Descriptive Sensory Analysis of Black Walnuts

Sherry McGraw, Michelle Warmund, Janelle Elmore, and Koushik Adhikari
The Sensory Analysis Center, Department of Human Nutrition, Kansas State University, Manhattan, KS 66506

Introduction

According to Warmund (2008, in press), there is an ever increasing demand for black walnuts. In the market place, black walnuts are being used fresh or in baked or confectionary products. Black walnuts have been harvested in the wild over the years. Now with more demand for black walnuts, cultivars are being started by grafting from that wild growth. There are now orchards of these plantings with several varieties being grown. They are producing a good crop of consistent, large kerneled black walnuts, that are desired in the market place.
This study was designed as a follow-up to an earlier study done comparing sensory attributes of Persian walnuts and eastern black walnuts (Warmund, etal. 2008, in press). For this study, sensory attributes were compared between the varieties /types of black walnuts, as well as within the variety based on color differences.

Materials & Methods

Products: Twelve samples of black walnuts were provided by the University of Missouri's Horticulture Department. Light, medium and dark colors of the following varieties were tested: EmmaK, Kwik Krop, Sparks, and a Wild-type.
Panelists: The Descriptive Sensory Analysis panel consisted of 6 highly trained descriptive panelists. Panelists had more than 120h of descriptive training and average more than 2000h of testing experience. For this panel, 3h of orientation occurred to identify the attributes.

Scale: A 15 point scale with 0.5-point increments (0.0=none – 15.0 = extreme) was used when evaluating the attributes.
Sample Preparation: Prior to serving, each whole piece of black walnut was chopped into 1/3's, then all mixed together. Each panelist received ~20 grams of each sample for evaluation. Panelists were required to take ½ teaspoon (3 pieces) in each bite. Samples were presented one at a time and coded with random 3-digit numbers. Samples were served at room temperature.

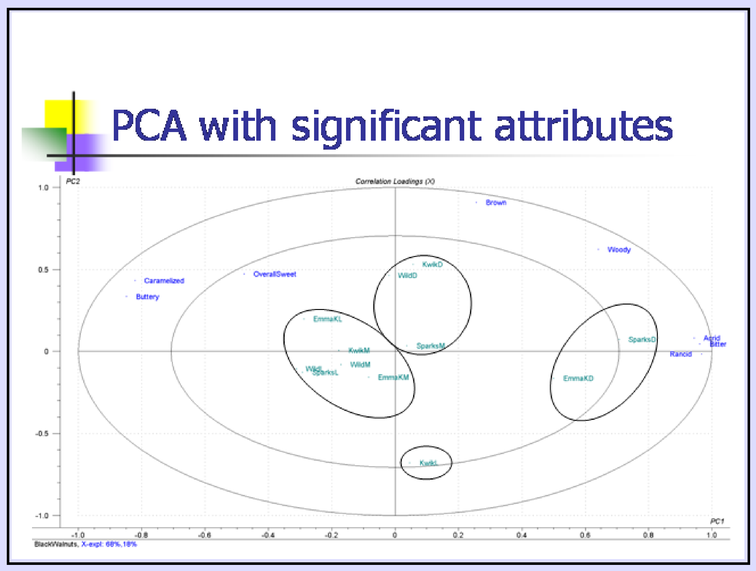
Statistical Analyses: Analysis of Variance (ANOVA) was performed on the main effects of 'Color' and 'Variety', and also on 'Color by Variety' interaction (PROC GLIMMIX in SAS®). Post-hoc mean separation was carried out to see differences in the samples due to significant attributes.
Principal Components Analysis (PCA) was carried on Unscrambler® to look at the relationship between the attributes the samples. Cluster Analysis by Ward's method was done on SAS® to check the PCA results.

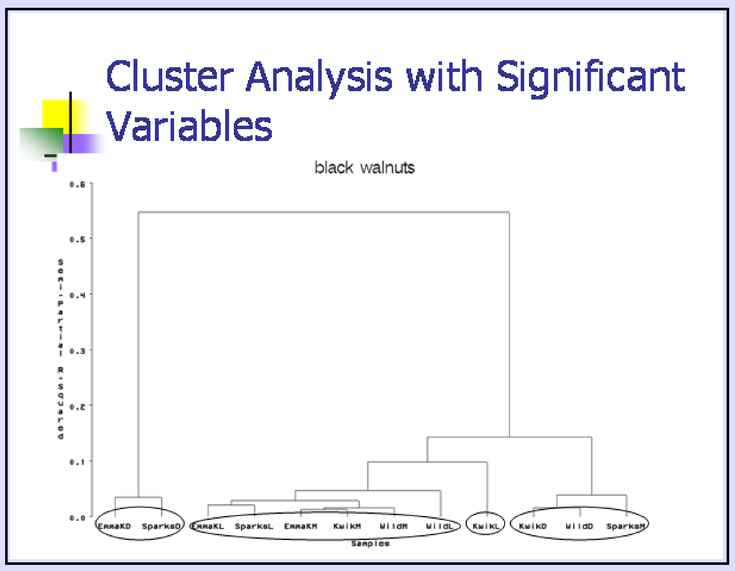
Results

Attributes with Differences by Variety/Type				
	Butter*	Caramelized*	Astringent*	Overall sweet***
Emma	2.2B	1.7AB	2.4A	2.5B
Kwik	2.4AB	1.7B	2.3AB	2.4B
Spark	2.3AB	1.6B	2.2B	2.3B
Wild	2.5A	1.9A	2.2B	2.8A

Attributes with Differences by Color			
	Musty/Dusty***	Woody***	Bitter***
Dark	2.4A	5.2A	3.0A
Light	2.1B	4.8B	2.5B
Medium	2.3AB	5.0AB	2.5B

* = 90% confidence, *** = 95% confidence





Summary of Findings

Analysis of Variance

When looking at the varieties as a group, only 4 attributes were determined to be different, butter, caramelized, astringent and overall sweet. Wild was highest for butter, caramelized and overall sweet.

When looking at the color, only 3 attributes were determined to be different, musty/ dusty, woody, and bitter. The dark samples were higher in intensities for all 3 attributes.

Principal Components Analysis and Cluster Analysis

The PCA map was plotted with the significant attributes of the samples. The dark color samples of EmmaK and Sparks were characterized by rancid, acrid and bitter attributes.
The dark color samples of Kwik Krop and Wild, and the medium color sample of Sparks were characterized as brown and woody.
The medium color samples of EmmaK, Kwik Krop, and Wild, and the light color samples of EmmaK, Sparks and Wild were characterized by buttery, caramelized and overall sweet.
The light color Kwik Krop sample appeared to be an outlier, due to very low intensities of brown, woody and overall sweet. Cluster Analysis (Ward's method) validated the PCA groupings.