Report to the Oregon Processed Vegetable Commission
1998–1999

1. Title: Broccoli Breeding and Evaluation

2. Project Leaders: James R. Myers, Horticulture

3. Project Status: Terminating 30 June 1999

4. Project Funding: $10,595

Breeding funds were used for a major portion of the support of a vegetable breeding technician, student labor, supplies, and research farm expenses.

5. Objectives:

A. Develop broccoli varieties adapted to western Oregon with the following attributes:

1. Relatively tall plants with exerted heads for easy mechanical harvest.

2. Large openly branched heads with heavy, clean stem for easy trimming and separation into spears and chunks.

3. Medium fine, firm, uniform florets of good color and short pedicels, and which are retained after freezing.

4. Early to midseason maturity, concentrated yield potential.

5. Head rot, clubroot and downy mildew resistance.

B. Evaluate cytoplasmic male sterility (CMS) as a method for producing F_1 hybrid seed.

6. Report of Progress:

Greenhouse inbred and hybrid seed production:

Cuttings taken from the Vegetable Farm in the 1997 season were grown in the greenhouse and used to produce selfed and hybrid seed. Nine S 240 series inbreds were crossed in as many combinations as possible to nineteen S 300 and S 400 series inbreds. Quantities of seed sufficient for trial was obtained in 264 cross combinations (including reciprocals).

Field Hybrid Seed Production:

Broccoli inbreds were planted in isolation at the Vegetable and Lewis Brown Farms for hybrid seed production. To get early seed production, transplants were used. Because of

the hot summer, initial seed set was unproductive, and we had to wait for a fall set of seed. The table below shows amounts of seed obtained from the isolation plots. The AN-series are cytoplasmic male sterile lines obtained from Cornell University, and are discussed below. In addition to reduced seed set from heat, several crosses failed because inbreds carried the same incompatibility allele. Two crosses (S 401 X S 240-5-8 and S 411 X S 240-5-20) set sufficient quantities for small scale on farm tests. This seed does need to be tested to be sure that neither of the inbreds was self-fertile. The results also point out the need to diversify the OSU germplasm to increase *S* allele diversity.

Broccoli isolation plots for hybrid seed production.

Location	Cross	Seed production (gm)
VF-14	AN21 X S240-5-8	5
VF-14	AN23 X S240-5-8	15
VF-14	AN24 X S240-5-8	12
VF-14	AN25 X S240-5-8	0
VF-14	AN27 X S240-5-8	1
VF-14	AN28 X S240-5-8	0
VF-19	S240-5-20 X S396	0
VF-15	S240-5-20 X S398	0
LB-peas	S240-5-8 X S370	0
LB-poplars	S401 X S240-5-8	20
LB-late blight	S411 X S240-5-20	20
LB-SW	S240-5-8 X S399	1

Yield Trial:

Twelve OSU hybrids and four commercial checks were grown in a yield trial replicated four times (Tables 1 and 2). A table of OSU numbers and corresponding pedigrees is shown below. The trial was planted 10 July for the main fall harvest. We used 36 inch rows with a within row spacing of 24 inches, attempting to get 10 plants per plot. The trial was checked weekly, and up to five harvests were made for a particular line. Only primary heads were harvested. Heads were trimmed to a six-inch head plus stem length prior to weighing. Three check varieties (Legend, Regal, and Arcadia) had the highest yield. OSU 98-124 (S400 X S240-5-8) was the highest yielding OSU hybrid and was not significantly different from the three highest yielding checks. This hybrid also had the largest head of the OSU hybrids with heads about nine inches in diameter. Heads were somewhat loose and floret size was irregular. In general, the hybrids with the best quality and harvest characteristics had smaller head size and lower yield. Increased trial precision may be possible by increasing row length from 20 to 30 or 40 ft. It may be possible through decreased row spacing and higher plant populations to increase yield of these lines while maintaining head quality.

Parentage of broccoli hybrids tested in a yield trial			
OSU Cross No.	**Pedigree**	**OSU Cross No.**	**Pedigree**
98-50	S398 X S240-5-1	98-122	S399 X S240-5-8
98-52	S399 X S240-5-1	98-124	S400 X S240-5-8
98-84	S398 X S240-5-5	98-220	S396 X S240-5-20
98-88	S400 X S240-5-5	98-222	S398 X S240-5-20
98-118	S396 X S240-5-8	98-224	S399 X S240-5-20
98-120	S398 X S240-5-8		

Observation Trials:

An unreplicated observation trial was also planted on 10 July. Plots varied in size from one to 20 plants. Data were recorded for plant and head characters (Table 3). Six commercial check hybrids were included in this trial. General combining ability of the inbreds was examined by averaging performance by inbred (Table 4). Many OSU hybrids show promise with the best hybrids coming from crosses with S392, S398, S399, and S411. The best use of the data is to reduce the number of hybrid combinations that need to be evaluated in replicated yield trials. Inbred lines used to make crosses were grown with the observation trial, and observation data were recorded (Table 5). Headrot was observed late in the season, but the incidence was too sporadic to compare hybrids for headrot severity.

A separate observation trial of the 91-203 series inbreds and new commercial hybrids was planted on 13 July. This trial was inadvertently planted on club root infected ground, and as a consequence, plants were stunted. Data were recorded on disease severity, but disease severity varied across the trial so that in some cases, we do not know if a hybrid was resistant, or escaped infection. Because of the disease-induced variability, observation data are not presented here. We were able to take cuttings from experimental lines in this field and establish them in the fall greenhouse for another round of inbreeding and seed production.

Evaluation of CMS lines:

Six inbreds containing the Arnand source of cytoplasmic male sterility (CMS) were obtained from Cornell University. We intend to incorporate CMS into the OSU material to have greater flexibility in hybrid seed production. The lines were planted in an isolation plot with S 240-5-8 as a pollen donor. Lines varied greatly in appearance and morphology as shown in the table below, and two lines (AN25 and AN28) were apparently sterile. Head characteristics could not be evaluated because the CMS lines were transplanted to the field as large, greenhouse grown plants. Seed harvested from the CMS lines will be backcrossed to S 240-5-8.

Arnand CMS line evaluation	
CMS Line	**Notes**
AN21	Variable ht., blue-green, waxy foliage
AN23	Green and glossy foliage
AN24	Variable ht., green and glossy foliage
AN25	Short plants, green and glossy foliage
AN27	Segregating green, glossy / blue-green waxy foliage
AN28	Short plants, green glossy foliage

8. Summary:

Twenty-six inbreds used for hybrid production were propagated in the greenhouse, selfed and crossed to produce approximately 264 hybrids for field-testing. Eleven of the best hybrids were grown with four commercial hybrids in a replicated yield trial. One OSU hybrid had yield comparable to the commercial hybrids, while also possessing an exserted plant habit with segmented heads. Seed of the other OSU hybrids and inbreds was included in an observation trial. General combining ability of the inbreds was evaluated. A separate trial containing the 91-203 series inbreds and new commercial broccoli hybrids was nonuniformly infected by club root. Six CMS germplasm inbreds were obtained, evaluated, and crossed to an OSU inbred. Seven inbred sets were grown for hybrid seed production.

9. Signatures:

Redacted for Privacy

Project Leader: _____

Redacted for Privacy

Department Head _____ _____

Table 1. Yield data from a hybrid broccoli trial grown at the OSU Vegetable Farm in 1998.[z]

Hybrid	Days to Harvest	No. of Harvests	Harvest Duration (days)	Plts/ Plot (No.)	Blind Plts/Plot (No.)	Heads/ Plot (No.)	Wt/ Head (lb)	T/A (unadj)	T/A (adj plts/plot)[x]	T/A (adj heads/ plot)[y]
Legend	83	4.3	12.3	8.5	0.3	8.3	1.50	4.43	5.40	5.18
Regal	75	1.8	5.8	7.8	1.5	6.8	1.48	3.48	5.33	4.45
Arcadia	93	4.5	9.5	11.3	0.0	11.3	1.33	5.35	4.78	4.78
98-124	95	3.3	6.5	7.8	0.0	7.8	1.23	3.30	4.40	4.40
98-88	93	3.5	7.8	10.0	0.3	9.3	1.23	4.08	4.40	4.13
98-122	84	3.5	8.3	7.3	0.5	7.3	1.10	2.85	3.98	3.98
Excelsior	86	3.8	11.8	10.0	0.5	9.5	1.08	3.68	3.85	3.68
98-52	89	2.3	4.3	7.8	0.8	7.0	1.05	2.63	3.83	3.45
98-120	87	3.3	6.0	8.3	1.0	7.3	1.03	2.70	3.80	3.30
98-84	84	3.0	6.0	8.5	1.0	7.8	1.00	2.78	3.60	3.35
98-118	83	3.0	8.8	8.5	0.8	7.5	0.95	2.65	3.48	3.13
98-50	84	3.3	8.3	7.5	1.0	6.5	0.95	2.23	3.40	2.90
98-224	82	2.8	7.5	6.8	0.3	7.3	0.88	2.33	3.25	3.48
98-220	81	3.0	10.3	9.0	1.0	8.5	0.88	2.68	3.18	3.13
98-222	81	2.8	9.3	8.0	0.8	7.3	0.90	2.28	3.18	2.88
$LSD_{\alpha=0.05}$	3	1.3	5.6	2.1	1.2	2.4	0.21	0.9	0.8	1.0

[z]Mean of four replications.

[x]Yield adjusted to a uniform stand of 10 plants/plot (7,260 plants/A).

[y]Yield adjusted to a uniform stand based on 10 heads/plot (7,260 heads/A).

Table 2. Observation data from broccoli hybrids grown in a yield trial at the OSU vegetable farm in 1998.

Entry[z]	Maturity (days)	Plt Ht. (in)	Bead Size[y]	Stem Color[x]	Head Color[x]	Head Dia. (in)	Head Shape[w]	Head Exsertion[x]	Head Segmentation[x]	Unif.[x]	Overall Score[x]	Comments
98-118	83	29	F	6.5	7.0	8.0	5.3	8.0	8.5	5.5	7.0	loose heads; deeply branched; long spears
98-120	87	30	M	5.5	7.0	8.3	4.5	7.8	8.5	6.0	7.0	loose heads; 1 possible self; slightly small segments
98-122	84	27	F	5.5	7.0	8.4	4.3	6.5	9.0	5.0	5.5	small florets; loose, rough heads; 1 offtype
98-124	94	30	M	7.0	7.0	9.1	3.8	7.5	8.3	6.5	6.5	loose heads; rough heads
98-220	81	27	F-M	6.5	7.3	7.9	4.8	6.8	7.5	6.5	6.0	variable, some flat heads; rough irregular segments; loose heads; 2 plants with multiple heads
98-222	81	27	M	6.0	7.0	7.1	6.8	6.0	9.0	5.5	7.0	
98-224	82	26	M	6.5	7.0	7.0	6.3	5.5	8.3	5.0	6.5	excellent floret size; 1 offtype
98-50	84	29	M	6.5	7.0	8.0	4.3	7.5	8.5	5.5	6.5	loose heads
98-52	88	28	M	6.0	7.0	7.6	4.5	6.8	7.0	6.8	8.0	2 selfs
98-84	84	26	M	6.0	6.8	8.0	5.5	6.3	8.3	7.5	7.5	
98-88	93	28	F	6.5	7.0	8.6	3.3	7.3	7.3	6.5	6.0	irregular segments (breaking up); center florets lagging; rough, loose heads
Arcadia	93	23	M	5.5	5.0	7.9	4.0	3.5	5.0	4.5	4.5	
Excelsior	86	20	C-M	4.5	4.0	8.5	4.0	3.5	4.0	3.5	3.3	
Legend	83	21	C	3.5	5.5	7.5	3.5	3.0	3.3	4.0	3.3	some heads concave
Regal	73	16	C	3.0	5.0	7.0	7.0	3.0	2.0	7.0	5.0	45 degree branch angle

[z]Data are means of four replications, except Regal, where data were recorded from only one replication.

[y]F = fine, M = medium, and C = coarse.

[x]Scale of 1 to 9 where 1 is poor and 9 is excellent.

[w]Scale of 1 to 9 where 1 = extreme concave head, 3 = slight concave head, 5 = slight dome, 7 = moderate dome and 9 = extreme dome.

Table 3. Observation data of OSU broccoli hybrids grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S240-1 crosses												
S240-1 X S370	74	19	5.5	5	7	C	5	5	7	7	5	
S370 X S240-1	73	18	5.5	5	7	M	5	7	6	9	7	2 plants
S240-1 X S384	74	17	6.0	4	7	C	9	5	5	5	3	
S384 X S240-1	88	22	9.5	4	7	M	5	5	7	5	5	irregular segmentation; loose head
S240-1 X S387	77	19	8.0	4	7	C	7	5	5	7	5	leafy heads
S387 X S240-1	77	20	7.0	5	7	C	7	5	5	7	7	
S240-1 X S389	79	21	6.0	7	7	M	5	7	5	7	7	
S389 X S240-1	78	21	6.5	7	7	C	5	5	5	7	7	compact heads
S240-1 X S391	75	22	6.0	6	7	M-C	9	7	7	8	9	
S391 X S240-1	77	23	7.0	7	7	M	7	6	7	7	7	
S240-1 X S392	79	23	6.5	7	7	M	5	5	6	3	7	
S240-1 X S396	73	23	7.0	5	7	M	7	9	7	7	9	possible self pollination
S396 X S240-1	77	25	7.0	5	7	M	5	7	7	7	9	
S240-1 X S398	73	24	7.0	5	7	C	5	7	5	7	7	
S240-1 X S399	74	23	6.5	5	7	M	5	7	5	3	5	quite variable
S399 X S240-1	77	23	7.0	6	7	M	5	6	5	7	5	
S240-1 X S400	81	26	7.5		7	M	5	6	5	5	5	
S240-1 X S403	77	20	7.0	5	7	C	7	5	5	7	5	
S403 X S240-1	77	21	7.0	5	7	C	6	5	5	7	5	
S240-1 X S410	77	22	6.5	4	7	M	5	6	9	5	5	loose head
S410 X S240-1	77	23	7.5	4	7	M	5	6	7	5	5	loose head
S240-1 X S411	84	22	7.0	3	7	M	5	6	7	8	5	low yield; loose head
S240-1 X S413	77	27	5.5	5	7	C	7	9	9	7	6	small heads but strong exsertion; low yield
S240-1 X S414	77	20	5.5	5	7	M	7	7	7	7	7	small heads
S240-1 X 91-213-1-1-3-2	84	26	7.0	4	7	M	7	6	6	7	7	nice floret size
91-213-1-1-3-2 X S240-1	93	31	11.0	3	7	M	7	8	9	5	5	irregular bead development; loose head
S240-1 X 91-219-2-2-3-1	93	26	9.0	3	7	C	5	7	9	7	5	immature center florets; loose head
91-219-2-2-3-1 X S240-1	93	27	7.0	5	7	C	7	7	7	8	8	
S240-1 X 91-232-4-1-2-1	88	25	6.0	5	7	C	7	7	7	7	7	small head; uniform segments
91-232-4-1-2-1 X S240-1	93	26	6.5	6	7	C	5	7	5	7	7	

Table 3. Observation data of OSU broccoli hybrids grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S240-5-1crosses												
S240-5-1 X S370	81	26	8.0	3	7	F	7	7	9	8	7	loose head
S370 X S240-5-1	88	27	7.5	3	7	M	7	7	9	3	5	loose head
S384 X S240-5-1	88	25	10.5	3	7	M	7	7	8	5	7	nicely sized segments; loose head
S387 X S240-5-1	84	27	8.0	3	7	F	5	7	9	8	5	tendency to sunken heads, may not happen until overmature;loose head
S240-5-1 X S389	81	24	7.5	4	7	F	7	5	8	9	7	2 plants
S389 X S240-5-1	93	24	7.5	5	7	M	5	5	7	5	7	
S396 X S240-5-1	77	27	7.0	3	7	F	7	9	9	7	5	leaves on upper stem small; loose head
S398 X S240-5-1	77	28	5.5	5	7	F	6	9	8	5	7	small head
S398 X S240-5-1	77	28	5.5	5	7	F	6	9	8	5	7	small head
S240-5-1 X S399	84	29	6.5	5	7	M	5	7	8	7	8	small heads but very nice uniform floret size
S399 X S240-5-1	77	29	7.5	5	7	M	7	7	8	5	8	very nice except uniformity
S240-5-1 X S400	88	27	8.5	4	7	M	5	7	7		7	2 plants, 1 blind
S400 X S240-5-1	88	30	8.5	3	7	F	7	8	8	5	7	loose heads
S240-5-1 X S403	84	29	8.0	3	7	F	5	5	7	8	7	irregular floret size; loose heads
S240-5-1 X S410	84	26	9.0	3	8	F	7	5	9		5	small florets; 1 plant; loose head
S410 X S240-5-1	79	24	7.0	4	7	F	7	7	7	5	5	
S240-5-1 X S411	88	26	8.0	3	7	M	7	7	8		7	1 plant; loose head
S413 X S240-5-1	84	32	8.0	4	7	F	7	7	9	5	7	uniform florets but slightly small; loose head
S240-5-1 X S414	84	27	8.0	3	7	M	7	7	9	7	7	very open head
S414 X S240-5-1	77	25	8.0	4	7	F	5	7	9	7	5	loose head
S240-5-1 X 91-213-1-1-3-2	93	32	8.0	4	7	M	7	7	7		7	1 plant
91-213-1-1-3-2 X S240-5-1	81	31	7.0	3	7	F	5	7	9	5	3	rough head; small florets
S240-5-1 X 91-232-4-1-2-1	93	28	9.5	4	7	M	7	7	8	9	5	immature center florets; 2 plants
91-232-4-1-2-1 X S240-5-1	93	28	9.5	4	7	M	7	7	8	9	5	
S240-5-5 crosses												
S370 X S240-5-5	77	25	6.0	5	7	F	5	6	7	7	5	small florets
S240-5-5 X S384	88	24	8.0	3	7	F	7	6	7	7	3	loose, rough heads; small irregular florets
S384 X S240-5-5	88	24	8.0	3	7	F	7	6	7	7	3	loose, rough heads; small irregular florets
S387 X S240-5-5	77	23	9.0	4	7	M	7	7	7	5	3	some heads irregular, loose and leafy

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Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S240-5-5 X S387	77	23	9.0	4	7	M	7	7	7	5	7	heads somewhat loose and irregular but nice florets
S240-5-5 X S389	84	27	7.0	5	7	F	3	5	7	7	7	
S389 X S240-5-5	77	24	7.0	5	7	F	5	7	5	7	5	irregular head
S240-5-5 X S391	77	23	7.5	4	7	F	7	7	7	5	3	leafy heads; irregular segments; small floret size
S391 X S240-5-5	88	28	12.0	1	7	F	7	7	7		3	rough, loose head; irregular development; leafy; 2 plants, 1 blind
S240-5-5 X S392	93	30	11.0	3	7	F	7	6	9	7	8	loose head
S392 X S240-5-5	84	27	8.0	5	7	F	5	7	9	7	7	secondary segmentation; loose head
S240-5-5 X S396	77	27	7.0	5	7	F	9	7	7	5	5	small, loose head
S396 X S240-5-5	77	23	8.0	4	7	F	5	7	7	7	3	florets break up into small segments; must be picked early;some leafy heads and loose heads
S240-5-5 X S398	84	28	7.5	5	7	M	3	5	7	5	5	secondary segmentation
S398 X S240-5-5	79	24	7.0	6	7	M	7	6	9	5	8	nice segmentation
S240-5-5 X S399	77	25	7.5	3	7	F	7	5	9	7	9	leaves large and acutely branched; nice florets
S240-5-5 X S403	77	25	7.5	4	7	F	3	5	7	3	3	irregular segments; some leafy heads; small florets
S403 X S240-5-5	81	26	9.0	3	7	F	5	5	9	5	3	florets too small; loose head
S240-5-5 X S410	77	20	6.5	4	7	F	5	6	7	5	3	leafy heads; small florets
S410 X S240-5-5	77	23	7.5	4	7	F	5	5	7	5	5	small segments; loose heads
S411 X S240-5-5	84	25	7.5	5	7	F	7	6	9	7	7	secondary segmentation; loose head
S240-5-5 X S413	84	30	9.0	3	7	F	9	8	9	7	7	florets small; very loose head
S414 X S240-5-5	77	23	8.0	4	7	F	5	5	9	3	5	loose head
S240-5-5 X 91-213-1-1-3-2	88	27	7.5	5	7	F	7	6	7	5	5	irregular head
91-213-1-1-3-2 X S240-5-5	84	25	9.0	4	7	F	7	6	7	5	7	rough heads
91-219-2-2-3-1 x S240-5-5	93	26	11.5	2	7	F	7	7	9	7	8	nice florets; loose heads
S240-5-5 X 91-232-4-1-2-1	93	26	8.5	4	3	F	5	5	7	5	7	
91-232-4-1-2-1 X S240-5-5	93	26	8.5	4	3	F	5	5	7	5	7	
S240 -5-8 crosses												
S240-5-8 X S370	84	25	8.5	3	7	M	7	7	9	3	5	secondary segmentation; loose head
S370 X S240-5-8	84	24	9.0	4	7	M	7	7	9	5	5	leafy, loose heads
S240-5-8 X S384	93	25	8.5	4	7	M	7	5	7	3	3	rough head and irregular florets

Table 3. Observation data of OSU broccoli hybrids grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S384 X S240-5-8	93	25	8.5	4	7	M	7	5	7	3	3	rough head and irregular florets
S389 X S240-5-8	81	27	8.0	4	7	F	7	7	5	5	5	segments are irregular and tend to break up at maturity
S240-5-8 X S391	81	27	8.0	4	7	F	7	7	9	5	5	small irregular florets
S392 X S240-5-8	93	30	8.0	2	7	M	5	7	8	7	7	immature center florets; loose heads
S240-5-8 X S398	77	30	5.5	4	7	F	9	8	8	7	9	
S403 X S240-5-8	81	28	9.0	2	7	F	7	6	9	9	3	sunken heads; small florets; 3 plants; loose heads
S240-5-8 X S410	81	27	7.0	4	7	F	7	6	9	9	5	florets small and irregular; 3 plants
S410 X S240-5-8	81	21	9.0	4	7	F	7	7	9	7	3	florets small; secondary florets; loose heads
S240-5-8 X S411	93	30	8.5	3	7	M	7	8	9	7	7	loose heads
S411 X S240-5-8	93	30	8.5	3	7	M	7	8	9	7	7	1 plant; loose head
S240-5-8 X S413	88	34	8.0	4	7	F	7	8	8	7	8	segments somewhat irregular, loose head
S240-5-8 X S414	84	27	8.0	3	7	M	5	7	9	5	5	heads loose; segments small
S240-5-8 X 91-213-1-1-3-2	84	32	7.0	5	7	F	7	6	7	7	7	secondary segmentation
S240-5-8 x 219-2-2-3-1	93	30	9.0	2	7	F	7	5	9	3	3	immature center florets and rough heads; very loose heads
S240-5-8 X 91-232-4-1-2-1	93	28	8.5	4	7	F	5	5	7	7	5	small florets; breaking into secondary florets
91-232-4-1-2-1 X S240-5-8	93	28	8.5	4	7	F	5	5	7	7	5	small florets; breaking into secondary florets
S240-5-12 crosses												
S240-5-12 X S370	81	27	7.0	5	7	M	5	6	8	5	7	nice segmentation
S370 X S240-5-12	77	26	7.0	5	7	F	7	7	9	7	7	
S240-5-12 X S384	84	22	8.0	4	7	F	7	5	7	5	5	leafy heads; irregular heads; secondary segmentation; loose heads
S384 X S240-5-12	84	22	8.0	4	7	F	7	5	7	5	5	leafy heads; irregular heads; secondary segmentation; loose heads
S240-5-12 X S387	77	25	8.0	4	7	F	7	7	8	5	5	loose irregular heads; ok if harvested early
S240-5-12 X S389	81	25	7.0	5	7	F	7	5	7	5	7	segments somewhat irregular
S389 X S240-5-12	77	27	8.0	5	7	M	5	7	9	5	7	
S391 X S240-5-12	77	25	8.0	4	7	F	7	7	9	5	3	loose head; small segments;leafy heads
S240-5-12 X S396	77	25	8.0	4	7	F	7	7	9	5	3	loose head; small segments;leafy heads

Table 3. Observation data of OSU broccoli hybrids grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S396 X S240-5-12	77	28	9.0	3	7	F	7	8	9	7	7	fairly uniform segments; segments breakup if harvested late; loose heads
S240-5-12 X S398	77	25	5.0	7	7	F	7	7	9	7	8	compact heads
S398 X S240-5-12	77	25	5.5	7	7	F	7	7	9	7	8	compact heads
S399 X S240-5-12	77	25	6.5	7	7	F	7	7	8	5	7	nice heads
S399 X S240-5-12	77	25	6.5	7	7	F	7	7	8	5	7	nice heads
S400 X S240-5-12	93	31	10.5	2	7	M	7	7	9	7	5	immature center florets; breaking into secondary; very loose heads
S403 X S240-5-12	81	28	7.0	4	7	F	7	7	8	7	7	florets somewhat irregular
S410 X S240-5-12	93	29	9.0	3	7	F	5	7	9		5	badly lodged; secondary segmentation; 1 plant; loose heads
S240-5-12 X S413	88	31	8.0	3	7	F	7	8	9	7	5	loose head; small florets; low yield
S413 X S240-5-12	88	31	8.0	3	7	F	7	8	9	7	5	loose heads; small florets; low yield
S414 X S240-5-12	88	27	8.0	3	7	F	7	7	9	5	5	small florets; low yield; loose heads
S240-5-12 X 91-213-1-1-3-2	93	35	8.0	4	7	F	7	5	7	7	7	1 plant; loose head
91-213-1-1-3-2 X S240-5-12	93	35	8.0	4	7	F	7	5	7	7	7	loose heads
S240-5-12 X 91-232-4-1-2-1	88	27	7.0	5	7	F	7	7	7		7	1 plant
S240-5-17 crosses												
S240-5-17 X S370	81	26	7.0	4	7	F	7	6	8	7	7	1.5" florets but uniform; loose head
S370 X S240-5-17	81	25	8.0	5	7	F	5	6	7	5	7	
S240-5-17 X S384	93	26	7.5	5	7	M	7	7	7	5	3	rough heads
S384 X S240-5-17	93	26	7.5	5	7	M	7	7	7	5	3	
S240-5-17 X S387	77	23	8.0	5	7	M-C	5	6	9	7	8	nice size florets
S387 X S240-5-17	77	23	8.0	5	7	M-C	5	6	9	7	8	nice size florets
S240-5-17 X S389	88	28	9.0	4	7	M	5	7	7		9	high yield; uniform; well sized segments; 1 plant
S389 X S240-5-17	77	22	6.5	7	7	F	5	5	7	5	8	
S240-5-17 X S391	88	29	7.5	3	7	F	7	8	7	7	7	small segments
S240-5-17 X S392	84	25	8.0	5	7	F	7	7	8	8	9	segments slightly rough
S240-5-17 X S396	77	25	7.0	5	7	F	5	9	9	7	8	leaves smaller at the top; loose heads
S396 X S240-5-17	77	25	7.0	5	7	F	5	9	9	7	8	leaves smaller at the top; loose heads
S240-5-17 X S398	77	23	6.5	4	7	M	5	6	9	5	8	

Table 3. Observation data of OSU broccoli hybrids grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S398 X S240-5-17	84	26	7.0	6	7	M	5	5	7	7	9	nice size segments; uniform
S240-5-17 X S399	77	21	8.0	4	7	M	7	5	7	7	7	2 plants
S399 X S240-5-17	77	21	8.0	4	7	M	7	5	7	3	7	nice segments
S240-5-17 X S400	93	31	9.5	4	7	M	5	7	8	7	7	loose heads
S400 X S240-5-17	93	31	9.5	4	7	M	5	7	8	7	7	loose heads
S240-5-17 X S403	88	29	9.0	2	7	M	7	5	9	7	5	center florets have slow development; loose heads
S403 X S240-5-17	84	27	8.0	3	7	F	7	5	7	7	5	secondary segmentation and leafy heads
S240-5-17 X S410	81	25	9.5	4	7	F	7	5	7	9	5	irregular segments with small leaves; 2 plants
S410 X S240-5-17	84	26	9.0	4	7	M	7	6	9		7	1 plant; loose head
S240-5-17 X S411	93	26	9.0	4	7	M	7	8	9	7	8	loose heads
S413 X S240-5-17	88	25	11.0	3	7	M	5	7	9	5	3	low yield; sunken centers; loose heads
S240-5-17 X S414	84	26	7.0	4	7	M	7	5	9	7	5	small florets; loose heads
S240-5-17 X 91-213-1-1-3-2	93	32	8.5	5	7	M	7	7	7	5	7	
91-213-1-1-3-2 X S240-5-17	95	32	8.5	5	7	M	7	7	7	5	7	
S240-5-17 X 91-219-2-2-3-1	93	26	9.5	3	7	F	7	7	8	5	7	2 plants; loose heads
S240-5-17 X 91-232-4-1-2-1	93	24	7.5	5	7	M	7	7	5	5	5	
91-232-4-1-2-1 X S240-5-17	91	29	11.0	4	7	M	7	7	9		7	1 plant; loose head
S240-5-20 crosses												
S240-5-20 X S370	77	23	6-10	5	7	F	7	7	7	9	7	variable head compactness
S370 X S240-5-20	84	24	9.0	4	7	M	7	7	9	5	7	loose heads
S240-5-20 X S384	84	24	9.0	4	7	M	7	7	9	5	7	rough head; 1 plant
S384 X S240-5-20	91	24	9.5	4	7	F	7	7	9	5	7	loose heads
S387 X S240-5-20	84	27	9.0	3	7	M	5	6	9	5	5	irregular, leafy and loose heads
S240-5-20 X S389	84	24	7.0	7	7	F	5	5	7	3	7	
S389 X S240-5-20	84	26	7.5	5	7	F	5	7	7	7	8	some secondary segmentation
S240-5-20 X S391	77	26		7	7	F		7	9	7	5	
S240-5-20 X S392	77	25	7.0	5	7	F	5	7	9	3	5	small irregular segments
S392 X S240-5-20	84	31	7.5	5	7	F	7	7	9	5	5	small segments
S240-5-20 X S396	84	31	7.5	5	7	F	7	7	9	5	5	small segments
S396 X S240-5-20	81	29	7.0	4	7	F	7	7	8	7	7	nice segments; small upper stem leaves

Table 3. Observation data of OSU broccoli hybrids grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S240-5-20 X S398	77	25	6.5	4	7	F	5	7	7	5	7	
S398 X S240-5-20	75	22	7.0	5	7	F	5	7	7	9	8	variable bead size;exserted but leaves above head; 2 plants
S240-5-20 X S400	91	33	8.0	4	7	F	7	8	8	7	7	loose heads
S400 X S240-5-20	91	29	6.0	5	7	M	5	7	7	5	7	
S403 X S240-5-20	91	28	9.0	3	7	M	7	8	9	7	7	loose heads
S240-5-20 X S410	84	24	7.0	4	7	F	7	5	7	5	5	small segments
S410 X S240-5-20	84	24	7.0	4	7	F	7	5	7	5	5	small segments
S240-5-20 X S411	91	28	7.0	5	7	M	7	8	8		7	1 plant
S411 X S240-5-20	91	29	6.5	5	7	M	7	7	8	8	8	
S240-5-20 X S413	84	27	7.0	3	7	M	5	7	9	5	5	secondary segmentation; loose heads
S413 X S240-5-20	84	27	7.0	3	7	M	5	7	9	5	5	secondary segmentation; loose heads
S240-5-20 X S414	84	23	8.0	4	7	M	5	5	8	7	7	fairly uniform segmentation; good size; loose heads
S414 X S240-5-20	84	23	8.0	4	7	M	5	5	8	7	7	fairly uniform segmentation; good size; loose heads
91-213-1-1-3-2 X S240-5-20	91	29	7.5	5	7	M	7	6	5	7	5	2 plants
S240-5-20 X 91-219-2-2-3-1	105	32	10.5	1	7	F	7	9	9	7	3	very late; fine beads; very loose head,undeveloped centers
91-219-2-2-3-1 X S240-5-20	105	32	10.5	1	7	F	7	9	9	7	3	very late; fine beads; very loose head,undeveloped centers
S240-5-20 X 91-232-4-1-2-1	100	28	6.5	5	7	F	7	5	5	5	5	head rot
91-232-4-1-2-1 X S240-5-20	93	28	6.5	5	7	F	7	5	5	5	5	
S240-5-24 crosses												
S370 X S240-5-24	81	22	9.0	4	7	F	5	7	9	7	7	
S240-5-24 X S384	91	24	10.0	4	7	M	7	5	7		5	rough head; 1 plant; loose head
S384 X S240-5-24	98	27	10.5	2	7	M	7	7	9	3	3	very rough heads; irregular floret development; loose heads
S240-5-24 X S387	84	25	9.0	1	7	M	7	5	9		3	2 plants both blind; loose heads
S387 X S240-5-24	84	25	8.5	3	7	M	7	5	9	7	7	open head with nice sized uniform segments; loose heads
S240-5-24 X S389	91	28	8.5	5	7	M	7	7	7	5	5	

Table 3. Observation data of OSU broccoli hybrids grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S389 X S240-5-24	93	25	6.5	5	7	C	7	7	5	7	5	2 plants
S240-5-24 X S391	84	27	9.0	4	7	F	5	7	9	7	5	leafy, loose heads
S391 X S240-5-24	81	28	8.0	3	7	F	7	7	9	7	5	segments breakup into too small secondary segments
S240-5-24 X S396	84	30	9.0	4	7	F	7	9	9	7	3	small heads and segments; secondary segmentation; loose heads
S396 X S240-5-24	77	26	5.0	7	7	F	7	7	9	5	5	small loose heads; well exserted; nice floret size
S240-5-24 X S398	81	25	7.5	5	7	F	5	7	8	7	7	florets= 1.5"
S398 X S240-5-24	77	25	7.0	3	7	F	5	8	8	7	7	irregular florets; loose heads
S240-5-24 X S399	84	24	7.0	5	7	F	7	5	7		7	possible leafy head; 1 plant
S399 X S240-5-24	77	24	5.0	7	7	F	7	7	7	5	8	
S400 X S240-5-24	84	32	4.0	4	9	F	7	7	9	3	3	secondary segments; too small
S240-5-24 X S410	84	26	11.0	3	7	F	7	7	9		5	segments breakup into small secondary segments; 1 plant; loose head
S410 X S240-5-24	91	30	9.5	4	7	F	7	8	9		5	small center florets; 1 plant; loose head
S240-5-24 X S411	91	27	9.5	4	7	M	7	7	8		7	1 plant
S413 X S240-5-24	84	29	8.0	3	7	F	7	7	9	7	3	loose head; secondary segmentation; small
S240-5-24 X 91-213-1-1-3-2	93	28	8.0	5	7	F	5	7	7	5	7	3 plants
91-213-1-1-3-2 X S240-5-24	93	28	8.0	5	7	F	5	7	7	5	7	3 plants
S240-5-24 X 91-219-2-2-3-1	98	29	9.5	1	7	F	7	8	9	5	3	irregular heads; center florets have late development; loose heads
91-219-2-2-3-1 X S240-5-24	93	30	8.0	4	7	F	7	7	7	5	5	irregular florets
91-232-4-1-2-1 X S240-5-24	91	30	8.0	4	7	F	7	7	7	3	5	
S240-5-26 crosses												
S240-5-26 X S370	84	25	6.5	4	7	M	7	5	7	7	7	2 plants
S370 X S240-5-26	81	29	6.0	4	5	F	5	7	9	3	5	segments breakup into smaller florets
S240-5-26 X S384	91	28	8.0	5	7	M	7	5	8	3	3	irregular floret size and development;loose head
S240-5-26 X S387	91	29	9.0	3	7	M	7	5	9		7	2 plants; 1 blind; loose head
S387 X S240-5-26	91	29	8.5	4	7	M	7	7	9	7	7	
S240-5-26 X S389	81	26	12.0	3	7	M	7	9	7	5	7	small upper stem leaflets; florets somewhat irregular; loose heads

Table 3. Observation data of OSU broccoli hybrids grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S389 X S240-5-26	81	26	12.0	3	7	M	7	9	7	5	7	small upper stem leaflets; florets somewhat irregular; loose heads
S240-5-26 X S391	93	27	7.5	5	7	F	7	5	8	5	5	downy mildew; loose heads
S391 X S240-5-26	84	25	8.0	5	7	M	5	7	7	5	5	possible leafy heads; segments may be too large
S240-5-26 X S392	93	25	9.0	4	7	M	7	5	7	7	7	2 plants
S392 X S240-5-26	91	32	8.5	5	7	F	7	8	7	5	8	
S240-5-26 X S396	84	27	7.5	5	7	M	5	7	9	7	7	upper stem leaflets are small; loose heads
S396 X S240-5-26	81	26	7.0	5	7	M	5	7	7	7	7	
S240-5-26 X S398	81	29	8.0	5	7	M	7	7	7	5	7	
S398 X S240-5-26	81	29	8.0	5	7	M	7	7	7	5	7	
S240-5-26 X S399	81	25	6.0	6	7	M	5	5	7	7	7	
S399 X S240-5-26	77	26	6.0	6	7	M	5	7	7	7	8	
S400 X S240-5-26	91	31	13.0	3	7	M	7	7	8		5	outer segment; large center immature; 1plant; loose head
S400 X S240-5-26	84	27	9.0	4	7	F	5	7	7		5	possible leafy heads; 1 plant
S240-5-26 X S410	91	32	9.0	4	7	F	7	9	9	8	5	segments are too small; 2 plants; very loose heads
S410 X S240-5-26	84	26	10.0	3	7	F	7	7	9	7	7	maybe too much secondary segmentation; loose heads
S240-5-26 X S411	91	27	9.0	4	7	M	7	7	8	8	8	loose head
S411 X S240-5-26	91	30	10.5	3	7	M	7	9	9		7	nice uniform segments; may break into secondary segments before maturity; 1 plant; loose head
S240-5-26 X S413	84	28	8.0	4	7	M	7	7	9		7	nice uniform segments; may break into secondary segments before maturity; 1 plant; loose head
S413 X S240-5-26	84	28	8.0	4	7	M	7	7	9		7	nice uniform segments; may break into secondary segments before maturity
S240-5-26 X S414	81	26	7.5	4	7	M	7	5	8	7	7	
S414 X S240-5-26	91	27	9.0	4	7	M	7	7	8		7	loose heads
S240-5-26 X 91-213-1-1-3-2	91	33	7.0	7	7	M	7	5	5	3	3	
91-213-1-1-3-2 X S240-5-26	91	36	7.5	5	7	M	7	9	7	8	8	

Table 3. Observation data of OSU broccoli hybrids grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S240-5-26 X 91-232-4-1-2-1	98	24	10.0	5	7	F	7	5	5	5	5	2 late plants
91-232-4-1-2-1 X S240-5-26	93	27	8.5	4	7	F	7	7	8	5	5	breaking secondary florets; loose heads
S240-5-30 crosses												
S370 X S240-5-30	81	26	7.0	4	7	M	7	7	9	7	7	
S240-5-30 X S387	84	22	11.0	3	7	M	7	5	7	3	7	beautiful, uniform, nicely sized segments; loose heads
S387 X S240-5-30	84	22	11.0	3	7	M	7	5	7	3	7	heads
S240-5-30 X S391	91	29	7.5	5	7	M	7	7	7	7	7	possible leafy head
S391 X S240-5-30	84	27	9.0	2	7	M	9	5	8		5	leafy head; 1 plant; loose head
S392 X S240-5-30	91	24	8.5	3	7	M	5	5	7	3	5	
S240-5-30 X S396	81	28	9.0	4	7	M	7	9	9	5	7	
S396 X S240-5-30	77	27	8.0	3	7	F	5	8	9	5	7	very nice, uniform segments; loose heads
S398 X S240-5-30	81	21	8.0	4	7	M	7	5	7	5	5	uniform florets with good size
S240-5-30 X S399	84	23	6.5	5	7	M	7	5	7	9	7	nice uniform segments; 2 plants
S399 X S240-5-30	91	29	8.0	4	5	M	5	7	7	5	7	
S240-5-30 X S400	91	27	7.0	4	7	M	5	5	5		5	2 plants
S400 X S240-5-30	93	27	8.0	4	7	M	7	7	5	7	7	
S403 X S240-5-30	84	28	11.0	2	9	F	7	7	9	7	3	segments broken into secondary segments; loose head
S240-5-30 X S410	91	26	8.5	4	7	F	7	5	8		5	small segments; 2 plants, 1 blind; loose head
S410 X S240-5-30	91	27	9.0	4	7	M	7	7	7	5	5	2 plants; loose head
S240-5-30 X S411	93	27	7.0	4	7	F	7	5	7	5	5	loose head
S411 X S240-5-30	91	27	8.5	4	7	F	7	7	8	9	7	2 plants; loose head
S240-5320 X S413	93	31	8.5	3	7	M	7	7	8		7	1 plant; loose head
S413 X S240-5-30	93	31	8.0	3	7	M	7	7	9	3	5	loose head
S414 X S240-5-30	93	27		2	7	C	7	6	8	3	5	rough heads
91-213-1-1-3-2 X S240-5-30	110	22	7.0	4	7	C	7	5	5		5	1 late plant
S240-5-30 X 91-232-4-1-2-1	105	21	8.0	4	7	M	7	5	5		5	1 very late blind plant
Excelsior	84	18	7.0	5	5	M	5	3	5	3	5	
Legend	79	20	7.0	4	3	C	3	3	3	3	3	
Arcadia	91	24	10.5	4	5	M	1	4	5	5	5	

Table 3. Observation data of OSU broccoli hybrids grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
Emerald City	91	23	8.5	4	5	M	5	5	3	3	3	rough head; irregular bead development
Shogun	98	26	9.0	4	7	M	3	3	5	5	5	
Samurai	100	19	8.5	4	5	F	3	3	5	3	3	

[z]Scale of 1-9 where 1 = extreme concave, 3 = slight concave, 5 = slight dome, 7 = moderate dome and 9 = extreme dome.

[y]Scale of 1-9 where 1 = poor and 9 = excellent.

[x]F = fine, M = medium, and C = coarse beadsize.

Table 4. Average Inbred Performance of Broccoli hybrids grown at the OSU Vegetable Farm in 1998.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]
S240-1 crosses	79.9	22.8	6.9	5.0	7.0	6.8	6.0	6.3	6.4	6.5	6.2
S240-5-1 crosses	84.1	27.5	7.8	3.8	7.0	2.8	6.3	7.0	8.2	6.4	6.3
S240-5-5 crosses	82.6	25.3	8.2	4.0	7.0	1.6	6.0	6.1	7.6	5.7	5.4
S240 -5-8 crosses	86.5	27.8	8.2	3.5	7.0	2.7	6.7	6.5	8.1	5.9	5.3
S240-5-12 crosses	82.8	27.2	7.6	4.4	7.0	1.5	6.7	6.7	8.3	6.0	6.0
S240-5-17 crosses	85.4	26.1	8.2	4.3	7.0	3.6	6.2	6.5	7.8	6.2	6.7
S240-5-20 crosses	86.6	26.8	7.7	4.3	7.0	2.6	6.2	6.7	7.9	5.9	6.0
S240-5-24 crosses	86.8	27.0	8.1	4.0	7.1	2.3	6.5	6.9	8.1	5.6	5.3
S240-5-26 crosses	86.8	27.9	8.5	4.4	6.9	4.0	6.5	6.8	7.7	5.9	6.4
S240-5-30 crosses	89.8	26.0	8.4	3.6	7.0	4.5	6.7	6.1	7.3	5.4	5.8
S370 crosses	80.5	24.5	7.3	4.2	6.9	3.4	6.2	6.5	8.1	6.1	6.3
S384 crosses	88.8	24.1	8.6	3.9	7.0	4.0	7.0	5.9	7.4	4.7	4.3
S387 crosses	81.7	24.1	8.7	3.6	7.0	5.0	6.5	5.9	7.9	5.8	6.1
S389 crosses	82.9	25.0	7.9	5.1	7.0	3.6	5.7	6.4	6.6	5.9	6.8
S391 crosses	82.6	26.1	8.1	4.3	7.0	2.2	7.0	6.7	7.9	6.3	5.3
S392 crosses	86.9	27.2	8.2	4.4	7.0	2.6	6.0	6.4	7.9	5.5	6.8
S396 crosses	78.4	26.6	7.5	4.5	7.0	2.2	6.3	7.8	8.4	6.3	6.2
S398 crosses	78.5	25.7	6.7	5.1	7.0	3.1	5.9	6.9	7.6	6.1	7.3
S399 crosses	79.4	24.8	6.8	5.3	6.9	3.7	6.2	6.1	7.1	5.9	7.1
S400 crosses	89.3	29.4	8.4	3.8	7.2	3.8	5.9	6.9	7.2	5.9	5.9
S403 crosses	82.3	26.3	8.3	3.3	7.2	3.2	6.2	5.7	7.6	6.7	4.8
S410 crosses	83.7	25.3	8.3	3.8	7.1	1.8	6.5	6.3	8.1	6.2	5.0
S411 crosses	90.3	27.2	8.1	3.8	7.0	4.1	6.8	7.2	8.2	7.3	6.9
S413 crosses	85.9	29.4	8.0	3.4	7.0	3.6	6.7	7.4	8.9	5.9	5.7
S414 crosses	83.7	25.1	7.7	3.7	7.0	4.3	6.2	6.1	8.4	5.9	6.0

Table 4. Average Inbred Performance of Broccoli hybrids grown at the OSU Vegetable Farm in 1998.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]
91-213-1-1-3-2 crosses	91.2	30.2	7.9	4.5	7.0	3.4	6.6	6.4	6.8	5.7	6.1
91-219-2-2-3-1 crosses	96.2	28.7	9.4	2.4	7.0	2.8	6.8	7.3	8.4	6.0	5.0
91-232-4-1-2-1 crosses	93.6	26.6	8.1	4.5	7.0	3.1	6.4	6.1	6.6	6.0	5.7

[z]Scale of 1 to 9 where 1 = extreme concave head, 3 = slight concave head, 5= slight dome, 7 = moderate dome and 9 = extreme dome.

[y]Scale of 1 to 9 where 1 is poor and 9 is excellent.

[x]Scale of 1 to 9 where 1 = fine, 5 = medium, and 9 = coarse.

Table 5. Observation data of OSU broccoli inbreds grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
S240-1	105	24	6	4	7	C	7	7	7	5	5	head rot
S240-5-1	110	32	6.5	3	7	M	7	8	8	3	5	rough head; irregular segment development; loose head
S240-5-5	105	23	9.5	4	7	F	7	5	7	5	5	head rot; not well exserted; segments irregular with tendency to break into secondary segments; loose head
S240-5-8	105	29	8	4	7	M	7	9	7	5	9	offtype taller with very open head; well sized, uniform segments
S240-5-12	105	27	10	3	7	F	7	7	9	7	7	very loose head; segments are small and break into secondary segments
S240-5-17	105	23	8.5	2	7	C	7	7	7	7	7	severe head rot; uniform segments
S240-5-20	91	27	9	3	7	M	5	8	9		7	earliest of S240 series; 1 plant; loose head
S240-5-26	105	28	10	3	7	F	7	8	7	7	5	rough head; segments are too small; loose head
S240-5-30	105	27	6.5L	2	7	M	7	8	9	5	5	head rot; center segments delayed development but outer segments have nice shape and size
S310	91	13	8.5	3	7	M	5	5	5	5	3	irregular bead size
S315	72	17	6	4	5	C	5	7	1	3	5	variable floret size; generally small
S352	91	19	7.5	4	5	C	5	5	5	3	5	strong primary head dominace; blue-green waxy leaves
S370	77	23	5.5	5	7	C	5	9	1	5	5	small upper stem leaves
S384	93	18	5	5	7	C	3	5	3	3	5	head rot
S387	77	22	6.5	4	7	C	7	9	3	5	3	
S389	76	22	6	7	9	M	7	5	5	3	7	florets tend to be small; much branching
S391	74	25	6	7	7	M	7	9	3	3	7	some leafy heads; small florets
S392	91	34	8	3	7	M	7	9	9	5	7	loose head
S396	73	28	5	7	7	M	7	9	5	5	7	variable segmentation; most extreme exsertion; much branching
S398	81	27	4.5	7	5	C	7	9	3	5	7	small upper stem leaves; strong central stem dominance
S399	77	20	4.5	7	7	C	7	7	1	5	7	small heads
S400	84	26	4	5	7	M	3	9	7	7	7	
S403	84	23	5	4	7	F	5	5	9	3	3	small open head; small florets
S410	84	23	6.5	4	7	F	7	9	8	5	7	small secondary florets

Table 5. Observation data of OSU broccoli inbreds grown in an unreplicated trial planted 13 July.

Source	Maturity (days)	Plt Ht (in)	Head Dia. (in)	Head Shape[z]	Head Color[y]	Bead Size[x]	Stem Color[y]	Head Exsertion[y]	Head Segment-ation[y]	Plot Uniform-ity[y]	Overall Score[y]	Comments
91-213-1-1-3-2	105	31	6.5	5	7	C	7	8	6	5	7	moderately tight head
91-219-2-2-3-1	105	20	6	3	7	M	5	3	7	7	3	nice segments but poor exsertion
91-232-4-1-2-1	91	25	6	4	7	C	5	7	3	5	5	tight head
91-219-2-2-2-1	101	27	9	3	7	F	7	8	7	3	7	might be nice as open-pollinated variety; select for uniformity; large head medium porosity

[z]Scale of 1-9 where 1 = extreme concave, 3 = slight concave, 5 = slight dome, 7 = moderate dome and 9 = extreme dome.

[y]Scale of 1-9 where 1 = poor and 9 = excellent.

[x]F = fine, M = medium, and C = coarse beadsize.