
Project Title: Identification of Crops and Cultivars of World Vegetables

Project Number: FI 2013-0017

Final Report

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Date of Submission: March 1, 2016

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ABSTRACT

A number of non-traditional crops were evaluated in successive plantings in 2 locations in NS, on mineral and peat based soils. Most notable after two seasons were 'Black Magic', 'Red Russian' and 'Premier' kale, 'Hakurei' and 'Scarlet Queen' turnip, watermelon radish, 'Chioggia', 'Touchstone Gold' and 'Tanus' beet, 'Punto' dandelion and 'Summerfest' komatsuna mustard green. Production was slightly earlier and yield higher in 2014 in general on peat based soil, due to higher soil moisture and temperature. In 2015 the mineral based soil crops were more comparable in yield. The availability of irrigation was likely a factor.

Project Objective: To evaluate crop cultivars of vegetables considered world vegetables (not traditionally grown in Canada) on peat based and mineral soil.

Materials and methods: Crops within this trial were established in 5 successive plantings in each of two locations on peat and mineral soil. Crops included curly and black kale, specialty salad turnips, colored beets, a selection of specialty brassicas including rapini, broccolini and sprouting broccoli and several others such as watermelon radish, fresh soy bean and scorzonera. Data collected included yield and quality parameters as per Canada grade standards (where available), farmer and researcher expertise and market requirements.

Results and discussion:

Brassicas: Cultivars of rapini, sprouting broccoli, broccolini and flower bud Asian greens were tested. 'Atlantis' broccolini produced a single, large head then continued to produce lateral side shoots that were of marketable quality. In 2014, 'Santee' sprouting broccoli produced a more open head and produced many side shoots over an extended period after the terminal was removed. No marketable yield was produced in 2015 due to bolting. 'Zamboni' rapini produced good quality rapini in most plots although bolting was also a concern. In 2014 and 2015, 'Hon Tsai Tai' produced a small amount of marketable crop of good quality but often bolted prior to harvest.

Beets: 'Bolder' golden beet produced a good yield. Roots were a bit larger than the other cultivars and the golden interior color was very good. 'Touchstone Gold' had a better appearance as it produced a smoother root. 'Chioggia' produced roots with white and pink striped flesh that were very attractive. It produced good yields in both years. 'Blankoma' produced round, white skinned and fleshed roots and 'Tanus' was an elongated red cultivar excellent for slicing. 'Detroit Dark Red' was the standard round, red cultivar included in the trial. Most plots of individual cultivars over the seasons and from one location to another produced similar yields. However, the overall results for 'Detroit Dark Red' was reduced by a poor plant stand in one of the plantings in 2014.

Turnips: two specialty salad cultivars were included, 'Hakurei' white and 'Scarlet Queen' red, in both seasons. Both cultivars were very attractive, excellent quality and had excellent flavor, similar to radish. The root size and crown of leaves were larger for 'Scarlet Queen' resulting in a heavier yield.

Watermelon radish performed well in both locations in 2014. It produced large roots with a variety of exterior color shades including green near the stem, fading to white then pink near the root. The interior was spectacular pink and flavor was excellent. In 2015, the cultivar 'Red Meat' was included in addition to the original selection of watermelon radish planted in 2014. The two cultivars looked similar and produced similar results. However, both exhibited significant bolting in some plantings in 2015.

Kale: 'Red Russian' and 'Blue Curled Scotch' produced high yields of good quality curly or frilly leaf kale in both seasons. 'Premier' was included in 2015 and produced a high yield. 'Black Magic' was a superior quality black kale with high yield in both seasons. The 'Black Kale' selection from Bejo seeds was only included in one planting in 2014 but was grown in all plantings in 2015 and produced good yield and high quality. 'Toscano' produced good yields in both seasons although quality was somewhat less than the other cultivars.

Komatsuna: Over the 20 plots grown in two seasons, 'Summerfest' proved a heavy producer of high quality mustard greens. 'Red Komatuna' produced beautiful red, high quality leaves but grew so slowly, much less yield was produced. It was also much less consistent with little or no marketable yield produced in some plots due to poor plant stand and/or extremely slow growth and subsequent bolting. 'Amara' produced good quality greens but yield was low due to significant bolting over all plantings.

Dandelion: 'Punto' and 'Clio' produced high quality greens with no pest damage and good flavour. These cultivars produced very upright leaves for ease of harvest and did not bolt. 'Garnet Stem' produced attractive green leaves with a dark red vein, but the plant was not as upright or high yielding as the other cultivars.

In 2014, 'Belstar Super' scorzonera produced such long roots that few were harvested intact. Roots were long and slender with a black exterior and cream colored interior. This was a long season root crop and performed best in the earliest plantings. In 2015, 'Belstar Super' was planted in the first two plantings only. The roots produced were shorter and thus the whole root was easier to recover intact.

Fresh soybeans were a long season crop and produced best in the earliest plantings. 'Butterbean' produced the best yield and quality over the two seasons.

'Kaleidoscope' flower sprout, a cross between Brussel sprouts and kale, were included in several plantings in this trial. Despite being topped similar to Brussel sprouts to encourage sprout sizing, no marketable product was produced in 2014. In 2015, three additional cultivars of flower sprouts were grown: 'Autumn Star', 'Snowdrop' and 'Mistletoe'. The plants that were topped produced a good quality, small sprout with several leaves on each. 'Autumn Star' produced the highest yield.

Conclusion and Summary: A number of crop cultivars included in this trial have the potential for commercial production. Most notable were ‘Black Magic’ kale, ‘Chioggia’ and ‘Touchstone Gold’ beet, ‘Hakurei’ and ‘Scarlet Queen’ turnip, Watermelon radish, ‘Punto’ dandelion and ‘Summerfest’ kamatsuna mustard green. In 2014, observations and yield data indicated that crops did produce a bit earlier with a heavier yield on peat based soil than the mineral soil likely due to the higher moisture and temperature experienced in this field. In 2015, results were similar from both locations.

Executive Summary: Horticulture Nova Scotia conducted a trial over 2 years investigating non-traditional crops in successive plantings in 2 farms in NS, on mineral and peat based soils. Most notable were ‘Black Magic’ kale, ‘Chioggia’ and ‘Touchstone Gold’ beet, ‘Hakurei’ and ‘Scarlet Queen’ turnip, Watermelon radish, ‘Punto’ dandelion and ‘Summerfest’ kamatsuna mustard green. Production was somewhat earlier and yield higher in general on peat based soil in 2014, due to increased soil moisture and air temperature. In 2015, results were similar from both locations. The availability of irrigation in the mineral soil plots in 2015 was a factor that contributed to this.

Acknowledgements: Thanks are extended to the following trial cooperators: Scott Newcombe, Dykeview Farms Ltd., Josh Oulton, Tap Root Farms, Dr. Raj Lada, NSAC and Prospect Agri-Services staff.

Table 1 . Seed Sources, 2014-2015

Crop	Cultivar	Description/ Type	Source	
Broccolini	Atlantis		Veseys	
Flower Bud Asian Greens	Gunsho		Johnny's	
	Hon Tsai Tai		Johnny's	
	Spring Raab		Johnny's	
Raab	Spring Raab		Johnny's	
Rapini	Zamboni		Veseys	
Sprouting Broccoli	Santee		Veseys	
Beets	Tanus	elongated	Veseys	
	Blankoma	white	Johnny's	
	Chioggia	pink/ white stripe	Johnny's	
	Boldor	yellow flesh	Veseys	
	Detroit Dark Red	red	Veseys	
	Touchstone Gold	golden flesh	Johnny's	
	Pablo Baby	mini	Veseys	
	Baby beet	mini	Johnny's	
	Turnip	Scarlet Queen	red	Johnny's
		Hakurei	white	Johnny's
Radish	KN-Bravo Daikon	purple	Johnny's	
	Nero Tondo	black spanish	Johnny's	
	Watermelon Radish		Norseco	
	Red Meat Watermelon Radish		Veseys	
Kale	Premier	frilly	Johnny's	
	Red Russian	red, frilly	Johnny's	
	Blue Curled Scotch	curly	Veseys	
	Winterbor	curly	Veseys	
	Ripbor	curly	Veseys	
	Scarlet Kale	red, curly	Veseys	
	Toscano	black	Johnny's	
	Black Kale	black	Bejo	
	Black Magic	black	Veseys	
Mustard Greens	Summerfest Komatsuna		Johnny's	
	Amara		Johnny's	
	Red Komatsuna		Johnny's	
Dandelion	Clio		Johnny's	
	Punto Italian		Veseys	
	Catalogna		Johnny's	
Flower sprouts	Garnet Stem		Johnny's	
	Autumn Star	early-season	Johnny's	
	Mistletoe	mid-season	Johnny's	
	Snowdrop	late-season	Johnny's	
	Kaleidoscope	three-color mix	Johnny's	
Scorzonera	Belstar Super		Johnny's	
Soybean	Butterbean		Johnny's	
	Envy		Johnny's	

Seed source indicates where seed was obtained for the trial; not necessarily the exclusive source.

Table 2. Brassica cultivar trial – yield, 2015

Cultivar	Marketable Head Weight (g)	Days to Harvest	% Marketable	Total Length (cm)
Atlantis Broccolini	119	71	100	33
Gunsho Flower Bud Asian	14	48	100	29
Hon Tsai Tai Flower Bud Asian	5	49	99	32
Spring Raab	36	55	100	34
Zamboni Rapini	30	47	100	29
Grand Mean	40.9	54.2	99.6	31.4

Table 3. Brassica cultivar trial – quality, 2015

Cultivar	Attribute Ratings ^z							Overall Quality
	Compactness	Head Shape	Flower Amount	Smoothness	Color	Leafiness	Uniformity	
Atlantis Broccolini	3	3	5	3	4	4	4	3
Gunsho Flower Bud Asian	3	3	3	4	4	3	3	3
Hon Tsai Tai Flower Bud Asian	3	3	3	4	4	4	3	3
Spring Raab	3	3	3	3	3	4	3	3
Zamboni Rapini	3	3	3	3	3	4	3	3
Grand Mean	3	3.1	3.5	3.2	3.6	3.8	3.2	2.9

^z Ratings of 1 - 5 with 5 = most desirable and 3 = average

Table 4. Beet, Turnip and Radish cultivar trial – yield, 2015

Cultivar	Yield t/ha	Days to Harvest	Top Size (cm)	Diameter (mm)	Average Bunch #/plot	% Unmarketable Crop			
						% Split	% Misshapen	% Oversize	% Undersize
Tanus Beet	24	63	32	48	15	0.5	1.7	0.1	13.4
Blankoma Beet	23	62	38	59	9	0	2.3	12.3	7.0
Chioggia Beet	23	62	35	61	12	3.8	2.3	4.1	6.8
Boldor Beet	18	61	34	65	9	4.9	21.9	4.6	6.7
Detroit Dark Red Beet	14	62	35	42	8	0	5	4.3	12.5
Touchstone Gold Beet	13	60	32	41	7	0	12.5	5.2	8.4
Pablo Baby Beet	12	57	32	59	11	0	3.8	27.7	5.6
Baby Beet	10	59	27	51	9	0	3.1	13.5	16.3
Scarlet Queen Turnip	27	53	39	51	12	4.3	7.8	19.5	7
Hakurei Turnip	18	53	28	43	10	2.1	14.6	15.4	5.7
KN-Bravo Daikon	31	53	38	115	8	17	13.2	4	6.8
Nero Tondo Radish	23	56	44	52	7	25.1	8.4	2.3	5.3
Watermelon Radish	10	51	39	47	3	37.6	6.7	5.1	2.7
Red Meat Watermelon Radish	11	52	40	112	3	17.3	36.1	15.8	0
Grand Mean	18.3	57.4	35.1	60.4	8.7	8.04	9.96	9.57	7.45

Table 5. Beet, Turnip & Radish cultivar trial – quality, 2015

Cultivar	Attribute Ratings ^z							
	Appear- ance	Color	Uniform Size	Uniform Shape	Uniform Color	Flavour	Texture (Pithiness)	Overall Quality
Tanus Beet	4	4	4	4	4	4	4	4
Blankoma Beet	3	3	3	3	3	3	4	3
Chioggia Beet	4	4	4	4	4	3	4	4
Boldor Beet	3	4	3	3	4	3	4	3
Detroit Dark Red Beet	4	4	3	3	4	4	4	3
Touchstone Gold Beet	4	4	4	4	4	3	4	4
Pablo Baby Beet	3	4	4	4	4	4	4	3
Baby Beet	4	4	3	4	4	4	4	4
Scarlet Queen Turnip	3	4	3	4	4	3	4	3
Hakurei Turnip	4	3	3	4	4	4	4	4
KN-Bravo Daikon	4	4	3	3	4	4	4	4
Nero Tondo Radish	4	4	3	3	4	3	4	3
Watermelon Radish	3	3	3	3	3	3	4	3
Red Meat Watermelon Radish	4	3	3	3	3	3	4	3
Grand Mean	3.6	3.6	3.3	3.4	3.8	3.5	4.1	3.5

^zRatings of 1 - 5 with 5 = most desirable and 3 = average

Table 6. Greens cultivar trial - yield and quality, 2015

Cultivar	Yield (t/ha)	Bunch Weight (g)	Days to Harvest	Stem Length (cm)	Stem & Leaf length (cm)	Leaf Characteristics ^z				Overall Quality
						External Color	Appearance	Uniformity	Insect Damage	
Premier Kale	24	236	62	17.7	37.6	3	3	3	4	3
Red Russian Kale	18	208	61	16.4	36.1	3	3	4	4	3
Blue Curled Scotch Kale	7	264	63	15.0	34.3	4	4	4	5	3
Winterbor Kale	4	240	63	12.6	32.6	3	4	4	4	4
Scarlet Kale	1	181	70	11.5	29.9	4	3	4	4	3
Toscano Kale	9	158	62	N/A	34.3	4	3	4	4	3
Black Kale	8	165	65	N/A	34.1	4	3	4	4	4
Black Magic Kale	7	159	66	N/A	33.4	4	4	4	4	4
Summerfest Komatsuna	34	299	53	13.9	38.7	3	3	3	3	3
Amara	3	152	46	12.6	29.1	4	4	4	4	4
Red Komatsuna	2	353	54	10.7	34.1	3	3	3	4	3
Clio Dandelion	23	575	59	N/A	41.6	4	4	4	5	4
Punto Italian Dandelion	22	651	61	N/A	44.3	4	4	4	5	4
Catalogna Dandelion	16	533	60	N/A	44.1	4	4	4	5	4
Garnet Stem Dandelion	13	391	59	N/A	44.2	4	4	3	5	4
Autumn Star Kalette	3	N/A	111	N/A	N/A	4	4	3	4	4
Mistletoe Kalette	2	N/A	111	N/A	N/A	4	3	3	4	4
Snowdrop Kalette	1	N/A	111	N/A	N/A	4	4	3	4	4
Kaleidoscope Kalette	1	N/A	111	N/A	N/A	4	4	4	4	4
Grand Mean	10.5	240.2	70.9	5.81	28.86	3.6	3.5	3.5	4.3	3.6

^zRatings of 1 - 5 with 5 = most desirable and 3 = average

Table 7. Scorzonera cultivar trial - yield and quality, 2015

Cultivar	Yield (t/ha)	Days to Harvest	% Marketable	Root Length (cm)	Attribute Ratings ^z						Overall Quality
					Tip Fill	Smooth- ness	Straight- ness	External Color	Internal Color	Core Proportion	
Belstar Super	11	133	92	22	3	3	4	4	4	3	4

^zRatings of 1 - 5 with 5 = most desirable and 3 = average

Table 8. Soybean cultivar trial - yield and quality, 2015

Cultivar	Yield (t/ha)	Days to Harvest	% Marketable	Attribute Ratings ^z				Overall Quality
				Exterior Color	Appearance	Uniformity	Insect Damage	
Butterbean	3	103	73	3	3	3	5	4
Envy	2	101	69	4	4	3	5	3
Grand Mean	2.4	101.9	71.1	3.4	3.4	3.1	5	3.5

^zRatings of 1 - 5 with 5 = most desirable and 3 = average

Table 9. Brassica cultivar trial – yield, 2014

Cultivar	Marketable Head Weight (g)	Days to Harvest	% Marketable	Total Length (cm)
Atlantis broccolini	111	74	91.8	29
Santee sprouting broccoli	52	57	100.0	30
Zamboni rapini	55	49	99.3	33
Grand Mean	72.4	59.8	97.0	30.8

Table 10. Brassica cultivar trial – quality, 2014

Cultivar	Attribute Ratings ^z								Overall Quality
	Compactness	Head Shape	Flower Amount	Smoothness	Appearance	Color	Leafiness	Uniformity	
Atlantis Broccolini	3	3	5	3	4	4	4	3	3
Santee Broccoli	2	3	4	3	3	3	5	3	3
Zamboni Rapini	3	4	3	3	4	3	3	3	3
Grand Mean	2.8	3.2	3.5	2.9	3.3	3.4	4.0	3.1	3.1

^z Ratings of 1 - 5 with 5 = most desirable and 3 = average

Table 11. Beet, Turnip and Radish cultivar trial – yield, 2014

Cultivar	Yield t/ha	Days to Harvest	Top Size (cm)	Diameter (mm)	Predicted Bunch #/plot	% Unmarketable Crop			
						% Split	% Misshapen	% Oversize	% Undersize
Chioggia Beet	23	47	36	38	14	1.5	1.0	8.2	2.6
Boldor Beet	26	52	34	30	12	1.8	9.0	0.6	3.0
Detroit Dark Red Beet	17	46	34	30	14	1.1	0.0	1.6	2.5
Tanus Beet	21	52	32	24	13	0.0	0.0	0.0	3.1
Scarlet Queen Turnip	40	44	40	43	16	8.4	2.0	9.3	4.8
Hakurei Turnip	26	44	32	37	15	5.2	1.1	13.2	6.0
Watermelon Radish	43	50	38	39	14	3.8	0.7	1	3
Grand Mean	28	47.9	35.3	34.4	14.1	3.1	2.0	4.8	3.5

Table 12. Beet, Turnip & Radish cultivar trial – quality, 2014

Cultivar	Attribute Ratings ^z							
	Appear- ance	Color	Uniform Size	Uniform Shape	Uniform Color	Flavour	Texture (Pithiness)	Overall Quality
Chioggia Beet	4	4	3	4	4	4	4	4
Boldor Beet	3	4	3	4	3	4	4	3
Detroit Dark Red Beet	4	4	4	3	4	4	3	3
Tanus Beet	3	4	3	3	4	4	4	3
Scarlet Queen Turnip	3	4	3	3	4	4	4	3
Hakurei Turnip	3	3	3	3	4	4	4	4
Watermelon Radish	3	3	3	3	3	3	3	3
Grand Mean	3.3	3.6	3.3	3.4	3.7	3.7	3.7	3.4

^z Ratings of 1 - 5 with 5 = most desirable and 3 = average

Table 13. Greens cultivar trial - yield and quality, 2014

Cultivar	Yield (t/ha)	Bunch Weight (g)	Days to Harvest	Stem Length (cm)	Stem & Leaf length (cm)	Leaf Characteristics ²				Overall Quality
						External Color	Appearance	Uniformity	Insect Damage	
Red Russian	18	265	55	17.0	40.9	3	3	3	4	3
Blue Curled Scotch	15	427	75	14.8	38	3	3	4	4	3
Ripbor	9	375	63	13.2	36.7	3	3	4	4	3
Winterbor	8	305	70	13.0	36.2	3	3	4	4	3
Black Magic	12	207	72	N/A	38.1	4	3	4	3	3
Toscana	7	302	61	N/A	38.8	3	3	4	3	3
Black kale	0.4	226	84	N/A	38.1	3	3	4	5	3
Summerfest Komatsuna	54	376	53	14.9	44.7	3	3	4	3	3
Red Komatsuna	3	568	70	16.0	41.1	4	4	3	3	3
Punto Italian Dandelion	16	525	61	N/A	44.1	3	4	4	4	3
Hon Tsai Tai	1	257	45	20.2	44.3	3	3	3	3	3
Grand Mean	12.9	348.5	64.4	9.9	40.1	3.2	3.3	3.5	3.8	3.2

²Ratings of 1 - 5 with 5 = most desirable and 3 = average

Table 14. Scorzonera cultivar trial - yield and quality, 2014

Cultivar	Yield (t/ha)	Days to Harvest	% Marketable	Root Length (cm)	Brittleness (% broke)	Attribute Ratings ^z						Overall Quality
						Tip Fill	Smoothness	Straightness	External Color	Internal Color	Core Proportion	
Belstar Super	4.3	127	83.8	18.5	0	3	3	3	3	3	2	3

^zRatings of 1 - 5 with 5 = most desirable and 3 = average

Table 15. Soybean cultivar trial - yield and quality, 2014

Cultivar	Yield (t/ha)	Days to Harvest	% Marketable	Attribute Ratings ^z				Overall Quality
				Exterior Color	Appearance	Uniformity	Insect Damage	
Butterbean	10	107	95	3	3	3	5	3
Envy	2	110	93	2	3	3	5	3
Grand Mean	6	108	94	2	3	3	5	3

^zRatings of 1 - 5 with 5 = most desirable and 3 = average