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EFFECTS OF PRE AND POST-BLOOM APPLICATIONS OF ETHEPHON ON FLOWERING OF STRAWBERRIES

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ABSTRACT

Young Missionary strawberry plants grown under controlled environmental conditons were sprayed with 0,125, 250, 500 and 1000 ppm solutions of Ehtephon pre and post-bloom. Pre-bloom applications completely inhibited flower production regardless of concentration while post-bloom applications prevented further growth of developed buds and decreased flower retention period.

INTRODUCTION

Ethephon (2-cholorethylphosphonic acid) has been shown by several investigators (13, 14, 15, 18, 19) to release ethylene directly to the plant tissues and thus affect several plant processes. The response of plants to ethylene varies with plant type and stage of growth and with ethylene concentration (1). Pre-harvest applications of Ethephon to deciduous as well as evergreen fruit trees have resulted in accelerated and uniform fruit ripening and loosening of fruits (2, 4, 7, 8, 10, 20). Cotton and nursery stocks have been defoliated successfully by Ethephon applications (11, 13, 14). The flowering habit of plants can be modified by Ethephon treatment at different concentrations and application dates. Cooke and Randall (6) obtained 100 percent flower initiation in otherwise vegetative pineapples using 1, 2 and 4 pounds of Ethephon per acre as a broadcast spray. McMurry and Miller (12) and Robinson *et al.*(16) sprayed cucumber leaves with Ethephon and reported the conversion of monoecious cultivars into gynoecious plants. Several investigators (5, 7, 8, 9, 17) have reported pre-bloom applications of Ethephon to delay flowering and to cause flower abscission. Strawberries *(Fragaria ananassa DUCH)* produce flowers over an extended period of several weeks. The gradual habit of flower production causes earlier flowers to develop into larger fruits and flowers opening later to produce small, low grade fruits. The objective of this investigation was to study the effects of Ethephon on flowering and vegetative growth of strawberries.

MATERIALS AND METHODS

Thirty uniform young Missionary strawberry plants (a self fruitful variety), refregerated at 4C for 30 days, were transplanted into 15-cm pots, and placed in a growth chamber with 14 hours of day and 10 hours of night. During the 10 weeks of experiment the temperature was 28C during day and 20C at night. Relative humidity ranged between 40 and 60 percent. Ethephon was applied to individual plants to the point of runoff at concentrations of 0, 125, 250, 500 and 1000 ppm. There were two application times: 1) March 7th, three weeks after planting when plants had developed 4-6 leaves; 2) March 21st, one week after the first flower was observed. The experiment was completely randomized design with three replications. Data were collected on flowering date, flowering period, number of flowers per plant and shoot growth.

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RESULTS AND DISCUSSION

Untreated plnats produced their first flowers on March 14th and by March 21st contained one flower cluster with an average of three open flowers while pre-bloom applications of Ethephon had inhibited flowering completely regardless of concentration. These applications, however, had no effect on appearance of leaves and plant vigor.. After the second application, flower production and bud development stopped immediately. The control plants developed normally and by the end of experiment averaged 2 flower clusters per plant with about 8 open flowers some of which had developed into fruits. On treated plants the opened flowers remained static for about three weeks after which they dried up and died. The lack of fruit production in treated plants may have been due to a direct effect of Ethephon and/or lack of fertilization. Inhibition of fertilization has been reported in peach pollen. Application of 100-1000 ppm of ethylene prevented pollen germination and inhibited pollen tube growth (3). Following the second application there was a significant difference in length of flower retention period among treatments (Table 1). Plants sprayed with higher concentrations (500 and 1000 ppm) retained their flowers for about 21 days while plants treated with lower conentrations were in bloom for an average of 24.3 days. These results indicate that with the range of concentrations used in this study, pre-bloom applications of Ethephon inhibit flowering and post-bloom applications inhibit opening of developed buds and decrease the period of flower retention.

Table 1. Effect of Ethephon on length (in days) of flower retention.

Date of Application	Ethephon (ppm)				
	0	125	250	500	1000
3- 7-72	42^{a2}	0^{d}	0^{d}	0^{d}	0^{d}
3-21-72	42^{a}	24.3^{b}	24.3^{b}	21^{c}	21^{c}

2. Means followed by same letters are not significantly different at 1% level probability (Duncan's New Multiple Range Test).

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