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Bloom Advancement in Sweet Cherry by Hydrogen Cyanamide

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Abstract

Application of the dormancy breaking agent, hydrogen cynamide, synchronized bloom of the sweet cherry cultivar 'Sam' and its pollinizer 'Rainier,' by advancing significantly the former's bloom date. By this treatment 'Sam' may produce commercial yields in mild winters and at low altitudes in subtropical regions.

Introduction

Most of the sweet cherry orchards in Israel, are planted at altitudes between 600 m to 800 m. As winters in subtropical region are rather mild, in most years (400-800 chill units according to the Utah model (4)), it has been observed frequently that the 'Sam' tend to bloom later than the other sweet cherry cultivars, and thereby its bloom does not coincide with its pollinizers. This problem is less severe if the winter is very cold or in northern part of Israel, where the cherry plantations are located at 900-1000 m altitude and are exposed to more chilling units. (Over 800 CU by the Utah model.) In order to advance the blooming period of 'Sam' we tested the dormancy breaking chemical hydrogen cyanamide or 'Dormex,' by spraying it on trees before bud break at several dates prior to bud break. Hydrogen cyanamide was found to break rest effectively on grapevines (5) peaches, plum and apples (1) and on raspberries (7, 8).

Materials and methods

Hydrogen cyanamide was obtained from Agan Chemical Manufacturers Ltd., Ashdod P.O. Box 262 Israel. The solution contained 50% active ingredient.

Preliminary experiments with hydrogen cyanamide were carried out in the years 1984 and 1985. Due to fear of a possible toxicity of this compound to flower buds or shoot tips, only scaffold branches and single trees were treated with various hydrogen cyanamide concentrations, on several application dates. As no damage was observed in the preliminary experiments, while the results were promising, a large experiment was planned for in Maale ha-Hamisha, 600 m above sea level at latitude 32° N. Thirty-six trees of cv. 'Sam' were treated as single tree replicates in a complete randomised experimental design. Hydrogen cyanamide as a 2.5% solution (a.i.) was sprayed to drip with a hand gun on two dates: Feb. 11 and Feb. 24, 1986, 0.025% Triton x-100 spreader was added. Two branches were counted, at 3 day intervals. The flowering percentage of total flower buds present on the branch was calculated on the counting date. Data are presented as means ± standard error. Percent bloom was checked also with cv. 'Rainier' which served as the pollinizer of cv. 'Sam.'

Result and Discussion

In 1984, 1.5% cyanamide applied in mid February to scaffold branches of 'Sam,' advanced bloom (time of 50% bloom) by 13 days compared with the untreated control. In 1985, cyanamide applied on February 21 advanced the cv. 'Sam' bloom by 1 and 7 days for 1.5% and 2.5% cyanamide respectively. Earlier application at either concentrations did not have any effect.

In the 1986 experiment too, hydrogen cyanamide advanced markedly the blooming period of the treated 'Sam.' Comparing the two application

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dates, the earlier treatment was most effective advancing bloom by about 18 days (Fig. 1). The flowering curve of cv. 'Rainier' in the same orchard overlapped the second application date of 'Sam' very well, thus improving the chance of pollination. The harvest period of 'Sam' was advanced by about 2 weeks compared with that of the untreated control. The harvesting period of 'Sam,' which is in Israel one of the latest, was advanced to the middle of the season. It must be emphasized, that each year, the date of cyanamide application must be determined carefully, depending on the stage of rest advancement, as has been shown for other crops (6, 7, 8). The responsiveness to cyanamide application seems to be dependent on a minimal accumulation of chilling, otherwise, poor response will be obtained as was shown for other rest breaking chemicals (1). From our calculations it seems that this minimum is about 350 chill units according to the Utah model (4), or about 35 portions according to the dynamic model (2, 3). Once the buds become responsive, the earlier the treatment the stronger the bloom advancement. If the cyanamide is applied too late, it might be phytotoxic to the buds.

The possibility of advancing bloom in sweet cherries may be of interest also to breeders that want to use pollen from late blooming cultivars to pollinate early blooming ones.

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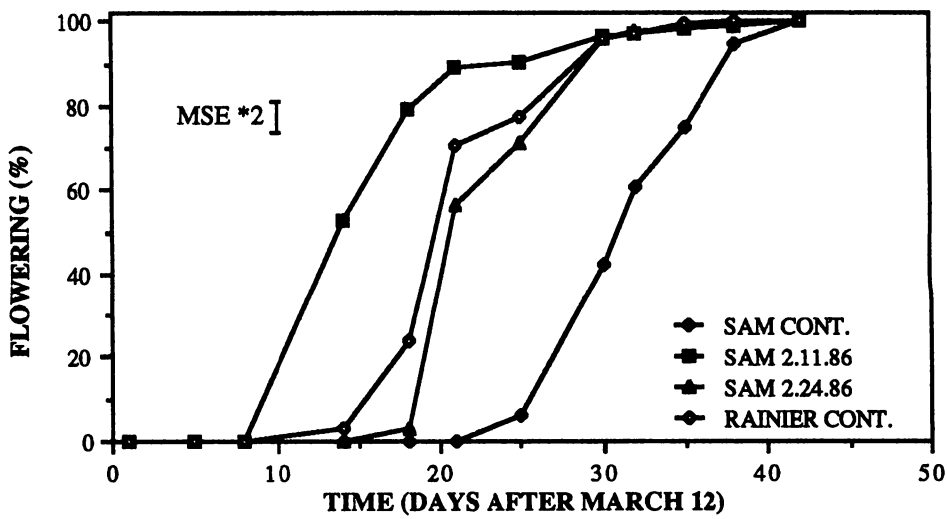

Figure 1. The influence of cyanamide treatments on the flowering curves of the cherry cv. 'Sam,' as compared with cv. 'Rainier,' which served as the pollinator.