Organic Seed Alliance

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

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California Organic Rutabaga Variety Trial 2013-2014

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Materials and Methods

Pinnacle Organic Farm is located about four miles east of Hollister, California, in northern San Benito County. The soil texture is clay to silty clay loam.

See Table 1 for average high and low temperatures and rainfall for Hollister throughout the year.

Nine rutabaga varieties (eight yellow-fleshed and one white-fleshed) (*Brassica napus*) and one white-fleshed turnip (*Brassica rapa*) were grown and evaluated for their emergence rate, root quality and appearance, and storability. Although all varieties were sampled and eaten, the only formal flavor data compiled was a sampling of the remaining three varieties 235 days after planting.

Seed was direct-seeded within a larger production field of rutabaga on August 2, 2013, and again on October 2, 2013, using a Jang precision seeder. Approximately four seeds per foot were sown. At the time of each planting, the soil was dry and somewhat rocky. Overhead irrigation was used throughout the season.

Each variety was replicated twice in the field. Each plot was 18 bed-feet with two rows per bed (i.e., 36 row-feet per plot and 72 row-feet per variety). There were 12 inches between rows, and 40 inches between bed centers. There were two bed foot gaps between plots.

Table 2 lists the rutabaga varieties, sources, and owner/breeder. Pinnacle Organic Farms' primary rutabaga variety, 'Laurentian', was included in the trial.

Results and Discussion

Plots were checked on August 16, 2013, two weeks after planting. Many of the varieties had spotty emergence. This could partly be due to planting too deep and slow emergence, and also the seeding rate may have been too light. Table 3 indicates the emergence rate two weeks after planting. Varieties in the trial had 1 - 2.5 roots per foot, whereas in the surrounding field planted with the tractor-mounted seeder, there were 3 - 3.5 plants per foot.

Observations were made on October 15, 2013, 47 days after planting. Roots for all varieties were sizing up to about 2 - 3 inches in diameter. At that point, 'Purple Top Turnip' was ready to harvest or even a little past its prime, with roots 3 - 4 inches in diameter. 'Gilfeather Turnip' had a very different appearance from the other rutabagas. It was lower growing, had darker green foliage, and was more vigorous. 'Marian', 'Magras', and 'Joan' had the largest tops. 'Major Dunne' also had large tops, but the leaves appeared to have virus symptoms.

First harvest occurred on October 29, 2013, 61 days after planting. Populations of all varieties were relatively low due to inconsistent emergence. Final densities ranged from one root every 9 inches ('Joan' and 'Magras') to one root every 21 inches ('Angela'). Therefore, without any crowding all roots were able to grow to full size. Less than 10% of the roots were pulled at this harvest. The majority of the roots were harvested on November 12, 2013 (75 days after planting). All roots from these two harvest dates were evaluated for their degree of surface scarring (see Table 4). Rutabagas that had little or no scarring were judged to be marketable roots, while those with significant scarring were considered rejects. The varieties with the best root quality were 'Magras', 'Gilfeather Turnip', and 'Helenor', which all had 95% or greater marketable roots. In the second best group were 'Joan' and 'Laurentian' with about 85% marketable roots. All the other varieties had less than 80% marketable roots.

After the November 12, 2013 harvest, 4 - 6 roots of each variety were packed in clean, damp sand in a 49 gallon plastic tote and stored in a dark, cool (45° - 60°F) garage. All roots that were cooked and eaten over the first two months in storage were very flavorful, firm, and sweet. After two months the remaining roots in storage began to break down, becoming soft and less edible. On March 25, 2014, (4.5 months after harvest) only four remaining varieties had firm roots. Three of these – 'Joan', 'Helenor', and 'Laurentian' – had very solid roots, and when cooked the flavor was bland but still OK to eat. The fourth variety – 'Gilfeather Turnip' – was starting to get soft and it had an unpleasant off-taste.

The second planting on October 2, 2013, had even poorer emergence than the first planting. High temperatures throughout October brought on an infestation of flea beetles, which ultimately consumed the young rutabaga seedlings and the trial was discontinued.

Conclusions

Rutabaga is certainly a minor crop in the U.S. However, it could take on much greater significance, as it is already an important food crop in many European countries. There has been minimal breeding done on this crop, and there is a definite opportunity to improve the quality of the germplasm currently available. This trial demonstrated a wide difference in at least one quality: root surface scarring, a trait that can be selected for quite easily. Increasing the length of time a root can be stored is another very attainable attribute. Flavor, which was not considered in this trial, is probably a much more difficult trait to make improvements upon, although it should be evaluated whenever possible.

	Aug	Sep	Oct	Nov
Average High Temp (°F)	81°	82°	74°	69°
Average Low Temp (°F)	55°	54°	45°	40°
Precipitation (inches)	0	0	0.02	0.36

Table 1. Monthly average high and low temperatures and rainfall, Hollister, California (August - November 2013).

Name	Seed Type	Source	Variety Type (Breeder)
'Joan'	Organic	High Mowing Organic Seeds	OP
'Laurentian'*	Conventional	Johnny's Selected Seeds	OP
'Helenor' F-1	Conventional	Johnny's Selected Seeds	F1 (produced by Bejo Seeds)
'Marian'	Conventional	Chiltern Seeds	OP
'York'	Conventional	Vesey's Seeds	OP
'Magras'	Conventional	Territorial Seed	OP
'Purple Top' Turnip	Conventional	Territorial Seed	OP
'Gilfeather' Turnip	Organic	Wild Garden Seed	OP
'Angela'	Organic	Adaptive Seeds	OP
'Major Dunne'	Organic	Adaptive Seeds	OP

* This was the grower's variety in the surrounding field
OP = open-pollinated, no intellectual property restrictions
F1 = F1 hybrid

Table 2. Rutabaga entry names and sources

Variety	Plants Emerged (rep1)	Plants Emerged (rep 2)	Plants Emerged (total)	Average Plants per Foot
'Joan'	93	78	171	2.1
'Laurentian'	80	77	157	2
'Helenor'	38	46	84	1.1
'Marian'	63	79	142	1.8
'York'	66	81	147	1.8
'Magras'	90	94	184	2.3
'Purple Top'	115	93	208	2.6
'Gilfeather' Turnip	45	60	105	1.3
'Angela'	30	35	65	0.8
'Major Dunne'	63	69	132	1.7

Table 3. Plant emergence 14 days after sowing.

Variety	# Roots with no scars	# Roots with few scars	# Roots with many scars	% Marketable roots*
'Joan'	42	24	10	87
'Laurentian'	29	11	7	85
'Helenor'	25	11	2	95
'Marian'	20	12	15	68
'York'	19	10	14	71
'Magras'	58	3	1	99
'Gilfeather' Turnip	44	2	1	98
'Angela'	13	7	6	77
'Major Dunne'	22	10	14	70

*Note: Marketable roots have either minimal or no scarring

Table 4. Root appearance -- degree of scarring on root surface (two harvests combined).

On April 7, 2014, 247 days after planting, and nearly five months in storage, ‘Laurentian’ was one of the four varieties that was still edible with relatively firm roots.

White-fleshed ‘Gilfeather Turnip’ peeled (247 days after planting).

Yellow-fleshed ‘Laurentian’ rutabaga peeled (247 days after planting).

Interior of “Gilfeather Turnip’.

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Photos courtesy of Moria Peters

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Educational Materials

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