Qualitative analyses of sensory characteristics of eight specialty leafy greens

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Abstract

In addition to being principle photosynthesis sites, leaves are major accrual areas of plant metabolites. Recent consumer-oriented focus groups and surveys showed a growing trend among consumers to improve health through consumption of various types of fresh produce. Among nearly 1000 edible species of leafy plants, only limited numbers are available commercially. The purpose of this study was to investigate the consumer acceptance of 8 specialty leafy greens (amaranth, huauzontle, pac choi, tai sai, arugula, mizuna, komatsuna, and red iceberg lettuce) by various approaches using sensory and instrumental methods.

Descriptive comments about leafy green characteristics from a group of 96 non-trained panelists were analyzed for this study. Among 374 descriptions of characteristics, 339 comments were used for qualitative analyses. The remaining 35 were excluded since their content did not fall under any category used in this study. Comments were coded as positive or negative and were separated by Lifrxqwoption of Microsoft Excel 2003. Each group was further divided into three categories: comments regarding appearance, taste, and texture. The most noted characteristics and percentage of responses in each subgroup were reported.

Among the greens, mizuna and tai sai showed desirable appearance characteristics with 18.2% and 10.3% positive comments for appearance. Panelists recognized amaranth, arugula, komatsuna, and red iceberg lettuce for their bitter taste; they also received negative comments for taste in 43.8, 44.6, 33.9, and 18.9% of panelists' evaluations. Arugula, pac choi, tai sai and red iceberg lettuce were also noted for their crispy and crunchy texture with 5.4%, 14.8%, 6.8%, and 16.9% positive comments for texture. Mizuna exhibited the highest percent of positive comments among the 8 greens for appearance and taste (18.2% and 34.1%, respectively).

Results of this study, along with other qualitative and quantitative approaches, may be utilized for evaluation of consumer acceptance of these 8 selected greens for commercial marketing.

Keywords: Quality attributes; leafy greens; sensory characteristics.

Initial Selection and Sensory Analyses

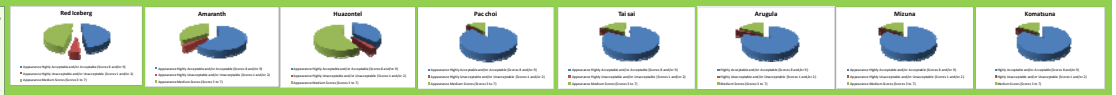
× Initial screening of the 64 specialty leafy greens based upon:
- •Hydroponic trials
- •Soil trials in greenhouse
- •Preliminary sensory tests

× Consumers' acceptance examination of the 8 selected leafy greens by 96 non-trained panelists:
- •A 9-point hedonic scale
- •Open-ended Questions

Selected Leafy Greens



Consumers' Perceived 'Appearance' of Eight Selected Leafy Greens



Consumers' Perceived 'Flavor' of Eight Selected Leafy Greens



Consumers' Perceived 'Texture' of Eight Selected Leafy Greens



Consumers' Perceived 'Overall Acceptability' of Eight Selected Leafy greens



Table 1. The Most Noted Characteristics of the Selected Specialty Leafy Greens.

Selected leafy greens	Noted sensory attributes
Arugula	Spicy flavor, slight bitterness, crispy texture, light aftertaste
Komatsuna	Mild slightly bitter taste, astringent aftertaste, dry mouthfeel
Mizuna	Attractive appearance, chewy texture, mild flavor
Pac Choi	Crunchy texture, slightly spicy flavor, cabbage-like taste
Huauzontle	Bland flavor, dry sandy texture, bitter off-flavor
Amaranth	Slight bitterness, grassy after-taste, appealing look
Tai Sai	Radish-like taste, crunchy texture, unpleasant after taste
Red Iceberg Lettuce	Bland sweet flavor, crunchy texture, slight bitter after taste

Panelists Perception of Leafy Greens Appearance, Flavor, Texture, and Overall Acceptability Based on a 9-point Hedonic Test.

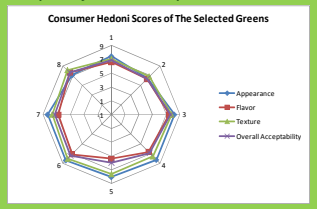


Table 2. Percent of Panelists with Positive and Negative Comments on the Leafy Greens Characteristics.

	Included Responses	Excluded Responses	% Positive Comments			% Negative Comments		
			Appearance	Taste/After taste	Texture	Appearance	Taste/After taste	Texture
Arugula	94	8	2.8%	14.3%	5.4%	2.8%	44.6%	0.0%
Komatsuna	82	7	0.0%	25.8%	6.8%	1.6%	33.9%	4.8%
Mizuna	93	4	18.2%	34.1%	2.2%	0.0%	18.6%	4.1%
Pac choi	27	3	7.4%	29.6%	14.8%	3.7%	40.8%	11.2%
Huauzontle	92	4	0.2%	21.9%	3.2%	12.5%	43.8%	18.6%
Amaranth	93	5	3.3%	36.6%	10.1%	13.3%	43.3%	3.3%
Tai sai	28	3	10.3%	27.6%	6.8%	3.5%	41.4%	3.4%
Red Iceberg Lettuce	93	4	3.8%	32.1%	16.9%	1.9%	18.9%	11.4%

Results and Discussion

× More than 50% of panelists reported the appearance, texture, and overall acceptability of the samples as highly acceptable or acceptable.
× Flavor of the selected leafy greens, however, had lower perception values.

Red iceberg lettuce. Panelists commented that red iceberg lettuce was bland, with a sweet flavor, crunchy texture, and bitter after taste. Appearance of this green was lower than most other greens. Due to commercial availability of red iceberg lettuce, this green served as the control for this study.

Arugula. Panelists pointed out that arugula had a spicy flavor, crispy texture, and a light aftertaste.

Komatsuna. Komatsuna was ranked higher than the control for appearance and lower than the control for flavor. The most noted characteristics were a dry mouthfeel and slight astringent aftertaste.

Mizuna. Appearance of mizuna was scored higher than the control. Noted characteristics were an attractive appearance and chewy texture.

Pac choi. Flavor, texture, and overall acceptability of pac choi were comparable with the control sample and its appearance was consistently scored higher by panelists. Recurrent comments were related to a crunchy texture and mild spicy flavor.

Huauzontle. Appearance, flavor, texture, and overall acceptability scores of the huauzontle were lower than the control sample. Lack of flavor and a dry, sandy texture were the most noted descriptions.

Amaranth. Amaranth's overall acceptability and appearance scores were comparable to the control sample (red iceberg lettuce), but its flavor and texture were scored lower than the control. The most noted organoleptic characteristics of amaranth were slight bitterness and grassy aftertaste, and the highest rated characteristics were color and appearance.

Tai sai. Tai sai was ranked higher than control for appearance. Sensory attributes noted were a radish-like taste and crunchy texture.

Conclusions

× Among the eight tested leafy greens, the appearance score of five taxa (komatsuna, mizuna, arugula, tai sai, and pac choi) were closely comparable to red iceberg lettuce.
× For most leafy greens, less than 10% of the consumers ranked them as highly unacceptable or unacceptable. Results of this study show that selected leafy greens have potential for consideration in production and marketing.
× This study demonstrated that selected specialty leafy greens have desirable sensory attributes that are comparable to traditional greens available in the market. This suggests the potential for commercial production and marketing of the selected specialty leafy greens.

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