



## 2021 Winter Tomato Variety Trial Report

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### Objectives:

- Evaluate 17 winter storage tomato varieties for productivity, quality, and storability under dry farmed conditions (Oak Creek Trial)
- Evaluate 3 winter storage tomato varieties with growers throughout the western US using SeedLinked App (Grower Trial)

### Oak Creek Winter Storage Tomato Trial Summary:

Seventeen winter storage tomato varieties were dry farmed at the Oak Creek Center for Urban Horticulture (see Table 1 and Image 1). The soil of the dry farm plot was classified as a Woodburn by Andy Gallagher and was estimated to have 12 inches of available water holding capacity (AWHC) in the first 5 feet of soil (a high AWHC, making it a good soil for dry farming). The soil has high concentrations of most nutrients and has a history of high BER incidence.

Plots were transplanted in mid-May, with four plants in each plot. Plant spacing was 4 feet in row and 4 feet between rows. Tomatoes were harvested weekly from 8/2/2021 to 9/23/2021. During harvests, ripe and breaking (almost ripe) fruit were collected using clippers. After a plot was harvested the fruits were sorted into marketable and unmarketable portions, and then fruits were counted and weighed. The types of blemishes on unmarketable fruit (blossom end rot, splitting, sunburn, and others) were recorded. Of the 17 varieties, seven were eliminated due to either high disease incidence (major necrosis or fruit blemishing) or over 50% blossom end rot (see Image 2 for BER reference) for at least three weeks (see Table 3).

On 9/23/2021, we began sorting the fruit for storage. We selected a subset of the fruit from each harvest for each variety to collect brix (% sugar by mass) and pH data through the winter storing period. The remainder of the fruit were stored in boxes or strung up as ristras (see Image 3). The storage environment was a tin roof storage building with a fan for circulation that had a relative humidity of 76 % and temperature during storage period ranged from 40 to 60 °F.

Results of the trial are presented in Table 2.

- Highest unblemished yield at harvest: Annarita (16 tons/acre), Petit del Ramallet (14 tons/acre), St. Jaume de Sesoliveres (13 tons/acre), Piennolo Giallo del Vesuvio (13 tons/acre), and Pendolino F1 (13 tons/acre)
- Highest unblemished yield after 3.5 months of storage: Annarita (14 tons/acre) and Petit del Ramallet (13 tons/acre)
- Highest Degrees Brix after 2 months of storage: Bombeta (9.7 °Bx), Mallorqui (9.4 °Bx), Piennolo Giallo del Vesuvio (8.4 °Bx)
- Storage in box nearly always resulted in more fruit loss than storage as ristra

**Table 1:** Seed sources, origin, and descriptions

Variety	Full Name	Seed Sources	Color	Provenance	Traditional storage
<b>Piennolo del Vesuvio</b>	Piennolo del Vesuvio	Fruition Seeds*, Salerno	Red	Napoli region of Italy	Hanging in ristra
<b>Pendolino F1</b>	Pendolino F1	Top Seed*, Salerno	Red		
<b>Piennolo Giallo</b>	Piennolo Giallo del Vesuvio	Salerno	Yellow	Napoli region of Italy	Hanging in ristra
<b>Annarita</b>	Pomodoro Pumidori de Jerno sel “Annarita”	Smarites.Bio*, Uprising Seeds	Red	Puglia region of Italy	Hanging in ristra or stored in wooden boxes
<b>Bombeta</b>	Tomaquet de Penjar Bombeta	The Seedstead*	Red	Catalonia	Hanging as whole plant
<b>Grappoli d’Inverno</b>	Grappoli d’Inverno	Adaptive Seeds*	Red	Italy	Hanging in ristra
<b>Principe Borghese</b>	Principe Borghese	Adaptive seeds	Red	Italy	Dried
<b>Can Bogunya</b>	Tomate de colgar Can Bogunya	Les Refardes*	Orange/Red	Catalonia	Hanging in ristra
<b>Petite del Ramallet</b>	Tomate de colgar pequeño del Ramallet	Les Refardes*	Orange	Catalonia	Hanging in ristra
<b>Mala Cara</b>	Tomate de colgar Mala Cara	Les Refardes*	Red	Spain	Hanging in ristra
<b>Mallorqui</b>	Tomate de colgar Mallorqui	Les Refardes*	Red	Island of Mallorca, Spain	Hanging in ristra
<b>Son Gil</b>	Tomate de colgar Son Gil	Les Refardes*	Pink	Spain	Hanging in ristra
<b>Montgri</b>	Tomate de colgar Montgri	Les Refardes*	Red	Catalonia	Hanging in ristra
<b>Pera Delta</b>	Tomate Pera Delta	Les Refardes*	Red	Spain	
<b>Fakel</b>	Fakel	Nichols Garden Nursery*, Adaptive seeds	Red	Russia	Stored in newspaper
<b>St. Jaume de Sesoliveres</b>	St. Jaume de Sesoliveres	Les Refardes*	Red	Anoia region of Catalonia	Hanging in ristra

\*Seed source used in trial

**Table 2: Oak Creek Variety Trial Yield, Fruit Quality, and Storage Data Summary**

Variety	Unblemished yield (tons/acre)	Total crop unblemished (%)	Blemishes (N/A for less 10% blemished)	Average fruit size (oz)	Degrees Brix (°Bx)	Fruit remaining after storage as ristra*		Fruit remaining after storage in box*	
						%	tons/acre	%	tons/acre
<b>Annarita</b>	16	96	N/A	0.8	6.8	89	14	81	13
<b>Bombeta</b>	7	70	BER, sunscald	0.4	9.7	72	5	22	1
<b>Mallorqui</b>	4	84	BER	0.8	9.4	72	3	50	2
<b>Mala Cara</b>	8	78	BER	1.4	6.7	57	5	19	2
<b>Pendolino F1</b>	13	68	BER, Splitting	0.5	7.9	75	9	N/A	N/A
<b>Piennolo Giallo del Vesuvio</b>	13	98	N/A	0.3	8.4	82	10	54	7
<b>Petit del Ramallet</b>	14	94	N/A	0.8	7.2	91	13	89	13
<b>Piennolo del Vesuvio<sup>1</sup></b>	10	97	N/A	0.5	N/A	70	7	58	6
<b>Piennolo del Vesuvio<sup>2</sup></b>	8	94	N/A	0.4	8.0	75	6	89	7
<b>Son Gil</b>	9	55	BER	1.9	6.9	N/A	N/A	86	8
<b>St. Jaume de Sesoliveres</b>	13	91	N/A	1.8	6.8	38	5	34	4

\*After 3.5 months of storage; <sup>1</sup>seed from fruitlet seeds; <sup>2</sup>seeds saved from previous season

**Table 3:** Varieties Eliminated from the Trial

Variety	Reason for Elimination
Principe Borghese	Disease and learned that this is a drying variety, did not last long enough to store properly
Grappoli d'Inverno	Eliminated due to disease, possibly contaminated seed stock May re-evaluate in future trials if seed stock is available
Montgri	High Blossom End Rot
Mt. Vesuvius	A lack of consistent info from the seed source
Pera Delta	High Blossom End Rot
Can Bogunya	High Blossom End Rot
Fakel	High Blossom End Rot



**Image 1:** (left) the growing site through the season (photos courtesy of Asher Whitney); **Image 2:** (center) Heavy Blossom End Rot (BER) on medium sized tomatoes (photo courtesy of Matt Davis); **Image 3:** (Right) A partially built ristra (photo courtesy of Asher Whitney).

**Grower Trial Summary:**

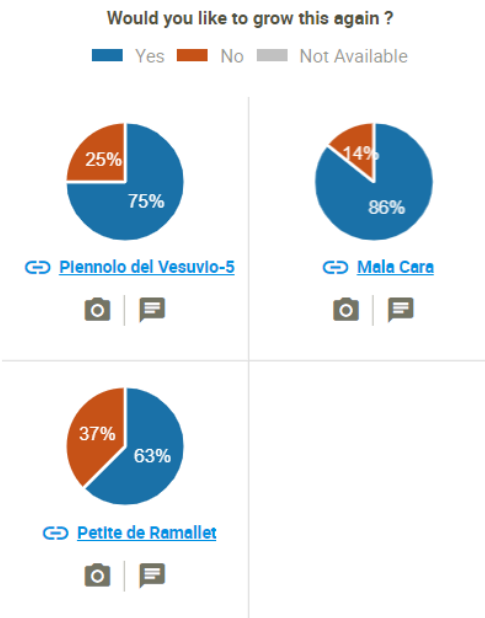
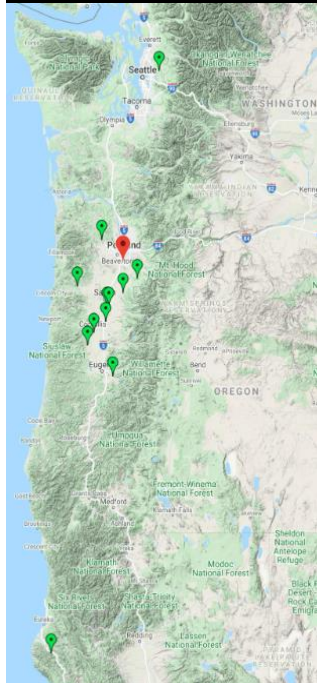
For the grower trial via SeedLinked, the 16 growers were given seed or starts based on location (see Image 4 for grower location). They were provided a protocol detailing planting, management, harvest, storage practices and rating guidelines. At the end of the season, growers were asked to rate the varieties on 1-5 scale across several categories; the protocol had examples of a 1 and 5 in each category. Average rating across eight farms is presented in Table 4. It should be noted that many growers experienced stunting, blossom loss, fruit drop, late maturing or crop failure due to the extreme heat events of 2021.

Out of the three varieties, Piennolo del Vesuvio had the highest yield, quality, and overall ratings. In contrast to the Oak Creek Trial Mala Cara had the highest storage rating. While 83% of growers said they would grow Mala Cara again, only 75% said they would grow Piennolo del Vesuvio again and 63% said they would grow Petit del Ramallet again (see Image 5). It should be noted much of the data from growers differs significantly from the Oak Creek results. Some growers commented they would like to grow these again under less severe heat and drought conditions.

**Table 4:** SeedLinked Data Summary (Ratings on 1-5 Scale). Different traits had a different number of responses (from 5-8 responses).

Variety	Yield Rating	Quality Rating*	Earliness	Disease Resistance	Blossom End Rot Resistance	Storage Rating	Overall Rating
Mala Cara	2.5	2.8	2.1	4.7	4.8	3.6	2.6
Petite del Ramallet	2.9	3.1	2.6	4.6	4.8	3.0	2.8
Piennolo del Vesuvio	3.6	3.7	3.3	4.4	4.7	3.3	3.0

\*Quality rating is an average of appearance, flavor, and marketable yield ratings.



**Image 4:** (left) Map of grower locations across the PNW  
**Image 5:** (right) Pie charts showing which varieties growers would grow again.

**Future Exploration:**

For the future of these varieties there are a few different paths to develop a stronger understanding of the higher performance varieties. One option would be to hold a replicated, on farm, trial with the highest performers including Annarita, Petit del Ramallet, Peinnolo del Vesuvio, Peinollo Giallo del Vesuvio, Mala Cara, and St. Jaume de Sesoliveres (Grappoli d’Inverno & Pendolino F1 if seed can be obtained). During a replicated trial it would be beneficial to hold a tasting trial for these varieties to examine consumer preferences in Winter Tomatoes. Another path would be to explore the performance of these varieties in a no till comparison. A no till comparison could be coupled with a mulching treatment to examine best no till practices for the Winter Tomato varieties. There is also some interest in crossing some of the medium fruited varieties such as Mala Cara, Son Gil, and St. Jaume de Sesoliveres, to select for better field and storage quality. We are excited to further explore and share the benefits of Winter Tomatoes.

**Special Thanks:**

I would like to extend a special thanks to all who helped to make this project possible through seed donation and grower participation, including the Dry Farming Collaborative, Culinary Breeding Network, SeedLinked and all the wonderful team members who helped to manage and harvest the field trial at Oak Creek.