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NOTE

THE EFFECT OF FRUIT COMPETITION AND LEAF AREA ON FRUIT SIZE OF STRAWBERRY *FRAGARIA X ANANASSA* DUCH. [1]

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ABSTRACT

Removing the primary fruit caused an increase in the weight of fruits at inferior positions; removing flowers at the later nodes did not, however, increase the weight of the fruit at earlier nodes.

Fruit size within the strawberry inflorescence was found to be a function of blossom position, fruit competition and plant vigor (leaf area). The data presented emphasize the effect of position within the inflorescence on the size of developing fruits. The primary and secondary fruits had a similar rate of development, despite their differences in size, and attained maturity in 49 to 52 days.

INTRODUCTION

Fruit size is one of the most important characters for evaluating strawberry cultivars. Large fruit size is especially important in reducing harvest cost and in marketing fresh strawberries.

Large differences exist in size within fruits of an individual inflorescence depending on fruit position in the inflorescence (1, 2, 4, 7, 8). Fruit size decreases markedly

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with each inferior blossom position. Differences in fruit size at various positions in the inflorescence are due to differences in the number of achenes which produce the necessary hormones for receptacle growth (4).

Fruiting strawberry plants have smaller leaves and a smaller total leaf surface than non-fruiting ones. Retardation of leaf and runner formation occurs as a result of fruiting (3). Lenz and Buenemann (5) reported a reduction in growth of roots and leaves in fruiting strawberry plants, but emphasized that the total amount of dry matter produced in fruiting plants was not less than that of non-fruiting ones. Similarly, Maggs (6) showed that the fruiting plants produced more dry matter per unit leaf area than plants without fruits.

In this study attempts were made to investigate the effects of competition and leaf area on final fruit size of the cultivar Cambridge Favourite grown under glasshouse conditions.

MATERIALS AND METHODS

One hundred and twenty uniform strawberry plants of the cultivar Cambridge Favourite (14 to 16 g fresh weight) were planted in November 1972 in 12.5 cm plastic pots filled with potting compost. Before planting, the roots had been washed and old leaves removed. Plants were kept outdoors in peat to receive natural winter chilling. In the following March they were transferred to a heated glasshouse and subsequently grown at a minimum temperature of 15.5 C under natural light conditions. Observations were made only on the first inflorescence emerged; all other inflorescences which developed later were removed.

The relevant flowering positions were marked on the day of opening and all other flowers in the clusters were removed. Flowers were retained in four treatments as follows:

1. primary + secondary No. 1+ secondary No. 2 (P+S1 + S2)
2. primary alone (P)
3. secondary No. 1 alone (S1)
4. secondary No. 2 alone (S2).

Within each treatment plants were pruned for leaf area in the following manner:

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a. intact, no leaf reduction,
b. all central leaflets removed to reduce the leaf area by one third or
c. both of the side leaflets removed to reduce the leaf area by two thirds.

Leaf pruning was carried out continuously as new leaves developed. The duration of fruit development from anthesis to harvest and the weight of ripe fruits in each treatment were recorded.

RESULTS AND DISCUSSION

The effects of fruit competition treatments at each of the fruit positions are shown in Table 1. The factor which influenced fruit size most was the position in the truss and the effect of position was not lost when all other competing fruits were removed. No differences in weights were found between primary fruits developing as a single fruit on a cluster (P) and those growing along with secondary fruits (P + S1 + S2). This indicated that removal of the secondary fruits did not affect primary fruit development. On the other hand, in every case where secondary fruit developed together with primary fruit (P + S1 + S2), it weighed less than those growing in clusters in which the primary flowers had been removed (S1 or S2). Pruning of the primary fruit brought about an increase in the weight of fruits at inferior positions (S1 or S2). Removal of flowers located at inferior positions (S1 or S2), however, did not bring about an increase in fruit weight at the earlier position (P).

Reducing leaf area by one third did not significantly decrease the weight of fruit but reducing it by two thirds resulted in a reduction of total fruit weight.

There was no interaction between the effects of fruit competition and leaf area. Even when only one fruit was allowed to develop in each inflorescence, the size was reduced as much by defoliation as when three fruits were present. The effect of a reduction in leaf area on fruit size cannot therefore be prevented by reducing the number of fruits that are supplied by the reduced leaf area.

The period of development of the individual fruits, from anthesis to ripening, was

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Table 1. Effect of fruit competition and leaf area on final weight of fruit at different positons on the truss.

Fruit competition treatment	Fruit position	Leaf area reduction			
		None	Leaf area reduced by one third	leaf area rduced by two thirds	mean*
P + S1 + S2	P	23.6	23.7	18.7	22.00a
P	P	24.2	23.8	19.6	22.53a
P + S1 + S2	S1	15.2	14.7	12.6	14.17b
S1	S1	17.0	16.1	13.9	15.67a
P + S1 + S2	S2	12.7	11.6	10.7	11.67b
S2	S2	14.1	14.2	12.9	13.73a
mean*		17.8a	17.3a	14.9b	

* Means in each group followed by the same letter are not significantly different at the 5% level of prodbability.

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also recorded. Under the conditions of this experiment, the development periods of primary and secondary fruits were similar (49 to 52 days) and were not affected by any of the treatments.

It is concluded that fruit size in strawberry depends primarily on its position in the cluster. Fruit competition and plant vigor (leaf area) affect size to a smaller extent and their effects are largely indenpendent of fruit position.

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