

Proceedings of the Iowa Academy of Science

Volume 10 | Annual Issue

Article 19

1902

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Recommended Citation

Weems, J. B. and Hess, Alice W. (1902) "The Chemical Composition of Nuts Used as Food," *Proceedings of the Iowa Academy of Science*, 10(1), 108-111.

Available at: <https://scholarworks.uni.edu/pias/vol10/iss1/19>

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THE CHEMICAL COMPOSITION OF NUTS USED AS FOOD.

BY J. B. WEEMS AND ALICE W. HESS.

[*Contribution from the Department of Agricultural Chemistry, No. 4, Iowa State College.*]

Nuts are used extensively as a luxury and their food value has been given little attention. According to the report of the department of agriculture, nuts are imported to the value of \$1,518,484 in 1901, and this amount does not include the nuts which are admitted duty free. The use of nuts under the unfavorable conditions for digestion has given to them a reputation of being indigestible. If used under favorable conditions as part of the meal and not as an addition to a product which is indigestible itself, there is no reason why many of the nuts should not be regarded more favorably as food. The cost of nuts in this state places them among the luxuries, since they cannot be regarded as an economical food material, except possibly the peanut. Compared with the more expensive forms of breakfast foods many of the nuts are not expensive forms of food.

The analyses of the nuts which have been made in connection with this study include the native nuts and those found on the market. There are other nuts besides those that have been selected which it is hoped will be added to the results given in this paper at some future time. As a matter of interest the chufa nut has been included in the analyses. While the chufa nut is not found in the market yet, it is advertised by seedmen as a nut which readily grows in Iowa. The results of the analysis made by the Maine Experiment Station ⁽¹⁾ are of interest in connection with this study.

(1) Report Maine Experiment Station. 1899, p. 87.

IOWA ACADEMY OF SCIENCES.

ANALYSIS OF NUTS MADE BY MAINE EXPERIMENT STATION.

	Refuse.	Edible portion.	EDIBLE PORTION.					Full value per pound.*
			Water.	Protein.	Fat.	Carbo- hydrates.	Ash.	
	pr. ct.	pr. ct.	pr. ct.	pr. ct.	pr. ct.	pr. ct.	pr. ct.	Calories
Almonds	64.8	35.2	1.7	7.3	19.3	6.2	.7	1665.
Almonds, kernels..	.....	100.0	4.8	21.0	54.9	17.3	2.0	3030.
Brazil nuts.....	49.6	50.4	2.7	8.6	33.6	3.5	2.0	1545.
Filberts	52.1	47.9	1.8	7.5	31.3	6.2	1.1	1575.
Filberts, kernels ..	.....	100.0	3.7	15.6	65.3	13.0	2.4	3290.
Hickory nuts.....	62.2	37.8	1.4	5.8	25.5	4.3	.8	1265.
Pecans	49.7	50.3	1.5	5.2	35.6	7.2	.8	1735.
Pecans, kernels ...	.....	100.0	2.9	10.3	70.8	14.3	1.7	3445.
Walnuts	58.0	42.0	1.2	7.0	27.0	6.1	.7	1385.
Walnuts, kernels ..	.....	100.0	2.8	16.7	64.4	14.8	1.3	3305.
Chestnuts	16.1	83.9	31.0	5.7	6.7	39.0	1.5	1115.
Peanuts, raw	26.4	73.6	6.9	20.6	30.7	13.8	1.6	1935.
Peanuts, kernels ..	.....	100.0	9.3	27.9	42.0	18.7	2.1	2640.
Roasted peanuts...	32.6	67.4	1.1	20.6	33.1	10.9	1.7	1985.
Shelled peanuts...	.....	100.0	1.6	30.5	49.2	16.2	2.5	2955.

* Calculated from analysis.

CHEMICAL COMPOSITION OF IOWA NUTS.

NAME.	Refuse.	Edible portion.	Waste in crack- ing.	EDIBLE PORTION.							IN DRY MATTER.				
				Water.	Ether ex- tract.	Crude fiber.	Protein.	Ash.	N. Free Extract.	Fuel value per pound. (4).	Ether ex- tract.	Crude fiber.	Protein.	Ash.	N. Free extract.
*Native hickory nut (<i>Carya alba</i>).....	68	30	2	1.20	19.38	.69	6.15	.66	1.92	968.	20.19	.72	6.40	.69	2.00
*Native hickory nut kernels.....				3.97	64.60	2.30	20.50	2.30	6.40	3228.	67.29	2.40	21.95	2.29	6.67
*Native walnut (<i>Juglans nigra</i>).....	76	22	2	.83	13.66	.51	2.11	.60	4.29	805.	14.21	.53	2.22	.62	4.42
*Native walnut kernels.....				3.80	62.10	2.30	9.60	2.70	19.50	3159.	64.60	2.40	10.10	2.80	20.10
+English walnut.....	57	43		2.88	23.24	.90	8.29	.86	6.83	1305.	24.90	1.01	8.88	.91	7.90
+English walnut kernels.....				6.70	51.05	2.10	19.28	2.00	15.87	937.	57.93	2.36	20.66	2.14	17.01
+Almonds.....	40	60		3.12	29.52	1.76	13.74	2.10	9.76	682.	31.14	1.66	14.52	2.22	10.26
+Almond kernels.....				5.20	49.20	2.93	22.90	3.50	16.27	2803.	51.90	3.10	24.20	3.70	17.10
+Filberts.....	65	35		1.23	22.33	1.12	5.18	1.05	4.09	1118.	23.14	1.16	5.38	1.09	4.25
+Filbert kernels.....				3.50	63.80	3.20	14.80	3.00	11.70	3195.	66.10	3.31	15.34	3.11	12.14
+Pecans.....	53	47		1.31	34.12	.99	4.60	.86	5.18	1620.	35.11	1.01	4.74	.82	5.82
+Pecan kernels.....				2.80	72.60	2.10	9.80	1.70	11.00	3451.	74.70	2.10	10.00	1.70	11.80
+Unroasted peanuts.....	27	70	3	2.31	34.37	2.24	19.11	1.63	10.36	1998.	35.55	2.32	19.76	1.66	10.71
+Unroasted kernels.....				3.33	49.10	3.20	27.30	2.30	14.80	2855.	50.78	3.31	21.23	2.37	15.81
+Roasted peanuts.....	30	69	1	.62	35.33	2.07	19.18	1.65	10.15	2043.	35.68	2.09	19.35	1.62	10.73
+Roasted kernels.....				.90	51.20	3.00	27.80	2.40	14.70	2961.	51.66	3.03	23.06	2.42	14.84
§Chufa nuts.....				23.36	24.34	9.96	5.02	2.84	34.48	1762.	31.75	12.98	6.55	3.70	45.02

*Gathered at Ames in 1900; analyzed in 1901.

(4). Calculated from analytical results,

†Bought in Ames and analyzed in 1901.

§From Boone, Iowa, 1898.

In the study of the results we see that the native nuts have a much larger percentage of refuse than the others, and with the exception of the chufa nut, the unroasted peanuts have the smallest amount of waste. The native walnuts having 76 per cent of refuse and the unroasted peanut with 27 per cent are the extremes.

The chufa nuts at the time of analysis contained a very large amount of water. In the other nuts the amount of water does not exceed 3.12 per cent in the almonds as purchased, while the english walnut kernels contain 6.70 per cent. The fat or ether extract is present to the greatest extent in natural nuts of 35.33 per cent in roasted peanuts, and the lowest in the native walnut of 13.66 per cent. The kernels of the pecan contain, however, 72.60 per cent of fat, the largest percentage of any of the nut meats, and the unroasted peanuts 49.10 per cent for the lowest.

The protein is present in the roasted peanuts to the amount of 19.18 per cent, as purchased, and 27.80 per cent in the kernels. The native walnut has the smallest amount of protein, 2.11 per cent, as gathered, and 9.60 per cent in the kernels. If the value of the nuts for the amount of starch, sugar, etc., present should be desired, the unroasted peanut with 10.36 per cent of carbo-hydrates will be found to be the highest in the nuts as purchased, if we except the chufa nut, which has 34.48 per cent. In the kernels, however, we find that the almond with 19.50 per cent, is highest of the common nuts. The hickory nut has the smallest amount of carbo-hydrates as gathered, 1.92 per cent, and the kernels 6.40 per cent. On comparing the nuts for their fuel value, they may be arranged in the following order: roasted peanuts, unroasted peanuts, chufa nuts, almonds, pecans, english walnuts, filberts, hickory nuts, and walnuts. The peanut is undoubtedly a valuable food material, and its reasonable price readily places it as the most useful of the nuts commonly met with in the market.