Report to the Oregon Processed Vegetable Commission
1989

1. Project Title: Broccoli breeding

2. Project Leader: J. R. Baggett

3. Project Status: Continuing, indefinite

4. Project Funding for Reporting Period: $6,000.00

5. Objectives:

Develop broccoli varieties for processing in western Oregon stressing:

a) Elongate habit with highly exserted heads easily accessible for harvest

b) Openly branched heads with heavy, clean stem for easy trimming and separation into spears or chunks

c) Medium fine, firm, uniform florets of good color and which are retained after freezing

d) Early to midseason maturity, concentrated high yield potential

e) Clubroot and downy mildew resistance

6. Report of Progress:

a) An early observation trial was planted April 14 to get a preliminary evaluation of the field crosses made in 1988. Some of the best field crosses and greenhouse crosses from previous years, and a number of commercial varieties, were also planted. Subjective notes and scores were taken for all material and the number of crosses versus selfs in the field grown hybrids were noted. Notes for commercial varieties are shown in Table 3.

89-1 (HS161-1 x S240-10) 86% crosses. Score 3.5. Tight segmented dome head, may not have adequate size and color. Very uniform.

89-2 (S240-10 x HS161-1) 100% crosses. Some notes as 89-1. A substantial number of selfs were found in the late trial. Good exsertion.

89-3 (HS161-1 x S240-11-2) 98% crosses. Score 3.5-4.0. Compact, little segmentation, yellow undercolor.

89-4 (S240-11-2 x HS161-1) 57% crosses. Same notes as 89-3 but too many selfs to be of use.

89-5 (S240-5 x S315A) 52% crosses. Score 3.0. Poor color, fair exsertion, no processing potential, and too many selfs.

89-6 (S366 x S364) Nearly 0% crosses. No potential because of large numbers of selfs. Plant and head very yellow in color.

b) A replicated yield trial was planted June 16 using 30 foot, two row plots with 20 inches between rows, and four replications. Some OSU hybrids included in this trial were not harvested because of excess selfed inbreds. Five OSU hybrids and six commercial hybrids were harvested weekly or more frequently, with yields expressed on a weekly basis in Table 2. Total yields in Table 1 show that the high exsertion-high color hybrids 87-3 and 87-4 produced about a ton/acre less than Gem. Yields of these hybrids was about the same in 1988, but Gem yields were higher in 1988. Highest yields were generally obtained from the varieties with heavy heads, poor exsertion, and poor color since these characteristics are highly associated. Broccoli plants with well exserted heads have long internodes and smaller heads in general. The highest yield was produced by Early Dawn, but this was in part due to overmaturity at harvest. Premium crop was very high in yield, but does not appear to have any potential for processing of quality broccoli in Oregon. Gem was higher in yield than OSU 87-3 and 87-5, but lower than most other commercial varieties. This trial indicates that the use of Gem and possibly 87-2 and 87-5 in preference to the low exsertion types, is dependent on higher processed quality.

OSU 88-3 and 88-4, HS161 x S240-5, yielded well and harvested very efficiently because of good head and plant form. These hybrids have been considered too light in color after processing.

c) The main planting of OSU inbreds, OSU hybrids, and commercial varieties was made June 27 in single rows 36" apart. Table 3 lists the best OSU hybrids evaluated and Table 4 includes notes from the commercial hybrids for both the early and late observation trials.

Fewer OSU greenhouse experimental hybrids than usual were available in 1989, but many of the best 1988 crosses were repeated. Those listed in Table 3 with a score of 3.5 to 4.0 are considered to have high potential and deserve repeating and further evaluation. Some of these, i.e. 88-5, 88-16, 88-36, 88-66, and 89-11, may have better potential than 87-3 and 87-5 for high exsertion along with bigger heads. However, as the overall size of these types increases, there is a potential problem with lodging when fertility is high. Several of the 1988 greenhouse hybrids listed above have already been produced as field crosses in the field in 1989. These will be evaluated in 1990.

A repeat evaluation of the 1989 experimental field crosses indicated a lower percent of crosses than was indicated in the early trial. For example, 89-2 and 89-3 had nearly 100% crosses in the early trial, but had nearly half selfs in the late trial. It is possible that the selfs were thinned out in the early trial, but not in the late trial. Thus, it is possible that our evaluation of percent crosses can be misleading.

New selections were made in new F_2 populations from the best 1988 crosses. These will be self-pollinated in the greenhouse for 1990 evaluation. F_4 families were planted in 1989 for continued selection in the development of new inbred parents.

Commercial Varieties: As in 1988, most of the commercial varieties observed in 1989 had large heads, short plants, poorly exserted heads, and bad color for processing. Some which should be reevaluated, based

on the scores and descriptions in Table 4 or based on the yield trial, are: FM-96, Tendergreen, 861268N, Pirate, and Early Dawn. None of these has good color and good exsertion combined.

7. Summary:

OSU 87-3 and 87-5, OSU hybrids with high head exsertion, continued to look good for quality, especially lack of fiber, good color, and good floret type. Yield of these hybrids was not as high as Gem, but was closer to Gem in 1989 than it was in 1988. High yields in commercial varieties was associated with large, poorly exserted heads, high fiber, and poor color. Breeding for better yielding, high exsertion types, by intercrossing existing OSU inbred lines and by developing new inbred lines, continued.

8. Signatures:

Submitted by:

Redacted for Privacy

Project Leader Date

Approved by:

Redacted for Privacy

Department Head Date

Table 1. Broccoli yield trial, Oregon State University, Corvallis, Oregon, 1989[1]

Variety	Source	Total No. Heads/Acre	Total Tons/Acre	Lbs./Head	No. Harvests	Avg. Tons/ Weekly Harvest	Tons Largest Weekly Harvest	Notes
87-3	OSU	22454	4.3	0.38	3	1.4	2.6	Highly exserted, good color, and floret type, size may not be adequate
87-5	OSU	16786	4.0	0.47	2	2.0	3.9	Similar to 87.3
88-1	OSU	21909	7.6	0.69	3	2.5	4.4	Very good yield, large heads, poor color
88-3	OSU	17222	6.1	0.72	2	3.0	3.1	Excellent plant and head form and yield; color moderately light
88-4	OSU	17876	6.3	0.71	2	3.1	3.4	Same notes as 88-3
Gem	Asgrow	19075	5.5	0.57	2	2.8	4.8	Tall plant, heads quite variable and rough, good color
Premium Crop		21255	8.7	0.82	2	4.4	6.1	Very poor exsertion, hard to pick; good wt., poor color; concentrated maturity
Pirate		18094	7.4	0.81	1	7.4	7.4	Very poor exsertion, hard to pick; stem color fair to good
Cruiser	Royal Sluis	21255	6.6	0.62	3	2.2	3.6	Poor color, poor exsertion
Early Dawn		22454	9.3	0.83	3	3.1	7.2	Possibly overmature at harvest, very early, poor exsertion, good color
Hi-Caliber		25179	6.9	0.55	3	2.3	3.4	Good exsertion, fair head color
LSD at 5%		3645	1.3	0.11				

[1]Direct-seeded June 16 in 30' plots, 20" between rows, two rows per plot, thinned to 10" between plants; 900 lbs/A 12-29-10 broadcast at planting time with 120 lbs. N side-dressed as urea on July 25.