

Fluorine Levels in 1960 Crops Of The Dalles Area



by
O. C. Compton
L. F. Remmert
W. M. Mellenthin

Miscellaneous Paper 119
September 1961

Agricultural Experiment Station
Oregon State University
Corvallis

S105
REF 55
cop 2



FLUORINE LEVELS IN 1960 CROPS OF THE DALLES AREA

O. C. Compton, L. F. Remmert, and W. M. Mellenthin*

SUMMARY

The fluorine contents of seven crops grown in The Dalles area are reported for 1960. These data are compared in Table 8 to similar data obtained previously.

Leaf samples collected in The Dalles area July 8, 1960, ranged from 14 to 248 ppm fluorine and averaged 77 ppm while those taken the latter part of September ranged from 38 to 431 ppm, and averaged 170 ppm fluorine. Similar samples from the Corvallis area all contained less than 23 ppm fluorine.

Leaf scorch of apricot and prune trees and the amount of soft suture on peach fruits were more severe in 1960 than in 1959. These abnormalities had not been observed prior to the operation of the aluminum factory in this area.

INTRODUCTION

In a previous report (2) data were presented on fluorine levels in seven crops grown in The Dalles area before and after a local aluminum reduction factory started operations. Leaf fluorine levels averaged 12 ppm or less prior to the start of operations but increased to as much as six times this average thereafter. Leaf scorch on apricot trees, typical of fluorine burn, and "soft suture" (1) of peach fruits were found in nearby orchards during the season following the start of factory operations. These leaf and fruit abnormalities were heretofore unknown in this area. Crop samples were collected for chemical analyses and observations were continued in 1960 and are presented in this report.

METHODS

Methods of sample collection and preparation, and the method of analysis for fluorine content used in 1960 were similar to those reported previously (2). Most of the orchards and portions of alfalfa fields or vineyards sampled were the same as those studied in previous years. Plant sampling sites had been selected at approximately 1-mile intervals in each of several small valleys that dissect the orchard areas to the east, south, and west of The Dalles. The distribution of these sites is shown on the map in Figure 1.

To the extent possible, leaf or forage samples were collected from certain crops grown at each site. Because of variation in crops grown from farm to farm, no single crop was sampled at all the sites selected. Sweet cherry was the most common crop. The other crops were sour cherry, peach, apricot, alfalfa, prune, and grape. Ten representative trees of each fruit crop at each orchard were selected, labeled, and used for sampling. Alfalfa

*Horticulturist, Chemist, and Superintendent of the Mid-Columbia Branch Experiment Station, respectively, Oregon Agricultural Experiment Station.

fields were sampled by collecting 10 to 15 small portions at random over an area representative of the field and compositing these portions into a single sample. Forage and foliage samples were collected July 8 and September 20, 21, 27, 1960. Fruit samples were collected just prior to harvest as indicated in the tables.

Leaves of trees and grape vines were taken from the mid portion of the shoots or canes while the alfalfa included all the stem to within 3-4 inches of the ground.

Peach fruits were sampled by cutting wedge-shaped portions of the flesh from the suture and from the side opposite the suture. These were analyzed separately.

Samples similar to those from The Dalles were collected at Corvallis or Hood River for controls or checks.

All samples were treated with lime after they were mixed or chopped and placed in large cellophane bags. Their fluorine contents were determined by the method reported by Rimmert and Parks (4).

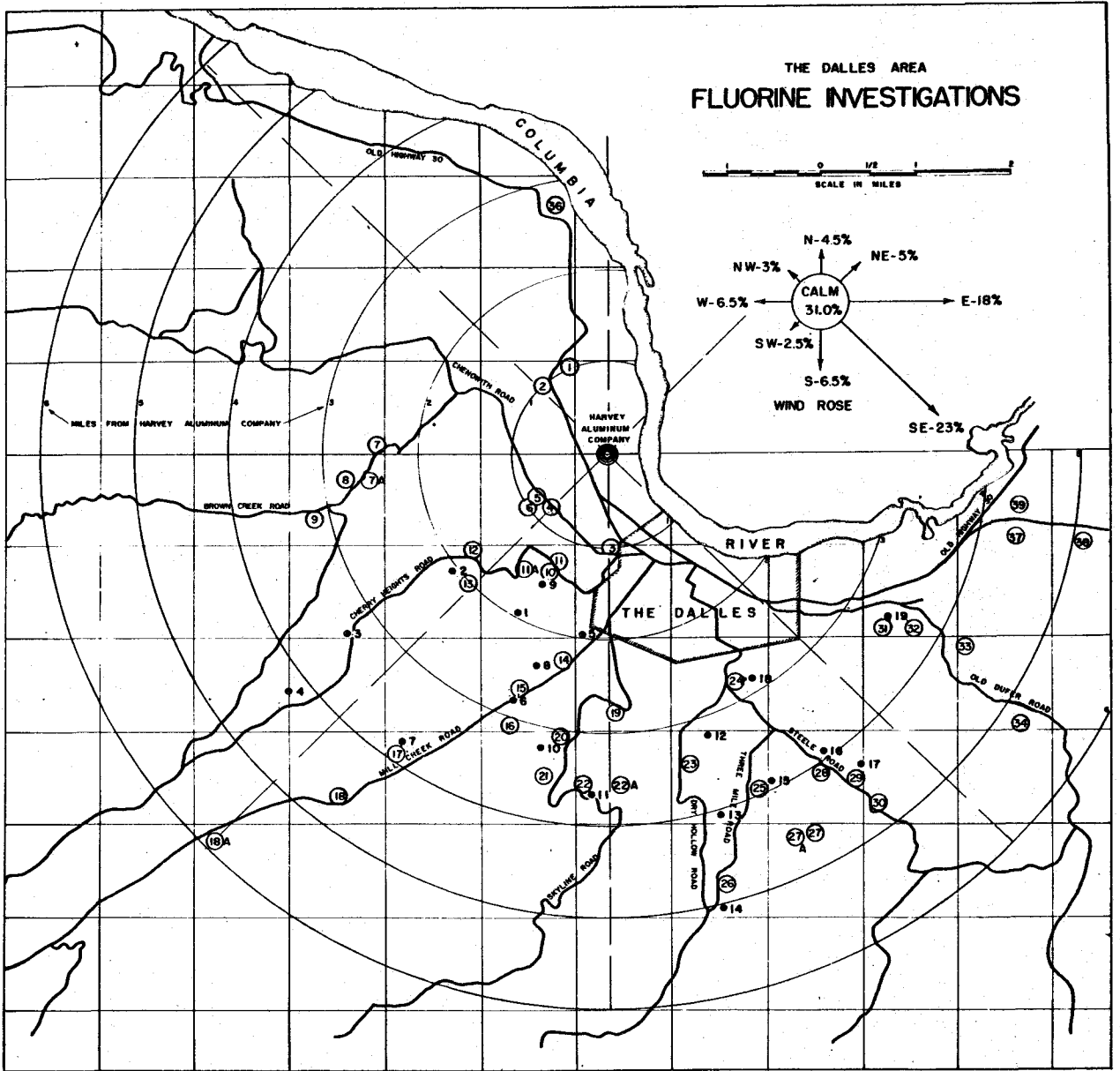


Figure 1. Map of sampling locations. Solid dots represent 1953 sampling locations. Those with numbers in circles represent sampling locations after 1953.

RESULTS

Data on fluorine contents of forage and leaf samples are presented in Tables 1 and 2. All samples from The Dalles area averaged 77.4 ppm fluorine at the July 8 sampling and 169.5 ppm at the September sampling. The fluorine contents of the samples taken near Corvallis and used as controls were normal for the area, 9.1 ppm fluorine on July 19 and 14.2 ppm on October 3. The Dalles samples ranged from 13.8 to 248. ppm on July 8 and from 38.1 to 431. ppm in September. The Corvallis samples contained less than 15 ppm in July and 23 ppm or less in October.

The fluorine content of samples collected at different distances and directions from the aluminum factory are given in Table 3. The pattern of distribution in 1960 was similar to that in 1959, except that fluorine levels were considerably higher in 1960 for comparable locations and dates. Data for six locations for 1959 and 1960, presented in the following tabulation, show clearly the effect of distance, direction, and year of sampling on the fluorine content of samples of sweet cherry leaves. This tabulation also

Fluorine Content of Leaves of Certain
Sweet Cherry Orchards in The Dalles for 1959 and 1960

Location no.	Distance and direction from Factory	Fluorine content, dry weight basis			
		June 17 1959	July 8 1960	Aug. 27-28 1959	Sept. 20-21, 27 1960
		ppm	ppm	ppm	ppm
6	1 mile SW	48	248	140	326
13	2 " SW	29	99	86	173
18A	6 " SW	13	30	20	98
31	3.5 " ESE	56	143	172	265
33	4.25 " ESE	65	151	130	256
34	5.25 " ESE	54	131	207	256

indicates the cumulative effect or seasonal increase. Samples taken in August 1959 contained 1.5 to 3.8 times as much fluorine as those taken in June 1959, while those taken in September 1960, contained 1.3 to 3.3 times as much fluorine as those taken in July 1960.

The average fluorine content of all samples at approximately 1 mile intervals from 1 to 6 miles from the factory are presented in Table 4. These data reflect the unequal distribution of sampling locations with respect to direction from the factory as shown in Table 3. As in 1959, there was a gradual decrease in fluorine content with distance from the factory from 0-1 mile to 3-4 miles in July and from 1-2 to 3-4 miles in September. Beyond 3-4 miles the fluorine contents were higher, mostly contributed by stations in the E to SE sector. In this sector there were no sampling stations within 3 miles of the factory as shown in Figure 1. In contrast, there was no similar effect of location within The Dalles area on fluorine content prior to the operation of the factory (2) (Tables 5 and 8).

Leaf scorch

A marginal burn characteristic of fluoride scorch was found July 8 on apricot leaves taken from most of the stations listed in Table 1. The most severe burn observed was on apricot leaves from station 11A. These leaves contained 116 ppm fluorine. Leaf markings were slight on apricot leaves examined at station 17 with 59 ppm fluorine and absent from similar leaves at station 16 with 40 ppm fluorine. As was found in 1959, injury on apricot leaves was extremely variable from tree to tree within an orchard. Prune leaves at Orchard 12 examined July 8 also showed moderate marginal scorch typical of fluorine injury. These leaves contained 78 ppm fluorine at that time.

Fluorine Content of Cherry and Peach Fruits

Cherry fruits were collected from 16 locations in The Dalles area, and from the Mid-Columbia Branch Experiment Station at Hood River in July and frozen for subsequent fluorine analysis. These fruits were pitted prior to sample preparation. The fluorine contents of these whole-fruit samples are presented in Table 5. The summary shows that each of the three main varieties at The Dalles contained about the same amount of fluorine and that they averaged 2.5 times as much fluorine as the fruits from Hood River. There were no abnormalities observed on any of these fruits.

Peach fruits were collected from 26 locations in The Dalles and from three areas outside of The Dalles on September 6-8, 1960. They were scored for presence or absence of "soft suture" (1) and sampled (2) as previously described and then analyzed for fluorine content. The results are presented in Table 6. Elberta peaches showing "soft suture" contained an average of 9.0 ppm fluorine in the suture tissue and 5.4 ppm fluorine in the dorsal tissue. Normal fruits contained 5.3 and 4.6 ppm fluorine respectively. The ratio Suture/Dorsal was 1.67 for soft suture fruits and 1.15 for normal fruits. Similar averages for J. H. Hale fruits were 15.0 ppm and 10.5 ppm fluorine in the suture and dorsal tissue respectively, with a ratio of 1.43. Normal fruits from Mosier and the Hood River Valley varied from 2.1 to 36.0 ppm fluorine and from 0.51 to 1.74 in the Suture/Dorsal fluorine ratio. Although there appears to be a noticeable difference in the fluorine content of the two sides of peach fruits showing "soft suture" in contrast to similar data for normal appearing fruits; the data are too limited to be conclusive.

The percentage of fruits showing "soft suture" was determined for a limited number of orchards by examining one to two boxes of fruit after delivery to the cannery. Other lots of fruit were scored in the field. One hundred fruits were collected on July 28, 1960, at random from each of six trees of three early ripening varieties growing on the OSU Experimental Station at The Dalles. The percentage of fruits having soft suture varied from 73 to 95%. Other data are shown in Table 7 for the Elberta and J. H. Hale varieties. In general, those farms within 2 miles of the factory showed the greatest amount of soft suture. The two varieties listed appear to be less sensitive than the early ripening Red Haven and Golden Jubilee varieties.

LITERATURE CITED

1. Benson, Nels. 1959. "Fluoride injury or soft suture and splitting of peaches," Proc. Amer. Soc. Hort. Sci. 74: 184-198.
2. Compton, O. C., L. F. Remmert and W. M. Mellenthin. 1960. Comparison of fluorine levels in crops before and after aluminum factory operations in The Dalles area, Oregon. Agr. Exp. Sta. Misc. Paper 95.
3. Rochon, C. A., Chief Chemist, Harvey Aluminum Inc., The Dalles, April 27, 1959. Private communication.
4. Remmert, L. F. and T. D. Parks. 1953. Determination of fluorine in plant materials. Anal. Chem. 25: 450-453.

Table 1. Fluorine content of foliage and forage samples,
The Dalles area, 1960

Station no.	Farm	Crop	Fluorine content, dry weight basis	
			July 8 ppm	Sept. 20-21, 27 ppm
1	Wetle	Alfalfa	76.0	---
2	Wetle	Alfalfa	118.	---
3	Stadelman	Alfalfa	97.6	98.3
4	Fleck	Apricot	119.	106.
		Peach	109.	392.
		Prune	130.	363.
5	Herman (2 fields west)	Alfalfa	98.4	136.
6	Kroon	Apricot	156.	96.1
		Cherry	248.	326.
		Peach	117.	201.
7	Sinsibau	Alfalfa	40.2	152.
7A	Daniels	Prune	48.7	117.
8	Hertel	Alfalfa	20.6	---
		Cherry	56.3	105.
		Peach	30.4	88.6
9	Fleck	Peach	37.7	89.4
		Cherry	44.6	165.
		Alfalfa	---	66.9
10	Exp. Station, The Dalles	Cherry	163.	431.
		Peach	158.	196.
		Apricot	89.9	274.
		Prune	84.5	283.
		Sour Cherry	88.1	429.
11	Myer (leaves only)	Grape A	---	181.
		Grape B	72.8	181.
		J. H. Hale Peaches, Sample A	---	307.
		Red Haven Peaches, Sample B	---	216.
11A	Bunn	Apricot A	113.	211.
		Apricot B	116.	---
		Peach	---	285.

Table 1 (Continued). Fluorine content of foliage and forage samples,
The Dalles area, 1960

Station no.	Farm	Crop	Fluorine content, dry weight basis	
			July 8	Sept. 20-21, 27
			ppm	ppm
12	Anderson	Prune	78.0	239.
		Peach	153.	178.
		Apricot	49.0	152.
		Alfalfa	36.6	---
13	Malcom	Cherry	98.5	173.
14	Williams	Cherry	88.6	143.
14A	Erickson	"Peach-Cot" Apricot	---	239.
		Peach	41.1	---
		Tilton Apricot	75.4	211.
		Cherry	81.2	---
14B	Meier	Peach - J. H. Hale	---	251.
		Peach - Red Haven	---	269.
		Cherry A	---	345.
		Cherry B	---	358.
14C	Nielson	Peach - J. H. Hale	---	240.
		Alfalfa	---	72.6
15	Francois	Peach	40.3	206.
16	Davis	Cherry	52.9	107.
		Apricot	39.6	167.
16A	Curtis Bros.	Sour Cherry	55.0	81.4
16B	McCollum	Peach - J. H. Hale	---	104.
17	Renslam, Ed	Alfalfa	13.8	50.0
		Cherry	31.9	100.
		Peach	54.7	96.5
		Apricot	59.2	73.5
		Grape	67.7	65.3
17A	The Pines Dairy	Alfalfa	---	52.2
		Peach - J. H. Hale	---	148.
		Peach - Elberta	---	179.
18	Kortage	Alfalfa, old	21.9	---
18A	Martin, John	Cherry	29.9	97.6

Table 1 (Continued). Fluorine content of foliage and forage samples,
The Dalles area, 1960

Station no.	Farm	Crop	Fluorine content, dry weight basis	
			July 8 ppm	Sept. 20-21, 27 ppm
19	Renslam, Earl	Cherry	83.8	135.
20	High Rolls Ranch	Apricot	86.0	124.
		Peach	51.5	78.9
		Prune	43.4	128.
21	Bailey	Cherry	51.0	116.
		Sour Cherry	51.5	133.
22	Curtis Bros.	Apricot	30.7	82.1
		Cherry	39.4	55.7
22A	Curtis (O. V. orchard)	Peach	54.6	189.
23	Cooper, George	Apricot	114.	155.
		Cherry	120.	205.
		Alfalfa	35.9	---
23A	Cooper, Gene	Peach - J. H. Hale	---	123.
24	Roberts	Cherry	182.	411.
		Peach	116.	324.
		Sour Cherry	117.	267.
25	Martin	Alfalfa	30.2	91.7
		Cherry	108.	90.6
		Sour Cherry	61.0	91.8
		Young Cherry	77.7	---
25A	Renkin	Sour Cherry	---	143.
		Peach	---	82.2
26	Tibbetts (Sander Bros.)	Cherry	67.4	136.
		Sour Cherry	53.7	93.1
27	Schantz	Cherry	65.6	146.
27A	Kronberg	Cherry	73.1	174.
28	Wagonblast	Alfalfa	29.8	41.0
29	Kaufman	Apricot	101.	---
		Peach	87.8	182.
30	Thompson	Cherry	145.	234.

Table 1 (Continued). Fluorine content of foliage and forage samples,
The Dalles area, 1960

Station no.	Farm	Crop	Fluorine content, dry weight basis		
			July 8 ppm	Sept. 20-21, 27 ppm	
31	Geiger-Wilson	Apricot A	168.	228.	
		Apricot B	---	338.	
		Cherry	143.	265.	
		Peach	94.0	233.	
32	Johnson	Alfalfa	61.0	98.9	
33	Cyphers Ranch	Apricot	142.	308.	
		Cherry	151.	256.	
		Alfalfa	32.9	---	
34	Todd	Apricot	112.	164.	
		Cherry	131.	256.	
35	Lewis-Brown and Beach Farms, Corvallis. Alfalfa collected from Russel farm adjacent to Beach farm.	Alfalfa	5.0	22.4	
		Apricot	11.0	12.1	
		Cherry	8.7	13.9	
		Sour Cherry	14.1	16.0	
		Grape	8.5	9.8	
		Peach	9.1	9.5	
		Prune	7.1	15.9	
36	Weeks	Alfalfa	34.8	38.1	
		Cherry	70.8	83.9	
37	Stadelman	Apricot	76.3	92.4	
37A	Stadelman	Apricot	96.4	---	
38	Tenold	Cherry	94.8	189.	
39	Stadelman-Suefert	Alfalfa	39.5	---	
		Ellett	Peach - J. H. Hale	---	113.
		Thienes	Peach	---	55.5
		Mid-Columbia Exp. Station, Hood River	Peach - Elberta	---	23.1
		Peach - J. H. Hale	---	27.2	

Note: Samples at Corvallis were collected on July 9, and October 3, 1960.

Table 2. Fluorine content of foliage and forage samples as the average per crop, 1960

Crop	Number of samples		Fluorine content, dry weight basis				Corvallis*	
	Sept. 20, 21, 27		The Dalles		Sept. 20, 21, 27		July 19	Oct. 3
	July 8	Sept. 20, 21, 27	Range	Average	Range	Average	ppm	ppm
Alfalfa	16	11	13.8 - 118.	49.2	38.1 - 152.	81.6	5.0	22.4
Apricot	18	17	30.7 - 168.	96.9	73.5 - 338.	178.	11.0	12.1
Cherry	26	26	29.9 - 248.	96.1	55.7 - 431.	196.	8.7	13.9
Sour Cherry	6	7	51.5 - 117.	71.0	81.4 - 429.	177.	14.1	16.0
Grape	2	3	67.7 - 72.8	70.2	65.3 - 181.	142.	8.5	9.8
Peach	14	26	30.4 - 158.	81.8	55.5 - 392.	186.	9.1	9.5
Peach (Hood River)**	--	2	--	--	23.1 - 27.2	25.2	--	--
Prune	5	5	43.4 - 130.	76.9	117. - 363.	226.	7.1	15.9

Summary for The Dalles

Total no. of samples	July 8	Sept. 20, 21, 27
	87	95
Range, all crops, ppm	13.8 - 248.	38.1 - 431.
Average, all crops, ppm	77.4	169.5

*There was only one sample per crop at Corvallis.

**Hood River samples not included in average.

Table 3.* Fluorine content of foliage and forage samples as the average for all crops at different distances and directions from the aluminum factory at The Dalles, 1960

Distance from factory miles	Average fluorine content, dry weight basis											
	N to NW		W to SW		SW to S		S to SE		SE to E			
	July 8	Sept. 20**	July 8	Sept. 20**	July 8	Sept. 20**	July 8	Sept. 20**	July 8	Sept. 20**		
0 - 1	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
1 - 2	---	---	140.	231.	97.6	98.3	---	---	---	---	---	
2 - 3	52.8	61.0	93.3	190.	106.	277.	---	---	---	---	---	
3 - 4	---	---	43.9	116.	70.9	161.	138.	334.	---	---	---	
4 - 5	---	---	41.2	127.	48.9	103.	86.6	127.	116.	206.	---	
5 - 6	---	---	---	---	---	---	74.6	144.	123.	219.	---	
					29.9	97.6	---	---	113.	203.	---	

* Only test stations sampled both on July 8 and Sept. 20, 21, 27 were used.

** The collection dates were Sept. 20, 21, 27, 1960.

Table 4. Average fluorine content of seven crops grown at different distances from the factory, 1960*

Distance from factory <u>miles</u>	Fluorine content, dry weight basis	
	<u>July 8</u>	<u>Sept. 20, 21, 27</u>
	<u>ppm</u>	<u>ppm</u>
0 - 1	134.	215.
1 - 2	102.	253.
2 - 3	75.7	172.
3 - 4	52.4	102.
4 - 5	89.2	166.
5 - 6	91.9	177.

*Includes only those stations where tests were made both on July 8 and on September 20, 21, and 27.

Table 5. Fluorine content of pitted cherry fruit samples collected in The Dalles area July 1-4, 1960, and in early July 1960, at the Mid-Columbia Branch Experiment Station, Hood River.

Station no.	Farm	Variety	Fluorine content, dry weight basis ppm
10	Experiment Station, The Dalles	Lambert	6.5
		Lambert	11.8
11	Myer	Centennial	11.1
		Royal Ann	9.2
14	Williams	Bing	7.5
		Royal Ann	4.6
16A	T. Curtiss	Lambert	8.1
19	Earl Ranslam	Royal Ann	8.8
20	High Rolls	Royal Ann	6.8
21	Bailey	Lambert	8.1
22A	Curtis Bros.	Lambert	3.1
29	Kaufman	Lambert	10.1
31	Geiger	Royal Ann	14.6
		Bing	11.3
34	Thompson	Bing	5.7
	Morast	Bing	7.5
	Hendricks	Royal Ann	5.2
		Lambert	7.5
		Black Republican	5.9
	Mayer	Lambert	9.8
	McClaskey	Bing	7.6
		Black Republican	5.0
	Henderson	Royal Ann	4.8
	Experiment Station, Hood River	Bing	1.5
		Lambert	2.3
		Royal Ann	5.5

Table 5 (Continued). Fluorine content of pitted cherry fruit samples collected in The Dalles area July 1-4, 1960, and in early July 1960 at the Mid-Columbia Branch Experiment Station, Hood River

Summary

Variety	The Dalles		Hood River*	
	<u>No.</u>	<u>Range</u>		<u>Average</u>
Bing	5	5.7-11.3	7.9	1.5
Lambert	8	3.1-11.8	8.1	2.3
Royal Ann	7	4.6-14.6	7.7	5.5
Three-variety average			7.9	3.1

*One sample per variety at Hood River.

Table 6. Fluorine content of longitudinal sections of peach fruits collected in The Dalles and other areas, September 6-8, 1960

Station no.	Name	J. H. Hale							
		Elberta		Condition of fruit					
		Fluorine content, dry weight basis Suture side ppm	Dorsal side ppm	Condition of fruit	Fluorine content, dry weight basis Suture side ppm				
2 (1953 No.)	Ellett	13.6	4.3	SS*	6.2	4.9	SS	6.2	4.9
3 (1953 No.)	Patten	4.0	4.0	SS		3.6	SS	5.9	3.6
4	Fleck	7.2	5.3	N**		5.1	SS	5.7	5.1
		11.9	5.8	SS		---	--	---	---
6	Kroon	19.1	6.7	SS		10.0	SS	17.8	10.0
8	Hertel	10.8	5.3	SS		5.3	SS	8.2	5.3
9	Fleck	5.0	3.8	N		---	--	---	---
		6.5	4.3	SS		4.0	SS	4.3	4.0
10	Exp. Sta., The Dalles	15.1	20.9	SS		11.0	SS	13.8	11.0
11	Myer	8.9	4.6	SS		23.6	SS	11.8	23.6
11A	Bunn	10.5	3.9	SS		30.4	SS	43.6	30.4
12	Anderson	14.5	6.1	SS		10.5	SS	43.6	10.5
14	Nielson	8.1	3.9	SS		12.1	SS	26.1	12.1
14B	Meier	---	---	--		8.0	SS	19.3	8.0
15	Francois	2.0	2.4	N		6.9	SS	10.9	6.9
		3.8	4.8	SS		---	--	---	---

Table 6 (Continued). Fluorine content of longitudinal sections of peach fruits collected in The Dalles and other areas, Sept. 6-8, 1960

Station no.	Name	Elberta				J. H. Hale			
		Condition of fruit	Fluorine content, dry weight basis		Condition of fruit	Fluorine content, dry weight basis			
			Suture side	Dorsal side		Suture side	Dorsal side		
		ppm	ppm	ppm	ppm	ppm	ppm		
16B	McCollum	SS	18.6	11.2	SS	17.5	17.8		
17	Ed Renslam	N SS	2.8 3.5	2.8 3.6	SS --	9.7 ---	5.9 ---		
17A	Pines Dairy	SS	7.9	5.3	SS	12.8	7.3		
20	High Rolls Ranch	--	---	---	SS	11.6	8.1		
22	Curtis	SS	9.4	3.4	--	---	---		
22A	Orchard View	SS	3.8	3.1	SS	10.3	9.2		
23	Cooper	SS	11.7	7.9	--	---	---		
23A	Cooper, Gene	--	---	---	SS	28.8	9.7		
24	Roberts	SS	8.1	5.3	--	---	---		
25	Martin-Renkin	N SS	5.1 3.7	6.9 3.9	SS --	4.1 ---	2.7 ---		
27	Schantz	SS	5.9	2.4	--	---	---		
29	Kaufman	N SS	6.9 7.7	2.5 6.5	-- --	---	---		

Table 6 (Continued). Fluorine content of longitudinal sections of peach fruits collected in The Dalles and other areas, Sept. 6-8, 1960

Station no.	Name	Elberta				J. H. Hale			
		Condition of fruit	Fluorine content, dry weight basis		Condition of fruit	Fluorine content, dry weight basis			
			Suture side	Dorsal side		Suture side	Dorsal side		
		ppm	ppm	ppm	ppm	ppm	ppm		
31	Geiger	N	7.8	8.7	SS	10.6	12.1		
		SS	10.9	5.1	--	---	---		
	Haener	SS	4.9	2.4	SS	8.1	16.3		
	Hill	SS	8.1	4.1	SS	14.9	17.2		
	Thienes	SS	4.1	1.5	--	---	---		
	Fruits showing "soft suture," average		9.0	5.4		15.0	10.5		
	Normal fruits, average		5.3	4.6					
.....									
Control areas									
	Troxel, Mosier	--	---	---	N	3.1	2.1		
	Arens, Odell	N	13.2	7.6	--	---	---		
	Exp. Station, Hood River	N	5.2	10.3	N	36.0	34.1		

*SS Fruits showing "soft suture."
 **N Normal fruits.

Table 7. Percentage of "soft suture" in Elberta and J. H. Hale peaches, The Dalles area; fruit examined at Columbia Fruit Packing House on Sept. 9 and 13, 1960

Orchard	Station no.	Elberta			J. H. Hale		
		Normal No. <u>124</u>	Soft suture No. <u>2</u>	Soft suture % <u>1.6</u>	Normal No.	Soft suture No.	Soft suture % <u>1</u>
Bailey (O. V. Farms)*	22A	191	8	4.0	92	1	1.1
The Pines	17A				51	3	5.6
D. and R. Ellett	2 (1953 no.)	111	3	2.6	168	11	6.1
Anderson*	12	166	13	7.3			
Experiment Station*	10	105	9	7.9	65	51	44.0
K. Fleck	9 Box 1 Box 2	120 93	1 10	0.8 9.7			
Experiment Station	10	52	70	57.4			
Ed. Ranslam	17 Box 1 Box 2	128 155	4 2	3.0 1.3	110 66	0 9	0.0 12.0
W. Kaufman	29	68	31	31.3			
Thienes (Standard Elberta)		62	31	33.3			
Nielson	14C				125	30	19.4
McCollum	16B				94	14	13.0
High Rolls	20				45	30	40.0
Troxel (Mosier area)					79	0	0.0

Table 7 (Continued). Percentage of "soft suture" in Elberta and J. H. Hale peaches, The Dalles area; fruit examined at Columbia Fruit Packing House on Sept. 9 and 13, 1960

Orchard	Station no.	Elberta		J. H. Hale	
		Normal No.	Soft suture No. / %	Normal No.	Soft suture No. / %
Francois	15			52	0
L. F. Polehn	Box 1 Box 2			77 99	2 1
<u>(Examined in orchard)</u>					
W. Myer** (N. end)	11 Box 1 Box 2	18 1	82 72	29 36	19 25
(S. end)		22	76	23	29
					39.6 41.0 55.8

*Improved Elberta.

**Last pick of J. H. Hale from this orchard--observations made by Compton, Rauch, and Messing.

Table 8. Range and average leaf fluorine contents of seven crops,
The Dalles area

Date sampled	No. samples	Fluorine content, dry weight basis	
		Range ppm	Average ppm
Aug. 13, 1953	53	1 - 17	6
July 1, 1957	67	3 - 25	11
Oct. 2, 1957	73	0.1 - 24	10
June 20, 1958	76	3 - 40	7
Oct. 7, 1958	70	16 - 197*	68*
June 17, 1959	76	6 - 106	26
Aug. 27, 1959	78	18 - 207	73
July 8, 1960	87	14 - 248	77
Sept. 20, 1960	95	38 - 431	170

*Aluminum factory started operating July 26, 1958 (3).