

# Why Nut Evaluation?

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## EARLY OBSERVATIONS

Early evaluations were based on visual observation with a descriptive analysis of the nut and usually the tree. For example, Thomas black walnut was discovered in 1881. It was described as being a prolific bearer, cracked much better than the average black walnut, and was larger in size and better flavored than other black walnuts. Kernel extraction was very good because of the roomy chambers of the shell. (5)

Other early descriptive terms used were as follows: A large nut; 19 nuts per pound; bears at an early age; thin shelled; cracks well; kernels easily extracted; kernels plump; good shell structure; and color and flavor of kernel is good.

These terms describe what the eye was seeing when the nuts and tree were compared to other native nuts and trees or other named cultivars.

## JUDGING NUT SAMPLES

Judging nut exhibits at fairs and shows differs from evaluation contests. In exhibition judging, the classes are usually set up to include only a single cultivar or clone. The problem here is to judge a sample in comparison with the other entries of nuts of the same clone, and to rank these as 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, etc. Here the schedule is concerned with such characteristics as size and uniformity of nuts in the sample, the color and attractiveness of the shell, and the color, plumpness, and quality of the kernels. In these exhibits, much depends on the showmanship of the exhibitor and the selective skills. The entry does not give information as to the intrinsic value of the clone as related to the other clones. (3)

The first judging schedule of points was devised by Professor E. R. Lake in 1915.

### General Values:

Size.....	10
Form.....	5
Color.....	5

### Shell Values:

Thinness.....	15
Cracking.....	20

### Kernel Values:

Plumpness.....	5
Color.....	10
Flavor.....	10
Quality.....	20
Total.....	100

Note: For insect or fungus injuries deduct 5-20 points.

Other score cards were established for chestnut, filbert, pecans, and Persian walnuts.

It was pointed out at the time that it was important at all times to have in mind the idea of working to keep the quality very high.

More recently, L.H. MacDaniels (4) offers a suggested judging schedule as follows:

### **JUDGING SCORECARD**

	Points	Comments:
<u>External Nut Characters:</u>		
Size .....	15	The larger nuts are preferable.
Condition.....	10	Sutures not split. Not excessively dry. Free from fiber.
Color.....	10	Bright, attractive, not stained.
Uniformity .....	15	Uniform size.
 <u>Internal Kernel Characters:</u>		
Plumpness.....	25	Plump, smooth, and free from high oil content (except chestnuts).
Color.....	10	The lighter the better.
Flavor.....	15	Not rancid or astringent, high in fat.

Upon comparing the two score cards the original card places 55% weight on external characters and 45% on kernel characters. The newer card places equal value on external and kernel values.

### **EVALUATION OF NUTS**

Evaluation is a means of improving nut culture by finding, describing, and comparing the trees; which consistently produce abundant nut crops of superior quality. (2)

There are two parts necessary to completely evaluate a given clone. The first part is an evaluation of a sample of nuts according to an accepted schedule that will determine the relative merit of the sample of nuts. The second part of the evaluation has to do with characteristics of the tree itself, such as hardness, productivity, leaf health, branch angles, tree form, vigor, susceptibility to pests, regularity and volume of cropping, and response to propagation techniques.

In Nebraska, we have thus far limited our evaluation to ranking samples of nuts submitted by members and others either in-state or out-of-state.

We are using the Iowa scoring system, which we modified by adding taste as a factor of kernel quality. Our formula for scoring black walnut would be as follows:

$$\text{Final score} = \% \text{ kernel divided by (seal + appearance + usability + size + separation + pieces + kernel size + kernel color + kernel veining + shrivel + taste grade) X 100.}$$

The reason taste was added to the scoring is the fact that the two score cards previously shown used taste as part of the scoring for shows. Also, in the survey of NNGA members conducted by Doug Campbell several years ago, eating quality ranked very high on the list of traits. (1)

Under the direction of Dr. Bill Gustafson, a scoring program called "NUT EVALUATION" has been devised. The raw data is fed into the IBM-AT Computer. The computer performs all of the calculations and will rank samples in descending order, from the highest score to the lowest score. It also prints out the various scores assigned by the grading committee so that a person can make comparisons between various samples. This makes it easy to convey the information to the newsletter, and saves much time in making hand calculations.

### **WHY EVALUATE NUTS?**

1. It provides a method of finding new cultivars of superior quality.
2. It provides a method of rating named varieties in your area.
3. It is a good method to develop enthusiasm among members of a state association.
4. It is only as the nuts themselves have merit that other characteristics are worthy of further consideration.
5. Educational value of nut evaluation process and visual comparison of various nut samples.

### **REFERENCES**

1. Campbell, R. D. 1979. What They Really Want to Know, Nut Shell, Vol. XXXIVI 10-11.
2. Hansen, Norman. 1968. Black Walnut Evaluation In Iowa. NNGA Proc. 59:45-50.
3. Lake, E. R. 1914. Proposed Score Cards for Judging Nuts. NNGA Proc. 5:19-21.
4. MacDaniels, L.H. 1979. Evaluating Nut Crops, Nut Tree Culture in North America. Pages 439-440.
5. Reed, C.A. 1920. Nut Culture in the United States. NNGA Proc. 11:38-39.
6. Bixby, WG. 1929. The 1929 Contest NNGA Proc. 22:42-70.

## NUT EVALUATION ENTRY

Date \_\_\_\_\_

Tree I.D. Number \_\_\_\_\_

### TREE DESCRIPTION

Species \_\_\_\_\_

1. a. \_\_\_\_\_ Native \_\_\_\_\_ Planted \_\_\_\_\_ Grafted \_\_\_\_\_

b. Clone/Cultivar name: \_\_\_\_\_

2. a. Estimated age: \_\_\_\_\_ years

b. Circumference @ 4 ½ ft: \_\_\_\_\_ inches

c. Estimated height: \_\_\_\_\_ feet

d. Average crown spread: \_\_\_\_\_ feet

3. Location (legal description, directions or town address)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. Average interval between nut bearing: \_\_\_\_\_ year(s)

5. Estimated production: (husked nuts)

	#Nuts	or	Bushels	or	Pounds
This year	_____		_____		_____
Last Year	_____		_____		_____
2 Years Ago	_____		_____		_____

6. Have nuts from this tree been entered in past evaluations?

Yes \_\_\_\_\_ No \_\_\_\_\_ What year \_\_\_\_\_ Entry # \_\_\_\_\_

Special Notes

I enclose 15 nuts from above tree to be evaluated by the Nut Growers Association.

Return to: Nut Evaluation Committee

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_ Zip \_\_\_\_\_

Phone: (\_\_\_\_\_) \_\_\_\_\_

## **NUT EVALUATION**

The Nut Growers Association annually conducts a "Nut Evaluation Program" to locate nut trees which produce superior quality nuts. Common species for evaluation include: Black Walnut, Persian (English) Walnut, Pecan, Hickory, Butternut, Hazelnut, and Heartnut, but other tree entries will be accepted and evaluated.

### Contest Rules

1. Each entry consists of 15 nuts (no limit on number of entries).
2. Nuts must be clean. Remove all husks (hulls); wash the nuts and allow to dry for about two weeks. A steel brush works well to remove residue.
3. A “Nut Evaluation Entry” form (or copy) must accompany each entry.
4. Entries should be received by December 31 or stored under refrigeration prior to the evaluation.

Please complete and return each entry form to: Nut Growers Association, Nut Evaluation Committee.

Name: \_\_\_\_\_ Address: \_\_\_\_\_

Entry Number: \_\_\_\_\_ Code: \_\_\_\_\_

## BLACK WALNUT EVALUATION SHEET

Native: \_\_\_\_\_ Seedling: \_\_\_\_\_ Clone: \_\_\_\_\_ Cultivar: \_\_\_\_\_

### Nut Quality

### Grade

SEAL: Number of nuts: \_\_\_\_\_ #1 All Sealed tightly \_\_\_\_\_  
#2 1 or 2 defective nuts/5 nuts \_\_\_\_\_  
#3 2, 5 or more defective/5 nuts \_\_\_\_\_

APPEARANCE: #1 Uniform size, symmetric, smooth \_\_\_\_\_  
#2 Intermediate \_\_\_\_\_  
#3 Variable size, asymmetric, rough \_\_\_\_\_

USEABILITY: \_\_\_\_\_ Nuts out of \_\_\_\_\_ #1 5 out of 5 nuts useable \_\_\_\_\_  
#2 5 out of 6 nuts useable \_\_\_\_\_  
#3 5 out of 6.5 or more nuts useable \_\_\_\_\_

SIZE: Sample Weight \_\_\_\_\_ grams #1 > 20 gms./nut \_\_\_\_\_  
#2 15-19.9 gms./nut \_\_\_\_\_  
#3 < 14.9 gms./nut \_\_\_\_\_

### Cracking Quality

YIELD: Sample total Kernel wgt. \_\_\_\_\_ total nut wgt. \_\_\_\_\_ x 100 = % kernel \_\_\_\_\_

SEPARATION: Kernel recovered 1<sup>st</sup> crack = \_\_\_\_\_ gms. #1 > 90% 1<sup>st</sup> crack \_\_\_\_\_  
Kernel recovered 2<sup>nd</sup> crack = \_\_\_\_\_ gms. #2 60-89% 1<sup>st</sup> crack \_\_\_\_\_  
Total kernel recovered \_\_\_\_\_ gms. #3 < 59% 1<sup>st</sup> crack \_\_\_\_\_

PIECES: Kernels that are in 1/2 's = \_\_\_\_\_ 1/4 's = \_\_\_\_\_ #1 > 19/20 1/4 's \_\_\_\_\_  
(1/2 's x 2 + 1/4 's = No. of 1/4 's) #2 12-18/20 1/4 's \_\_\_\_\_  
#3 11/20 1/4 's \_\_\_\_\_

### Kernel Quality

SIZE: Kernel wgt./nut = \_\_\_\_\_ gms. #1 > 5 gms./nut \_\_\_\_\_  
#2 4.0-4.9 gms./nut \_\_\_\_\_  
#3 < 3.9 gms./nut \_\_\_\_\_

COLOR: #1 Light & bright \_\_\_\_\_  
#2 Intermediate \_\_\_\_\_  
#3 Dark and dull \_\_\_\_\_

VEINS: #1 Slight \_\_\_\_\_  
#2 Moderate \_\_\_\_\_  
#3 Prominent \_\_\_\_\_

SHRIVEL: #1 > 19/20 ¼'s nonshriveled \_\_\_\_\_  
#2 15-18/20 ¼'s \_\_\_\_\_  
#3 < 14/20 ¼'s nonshrivelled \_\_\_\_\_

TASTE: Classed as #1 exceptional \_\_\_\_\_, #2 average \_\_\_\_\_, #3 inferior \_\_\_\_\_, \_\_\_\_\_

REMARKS: \_\_\_\_\_ Total Grade \_\_\_\_\_

Final Score: \_\_\_\_\_

% Kernel  
----- x 100

Total Grade \_\_\_\_\_ Placing: \_\_\_\_\_

\*Forms for nut species can be obtained from the Iowa or Nebraska Nut Growers Association.

## SCORING FORMULAS

1. MacDaniels Score\*
  - a. weight of a 10-nut sample in grams
  - b.** weight of kernels obtained by first crack
  - c.** total weight of all kernels in sample
  - d.** number of whole quarters of kernel in sample

The sample score is the sum of the weight of kernels from first crack in grams, the total weight of kernels divided by 2, and the number of quarters divided by 2. Pg. 436, Nut Tree Culture in North America.

2. Iowa Score No 1\*\*  
Final Score = (crackout %) divided by (nut size + seal + appearance + useability + separation + pieces + kernel size + color + veins + shrivel grades) x 100
3. Iowa Score No 2  
Final Score = (crackout %) divided (nut size + seal + appearance + useability + separation + pieces + kernel size + color + veins + shrivel grades) x 100

Iowa adds all three of the above scores together to get their final score.

\*MacDaniels score favors large size nuts.

\*\*Iowa Score No 1 favors the percentage of kernel in a nut.

4. Nebraska Score:  
Final Score = (crackout %) divided by (nut size + seal + appearance + useability + separation + pieces + kernel size + color + veins + shrivel + taste grades) x 100

**BLACK WALNUT CULTIVARS**  
**With greater than 35% kernel to shell ratios**

**Nebraska Evaluations 1987-1996**

<u>Source</u>	<u>Cultivar</u>	<u>Grams per Nut</u>	<u>Grams of Kernel/nut</u>	<u>% Kernel</u>	<u>Nuts per pound</u>	<u>Lbs. Of Nuts per Lb kernal</u>	<u>Score</u>	<u>Rank</u>
<b>1987</b>								
Baker (MO)	Emma K	16.00	6.0	37.50	28.35	2.666	234	2
Bently (NE)	Krouse	12.80	4.6	35.94	35.44	2.783	200	4
<b>1988</b>								
No Cultivar scored over 35%								
<b>1989</b>								
Bauman (OH)	Myers	15.60	5.66	36.28	29.08	2.756	259	1
Bauman (OH)	Emma K	18.00	6.70	37.22	25.20	2.686	248	2
Gardner (MO)	Emma K.	18.40	6.52	35.43	24.65	2.822	221	4
<b>1990</b>								
UNL, M-7 (NE)	Sparks 147	17.15	6.07	35.39	26.45	2.825	236	3
<b>1991</b>								
UNL L-9 (NE)	Sparks 147	17.20	6.64	38.58	26.37	2.590	276	1
UNL O-5(NE)	Wrights G-4	19.67	7.10	36.08	23.06	2.770	258	2
Lane (MO)	Jackson	13.38	4.85	36.29	33.90	2.759	242	6
UNL M-7(NE)	Sparks 147	13.43	5.06	37.67	33.77	2.654	222	9
<b>1992</b>								
UNL P-7 (NE)	Sparks 127	12.00	4.46	37.26	37.80	2.691	233	3
<b>1993</b>								
Lane (MO)	Sparks 127	17.34	6.19	35.68	26.16	2.801	223	2
UNL M-7 (NE)	Sparks 147	16.00	6.14	38.41	28.35	2.606	202	8
UNL L-3 (NE)	Sparks 127	11.55	4.11	35.58	39.27	2.810	198	9
UNL L-1 (NE)	Sparks 127	11.40	4.26	37.36	39.79	2.610	197	10
UNL L-9 (NE)	Sparks 147	15.07	5.77	38.29	30.10	2.806	191	12
UNL O-5 (NE)	Wright's G-4	13.90	4.94	35.51	32.63	2.814	178	26
<b>1994</b>								
UNL P-3 (NE)	Myers	16.06	5.62	35.00	28.24	2.858	233	2
UNL P-7 (NE)	Sparks 127	15.34	5.40	35.20	29.57	2.841	207	7

<u>Source</u>	<u>Cultivar</u>	<u>Grams per Nut</u>	<u>Grams of Kernel/ Nut</u>	<u>% Kernel</u>	<u>Nuts per Lb.</u>	<u>Lbs. of Nuts per Lb. of Kernel</u>	<u>Score</u>	<u>Rank</u>
<b>1995</b>								
Lane (MO)	Emma K	15.91	5.72	35.94	28.51	2.781	239	2
UNL L-9 (NE)	Sparks 147	14.19	5.06	35.65	31.97	2.804	178	16
<b>1996</b>								
Lane (MO)	Emma K	17.67	7.00	37.92	25.67	2.524	253	1
Lane (MO)	Sauber 1	13.74	4.84	35.19	33.01	2.839	207	5
L. Hay (MO)	Myers	13.88	5.28	38.01	32.68	2.629	165	23

**BLACK WALNUT CULTIVARS  
with greater than 35% kernel to shell ratios**

**Kansas and Missouri Evaluations 1984-1996**

<u>Source</u>	<u>Cultivar</u>	<u>Grams per nut</u>	<u>Kernel weight/nut</u>	<u>Percent Kernel</u>	<u>Nuts per lb.</u>	<u>Lbs of nuts per lb. Kernel</u>
<b>1984</b>						
G. Gardner (MO)	Emma K	19.30	6.99	36.21	23.5	2.761
<b>1985</b>						
G. Gardner (MO)	Emma K	20.58	7.55	36.21	22.04	2.726
G. Gardner (MO)	Surprise	22.75	8.03	35.33	19.94	2.833
<b>1986</b>						
G. Gardner (MO)	Clermont	16.88	6.01	35.59	26.88	2.809
G. Gardner (MO)	Emma K	19.75	7.13	36.09	22.97	2.770
J. Williams (MO)	Emma K	15.54	5.58	35.89	29.20	2.785
<b>1987</b>						
J. Williams (MO)	Emma K	14.79	5.30	35.85	30.66	2.791
B. Lane (MO)	Sauber	15.76	5.69	36.08	28.79	2.700
J. Williams (MO)	Sparks 127	12.30	4.59	37.30	36.89	2.697
J. Williams (MO)	Bowser	14.03	5.01	35.70	32.34	2.800
P. Baker (MO)	Emma K	14.52	5.40	37.19	31.23	2.689
<b>1988</b>						
No cultivar scored over 35%						
<b>1989</b>						
R. Curtis (KS)	Emma K	14.97	5.58	37.25	30.31	2.681
B. Lane (MO)	Jackson	11.62	4.32	37.14	39.04	2.690

<u>Source</u>	<u>Cultivar</u>	<u>Grams per Nut</u>	<u>Kernel Weight/Nut</u>	<u>Percent Kernel</u>	<u>Nuts per lb.</u>	<u>Lbs. of Nuts per lb. of Kernel</u>
<b>1990</b>						
No Cultivar scored over 35%						
<b>1991</b>						
Ks. Exp. St. (KS)	Emma K	15.11	5.30	35.09	30.03	2.851
B. Lane (MO)	Jackson	13.09	4.73	36.16	34.66	2.767
<b>1992</b>						
J. Williams (MO)	Surprise	20.85	7.43	35.62	21.75	2.806
T. Blaufuss (KS)	Surprise	18.33	6.78	36.97	24.75	2.704
J. Williams (MO)	Emma K	16.18	5.78	35.72	28.03	2.799
T. Blaufuss (KS)	Emma K	14.84	5.32	35.83	30.56	2.784
J. Williams (MO)	S-127	12.56	4.81	38.32	36.10	2.611
<b>1993</b>						
Ks. Exp. St. (KS)	S-147	18.43	7.07	38.34	24.61	2.604
B. Lane (MO)	S-127	15.43	5.61	36.39	29.40	2.750
<b>1994</b>						
No cultivar scored over 35%						
<b>1995</b>						
B. Lane (MO)	Emma K	17.50	6.22	35.53	25.92	2.815
E. Provost	Surprise	16.89	5.97	35.37	26.86	2.829
Ks Exp. St. (KS)	Emma K.	17.74	6.62	37.31	25.57	
Ks Exp. St. (KS)	S-147	14.96	5.78	38.61	30.32	
<b>1996</b>						
Ks Exp. St. (KS)	DuBois 8201	17.92	6.35	35.42	25.31	2.822
Ks Exp. St. (KS)	Emma K	20.25	7.36	36.35	22.40	2.751
B. Lane (MO)	Sparks 147			37.63	33.31	
E. Williams (MO)	Emma K			35.48	30.21	

**BLACK WALNUT CULTIVARS  
With greater than 35% kernel to shell ratios**

**Kansas Evaluations 1959-1988**

<u>No. of Samples</u>	<u>Cultivar</u>	<u>% K. High</u>	<u>Nuts/Lb Low</u>	<u>Nuts/LB Mean</u>
8	Emma K	36.56	21.34	26.93
7	Bowser	36.29	26.34	29.82
6	Clermont	35.59	24.70	34.00
4	Brown Nugget	35.50	27.10	29.07
2	Surprise	35.33	19.94	20.24
6	Myers	35.10	29.14	33.24