Leaf elemental concentration and variability of 30 young almond seedlings grown in athens

Procopiou J., Papanicolaou W., Haritou A., Wallace A.

GREMPA, colloque 1980

Paris : CIHEAM
Options Méditerranéennes : Série Etudes; n. 1981-I

1981
pages 161-163

Leaf elemental concentration and variability of 30 young Almond seedlings grown in Athens (Greece)

J. Procopiou, Xeni Papanicolaou, Anna Haritou and A. Wallace

Agricultural Research Station Vari, Rhodes, Greece

Laboratory of Nuclear Medicine and Radiation Biology, UCLA

The mean leaf concentration and variability of 30 seedbed almond seedlings for 16 elements is presented. The CV (coefficient of variation) varied from 10.8% for B to 53.4% for Li. Some leaf and fruit data for mature trees are also presented for comparison.

INTRODUCTION

Leaf analysis is widely used to understand nutritional status of trees. The purpose of this work was to see the range and variability of the leaf concentration for several elements in 30 bitter almond seedlings grown in a seedbed. For comparison and general information some similar data from mature almond trees and fruit parts are also presented.

MATERIALS AND METHODS

Thirty bitter almond seedlings about 18 months old grown in a seedbed of calcareous soil were used in this study. The almonds were from different trees and so were genetically different but of similar appearance and vigor. They were grown in their original seedbed place and thinned to about 10 x 10 cm shortly after emergence. About 12 leaves per seedling about 4 months old were collected July 16, 1979, washed in liquid detergent and tap water and further prepared and analyzed by emission spectrography according to Wallace et al. (1974).

RESULTS AND DISCUSSION

The data indicate marginal to low B (Tables 1 and 2) and low N of unpruned almonds (Table 2). The high

Table 1

Leaf elemental concentration of 30 almond seedlings grown in a seedbed in Holargos, Greece. Concentration en éléments de 30 semis d'amandes.

	P	K	Ca	Mg	Na	Zn	Cu	Fe	Mn	B	Al	Si	Ti	Sr	Ba	Li
		%						ppm								
Mean	0.089	1.51	2.45	0.555	2729	19.8	3,38	122	17.8	28.2	231	585	5.9	22.2	9.0	2.06
Range:																
Lower	0.056	0.94	1.73	0.348	1791	11.7	1.31	91	8.1	23.2	120	314	3.4	14.8	6.4	0.4
Higher	0.130	2.11	3.30	0.706	4020	28.4	5.80	171	32.5	33.6	424	1150	9.2	33.5	11.4	3.8
CV %	17.0	21.9	16.2	19.4	18.6	19.0	32.2	19.8	35.8	10.8	35.5	32.6	30.4	23.2	14.3	53.4

CV is coefficient of variation

Table 2

Elemental concentration of leaves and fruit parts of almonds grown in Greace (dry weight basis).

Material	Area	Approx. leaf age Mo.	N	P	K	Ca	Mg	Na	Zn
					%				ppm
1. Leaves from pruned dry-farmed trees.	Arcadia	6	1.99	0.13	1.73	4.32	0.61		19
2. Same but unpruned			1.68	0.12	1.37	5.15	0.73		18
3. Leaves from neglected unproductive trees	Rhodes	4		0.10	1.22	2.07	0.41	1285	12
4. "Truito" almond, leaves	Holargos	6		0.07	1.44	3.03	0.45	701	16
5. Same tree, hulls at harvest				0.22	4.51	0.34	0.17	520	11
6. "Retsou" almond, leaves	Holargos	6		0.09	1.78	2.27	0.44	754	14
7. Same tree, hulls at harvest				0.28	5.27	2.22	0.11	312	11
8. "Truito" almond, seed coats at harvest	Holargos			0.33	0.66	0.90	0.30	132	31
9. Same kernels, blanched and after oil was extracted by pressure				0.85	1.90	0.34	0.42	33	34

(continues)

	Cu	Fe	Mn	B	Al	Si	Ti	V	Co	Ni	Mo	Cr	Sr	Ba	Li	Ag	Sn	Pb	Be	Cd
							ppm													
1.		147	82	32																
2.		162	82	27																
3.	1	130	21	23	80	157	2.1	+	2.4	2.5	–	5.0	13	8	1.9	0.6	–	–	–	–
4.	35	83	36	30	91	312	1.2	+	2.4	2.9	–	1.4	27	14	2.5	0.6	–	–	–	–
5.	36	164	9	101	172	566	15.0	1.4	1.8	4.1	–	4.8	14	8	1.3	0.4	0.4	+	–	–
6.	2	79	28	55	76	268	2.4	+	+	2.7	–	1.5	19	12	+	0.3	–	–	–	–
7.	9	174	6	64	75	222	3.2	+	+	2.2	–	8.5	10	11	1.2	0.4	+	–	–	–
8.	13	178	90	57	15	16	6.8	–	+	–	–	+	7	8	0.9	0.4	–	–	–	–
9.	28	92	13	20	7	7	+	+	+	–	+	–	2	2	1.0	0.3	–	6.3	–	–

+ = below detection limit
– = nonexisting

Na of the seedlings may be due to their leaves being close to soil and watering by sprinkling, waterborn and/or soilborn sodium, and to insufficiency of our washing to remove sodium. Neighboring tree-leaves, Nos. 4 and 6 (Table 2) had much less sodium. The coefficient of variation of the element concentra-

tion was around 20% for P, K, Ca, Mg, Na, Zn, Fe, B, Sr and Ba. It was higher for Cu, Mn, Al, Si, Ti and Li. The reason for the higher variation is most likely surface contamination on leaves (Wallace et al. 1980). The coefficient of variation values were like those reported for individual leaves on one tree for citrus (Wallace et al. 1979). Some high Cu values of Table 2 are attributed to sprays with copper compounds.

BIBLIOGRAPHY

1. Kenworthy, A. L. Martin, L., 1966. Mineral contents of fruit plants, p. 815. IN N. F. Childers, ed., Fruit Nutrition Rutgers, the State University, New Brunswick, N. J.

2. Wallace, A., Romney, E. M., Alexander, G. V., 1974. Variation in the simultaneous analysis by emission spectrography of twenty-four elements in plant material. Comm. Soil Sci. Plant Analysis, 5 (1):45-50.

3. Wallace, A., Kinnear, J., Cha, J, W., Romney, E. M., 1980. Effect of washing procedures on mineral analyses and their cluster analyses for orange leaves. J. Plant Nutrition 2 (1 & 2): 1-9.

4. Wallace, A., Procopiou, J., El-Gazzar, A. M., Kinnear, J., 1979. Variability in mineral composition of orange leaves of the same age and collected from a single tree. Alexandria Jour. Agric. Research 27 (1): 55-62.