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Identification of Ethnic Greens and Herbs for the East Coast United States of America: Focus Group and Survey Methods Approach

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ECUTIVE SUMMARY

The primary focus of this study was to identify opportunities for small and medium farmers in the East Coast of the United States to produce ethnic greens and herbs. The motivation for this study emanates from the fact that the 16 states along the East Coast and Washington, D.C., which served as the geographic focus of the study, have a high proportion of growing ethnic populations, especially Asians and Hispanics. In the U.S., this population had a purchasing power of almost 1.5 trillion in 2009, which represented a major economic opportunity for farmers, especially those within the eastern region of the country. Farmers in this region face growing land constraints, increased input costs, and competition from other domestic and international growers. To increase profitability, many farmers have been adopting the move towards growing specialty crops. Specialty crops are non-commodity crops, and have unique characteristics for which consumers are typically willing to pay a premium. These crops are usually targeted toward a specific, small consumer base such as a particular ethnic population. Since Hispanic and Asian populations in the eastern United States have been growing steadily in the past decade, producing and marketing ethnic greens and herbs could be a profitable venture and therefore represents a new dynamic opportunity for U.S. farmers.

Research components of this project include (a) marketing (i.e. estimating consumer demand for ethnic greens and herbs, assess willingness to pay a premium for fresh leafy greens and herbs, document ethnic consumers' preferences for local produce and demographic characteristics), (b) production, (c) profitability, and (d) dissemination of results to stakeholders. Specifically, the study aims to explore the following important points: 1) estimate the size of the ethnic greens and herbs, market in eastern United States, including demand for the top 10 ethnic greens and herbs per ethnicity; 2) document consumer expenditure on ethnic greens and herbs, frequency and the distance travelled to purchase these products; 3) assess the demand for locally produced ethnic greens and herbs and document the characteristics of consumers who are willing to pay a premium for the produce; 4) document the evolving structure of the supply chain in the ethnic greens and herbs market in eastern United Sates and analyze the issues faced by market intermediaries; 5) conduct field trials, estimate profitability, and recommend best production practices and strategies

to farmers; and 6) communicate the results from the consumer survey, intermediary survey and production trials to stakeholders and policy makers.

Based on the population characteristics and consumption priorities, four ethnic groups (Chinese, Asian Indians, Mexicans and Puerto Ricans) were selected to serve as the basis for the production and marketing studies. Research parameters were further defined by boundaries of the 16 East-coast states and Washington, D.C. Project team members, identified greens and herbs of interest with input from crop expert panel review members, and consumers from the four targeted ethnic groups. Project team members identified over 100 greens and herbs varieties, out of which 10 were selected for each ethnic group to be included in a questionnaire for an internet focus group bulletin board study. Results from the sessions and input from the expert panel were then used to develop four separate telephone surveys, one for each ethnicity. The telephone survey was conducted from March 2010 to October 2010. A total of 1,117 completed surveys (276 Chinese, 277 Asian Indian, 280 Mexicans, and 284 Puerto Ricans) were randomly collected with an additional 127 partial surveys were obtained from participants who did not purchaser ethnic greens and herbs (21 Chinese, 45 Asian Indian, 24 Mexicans, and 37 Puerto Ricans) in order to document the reasons for not buying. A complete version of the survey led to the final selection of 10 crops for each ethnicity in order to document consumer demand. The consumer survey cooperation rates were calculated as: Chinese (34.8%), Asian Indian (42.1%), Mexican (44%), and Puerto Ricans (35.4%), with an overall yield rate of 39%.

These 10 crops for each ethnicity were further refined through a systematic process based on survey results (demand) and relevant production considerations (supply) for the local marketplace, targeting at least six crops per each ethnicity to be included in the subsequent production research. In order to estimate the overall market size for each ethnic group, the survey components collected information on the overall expenditure on produce, expenditure on ethnic greens and herbs, expenditures on the top 10 greens and herbs and the number of times an ethnic respondent visits grocery store in a month.

The study also estimated statewide ethnic greens and herbs market demand for each of the 16 Eastern states and Washington D.C. This will enable producers and market intermediaries to identify appropriate target market(s). The first phase of the project was intended to document

consumer buying patterns relating to ethnic greens and herbs, while the second phase focused on production research and field demonstration for selected ethnic greens and herbs in Florida, New Jersey, and Massachusetts. In phase three, wholesale buyers, distributors, brokers, and retailers were surveyed to document the potential opportunities and limitations in expanding ethnic greens and herbs markets. The overall study results will help stakeholders discover potential changes in ethnic markets that could be beneficial increase the farm operational profit of small and medium sized grower in the region.

1. INTRODUCTION

Since, the mid-1980s, Profitability and farm economic viability have been a challenge for farmers in the east coast of the United States in particular because of highly volatile market prices. Growers in the East Coast also operate on relatively small operational holdings with high production cost per unit of output relative to other regions. This increased cost them at a competitive disadvantage against larger commodity growers from other states. Development encroachment on farmland coupled with a declining profit margin from operations create challenges for some farming enterprises, especially for agronomic crops such as corn and soybeans that require large acreage and lower per acre cost of production to remain viable. In the 21st century, success in commercial farming in the East Coast will depend largely on the ability of the growers to focus on high value, specialty crops such as ethnic produce, targeted at specific niche markets to accrue favorable competitive advantages.

Economic opportunities have arisen in the last decade for specialty crops catering to the ethnically diverse consumers along East Coast of the United States (Govindasamy et al. 2006; Mendonca et al. 2006; Sciarappa, 2001-2003; Tubene, 2001). The U.S. Census data projections indicate that New York and Maryland, each with 40% minority population estimates, are among the next set of states to become “majority-minority” states (Bernstein, 2005). The U.S. Census data also shows that the mainstream population increased by 9.7 % from 2000 to 2010 as compared to 43% for Asians and 43.5 % for Hispanics (Census 2000, 2010). According to the 2001 Census Bureau reports, Hispanics and Asians continue to be the two fastest-growing minorities in the U.S.

The Hispanic population, (“Hispanic or Latino” refers to a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race), increased by 15.2 million between 2000 and 2010, accounting for over half of the 27.3 million increase in the total population of the United States. Between 2000 and 2010, the Hispanic population grew by 43 percent, which was four times the growth in the total population at 10 percent. Population growth between 2000 and 2010 varied by Hispanic group. The Mexican origin population increased by 54 percent and had the largest numeric change (11.2 million), growing from 20.6 million in 2000 to 31.8 million in 2010.Mexicans accounted for about three-quarters of the 15.2 million increase in the Hispanic population from 2000 to 2010. Puerto Ricans grew by 36 percent,

increasing from 3.4 million to 4.6 million. The Cuban population increased by 44 percent, growing from 1.2 million in 2000 to 1.8 million in 2010. Hispanics who reported other origins increased by 22 percent, from 10.0 million to 12.3 million (U S Census Bureau, 2011). Using the Asian population in 2010 alone, this population increased by 4.4 million between 2000 and 2010. Thus, from 2000 to 2010, the range for the increase in the Asian population was 43 percent. In comparison, the total population grew about 10 percent, from 281.4 million in 2000 to 308.7 million in 2010 (Census, 2000 and 2010).

Among the Hispanic population in the eastern U.S., Puerto Ricans were primarily concentrated in New York (1,050,293), Florida (482,027), New Jersey (366,788), Pennsylvania (228,557), Massachusetts (199,207), Connecticut (194,443), and Virginia (41,131); whereas, Mexicans were concentrated in Florida (363,925), Georgia (275,288), New York (260,889), North Carolina (246,545), New Jersey (102,929), Virginia (73,979), Pennsylvania (55,178), and South Carolina (52,871). Overall, about 2.7 million Puerto Ricans and 1.6 million Mexicans were living in the eastern U.S. (Table 1). In ethnically diverse population hubs such as the Northeast Region, the Asian population growth reached 60% during this period. As can be seen in Table 1, among Asians in the eastern U.S., the majority of Chinese were concentrated in New York (424,774), New Jersey (100,355), Massachusetts (84,392), and Pennsylvania (50,650). Among Asian Indians, the majority were living in New York (251,724), New Jersey (169,180), Florida (70,740), Pennsylvania (57,241), and Maryland (49,909). According to annual the UGA Selig Center Multicultural Economy study (Humphreys, J.M. 2009), the combined Hispanics and Asian ethnic populations of the U.S. had a purchasing power of almost 1.3 trillion in 2007. The buying power of Hispanics exceeded $978 billion in 2009 with an estimate of more than $1.3 trillion by 2014. In the case of Asians, the buying power was estimated at about $508 billion in 2009 and is expected to increase to $696.5 billion by 2014. The rapid expansion of ethnic populations and their purchasing power presents significant opportunities for the produce sector, especially greens and herb producers in the region as they can take advantage of their close proximity to densely populated areas. Major retailers are responding to these population shifts. For example, to target the fast-growing ethnic population and increase its grocery sales, Wal-Mart Stores Inc. plans to convert two of its existing Phoenix and Houston supermarkets to stores that will specifically target the Hispanic shopper (Cheng, 2009). Farmers can follow Wal-Mart's example by adjusting their

production to cater to these new ethnic groups. Assessing the demand and determining production costs will allow farmers to target crops with the highest potential return.

A separate survey for each ethnicity was prepared and modified based on the input from experts and ethnic consumers, particularly, Chinese, Asian Indians, Mexicans and Puerto Ricans who participated in Internet focus group bulletin board sessions. In 2010, between March through October, a total of 1,117 completed surveys were randomly collected from consumers who identified with one of these four ethnicities and who resided along east-coast region of the U.S. Each survey included a list of the top 10 crops specific to each of the corresponding ethnicity in order to document consumer demand. The surveys was pre-tested during the Internet focus group bulletin board sessions, one for each ethnicity, and were conducted for two days during March 2010. Estimation of the size of the ethnic greens and herbs market and assessment of market demand were examined using both the Internet focus group bulletin board sessions and telephone surveys. The first phase of the project documented consumer buying patterns related to ethnic greens and herbs. Based on the survey results, production trials and crops demonstrations were started in 2011 in New Jersey, Massachusetts, and Florida. In phase three, wholesale buyers, distributors and retailers were surveyed to document the limitations to expand ethnic greens and herbs markets in the eastern U.S.

Growing ethnic greens and herbs presents opportunities for producers to exploit existing comparative advantages associated with serving ethnic markets in densely populated areas in order to increase profitability and sustain farming operations. The objectives of this study were to:

1. Estimate the size of ethnic greens and herbs market in eastern United States and determine the market demand for selected ethnic produce in the region;

2. Document characteristics of ethnic greens and herbs consumers such as expenditure, ethnic supermarket visitation frequency, distance travelled to purchase these products, and other factors;

3. Assess demand for local ethnic greens and herbs and document the characteristics of consumers who are willing to pay a premium for fresh, local produce;

4. Document the evolving structure of the ethnic greens and herbs industry supply chain in eastern U.S. and analyze the issues market intermediaries face with sourcing and supplying these products;

5. Conduct field trials, estimate profitability, and recommend best production practices and strategies that participating growers could consider in order to first ensure adequate product supply and to overcome problems of oversupply; and

6. Communicate consumer survey, intermediary survey, and production trial results to stakeholders.

The underlying goal of this project was to understand the major factors that influence the consumption of specialty crops or ethnic crops by modeling economic, social, and marketing forces. This initiative assessed sustainability of specialty crops and evaluated the sustainability of current practices. Results from this project will increase knowledge about the health promoting properties of bioactive components found in specialty crops.

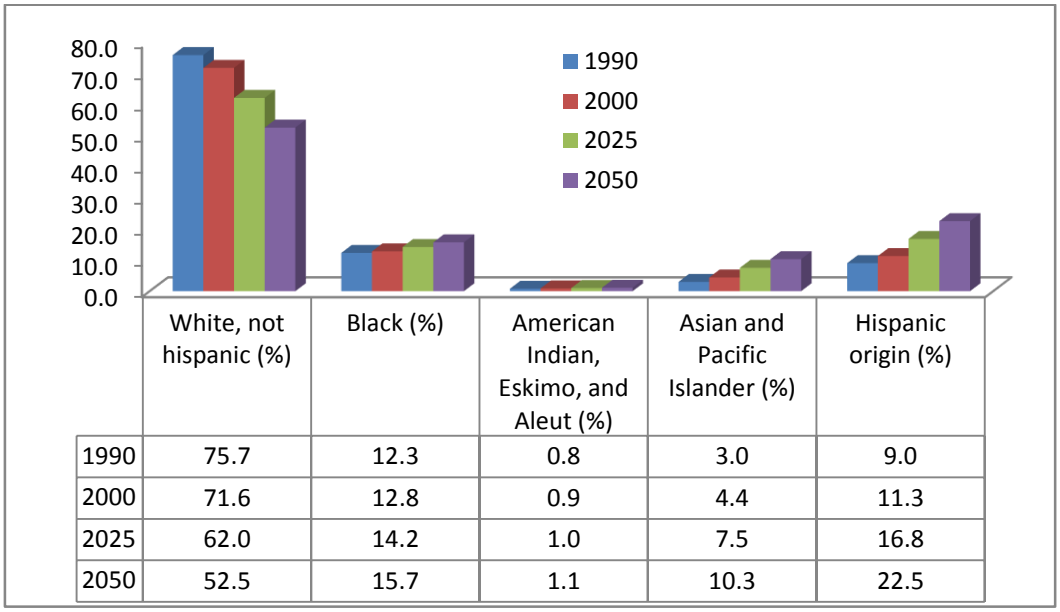
The entire process established the economic benefits, both individual and societal, for increased consumption. Results will also improve the understanding of the environmental, economic, and social implications of specialty crop production, distribution, and marketing- including the production and transportation of specialty crops. The project work was innovative because it used a combination of tried-and true economic methods such as in-depth interviews, Internet focus group bulletin board sessions, and surveys to analyze the demand for ethnic greens and herbs.

2. RESEARCH APPROACH

In view of national trends in ethnic populations (Figures 1 and 2), the research intended to capture the opportunities in the ethnic niche market growth in the areas of greens and herbs which are growing at a faster rates and it is expected to continue. The specific ethnic market subjects of this study were the Asian and Hispanic segments, chosen for their strong recent growth and continued growth expectations. The top two sub-groups within each of these segments chosen for the study were Chinese and Asian Indian (Asian sub-groups) and Puerto Rican and Mexican (Hispanic sub-groups). The geographic focus includes the 16 states bordering the East Coast and Washington, D.C. The project was carried out through a consortium of land grant universities, county

government marketing specialists, small and medium sized growers who were true working partners in the process, and not just advisory in nature. While the collection and dissemination of information gathered were listed under individual activity areas, data collection and information dissemination were coordinated through a collaborative effort of team members and industry-based advisory board. The industry-based advisory board consisted of growers, wholesale buyers, distributors and retailers who deal with ethnic specialty produce.

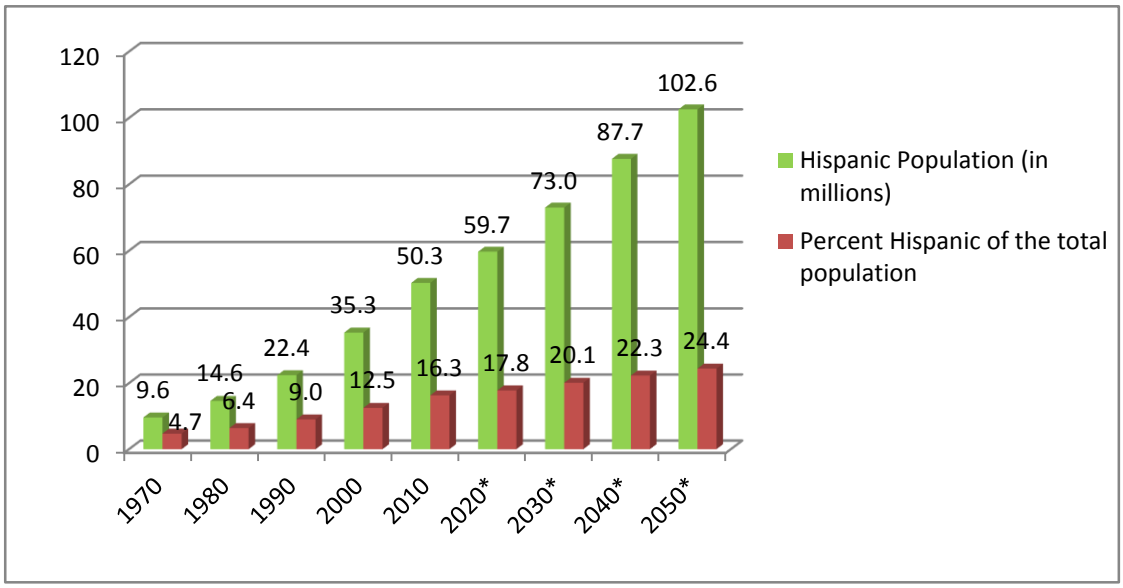
Figure 1: U.S. Population Projections by Race (1990-2050)



	White, not hispanic (%)	Black (%)	American Indian, Eskimo, and Aleut (%)	Asian and Pacific Islander (%)	Hispanic origin (%)
1990	75.7	12.3	0.8	3.0	9.0
2000	71.6	12.8	0.9	4.4	11.3
2025	62.0	14.2	1.0	7.5	16.8
2050	52.5	15.7	1.1	10.3	22.5

Source: U. S. Census Bureau, Population Division, Population Projections of the United States, by Age, Sex, Race, and Hispanic Origin: 1993 to 2050, Series P25-1104. (Extracted date: 5/24/2011).
http://www.census.gov/population/www/pop-profile/natproj.html

Figure 2: Hispanic Population in the United States: 1970 to 2050



Source: U.S. Census Bureau, 1970, 1980, 1990, 2000 and 2010 Decennial Censuses; Population Projections, July 1, 2020 to July 1, 2050.

2.1. Rationale and Significance

This project is relevant to small and medium-sized farmers in the eastern U.S, and to the whole supply chain community since it provides valuable insights into how consumers make ethnic greens and herbs purchasing decisions, and elucidate which product attributes contribute to the process. Previous work (Govindasamy et al., 2006; Govindasamy et al., 2007; Park et al., 2007) has shown that ethnic consumers are looking for produce with specific attributes, such as specific varieties with authentic flavors. Most of the ethnic greens and herbs reviewed can be grown in production systems similar to those used to grow traditional American crops. Some crops benefit tremendously by using the intensive production systems adopted to increase yields, weed control, and irrigation efficiency. These same production systems however, have the potential to contribute to the same oversupply of the ethnic crops that they do for traditional vegetables in some instances. While niche markets of high value crops create potential income and contribute to farm viability, rapid over-production and inadequate marketing infrastructure can lead to an excessive supply of the products, causing depressed prices, thus reducing the viability for these crops for farmers. For example, Canadian growers, assisted by favorable U.S. to Canadian exchange rate, potential subsidies, and the NAFTA trade policy, are rapidly filling niche markets for some ethnic crops,

such as Chinese cabbage (Brassica *rapa*), water spinach (*Ipomoea aquatica*), and ethnic eggplants (*Solanum spp*.).

Despite the competitive disadvantages relative to year-round producers in western regions, significant comparative advantages exist for local East Coast growers as a result of their proximity to densely populated areas, rich in ethnic diversity (Govindasamy et al., 2006). Increasingly, these producers are adopting new crops or creating new value-added products in order to remain economically viable. Establishing or extending existing cooperative marketing associations along the East Coast, from North to South, can create an improved market system that will provide appropriate year-round supplies to markets up and down the Coast. Coordinated production and marketing are potential solutions to these perceived threats. New Jersey has a long tradition of cooperative marketing of produce, including the first and currently oldest operating produce cooperatives in the country; however, vegetable co-ops have tended to operate within state boundaries. Established cooperatives, such as the Landisville Produce Cooperative (NJ) and/or Pioneer Valley Growers (MA) can provide links between ethnic crop growers, community markets, and mainstream groceries. Extending their memberships or affiliations beyond the East Coast could create a market system to provide year-round supplies.

2.2. Data Collection

The entire project findings for market potential came from the data collected from consumer Internet focus group bulletin board sessions and telephone surveys. The specific ethnic market subjects of study were the Asian and Hispanic segments, within each of these segments: Chinese and Asian Indian (Asian sub-groups) and Puerto Rican and Mexican (Hispanic sub-groups) residing along the East Coast including Washington, D.C. The key components of this study included an assessment of consumers' preferences, shopping patterns, opinions, willingness to pay premiums for locally grown greens and herbs, willingness to buy organically grown and genetically modified greens and herbs as well as analysis of the demographic characteristics of likely purchasers. Data obtained from Internet focus group bulletin board sessions and telephone surveys were used to evaluate ethnic consumers purchasing behaviors such as frequency and quantities of ethnic greens and herbs, estimate the overall market size. The survey instrument was also used to collect the top ten greens and herbs used by consumers from the four ethnicities.

2.3. Market Estimation and Production Research

This study was undertaken to examine the possible niche markets which East Coast farmers might be able to use to regain their advantage. Production and/or supplying of ethnic produce to the market depends on correct estimation of demand. Excess supply of crop(s) tends to negatively influence the price, leading to decline in the farm's profit margin. The ethnic greens and herbs demand was estimated through marketing research approach. The ethnic consumer survey collected necessary expenditure data to estimate the overall greens and herbs market size for each of the four ethnic groups in the eastern United States. In the process of estimating market size, the survey component included the overall expenditure on produce, expenditure on ethnic greens and herbs, expenditures on top ten greens and herbs and the number of times an ethnic respondent visited grocery store in a month. The study also estimated the overall ethnic greens and herbs market demand for all Eastern United States (16 states and Washington, D.C.) including State-wise market demand. This will help producers and marketers to identify a target market. The 40 greens and herbs included in the survey instrument were selected from an initial list of over 100 ethnic greens and herbs based on the recommendations of selective ethnic consumers and a crop expert panel review. The surveyed crops list were further refined through a ranking method based on expenditures, quantities and appropriate production considerations for the local market demand and supply factors.

3. ETHNIC CONSUMER SURVEY

The ethnic survey procedure was divided into two components, the Internet focus group bulletin board sessions and the telephone surveys. In the initial stage, survey instrument was prepared and pretested before conducting Internet focus group bulletin board sessions and the bulletin board survey. The final telephone surveys were prepared based on the input from the Internet focus group bulletin board sessions. This report presents both the procedures of the internet focus group bulletin board sessions and telephone surveys.

3.1. Internet focus group bulletin board sessions

To best achieve the goals of the overall project and develop a meaningful survey instrument to be utilized with a larger sample of four ethnic groups, four separate Internet focus group bulletin board sessions, one for each of these targeted ethnic groups were held between 10-12 March (10-12), 2010. Internet focus group bulletin board session participants were selected at random from the recognized panel of participants residing in 16 states located along the eastern coast of the United States and Washington, D.C. (Table 1) as defined and managed by Survey Sampling International, LLC, (Shelton, CT) a provider of sampling solutions for survey research. Panelists received a consent statement from a Survey Sampling International project manager that was developed by the researchers and approved, along with the questionnaire, by both the Office of Research Protections at The Pennsylvania State University (University Park, PA) and the Office of Research and Sponsored Programs, Rutgers-The State University of New Jersey, (New Brunswick, NJ).

All potential participants were screened based on age and asked to participate if they were at least age 18 years, identified with one of the ethnic groups of interest, were responsible for at least half of the grocery shopping for the household, and lived within the east coast region of the U.S. Panelists were informed of this criterion in the consent statement as well as their compensation based upon 2500 points, which is equivalent to $25.00. To begin the session, panelists clicked on a hyperlink at the bottom of the consent statement, which then directed them to the Internet focus group bulletin board session welcome screen. Over a 48 hour time period panelists were instructed to log into the bulletin board system and respond to questions posed by the moderator, review other panelists' submissions, and comment if necessary. Each morning the moderator would send an email to all panelists recruited and remind them as to how to log into the system and to respond to new questions and review questions that were posted on the previous day. In total, of the 44 panelists who accessed the bulletin boards, 38 c completed the study: 11 in the "Chinese" ethnicity focus group sessions, 10 in the "Asian Indian" sessions, nine in the "Mexican" sessions, and eight in the "Puerto Rican" sessions. During the sessions, participants were asked about their shopping habits, preferences, perceptions and demographic characteristics. The bulletin board responses were used to construct ethnic consumer telephone surveys.

3.2. Consumer Telephone Survey and Implementation

Perceptive Marketing Research, Inc. (Gainesville, Florida), a market research firm conducted the Telephone surveys of consumers residing in the states along the east coast region of the U.S. (Connecticut, Delaware, Florida, Georgia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia) and Washington, D.C. The survey was administered between 11 May to 22 Oct. 2010 to gather information that can be used to assist small and medium farm by providing a better understanding of consumer perceptions and factors that drive ethnic greens and herbs markets, specifically attitudes and behaviors of Asian Indian, Chinese, Mexican, and Puerto Rican consumers. The survey instrument was approved by the Office of Research Protections at The Pennsylvania State University (University Park, PA) and the Office of Research and Sponsored Programs, Rutgers-The State University of New Jersey, (New Brunswick, NJ), and was pre-tested on a subset of the target consumer population (n=38) who participated in Internet bulletin board focus group sessions held 10-12 Mar, 2010. Based on responses, questions that were misleading or misunderstood were clarified prior to full deployment of the survey.

Since Census 2010 results were not available, sample sizes for each ethnicity were identified based on Census 2000 (Table 1). As shown in Table 2, in total, 1,117 completed survey responses were obtained: 276 from consumers identifying with the Chinese ethnic group, 277 from the Asian Indian ethnic group, 280 from the Mexican ethnic group, and 284 from the Puerto Rican ethnic group. Further sample size requirements were established, based upon ethnic groups by state in accordance with a stratified random sampling method, with a minimum requirement of one sample per state for each ethnic group. The sampling error associated with each ethnicity is approximately ±5% with a 90% confidence interval. Consumers who met the age requirement, were the primary food shoppers for the household, and belonged to the ethnic group of interest but had not purchased ethnic greens and herbs were classified as non-purchasers and were included in the partially-completed survey category. Non-purchasers who were interviewed accounted for less than 1% of the total sample for each ethnic group with the number of non-purchasers interviewed as follows: Chinese (19), Mexican (21), Puerto Rican (34), and Asian Indian (40).

Table 1: Distribution of Ethnic Populations in the East Coast (2000)

STATE	Ethnicity			
	Chinese	**Asian Indian**	**Mexican**	**Puerto Rican**
Connecticut	19,172	23,662	23,484	194,443
Delaware	4,128	5,280	12,986	14,005
District of Columbia	3,734	2,845	5,098	2,328
Florida	46,368	70,740	363,925	482,027
Georgia	27,446	46,132	275,288	35,532
Maine	2,034	1,021	2,756	2,275
Maryland	49,400	49,909	39,900	25,570
Massachusetts	84,392	43,801	22,288	199,207
New Hampshire	4,074	3,873	4,590	6,215
New Jersey	100,355	169,180	102,929	366,788
New York	424,774	251,724	260,889	1,050,293
North Carolina	18,984	26,197	246,545	31,117
Pennsylvania	50,650	57,241	55,178	228,557
Rhode Island	4,974	2,942	5,881	25,422
South Carolina	5,967	8,356	52,871	12,211
Vermont	1,330	858	1,174	1,374
Virginia	36,966	48,815	73,979	41,131
TOTAL	**884,748**	**812,576**	**1 ,549,761**	**2,718,495**

Source: United States Census 2000

Table 2: Ethnic Sample Survey Distribution by State

STATE	Chinese	Asian Indian	Mexican	Puerto Rican	Total
Connecticut	10	11	1	47	69
Delaware	1	1	4	1	7
District of Columbia	1	3	1	1	6
Florida	23	32	96	8	159
Georgia	9	26	65	1	101
Maine	2	1	1	1	5
Maryland	20	16	5	1	42
Massachusetts	37	16	1	51	105
New Hampshire	1	4	1	1	7
New Jersey	41	69	24	15	149
New York	76	30	15	71	192
North Carolina	14	14	50	1	79
Pennsylvania	20	24	5	81	130
Rhode Island	4	2	1	1	8
South Carolina	4	6	4	1	15
Vermont	1	1	1	1	4
Virginia	12	21	5	1	39
Purchasers*	276	277	280	284	1117
Partial Interviews**	21	45	24	37	127
Total Surveys	297	322	304	321	1244

** Purchasers are respondents that indicated they have purchased ethnic greens and herbs within the past 12 months.*
*** Partial Interviews are respondents that indicated they have not purchased ethnic greens and herbs within the past 12 months.*

3.3. Cooperation Rate

The team relied heavily on the project advisory board for the design and dissemination of the surveys in order to enhance response rate. In total, Perspective Marketing Research Inc. used 7,678 telephone number leads to arrive at 1,117 completed surveys. The random sample was drawn from their database which was compiled from various sources including public phone directories, Secretaries of State, County Courthouses, Public Record Notices etc. Ultimately, a total of 1,244 responses were received from all four ethnic consumers as follows; 1,117 completed surveys by purchasers of ethnic greens and herbs (Chinese-276, Asian Indian-277, Mexicans-280, and Puerto Ricans-284) and 127 partial surveys from non-purchasers of ethnic greens and herbs (Chinese-21, Asian Indian-45, Mexicans-24, and Puerto Ricans-37).

Table 3: Ethnic Consumer Cooperation Rate

Survey Response Analysis	**Ethnic group**				
Variables used to calculate response rate	Chinese	Asian Indian	Mexican	Puerto Rican	**Total**
a) Complete Interviews (I)	276	277	280	284	**1117**
b) Partial Interviews (P)	21	45	24	37	**127**
(a+b)	297	322	304	321	**1244**
c) Refusals	65	58	24	48	**195**
d)No answer	635	566	537	719	**2457**
e) Telephone interview was interrupted	17	12	11	9	**49**
f) Respondent was not available during initial and follow up attempts	137	128	120	131	**516**
g) Total unsuccessful contacts	854	764	692	907	**3,217**
Total	**2,005**	**1,850**	**1,688**	**2,135**	**7,678**
Response Rate	**34.8%**	**42.1%**	**44%**	**35.4%**	**39%**

Around 6% of households refused to answer the call and 32% did not respond at all. Overall, 42% of calls were reported as unsuccessful. Cooperation rates for each ethnic group (Table 3) were calculated based on the number of complete and partial interviews divided by the sum of: a)

complete interviews, b) partial interviews c) number of consumers who refused to participate, d) telephone call that was not answered, telephone was busy, telephone call that were intercepted by an answering machine, or computer-assisted telephone interviewing system (CATI) refused the telephone number, e) number of interviews that were interrupted, and f) number of cases where the respondent was not available during the initial and follow-up attempts. Based on this calculation cooperation rates were given for each ethnicity: Chinese (34.8%), Asian Indian (42.1%), Mexican (44%), and Puerto Ricans (35.4%), and the overall rate was about 39%.

3.4. Subtlety of Ethnic Languages and Crop Name

The Survey Sampling International, LLC administered the surveys by using trained, bilingual phone interviewers to minimize response bias due to potential language barriers. All four ethnic surveys offered different language options based on ethnicity; (1) Chinese interviews offered / conducted in English, Mandarin, and Cantonese; (2) Indian interviews offered/ conducted in English and Hindi; and (3) Mexican and Puerto Rican offered/conducted in English and Spanish. In anticipation of crop name recognition issues, greens and herbs names were translated into English and ethnic local language (s). With respect to Asian Indian communities specifically, crops names were translated into national language (Hindi) and several other local languages such as Kannada, Gujarati, Tamil and Telugu. Interviewers were provided with additional crop names and/or crop pictures to ensure interviewers' crop familiarity and increase their ability to communicate with survey respondents and to acquire accurate information.

3.5. Survey Design: Sequence and Content

The survey questionnaires were designed to collect two sets of data: one pertaining to purchasers and another for respondents who do not purchase ethnic greens and herbs. The first set of survey questions asked respondents whether he/she had bought ethnic greens and herbs in the past 12 months. If any respondent said "yes", then respondent was directed to answer all of the remaining survey questions. If any respondent said "no" then the respondent was categorized as a "non-purchaser" and asked to give a reason(s) for not purchasing ethnic greens and herbs and then asked to answer the demographic questions in the questionnaire. Reasons for not to purchase ethnic greens and herbs included: non-familiarity, lack of availability in main stream American store, poor selection, ethnic store outlet is too far, no ethnic store/outlet available, prices charged and any other reasons. The non-purchasers

data was collected to learn reasons for non-purchase and to identify potential new or extended opportunities to utilize these ethnic markets in the eastern United States.

Those who answered affirmatively were requested to complete the full survey questions including frequency, proximity, expenditures on ethnic greens and herbs, point-of-purchase (typical American grocery store, ethnic grocery store, community farmers' market, on-farm markets or roadside stands, and pick your own) quantity, price, and expenditures. These attributes were helpful to quantify market demand, evaluate the importance of product features, and compare ethnic versus conventional stores. In terms of buying options, the survey questions were designed to ascertain consumers' experience when purchasing ethnic greens and herbs by rating the importance of attributes such as store availability, language that employees speak, selection, freshness, quality, price, packaging, and information on the package, and the choices were prompted as "very important," "somewhat." "not important," and "unsure." Furthermore, the survey included a set of questions relating to locally grown ethnic greens and herbs and respondents were asked whether they increased purchasing of locally grown ethnic green/herbs because of quality/freshness, availability, support local farmer, food miles, food safety, and/or agro-terrorism.

Survey participants were also asked several questions related to willingness to pay premium for ethnic greens and herbs that were: organically grown, genetically modified, country of origin (COOL), novel herbs and greens, and various promotional methods. Participants were also asked whether they grow ethnic greens and herbs at home and this attitude capture their interest towards ethnic greens and herbs in practicing their culinary tradition. The final section of the survey included questions to obtain detailed demographic information for respondents including whether they lived in an urban, suburban, or rural area, household size, number of adults in the household, number of children age 17 and younger in the household, education level, current occupation, household income, marital status, gender, language spoken in the home, birth country, and the age at which the respondent immigrated to the United States. The complete version of the survey was intended to collect demand and marketing information including product, placement, and promotion.

3.6. Data Purpose

The survey was designed to document ethnic consumers' information pertaining to their attitudes, preferences and demographic characteristics to evaluate their purchasing behavior towards ethnic greens and herbs. Specially, the socio-demographic information such as gender, household size, age, education level, household income, and employment status helps to identify and target appropriate segments based on estimated demand. Econometric models (e.g. qualitative choice, multiple regressions) have been developed to identify the factors that significantly contribute towards willingness to pay for ethnic greens and herbs given the characteristics of consumers. The probability of willingness to pay a premium, given the consumer characteristics, has been estimated using a logit and probit framework. Along with the probability models, the conjoint analysis was used to elicit consumer preferences for specialty ethnic greens and herbs. These models will facilitate effective distribution efforts by enabling producers, wholesalers, and retailers to target appropriate markets and locations, based upon demographic profiles and geographic population concentrations.

The survey also included questions asking ethnic consumers to estimate their overall expenditures on total produce purchased on a monthly basis, expenditures on ethnic greens and the herbs per visit, and number of visits per month. Each of four ethnic market sizes were estimated based on expenditure data sets. A separate question relating to the top ten ethnic greens and herbs per each ethnicity was also included in the survey to document expenditure per week, price per unit, quantities in terms of pounds/bunches/numbers per each crop to prioritize the subsequent production research. The top ten crops data was used in the crop selection process based on raking criteria using purchasing frequency and total expenditures with zero purchase.

4. CROP SELECTION PROCESS

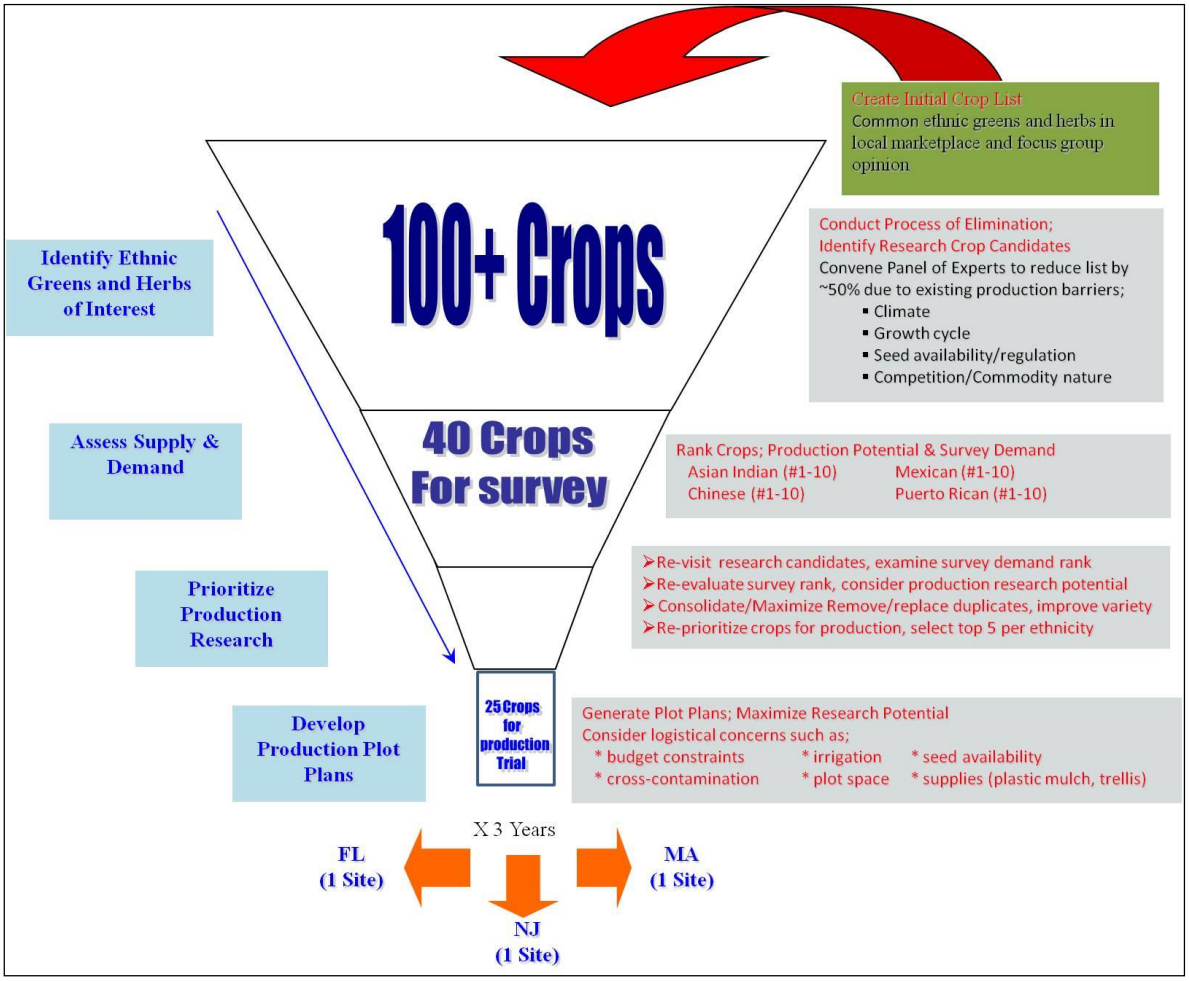
The crop selection process began with a crop expert panel review of an initial list of over 100 ethnic greens and herbs to select 40 (10 per each ethnicity) for inclusion in the ethnic consumer survey questionnaire (Fig. 3). The surveyed crops were then further refined through a systematic process based on the survey results (demand) and relevant production considerations (supply) for the local marketplace, to derive a shorter list of the most promising 25 crops to enter into the production trials. The survey model for ethnic greens and herbs selection and the follow-up field

production trials focused on the selected crops for the southern (Florida), central (New Jersey) and northern (Massachusetts) regions of the East Coast is illustrated in Figure 3.

4.1. Identification of Ethnic Greens and Herbs

An initial list of ethnic greens and herbs commonly sold/marketed and considered as ethnic produce items for each of the four ethnic groups of the study was compiled based upon a combination of Internet focus group bulletin board sessions and identification through related research. To determine which crops from the initial list to be included in the survey, a panel of marketing, field/extension, and crop specialists scrutinized the list of ethnic greens and herbs to eliminate those with existing production barriers that could impede their local production and/or marketplace success.

Figure 3: Ethnic Greens and Herbs Selection Process



Production barriers such as climate condition relative to the crop's ecology and plant's growth cycle (relatively short cycle necessary to grow in designated East Coast production sites), lack of seed supply due to regulatory issues, and local competition were also considered. Thus, specialty crops with short post-harvest life were given priority over other crops. This process reduced the survey crop candidate list to 40 crops (10 for each ethnic group: Asian Indian, Mexican, Puerto Rican, and Chinese) to assess demand. The list was further reduced with a final list including six crops per ethnicity, except for the Puerto Rican crop list which included an additional herb, thus 25 were included in the subsequent production research. Assessment of survey results, along with additional production evaluation for each, has been conducted to achieve project goals.

4.2. Crops Selection Criteria

Crops were ranked based on expenditure and/or purchasing data obtained from the consumer Internet survey. Multiple criteria were established to rank produce items: (1) purchase frequency (number of consumers purchasing the corps); (2) mean (weekly) expenditures across all respondents (including zero purchases); and (3) overall rank (average of results rankings) for each crop (Tables 4-7). In view of prior experience in crop ranking, this study did not considered volume (number of pounds, bunches, and number of units) bought by respondents in the ranking criteria due to most greens and herbs being sold in bunches and the size varies depending on the market, region, season, and availability. Furthermore, there is no standard measurement in packaging these greens and herbs as packaging size also varies for each ethnicity based on food habits and cultural factors. For example, Asian Indian ethnic communities use more cilantro as a green and herb in their cuisine than any other ethnicity; and it is because of this reason Asian Indian grocery stores sell larger bunches of cilantro than retailer who target other ethnic groups. Hence this study considered only frequency and expenditures from consumer surveys for ranking purpose. For the final 25 crops (seven Puerto Rican crops and six crops for each of the other ethnic groups), production research plots were established in New Jersey, Massachusetts, and Florida for three years in order to demonstrate greens and herbs which are appropriate for efficient production and alternative production systems. In addition to assessment of expenditures and purchasing frequency from consumer surveys, greens and herbs were also evaluated based on estimated ease of production,

potential yields, research interest, cost, and current market conditions. Results from these combined efforts will be used to assess the production and market potential.

4.3. Production Research Priorities

An overall ranking procedure was established to help identify crops with relatively low demand that could be included in the initial attempt to arrive at 25 crops (6 per all three ethnicities- Chinese, Asian Indian, Mexicans and 7 per Puerto Ricans) for the final production and demonstration purposes. A few produce items in each ethnic groups' list consistently ranked in the top six, or higher, greens and herbs purchased, across all of the criteria, allowing for a systematic approach to eliminating crops from the research list. Crops ranked six or higher in all categories were systematically removed from further production considerations The remaining crops were further evaluated for supply-side potential and consolidated across ethnic groups to maximize production research.

Table 4: Chinese Crops Ranking based on Purchase Frequency and Total Expenditure with Zero Purchase

Chinese Produce Item	Purchase Frequency	Rank	Total Expenditure with Zero Purchase	Rank	Average Rank	Final Rank
Shanghai bok choy	213	1	679.26	1	1	1
Chinese broccoli	170	3	497.08	2	2.5	2/3
Spinach	171	2	428.89	3	2.5	2/3
Sugar Pea tops/bean	96	4	384.15	4	4	4
Garland hrysanthemum	67	7	222.78	5	6	5
Chives & Flowers	87	5	215.05	6	5.5	6
Yen choy	68	6	147.47	7	6.5	7
Malabar Spinach	47	8	142.09	8	8	8
Potherb Mustard	39	9	90.95	9	9	9
Lycium Leaf	13	10	70.25	10	10	10

Source: Telephone Surveys, 2010

As illustrated in Table 4, expenditure results of Chinese consumers surveyed revealed a distinct ranking of 10 Chinese greens and herbs. Five Chinese crops received an overall rank of six or higher. Three out of these five crops consistently ranked eight or higher in each category, suggesting lower marketplace potential relative to their one through six ranked counterparts. As such, these four crops (Yen choy, Malabar Spinach, Potherb Mustard, and Lycium Leaf) were not considered as strong enough crops for further research and were removed from the crops list.

Ranking information for Asian Indian crops, which followed the same methodology presented above, are listed in Table 5. Based on the ranking criteria, Malabar Spinach, Purslane / Veradolga, Indian Sorrel, and Amaranth (Purple) were consistently ranked seven or higher in both categories and were removed from the production list. Though Turmeric was ranked first it was not considered for the production crop list due to its long life cycle and production limitations within the targeted states of this project.

Table 5: Asian Indian Crops Ranking based on Purchase Frequency and Total Expenditure with Zero Purchase

Asian Indian Produce Item	Purchase Frequency	Rank	Total Expenditure with Zero Purchase	Rank	Average Rank	Final Rank
Turmeric	153	3	799.9	1	2	1/2
Radish Greens	167	1	512.74	3	2	1/2
Indian Sorrel Spinach	141	4	576.61	2	3	3/4
Fenugreek	161	2	450.67	4	3	3/4
Amaranth (green)	44	5	152.57	5	5	5
Nightshade	42	6	150.8	6	6	6
Malabar Spinach	38	7	111.73	7	7	7
Purslane/Veradolga	27	8	95.99	9	8.5	8
Indian Sorrel	15	10	99.71	8	9	9
Amaranth (Purple)	23	9	61.04	10	9.5	10

Source: Telephone Surveys, 2010

According to the ranking results (Table 6), Papalo, Lippia, Amaranth, and Lemon Verbena crops constantly received rankings in the top six. Since vine vegetable crops were removed due to the volatile market demand and production limitations, Papalo was considered as a production crop in the next rank

order. Finally Lippia, Amaranth, and Lemon Verbena crops were removed from the production list due to higher rank order.

Table 6: Mexican Crops Ranking based on Purchase Frequency and Total Expenditure with Zero Purchase

Mexican Produce Item	Purchase Frequency	Rank	Total Expenditure with Zero Purchase	Rank	Average Rank	Final Rank
Purslane/Verdolaga	124	2	689.05	1	1.5	1/2
Roselle	130	1	577.59	2	1.5	1/2
Vine Vegetables	74	6	492.03	3	4.5	3/4/5/6
Lambsquarter	77	5	415.41	4	4.5	3/4/5/6
Chard	89	4	374.86	5	4.5	3/4/5/6
Epazote	110	3	294.15	6	4.5	3/4/5/6
Papalo	55	8	230.57	7	7.5	7/8
Lippia	62	7	225.34	8	7.5	7/8
Amaranth	31	9	184	9	9	9
Lemon Verbena	18	10	106.73	10	10	10

Source: Telephone Surveys, 2010

Results of surveyed Puerto Rican consumers reveal the ranking of 10 Puerto Rican crops (Table 7). Purslane, Dandelion greens, and Tarrgon were constantly listed among the top eight greens and herbs these consumers purchased. Interestingly, Puerto Rican consumers use more herbs than any other ethnic cultures studied. According to ranking order, the top five crops were considered for production research purpose. Irrespective of ranking, Lemon balm and Dandelion greens were considered as production research crops due to overlap with crops important to the other ethnic groups studied.

Table 7: Puerto Rican Crops Ranking based on Purchase Frequency and Total Expenditure with Zero Purchase

Puerto Rican Produce Item	Purchase Frequency	Rank	Total Expenditure with Zero Purchase	Rank	Average Rank	Final Rank
Lettuce/Lechuga	254	1	759.98	1	1	1
Garlic Chives	181	3	684.17	2	2.5	2/3
Culantro	230	2	655.4	3	2.5	2/3
Spanish Oregano	125	4	351.44	4	4	4
Wild Garlic	59	5	187.11	6	5.5	5
Lambs Quarter	30	7	345.86	5	6	6
Lemon Balm	34	6	131.8	7	6.5	7
Purslane	21	9	82.44	8	8.5	8/9
Dandelion greens	23	8	75.99	9	8.5	8/9
Tarrgon	9	10	21.71	10	10	10

Source: Telephone Surveys, 2010

4.4. Re-evaluation of Crops during Production Research

Ethnic greens and herbs were evaluated thoroughly and ranked based on buying frequency and expenditures criteria and crops that were selected from each ethnic group were re-evaluated for production or demonstration purpose based on the climatic conditions in all three sites (Florida, New Jersey, and Massachusetts). Table 8 illustrates re-evaluation of crops for production research. The crops selection process was based on selecting at least two herbs for each ethnicity from the final crops list. This investigation also measured the incremental research benefits of comparisons of similar crop types from each site and considered local market demand, supply factors, and profitability. We noticed that one of the crops (Fenugreek) on the Asian Indian list was used as a green and as an herb. Though some of the crops have higher demand they were removed from the production list because of production and marketing constraints including climate, multipurpose utility of crop (vine vegetables), and long duration.

In the case of Chinese greens and herbs, four greens (Shanghai Bok Choy, Chinese Broccoli, Spinach, and Sugar Pea tops/bean herbs) and two herbs (Garland Chrysanthemum and Chives & Flowers) were selected from the survey list. The removal of relatively low demand crops (Yen Choy, Potherb Mustard, and Lyceum leaf) resulted in a list of production candidates with significant research potential, as relatively little historic research exists on local production of these crops.

The Asian Indian production crops list contained four greens (Radish greens, Indian Sorrel Spinach, Amaranth –green variety, and Malabar Spinach) and two crops (Fenugreek and Nightshade) which were used as both culinary greens and herbs and/or in a medicinal capacity. Though the turmeric herb (Indian Saffron) was on the top of the selection list it was not included in the production research due to its growing season, which spans 10 months, thus it is not suitable for the North east Region.

The final production research crops from the Mexican list included four greens (Purslane/Verdolaga, Roselle, Lamb squarter and Chard) and two herbs (Epazote and Papalo). Mexicans have a tradition of using vine vegetable flowers in their cuisine; however, melon was removed from the final production list because of production costs and multiple uses of the harvested fruit.

The Puerto Rican production crop list required further evaluation, as no crops were systematically eliminated on the basis of relatively low demand. Each of the 10 crops of interest, based on the consumer survey, were closely scrutinized based on supply, profit potential, and research priorities. The remaining crops were reviewed for duplication across the Hispanic ethnic groups (i.e. along with the Mexican list) to arrive at a proposed final production candidate list of at least six crops. Since the Puerto Rican community uses more herbs than greens, the final research crops were selected based on this criteria, hence two greens (Lettuce/Lechuga and Garlic Chives) and four herbs (Culantro, Spanish Oregano, Wild Garlic, Lemon Balm, and Dandelion greens) were selected. The Dandelion green was selected as an additional crop based on consumer survey responses for a total of seven crops.

4.5. Consolidation of Crops across Ethnicities

The details of the crops list and production considerations are presented in Table 8. Additional deletions were made to eliminate duplication across ethnic groups and maximize production research efforts. Furthermore, additional crops were removed based on production constraint and substituted with other crops based on rank or research criteria. The following is a summary of consolidation and substitutions:

- Turmeric (Indian Saffron) was removed from the Asian Indian crops list. Malabar Spinach, which also included on the initial Chinese crop list, was selected.
- While Amaranth (green) was considered as a production candidate for the Asian Indian crops list, Amaranth (purple) was not considered as a candidate based on ranking and production limitations.
- Since vine vegetable was removed, due to production and/or profitability constraint, Papalo was selected instead, as it was next in the rank order.
- Lambsquarter was removed from Puerto Rican crops list since it was also on the Mexican list and hence a duplicate.
- Purslane/Veradolga was removed from both the Puerto Rican and Asian Indian crops lists, as it was a duplicate, but remained on the Mexican crop list.

4.6. Re-prioritization of production Crops

The production research prioritization process was based on consumer survey demand and production considerations resulting in 25 of the 40 crops recommended for production research (Tables 8 and 9). This list included five greens/herbs that were significant to more than one ethnic group targeted, thus they were each categorized as a high production research priority. They were:

- Malabar Spinach. Consumed by both Asian Indian and Chinese ethnicities.
- Purslane consumed by Asian Indian, Mexican, and Puerto Rican ethnic groups.

- Amaranth is consumed in large quantities by both Asian Indian and Mexican consumers. Both Amaranths (green and purple) belong to the same genus; however, they are different species.

- Indian Sorrel Spinach and Roselle are common names for the same genus and species. This crop is of importance to both Asian Indian and Mexican ethnicities.

- Lambs quarter is consumed by both Mexicans and Puerto Ricans.

A major constraint was the difficulty in accessing the 'correct species and actual variety' for many of these ethnic greens and herbs. This is in part due to the ethnic consumers use more than one common name for certain greens and herbs; there are several different varieties within a species; most seed companies lack or have few commercial offerings of these specialty ethnic crops and greens, and of the varieties that are available they are often in short supply, seed quality is variable and the seed may be labeled incorrectly. Therefore, for several of the specialty greens and herbs there was a need to evaluate and compare the available varieties and cross check their market potential with corresponding ethnic consumers or buyers.

Table 8: Ethnic Greens and Herbs Proposed for Production Based on Rank and Priority

No	Greens &Herbs	Green/herb	Crop Elimination (based on ranking and production Limitations)	Re-evaluation for Production (Remove Duplicates)	Final Selected Greens & Herbs (25 crops)
1	**Chinese:** Shanghai Bok Choy	Green			Shanghai Bok Choy
2	Chinese broccoli	Green			Chinese broccoli
3	Spinach	Green			Spinach
4	Sugar Pea tops/bean	Green			Sugar Pea tops/bean
5	Garland Chrysanthemum	Herb			Garland Chrysanthemum
6	Chives & Flowers	Herb			Chives & Flowers
7	Yen Choy		Removed		
8	Malabar Spinach		Removed		
9	Potherb Mustard		Removed		
10	Lycium Leaf		Removed		
11	**Asian Indian:** Turmeric	Herb	Removed (Production constraint)		
12	Radish Greens	Green			Radish Greens
13	Indian Sorrel Spinach	Green			Indian Sorrel Spinach
14	Fenugreek	Herb/Green			Fenugreek
15	Amaranth (green)	Green			Amaranth (green)
16	Nightshade	Green/ Medicinal			Nightshade
17	Malabar Spinach	Green		Chinese Duplicate	Malabar Spinach
18	Purslane/Veradolga	Green	Removed		
19	Indian Sorrel	Green	Removed		
20	Amaranth (Purple)	Green	Removed		
21	**Mexican:** Purslane/Verdolaga	Green			Purslane/Verdolaga
22	Roselle (Hibiscus leaves)	Green			Roselle (Hibiscus leaves)
23	Vine Vegetables	flower	Removed (Production constraint)		
24	Lambsquarter	Green			Lambsquarter
25	Chard	Green			Chard
26	Epazote	Herb			Epazote
27	Papalo	Herb			Papalo
28	Lippia	Herb	Removed		
29	Amaranth	Green	Removed		
30	Lemon Verbena	Herb	Removed		
31	**Puerto Rican:** Lettuce/Lechuga	Green			Lettuce/Lechuga
32	Garlic Chives	Green			Garlic Chives
33	Culantro	Herb			Culantro
34	Spanish Oregano	Herb			Spanish Oregano
35	Wild Garlic	Herb			Wild Garlic
36	Lambsquarter	Green	Removed	Mexican Duplicate	
37	Lemon Balm	Herb			Lemon Balm
38	Purslane	Green	Removedd		
39	Dandelion greens	Herb			Dandelion greens
40	Tarragon		Removed		
40 crops			**-15**	**-2**	**25 Greens and herbs**

4.7. Production Plot Plans (16 Research and 9 Demo Crops)

A total of 16 research and 9 demonstration crops were considered for production on black plastic or biodegradable plastic with drip based irrigation on the available sites (Table 9). At least four crops from each ethnicity were considered for research and two crops for demonstration purposes. Three crops were recommended for demonstration purposes from the Puerto Rican list due to additional crop consideration during the evaluation procedure. The Chinese research crops list included Shanghai bok Choy, Chinese broccoli, Sugar pea, and Chives (for greens & flowers), whereas, Spinach and Garland chrysanthemum were recommended as demonstration crops. With respect to Asian Indian crops list, Indian Sorel Spinach, Radish (for green), Fenugreek, and Amaranth were considered for research plots, and Nightshade and Malabar spinach (red Ceylon spinach) were recommended for demonstration purposes. Considering Mexican crops, Purslane, Roselle, Jamaican Sorrel (also called Hibiscus for leaves), Lamb squarter and Epazote were recommended for research, Swiss chard and Papaloquelite (Papalo) were considered for demonstration use. Puerto Rican crops list included Lettuce, Garlic chives, Culantro, and Dandelion (for greens) for research plots, whereas, Spanish oregano, Wild garlic, and Lemon balm were recommended for demonstration reason.

Table 9: Selected Ethnic Greens and Herbs for Production Plots

Ethnic Group	Plot Type	Ethnic Crop Name	Scientific Name
Chinese	Research	Shanghai Bok Choy	*Brassica rapa var. chinensis*
		Chinese broccoli	*Brassica oleracea*
		Sugar pea	*Pisum sativum*
		Chives (for greens & flowers)	*Alium shoenoprasum*
	Demo	Spinach	*Spinacea oleracea*
		Garland Chrysanthemum	*Chrysanthemum coronarium*
Asian Indian	Research	Indian Sorel Spinach	*Rumex versicarius*
		Radish (for green)	*Raphanus sativus*
		Fenugreek	*Trigonella foenumgraecum*
		Amaranth	*Amaranthus spp.* or *amaranthus tristis*
	Demo	Nightshade	*Solanum nigrum; Solanum spp.*
		Malabar spinach (red Ceylon spinach)	*Basella alba cv.* 'Rubra'
Mexican	Research	Purslane	*Portulaca oleraracea*
		Roselle, Jamaican Sorrel/Hibiscus	*Hibiscus sabdariffa*
		Lambsquarter	*Chenopodium album*
		Epazote	*Chenopodium ambrosioides*
	Demo	Swiss chard	*Beta vulgaris* Subsp. *cycla*
		Papaloquelite (Papalo)	*Porophyllum ruderale*
Puerto Rican	Research	Lettuce	*Lactuca sativa*
		Garlic chives	*Allium tuberosum*
		Culantro	*Eryngium foetidum*
		Dandelion (for greens)	*Taraxacum officinale*
	Demo	Spanish oregano	*Plectranthus amboinicus*
		Wild garlic	*Allium spp.*
		Lemon balm	*Melissa officinalis*

5. ETHNIC GREENS AND HERBS PRODUCTION AND RESEARCH

The ethnic greens and herbs production research was designed based on the Internet focus group bulletin board sessions and consumer survey results. As previously described in detail, a total of 25 greens and herbs were selected for all the four ethnicities in order to conduct field experiments in New Jersey, Massachusetts, and Florida. During the second phase which began summer 2011, the project concentrated on ethnic greens and herbs production research and demonstration with the following objectives;

1. To examine the feasibility of growing ethnic greens and herbs while establishing a common set of field demonstration and research plots in all three sites;

2. To evaluate ethnic greens and herbs at each site and provide data on yield and quality parameters for analysis;

3. To conduct an intermediary (Wholesalers/Distributors/Brokers/Retailers) survey to examine the issues related to the production and marketing and document the limitations to expansion of the ethnic greens and herbs markets in Eastern United States.

4. To communicate research results to stakeholders including producers, Intermediaries and extension specialists through various methods such as a one-day workshop/training session, webinar, fact sheets, reports, publications, eXtension, twilight and other meetings related to ethnic greens and herbs.

5. In 2012, grower surveys were given to commercial growers in each of the cooperating states.

5.1. Production Trails

Ethnic greens and herbs production trials were conducted for three cycles from year two to year four based on the crops selected from consumer survey. After the initial crop selection process, in year two during summer 2011, research and field trials were established on the agricultural experiment stations in each of the three collaborating universities located in Florida, New Jersey, and Massachusetts for a total of 25 ethnic greens and herbs including: 6 Chinese greens and herbs; 6 Indian greens and herbs; 6 Mexican greens and herbs; and 7 Puerto Rican greens and herbs. Each crop was sown or transplanted into the field at the beginning of the growing season, on the date appropriate for each state in a manner similar to warm season vegetable crops. All studies were planned as two years studies beginning in Year 2. At the end of Year 2, another cycle of crops were selected and the most promising crops following the second year 'graduated' from these initial studies and in Years 3 and 4, were then be subject to a standard of simple production systems aimed at improving yields and quality and which were used to assess the economic aspects of selected production inputs on profitability. These studies included fertility levels and plant population density. To make most efficient use of resources, the nature of the input treatments

were determined after observing the growth and development for the selected crop in Years 1 and 2. Field trials were conducted only on the most promising crops (up to 75% of the crops) and were not repeated in all 3 locations but divided so that each location would examine approximately 1/3 of the selected crops for the horticultural production systems focus. Input by the commercial growers, users, seed companies, and researchers identified the specific seeds in Year 02 that grew out and commenced in Year 03. In addition, from Year 2 and to be conducted in each subsequent year, an aggressive germplasm collection conducted for each of species to be evaluated will be collected and maintained in both a greenhouse and evaluated in the field at the New Jersey sites This is done in order to better and more rapidly assess the genetic variation in growth and quality and to maintain a live gene bank for these species.

All crops were botanically authenticated using traditional and/or chemical taxonomic approaches (the latter only when appropriate). The following parameters were included with minimal variations: growth and development, days to maturity, above ground biomass and product of commerce weight and assessment of quality (visual, taste and sensory evaluation). Commercial growers, seed companies, and consumers alike were invited to participate in annual field days and trials while harvesting fresh greens and herbs and conducted taste and acceptability test. This will ensure that we are evaluating these new crops in the way that members of each ethnic group expect and will also help to establish stronger linkages from the grower to the marketplace. There may be continued substitution of specific crops over time given the results from the trials, lack of suitable commercial viable seeds and/or other issues relating to biotic stresses such as unexpected insect and disease pressures.

5.2. Intermediaries (Wholesalers/Retailers/Distributors) Survey

In phase two, wholesale buyers, distributors and retailers were surveyed to document the limitations to expansion of ethnic greens and herbs markets in the Eastern United States. The objective of this study was to document on how intermediaries are meeting the demands for ethnic greens and herbs, and how it is profitable for growers to notice this demand and respond as well by devoting more land to ethnic greens and herbs. A telephone survey of the Cooperative Extension Service, State Departments of Agriculture, and ethnic community Associations was conducted to enlist the names of ethnic greens and herbs retail markets in Eastern United States. After locating

the ethnic markets, representative from some of these stores were invited to participate in an internet survey on the produce sold such as quantity, quality, prices and other characteristics. A 10-minute Internet survey was designed to better understand produce wholesalers, distributors, brokers, and retailers experience with sourcing ethnic greens and herbs, ethnic groups they serve, current problems with acquiring an authentic and a consistent supply of produce, and ethnic greens and herbs their clientele desire and frequency of produce purchase. Additional questions focused on understanding barriers they perceive that may interfere with their success in produce marketing and their interest in learning about growers in their region who might supply desired ethnic greens and herbs. The retailer's survey questionnaire included a section on advertisement and sales volume. The relationship between the amount spent on advertisement, modes of advertisement, number of on-site and off-site signs, and volume of sales were analyzed. Intermediaries were contacted using channels of communications already established, as a result of the two-day Mid-Atlantic Specialty Crops Research Initiative strategic planning workshop, and by cultivating a relationship with intermediaries and their respective associations in targeted states. A total of 50 completed surveys were estimated from wholesalers, distributors, and brokers, with an additional 50 completed expected from retailers from other collaborating states.

5.3. Growers Survey

The growers' survey questionnaire provided information regarding the farm operation, production, marketing, and distribution information given by local East Coast ethnic greens and herbs growers. Three growers were selected from each collaborator's state to participate in a full-farm case study of their business. Aside from demographic information, the case study analysis compared farm size, number of crops and rotations, primary market(s) and selling methods, gross income, amount of labor used, and the owner's perceptions of ethnic green and herb markets in order to ascertain barriers to and opportunities for production and marketing of ethnic produce. These studies were developed into guidelines and rationale for developing cooperative marketing strategies for the eastern United States growers. Individual growers who have been experimenting with ethnic greens and herbs were interviewed to develop comprehensive descriptions of their operations, including but not limited to farm plans, marketing plans, ethnic greens and herbs grown, opportunities and threats to continuing production of ethnic greens and herbs. In addition, producer willingness to grow new ethnic crops were also examined from an intermediaries' point of view.

5.4. Stakeholder Engagement

Throughout the project, data collection and information dissemination were coordinated through a collaborative effort among team members and an industry-based advisory board. The industry-based advisory board consists of producers, consumers, wholesalers, retailer and distributors who deal with ethnic specialty produce. Especially, producers who were directly engaged in establishing production trails which were used as a venue for regional twilight meetings to get clientele input as well as dissemination of findings.

5.5. Outreach

The outreach plan includes communicating the results from Internet focus group bulletin board sessions, consumer survey, wholesaler/retailer survey and producers case studies to stakeholders through various methods such as an intensive workshop/ training, published peer-reviewed papers, extension factsheets, eXtension, twilight and other national and regional meetings related to ethnic greens and herbs. The outreach plan included training for farm producers, intermediaries and extension specialists. Although communicating project results was one of the key objectives, industry leaders and intermediaries such as wholesalers and retailers were invited to present their views to increase efficiency in the supply chain of ethnic greens and herbs. Specifically, a one-day training workshop was conducted in Harrisburg, PA to disseminate the study findings. A webinar, that is, live meetings or presentations via the Internet was conducted by project team members to communicate the outcome to producers, wholesalers, brokers, distributors and retailers, effectively. The role of the advisory board in this project was critically important to the success of the project. The team utilized a number of follow up strategies to maximize the impact and success of the deliverables. The effectiveness of the research can also be measured by the number and quality of published peer-reviewed papers, extension factsheets, grower association presentations, and presentations that are generated by the team. Presentations will continue to be made at meetings including but not limited to the agricultural economics association meeting and food marketing association meetings. To ensure that the results of the research reach ethnic producers, papers will be developed for both the gray literature and scientific publication areas. The presentations will be provided to national and local farm producer groups and marketers to ensure that the results of the research are disseminated to small and medium farm producers. Fact sheets

will be developed and disseminated via the Internet, eXtension, at meetings and conferences. For linking the small and medium-sized producers to niche markets, special coalitions will be formed to focus on specific issues.

6. SUMMARY AND RECOMMENDATIONS

This project primarily focused on marketing (includes estimating consumer demand for ethnic greens and herbs, willingness to pay a premium for fresh leafy greens and herbs, documenting ethnic consumers preferences for local produce and demographic characteristics), production, profitability and dissemination of results to stakeholders. Data from both studies provided growers and retailers with information vital for meeting demand and exceeding the needs of ethnic consumers they serve.

Furthermore, this market intelligence can assist growers in tailoring their products and promotional activities to better meet the needs of the ethnic greens and herbs purchaser, allowing these consumers to be able to purchase authentic ethnic produce from local farms which will enable them to satisfy their social as well as community needs. Moreover, promotion of locally grown produce reduces the food miles resulting in environmental benefits to the community. In addition, the results from intermediaries' survey will help to understand the needs of intermediaries of ethnic greens and herbs in eastern United States and the variety of ethnic produce sold through these distribution systems. The intermediaries' survey results will also provide the information relating to issues about production and marketing of ethnic greens and herbs. Availability and freshness of ethnic greens and herbs and producer willingness to grow new ethnic crops will also help intermediaries in the process of making suitable adjustments to their business and supply chain. Combining ethnic consumer and intermediaries' survey results, information from production trials, and the current views and practices of ethnic growers, will help to make final ethnic greens and herbs recommendations in the eastern United States. The final results of this study will help stakeholders in discovering potential changes in the ethnic markets that could be beneficial to small and medium size growers in order to increase the farm operational profit in this region.

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APPENDIX:
Ethnic Greens and Herbs Consumer Survey

Your responses will remain anonymous. The information you provide will not be linked to you personally, but rather, will be combined with the responses of the other individuals that participate in the survey. Your voluntary participation will assist in the assessment and response to <ethnic group> *consumer trends and preferences.*

Read the following Definition

<ethnic group> Ethnic Greens: <ethnicity> Ethnic Greens refers to "a plant that is cultivated or grown for one of its' edible parts of leaf, stem or flower buds, such as a leafy green, the stem of celery or buds of banana tree for the use of the <ethnic group> ethnic group.

<ethnic group> Ethnic Herbs: <ethnic group> Ethnic herb is a plant part that may include any plant parts such as leaves, stem, roots, flowers, barks, seeds, resin, berries or other portion of plant that is valued and consumed for flavor, or scent have a variety of uses such as culinary, medicinal or in spiritual use of the <ethnic group> ethnic group.

1a. In the past 12 months, have you purchased any <ethnic group> *greens and herbs?*
1. Yes 2. No

If the answer is "Yes": *Proceed to question #2*
If the answer is "No": *Proceed to question 1b and from question #28 to end of the survey*

1b. *What are your reasons for NOT purchasing? Please provide all reasons that contribute to your decision NOT to purchase.*
1. Not familiar <ethnic group> greens and herbs
2. Lack of availability in American store
3. Poor selection
4. Closest <ethnic group> outlet is too far
5. No <ethnic group> store/outlet available
6. Prices charged for <ethnic group> greens and herbs
7. Other <Please specify>_____

2. On average, how many times a month do you typically purchase <ethnic group> *greens and herbs?* XXXX visits/month.

3. On average, how much do you spend on <ethnic group> greens and herbs per visit? $XXX.XX

4. On average, how much do you spend for all of your produce, in a month? $XXX.XX

5. Where do you tend to buy <ethnic group> *greens and herbs* during the course of the year? Please indicate *all* places, even if you only visit a certain retailer during the season in which fresh greens and herbs are available:
1. *Typical American grocery stores*
2. <ethnic group> *grocery stores*
3. *Community farmers' market*
4. *On-farm markets or roadside stands*
5. *Pick your own farms*
6. *Other <Please specify>*_____

6. What portion of your <ethnic group> *greens and herbs* are purchased at typical American grocery stores? Would you say, "ALL, MOST, SOME, or NONE"?
1. All 2. Most 3. Some 4. None

7. Do you first purchase <ethnic group> *greens and herbs* and then decide what meal to create, or do you decide on the meal that you want to create and then purchase the <ethnic group> greens and herbs?
a) I first purchase <ethnic group> greens and herbs and then decide what meal to create
b) I first decide on the meal that I will cook and then purchase the <ethnic group> greens and herbs
c) Other <Please specify> _____

8. How close to your home is the nearest <ethnic group> grocery store? XXXX miles

9. What <ethnic group> greens and herbs do you usually buy? Please enter the quantity of

greens and herbs that you buy per week, circle the units (lbs, numbers or bunches) and enter the price per unit.

No:	Name of green/herb	Regular/ Seasonal	Quantity/Week	Price/Unit	Total Purchase Cost
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

10. Are there any greens and herbs, that are specific to your culture and that you either use or would like to use in your cooking, that you have difficulty finding in your area?

Names of green or herb:
a.
b.
c.
d.
e.

11. What do you do, or alter, if <ethnic group> greens and herbs that you desire are not available at the market or grocery store where you usually shop?
   a) I do not have any problem finding <ethnic group> greens and herbs at my market or grocery store.
   b) I do not make any substitutes. I just skip the ingredient in the recipe.
   c) I substitute the missing ingredient with other greens and herbs specific to my culture
   d) I substitute the missing ingredient with non-<ethnic group> or American greens and herbs
   e) Other <please specify>_____

12. Pertaining to your own experiences when purchasing <ethnic group> greens and herbs, please rate the importance of each of the following factors in your decision to either shop at a particular store or purchase a particular green and/or herb.

	Very	***Somewhat***	***Not important***	**Unsure**
a) *Store Availability*	1	2	3	4
b) *Language the employees speak?*	1	2	3	4
c) *Selection*	1	2	3	4
d) *Freshness*	1	2	3	4
e) *Quality*	1	2	3	4
f) *Price*	1	2	3	4
g) *Packaging*	1	2	3	4
h) Information on the package	1	2	3	4
i) Other *<Please specify>:*_____	1	2	3	4

13. What would influence your willingness to buy more of the <ethnic group> greens and herbs that you currently buy?
   a) more familiarity with the <ethnic group> greens and herbs and how to use them
   b) better access to/availability of <ethnic group> greens and herbs
   c) higher quality of <ethnic group> greens and herbs available to me
   d) wider variety of <ethnic group> greens and herbs available to me
   e) <ethnic group> greens and herbs that are fresher than what is currently available to me
   f) lower prices for <ethnic group> greens and herbs available to me

g) <ethnic group> greens and herbs are sold in packages rather than sold loose
h) <ethnic group> greens and herbs are sold loose rather than in packages
i) <ethnic group> greens and herbs are marketed as being sold by a brand that I know and trust
j) <ethnic group> greens and herbs were grown by local farmers
k) others in my household would eat meals made with <ethnic group> greens and herbs
l) other <please specify>
_____

14. How likely are you to agree with the following statement: I am able to find and purchase <ethnic group> greens and herbs that are the level of quality that I expect and desire:
a). Strongly agree b).Agree c).Neither agree nor disagree
d). Disagree e).Strongly disagree

15. *Please respond to the following with whether you find the* <ethnic group> *outlets to be "BETTER, the SAME, or WORSE" than the traditional American grocery stores, in terms of their greens and herbs:*

	Better	**Same**	**Worse**	**Unsure**
a) Selection is	1	2	3	4
b) Freshness is	1	2	3	4
c) Quality is	1	2	3	4
d) Price is	1	2	3	4
e) Packaging is	1	2	3	4
f) Other <Please specify>:_____	1	2	3	4

16. Are you willing to pay more for <ethnic group> greens and herbs than the comparable American or conventional substitutes, and if so, what percent more? XXXX percent

17. Are you concerned about food safety issues relating to <ethnic group> greens and herbs that you buy? 1. ☐Yes 2.☐ No 3.☐ Unsure

18. Have you increased purchases of locally grown <ethnic group> greens and herbs for any of the following reasons? (Check all that apply)
1. ☐Quality & Freshness 2. ☐Availability 3.☐Support Local Farmer
4. ☐Food Miles or distance food travels from the farm to my area
5. ☐Food Safety 6.☐Agroterrorism (read the following Definition)

(Agroterrorism means the deliberate introduction of a chemical or a disease agent, either against livestock/crops or into the food chain, for the purpose of undermining stability and/or generating fear).

19. Does the amount of <ethnic group> greens and herbs that you purchase increase throughout the year? 1. Yes 2. No 3. Unsure

(If answer is "yes" to question 19 proceed to question number 20, otherwise skip question 20).

20. When or for what occasions does the amount of <ethnic group> greens and herbs you purchase increase?
1) <ethnic group> holidays I/we celebrate
2) traditional American holidays I/we celebrate
3) warmer months of the year
4) cooler months of the year
5) get-together with family and/or friends
6) when household members return home from school or other extended travel
7) when extended family visit
8) Other <please list>_____

21.Do you use traditional <ethnic group> greens and herbs for natural remedies?
1. ☐Yes 2.☐No 3.☐ Unsure
(if answer is "yes" to question 21 proceed to question number 22, otherwise skip question 22)

22.Are you currently eating <ethnic group> greens and herbs for health reasons?
1. ☐Yes 2.☐No 3.☐ Unsure

23.Do you read food labels? 1. ☐Yes 2.☐No 3.☐ Unsure

24.*If made available to you, would you be "willing to buy"* <ethnic group> *greens and herbs that are*: (Please indicate Yes or No or Unsure)

	Yes	***No***	***Unsure***
a) *Locally Grown*	1	2	3
b) *Organically grown*	1	2	3
c) *Genetically modified*	1	2	3
d) *Labeled according to country of origin*	*1*	2	3
f) *New herbs & greens*	1	2	3

25. *Which types of advertisements would influence your decision to purchase* <ethnic group>*greens* and herbs? Please indicate all types, even if not currently available, from the following

1. Out-of-store ads (media including radio, TV, newspaper, and on-line)
2. Visible-from-road ads (such as billboards and on-farm or roadside stands promotions)
3. On-site or in-store ads (displays, demos, brochures, posters/banners, or announcements)
4. Point-of-purchase ads (price cards/tags or produce identification; labels/stickers)
5. Direct Mail
6. E-mail
7. None
8. Other <Please specify>_____

26.*Do you grow* <ethnic group> *greens* or *herbs for consumption at home?*
1. Yes 2. No

27.*Are you a vegetarian?*
1. Yes 2. No

The following information is concerning you and your household necessary for classification purposes. Again, your answers will be kept strictly confidential and used only to help us interpret the aggregate survey results.

28.*Is your neighborhood URBAN, SUBURBAN, or RURAL?*
1. Urban 2. Suburban 3. Rural

29.*How many years have you been living in <City, State>?* XXXX years

30.*Including yourself, how many people live in your household?* XXXX people

31. *How many of the people in your household are age 17 or younger?* XXXX people

32.*Which of the following ranges includes your age*
1. *Less than 20*
2. *21 to 35*
3. *36 to 50*
4. *51 to 65*
5. *Over 65*

33.*What is the highest level of education equivalent that you have completed?*
1. *Less than 12th grade*
2. *High school graduate*
3. *2 year college degree*
4. *4 year college degree*
5. *Post graduate or advanced degree*

34.Which of the following best describes your current occupation?
1. Employed by someone else
2. Self-employed
3. Retired
4. Full-time Homemaker
5. Unemployed
6. Other <Please specify>:_____

35.Which of the following ranges includes the annual-income of your household before taxes?
1. Less than $20,000 4. $60,000 to $79,999 7. $125,000 to $149,999
2. $20,000 to $39,999 5. $80,000 to $99,999 8. $150,000 to $199,999
3. $40,000 to $59,999 6. $100,000 to $124,999 9. $200,000 or more

36. Which of the following best describes your current marital status?
1. Married 2. Single 3. Divorced 4. Separated 5. Widower
6. Living together 7.Other <Please specify>:_____

37. *Gender*
1. Female *2. Male*

38. Do you speak your <ethnic group>language?
1. Yes *2. No* *3. Somewhat/very little*

39. Where were you born?
1. U.S. *2. <ethnic Country>* *3. Other (please specify):*_____

If answer is 2 or 3 for question 39, Please go to question no.#40

40. How old were you when you arrived in the US? XX Years