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MINERAL LOSSES OF AVOCADO TREE RESULTING FROM ABSCISSION OF FLOWERS, FRUITLETS AND FRUITS

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SUMMARY

The total nutritional loss in an avocado tree due to abscission of buds, flowers, fruitlets and fruits is relatively small. Only 25.8 kg·ha^{-1} N, 3.7 kg·ha^{-1} P and 31.0 kg·ha^{-1} K are found in the abscissed organs. Among the microelements Fe is lost 7-50 times more than the other microelements (1.40 kg·ha^{-1}). No relationship was found between the nutrients and the previous or future yield except for phosphorous. Decrease in P level in the flowers was followed by an increase in yield the following winter. The small nutritional loss seems to be of minor importance as a factor in avocado productivity.

KEY WORDS: *Persea americana, yield.*

INTRODUCTION

Recording the abscission process and its intensity have shown that an avocado tree has 0.25-1.25 million flowers (Lahav and Zamet, 1999). Nevertheless its production is relatively low and there is no relationship between the number of flowers and the number of fruits harvested. It may be assumed that the large amount of organs shed are not necessarily the only factor for low productivity. The total dry weight of the abscised matter is 15% only of the fruits harvested. The objective of the present work was to determine the mineral loss resulting from the massive abscission.

METHODS

During the summer of 1971 all abscised organs of 12 ‘Fuerte’ trees were counted and weighed (Lahav and Zamet, 1999). The organs were classified to: buds, flowers, fruitlets up to 20 mm long, fruits and other parts abscised. These organs were washed, dried, ground and analyzed for 12 elements (N, P, K, Ca, Mg, Na, Cl, B, Fe, Zn, Mn and Cu). Correlation coefficients were calculated between the mineral contents and the previous (1970/1) or future (1971/2) yields.

RESULTS

The mineral content of the various abscised organs is presented in Table 1. Among the macroelements there are relatively large losses of nitrogen and potassium (93 and 111 g·tree^{-1}, respectively) while iron is the major nutrient among the microelements (5 g·tree^{-1}). Losses of other nutrients are small. Most of the loss is caused by the flowers because of their relatively high proportion in the abscised organs. Nutrient content in fruitlets and fruits is small. There is no relationship between the nutrients and the

previous or future yield except for phosphorous (Table 2). Decrease in P level in flowers was followed by an increase in yield the following winter (Figure 1).

DISCUSSION

The macroelements content in the abscised organs was similar to that found in California (Cameron *et al*., 1952) but the total calculated loss was generally lower. The total loss per hectare was calculated to be only 30 $kg \cdot ha^{-1}$ of N or K which is much less than the amount of fertilizers applied. However it should be noted that the abscised organs are not removed from the plantation but remain on the ground and also, nutrients are translocated back to the tree before shedding. this translocation is possibly the cause for the negative coefficient between P level in the flowers and yield. It should be emphasized that P level in the leaves was never reported to be correlated with the yield (unless an extreme deficiency exist). The relatively high amounts of iron lost indicate its possible importance in avocado productivity.

The nutrient balance presented is incomplete since it does not include the losses by the shedded leaves. However, it may be concluded that similarly to the total loss in dry matter, the nutritional losses are relatively small and of minor importance as a factor in avocado productivity.

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Table 1. Calculated losses of nutrients in an avocado tree due to abscission (Avg. of 12 trees).

Nutrient	**Buds**		**Flowers**		**Other inflorescence parts**		**Fruitlets up to 20 mm**		**Fruits**		**Total**
	%	g·tree^{-1}	%	g·tree^{-1}	%	g·tree^{-1}	%	g·tree^{-1}	%	g·tree^{-1}	g·tree^{-1}
Ash	7.61	26.10	8.08	224.14	8.68	99.47	6.06	86.60	3.92	43.59	479.90
N	2.16	7.41	2.04	56.59	1.05	12.03	0.76	10.86	0.54	6.00	92.89
P	0.34	1.17	0.28	7.77	0.13	1.49	0.14	2.00	0.08	0.89	13.32
K	1.51	5.18	1.60	44.38	2.22	25.44	1.80	25.72	0.93	10.34	111.06
Ca	0.46	1.58	0.70	19.42	0.97	11.11	0.53	7.57	0.10	1.11	40.79
Mg	0.56	1.92	0.62	17.20	0.55	6.30	0.21	3.00	0.24	2.64	31.06
Na	0.09	0.33	0.15	4.30	0.14	1.56	0.06	0.86	0.04	0.44	7.52
Cl	0.14	0.48	0.25	6.94	0.33	3.78	0.09	1.29	0.07	0.78	13.27
	μg·g^{-1}		μg·g^{-1}		μg·g^{-1}		μg·g^{-1}		μg·g^{-1}		
B	48	0.02	44	0.12	30	0.03	26	0.04	19	0.02	0.23
Fe	1105	0.38	1135	3.15	883	1.01	306	0.44	42	0.05	5.03
Zn	102	0.03	167	0.46	133	0.15	54	0.08	18	0.02	0.74
Mn	80	0.03	71	0.20	58	0.07	23	0.03	9	0.01	0.34
Cu	21	0.01	17	0.05	15	0.02	9	0.01	5	0.01	0.10

Table 2. Correlation coefficients between the nutritional content of abscised avocado flowers and the previous or future yield.

Nutrient	Previous yield	Future yield
Ash	-0.33	-0.21
N	0.07	-0.20
P	-0.04	-0.73**
K	-0.08	0.27
Ca	-0.29	-0.05
Mg	-0.26	0.11
Na	0.12	0.11
Cl	0.29	0.10
B	0.10	-0.12
Fe	0.10	-0.10
Zn	0.04	-0.30
Mn	0.31	-0.03
Cu	-0.10	-0.08

** Significant at $P \leq 0.01$

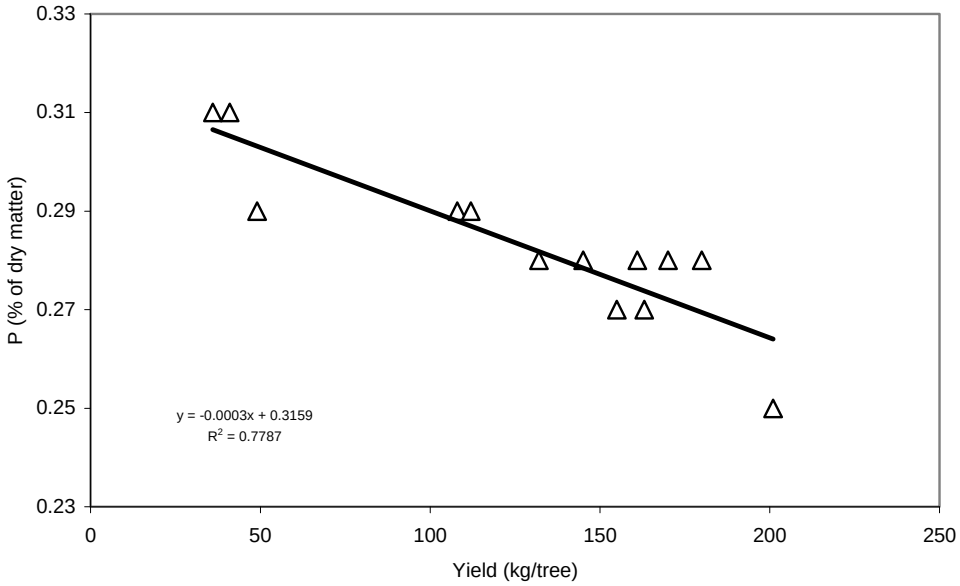

Figure 1. The relationship between phosphorous level in the abscised organs and yield.