Factors Affecting Fruit Development of the Jumbo Runner Peanut

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TO INTERPRET peanut yields, it is essential to understand the factors that affect the development of the peanut (Arachis hypogaea L.) fruit. The most comprehensive study on this subject was made by Shibuya (5) with large seeded runner and small seeded Java Bunch peanut. Certain phases of peanut fruit development have been reported by Pickett (3) for Virginia Bunch, by Patel and Seshadri (2) for a Spanish variety, and by Smith (7) for Virginia Jumbo Runner peanuts. In all lines of research based on fruit yield and quality, in which the Jumbo Runner variety of peanut has been used, the need for more information about the factors that affect fruiting has become increasingly important.

This study is part of a more comprehensive project dealing with factors affecting fruit development and yield. The first phase dealt with the effects on fruiting of peg removal during different intervals in the blooming period. It soon became apparent that only very limited information could be obtained from peg removal experiments and peg tagging was resorted to for determining the effect of time of fruit initiation on fruit development. A preliminary report on part of this study was presented in 1950 (4).

METHODS

Seed from a single plant selection of the Holland strain (1) of Jumbo Runner peanut was used in 1949 and this selection was rogued annually in order to maintain a uniform seed stock for subsequent plantings.

Leaf shedding, resulting from infections of Cercospora arachidicola Hori and C. personata (B. and C.) E. and E., was controlled by repeated applications of sulphur to the foliage. The Southern corn rootworm (Diabrotica undecimpunctata howardii Barb.) was controlled through the use of lindane in 1949 and 1950, and with aldrin in 1951 and 1952.

In the experiment to determine the effect of peg removal on yield and fruit development, pegs were removed by clipping them before they reached the soil. Thus the fruit development was restricted to that fruit produced from pegs formed at certain intervals during the fruiting period. A peg according to Smith (6) is the stalk-like appendage produced from the point of flower attachment, after flowering but before fruit enlargement. When clipping was done during a given interval, it was done at weekly intervals, and all pegs produced during the preceding week were removed. The field plots consisted of 4 plants each, spaced 3 feet apart. A randomized block design was used and each treatment was replicated 6 times. The plots were located on Onslow sandy loam soil at the Tidewater Field Station, Holland, Va.

The rate of development of fruit from flowers produced at different times during the flowering period was studied by marking 10 newly formed pegs per plant, at weekly intervals. In order not to disturb previously marked pegs, the pegs farthest from the crown of the plant were marked each time. These plants were spaced 3 feet apart with 4 plants per plot. Three plots selected at random were harvested at weekly intervals over a period of several weeks, starting in late September. The development of fruit from pegs that the developing fruit would prevent the band from falling at harvest. However, a high percentage of the bands fell before the fruit enlarged or because the fruit failed to develop. During the next two seasons the bands were wrapped around the pegs just as they reached the soil, and it was assumed to prevent their loss.

RESULTS

Pegs were removed by clipping during different intervals in the blooming period in 1949. On one set of plants, pegs were first removed on Sept. 3, which included flowers produced during the preceding 10 days, and on another set from early July until July 26; and on another set from early July until Aug. 23. On a third set of plants the newly formed pegs were first removed on Sept. 3, which included flowers produced during the preceding 10 days, then were removed weekly until harvest. The weight of fruit (retained by a screen with slots 22/64-inch in width) per plant at harvest was not altered by the removal of all pegs from the beginning of the blooming period until July 26 or until Aug. 23; see table 1. These results show that the plants developed a comparable number of large fruit (fruit retained by a screen with slots 22/64-inch in width) even though the start of fruit formation was delayed for different lengths of time by peg removal during different intervals in the blooming period. It was apparent from the 1949 data that fully developed large fruit, however, is related to the length of time during which it developed, as is shown by differences in weight of fruit (pod and seed) and seed weight as the result of peg removal during both periods. The seed weight of the plants with pegs removed until Aug. 23, the plants with pegs removed until July 26 or from undisturbed plants. The weight of extra large seed (seed retained by a screen with slots 22/64-inch in width) per plant at harvest was not altered by the removal of all pegs from the beginning of the blooming period until July 26 or until Aug. 23; see table 1. These results show that the plants developed a comparable number of large fruit, which contained extra large seed comparable in weight to those produced by plants with pegs removed until Aug. 23, the plants with pegs removed until July 26 or from undisturbed plants.

Plants from which the pegs were removed throughout the period of peg formation in 1949 produced early fruit close to the taproot. These fruit contained extra large seed comparable in weight to those produced by plants with pegs removed until Aug. 23, the plants with pegs removed until July 26 or from undisturbed plants. This would explain the presence of any extra large fruit in this group of plants, since seed of this size was not expected from pegs produced after Aug. 23.

Pegs were removed by clipping during 4 weeks in 1950. The pegs were clipped from the time the first pegs were observed in early July until July 26, or early Aug. 23. It was apparent from the 1949 data that the developing fruit could not be expected from plants in which the pegs were kept clipped until the latter part of August. Peg removal was not used in 1950. The newly formed pegs on the other sets of plants were first removed on Sept. 3 of 1949.