



## **EXPERIENCES IN METALOSATE® FOLIAR APPLICATIONS ON CROPS IN THE SAN JOAQUIN VALLEY OF CALIFORNIA**

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Foliar applications of calcium are routinely made to apples to reduce the incidence of corky spot and bitter pit. A number of different calcium products are available for use. The suppliers of the products all claim that their product is superior.

Working with our sales staff, I set up a trial to follow calcium uptake over a season in Pink Lady apples. A special thanks goes to McCardy Farm Management and Brian Mellor for their assistance. Also, a special thanks to Chet Miller for his assistance on the days I could not be there personally to follow the test.

Three five acre plots were selected in a block of Pink Lady apples. Each plot was assigned a calcium product to be applied on a monthly basis throughout the growing season. The products were product N, product V, and Albion's Calcium Metalosate. The products were applied as part of the regular spray program. They were combined with the insecticides, miticides, and fungicides used for crop protection.

The Little John apple orchard was located about three miles east and south of Farmington, California. The block of Pink Lady apples totaled about 17 acres. The Pink Lady block was five years old.

Dates of the applications follow:

March 26, 1998  
April 30, 1998  
June 5, 1998  
July 18, 1998  
August 18, 1998

Product N was applied at the rate of one gallon of the formulated product per acre. Product V was also applied at the rate of one gallon of the formulated product per acre. The Calcium Metalosate was applied at one half gallon of the product per acre. All the materials were applied in 100 gallons of water per acre using conventional air-blast sprayers.

Samples were taken midseason on June 19, 1998, and sent to Albion Laboratories for analysis. Chet coded the samples prior to shipping them to Albion so only he knew what sample went with each product. A second sample was taken on October 12, 1998, just prior to the first picking in the orchard. Chet coded these samples also and they were sent to Albion Laboratories for analysis. Chet gave me the code after the analysis of the the second sample data was received.

The apples were sampled from each quadrant of the trees and taken from chest height to head height in the tree. Average size apples were selected for the sample.

The mineral analysis of the flesh and peel for the June and October samples are given in Table 1 and Table 2 respectively.

Table 1 Results of the Analysis of the June 24, 1998 Sample for Flesh and Peel of Pink Lady Apples							
Sample Identification							
		Product N		Product V		Metalosate Ca	
Constituent	Units	Flesh	Peel	Flesh	Peel	Flesh	Peel
Nitrogen	ppm	3219	5034	3570	5606	2533	3908
Sulfur	ppm	625	844	644	861	611	754
Phosphorus	ppm	769	1137	1037	999	809	691
Potassium	ppm	5098	7364	6757	6302	6077	5032
Magnesium	ppm	452	890	561	731	798	798
Calcium	ppm	474	1118	776	1061	562	1368
Sodium	ppm	137	83	161	56	174	174
Nitrate	ppm	218	125	234	150	12	12
Iron	ppm	12	16	13	14	17	17
Aluminum	ppm	19	17	34	21	23	23
Manganese	ppm	3	6	4	6	8	8
Boron	ppm	6	32	28	34	33	33
Copper	ppm	5	5	4	3	3	3
Zinc	ppm	4	6	4	4	8	8
N/Ca Ratio	< 10	6.8	4.5	4.6	5.3	2.9	2.9
K+Mg/Ca	< 35	11.7	7.4	9.3	6.7	4.3	4.3
Ca/B Ratio		29.6	34.9	27.7	31.2	41.5	41.5

The Calcium Metalosate treated apples had the highest calcium in the peel and flesh at both sample dates except for product V in the flesh at the June 24 sample date. The Metalosate treated apples had the lowest total nitrogen in the peel and the flesh at both sample dates. The reduction in nitrogen in the peel and flesh of the apples was significant. No nitrogen has been added to the orchard in the last five years. I am curious if there is a known physiological reason for this response.

The effect of the lower total nitrogen combined with the higher calcium can be seen in the calcium to nitrogen ratios calculated at the bottom of Tables 1 and 2. The Calcium Metalosate treated apples had a N/Ca ratio of 3.81 in the peel, compared to 4.74 for product N and 5.05 for product V for the October sample date. The N/Ca ratio for the flesh of the Calcium Metalosate treated apples was 4.72, compared to 5.88 for product N and 8.49 for product V at the last sample date.

All of the products had N/Ca ratios of less than 10 for flesh and peel. A N/Ca ratio less than ten is generally accepted as an indicator for storage suitability. The Calcium Metalosate had the lowest N/Ca ratio and in years when environmental conditions would favor high N/Ca ratios, the Calcium Metalosate would appear to be the product of choice.

Sample Identification							
		Product N		Product V		Metalosate Ca	
Constituent	Units	Flesh	Peel	Flesh	Peel	Flesh	Peel
Nitrogen	ppm	1443	3144	1783	3517	1343	2752
Sulfur	ppm	185	456	259	420	257	398
Phosphorus	ppm	525	1132	577	1000	565	1092
Potassium	ppm	5170	5307	5014	4972	5426	5058
Magnesium	ppm	222	708	228	696	235	669
Calcium	ppm	245	662	210	584	284	723
Sodium	ppm	100	88	87	99	110	111
Nitrate	ppm	90	144	114	135	100	118
Iron	ppm	11	23	9	20	9	18
Aluminum	ppm	6	18	8	18	6	18
Manganese	ppm	1	4	2	4	2	4
Boron	ppm	21	33	25	36	25	36
Copper	ppm	10	4	5	3	5	3
Zinc	ppm	3	4	3	2	1	3
N/Ca Ratio	<10	5.88	4.74	8.49	5.05	4.72	3.81
K+Mg/Ca	<35	22.01	9.09	24.96	9.71	19.93	7.92
Ca/B Ratio		11.67	20.06	8.4	19.33	11.36	20.08

Potassium or any other nutrient in the flesh and peel did not seem to be affected by any of the foliar calcium products.

Figures 1 and 2 show the ppm nitrogen and calcium respectively for the June 24 samples. Figures 3 and 4 show the ppm nitrogen and calcium respectively for the October 12 samples.

Mid Valley and a cooperator carried out a test using Calcium Metalosate to see if we could lessen the amount of walnut blight. The Calcium Metalosate was applied with the copper sprays. Five applications of copper were made to control the walnut blight. In one third of the field, one half gallon of Calcium Metalosate was added to the copper material. We did not see any reduction in walnut blight. Yield and quality were the same in both the treatments. We are discussing possible treatments for the coming year.

Mid Valley also had a test comparing product N, product V, and Calcium Metalosate on Bing cherries. Two applications were made during fruit development. We planned to measure firmness, size, and brix. The continual rain in the spring of 1998 caused the cherries to split and measurements of the mature fruit were not possible.

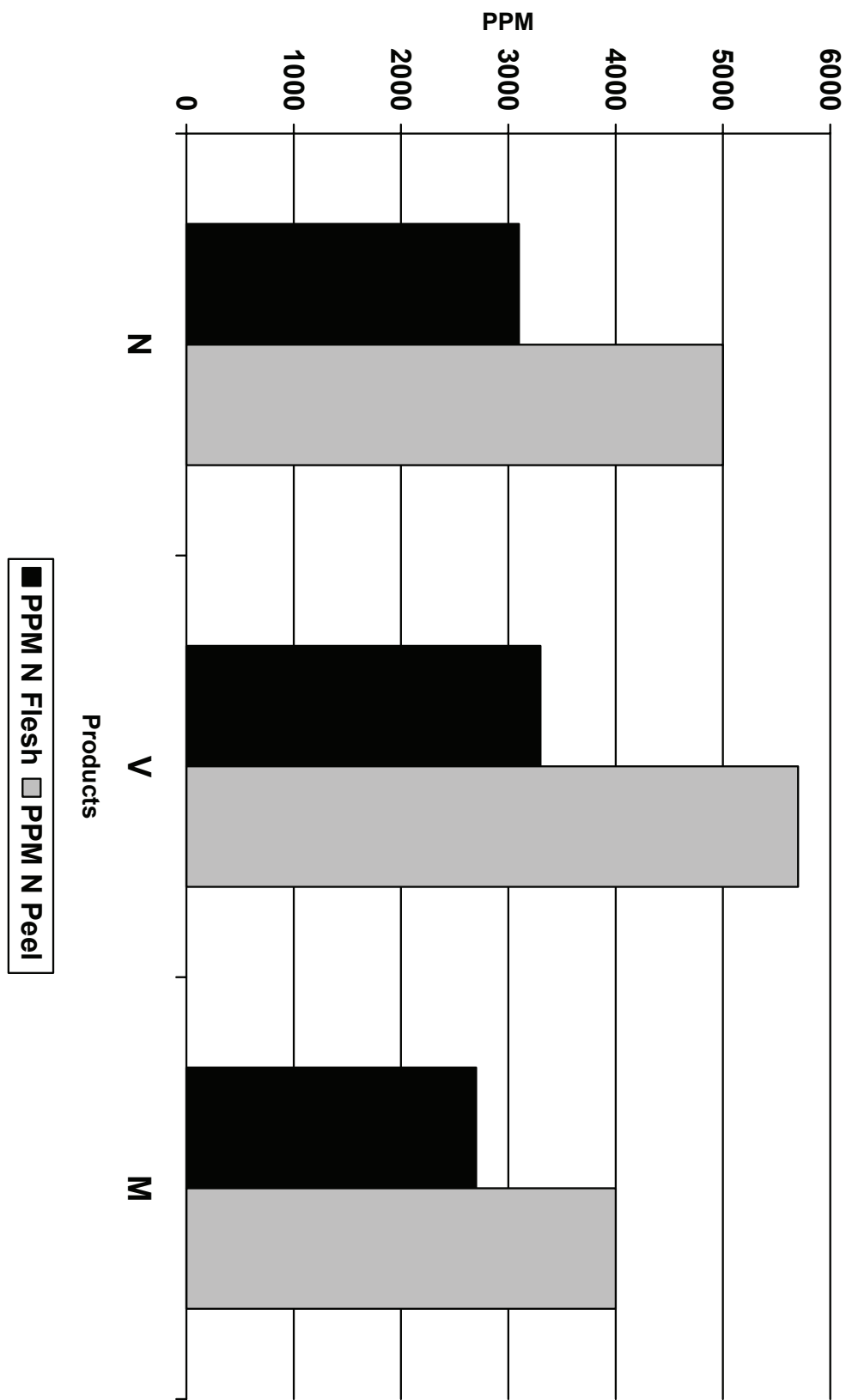


Figure 1. PPM Nitrogen June 24, 1998 Sample

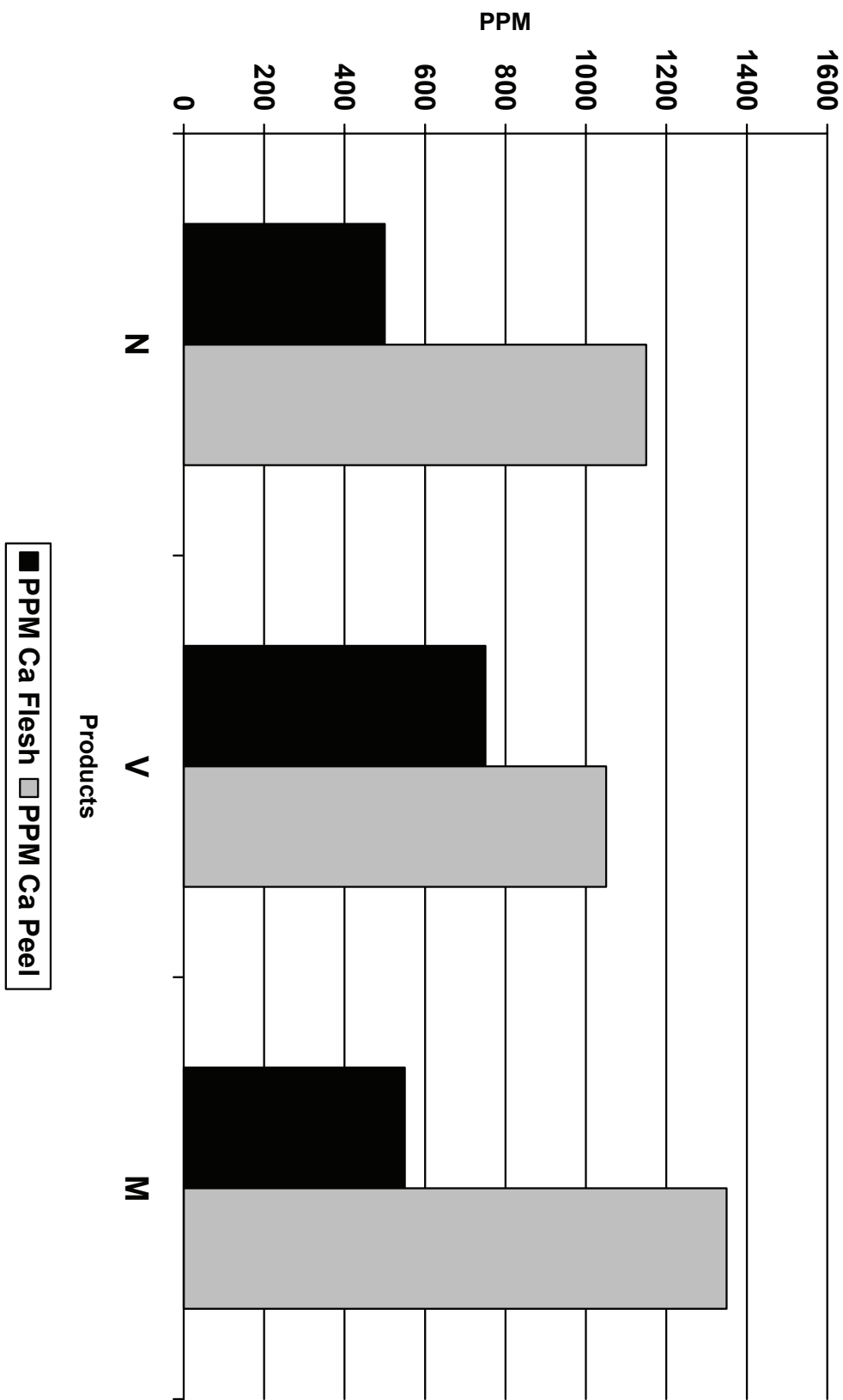


Figure 2. PPM Calcium June 24, 1998

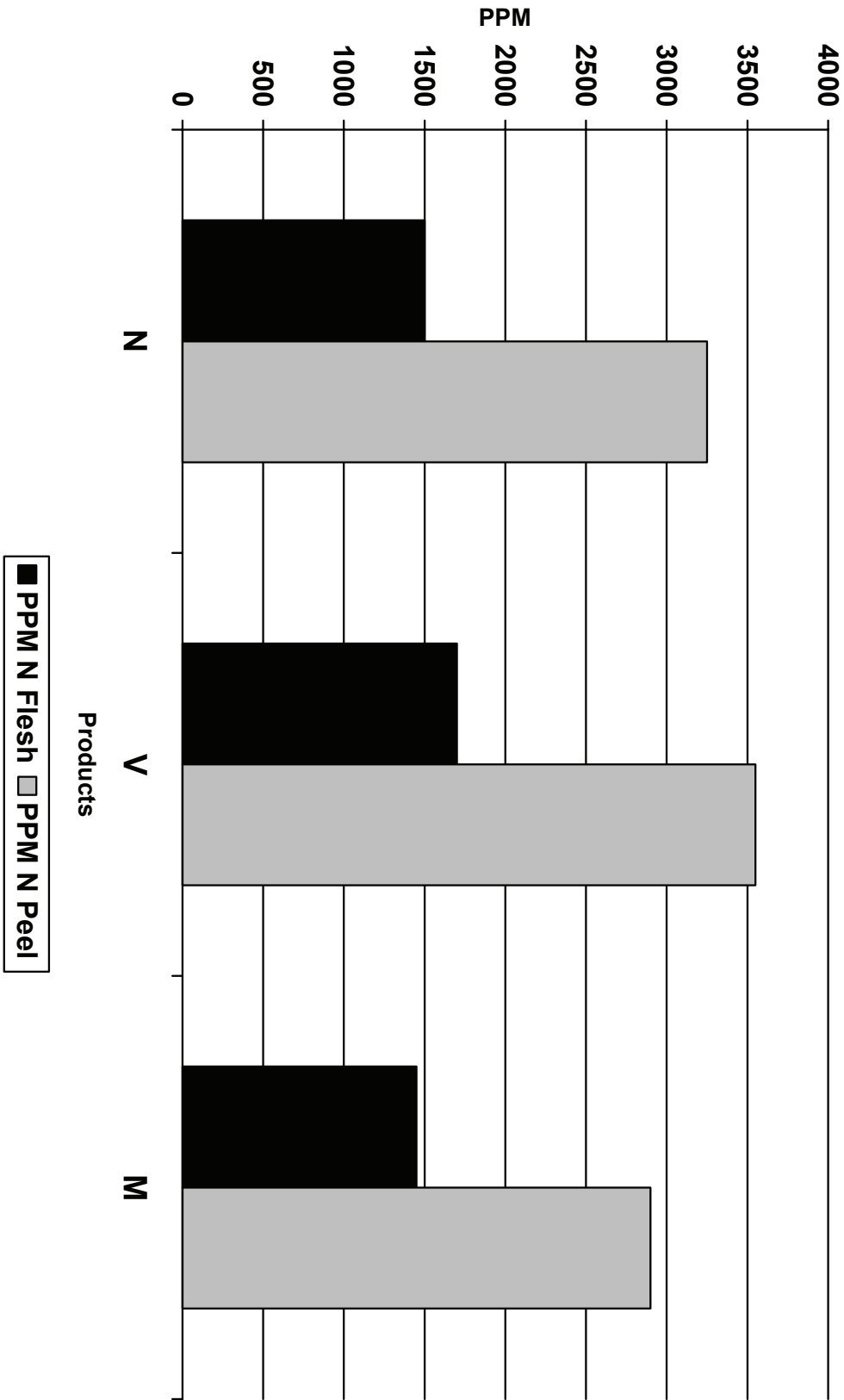


Figure 3. PPM Nitrogen October, 1998 Sample

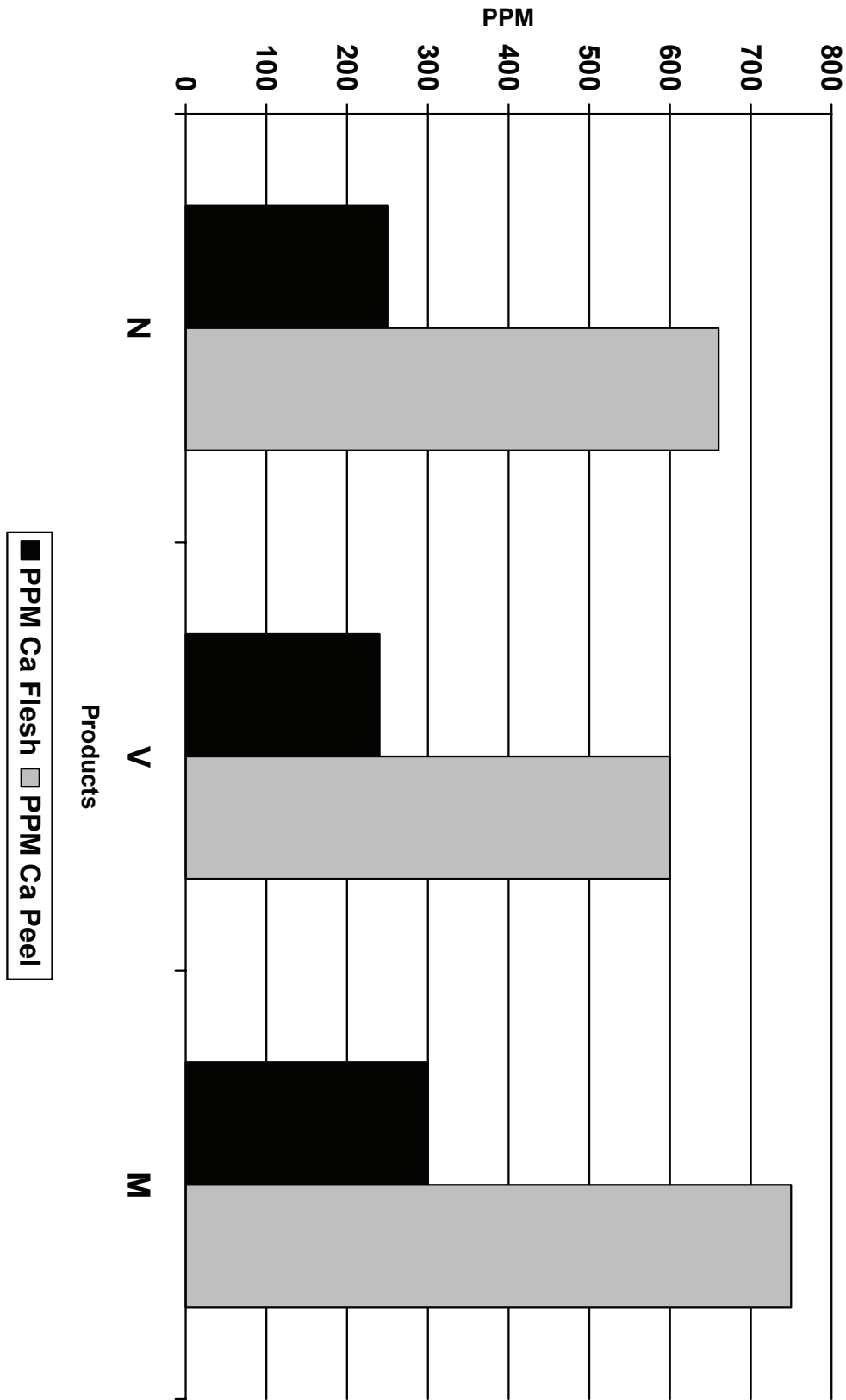


Figure 4. Calcium October, 1998 Sample