



## Organic Seed Alliance

*Advancing the ethical development and stewardship  
of the genetic resources of agricultural seed*

PO Box 772, Port Townsend, WA 98368

# Purple Sprouting Broccoli 2014-2015 Trial Results



In partnership with Oregon State University  
and Washington State University



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## Introduction

Purple sprouting broccoli is an ideal crop for winter food production in the Pacific Northwest as it can be summer planted, overwintered, and harvested in late winter/early spring. The harvest window, commonly February through March, comes at a time when little diversity in fresh produce is available in the region and overwintering storage crops are waning. It is gaining popularity as a gourmet produce item distinct from traditional broccoli. The best varieties have tender stems, sweet flavor, and buds that are about 2 inches (5 centimeters) across and a beautiful purple color high in anthocyanins, a health promoting antioxidant.

The ability to overwinter this crop is critical for regional production, as plants must survive through the winter in order to produce sprouts in the late winter and early spring. Plants need to be well established going into the winter, however plants that are too large have less cold tolerance. The “sweet spot” size seems to be about two-thirds to three-quarters of full size. Most seed company representatives we have visited with recommend seeding in June to early July and transplanting eight to ten week old seedlings in mid-August to early September in the Pacific Northwest. Research is still needed to identify the optimum planting date for the various micro-climates around the region.

Unfortunately, there are few options for sourcing organic seed of this crop and ‘Santee’, the one organic variety we found available, was not in our 2014 trial. We plan to include it in the 2015 planting cycle. Several organic seed companies have expressed interest in trials of this crop, so hopefully organic availability will expand in the near future. There is also good potential to produce organic seed of this crop within the region and several open-pollinated options available. Organic Seed Alliance (OSA) is currently breeding a new organic variety in partnership with Organically Grown Company. Although seed is not currently commercially available, we plan to release it in the near future.

This project has focused on selection for winter hardiness, head quality, and flavor in breeding plots in Oregon and Washington over the past two years. Two of OSA’s breeding populations were included in this trial. Current sources for purple sprouting broccoli seed that we identified at the time of this report include Osborne Seed Company, High Mowing Organic Seeds, and Territorial Seed Company. Please also check Organic Seed Finder at <http://www.organicseedfinder.org/> to source organic options.

## Methods

The nine varieties included in this trial were seeded the first week of August 2014 and transplanted in the field the first week of September 2014.

The trial was planted in a replicated complete block design with three replications. Plots were ten feet long with two rows of six plants spaced eighteen inches apart, twelve plants total in each plot. The first varieties to mature had harvestable buds by the middle of February 2015. Harvest continued weekly until the end of March 2015.

All plots were evaluated and the data presented in the tables in results represent the average of the three replications. All evaluations were conducted “blind”, with only plot numbers presented until after evaluations were complete. Plots were scored for uniformity in the field. The number of plants in each plot was counted and assessed for the percentage of overwintering survival. Harvest dates were recorded and then categorized as early, mid, and late in timing of maturity according to the first harvest date. The diameter of the central head, side shoot bud size, and stem length were recorded at time of harvest. Buds varied in



the depth of purple color from a bright purple to a dull, bluish purple. The ranking for color in the evaluation was for the depth of color from a light purple (1) to a dark purple (5). Varieties also varied in stem color from green to purple, although stem color was noted it was not scored. Overall appearance and flavor were evaluated at a participatory taste evaluation on March 23, 2015, in Port Townsend, Washington, and March 30, 2015, in Portland, Oregon. Farmers, retailers, and chefs at these two events provided valuable feedback on appearance, flavor, and discussion of harvesting, marketing, and breeding potential for this crop.

## Discussion

Varieties varied considerably in all traits evaluated with no distinct trend toward better performance of the F1 varieties compared with open-pollinated varieties. Timing of maturity among varieties occurred in three main windows of time, but within the period of approximately one month. Selecting an early, mid, and late season variety may be the best approach to extending the window of timing of harvest and product availability on a single farm.

### *Winter Hardiness*

Winter hardiness is an important trait for this crop and 'Red Head', 'Red Fire', and OSA 206 were the most winter hardy while 'Red Matador' was the least hardy. The OSA breeding populations have survived temperatures in previous years as low as 8°F to 10°F (-13°C to -12°C), but at that temperature two-thirds of the population died. In 2014 this trial experienced temperatures down to 14°F (-10°C) and survivorship varied among varieties from 44% to 78%. The trial seeding date of early August and transplanting in early September is generally considered late both for seeding and transplanting purple sprouting broccoli on the Olympic Peninsula. Generally purple sprouting broccoli is seeded anytime from mid-June to mid-July, depending on the local climate. However, it turned out to be well timed as the vast majority of plants in the trial survived the winter. In 2014, the fall after planting, a sudden cold snap occurred in November with temperatures dropping to 14°F (-10°C) after a mild fall. The plants at one farm location on the Olympic Peninsula all died, while most of the plants in this trial (also exposed to 14°F (-10°C)) survived. The producer planted his field at least one month earlier than this trial and hypothesized that the larger size of the plants was the reason they were less cold tolerant.

### *Central Head Size*

The size of the central head varied significantly among varieties from 9.4 cm to 14.4 cm diameter. In general the varieties with larger central head size tended to have smaller buds on side shoots. 'Rudolph' F1 was the exception with large central head and large side shoot bud size. The size of buds on side shoots is important for the appearance of a full, attractive bunch and 'Rudolph', 'Red Head', 'Red Matador', and OSA 239 all had nice sized heads on side shoots. Producers who participated in the evaluation hypothesized that cutting the central head early may affect side shoot formation and bud size, but this is not confirmed. Producers and retailers also proposed that the central head might be cut and marketed differently than the side shoots.

### *Uniformity*

Varieties varied in uniformity, but overall none of the varieties were highly uniform and several open-pollinated varieties, including 'Red Head' and 'Cardinal', were similar to the 'Red Fire' F1 in uniformity. The bunching of varieties for marketing means the uniformity of appearance is not generally considered a high priority trait. The uniformity of quality (i.e. large bud size) is more important from a production perspective.

### *Flavor*

The flavor varied significantly among varieties in sweetness and in harshness. Harsh varieties had a more “mustardy” or sulfur flavor. They also varied in stem tenderness with some varieties significantly easier to eat raw than others. More stringy stems were also more difficult to harvest, as they did not tend to snap off the plant as easily. Unfortunately, ‘Red Matador’ and ‘Red Admiral’ were past maturity by late March when we hosted the participatory tasting evaluation and so were not included. ‘Cardinal’ was also not included in the taste evaluation because it was not yet mature at the time of the tasting. ‘Red Fire’ F1 and OSA 206 were the top choices for overall flavor. ‘Red Fire’ was described as sweet and floral while OSA 206 was described as sweet and slightly spicy.

### *Harvesting*

Producers and retailers are still developing methods for harvesting and presenting purple sprouting broccoli as a crop. Many producers bunch side shoots with a twist tie for marketing, while other producers sell shoots in a loose bin and priced by weight. Some varieties seemed to have more brittle heads that could be damaged if not carefully handled in bunches or loose bins. Producer feedback indicated a preference for more purple color in the stems, as it looks better and less messy when presented in a bulk or loose form, and if the individual flower buds break off or get damaged it is not as obvious as it is when the stems are highly contrasted green.

### *Variety Improvement*

Farmers, produce retailers, and chefs all discussed the potential for crop variety improvement and provided feedback that selection for winter hardiness, long stems, vibrant purple color, mild flavor, tenderness, and larger bud size are all desirable traits to consider in any breeding program.

# Results

Variety	Source	Organic	OP/ F1	Hardiness/ Harvestable Plants (%)	Plot Uniformity Overall (1- 5, 1=poor, 5=best)	Timing of maturity (1-3, 1=early, 3=later)	Central Head Diameter (cm)	Shoot Head Diameter (cm)	Stem Length (cm)	Bud Color (1-5, 1=light, 5=dark)	Appearance (1-5, 1=bad, 5=great)	Texture (1-5, 1=tough, 5=tender)	Overall Flavor (1-5, 1=worst, 5=best)
Red Matador	Osborne	No	F1	44.4	N/A	1	11.5	4.0	6.2	4.0	N/A	N/A	N/A
Red Fire	Osborne	No	F1	72.2	4.5	2	10.4	3.5	9.1	5.0	3.4	4.0	4.1
Red Admiral	Osborne	No	F1	62.5	N/A	1	12.0	2.8	N/A	3.0	N/A	N/A	N/A
Territorial	Territorial	No	OP	59.0	2.3	2	10.1	2.9	8.0	3.5	2.2	2.3	2.3
Cardinal	Tozer	No	OP	65.6	4.0	3	N/A	N/A	8.3	5.0	N/A	N/A	N/A
Rudolph	Osborne	No	OP	66.0	N/A	1	14.9	3.9	8.6	4.0	2.9	3.4	2.4
Red Head	Tozer	No	OP	77.8	4.2	3	11.7	3.9	6.1	4.7	3.5	3.5	2.8
OSA 239	Farm	Yes	OP	63.9	2.3	3	9.4	4.1	7.8	4.4	3.0	2.7	2.5
OSA 206	Farm	Yes	OP	75.0	3.0	3	11.4	3.4	7.8	4.6	4.3	3.3	3.7

Table 1: Overall summary for 2014-2015 purple sprouting broccoli variety trial results.

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Photos courtesy of Organic Seed Alliance

**Reference as:**

**Colley, M., Davis, K., McKenzie, L. 2015. Purple Sprouting Broccoli 2014-2015 Variety Trials. Organic Seed Alliance, Port Townsend, WA.**

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**Educational Materials**

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