0.1		2.7	964.5	3.9
2.7	653.5	5.1		0.2	4.9	20	7.1	0.2		7.3	961.8	3.9
2.7	648.4	11.2		1.2	10.0	19	16.0	0.7		16.7	954.5	3.8
2.6	637.2	19.1	0.2	1.9	17.0	18	25.1	2.3		27.4	937.8	3.7
2.4	618.1	27.0	0.3	3.6	23.1	17	37.0	5.3		42.3	910.4	3.4
2.1	591.1	38.9	0.5	7.4	31.0	16	45.3	9.9	0.7	55.9	868.1	3.0
1.7	552.2	50.1	0.1	10.0	40.0	15	53.1	14.4	1.7	69.2	812.2	2.4
1.2	502.1	58.1	1.2	11.3	45.6	14	60.8	18.5	2.7	82.0	743.0	1.7
0.6	444.0	63.4	1.9	14.4	47.1	13	65.6	21.1	3.5	90.2	661.0	0.9
2.7	380.6	66.8	3.1	15.0	48.7	12	62.5	22.5	4.2	89.2	570.8	3.7
2.1	313.8	70.6	4.4	17.7	48.5	11	58.5	26.7	5.3	90.5	481.6	2.8
1.4	243.2	69.2	3.8	20.2	45.2	10	57.0	30.2	5.5	92.7	391.1	1.9
0.7	174.0	66.9	4.4	21.1	41.4	9	64.5	25.9	6.9	97.3	298.4	1.0
1.1	107.1	58.2	4.2	18.6	35.4	8	63.8	21.9	5.1	90.8	201.1	2.0
0.5	48.9	35.7	2.4	9.6	23.7	7	46.1	17.2	2.8	66.1	110.3	1.1
0.1	13.2	13.2	0.3	3.2	9.7	6	25.1	11.6	1.2	37.9	44.2	0.4
0.0	0.0	0.0				5	4.0	2.0	0.3	6.3	6.3	0.1

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