Table 1. Effect of growing temp on nutrient contents of lettuce leaves.

Nutrient	Min temp (°C)	Nutrient content (% dry wt) Youngest leaves	Oldest leaves	Avg/head
Total nitrogen	−1	5.46 a[z]	3.54 a	4.99 a
	10	4.78 b	3.40 a	4.44 b
	Avg	5.12 a	3.47 b	
Phosphorous	−1	0.68 a	0.44 a	0.62 a
	10	0.66 a	0.38 a	0.60 a
	Avg	0.67 a	0.41 b	
Potassium	−1	4.39 a	5.57 a	4.68 a
	10	4.45 a	4.57 b	4.48 a
	Avg	4.41 a	5.07 b	
Calcium	−1	0.26 a	1.35 a	0.54 a
	10	0.33 a	1.72 b	0.68 a
	Avg	0.29 a	1.53 b	
Magnesium	−1	0.28 a	0.51 a	0.34 a
	10	0.31 a	0.52 a	0.36 a
	Avg	0.30 a	0.52 b	

[z]Mean separation, within column and row, for each nutrient by Duncan's multiple range test, 5% level.

no effect on P content of plant leaves.

The cations, K, Ca, and Mg were highest in the oldest leaves. Similar findings were reported for cabbage (8) and clover (12). In regards to K, plants grown at the lower temp contained more K in the oldest leaves than in similar leaves of plants grown at the higher temp which is probably attributed to less utilization at the lower temp. Temp had no effect on the Mg content of leaves.

Since lettuce leaves are a high source of Ca (9), the important aspect of this study is the loss of much of the Ca when the oldest cold-injured leaves of plants were trimmed off in preparation for use. Even though there was no difference due to temp on Ca content of leaves on the whole plant basis, plants grown at the cooler temp contained less Ca in the oldest leaves than those grown at the warmer temp. Since Ca is immobile within the plant and found mostly in the oldest leaves of plants (2) as much as four-fifth of the Ca could be lost through trimming of the oldest leaves of cold grown lettuce plants. Thus trimming which reduced plant wt and yield also removed much of the Ca.

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Screening Carrot Roots for High Soluble Solids by Specific Gravity[1]

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Abstract. **Carrot (*Daucus carota* L.) roots were separated into high and low density groups by placing them in a NaCl solution of known density. The high density roots had mean % soluble solids significantly higher than low density roots. The density of the test solution required for optimum separation of high density roots varied with the cultivar.**

Total sugar in carrot roots is reported to vary directly with specific gravity (1, 3). In 'Nantes Strong Top' a correlation of 0.62 was reported (1) between the sp gr of individual roots and % soluble solids (SS). Separation of carrot roots into density classes should provide a rapid screening technique for roots with high sugars if most cultivars have a correlation similar to 'Nantes Strong Top'. The term "total sugar" and "% soluble solids" are used interchangeably in this context (even though their absolute scales are quite different) because correlations of 0.791 to 0.844 were reported between these factors in carrots (2).

Samples were taken from 5 cultivars grown in Central Florida in an organic soil at Zellwood and 6 cultivars grown in Leon fine sand at Sanford. The lines were planted in Sept. 1972, and harvested in Jan.

All roots were tested in NaCl solutions of predetermined density. The tests were made in 94.6-liter tubs which were deep enough to permit easy monitoring of density with a 30-cm hydrometer. The roots were rinsed immediately after removal from the brine to prevent salt injury which might reduce viability during subsequent seed production.

Because the tops (4-6 cm of petiole tissue retained for cold storage) had a lower density than roots and the total volume of these petioles varied greatly among roots and cultivars, it was necessary to carefully define "sinking" and "floating". A "floating" root made less than a 45° angle with respect to the water's surface. A "sinking" root either rested flat on the bottom or partially floated, but the root made a greater than a 45° angle with the surface. A root which made an angle of more than 45° had part of its petiole tissue submerged along with the root. Consequently, the density of the root exceeded the density of the solution, and the root qualified as a "sink".

All root samples from Sanford were tested in NaCl solutions with sp gr of 1.028 and 1.036. No roots were sufficiently dense to sink at sp gr of 1.036. Root samples from Zellwood

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Table 1. Mean soluble solids associated with various density classes in carrot roots.

Cultivar and (source)	Location[z]	Specific gravity	No. of roots	Mean soluble solids
Nantes Coreless (Park)	Z	>1.030	12	7.85 a[y]
		1.026–0.030	26	7.59 a
		<1.026	25	7.05 b
Nantes Coreless (Park)	S	>1.028	26	7.10 a
		<1.028	42	6.80 b
Scarlet Nantes (Harris)	Z	>1.030	19	7.84 a
		1.026–1.030	32	7.30 b
		<1.026	28	7.13 b
Scarlet Nantes (Harris)	S	>1.028	33	7.12 a
		<1.028	55	6.31 b
Tantal (Clause)	Z	>1.030	17	8.05 a
		1.026–1.030	23	7.60 b
		<1.026	48	6.89 c
Tantal (Clause)	S	>1.028	12	7.69 a
		<1.028	24	6.97 b
Danvers 126 (Keystone)	Z	>1.030	7	8.38 a
		1.026–1.030	20	7.29 b
		<1.026	20	6.99 b
Danvers 126 (Keystone)	S	>1.028	8	8.30 a
		<1.028	29	7.68 b
D 301 (Dessert)	Z	>1.034	89	9.78 a
		1.030–1.034	28	9.05 b
		<1.030	15	8.27 c
Hicolor 9 (Asgrow)	S	>1.028	96	7.88 a
		<1.028	99	7.16 b
Tip-top (Sluis & Groot)	S	>1.028	23	7.22 a
		<1.028	42	6.82 b

[z]Z=Zellwood (organic soil); S=Sanford (Leon fine sand).
[y]Mean separation by Duncan's multiple range test, 5% level.

were tested in solutions with sp gr of 1.026 and 1.030 to obtain a 3-part separation of the sample. The only exception was for the breeding line D 301, which was tested at sp gr of 1.030 and 1.034 because it was known to have a very high SS level.

After the roots of each cultivar were separated into density classes, the SS of each root was determined by methods previously described (1). The differences between mean SS of contiguous density classes ranged from 0.17 to 1.09 with an average difference of 0.57 (Table 1). Most of these values were statistically significant.

The roots were subsequently held in cold storage for 10 weeks and planted for seed production. There appeared to be no root injury as a result of exposure to the brine for 1 or 2 min.

This method is rapid, simple, and useful to carrot breeders. Any open-pollinated line can be screened rapidly for high density roots. Subsequent refractive index measurement of these roots will yield a higher proportion of high SS selections than unselected roots. For example, the 96 'Hicolor 9' roots in Table 1 with sp gr over 1.028 had 13 roots with over 8.5% SS, while only 6 roots out of 99 in the sp gr class under 1.028 had over 8.5% SS. Another use might be to maintain high SS inbreds or mass selections for high SS without refractive index measurement. For example, D 301, which is a high SS inbred, had 32 out of 43 roots with less than 9.1% SS in the sp gr classes below 1.034. There were only 6 out of 89 roots with less than 9.1% SS in the sp gr class above 1.034. Hence, selection for high density removed the majority of roots with low SS from the root sample to be used for seed production.

It was frequently observed that the largest roots in each test had low density. Although no measurement was made of this variation, it appears that high density roots may be smaller on the average than low density roots. Repeated selection for high density may significantly affect the average root size of a population.

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Seasonal Mineral Accumulation by the Sweet Potato[1]

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Abstract. **The concentration and total content of P, K, Ca, Mg, N, Fe, Mn, and B in storage roots and in vines of sweet potatoes [*Ipomoea batatas* (L.) Lam.] was followed for a 14 week period beginning 2 months after planting. The concentration of N, P, K, Mn, and Mg in the vines and N, P, and K in the roots decreased slightly during the period. Other elements showed no definite seasonal trends. Total uptake by the vines showed little change after the second sampling period except for Ca and Fe. N and Mn content of the vines decreased toward the latter part of the season. The roots showed increasing total accumulation of all elements as the crop developed. Although there were differences among cultivars they were not of sufficient magnitude to suggest substantial differences in mineral requirements.**

The cultivars of sweet potatoes grown and the fertilization practices employed have changed greatly since early studies on mineral uptake by sweet potatoes were reported (1, 2). The objective of this experiment was to study the seasonal uptake and concn of the several nutrient elements in relation to the growth of the sweet potato plant. Data are reported here on the concn of the several elements in vines and roots of the crop and the accumulation or content at bi-weekly intervals during the period of root development.

'Centennial', 'Jewel', 'Nemagold', and 'Redmar' sweet potatoes were grown in 1971 on a Norfolk sandy loam near Salisbury, Maryland. Fertilization consisted of 1680 kg per ha of a 5–4.4–16.6–1.2 (N–P–K–Mg) analysis applied 1/3 preplant broadcast and 2/3 in 2 topdress applications. The soil type and fertilization program are typical of commercial sweet potato production in Maryland. Rainfall was adequate during the entire season. Sprouts were planted on May 24, spaced 31 cm apart in 93 cm rows, resulting in about 36,000 plants per ha. Sampling was begun on July 27, at which time storage roots were large enough to provide adequate material for analysis. Subsequent sampling was done at 2-week intervals, with the last sampling

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