

Chives and Perilla, Korean Greens for Emerging Ethnic Markets

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Rapid urbanization, coupled with increasing land values and rapidly changing demographics (> 33% ethnic population in 2006; US Census Bureau 2007) provides a compelling case for the production of high-value horticultural crops in New Jersey. As New Jersey now has the most diverse ethnic population of any state in the US, the introduction of fruits and vegetables, long known to those ethnic communities, but largely unknown to most American farmers, creates a potential production opportunity in the search for new market-driven fresh produce.

Asian consumers are identified as a substantial ethnic market niche opportunity, as a result of their prevalence and significant growth in the US, especially the Northeast, as well as their substantial buying power. Asians are the fastest growing single race segment in the nation in terms of population growth (48% between Census 1990 and Census 2000; US Census Bureau 2000), and their absolute growth in the Northeast is the largest of any other race category in the region (increase of 795,000 people between Census 1990 and Census 2000; US Census Bureau 2000). The median income for Asians exceeds the national totals for all races and has consistently done so since before 1990 (US Census Bureau; Current Population Survey; 1987 to 2000). Studies project that the national buying power for Asians as a group is expected to continue (quadrupling from 1990 to 2009, reaching ~\$528 billion in 2009; Humphreys 2004) and exceeds the growth rate expectations of other major race segments and the nation as a whole over the same time period. Koreans are among the largest Asian sub-groups in both the Mid-Atlantic and larger Northeast region, (growing at a 35% increase) and a consumer survey assessed 447 ethnic consumers (Chinese, Indian, and Korean) in the Mid-Atlantic states to understand their socio-demographic characteristics, shopping patterns, preferences and related practices, and propensity to purchase ethnic produce. Koreans living in the Mid-Atlantic states were found to be largely first or second generation, spend \$102 million per year on fresh produce and actively seek to purchase fresh fruits and vegetables that they have historically consumed.

From the survey, Asian chives and perilla were identified as promising herbs and greens among the produce reported. Field plots were established to make better informed decisions as to whether they could be grown successfully.

Korean chives (*Allium thunbergii* G. Don, Amaryllidaceae) are grown for both culinary and ornamental purposes. All parts of the plant have an “onion” aroma when cut or crushed; however the flower scent is more suggestive of violets. The plant is grown extensively in China for culinary purposes and for this reason it is commonly called Chinese chives. Korean chives are characterized by their flat light fan-shaped green leaves whose leaves and flowers are consumed. In contrast, American chives (*Allium schoenoprasum*), native to North America, have leaves that are round, hollow and ca. 1–3 mm in diameter (Yamaguchi 1983).

Korean chives are also used in folk medicine, traditional benefits are reported to include antibacterial, cardiac, depurative, digestive, stimulant, stomachic, and tonic properties; as an anti-emetic herb it improves kidney function and it is used to treat urinary incontinence, kidney, and bladder weaknesses (Yin and Tsao 1999; Teuscher 2006).

Korean perilla [*Perilla frutescens* (L.) Britt., Lamiaceae] is an annual herb native to East Asia. It is a traditional crop of China, India, Japan, Korea, and Thailand. Perilla is a very aromatic plant, with a strong minty smell. There are two major forms of perilla, a green and red type. The leaves of one of the red leafed

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types are so large they are named the beefsteak plant as the leaves remind one of a slice of raw beef. Leaves are generally large, round, flat, with a less serrate edge and often, a violet coloring on the reverse side. Perilla comes in a variety of sizes and shapes making the Korean, Japanese, and Chinese types different from each other, enough so that each ethnic group prefers to use the type with which they are familiar.

The leaves' essential oils provide for their strong taste. Fresh leaves have an aroma reminiscent of apples and mint and are eaten in salad dishes. The essential oil extracted from the leaves of perilla by steam distillation consists of a variety of chemical compounds, which may vary depending on species. The most abundant, comprising about 50%–60% of the oil is perillaldehyde which is most responsible for the aroma and taste of perilla. Other terpenes such as limonene and β -caryophyllene are common as well. The oil distilled from the herb is a flavoring agent used sparingly in oriental sauces and confections.

Perilla also produces an edible and industrial seed oil that has a rich taste and scent slightly resembling dark sesame oil. Perilla oil is obtained by pressing the seeds of perilla, which contain 35% to 45% oil. In parts of Asia, perilla oil is valued more for its medicinal benefit than its flavors as it is a rich source of the omega-3 fatty acid alpha-linolenic acid.

This traditional Asian crop has multiple uses (Brenner 1993; Nitta et al. 2005). In folk medicine perilla is used as antispasmodic, diaphoretic, sedative herb, antiseptic, antitussive, and as expectorant. In Korea, the leaves are used for cold, cough, and dyspepsia (Brenner 1993; Duke 2001). In addition, perilla is used in sushi, salads, edible garnish, and soup, Koreans like to use young large raw leaves to wrap and eat with cooked food.

The objective of this study was to evaluate different commercial cultivars of chives and perilla for performance in New Jersey.

METHODS

Seeds of Korean chives and perilla cultivars were obtained from commercial seed companies. Korean chives, both wild forms (*Allium thunbergii*), and cultivated forms (*A. tuberosum*) and Korean perilla were first evaluated in greenhouse trials at Rutgers and later in field trials at the Clifford and Melda E. Snyder Research and Extension Farm in Pittstown, New Jersey. The traditional American chive, the rounded leaf 'Garden' chive, (Seeds of Change) was used as a control to compare with the flat-leaf 'Nira' during two consecutive years. Plant performance and product quality was evaluated under organic conditions.

RESULTS

Korean Chive Field Data

The physical attributes of 12 traditional and Asian chives cultivars were evaluated (Table 1). The results indicate that several Asian cultivars were promising. 'Nira' established well under the field conditions during 2005 and 2006 (Table 2). 'Nira' had lower plant height, higher vigor, and flatter, wider leaves than 'Garden', features that are desirable for Asian chives consumers. Despite the adverse field conditions in 2005, the relative performance of both cultivars was consistent in the two years of study (Table 2). Korean chives had a distinctive mild garlic flavor.

Perilla

While several studies have found low commercial potential for the cultivation of perilla as an oil source in the US (Brenner 1993), there may be promising opportunities for production as a fresh culinary herb for the Asian market. Many commercial perilla cultivars were first evaluated under greenhouse conditions and the best selected for field trialing based on the leaf characteristics color, texture, and flavor (Table 3). Results showed that perilla can be cultivated under New Jersey climate and has great potential for commercial production (Table 4). The production system would be similar to what is now commercially developed for basil, for which New Jersey is one of the nations' leading producers.

'Yip Deulkkae' and 'Manbaek Deulkkae' were developed in Korea for vegetative leaf production only, while 'Saeypsil Deulkkae' and 'Yangsan Deulkkae' were bred for both leaf and seed production by the National Institute of Crop Science, Rural Development Administration, South Korea. These four cultivars all performed well under field conditions in northern New Jersey.

Table 1. Evaluation of physical attributes and leaf characteristics of chives germplasm.

Cultivar	Source ^z	Plant				Leaf			Fresh wt. (g/crown)	
		Height (cm)	Vigor ^y	Circum. (cm)	Uniformity ^x	Color ^w	Width (cm)	Thick (mm)		Roundness ^v
Traditional										
Chives	RI	63	4	8	3.8	DG	4.4	0.4	3.8	233
Common	RI '01	68	4.2	8.1	3.7	DG	6.6	0.5	4	233
Fine leaf	JN '01	68	4	7.8	4	G	6.3	0.5	3.7	220
Fine leaf	JN '05	71	4.2	7.9	4	G	5.7	0.4	3.7	187
Garden	JS01LA	70	4.7	9.7	4	G	6.2	0.4	3.5	253
Grolau	RI	70	4.3	14.1	3.7	G	6.6	0.4	4.1	233
Grolau chives	RI	69	4.7	9.2	4.3	DG	5.8	0.4	3.2	273
Purly	JN '01	61	3.7	7.3	4	DG	5.7	0.5	4	193
Purly	JN '05	65	3.8	8.6	3.5	G	6.1	0.4	3.2	173
Staro	JN '01	117	4.2	8	4	LG	6.9	0.5	3.7	213
Staro	JN '05	68	4.5	8.5	4.2	DG	5.6	0.6	3.1	247
Wilau chives	RI	44	2.8	6.1	2.5	DG	5.5	0.5	2.7	106
Asian										
Chinese leeks	JN '06	36	3.3	7.2	4	LG	6.5	1.2	1	147
Garlic	JS01LA	37	3.5	6.3	4	LG	7	1.1	1	140
Garlic chives	RI	36	3.5	7	4.2	LG	6.9	1.4	1.3	113
Mauve garlic	RI	28	2.7	5.5	3.8	DG	4.9	1.8	1.5	80
New belt	JN '05	38	3.7	6.6	4.3	LG	6.8	1.0	1.1	153
Nira	JS05GS	47	3.8	6.2	4.2	LG	8	1.2	1.1	220

^zJN=Johnny's, RI=Richters, JS01LA, JS05GS=Seed of Change.

^yRating 1–5 with 5 = most vigorous.

^xRating 1–5 with 5 = most uniform.

^wG=green, DG=dark green, LG=light green.

^vRating 1–5 with 1 = flat, 5 = round.

Table 2. Comparison of 'Nira' and 'Garden' chives in 2005–2006.

Cultivar year	Plant				Leaf			Fresh wt. (g/crown)
	Height (cm)	Vigor ^z	Circum. (cm)	Uniformity ^y	Width (cm)	Thickness (mm)	Roundness ^x	
Nira								
2005	24	3.3	4.4	3.3	3.2	0.8	1.0	38
2006	47	3.8	6.2	4.2	8.0	1.2	1.1	220
Garden								
2005	32	3.7	4.4	3.7	4.2	0.3	3.5	44
2006	70	4.7	9.7	4.0	6.2	0.4	3.5	253

^zRating 1–5 with 5 = most vigorous.

^yRating 1–5 with 5 = most uniform.

^xRating 1–5 with 1 = flat, 5 = round.

Table 3. Evaluations of perilla cultivars in greenhouse trials, 2005.

Cultivar and seed source	Leaf					Plant			
	Color ^z	Texture	Flavor	Fresh wt. (g/plant)	Dry wt. (g/plant)	Height (cm)	Fresh wt. (g/plant)	Dry wt. (g/plant)	EO (%/g DW)
Gammi Yip Deulkkae, Nongwu Bio Co	DG	Medium	Mild	3.8	2.3	36	52	42	0.6
Gunja, Gunja Nonghyup	DG	Strong	Mild	3.7	2.3	72	49	42	0.9
Namchun Deulkkae, RDA ^y	DG	Strong	Mild	2.7	1.7	51	44	38	0.6
Manbaek Deulkkae, RDA	G	Medium	Medium	3.0	2.1	50	51	45	0.6
Saeyupsil Deulkkae, RDA	DG	Medium	Medium	4.6	2.1	53	44	38	1.1
Asia Yip Deulkkae, Asia Seed Co	DG	Medium	Mild	4.4	2.0	44	52	46	0.7
Yangsan Deulkkae, RDA	LG	Medium	Medium	3.3	2.2	68	49	43	0.9
Yupsil Deulkkae, RDA	G	Medium	Mild	3.7	2.1	62	48	42	0.6
Yeongho Deulkkae, RDA	G	Medium	Mild	3.2	1.9	69	46	40	0.6
Okdong Deulkkae, RDA	G	Strong	Medium	3.1	1.8	68	46	40	0.8
Yip #1 Deulkkae, RDA	DG	Medium	Medium	3.5	1.8	39	47	41	0.5
Sosung, Sosung Nonghyup	G	Medium	Medium	3.7	2.3	70	53	47	0.9
Chungsan Deulkkae, RDA	LG	Medium	Medium	3.7	2.3	66	53	47	0.7
Hanbit, Hanbit Yeongnong	G	Medium	Medium	2.7	1.7	70	44	38	0.7
Hyunchun, Hyunchun Food Co	G	Medium	Mild	3.2	1.8	71	45	38	0.9
(Hanguk) Deulkkae, Hanguk Seed Co	G	Strong	Mild	3.0	1.8	66	43	37	0.8
Jinheung Yip Deulkkae, Hanguk Seed Co.	DG	Medium	Mild	3.0	2.2	53	53	47	0.5

^zG=green, DG=dark green, LG=light green.^yRDA=Rural Development Administration, South Korea.

Table 4. Field performance of selected perilla cultivars, Pittstown, New Jersey, 2006.

Cultivar	Plant				Leaf			
	Height (cm)	Spread (cm)	Vigor ^z (1–5)	Uniformity (1–5)	Length (cm)	Width (cm)	Disease ^y (1–5)	Insect ^x (1–5)
Yip Deulkkae	59.0	51.2	3.8	3.5	14.5	13.6	1.5	1.5
Manbaek Deulkkae	60.7	51.5	3.8	2.3	14.3	12.5	1.8	1.3
Saeypsil Deulkkae	94.9	65.3	3.5	3.3	14.0	11.7	1.0	1.0
Yangsang Deulkkae	78.4	57.4	2.3	2.3	13.8	10.4	2.3	1.0

^zRating 1–5 with 5 = most vigorous.

^yRating 1–5 with 1= little to no disease observed; 5 = severely damaged by disease.

^xRating 1–5 with 1=little to no insect feeding observed; 5 = severe insect damage.

CONCLUSION

New Jersey climate and soil are suitable for the production of perilla and chives. ‘Nira’ cultivar appears to be the most promising Asian chives cultivar. ‘Yip Deulkkae’ has the most promising flavor and texture appearance of the Perilla cultivars evaluated in this study.

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