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Fluorine Levels in 1961 Crops of The Dalles Area

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Fluorine Levels in 1961 Crops of The Dalles Area

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Summary

The fluorine contents of seven crops grown in The Dalles area during 1961 are reported. These data are compared in Table 14 to similar data obtained previously.

Leaf samples collected from crops in The Dalles area in July 1961, ranged from 12 to 217 ppm fluorine and averaged 65 ppm, while those taken in September ranged from 16 to 204 ppm and averaged 68 ppm fluorine. Similar samples from the Corvallis area all contained 13 ppm fluorine or less.

Leaf scorch of apricot trees and soft suture on peach fruits were observed in 1961 in The Dalles area orchards. These conditions were observed in 1959 and 1960, but not prior to the operation of an aluminum factory located in this area.

Introduction

Fluorine levels in the foliage of seven crops and in needles of pine trees growing in The Dalles area have been presented recently (2,3,4). Only nominal leaf fluorine concentrations were found prior to the operation of an aluminum factory in the vicinity, but considerably higher and variable concentrations have occurred since aluminum manufacturing started in July 1958. Leaf scorch on apricot trees and needle burn on ponderosa pine trees, typical of fluorine injury, were found at nearby locations following the start of factory operations. Leaf samples were again collected in 1961 for determination of their fluorine contents. The results of these analyses and the observations made are presented in this report.

Methods

Methods of sample collection and preparation, and the method of analysis for fluorine content used in 1961 were similar to those reported previously (2). The orchards and portions of fields sampled in past years were used again in 1961 with the addition of 11 more sampling sites for Royal Ann cherry trees. The locations of the sampling sites are shown on the map in Figure 1.

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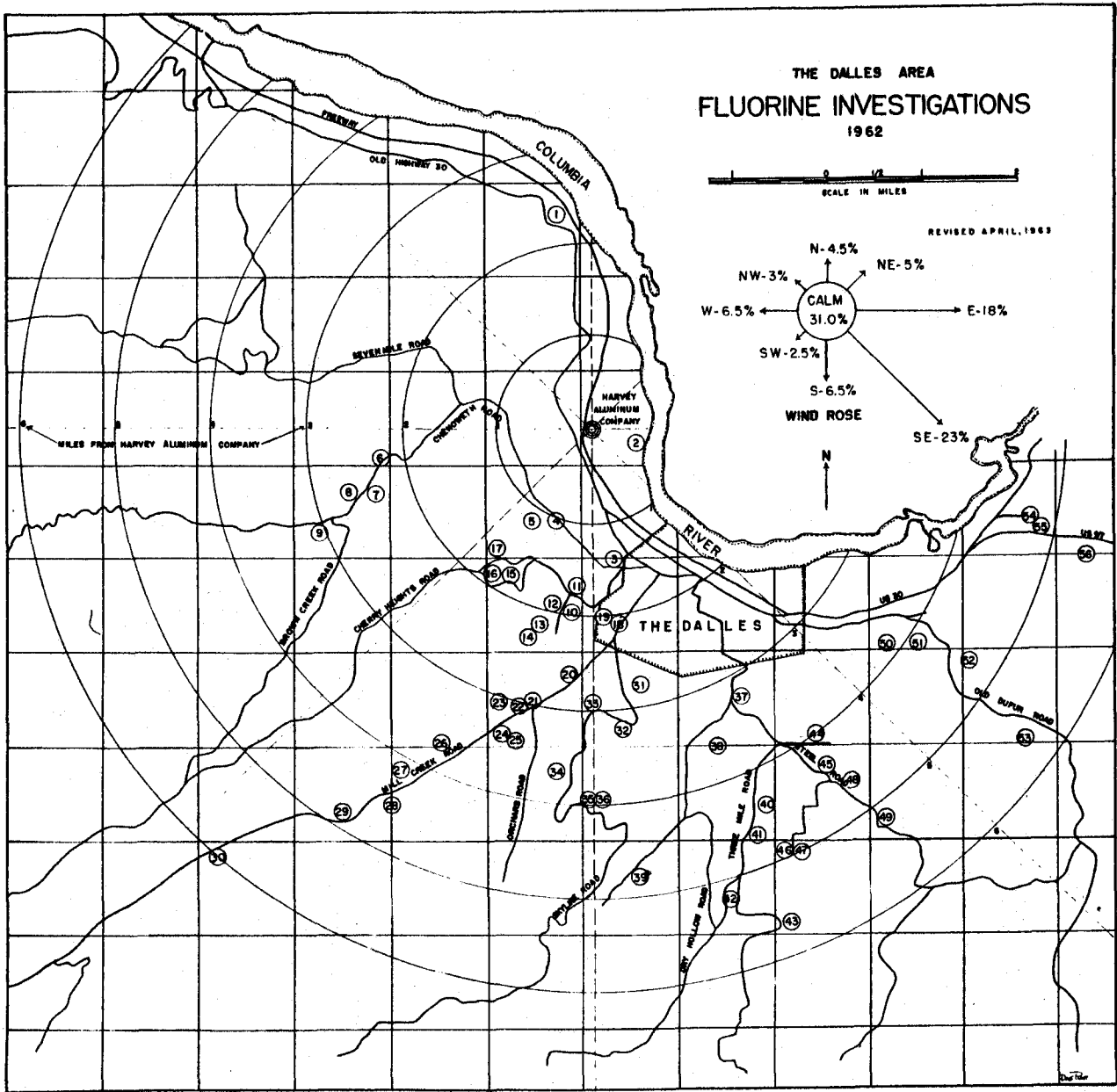


Figure 1. Map of sampling locations.

Foliage samples were collected beginning July 12-13 and September 7-8, 1961, while additional samples of alfalfa were collected May 26th, just prior to the first cutting.

Samples similar to those from The Dalles were collected near Corvallis for controls or checks.

Results and Discussion

Fluorine content of forage and foliage samples

Data on fluorine contents of forage and foliage samples are presented in Tables 1, 2, and 3. The average for all samples from The Dalles area was 64.9 ppm fluorine during July and 67.7 ppm in September. The check samples taken near Corvallis contained 12.9 ppm fluorine or less at each sampling. The maximum concentrations in The Dalles samples were 217 ppm in July and 204 ppm in September. In contrast, in 1960 (3) maximum concentrations in all crops were 248 ppm in July and 431 ppm fluorine in September. The September 1960 average was 2.5 times that of September 1961.

The marked seasonal increase in the fluorine contents of the various crops noted in past years (2,3) was not so evident in 1961. In some crops the samples taken in September contained less fluorine than similar ones taken in July, as illustrated by the data in Table 2.

Alfalfa forages were collected in May, July, and September from 14 farms, with less than half of them supplying samples for all three collections. The fluorine contents of alfalfa samples (Table 3) averaged about 30 ppm for each date of sampling. Maximum concentrations were about twice those of the average.

The fluorine contents of samples collected at different distances and directions from the aluminum factory are presented in Tables 4, 5, and 6. The pattern of distribution in 1961 was similar to that of 1959 and 1960. In addition, data for six sweet cherry orchards are shown in the accompanying tabulation.

Fluorine content of leaves of certain sweet cherry orchards
in The Dalles area for 1959, 1960, and 1961

Location no.	Distance & direction from factory miles	Fluorine content, dry weight basis					
		June 17 1959	July 8 1960	July 12 1961	Aug.27- 28,1959	Sept.20, 21,27 1960	Sept. 7-8 1961
		ppm	ppm	ppm	ppm	ppm	ppm
5	1 1/4 SW	48	248	202	140	326	141
16	2 SW	29	99	93	86	173	93
30	6 SW	13	30	33	20	98	30
50	3 3/4 ESE	56	143	84	172	265	111
52	4 1/2 ESE	65	151	98	130	256	105
53	5 1/2 ESE	54	131	75	207	256	90

The effects of distance from the aluminum reduction factory, direction, and year of sampling on the fluorine contents of these leaf samples are clearly evident. These data indicate that the cumulative effect or seasonal increase, which was marked in 1959 and 1960, was negligible or non-existent in 1961.

The average fluorine contents of all crop samples at approximately one mile intervals from one to six miles from the factory are presented in Table 7, for sweet cherries only in Tables 8 and 10, and for apricot, peach, prune, and sour cherry trees in Table 9. Certain data in Tables 7 and 9 reflect the imperfect distribution of sampling locations with respect to direction from the factory. This is also shown in Table 4. In contrast, the data in Table 8 show that there was a decrease in the fluorine contents of sweet cherry leaves with distance from the factory. It has been noted (2) that there was no discernible effect of location within The Dalles area on fluorine content prior to the operation of the factory.

Leaf scorch

A marginal burn characteristic of fluoride injury was found in July 1961, on apricot leaves taken from many of the stations listed in Table 1, but this burn was slight wherever found. Leaves from station 55 containing 40 ppm fluorine showed a very slight marginal burn, while leaves from trees at station 48 having the same fluorine concentration were not burned. Somewhat similar results were reported previously (3). The extreme variability in the severity of leaf injury from tree to tree within an apricot orchard, also previously reported (3), was again evident in 1961.

Soft suture of peach fruits

Peach fruits from 17 orchards or locations were examined for presence or absence of soft suture (1); the data are presented in Table 11. The percentage of fruits having soft suture varied from 2% to 36% for the Elberta variety and from 10% to 52% for J. H. Hale in The Dalles area. Fruits from the Mosier and Hood River areas showed 2% or less soft suture. In general, as reported previously (3), peaches from those farms within two miles of the aluminum factory showed the greatest amount of soft suture.

Calcium chloride spray treatments

Calcium chloride sprays at a concentration of two pounds per 100 gallons were applied 2, 3, or 4 times on J. H. Hale peach trees at The Dalles Experimental Farm. The percentage of soft suture and the fluorine content of the fruits are presented in Table 12. The data indicate that the fruit tissue from the suture side of the unpeeled peaches contained slightly more fluorine than did that from the dorsal side. The fluorine content also appeared to be greater as the number of protective calcium chloride sprays was increased. Although these peach fruits were washed thoroughly, the apparent increase in fluorine content with repeated calcium chloride spray application may represent surface contamination and not absorption per se.

Fluoride leaf sprays

Ten pairs of Royal Ann cherry trees in the Mosier area were selected in April 1961, for uniformity and proximity to pollen source. One tree of each pair was sprayed seven times between April 7 and July 18 with an ammonium fluoride solution containing 500 ppm fluorine. Leaf samples were taken prior to each spray application after April 18 and washed thoroughly before sample preparation for fluorine analysis.

Fruits were harvested from five of the replications and also prepared for fluorine analysis by thorough washing. The data obtained are presented in Table 13 and in the text.

The fluoride sprays raised the leaf fluorine content to a maximum of 119 ppm after six applications, but four weeks after the seventh and last spray the leaf fluorine level was only about half of this maximum. No visible leaf abnormalities developed.

The fruits from the sprayed trees contained an average of 8.3 ppm fluorine in the tip half and 6.5 ppm in the stem half of the fruit, while similar fluoride levels in the nonsprayed fruits were 4.4 and 4.9 ppm respectively. The only visible difference between the sprayed and nonsprayed fruits was the presence of a slight depression near the tip of the former.

Juice tests made on these fruits indicated that the fluoride sprayed fruits contained more titratable acids than did the check fruits. There was also more acid in the tip of the fruits than in the base or stem end regardless of spray treatment. Comparable values were: Nonsprayed base, 100; nonsprayed tip, 116; sprayed base, 112; sprayed tip, 141.

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Table 1. Fluorine content of foliage and forage samples, The Dalles area, 1961 ^{1/}

Station no.	Farm	Crop	Fluorine content, dry weight basis	
			July 12-14 17-18	Sept. 7-8, 11-12
			ppm	ppm
1	Weeks	Cherry	59.9	46.4
	Wetle ^{2/}	Alfalfa	----	54.3
2	Klindt	Ginkgo	----	899. ^{3/}
		Maple	----	1200. ^{3/}
3	Stadelman	Alfalfa	58.7	27.4
4	Fleck, K.	Apricot	82.3	204.
		Peach	89.3	117.
		Prune	101.	----
	Herman	Alfalfa	----	36.9
5	Kroon	Apricot	164.	----
		Cherry	202.	141.
		Peach	98.3	79.3
6	Sinsabaugh	Alfalfa	47.6	22.4
7	Daniels	Prune	31.0	49.4
8	Hertel	Cherry	73.9	73.5
		Peach	----	39.4
9	Fleck, K.	Cherry	56.2	66.5
		Peach	49.9	45.4
10	The Dalles Expt. Station	Apricot	136.	115.
		Cherry, sweet	108.	139.
		Cherry, sour	102.	123.
		Peach	78.7	129.
		Prune	217.	104.
11	Fleck, J.	Cherry, Bing	71.3	141.
		Cherry, Royal Ann	91.2	153.
		Peach, J. H. Hale	111.	151.
12	Myer, W.	Grape	79.0	54.2
	Bunn	Apricot	101.	126.
13	Hendricks	Cherry, R. A.	152.	128.
		Pear, Bartlett	----	74.2
14	Mill Creek Orchard	Cherry, mixed	80.0	112.
15	Ellett	Cherry, Royal Ann	97.7	61.8

^{1/}Additional results on alfalfa samples are presented in Table 3.

^{2/}Farms without station numbers are located near the two adjacent numbered stations. They are no longer supplying samples.

^{3/}The values obtained for ginkgo and maple leaves are not included in the ranges and averages for crop samples.

Table 1. (Continued)

Station no.	Farm	Crop	Fluorine content, dry weight basis	
			July 12-14, 17-18	Sept.7-8, 11-12
			ppm	ppm
16	Malcom	Cherry	92.6	93.1
17	Anderson	Apricot	64.6	56.4
		Cherry	73.8	46.4
		Peach	59.1	43.6
		Prune	86.8 ^{4/}	71.3
		Prune	82.4	----
18	Meyer	Cherry	84.8	109.
19	Meyer-Erickson	Apricot, peach-cot	30.6	74.5
		Apricot, Tilton	42.3	77.3
		Cherry, Royal Ann	56.9	92.5
		Peach, Red Haven	59.1	86.4
20	Williams	Cherry, Royal Ann	50.2	57.4
21	Francois	Peach	32.0	51.1
22	Curtiss Bros.	Sour cherry	----	37.0
23	Mill Creek Orchard	Cherry, Bing	37.6	56.4
24	Curtiss Bros.	Cherry	38.3	53.2
		Peach	26.4	25.6
25	Davis	Apricot	30.0	70.5
		Cherry	34.7	41.8
26	Barrett	Cherry, Royal Ann	55.8	54.8
27	Ranslam, Edward	Alfalfa	27.2	20.6
		Apricot	37.8	29.6
		Cherry	20.1	23.0
		Grape	21.4	18.5
		Peach	34.6	34.2
28	The Pines Dairy	Alfalfa	35.6	18.8
		Cherry	31.0	44.6
		Peach	22.6	92.7
		Sour cherry	37.5	46.9
29	Kortage	Alfalfa	12.1	15.7
30	Martin, John	Cherry, Royal Ann	32.9	29.8
31	Meyer	Cherry, Royal Ann	45.8	53.0
32	Ranslam, Earl	Cherry, Royal Ann	57.7	66.1
33	High Rolls Ranch	Apricot	46.0	41.7
		Cherry	94.5	104.
		Peach	42.8	38.8
		Prune	55.9	56.2

^{4/}Leaves were burned.

^{5/}Peach across road from Geo. Cooper house on the Glen Cooper farm.

^{6/}Samples at Corvallis were collected on July 25 and September 9, 1961.

Table 1. (Continued)

Station no.	Farm	Crop	Fluorine content, dry weight basis	
			July 12-14, 17-18	Sept. 7-8 11-12
			ppm	ppm
34	Bailey	Cherry, Royal Ann	51.8	65.3
		Sour cherry	56.3	49.9
35	Curtiss Bros.	Apricot	29.2	21.3
		Cherry	46.7	53.7
		Cherry, Lambert & B.	47.9	----
		Peach	----	36.2
36	O. V. Orchard	Peach	58.6	42.5
37	Roberts	Cherry, Lambert	123.	128.
		Cherry, Royal Ann	100.	144.
		Peach	117.	63.6
		Sour cherry	122.	96.6
38	Cooper, George	Apricot	44.4	45.8
		Cherry	97.7	68.2
		Peach, J. H. Hale <u>5/</u>	36.2	----
		Alfalfa	----	27.7
39	Thienes	Cherry	28.3	36.7
40	Martin, Jack	Alfalfa	16.5	20.9
		Cherry, Royal Ann	49.7	48.8
		Sour cherry	37.4	44.8
41	Renkin	Cherry, Royal Ann	49.1	76.1
		Peach	36.6	24.8
42	Sander Bros.	Cherry, Royal Ann	47.3	38.2
		Sour cherry	30.6	34.5
43	Elton	Cherry, Royal Ann	47.5	48.6
44	Cooper, Glen	Cherry, Royal Ann	67.4	68.4
45	Wagonblast	Alfalfa	30.9	20.1
46	Haner	Cherry, Royal Ann	47.2	53.1
47	Jones	Cherry, Royal Ann	50.9	89.5
48	Kaufman	Apricot	40.4	----
		Peach	71.7	----
		Cherry, Royal Ann	----	86.4
49	Thompson	Cherry, Royal Ann	56.0	76.5
50	Geiger	Apricot, Tilton	104.	104.
		Apricot, Lewis	89.1	----
		Cherry	84.4	111.
		Peach	69.7	137.
51	Adventist School	Alfalfa	33.5	64.3
52	McClaskey	Apricot	70.7	42.7
		Cherry, Royal Ann	98.1	105.
53	Thompson	Apricot	85.5	55.3

Table 1. (Continued)

Station no.	Farm	Crop	Fluorine content, dry weight basis	
			July 12-14, 17-18	Sept. 7-8 11-12
53	Thompson	Cherry, Royal Ann	<u>ppm</u> 74.8	<u>ppm</u> 89.7
54	Stadelman	Alfalfa	19.1	23.7
55	Stadelman	Apricot	39.8	58.1
56	Tenold	Cherry, Royal Ann	48.3	118.
57	Lewis-Brown and Beach Farms Corvallis <u>6/</u>	Alfalfa	4.9	5.6
		Apricot	6.3	8.9
		Cherry	9.0	8.0
		Ginkgo	----	21.8 <u>3/</u>
		Grape	3.6	9.4
		Peach	9.3	12.9
		Prune	8.0	12.3
		Sour cherry	6.2	7.8

Table 2. Fluorine content of foliage and forage samples as the average per crop, 1961

Crop	Number of samples		The Dalles				Corvallis *	
	July 12-13	Sept. 7-8	July 12-13		Sept. 7-8		July 25	Sept. 9
			Range	Average	Range	Average	ppm	ppm
Alfalfa	9	12	12.1-58.7	31.2	15.7-64.3	29.4	4.9	5.6
Apricot	18	15	29.2-164.	68.8	21.3-204.	74.8	6.3	8.9
Cherry	44	44	20.1-202.	68.5	23.0-144.	79.4	9.0	8.0
Sour cherry	6	7	30.6-122.	64.3	34.5-123.	61.8	6.2	7.8
Grape	2	2	21.4-79.0	50.2	18.5-54.2	36.4	3.6	9.4
Peach	18	18	22.6-117.	60.8	24.8-151.	68.8	9.3	12.9
Prune	6	4	31.0-217.	95.7	49.4-104.	70.2	8.0	12.3

Summary for The Dalles

Total no. of samples	July 12-13	Sept. 7-8
	103.	102.
Range, all crops, ppm	21.1-217.	15.7-204.
Average all crops, ppm	64.9	67.7

* There was only one sample per crop at Corvallis.

Table 3. Fluorine content of alfalfa forage samples,
The Dalles area, 1961

Station no.	Farm	Fluorine content, dry weight basis		
		May 26 ppm	July 12-13 ppm	Sept. 7-8 ppm
	Wetle	42.1	----	54.3
3	Stadelman	39.8	58.7	27.4
	Herman	----	----	36.9
6	Sinsabaugh	57.9	47.6	22.4
27	Ranslam, Ed	11.6	27.2	20.6
28	The Pines Dairy	----	35.6	18.8
29	Kortage	20.7	12.1	15.7
38	Cooper, George	----	----	27.7
40	Martin, Jack	30.7	16.5	20.9
45	Wagonblast	13.8	30.9	20.1
51	Adventist School	----	33.5	64.3
52	McClaskey	25.8	----	----
54	Stadelman	36.3	19.1	23.7
	Range	11.6-57.9	12.1-58.7	15.7-64.3
	Average	31.0	31.2	29.4

Table 4. 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, 1961 *

Distance from factory miles	Average fluorine content, dry weight basis												
	N to W		W to SW		SW to S		S to SE		SE to E				
	July 12-13 ppm	Sept. 7-8 ppm	July 12-13 ppm	Sept. 7-8 ppm	July 12-13 ppm	Sept. 7-8 ppm	July 12-13 ppm	Sept. 7-8 ppm	July 12-13 ppm	Sept. 7-8 ppm			
0-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1-2	-----	-----	102.	108.	58.7	27.4	-----	-----	-----	-----	-----	-----	-----
2-3	59.9	46.4	50.8	48.4	78.5	87.1	55.9	63.5	81.8	77.0	86.0	117.	-----
3-4	-----	-----	53.1	56.0	41.4	52.2	41.4	48.3	45.4	49.5	69.5	87.7	-----
4-5	-----	-----	-----	-----	28.0	34.5	41.4	48.3	45.4	49.5	69.5	87.7	-----
5-6	-----	-----	-----	-----	32.9	29.8	45.4	49.5	45.4	49.5	69.5	87.7	-----

* Includes only those stations sampled both on July 12-13 and Sept. 7-8.

Table 5. Fluorine content of sweet cherry leaf samples as the average at different distances and directions from the aluminum factory at The Dalles, 1961*

Distance from factory miles	Average fluorine content, dry weight basis												
	N to W		W to SW		SW to S		S to SE		SE to E				
	July 12-13	Sept. 7-8	July 12-13	Sept. 7-8	July 12-13	Sept. 7-8	July 12-13	Sept. 7-8	July 12-13	Sept. 7-8			
0-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1-2	-----	-----	-----	105.	111.	-----	-----	-----	-----	-----	-----	-----	-----
2-3	59.9	46.4	73.9	73.5	94.1	99.1	70.5	89.6	-----	-----	-----	-----	-----
3-4	-----	-----	56.2	66.5	43.6	54.3	85.0	92.0	84.4	111.	-----	-----	-----
4-5	-----	-----	-----	-----	25.6	33.8	48.8	62.1	98.1	105.	-----	-----	-----
5-6	-----	-----	-----	-----	32.9	29.8	50.3	54.4	61.5	104.	-----	-----	-----

* Includes only those stations sampled both on July 12-13 and Sept. 7-8.

Table 6. Fluorine content of foliage samples of apricot, peach, prune, and sour cherry trees as the average at different distances and directions from the aluminum factory at The Dalles, 1961*

Distance from factory miles	Average fluoroine content, dry weight basis											
	N to W		W to SW		SW to S		S to SE		SE to E			
	July 12-13	Sept. 7-8	July 12-13	Sept. 7-8	July 12-13	Sept. 7-8	July 12-13	Sept. 7-8	July 12-13	Sept. 7-8		
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		
0-1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1-2	-----	-----	102.	110.	-----	-----	-----	-----	-----	-----	-----	-----
2-3	-----	-----	31.0	49.4	32.0	51.1	46.1	62.5	-----	-----	-----	-----
3-4	-----	-----	49.9	45.4	37.6	49.0	74.2	54.0	86.9	121.	-----	-----
4-5	-----	-----	-----	-----	33.1	50.9	37.0	34.8	55.3	50.4	-----	-----
5-6	-----	-----	-----	-----	-----	-----	30.6	34.5	85.5	55.3	-----	-----

* Includes only those stations sampled both on July 12-13 and Sept. 7-8.

Table 7. Average fluorine content of forage and foliage samples of seven crops grown at different distances from the aluminum factory at The Dalles, 1961*

Distance from factory miles	Fluorine content dry weight basis	
	July 12-13 ppm	Sept. 7-8 ppm
0-1	---	---
1-2	99.6	104.
2-3	60.3	65.3
3-4	64.3	71.3
4-5	38.2	44.9
5-6	52.9	61.3

* Includes only those stations sampled on both July 12-13 and Sept. 7-8.

Table 8. Average fluorine content of foliage samples of sweet cherry trees grown at different distances from the aluminum factory at The Dalles, 1961*

Distance from factory miles	Fluorine content dry weight basis	
	July 12-13 ppm	Sept. 7-8 ppm
0-1	----	----
1-2	105.	111.
2-3	77.6	86.2
3-4	65.3	75.6
4-5	49.1	60.7
5-6	51.1	66.8

* Includes only those stations sampled both on July 12-13 and Sept. 7-8.

Table 9. Average fluorine content of foliage samples of apricot, peach, prune, and sour cherry trees grown at different distances from the aluminum factory at The Dalles, 1961*

Distance from factory miles	Fluorine content dry weight basis	
	July 12-13 ppm	Sept. 7-8 ppm
0-1	---	---
1-2	102.	110.
2-3	42.5	59.4
3-4	70.8	70.2
4-5	39.6	46.7
5-6	58.1	44.9

* Includes only those stations sampled both on July 12-13 and Sept. 7-8.

Table 10. Fluorine content of Royal Ann sweet cherry leaf samples, The Dalles area, 1961

Station no.	Farm	Distance and direction* from aluminum factory		Fluorine content dry weight basis	
		miles	direction	July 12-13 ppm	Sept. 7-8 ppm
1	Weeks	2 1/4	N	60	46
5	Kroon	1	SW	202	141
8	Hertel	2 1/2	W	74	74
9	Fleck, K.	3	W	56	67
10	The Dalles Exp. Station	2	S	108	139
11	Fleck, J.	1 3/4	S	91	153
12	Hendricks	2	S	152	128
15	Ellett	2	SW	98	62
16	Malcom	2	SW	93	93
17	Anderson	1 3/4	SW	74	46
18	Meyer	2	S	85	109
19	Meyer-Erickson	2	S	57	93
20	Williams	2 1/2	S	50	57
24	Curtiss Bros.	3 1/2	S	38	53
25	Davis	3 1/2	S	35	42
26	Barrett	3 3/4	SW	56	55
27	Ranslam, Edward	4	SW	20	23
28	The Pines Dairy	4 1/2	SW	31	45
30	Martin, John	6	SW	33	30
31	Meyer	2 3/4	S	46	53
32	Ranslam, Earl	3 1/4	S	58	66
33	High Rolls Ranch	3	S	95	104
34	Bailey	3 3/4	S	52	65
35	Curtis Bros.	4	S	47	54
37	Roberts	3 1/4	SE	100	144
38	Cooper, George	3 1/2	S	98	68
39	Thienes	4 3/4	S	28	37
40	Martin, Jack	4 1/2	SE	50	49
41	Renkin	4 1/2	SE	49	76
42	Sander Bros.	5 1/4	S	47	38
43	Elton	5 1/2	S	48	49
44	Cooper, Glen	4	SE	67	68
46	Haner	5	SE	47	53
47	Jones	5	SE	51	90
48	Kaufman	4 1/2	SE	---	86
49	Thompson	5 1/4	SE	56	77
50	Geiger	4	SE	84	111
52	McClaskey	4 3/4	SE	98	105

Table 10 (Continued)

Station no.	Farm	Distance and direction* from aluminum factory		Fluorine content dry weight basis	
		<u>miles</u>	<u>direction</u>	July 12-13 <u>ppm</u>	Sept. 7-8 <u>ppm</u>
53	Thompson	5 1/2	SE	75	90
56	Tenold	5 1/2	E	48	118
57	Lewis-Brown, Corvallis	120	SW	9	8

* Stations located between N and NNW of factory are designated as N of factory; stations located between NNW and NW of factory are designated as NW of factory; etc.

Table 11. Percentage of "soft suture" in Improved Elberta and J. H. Hale peaches, Mid-Columbia areas; fruit examined at Columbia Fruit Packing House on September 7, 1961
(50 fruits per sample)

Orchard	Area	Improved Elberta		J. H. Hale	
		Normal %	Soft suture %	Normal %	Soft suture %
Anderson	The Dalles	64	36	90	10
Myers	" "	70	30	50	50
Ellett	" "			72	28
Whalen	" "			60	40
The Pines	" "	86	14		
Ed Ranslam	" "	86	14		
Bailey	" "	98	2		
Thienes	" "	98	2		
Co. Park State Home	" "			48	52
Fleck	" "			62*	38*
Geiger	" "			90*	10*
Hudson	Mosier	100	0		
Leininger	"	100	0		
Wilson	"	100	0	100	0
F. Evans	"			100	0
D. Evans	"	100	0		
Kirby	Hood River	98	2		

* Mixed Improved Elberta and J. H. Hale.

Table 12. Fluorine content and percentage of soft suture of J. H. Hale peach fruits, calcium chloride spray block, The Dalles Experimental Farm, 1961

No. of CaCl ₂ sprays	Fluorine content, dry weight basis		
	Suture side	Dorsal side	Soft suture
Check	<u>ppm</u> 9.4	<u>ppm</u> 5.4	<u>%</u> 26.8
2	9.1	7.3	23.3
3	16.5	6.9	5.2
4	16.9	10.5	4.5

Table 13. Fluorine content of leaves from Royal Ann cherry trees treated with ammonium fluoride sprays, Mosier area

Date sampled 1961	Fluorine content, dry weight basis		
	Check trees	Sprayed trees	
	ppm	ppm	
April 18	Prior to 2nd spray*	7.2	5.4
May 1	" " 3rd "	34.5	49.2
May 18	" " 4th "	16.4	31.3
May 26	" " 5th "	6.2	41.9
June 10	" " 6th "	5.5	53.5
June 17	" " 7th "	10.8	119.
July 18	After 7th spray	18.7	60.9

* First spray applied April 7 when flowers were in the pop-corn stage.

Table 14. Range and average leaf fluorine contents of seven crops, The Dalles area for samples collected since 1953

<u>Date sampled</u>	<u>No samples</u>	<u>Fluorine content, dry weight basis</u>	
		<u>Range</u>	<u>Average</u>
		<u>ppm</u>	<u>ppm</u>
August 13, 1953	53	1 - 17	6
July 1, 1957	67	3 - 25	11
October 2, 1957	73	0.1 - 24	10
June 20, 1958	76	3 - 40	7
October 7, 1958	70	16 - 197*	68*
June 17, 1959	76	6 - 106	26
August 27, 1959	78	18 - 207	73
July 8, 1960	87	14 - 248	77
September 20, 1960	95	38 - 431	140
July 12, 1961	103	12 - 217	65
September 7, 1961	102	16 - 204	68

* Aluminum factory started operating July 26, 1958 (5).