B Vitamin in Walnuts

studies of components of vitamin B complex in walnut meats extended

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Three varieties of walnuts—Payne, Placentia, and Franquette—*Juglans regia* on *J. negri* rootstock—were analyzed for their content of pantothenic acid, folic acid, and vitamin B_6 in an extension of previous studies of the vitamins thiamine, riboflavin, and niacin in the same varieties.

The sample walnuts used in the second study were grown in the same districts as those in the first study and were selected from the best grade of nuts of the 1950 and 1951 crops. They were shipped in the shells to the laboratory where both shelled and unshelled nuts were stored at 35° F.

Shelled nuts were thoroughly ground twice and divided into representative samples which were packaged in pliofilm and stored in the freezer. All samples were made up of mixed light, amber, and dark kernels.

Results of the analyses are shown in the table in column 1 below—each value quoted is the mean of six to 12 separate and closely agreeing assays. The thiamine and riboflavin determinations on the 1950 crop samples agreed favorably with those found in the earlier experiment, as shown in the two-column table. The niacin values were in all cases significantly higher than those found in the earlier study. The improved method of extraction accounted for the difference. The niacin content of walnuts thus found agrees more closely with those reported by the Food and Drug Administration to the Office of the Quartermaster General than with the earlier analyses.

The pantothenic acid values of the Payne and Placentia nuts of the 1951 crop were significantly higher than those of the 1950 crop. The Franquettes showed a similar but less striking increase. This is the first crop year effect on the vitamin content of walnuts so far recorded.

As shown in the table in column 2 below, the rat growth method yielded the value 1.09 milligram percentage—mg.%—for 1950 Payne walnuts. Bioassays with either chicks or rats are likely to provide more reliable values for pantothenic acid than the microbiological procedures because of the more complete extraction of the vitamin from its coenzyme A and other bound forms.

The folic acid content of the Payne and Placentia nuts was the same—0.20 to 0.23 mg.%. The Franquette variety, as usual, had a lower value, 0.13 mg.%. A comparable analysis was made by other research workers—0.08 mg.%—in English walnuts purchased in the Washington, D.C., market. The folic acid levels found in the California-grown walnuts are higher than those of most vegetable foods but are comparable with those of most dried beans, some green leafy vegetables, and some meats. The high content of solids—about 96%—in these nuts may account for their relatively high levels of folic acid as well as of other B vitamins.

Vitamin B_6 was present in concentrations of 1.05, 0.96, and 0.87 mg.% in the Payne, Placentia, and Franquette walnuts. These values were confirmed by the close agreement found in the bioassays. The vitamin B_6 microbiological and bioassays yielded the closest agreement yet found in such comparisons, 97% and 104% of the microbiological values being found by rat growth assay. These levels compare with those reported for wheat germ and soybean flour but are higher than most of the other values reported for vegetable and some animal foods. Again the concentration of the nuts may account for the difference in ranges reported.

Proximate Composition of Walnuts

Variety and crop year	Moisture	Ash	Protein	Fat	Carbohydrate
	%	%	%	%	%
Payne					
1950	3.9	1.75	16.2	69.1	9.0
1951	3.5	...	...	65.2	..
Placentia					
1950	3.6	1.79	14.9	70.1	9.6
1951	3.3	...	...	66.9	..
Franquette					
1950	5.2	1.71	14.8	70.4	7.9
1951	3.4	...	...	68.2	..

Comparison of Microbiological and Bioassays of Walnuts

Variety and crop year	Vitamin	Bioassay	Microbiological assay	
				% of bioassay value
		mg. %	mg. %	
Payne 1951	Vitamin B_6	1.08	1.05	97
Franquette 1951	Vitamin B_6	0.83	0.87	104
Payne 1950	Pantothenic acid	1.09	0.67	62

B Vitamin Content of Walnuts

Variety and crop year	Thiamin	Riboflavin	Niacin	Pantothenic acid	Folic acid	Vitamin B_6
Payne	mg. %	mg. %	mg. %	mg. %	mg. %	mg. %
1950	0.28	0.17	1.17	0.67	0.20	...
1951	...	0.17	1.19	0.95	0.23	1.05
1942–1945[b]	0.31	0.11–0.16	0.73	...	...	...
Placentia						
1950	0.26	0.17	1.23	0.60	0.22	...
1951	...	0.17	1.17	0.72	0.23	0.96
1942–1945[b]	0.29	0.13–0.17	0.81	...	...	...
Franquette						
1950	0.24	0.12	0.89	0.49	0.13	...
1951	...	0.14	0.86	0.53	0.13	0.87
1942–1945[b]	0.24	0.10–0.12	0.58	...	...	...

[b] *California Agriculture*, August, 1949.

Variety Differences

In all cases, the Franquette nuts had lower levels of B vitamin content than did the Placentia and Payne varieties. There was only 60% to 87% of the vitamin values of the latter varieties found in the Franquette walnuts.

No effect of crop year was noted except in pantothenic acid, of which all the 1951 samples yielded higher values than did those of the 1950 crop. The Payne and Placentia nuts had significantly higher contents of all six vitamins for every sample than the Franquettes.

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The above progress report is based on Research Project No. 1468.