# Double Cropping Buckwheat After Wheat in New York

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## Key takeaways

Planting buckwheat after wheat worked reasonably well. Buckwheat needs to be planted within a week of wheat harvest so that it will outcompete wheat volunteers and weeds.

In sites where the first frost is likely to be late, it can be planted as late as July 26. The proportion of undersized seed is likely to increase too much if planted later.

The lower fertility after wheat balanced the tendency to become overly vegetative on high-fertility soil.

The potential yield is modest, 600 to 1000 lb/ac.

A combine designed for buckwheat is necessary. Having a custom harvester who can both swath and pick up with a straw-walker combine would be ideal. That way each grower would not need specialized knowledge and equipment

There are areas with significant potential to support a custom harvester in Western New York, including the area immediately north of Penn Yan.

Potential for double-cropping buckwheat after wheat in warm and fertile sites in New York.

Buckwheat is not normally raised on high-fertility soils because of excess vegetative growth and the low financial return if single cropped. Both of these limitations might be overcome by double cropping after wheat.

Double cropping has not been practiced in New York because the later planting date generally would not let the crop mature before frost. There may be enough time, at least in protected sites near lakes, due to the later frost dates in recent years.

We tested this proposition with a sequential planting at Hemdale Farm in Seneca Castle. The approach was to replicate what would work for a field-crop grower.

- No till drill after wheat harvest to minimize time and cost
- Control weeds and volunteer wheat with glyphosate
- No fertilizer or pest control to minimize time and cost, since residual fertility is substantial.
- Direct-cut harvest since that equipment is most available

## Field Operations and layout

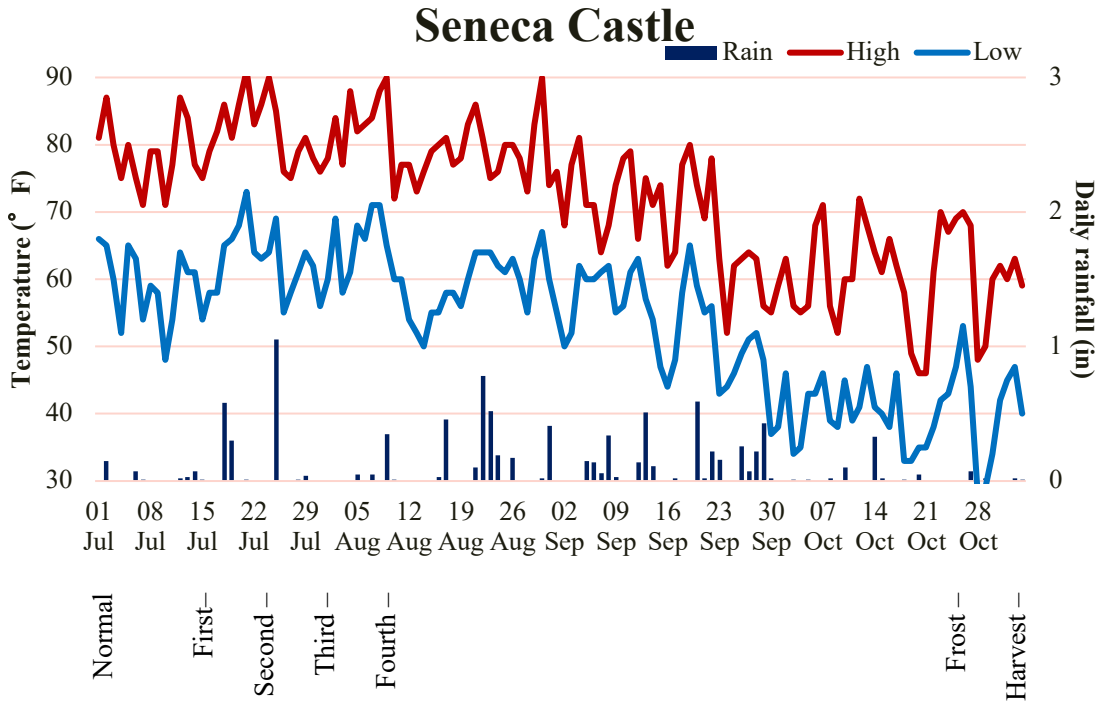
Buckwheat was planted following wheat harvest on two fields near Seneca Castle, NY. The wheat, harvested on July 12-13, left a heavier residue than is usual.

The field was treated with glyphosate to kill weeds that had established in the wheat. No further weed management was employed.

Buckwheat was planted without additional fertilizer or crop protection using a 30-foot no-till drill.

| Field | Plot | Planting date | Planted area (ac) |
|---|---|---|---|
| MA | E | 15 July | 3 |
| | W | 15 July | 3.3 |
| | E | 20 July | 4.2 |
| | W | 20 July | 4.2 |
| | E | 26 July | 3.8 |
| | W | 26 July | 3.8 |
| SH | E | 20 July | 4.4 |
| | W | 20 July | 4.4 |
| | E | 26 July | 4.5 |
| | W | 26 July | 4.5 |
| | E | 1 Aug | 5.5 |
| | W | 1 Aug | 5.5 |

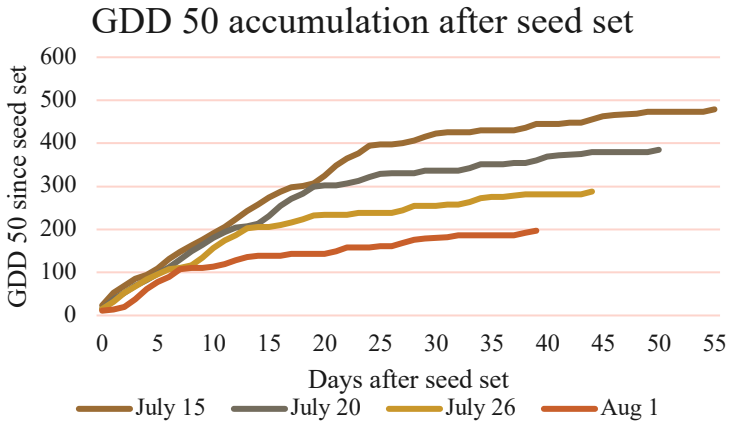
## Growing conditions




This year's temperatures were quite normal. July 15 through October had 1467 GDD50. The average is 1434, with a range of 1116 to 1721 in the last 50 years. The soil was fairly dry at planting, but emergence was rapid and plants grew well. The temperature cooled off about September 21, causing growth to slow.

The leaves were killed by a light frost on October 18. The recent mean date of first frost is October 11, with a 10% chance before October 1.

The growing degrees during seed fill varied greatly among planting dates




It takes about 350 $GDD_{50}$ to get a ripe crop. From climate data, the likelihood of having enough heat can be calculated for each planting date.

It is also possible to estimate locations that are suitable for planting on different July planting dates.

## Crop progression in images and videos.

August 29

| | |
|---|---|
| SH July 20 | https://youtu.be/NpZ8PYV8ioY |
| SH July 26 | https://youtu.be/xHSjCoh9Xww |
| SH Aug 1 | https://youtu.be/j5r7Nu1Du2k |

Sept 12

| | |
|---|---|
| SH July 26 | https://youtu.be/wYdk20vMTQI |
| SH July 20 | https://youtu.be/cG1E-_1Jz4Q |
| MA July 15 | https://youtu.be/g_yUSpa3vLI |
| MA July 20 | https://youtu.be/Gk6gnzn0-MY |
| MA July 26 | https://youtu.be/FtpmdEjMfjo |

October 5.

| | |
|---|---|
| SH July 20 | https://youtu.be/F0sEIa9DQAk and https://youtu.be/WkUvOQY_TCs (Fertility) |
| SH July 26 | https://youtu.be/DPj3Ez98ka4 |
| SH Aug 1 | https://youtu.be/nblbFURGaDA Still green |

Effect of wheat reside https://youtu.be/9syOnw9eYmw (Aug 3_

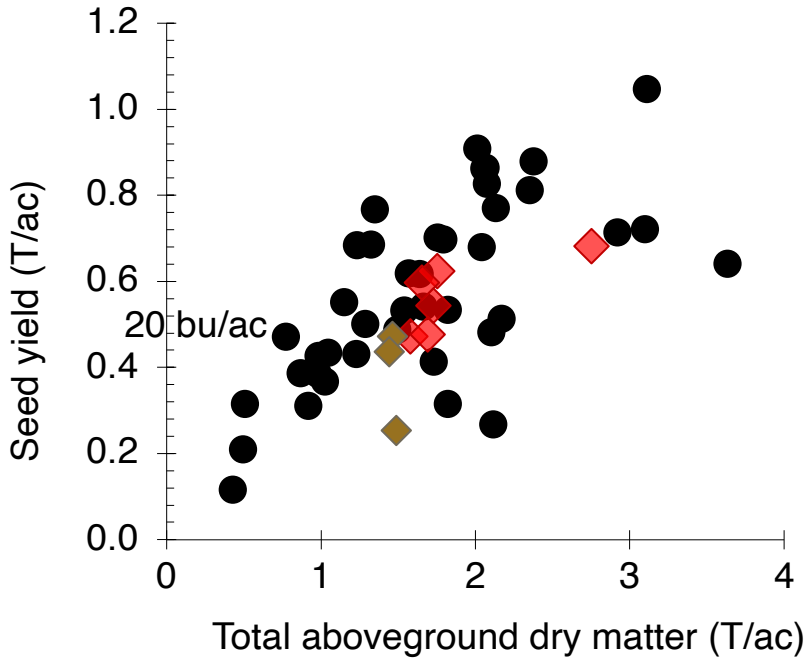
Effect of headland compaction https://youtu.be/wom6xi9S_E0

Effect fertilizer. https://youtu.be/5AQmOvRQ93o

Planting no-till https://youtu.be/JsqgaCCNuzA

Picture in separate file

## How well did the crop grow?




The crop crew to a fairly typical size of about 1.5 tons of dry matter per acre. Black circles are historic data from commercial fields of Koto buckwheat. The red diamonds are the from the Ma site. The brown diamonds are the SH site, with the lowest seed amount in the last, August 1, planting. A somewhat larger biomass around 2 tons would have more yield potential.

The crop was normal size and the transition to flowering uniform.

The light frost on October 18 ended the growing season All the leaves were dry eight days later

## Effect of chaff rows from wheat harvest.

There is inevitably some volunteer wheat after wheat harvest. These fields had lodged some, resulting in more seeds than usual and more long straw in the chaff strips. That provided a good opportunity to assess the effect.

The chaff row grew and yielded poorly. That accounted for about 10% of the field. It is likely that it is not worth doing anything in the buckwheat crop and just accepting the lower yield. Alternatively, it could be worthwhile to spread the chaff more uniformly and to kill the wheat seedlings better.

The August 1 planting emerging behind the volunteer wheat. The buckwheat needs to be sown sooner after wheat harvest to avoid this high competition.

The July 26 planting flowered August 22 despite being highly suppressed in the weaker areas

The chaff row was less obvious in the better parts of the field at flowering, but the plants were smaller

*Seed set was determinate.* The late planting date and modest fertility caused the plants to be effectively determinate, making seed on the axillary inflorescences at nodes 4, 5 and 6, and having a terminal head. This pattern of seed set is ideal.

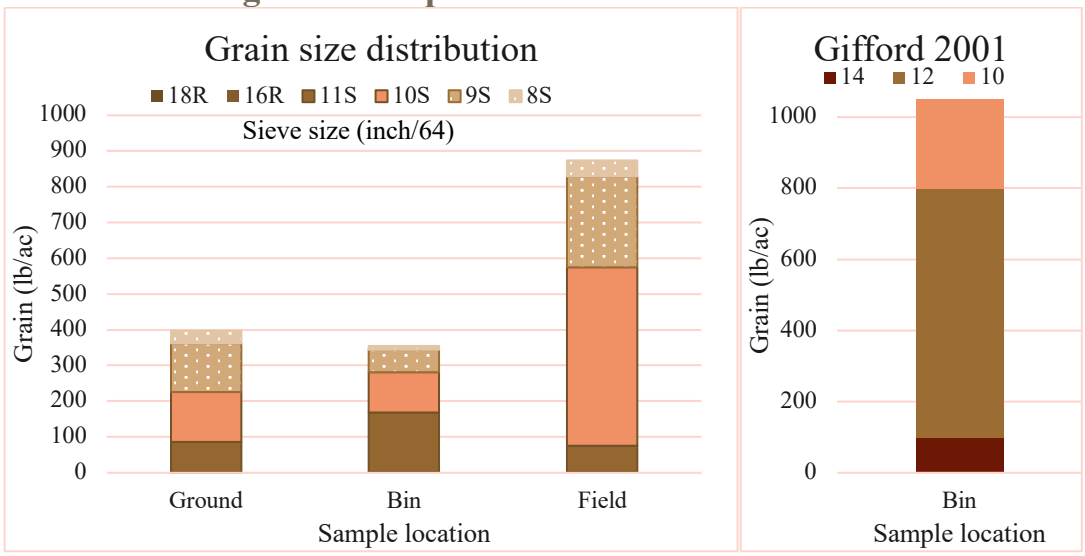
## How much did the crop yield?

Harvest was with a John Deere 9770 STS Bullet Rotor with a 35' head. It was adjusted to get as much seed in the bin as we could, but the rotor broke the straw, which in turn trapped a lot of grain that ended up on the ground. An analysis of the loss is on the next page

| | Total area (ac) | Harvested area (ac) | Gross grain weight (lb) | Yield (bu/ac) | Harvest | Moisture content | Test weight | Dockage (1000 g sample) |
|---|---|---|---|---|---|---|---|---|
| Ma715W | 3 | 3.68 | 2240 | 12.2 | 10/11/22 | 19.7 | 44 | 2.4% |
| Ma715E | 3.3 | 2.1 | 740 | 7.0 | 10-21-22 | 18.5 | | 1.5% |
| Ma720W& some 715E | 4.2 | 5.38 | 2760 | 10.3 | 10-11-22 & some 715E | 18.5 | 46 | 2.0% |
| Ma720E | 4.2 | 9.11 | 2400 | 5.3 | 10-21-22 | 19 | | 2.5% |
| Ma726W | 3.8 | X | | | In MA20E | | | |
| Ma726E | 3.8 | X | | | In Ma 20E | | | |
| Sh720W | 4.4 | 4.2 | 1700 | 8.1 | 10-21-22 | 18.5 | | 0.7% |
| Sh720E | 4.4 | 4.8 | 2060 | 8.6 | 10-21-22 | 18.5 | | 1.9% |
| Sh726W | 4.5 | 4.6 | 1520 | 6.6 | 10-21-22 | 18.7 | | 1.0% |
| Sh726E | 4.5 | 5 | 2220 | 8.9 | 10-21-22 | 19.5 | | 1.7% |
| Sh801W | 5.5 | 0 | | 0 | Never matured | | | |
| Sh801E | 5.5 | 0 | | 0 | Never matured | | | |

The combine delivered very clean seed with low dockage. The moisture content was acceptable, albeit above what is obtained with swathing. The moisture in the 7/26 planting was slightly higher than the 7/20 planting. The test weight might have been lower as well because of a shorter grain-fill period, but we don't have that measurement.

## Where did the grain end up?



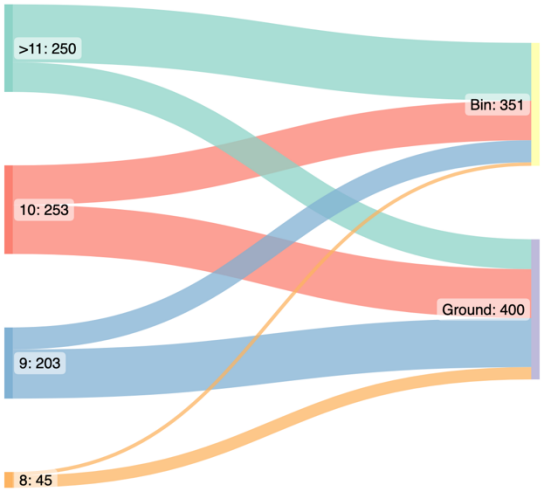

Grain was collected from plants before harvest, from the bin after harvest and from the ground in the chaff row after harvest. The grain was separated in a seed sieve.

*Small Seed.* Of the grain that was on the plants, about 600 lb/ac was large enough to use (Sieve >10). The later planting resulted in shorter seed fill for the late-set seeds, resulting in smaller kernels. Undersized grains accounted for about 30% of the seeds, where 20% is normal (See Gifford 2001 Koto sample for comparison.)

*Combine efficiency.* The combine had a lot of trouble separating chaff from grain. The grain in the bin was very clean with 90% being over 10 sieve and dockage between 1 and 2.5%. However, about the same amount of seed went on the ground as in the bin.

The combine needs to put all of the grain >10 sieve in the bin.

Seed on the ground under buckwheat straw




The combine put a bigger proportion of large seeds in the bin, but a lot ended up on the ground.

## Lessons learned

Buckwheat can be double cropped as late as July 20, possibly July 26.

Potential yield is about 600 to 1000 lb/ac.

Wheat straw should be spread evenly to avoid suppressing buckwheat.

The JD rotary combine left about half the yield on the ground. The broken straw and leaves held the grain. Since most wheat growers have rotary combines that will have this problem, it is necessary to identify ways to harvest only with combines that separate well. Many buckwheat growers have used Gleaner combines from the 1960s, but almost all of those are completely worn out.

Swathing is worth examining. A local operator could provide that as a service, along with a pickup head or a relevant combine with pickup head. Let’s find out who is available now and what the business case would be.