senility factor.

Only about one-fifth of all pear losses was caused by plant pathogens. Western pears are routinely treated with a postharvest fungicide to control pathogenic activity. The relatively small loss from fungal rots found in our study attests to the soundness of that commercial practice.

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Ethephon Improves Marketability of 'Schmidt' Sweet Cherries Picked without Stems[1]

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Abstract. **Orchard application of 300 ppm (2-chloroethyl)phosphonic acid (ethephon) to sweet cherries (*Prunus avium* L. cv. Schmidt) enhanced fruit abscission and decreased fruit injury from stem scar tearing when harvested without stems. Postharvest pitting of the fruit at the stem scar and the development of brown rot were reduced by ethephon. Even so, treated fruit picked without stems was unmarketable after 5 days at room temperature because of excessive amounts of decay, regardless of fungicidal treatment or storage for 0 to 6 weeks at 0 and 5°C.**

Michigan sweet cherries are seldom harvested with stems attached. Those intended for fresh use, mostly of the 'Schmidt' cultivar, are generally suitable only for immediate marketing and consumption. Removing the stem often tears the skin and flesh resulting in exudation of juice, increased susceptibility to decay, and rapid browning and dehydration of the damaged tissues. Bukovac et al. (1) have shown that fruit abscission of sweet cherries, for brining purposes, is promoted by the preharvest application of ethephon. A similar effect for fresh market fruit might help overcome some of the difficulties encountered in marketing stem-less fruit.

Fruit from mature 'Schmidt' trees of similar vigor and crop load at 2 locations in northwestern lower Michigan with and without ethephon at 300 ppm were harvested at 6 and 8 and at 10 and 12 days after spraying. Removal force to separate the fruit and stem was measured with a Hunter Mechanical Force Gauge in the orchard. Other samples were hand-picked without stems at random from all sides and up to 3.7m from 2 trees of each treatment and evaluated the following day for damage at the stem scar and skin color. Control and ethephon-treated fruit were assigned to each of three 50-fruit replicates for 16 storage treatments. Fruit treated with fungicide was submerged in a suspension of dichloran[3] (450 ppm) plus benomyl (150 ppm) for 15 sec and drained. Nontreated fruit was not moistened. Storage at 0 and 5°C for periods of 0, 2, 4, and 6 weeks was employed.

After storage in a perforated polyethylene bag for the designated period, each sample was held 5 days at room temp and decay development recorded as no of fruit with visual symptoms of brown rot caused by *Monilinia fructicola* (Wint.) Honey; the remaining decayed fruits were counted as rots caused by other organisms (primarily *Rhizopus* sp. and *Alternaria* sp.). Pitting at the stem scar included fruit with slight surface darkening and dehydration of the surrounding tissue. Weight losses during storage and the simulated marketing period at room temp were recorded.

Either preharvest application of ethephon or delay in time of harvest resulted in riper fruit at harvest-time as measured by darkening of skin color and decrease in fruit removal force, see Table 1. This ripening effect of ethephon (1) resulted in the promotion of fruit abscission (2, 3) and thereby reduced stem scar damage as a result of separation of the stem from the fruit. These effects were more pronounced for ethephon than for delay in harvest, whereas, the effects on red coloration were similar. The reduction in fruit damage at harvest from ethephon resulted in a decrease in the subsequent development of stem scar pitting of the fruit due to desiccation of the flesh tissue damaged by stem detachment (Table 2). Pitting differences, however, were not reflected in the overall weight losses, which ranged up to an average of 4.4% after 6 weeks of storage.

Table 1. At harvest maturity and injury of 'Schmidt' sweet cherry fruit.

Factor	Fruit removal force (g)	Stem scar damage (% of fruit)	Skin color (rating)[z]
No ethephon	348	18.6	1.70
Ethephon	242	6.4	1.51
1st harvest	316	15.2	1.72
2nd harvest	272	10.0	1.49

[z]Scale of 1 (black to 5 (light red).

Table 2. Percentage of fruit affected by disorders after a simulated marketing period of 5 days at room temp.

Factor or treatment	Stem scar pitting	Brown rot	Other rots
No ethephon	44.1	33.4	22.0
Ethephon	27.6	29.0	22.4
	**	**	NS
1st harvest	35.6	17.4	28.6
2nd harvest	36.1	44.8	15.6
	NS	**	**
No fungicide	36.2	35.2	20.2
Dicloran + benomyl	35.5	27.2	24.0
	NS	**	**
Storage at 0°C	36.8	24.8	21.4
Storage at 5°C	35.0	37.6	22.8
	NS	**	NS

NS - Not significantly different.
*Significantly different at 5% level.
**Significantly different at 1% level.

The simulated marketing period at room temp to which the cherries were subjected prior to evaluation resulted in excessive deterioration (Table 2). Control fruit not stored and examined 5 days following harvest developed an average of 35.1% stem scar pitting, 28.8% brown rot, 13.2% other rots and 1.5% weight loss; none of them was considered to be marketable. In spite of the high incidence of decay, there was a measurable retardation of brown rot by ethephon, early harvest, fungicidal treatment, and 0°C storage. The other rots were not affected by ethephon or storage temperature, but unaccountably were decreased by early harvest and fungicidal treatment. Prolonging the cold storage period of the fruit up to 6 weeks significantly increased deterioration from all causes.

The possibilities for marketing

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[3]2,6-dichloro-4-nitroaniline.

'Schmidt' sweet cherries without stems would seemingly be enhanced by preharvest treatment of the fruit with ethephon since there was a reduction in physical damage caused by removing the stems. Better means for decay control, however, would have to be utilized. The acceptance of such practices as continuous refrigeration during the marketing period, for example, might justify the further evaluation of ethephon as an aid to the fresh marketing of stem-less cherries.

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Influence of Mulch on Residue Accumulation and on Injury to 'Richhaven' Peach trees from 2,6-Dichlorobenzonitrile (Dichlobenil)[1]

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Abstract. **Hay mulch applied only the year of planting under 'Richhaven' peach trees reduced foliar injury following annual applications of dichlobenil. Dichlobenil residues were greater than those of its breakdown product, 2,6-dichlorobenzamide (BAM), in mulch and at 0-15 cm soil depth under mulch. Mulch did not reduce amount of dichlobenil in soil. Only dichlobenil at 13.44 kg/ha, twice the rate labeled for usage under fruit trees, applied on mulch residue partially prevented an influx of annual weeds.**

We reported previously that simazine accumulated in the hay mulch under apple trees (5). As a consequence, the residue in the soil under the mulch was less than when simazine was applied on non-mulched soil. Hay mulch could be a practical means for the reduction of herbicide phytotoxicity to young fruit trees from a pre-emergence herbicide such as dichlobenil. Dichlobenil adsorbs tightly on certain organic materials (7, 8), has low water solubility (1) and in general does not move rapidly in soil (2, 8). Benyon and Wright (2) found that BAM is formed after application of dichlobenil and its residues in several soils were generally greater than those of the dichlobenil, except in peat. Since the organic matter content of hay residues is high, it was of interest to determine dichlobenil and BAM residues both in mulch and soil.

'Richhaven' peach trees planted in April, 1968 in Scituate sandy loam (organic matter – 4.9%; sand – 61%; silt – 30%; clay – 8%; pH – 6.2%) at the Horticultural Research Center, Belchertown, Mass., were selected for the study. All trees were mulched with 4 bales of hay (approx 72 kg) spread over a circular area extending 2.13 m from the tree trunk to maintain a similar soil management system until establishment of treatments. No more mulch was applied for the remainder of the experiment. Eight single-tree replications of the following treatments were established in Nov., 1968: (A) hay mulch applied only at planting; (B) cultivation annually in May and July; (C) 4% granular dichlobenil applied at 6.72 kg active ingredient per ha (ai/ha) on non-mulched soil; (D) dichlobenil at 13.44 kg ai/ha on non-mulched soil; (E) dichlobenil applied on mulch at 6.72 kg ai/ha, and (F) dichlobenil applied on mulch at 13.44 kg ai/ha. The mulch was removed prior to establishment of treatments B, C, and D. Dichlobenil was applied in mid-Nov., 1968-72.

Mulch and soil samples were obtained under 6 of the single-tree replications in treatment F and soil samples from 6 of the trees in treatment D in late Oct., 1970, and 1972, to determine dichlobenil and BAM residues. A different area under the trees was selected on each date to insure sampling of undisturbed soil or mulch. A soil sampling tube was thrust vertically into the soil to a depth of 30 cm. This was done a sufficient number of times to obtain 0.95 liter samples from the 0-15 and 15-30 cm soil depths under mulched and non-mulched trees. The mulch and soil samples were analyzed by Thompson-Hayward Chemical Company, Kansas City, KS.

Leaf phytoxicity. Foliar phytotoxicity symptoms, characterized by leaf margin yellowing (LMY) and leaf tip burn, resulted from dichlobenil applications both at the rate labeled for usage under peach trees (6.72 kg/ha) and double that rate (Table 1). The hay mulch application of May, 1968, prevented foliar injury in 1969, but was increasingly less effective from 1970 through 1973. In 1972, LMY appeared later and was less severe than in 1971 and 1973 (Table 1). Annual variation in the occurrence of LMY has been reported by others (4).

Dichlobenil and BAM residues. Mulch residues adsorbed dichlobenil (Table 2) and probably delayed the formation of BAM, the causative agent of LMY (4). Otherwise, BAM which a very water-soluble and weakly adsorbed by soil (4) should have been equally available to tree roots and caused equally severe foliar phytotoxicity on trees in mulched and non-mulched soil since the hay decomposed rapidly and consisted of a layer 2.54 cm or less thickness by spring, 1970.

Contrary to the findings of Beynon and Wright with several soils (2), dichlobenil residues were greater than

Table 1. Foliar phytotoxicity on terminal shoots of 'Richhaven' peach trees following dichlobenil usage.

Treat.	Dichlobenil[z] placement and rate (kg ai/ha)	% leaves showing injury in late August[y]				
		1969	1970	1971	1972	1973
C	On non-mulched soil, 6.72	30b[x]	69b	78a	15bc	50b
E	On mulched soil, 6.72	0c	18c	47b	8c	30b
D	On non-mulched soil, 13.44	69a	94a	94a	70a	97a
F	On mulched soil, 13.44	0c	53b	81a	29b	91a

[z]Dichlobenil applied annually in mid-Nov. for 5 consecutive years starting in 1968; 8 single-tree replications.

[y]3 shoots per tree.

[x]Mean separation, within columns, by Duncan's multiple range test, 5% level.

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