

Organic Evaluation and Increase of a Determinate Buckwheat Variety

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Buckwheat is a late planted short season broadleaf crop that is very adapted to the North Dakota environment, and is an important crop for organic farmers. Buckwheat also has a positive impact on a number of eco-system services including weed suppression, nutrient addition, erosion control, and tillage improvement. Buckwheat with its long flowering periods and abundant flowers provides excellent habitat for pollinators. The majority of buckwheat varieties are indeterminate, meaning they will continue to flower and set seed throughout the season until the crop is terminated. This report will focus on the determinate variety Devyatka which has an earlier, shorter flowering period along with earlier maturity.

Objectives:

In the summer of 2012 NPSAS Farm Breeding Club (FBC) members met with agricultural representatives from the Ukraine who came to North Dakota to find out how we manage crops and to attend trade shows. They provided the FBC with one kilogram each of two of their favorite buckwheat varieties, which are large seeded and determinate in their growth. Results from the initial project “New Buckwheat varieties for Greater Sustainability” can be found on the North Central SARE final report link below.

<https://projects.sare.org/project-reports/fnc13-924/>

Only small amounts of seed were left from the initial work completed in 2014, our efforts experienced drought and hail related setbacks but we did manage to harvest limited seed, so in 2019 the CREC in collaboration with NPSAS increased the remaining seed on the Research Centers certified organic plot ground. The increase was planted May 31, swathed August 19, harvested August 29 and resulted in 99.6 pounds (1179 lbs/ac) of clean seed to be furthered increased in 2020 along with evaluation comparing currently planted indeterminate varieties.

In 2020 we received funding from the Organic Crop Improvement Association (OCIA) R&E Micro Grant (Research) program to continue this work. Funds were used to support the organic variety trial and two seed increases on certified organic land producing certified organic seed of this variety.

Methods & results:

An organic variety trial was planted at the CREC on May 25 on ground that was previously cover crop. Six currently available buckwheat varieties were planted to compare their performance to Devyatka. The field trial sown in 7” rows at 55 lbs/ac PLS. Conditions were good at seeding with fast uniform emergence that aided in weed control. Devyatka was earlier to flower and mature, it was swathed on August 20 and harvested on September 1. The other varieties were swathed on August 27 and harvested on September 4. Data gathered on flowering, Table 1., illustrate that most of the varieties started to flower 35-36 days after planting with Devyatka starting to flower in 30 days. Data also show that this variety is shorter when compared

to the other varieties. Plant heights were 32 inches compared to the trial mean of 45 inches. This reduced height did result in less plant lodging compared to other varieties. Test weight was significantly lower for Devyatka compared to other varieties. Test weight was 45 lbs/bu compared to the trial mean of 48 lbs/bu. Growing conditions and seed yields in 2020 organic variety trial were excellent, highest ever recorded in the organic tests at the CREC. Seed yield of Devyatka was good, 1459 lbs/ac, although it was also significantly lower than all of the other varieties tested with a trial mean of 2066 lbs/ac. Koto was the highest yielding entry at 2362 lbs/ac. Koto also has one of the highest test weights in the trial.

Seed was increased again this year for future evaluation. Seed was increased at two locations for insurance against severe weather conditions. The main increase was done by Owen Trangsrud on a certified organic farm in North Central Ransom county, near Enderlin, ND. The 1.8-acre field was sown on June 13 at a rate of 50 lbs/ac. Crop rotation on the field was 2017 alfalfa, 2018 flax, and 2019 white sorghum. Plant heights were greater at this location with plants being 49 inches tall with plants reaching heights of 64 inches. Plant lodging occurred near the end of the growing season due to the tall plant height. The crop was swathed on September 2, and harvested September 12. The field yielded 3740 lbs. of seed or 2077 lbs/ac. This site received more rainfall than the CREC site with 15.76" compared to 9.04". A second backup increase was done at the CREC that yielded 71 lbs. clean seed or 1085 lbs/ac. This site yielded less mainly due to deer predation.

Based off this year's results from a high yielding growing season for buckwheat it appears that planting an indeterminate variety results in higher yield and quality. We plan to continue testing and increasing this variety to determine how it will perform across varying growing seasons and environments and to produce certified organic seed of this variety available to farmers.

Table 1. 2020 organic buckwheat variety trial at the NDSU CREC.

Variety	Days to bloom	Plant height	Plant lodge	Test weight	Seed yield
		inch	0-9	lbs/bu	lbs/ac
Springfield	36.0	46.7	1.3	47.7	2210.9
Horizon	35.8	48.6	1.3	47.8	2291.1
Koma	35.8	42.8	1.8	49.3	1952.1
Koto	35.0	46.0	1.0	49.3	2362.2
Manor	34.8	49.2	1.5	48.0	1907.0
Devyatka	30.0	32.0	0.0	44.9	1459.0
Green Testa	35.8	46.0	2.0	48.2	1970.5
Mean	34.7	45.1	1.3	47.8	2066.1
C.V.%	1.5	6.1	60.0	2.2	10.5
LSD.10	0.6	3.4	1.0	1.3	264.5
LSD.05	0.7	4.1	1.2	1.6	319.7



2020 organic buckwheat variety trial at the CREC.



Devyhkta swathed while other varieties still flowering.



Manor a popular indeterminate variety beside Devyhkta.

Outreach:

Due to COVID19 no field tours were held this year at NDSU, however we did do a virtual tour at the NDSU CREC. Included in the organic tour was the buckwheat increase along with explaining the project. Below is a link to the tour.

<https://www.ag.ndsu.edu/CarringtonREC/field-days/Organic-sustainable%20agriculture>

Organic yield data was published in the CREC annual report, CREC & NDSU variety trial data web sites, along with portions of this report published in Volume 60 of the NDSU CREC annual report.

Plans are to present this data and project at the NPSAS virtual winter conference later this winter.

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