

Fruit and Vegetable Production Data Collection 2013-2015

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Cooperators:

- **Jill Beebout & Sean Skeeahan** – Chariton – 2013-2015
- **Melissa & Andy Dunham** – Grinnell – 2013 & 2014
- **Tammy & Rob Faux** – Tripoli – 2013-2015
- **Stacy & Rick Hartmann** – Minburn – 2013-2015
- **Emma & Marcus Johnson** – Central City – 2013-2015

Web Link:

http://bit.ly/pfi_horticulture

Funding By:

Leopold Center for Sustainable Agriculture
USDA - Risk Management Agency
Ceres Foundation

- **Susan Jutz** – Solon – 2013-2015
- **Jan Libbey & Tim Landgraf** – Kanawha – 2013-2015
- **Alice McGary & Nicolas Leete** – Ames – 2013-2015
- **Tyler Magnuson & Caitlin Caughey** - Hancock - 2015
- **Mark Quee** – West Branch – 2013
- **Ellen Walsh-Rosmann & Daniel Rosmann** – Harlan – 2013 & 2015
- **Matt Russell & Patrick Standley** – Lacona – 2013
- **Ben Saunders** – Granger – 2013
- **Jordan Scheibel** - Grinnell - 2015
- **John & Jessica Wesselius** – Sioux Center – 2013 - 2014

In a Nutshell

- **Fifteen farms participated** in fruit and vegetable production recordkeeping to date.
- The purpose of the project was to **create lowa-specific production histories** for:
 - producers to have **baseline comparisons**,
 - the advancement of **crop insurance options**,
 - and to provide information about typical Iowa production **for lenders**.
- **Actual yields exceeded FSA-NAP yield estimates** for most crop categories.
- **Appendices A and B** provide further production information for asparagus and kale.

Project Timeline:
2013 - 2015



Project cooperators - left to right: Alice McGary, Tim Landgraf, Susan Jutz (above) and Rick Hartmann (below).

Background

In 2013, Practical Farmers of Iowa started a yield data collection project for several reasons. Iowa-specific production histories do not exist for most Iowa fruit and vegetable crops. Fruit and vegetable farmers have expressed they would like these numbers to compare their planting, harvest and yields with locally-relevant baselines. Similarly, lenders need more information about fruit and vegetable production potential to better assess the profit potential of these farms as well as assess the risk/benefit of lending to these farms.

Fruit and vegetable producers currently have insufficient crop insurance options. Private and public insuring agencies both say they need more Iowa-specific, actual production history to improve insurance options for these farmers.

Thirteen farms submitted data for the project in 2013, nine farms submitted data in 2014, and ten farms submitted data in 2015. Multiple years' data provides additional information for producers, insurers and lenders alike.

Method

Data were collected according to Farm Service Agency's (FSA) Non-insured Disaster Assistance Program (NAP) standards. Data were collected under these standards, so FSA could build their production history database for these crops in Iowa. They have added this project's producer data to their database.

Data sheets were adapted from Melissa Dunham of Grinnell Heritage Farm's spreadsheets used to submit data to FSA in the past. FSA, private insurers and Risk Management Agency all reviewed the data collection sheets for the project to make sure they would be able to use the information in the format collected.

A total of 15 farms participated in this project between 2013 and 2015. Farmers reported data for 30 FSA crop categories: apples, asparagus, beans, broccoli, cabbage, cantaloupes, carrots, cauliflower, corn, cucumbers, eggplant, garlic, greens, herbs, kohlrabi, leeks, lettuce, okra, onions, peas, peppers, potatoes, sweet potatoes, radishes, squash, tomatoes, turnips and watermelon.

Data represented 50 FSA type categories (sub-categories of crop categories). For example, onions tracked included types red, storage, sweet early, white and yellow hybrid. Summary data are included in this report. Total harvest includes units per crop type and includes culls due to insect- and producer-caused damage to crops (damage not due to natural disaster). Total acreage includes walking paths in production areas.

Additional data beyond FSA requirements were collected to enhance producer comparisons included: variety name, plant spacing, irrigation, planting notes and harvest notes. This data will be reported in separate, more detailed case studies on individual crops.

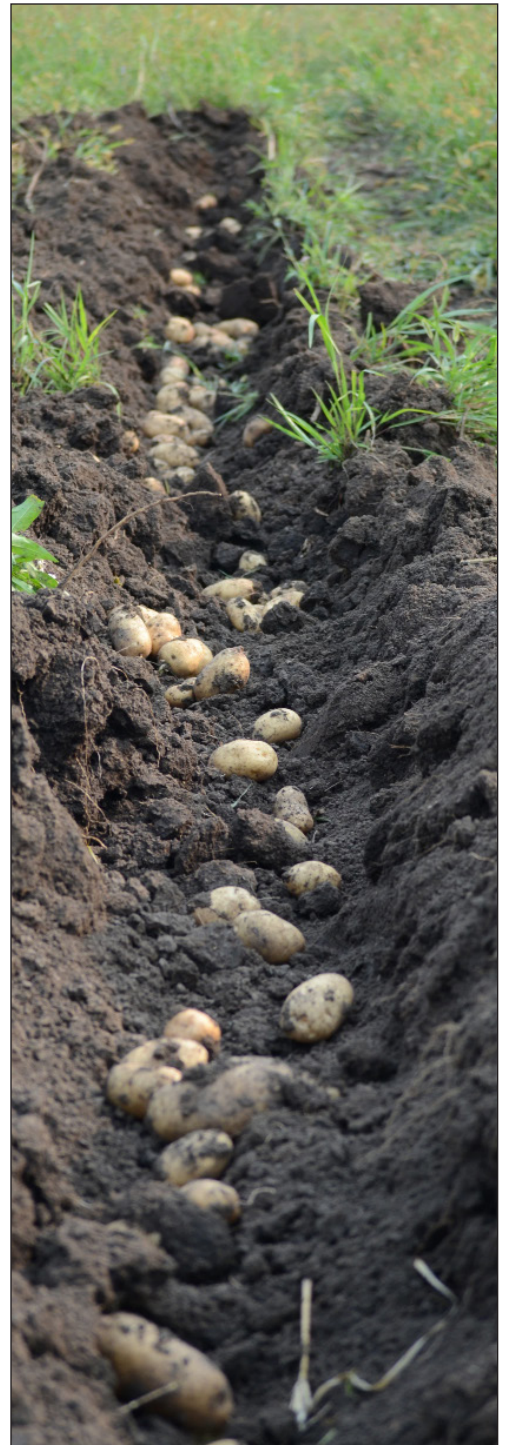
Results and Discussion

Production varied significantly across farms. These variances can be contributed to differences in production practices such as plant spacing and method, harvest methods, fertility practices, weed control, pest control, and environmental issues such as weather, soil health, weed pressure and pest pressure.

If comparing yield among farms, please keep these and other variables in mind. Actual production data presented here was transformed to a per acre weighted average in order to provide standardized comparison with FSA-NAP. There are concerns with the validity of scaling up from, for example, 0.1 acres to 1 acre.

"Although the yield data taken has not necessarily been statistically significant, it has provided some very noteworthy information. For example, yield differences between pea varieties recorded during the record keeping trials have been so different, we have changed our varietal selection for upcoming plantings. The differences were not noticed or evident through observation alone, but only came to light through careful record keeping. Observational data are normally kept on crop variety yields, but by participating in the record keeping project we have been able to put numbers to our observations."

- Rick Hartmann, Small Potatoes Farm



Rick and Stacy Hartmann of Small Potatoes Farm.

Table 1: Actual production (presented as weighted averages) collected during this project and FSA-NAP Olympic averages. Olympic averages—five year history—are currently used to set the Transitional (T) yield for producers who do not have actual yields the first year of their NAP coverage. Olympic averages are five-year averages set by the State Committee from existing production data. These are only currently available for a limited number of crops. Information from this project was used in setting Olympic averages for the 2015 and 2016 growing seasons. Producers with NAP coverage should be providing production records to their local FSA Office so their Actual Production History (APH) for the crop can be properly updated. Where applicable, FSA-NAP yield numbers include non-irrigated / irrigated production estimates. HT = high tunnel; OD = outdoor production. 42# Cont = number of 42 pound containers; Lbs = pounds; Cwt = hundredweight; 8# Cont = number of 8 pound containers; 100# Con = number of 100 pound containers.



Table 1

2013 - 2015 Production -- Total produce harvest & FSA-NAP estimates (per acre)								
Product	FSA Crop Type	PFI	# of	PFI	# of	PFI	# of	Unit
		Yield	farms	Yield	farms	Yield	farms	FSA-NAP (2014) Yield
		2013	2013	2014	2014	2015	2015	
Apples (42# Cont)								
	Common	514	1	266	1	423	1	227
	Specialty	676	1	262	1	558	1	227
Asparagus (lb)								
	None	351	2	931	1	1,207	2	n/a
Beans (Cwt)								
	Green - HT	632	1	380	1	352	1	n/a
	Green - OD	98	2	126	2	107	1	n/a
	Pole	119	1	-	-	-	-	n/a
	Snap Wax	48	1	-	-	-	-	n/a
Broccoli (Lb)								
	None	7,985	1	9,711	1	7,788	1	n/a
Cabbage (100# Cont)								
	Choy Sum	-	-	145	1	138	1	n/a
	Hybrid Cabbage	15	1	504	2	252	1	190
	Napa Cabbage	-	-	149	2	125	1	n/a
	Open Pollinated	-	-	304	1	179	1	n/a
	Red Cabbage	-	-	169	1	218	1	190
	Savoy	73	1	-	-	-	-	n/a
Cantaloupes (Cwt)								
	None - HT	-	-	-	-	664	1	n/a
	None - OD	-	-	-	-	285	1	168
Carrots (Cwt)								
	Hybrid	323	5	307	4	307	2	407
Cauliflower (Cwt)								
	None	7	1	78	1	61	1	n/a
Celeriac (Cwt)								
	None	-	-	-	-	134	1	n/a

Table 1 - continued

2013 - 2015 Production -- Total produce harvest & FSA-NAP estimates (per acre)

Product	FSA Crop Type	PFI Yield 2013	# of farms 2013	PFI Yield 2014	# of farms 2014	PFI Yield 2015	# of farms 2015	Unit
								FSA-NAP (2014) Yield
Corn (8# Cwt)								
	Sweet	849	1	-	-	293	1	1,200
Cucumbers (Cwt)								
	Common - HT	463	1	-	-	-	-	n/a
	Common - OD	378	1	96	1	413	1	188
	English	-	-	122	1	195	1	n/a
	Pickling	-	-	60	1	104	1	n/a
Eggplant (Cwt)								
	Oriental - HT	291	1	-	-	-	-	177
	European	-	-	249	1	209	1	177
Garlic (100# Cont)								
	Common - Scapes	3	2	-	-	-	-	n/a
	Common - Whole	71	3	99	1	80	3	n/a
Greens (Lb)								
	Arugula	1,200	1	-	-	3,594	1	n/a
	Common Kale	48,456	2	49,538	2	47,141	2	10,788
	Red Swiss Chard	55,697	1	63,562	1	75,431	1	9,408
Herbs (Lb)								
	Basil-HT	26,293	1	32,649	1	16,658	1	n/a
	Basil-OD	9,102	1	8,648	1	8,107	1	n/a
Kohlrabi (Cwt)								
	None	-	-	174	1	-	-	n/a
Leeks (Cwt)								
	None	-	-	228	1	124	1	n/a
Lettuce (Cwt)								
	Crisphead - HT & OD	283	1	-	-	-	-	n/a
	Leaf Lettuce - HT	81	1	127	1	76	1	n/a
	Leaf Lettuce - OD	102	1	47	1	63	1	n/a
	Romaine Lettuce - HT	204	1	-	-	-	-	n/a
Okra (Cwt)								
	None	-	-	10,633	1	14,533	1	n/a
Onions (Cwt)								
	Red	236	2	213	2	189	2	n/a
	Storage	226	3	207	2	278	2	n/a
	Sweet Early	311	1	249	1	137	1	n/a
	White	427	1	213	1	182	2	187
	Yellow Hybrid	323	1	168	1	89	2	296
Peas (Lb)								
	Snap	5,058	1	-	-	-	-	n/a
	Snow	2,712	1	-	-	-	-	n/a
	Sugar	6,734	1	3,503	1	-	-	n/a

Table 1 - continued

2013 - 2015 Production -- Total produce harvest & FSA-NAP estimates (per acre)								
Product	FSA Crop Type	PFI Yield	# of farms	PFI Yield	# of farms	PFI Yield	# of farms	Unit
		2013	2013	2014	2014	2015	2015	FSA-NAP (2014) Yield
Peppers (Cwt)								
	None	109	1	-	-	-	-	n/a
	Oriental Red	124	1	-	-	-	-	n/a
	Yellow	114	1	97	1	151	1	n/a
	Banana	-	-	116	1	103	1	n/a
	Green Bell	-	-	225	2	198	2	243
	Italian	-	-	109	1	118	1	n/a
Potatoes (Cwt)								
	Fingerling	79	2	85	3	385	1	n/a
	Red	92	4	207	5	145	5	216
	Russet	110	1	-	-	241	1	n/a
	Specialty	86	4	138	2	127	3	n/a
	White	84	4	240	4	161	4	n/a
	Yellow	87	4	114	5	122	5	229
Sweet Potatoes (Cwt)								
	Beauregard	143	3	135	1	151	2	n/a
Radishes (Cwt)								
	Hybrid	-	-	-	-	134	1	n/a
Shallots (Lb)								
	None	13,250	1	-	-	-	-	n/a
Squash (Cwt)								
	Acorn Squash	176	1	85	1	158	1	167
	Buttercup	95	1	125	1	269	1	n/a
	Butternut Squash	209	2	43	1	175	1	167
	Spaghetti Squash	146	1	193	1	368	1	172
	Summer Squash	263	1	-	-	-	-	167
	Winter Squash	89	1	54	1	197	2	169
	Zucchini Squash	236	1	259	1	451	2	162
Tomatoes (Cwt)								
	Cherry	-	-	-	-	250	1	n/a
	Hybrid	683	1	-	-	94	1	207
	None - HT	-	-	474	1	540	1	n/a
	None - OD	303	1	239	1	170	1	n/a
	Yellow	151	1	293	1	219	1	n/a
Turnips (Cwt)								
	Hybrid Turnips	83	1	-	-	190	1	145
Watermelon (Cwt)								
	Ice Box/ Sugar Babies	83	1	-	-	-	-	n/a

PFI Cooperators' Program

PFI's Cooperators' Program gives farmers practical answers to questions they have about on-farm challenges through research, record-keeping, and demonstration projects. The Cooperators' Program began in 1987 with farmers looking to save money through more judicious use of inputs. If you are interested in conducting an on-farm trial contact Stefan Gailans @ 515-232-5661 or stefan@practicalfarmers.org.

Appendix 1: 2015 Asparagus Production Highlight

Highlighted Farmers:

- **Jill Beebout: Blue Gate Farm, Chariton**
- **Rick Hartmann: Small Potatoes Farm, Minburn**

Asparagus Production, Beebout

Planting

Asparagus at Blue Gate Farm was planted in early May 2011. The asparagus field is 27 rows of about equal length. Crowns were spaced 15 in. apart within the row, and the rows were 48 in. on-center. Beebout left a break through the center of the rows to accommodate harvest, but has found it to be unnecessary. When the asparagus was transplanted the land was coming out of mixed grass hay and alfalfa; Beebout did a plow-down and traditional field prep with no additional amendments. Crowns were slightly mounded with soil at planting, but not subsequently covered.

The pathways were seeded to white dutch clover, and some weed management was done during establishment. "The clover was doing an ok job keeping some green matter in the pathways. I experimented with soybeans in the pathways, which was an abject failure for me. I am now working to re-establish the white clover," says Beebout.

Management

Beebout mows the 48 in. pathways between rows a couple times at the end of the asparagus season, keeping as close to the fern stems as possible. "It's a little junky between the stems, but they grow tall enough it doesn't matter much," she says. For fertility, they do an early spring burning of the previous year's residue, then apply finished compost with a manure spreader. Where they have missed burning, they have had some trouble with asparagus beetle. Beebout attributes the difference to effects of burning, including better airflow with the residue removed.

Harvest

2015 was the third year of harvest for the field; production information and yield is shown in **Table 1**. During the height of the season they harvest every day because the spears mature so quickly. Beebout snaps the spear at soil-level, and will give a second snap so the spears fit into their 14 inch-wide harvest baskets. This ensures more uniform 1 lb bundles, which they make in the field with a broccoli band. Beebout prefers thicker spears - the thicker the better, "like steak," she says.

Table 1

2015 Asparagus Production, Beebout

Variety:	Jersey King
Crown Transplant Date:	May 2, 2011
Irrigation:	at transplant
In-Row Crown Spacing:	15 in.
Btwn-Row Spacing:	48 in.
Area Planted:	0.87 acres
Harvested in 2015:	877 lb
Calculated harvest:	1,003 lb/ac 0.023 lb/ft ²
Harvest date range:	April 11 – May 20



Asparagus emerging April 12 (top); spears coming through burned residue on April 18 (center); harvesting May 19 (bottom) at Beebout's.

Varieties

"Through our research, Jersey King seemed to be one of the more popular, more productive, all-male varieties. There is a purple cast on the young spears, but it is a green variety," says Beebout. She sourced the asparagus crowns through AgResource, Inc., and they were very high quality. Though Beebout does not plan to expand production of asparagus at this time, she would choose the same variety.

Asparagus Production, Hartmann

Planting

Asparagus at Small Potatoes Farm was planted in April 2008. Crowns were spaced 12 in. within the row, with rows 48 in. on center. Hartmann has utilized odd-shaped areas on the farm for asparagus beds, which keeps his farm compact but can slow harvest. Hartmann is certified organic, but did not have access to certified organic crowns in 2008. Under organic rules, non-organic bare-root plants are allowed, but cannot be harvested for a full year. Since the 2008 planting, he has replaced some plants; the new crowns were sourced from Miller Nurseries, and were tremendous quality. If starting over now, he would use certified organic crowns, which are more available.

During establishment Hartmann weeded with a Japanese hoe and by hand, “working around the fields like a clock,” he says. “In the spring there are plants shooting up and if you nip the top you’ll stop the growth. Inexperienced people will kill a lot of asparagus with a wheel hoe.” He also did incremental covering of the crowns during establishment.

Management

Weed management in the asparagus beds has always been problematic for Hartmann, which he thinks has somewhat reduced his productivity. “The asparagus is weeded well until June, when our attention turns to all the other crops,” he says. After weeding the beds, he tries to apply mulch - grass clippings, leaves, and wood chips as available. His consistent mulching keeps fertility high.

Hartmann leaves the asparagus fronds up through the fall and winter to provide habitat and to catch snow. A few weeks before the plants come up in April he mows the previous year’s residue. Hartmann has stopped late spring mowing. Instead, he selectively weeds, leaving wood sorrel, white clover, and dandelion, which are slowly starting to take over in the pathways and provide forage for early-season pollinators.

Hartmann has not had much pest or disease pressure in his asparagus. On occasion he will find asparagus beetles, which he removes manually while harvesting.

Harvest

The 2015 harvest was the fourth year of harvest; yield information is shown in **Table 2**. Like Beebout, Hartmann harvests by snapping, though he is less particular about spear (shoot) thickness. “If the crown only has one shoot I’ll leave it, because the plant is getting weak. If it’s a full crown and keeps giving shoots, I don’t care how small it is, I’ll pick it. But generally I’ll only pick when the shoot is thicker than my pinky finger,” he says. Hartmann harvests frequently, often daily. He harvests into bulk bins that go straight into the cooler. The harvest is divided evenly for CSA shares and banded into bundles. For grocery, they are packaged in 20 lb bags. “If I was going to farmers market and had a standard-sized bundle I would field bundle, but my markets don’t allow for it,” says Hartmann.

Varieties

Jersey Supreme is an all-male line, but Hartmann also has some Purple Passion, a purple-colored variety. The purple spears add diversity to his CSA, but Purple Passion has male and female crowns, and the female crowns spread into the pathways.



Purple Passion (top) and Jersey Supreme (bottom). Mowed-down fall residue and wood chips serve as partial ground cover at Hartmann’s.

Table 2

2015 Asparagus Production, Hartmann

Variety:	Jersey Supreme
Crown Transplant Date:	April 20, 2008
Irrigation:	at transplant
In-Row Crown Spacing:	12 in.
Btwn-Row Spacing:	48 in.
Area Planted:	0.21 acres
Harvested in 2015:	426 lb
Calculated harvest:	2,071 lb/ac 0.048 lb/ft ²
Harvest date range:	April 16 – June 16

Appendix 2: 2015 Kale Production Highlight

Highlighted Farmers:

- **Susan Jutz and Carmen Black: Sundog Farm (Formerly ZJ Farm), Solon**

Kale Production, Black (Jutz)

Planting

Kale at Black and Jutz was transplanted from soil blocks from April 24 - May 19, 2015. The fields occasionally have manure applied, and they use a variety of cover crops on their vegetable beds. The field was prepared by tilling with a 5 ft Land Pride tiller; transplants were spaced 12 in. apart within the row and rows were 36 in. apart and ~230 ft long.

Management

Kale was watered-in after transplanting. Typically irrigation is not needed on the farm's kale, but 2015 was particularly dry and they did put down drip irrigation part-way through the season. The crop was cultivated with a belly-mounted cultivator on a Cub tractor until the kale was too tall; then it was weeded once more by hand. Dipel was sprayed once a month for cabbage moth, and a spinosad was sprayed once to manage flea beetles.

Harvest

Kale was harvested twice per week, and the crew tried to harvest evenly through the field, beginning where they left off at the previous harvest. To encourage further growth, 4-8 leaves were left on below the growth point, and damaged leaves were cleaned from the plants as the crew harvested. Leaves were harvested, un-bunched, straight into the coolers used for CSA pick-up and then to the cooler. Any cull leaves were fed to the sheep and goats. During each harvest the crew picked what was needed for the CSA, which was typically about 1/3 of the row. Yield information is shown in **Table 1**.

Varieties

Black and Jutz planted three varieties of kale in 2015 - Winterbor, Ripbor and Dwarf Siberian. According to Black, Ripbor is now nearly impossible to find, and with the continuing shortage of kale seed, Winterbor can be hard to find, too. In 2015, Dwarf Siberian was suggested as a possible substitute variety; Black and Jutz did not find it to be a suitable alternative. "We didn't like the Dwarf Siberian, and neither did our CSA members," remembers Black. "People cared about variety. They always took less of the Dwarf Siberian because of the thick stem - there was too much waste and it was troublesome for smoothies."

Table 1

2015 Kale Production, Black (Jutz)

Varieties:	Dwarf Siberian, Winterbor, Ripbor
Transplant Date:	April 24-May 19
Irrigation:	drip tape (late)
In-Row Spacing:	12 in.
Btwn-Row Spacing:	36 in.
Area Planted:	3, 230-ft rows
Harvested in 2015:	1535.5 lb
Calculated harvest:	46530 lb/ac 1.07 lb/ft ²
Harvest date range:	June 15 – Nov. 15



Kale plants before and after harvest. 4-8 leaves are left below the growth point, and damaged leaves are cleaned from the plant.

The thick stem, however, did seem to boost the yield - in weight - of the crop, because each leaf was heavier. The growth habit of Dwarf Siberian was also problematic. Rather than growing taller on an upright stem, the Dwarf Siberian habit was more similar to swiss chard - bushing from near the ground. Because of this, the stems rotted, making the plants hard to clean and continued harvest impossible. Black pulled the Dwarf Siberian two months earlier than the other varieties, which both lasted into November. "It needed to be cut and re-planted like chard," said Black, "it isn't suited for multiple harvests."

In 2016 Black tried Nash's Green as an alternative to Winterbor, and was not very pleased with it, through she preferred it to Dwarf Siberian. In 2017 she is only growing Winterbor for curly green kale.