a greater or less degree. This may well not hold at all temperature and humidity levels, however.

When air currents blow upon them it is not so easy to see why the crickets under some conditions are stimulated to greater physical exertion as evinced by an increase in the chirping rate. Is it possible that the air currents make them more comfortable by cooling their bodies, under some conditions, just as it sometimes affects our own moods? It is at least indicated that air movements in some manner may at times operate to change the rate of chirping, and this factor may perhaps explain in part some of the discrepancies observed where the rates have changed out of proportion to the changes in air temperature.

While it is obvious that air temperature alone is not the only factor operating to make our cricket thermometers accurate, we are not justified in minimizing the air temperature factor, however. The evaluation of one factor in any environmental complex without due regard to all others can only result in confusion.

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FRUIT-BUD FORMATION IN THE STRAWBERRY IN SPRING IN SOUTHEASTERN STATES

AFTER the strawberry season is entirely past in Maryland one may travel either southward or northward and find strawberries just ripening. Even in Florida where the ripening season starts in November, berries may still be harvested as late as July. It is evident that the processes of fruit-bud formation and fruit development in the South take place under different conditions from the same processes in strawberries growing farther north.

In various sections of the Northern states from Maryland to Iowa and northward, the terminal growing points of strawberry plants have been found to begin transforming from vegetative buds to fruit buds in late September and October. In Florida the varieties there evidently initiate fruit buds continuously throughout late fall, winter and spring, as flower cluster production is a continuous process from November until June. From Georgia to North Carolina winter temperatures are cold enough to enforce short dormant periods, but the fruit-bud formation of fall is again resumed as soon in the spring as the temperatures become high enough for growth. From Virginia northward there seems to be no period of spring fruit-bud formation, and consequently no second crop.

The work of Garner and Allard,[1] and work previously referred to in this periodical[2] on effects of the length of the daily light period on plant growth, have furnished a background for an explanation of this late spring fruiting of the strawberry in the South. This work also furnishes one reason why strawberries vary so greatly in yields in different localities.

Fruit-bud development does not begin in the spring-bearing varieties to the north until the daily light period becomes relatively short in the late fall, and it ceases as soon as the temperature is as low as freezing. It would seem that conditions of similar day length and temperature following a period of winter dormancy might influence strawberry-plant activity in the same manner as preceding the dormant period. The following observations give evidence that fruit-bud initiation is resumed in the Southeast from Georgia northward to North Carolina in early spring while the temperatures are still low and the length of the daily light period still short. North of eastern North Carolina, the daily light period is too long for fruit-bud initiation in spring-bearing varieties when favorable temperatures for growth occur.

Missionary and Klondike, the only varieties produced commercially in the Southeast, have little or no rest period and grow freely during the short days of winter when the temperature is high enough. In the spring their fruit buds that formed in the fall and early winter develop into the "ground bloom" and the "ground fruit," terms that refer to the flowers and fruit lying on the ground. The ground bloom of all varieties observed is produced chiefly, if not entirely, on basal-branching clusters,[3] the flowers of which often open in considerable numbers during the late fall and winter months and of course are killed by freezing temperatures where they occur. From Georgia to North Carolina there appears a second crop of bloom and fruit known as the "crown bloom" and "crown fruit." This fruit is produced mainly on high-branching clusters with stout erect stems which support the berries unless they are too large and heavy.

The most vigorous plants produce low, but not basal-branching clusters (at least not usually) that resemble those of the ground bloom but which of course appear later. The extent of the crown bloom varies from year to year, depending on conditions little understood, though both the vigor of the plants in the fall and the weather conditions in winter and spring affect the amount of fruit buds produced in the spring. At Willard, North Carolina, the initial stages of fruit-bud formation have been found as late

[1] W. W. Garner and H. A. Allard, "Further Studies in Photoperiodism: The Response of the Plant to Relative Length of Day and Night," *Jour. Agr. Res.*, 23: 871–920, 1923.

[2] G. M. Darrow and G. F. Waldo, "The Practical Significance of Increasing the Daily Light Period of Winter for Strawberry Breeding," SCIENCE, 69: 496–497, 1929.

[3] G. M. Darrow, "Inflorescence Types of Strawberry Varieties," *Amer. Jour. Botany*, 41: 571–585, 1929.

as April 27, which is over a month after the first ripe berries were picked. Here small fruit buds just appearing from the crowns may be observed as late as the first week in June.

When a collection of varieties is grown, very interesting differences in the length of time during which fruit-bud formation occurs become evident. In 1929 a considerable number of varieties were fruited near Albany, Georgia. The season proved to be one in which the varietal response to conditions was especially marked. Yield records, kindly furnished by Mr. J. L. Pelham, showed clearly the importance of these phenomena. The comparative yield records in pints (for fifty feet of row) for four representative sorts are given in Table I by weekly periods.

late fruit. U. S. D. A. No. 655 is a very productive early sort in Maryland which in Georgia produced a large, fairly early crop and another large later crop. This variety is capable of forming fruit buds in both fall and spring. Finally the Blakemore, which is a productive early sort in Maryland, produced a large very early crop and a second larger late crop. Some fruit of both U. S. D. A. No. 655 and the Blakemore was picked each week from April 1 to June 5. However, the low point of cropping of the Blakemore was two weeks earlier and its second crop was larger than that of U. S. D. A. No. 655. The percentages of the total yield of each of the four sorts which were produced by the late crop were 0, 17, 47 and 63, respectively.

TABLE I

WEEKLY YIELDS OF FOUR STRAWBERRY VARIETIES OVER A TEN-WEEK PERIOD AT ALBANY, GEORGIA, 1929

	April				May			June			Total yield pints	Percentages of total in second crop
	1–6	7–13	14–20	21–27	28–4	5–11	12–18	19–25	26–1	2–5		
U. S. D. A. No. 25	5.0	3.0	4.5	2.0	1.5	0	0	0	0	0	16.0	0
U. S. D. A. No. 261	0.5	2.0	13.5	10.5	11.5	2.0	0	1.0	4.0	3.5	48.5	17
U. S. D. A. No. 655	6.5	10.0	9.0	3.0	2.5	1.0	4.0	9.5	10.0	5.0	60.5	47
Blakemore	13.5	5.5	6.0	1.0	3.0	3.5	9.0	12.5	10.0	4.5	68.5	63

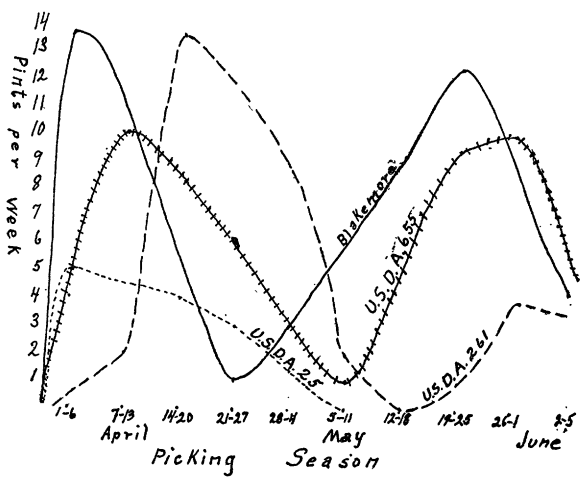

FIG. 1

The first variety, U. S. D. A. No. 25, which is a distinct spring-bearing variety that produces fruit buds only in the fall, is very productive and early in Maryland. In Georgia, however, it produced a very small crop, only 16.0 pints and that mostly early in April. It produced no late crop. U. S. D. A. No. 261 is a very productive late variety in Maryland, which is late also in Georgia. Toward the end of May and early in June it produced a small crop of

In an early season like that of 1929 a variety with the general characteristics of the Blakemore is especially desirable in the South for it produces a large early crop before berries in regions farther north begin to mature. The later second crop which is probably produced from fruit buds differentiated in late winter can then be used for the frozen storage industry. In late seasons like that of 1928 the crops from fall and spring-formed buds may overlap. Both the U. S. D. A. No. 655 and the Blakemore originated as crosses of the Missionary and Howard 17 and have inherited from the mother parent the tendency to form fruit buds in the spring. All other selections of the same parentage also form fruit buds in the spring in North Carolina and southward. On the other hand, several crosses of the Klondike with other varieties have either not shown this tendency or have shown it in a slight degree only. The production of spring-formed fruit buds seems to be due to the ability of certain varieties to respond to conditions in early spring favorable for fruit bud initiation which are similar to conditions prevailing when the first fruit-bud formation took place in the fall.

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