Winter Injury to Fruit Buds of Stone Fruits in Washington[1]

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A cold wave brought below-zero temperatures to a large part of the Pacific Northwest in late December of 1968. A minimum temperature of − 11°F was recorded on December 30 adjacent to the Roza Unit orchards of the Irrigated Agriculture Research and Extension Center in the Yakima Valley, near Prosser, Washington. The weather preceding the freeze was relatively mild with maximum temperatures in the 30's and minimums in the 20's. Under these conditions, fruit trees are relatively susceptible to low temperature injury.

A large number of stone fruit varieties and selections are maintained at the Center primarily in connection with the stone fruit breeding program. After the freeze the Center orchards were surveyed to assess fruit bud losses. Branches were cut and brought into the laboratory. Fruit buds were cut crosswise and examined for browning. Discolored buds were considered dead. Where two or more trees of a variety or selection were sampled, the mean percentage of bud survival was calculated.

Over two hundred peach and nectarine varieties and selections were examined. Virtually no live fruit buds were found. However, Veteran, Sunapee and Prosser 2-1 bore very light crops in 1969.

Fruit bud survival in apricots ranged from 72 to 1 per cent (Table 1). Hardy buds were not always asso-

Table 1. Hardiness of the fruit buds of apricot varieties and selections.

Name	No. trees	% Live fruit buds	Name	No. trees	% Live fruit buds
Mantoy	1	72	Wenatchee		17
Tilton	3	55	Golden Giant		16
Golden	1	51	Early Moorpark	1	15
Prosser 4-36	1	43	Utah 11	1	15
Utah 32	1	41	Earliorange	2	14
Summerland 2E-14-22	2	37	Phelps	1	12
Prosser 8-246	1	35	Prosser 8-111	2	11
Royal	1	26	Summerland 4E-55-9	2	11
Prosser 2-10	2	24	Valigold	2	11
Prosser 4-12	3	24	Blenril	3	8
Utah 18	1	24	Earliril	5	7
Sunglo	4	22	Prosser 5-61	1	7
Earligold	1	20	Hemskirke	2	6
Redsweet	2	20	Perfection	2	6
Routier's Peach	2	19	Wilson Delicious	1	4
Prosser 8-227	1	18	Riland	1	2
Naramata	1	17	Castleton	1	1

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Table 2. Hardiness of fruit buds of plum varieties of *P. salicina* derivation.

Name	No. trees	% Live fruit buds
Ivanovka	2	100
Wright's Early	1	99
Red Ace	2	96
Early Gold (Shiro)	2	95
Duarte	1	92
Climax	1	86
Trailblazer	2	82
Twilight	1	80
Nubiana	2	68
Mammoth Cardinal	1	64
Formosa	2	55
Ozark Premier	1	55
Redheart	2	55
Elephant Heart	2	48
Methley	2	43
Queen Ann	1	36
Laroda	2	35
Burmosa	1	35
Miracle	1	27
Wickson	1	12
Santa Rosa	1	4

ciated with hardy wood. Tilton fruit buds were relatively cold-resistant, but the trees, which were severly injured in the 1964 freeze*, suffered additional injury. Progressive wilting and dying of a number of major limbs occurred during 1969. On the other hand, only a few live fruit buds were found on some of the wood-hardy varieties such as Riland and Perfection. Varieties such as Sunglo, which normally bear heavy loads of fruit buds, required thinning in 1969 in spite of relatively low bud survival.

Plum varieties derived from American species, and hybrids between American and Asiatic species suffered little or no fruit bud injury in the freeze. Bud survival ranged from 97 to 100 percent in the 25 varieties and selections examined. A very wide spread of bud survival percentages was obtained for dessert-type plums

*Toyama, T. K., and G. E. Barnard. 1965. The effect of the December, 1964 freeze on some stone fruit varieties and selections. Wash. State Hort. Assoc. Proc. 61:51-53

Table 3. Hardiness of the fruit buds of sweet cherry varieties and selections.

Name	No. trees	% Fruit buds alive on: 1-yr. wood	Spurs	Name	No. trees	% Fruit buds alive on: 1-yr. wood	Spurs
Prosser 1-794	2	93	98	Ulster	1	75	87
Star	2	93	98	Vic	1	76	86
Hedelfingen	2	80	98	Merton Bounty	2	67	84
Prosser 1-1167	1	91	96	Sam	4	79	83
Lamida	1	87	95	Spalding	3	78	83
Moreau	3	78	94	Centennial	1	73	81
Lambert	3	88	93	Oxheart	1	60	80
Napoleon (Royal Ann)	1	86	93	Valera	2	64	79
Chinook	4	88	92	Deacon	2	69	78
Venus	1	87	92	Prosser 1-576	3	61	77
Vernon	2	80	92	Van	4	55	75
Ebony	3	84	91	Rainer	3	58	74
Vineland 27016	1	79	91	Corum	1	42	74
Merton Favourite	2	73	90	Black Tartarian	2	46	71
Early Burlat	3	73	90	Sparkle	1	51	67
Emperor Francis	3	79	89	Bing	6	47	64
Merton Bigarreau	2	69	88	Republican	6	45	58
				Merton Heart	2	37	40

Table 4. Hardiness of the fruit buds of European plum varieties and selections.

Name	No. trees	% Live fruit buds
Merton	1	100
Parson	1	100
Vineland 33016	2	99
Italian Prune	3	98
Prosser 5-4	1	98
Prosser 5-18	2	97
Richards Early Italian	2	97
Vineland 370117	4	96
Demaris	4	95
Reine Red	1	95
Timme	1	94
Weatherspoon	1	94
Burbank Grand Prize	2	93
French Improved	1	93
Stanley	4	92
Peach	3	90
New York 981	1	89
Edwards	2	84
Rich Pride	2	76
Hall	2	72
Prosser 6-39	1	67
Reine Claude	1	66
Oneida	1	58
Vineland 370118	2	56
Yakima	1	44
Bluefre	2	43
Thurnhurst	1	41

of *P. salicina* derivation (Table 2). Fruit buds of some varieties were quite hardy. More than 90 percent of the buds of Ivanovka, Wright's Early, Red Ace, Early Gold, and Duarte survived. The one tree of Burmosa showed severe winter injury symptoms in 1969.

The freeze was not severe enough to produce good spreads of bud survival percentages for European plums and sweet cherries. A few of the plum varieties had distinctly less hardy fruit buds than most of the others (Table 4). Less than 50 per cent of the buds of Yakima, Bluefre, and Thurnhurst survived.

Fruit buds on spurs and on one-year wood were counted separately for the sweet cherries. Spur buds were hardier than buds on one-year wood (Table 3). Bud losses did not result in yield reductions in most varieties. A full commercial crop of Bing was produced in the Yakima Valley in 1969, although an unusually heavy June drop was observed in some orchards.

Since the data in these tables were obtained from variable numbers of trees of different ages spread over some 40 acres, close comparisons between varieties and selections should not be attempted. Nevertheless, varieties for which relative bud hardiness was known to some extent from previous experience, performed about as expected, even in European plum and sweet cherry, where the spread was limited. Therefore it seems likely that the data are reasonably representative. The percentages based on more than one tree can, of course, be viewed with greater confidence than those from single trees.

Wood injury was limited mainly to browning of the cambium of the terminals and killing of weak twigs and spurs. The peaches and some of the apricots and Japanese plums showed the greatest amount of this type of injury. Bark splitting on trunks and other signs of more severe wood injury were observed in a few of the least hardy apricots and Japanese plums.

Open Letter to Members of A. P. S.

2705 S.E. 166th Ave.
Portland, Ore. 97236
Jan. 12, 1970

Members of A. P. S.:

I am searching for several old varieties of apple that were common in orchards a century ago. As a

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1970, either as a special or a regular issue of the Digest.

The apple variety book, entitled The North American Apple—Varieties, Rootstocks and Outlook, was edited by W. H. Upshall during 1969, and has been turned over to R. F. Carlson, Chairman of the Editorial Committee, with the charge to find a publisher.

The History of Pomology book is in need of an editor. D. V. Fisher, who has been in charge of it until now, together with the Editorial Committee, will try to find one as soon as possible.

L. D. Tukey was designated as official representative of A. P. S. at the International Horticultural Congress in Israel in March, 1970.

—L. D. Tukey and G. M. Kessler

Early Apples in Massachusetts

J. F. Anderson, of the University, has the following to say about the performance of two early apples at Amherst: 'Julyred' seems to have very good eating, handling and storage quality, and is a medium-sized, medium red fruit, and ripens first week in August. 'Niagara' ripens 10 days before McIntosh, but did not color well, the past two seasons, and showed much russetting and prominent lenticels.

OPEN LETTER

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fellow member, I ask your help. Somewhere back in the orchards of your Experiment Station, nurseries or farms, there may still be standing a tree or two of the varieties I seek.

Over 122 years ago, the great pomologist, Henderson Luelling, left Iowa with 700 grafted fruit trees in two covered wagons. Crossing hostile Indian country, he finally reached Oregon late in 1847. The following Spring he set the first orchard and nursery on the Pacific Coast. These grafted trees were recognized as superior by the then newly formed American Pomological Society.

Luelling returned east in 1852 to purchase new varieties from the A. J. Downing and the Ellwanger & Barry nurseries.

Thus, a century ago, over a 100 varieties of apple alone, were already on the scene in the Oregon Territory —varieties that were common in established eastern orchards.

In the Fall of 1969, the Oregon Historical Society dedicated Pioneer Park. I contributed for planting in the Park the following 10 apple varieties: Lady, Fort Vancouver, White Winter Permain, Spitzenberg, Mother, Summer Rose, Hudson's Golden Gem, Oregon Red Winter, Twenty Ounce, and Coos River Beauty. In addition to these varieties, 90 additional ones will be planted in a Pioneer Orchard Museum in the Pioneer or Howell Territorial Park. And I have the responsibility to secure, graft and plant them.

I would appreciate your help in locating the following apple varieties: Black Heart, Horse-Haas-Fall Queen, Newark Pippin, Sweet June, Ladd's Seedling, Fall Beauty, Tewksbury Winterblush, Virginia Greening, McCarver's Seedling, Summer Bellflower, Red Cheek Pippin, Newton Spitzenberg, Cole's Quince, Keswick Codlin, Dutch Mignonne, Smith's Cider, Winter Queen-Buckingham, Hall, Oregon Seedling, Ideal, Hutchinson, and Michael Henry Pippin.

The Pioneer Orchard Museum will be one way to preserve some of our "old sorts."

On behalf of the Oregon Historical Society, I thank you in advance for any assistance you can give.

Sincerely,
Larry L. McGraw