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Pea Vine Production and Marketing Study

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Procedure Results and Discussion Conclusion Pea Shoot Extension Publication (pdf) Pea Vine Brochure (pdf) Pea Vine Recipes

In 1998and 1999, we studied pea vine production with Hmong (a Laotian ethnic group) farmers at the Pike Place Market in Seattle, Washington.

Pea vinesare the top 10–15 cm (4–6) inches of pea plants and are used in salads, stirfries, and as decorative garnishes. Pea vines are a traditional Indochinese crop, and have the potential to contribute to the economic viability of small farmers in the area. Farmers are marketing fresh pea vines at farmers markets and specialty food stores for \$2–10 per pound (Figure 1). Pea vines have caught the imagination of chefs around the country, and in Seattle more than 40 restaurants are now using pea vines in their cuisine.

Procedure

In 1998, this study was conducted on a commercial farm in Fall City, and in 1999, the study was conducted on a commercial farm in Tenino, Washington. In order to observe a wide diversity of plant characteristics, various types of peas were chosen for this study, including *marrowfat* and *afila* types (<u>Table 1</u>). *Marrowfats* are used in the snack pea industry where they are deep fried, puffed, and sold as snack items. *Afilas* contain the *af* gene which replaces pea leaflets with tendrils and thus plants produce a larger number of tendrils. Also included in the study was the variety HN 412, commonly grown in Taiwan for pea vine production. By observing a wide diversity of plant characteristics, we hoped to identify desirable characteristics for pea vine production.

Table 1. Pea types and varieties included in a Washington State University pea vine study in 1998 and 1999, in western, Washington.

1998		1999	
Туре	Variety	Туре	Variety
Snow pea	Snowflake Oregon Sugar Pod II	Snow pea	SP6 Oregon Giant



Figure 1. Pea vines for sale by a Hmong farmer in the Pike Place Market, Seattle, WA.

Snap pea	Super Sugar Snap Cascadia	Snap pea	Super Sugar Snap Cascadia
Shell pea	Tom Laxton Pro 2100	Shell pea	Tom Laxton Pro 2100
Yellow split pea	HN 412 Rex Alladin (AF ¹)	Yellow split pea	HN 412
Marrowfat ² , AF	Phantom Majorette		

 ^{1}AF - *afila* (af gene) pea type in which leaflets are replaced by tendrils

²*Marrowfats* are used in the snack pea industry; they are deep fried, puffed, and sold as snack items

1998

On May 4, 12 pea varieties were planted in a randomized complete block design with 4 replications. Plots were 1 bed wide and contained 6 rows spaced 15 cm (6 in) apart. Seeds were spaced 5 cm (2 in) apart in the row. Plot size was 1 meter wide and 3 meters long (3 feet by 10 feet). Total study area was approximately 200 meters2 or 0.02 hectare (2160 feet2 and 0.05 acre, respectively).

Prior to planting, plots were fertilized at a rate of 50 lbs of nitrogen per acre. Plots were not irrigated during the growing season. On June 4, plots were hand weeded and plant stand and plant height were measured. Pea vines were hand harvested two times, on June 16 and July 6, by cutting the top portion of the vines. At the first harvest, plants were cut to approximately half their height, leaving plants 21 cm (8 in) tall in the plots. Plants regrew, and this new vine growth was cut at the second harvest. Pea vine weight and vine length were measured at both harvests. Number of nodes and mean node length of harvested vines were measured at first harvest only. Number of marketable vines, flowering, and node at which vines regrew were measured at second harvest only.

An important component of our study in 1998 was taste-testing and visual evaluations of pea vines. On June 16, a group of 8 Seattle chefs evaluated and ranked the flavor, texture and appearance of fresh pea vines. On July 16, 2 Asian-American Washington State University (WSU) Extension Agents working with Indochinese farmers evaluated and ranked the appearance and marketability of fresh pea vines. On September 18, WSU Extension and the Pike Place Market hosted a food preparation and tasting workshop at the Pike Place Market. At this workshop, a local Chinese-American chef prepared and served pea vines to participants.

1999

On April 15, 7 varieties were planted in a randomized complete block design with four replications. Plots were 1 bed wide and contained 2 rows spaced 30 cm apart (1 foot). Seeds were spaced 5 cm (2 in) apart in the row. Plot size was 1 meter wide and 3 meters long (3 feet by 10 feet). Total trial area was approximately 200 meters2 or 0.02 hectare (2160 feet2 and 0.05 acre, respectively).

Prior to planting, blood meal was applied and incorporated as a source for nitrogen at a rate of 50 pounds of nitrogen per acre. Plots were mechanically cultivated for weed control once a month throughout the growing season. Hand weeding was performed to control in-row weeds once in June, twice in July, and once in August. Plots were irrigated once a week with overhead sprinklers at the rate of one inch of water per application, and was dependent on precipitation.

On June 24, plant height was measured. Pea vines were hand harvested on June 24, July 7, and July 15 from 3 meters (10 feet) of row in the center of each plot. At each harvest, plants were weighed, vine length was measured, and the number of harvested vines was counted. Observations were also made on the presence of flowers and pods on harvested vines.

Results and Discussion

1998

Results of plant measurements are presented in <u>Table 2</u> and results of visual evaluations are presented in <u>Table 3</u>.

Plant stand and height

Expected stand for all varieties was 60 plants per 3 meters of row. Oregon Giant had the fewest number of plants (43) while Snow Flake had the greatest number (65). Significant differences in early plant height on June 4 suggest that optimum date of first harvest will depend on the variety; plants which quickly develop vines should be ready for harvest earlier than plants which are slow to grow. In this trial, Tom Laxton, Super Sugar Snap, and HN 412 were ready for harvest earlier than other varieties.

Internode number and length

The number of internodes per harvested vine ranged from 3.7 to 5.0 and differed significantly among varieties. Mean internode length also differed significantly and ranged from 3.4 to 7.4 cm. The number of internodes did not appear to play an important role in determining most suitable varieties for pea vine production, however internode length did appear to be important. When chefs and extension agents were asked to evaluate varieties, their rankings indicated that varieties such as Rex, which had a mean internode length of 3.4 cm, appeared too short and were undesirable. At the same time, varieties such as Super Sugar Snap and Tom Laxton, which had mean internode lengths greater than 7 cm, appeared too leggy and were also undesirable. Internode length appeared to be a good indicator of pea vine quality; internode length between 4 and 6 cm appeared to be most desirable (Figure 2).

It was interesting to note that HN 412, a standard variety for pea vine production in Taiwan, had a mean internode length of 5.3 cm yet in the visual evaluation it was noted as appearing too leggy and thus was undesirable. This leggy appearance appeared to be due to the small leaf size of this variety, which exposed stem area. Thus, larger leaves are also a desirable characteristic for fresh pea vines.



Figure 2. Plant height measured on June 4, 1998. From left to right, pea variety HN 412 appears too leggy for pea vines; variety Snowflake appears just right; the many tendrils of variety Majorette (afila type) makes this type desirable to chefs but unacceptable to the Asian-American customer.

Vine length and weight

Length of harvested pea vines differed significantly among varieties at both harvest dates, and ranged from 13 to 35 cm at first harvest, and 28 to 59 cm at second harvest. Although pea vine weight is presented in <u>Table 2</u>, we feel it did not accurately reflect potential pea vine yields. In the process of evaluating pea vines for flavor in this study, we found that the lower portion of the vines were tough and fibrous, and only the top 10–15 cm was tender enough to be eaten raw. The weight measured in this study was for vines that were 2–4 times this desirable length, thus it is an overestimation of expected yield.

Vine number and regrowth node

At time of first harvest, all plants consisted of only one vine. This vine was clipped at approximately half the height of the plant (Figure 3). At second harvest, vines were harvested from the same plants. (Figure 4). The node of regrowth, where 0=node closest to ground, varied among plants of the same variety. If plants are harvested several times, then the total number of vines produced and the rate of vine regrowth will affect total yield.



Figure 4. Ne where the p

lowered

e closest to rst harvest.

me of second blossoms, thus ion.

flowering may be a factor for consideration for fresh ma

Taste and Visual Evaluations

All persons involved in evaluating pea vine guality (chefs, farmers, and extension agents) preferred vines which were tender and leafy. In general, only the top 10-15 cm of vines were tender while lower portions were tough and fibrous.

N 412 and Casca

There was some conflict of opinion between Asian-Americans and Caucasian-Americans regarding preferred appearance of pea vines. Caucasian-American chefs found the afila varieties, which produced many tendrils, attractive and desirable as an edible garnish. Asian-Americans on the other hand preferred varieties with fewer tendrils and felt that varieties with many tendrils were unacceptable. Asian-Americans commented that tendrils should be removed before serving pea vines as a vegetable, and shared a Laotian saying, "tendrils tie your tongue".



Figure 5. Snowflake, left, suitable as a vegetable and an edible garnish; Majorette, right, suitable as a garnish only.

Thus, there may be two uses of pea vines, one as an Asian vegetable and a second as an edible garnish. Variety selection for pea vine production should be targeted for the appropriate use. In this study, Snowflake was most preferred as both a vegetable and an edible garnish, and Cascadia and Oregon Giant were acceptable. Oregon Sugar Pod II was highly acceptable to Extension Agents though chefs found it to be wilted.

1999

Results of plant height and yield components are presented in Table 4 and Table 5.

Plant height

There were significant differences in early plant height in 1999. As in 1998, the fastest growing varieties were Super Sugar Snap, HN-412, and Thomas Laxton.

Vine weight, length, and number

The weight of harvested pea vines differed according to harvest date. Pea vine weight at first harvest was the greatest for all varieties and accounted for 63% of the total harvest. Pea vine weight at second harvest tended to be the smallest, while the third harvest accounted for 28% of the total harvested weight. Overall, Snow Peas SP6 was the highest yielding variety. Thomas Table 4. Mean plant height (cm) on June 24 of seven varieties in Tenino. western Washington in 1999.

Variety	Plant Height (cm)
Snow Peas SP6	30.9
Super Sugar Snap	54.2
Oregon Giant	39.4
PRO 2100	38.7
Cascadia	37.0
HN-412	46.9
Thomas Laxton	42.2
Significance	0.01

Laxton was high yielding at first harvest, but low yielding at second and third harvest dates.

Length of harvested pea vines differed among varieties and ranged from 14.4 to 22.8 cm at first harvest, 11.4 to 15.1 cm at second harvest, and 10.1 to 19.1 cm at the third harvest. The length of harvested vines should be 10-15 cm as stems below this point are more tough and fibrous, and not as suitable for raw consumption.

The number of harvested pea vines was greatest at the first harvest when all plants were harvested. At second harvest, only 22% of the plants produced vines that were long enough to be harvestable. By the time of third harvest, 67% of the plants produced harvestable vines. To increase total yield, it may be necessary to delay the time of second and third harvests so that more plants produce harvestable vines.

Flower and pod

The presence of flowers and pods was recorded at each harvest. All varieties except HN-412 were flowering at the first harvest (data not shown). Blossoms and immature pods appear to be desirable for fresh market pea vines.

Conclusions

As with all commercial vegetables, quality is more important than quantity. Thus, when evaluating varieties for pea vine production, consideration must be given to the length and the appearance of harvested vines. In this study, we identified that:

- The desired length for commercial pea vines appears to be 10-15 cm (4-6 in)
- Pea varieties with a mean internode length of 4 to 6 cm (1.5-2.5 in) appear to be most suitable for pea vine production
- · Varieties with few tendrils are preferred for the Asian-American market
- Pea vines are viewed as a vegetable and an edible garnish, and variety selection should be targeted towards both uses
- Snow pea and snap pea types were generally most suitable for pea vine production

Future studies of pea vine production should evaluate yield components. The number of marketable vines produced per plant, the rate of vine regrowth, and the number of harvests which plants can sustain will be key components for determining total yield. To more accurately compare yield between varieties, only the top 10–15cm (4–6 in) of pea vines should be measured. Timing of harvest should be such that the majority of plants have produced harvestable vines.

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Pea Vines - Table 2

Pea Vine Production and Marketing Report

Table 2. Mean plant stand per 3 meter row and plant height (cm) on June 4; number of internodes, mean internode length (cm), pea vine weight (g) and harvested pea vine length (cm) on June 16; pea vine weight (g), harvested pea vine length (cm), number of harvested vines, and node of regrowth where 0=node closest to ground, on June 16 of twelve pea varieties in Fall City, western Washington in 1998.

	Jun	e 4	June 17		July 4					
Variety Type	Plant Stand	Plant Ht. (cm)	Internode No.	Internode Lth (cm)	Vine Wt (g)	Vine Lth (cm)	Vine Wt (g)	Vine Lth (cm)	Vine No.	Node of Regrowth
Snowflake snow	65	12.4	3.8	4.7	270	17.5	90	35.3	2.7	0.2
Super Sugar Snap <i>snap</i>	56	23.3	5.0	7.2	370	35.4	70	50.5	2.3	0.7
HN 412 <i>yellow</i> split	53	23.2	4.7	5.3	340	25.3	90	48.2	3.0	1.1
Tom Laxton shell	59	30.5	4.7	7.4	330	34.9	60	59.1	2.0	1.0
Oregon Sugar Pod II <i>snow</i>	51	18.7	4.1	5.4	330	22.1	110	49.7	3.0	1.1
Oregon Giant <i>snow</i>	43	18.8	3.7	5.3	290	19.4	130	47.4	2.9	1.7
Aladdin <i>yellow</i> split	55	21.6	5.0	4.7	310	22.7	50	39.6	2.3	0.5
Rex yellow split	62	14.7	5.0	3.4	270	17.2	60	33.6	2.1	0.7
Cascadia <i>snap</i>	61	15.6	3.8	5.9	320	22.4	70	36.9	2.6	1.8
Phantom <i>marrowfat</i>	52	13.4	3.4	3.8	270	13.0	40	28.4	2.7	1.1
Majorette <i>marrowfat</i>	57	16.3	4.2	3.6	280	15.1	80	32.2	3.3	1.4
PRO 2100 shell	56	20.7	4.9	5.5	260	26.9	40	31.4	2.0	2.3
Significance	0.01	0.01	0.05	0.01	NS	0.05	0.01	0.01	0.05	NS

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Table 3 - Pea Vines

Pea Vine Production and Marketing Report

Table 3. Summary of pea vine visual evaluations, where 1 is highest and 12 is lowest, on June 16 by a panel of chefs, and July 16 by a small group of WSU Extension Agents who work with Indochinese farmers.

Variety & Type	Date	Comments	Ranking
Snowflake	6/16	compact form	3
snow	7/16	good large leaves, all the way to the terminals; tops look tender; tender stems (may be hard to bunch if stems break); fewer tendrils	1
Super Sugar	6/16	too leggy	10
Snap <i>snap</i>	7/16	too leggy	unacceptable
HN 412	6/16	light, sweet, woody stem	7
yellow split	7/16	too leggy; tough; no flowers	unacceptable
Tom Laxton	6/16	none	12
shell	7/16	small leaves; looks overmature; could be acceptable if harvested earlier	6
Oregon Sugar	6/16	wilts quickly	9
Pod II snow	7/16	big leaves; leafy; tender looking; blooms look attractive; pea pods also a market (dual crop?)	2
Oregon Giant	6/16	grassy flavor	11
snow	7/16	a little leggy; nice leaves, compact and large; tendrils (garnish); tender stems, but a little tough	3/4
Aladdin	6/16	earthy flavor; many tendrils (garnish)	2
AF, yellow split	7/16	too many tendrils	unacceptable
Rex	6/16	none	5
yellow split	7/16	small leaves, short; wilts	unacceptable
Cascadia	6/16	too leggy; woody; beautiful leaves and shape	6
snap	7/16	big leaves; vines and pods look tender longer; more tendrils (garnish); could be 3 due to pods (dual purpose)	3/4
Phantom	6/16	tough	4
AF, marrowfats	7/16	tendrils (garnish)	garnish
PRO 2100 shell	6/16	Strong; almost unpleasant aftertaste; fibrous and tough; small leaves; scraggly	8
	7/16	very leggy; small leaves; does not look as good as others; bundles well	5
General Comme	ents	Remove tendrils before cooking/preparing pea vines as Taiwanese saying: <i>"tendrils tie your tongue"</i>	a vegetable;

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Table 5 - Pea Vines

Pea Vine Production and Marketing Report

Table 5. Mean weight (g) of harvested pea vines from 3 meters row, mean length of harvested pea vines (cm), and mean number of harvested pea vines of seven pea varieties in Tenino, western Washington, in 1999.

Mean weight of harvested peavines (g)							
Variety	6/24/99	7/7/99	7/15/99	Total			
Snow Peas SP6	235.9	20.9	116.2	372.9			
Super Sugar Snap	165.4	25.0	102.6	293.0			
Oregon Giant	164.9	43.8	38.2	246.9			
PRO 2100	122.4	21.7	76.5	220.6			
Cascadia	183.2	22.1	73.2	278.5			
HN-412	153.4	29.4	101.8	284.6			
Thomas Laxton	201.6	22.2	42.6	266.5			
Significance	NS	NS	NS	0.01			

Mean length of harvested peavines (cm)

Variety	6/24/99	7/7/99	7/15/99
Snow Peas SP6	14.4	11.4	11.0
Super Sugar Snap	21.4	12.9	18.9
Oregon Giant	16.4	13.9	10.1
PRO 2100	16.0	12.0	17.0
Cascadia	14.7	12.1	13.3
HN-412	22.8	15.1	19.1
Thomas Laxton	14.7	13.2	14.9
Significance	0.01	NS	0.01

Mean number of harvested peavines

Variety	6/24/99	7/7/99	7/15/99	Total
Snow Peas SP6	52.0	6.8	41.4	100.1
Super Sugar Snap	50.5	12.8	34.3	97.5
Oregon Giant	47.0	14.0	17.6	78.6
PRO 2100	54.0	16.4	38.7	109.1
Cascadia	48.3	9.0	29.0	86.3
HN-412	46.8	11.5	40.5	98.8
Thomas Laxton	41.8	6.0	26.1	73.8
Significance	NS	NS	NS	NS

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