

**EFAO 2022: Research Protocol**

## **Screening of quinoa transplant date and viability**

**Farmer-researcher: Dean Orr, Mill Valley Farm - CENTRAL**

**Project type: Screening trial**

**Research priorities: Seed selection, production, & breeding**

**EFAO Contact: Dillon Muldoon**

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### **Objective**

Dean wants to screen the viability of transplanted quinoa planted on two different dates and its influence on quinoa transplant success, plant vigour, and yield in organic quinoa production in southern Ontario.

Dean will assess the viability of transplanting quinoa and the optimal transplant date for Buffy, one of the top two performing varieties of quinoa for organic production in southern Ontario based on his 2021 screening trial (1).

The goal is to look at the same crop rating parameters as last year for direct seeded quinoa on transplanted quinoa; which were fairly encompassing of overall crop suitability given certain planting conditions: emergence as a percent, plant vigour on a rating scale, transplant survival as a percent (Hardiness/competitiveness), and yield. Comparing these between seeding/transplanting dates will allow us to see any effects of transplanting viability and/or date - which, of course, result in different planting conditions.

### **Background**

Quinoa appears to be a very accessible grain for direct marketing to consumers, as consumers generally use unprocessed quinoa in meals. Even more, the crop appears to be relatively well suited for growing in colder North American regions, such as Ontario. Challenges appear to be seed availability, as well as access to regionally adapted varieties.

This idea for this year's trial was a natural extension of Dean's project on quinoa screening that he trialed in 2021. While there was some data from southern Ontario that Early June

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was an acceptable direct seeding date, Dean found that germination, vigour, and competitiveness were very poor for the varieties he planted, which made management very difficult. Early on he wondered if conditions were too warm to germinate properly, as quinoa is a cooler weather crop, and other crops, such as lettuce are known to have reduced germination in warmer soil temperatures. After doing some more reading this winter, it appears that quinoa is planted similarly to canola in Western Canada (aka early!). Due to the wet spring in 2022 Dean seeded quinoa on four dates in 600 seed cell trays to assess the viability of transplanted quinoa and the optimal seeding/transplant date.

There's only one publication (2) that he has come across as far as Ontario planting date or condition recommendations, and it does not cover early planting dates (May 14 is the earliest, and even that may be considered later season planting, as the research was done in Harrow, ON). As well, this article did not comment on crop competitiveness or vigour, both of which are important metrics when planning a growing season for a relatively unknown crop. To summarize, it seems that planting date recommendations for quinoa in North America appear to be few and far between.

## References

1. <https://efao.ca/wp-content/uploads/EFAO-Dean-Orr-Research-Report-2021-FINAL-audio-17Dec21.pdf>
2. Optimal planting date, row width, and critical weed-free period for grain Amaranth and Quinoa, grown in Ontario, Canada. Nurse, R.E., et al. 2016
3. [https://www.ontariosoilcrop.org/wp-content/uploads/2015/07/v11-2014crpadv\\_gen\\_6\\_quinoa\\_variety\\_assessment\\_in\\_eastern\\_ontario\\_2014\\_carleton\\_scia\\_major\\_grant.pdf](https://www.ontariosoilcrop.org/wp-content/uploads/2015/07/v11-2014crpadv_gen_6_quinoa_variety_assessment_in_eastern_ontario_2014_carleton_scia_major_grant.pdf)
4. <https://onspecialtycrops.ca/2018/08/16/quinoa-crop-update-august-16-2018/>
5. <https://mbdiversificationcentres.ca/?s=quinoa>
6. <https://mbdiversificationcentres.ca/to-the-bin-or-bust-quinoa/>
7. <https://prairiegardenseeds.ca/search?q=quinoa>

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### Experimental Design

#### Varieties

Dean will evaluate the seed/transplant date and transplant viability of quinoa for Buffy, one of the top two performing varieties from his trial in 2021.

#### Field Layout

Field prep: Dean will prepare the field as he usually would to plant organic quinoa (ADD)

Transplant: Dean will mark out rows using this 10', 12 row planter ahead of time to ensure that the entire trial fits the field. If needed he will remark out the plots before each planting date. Dean will use a Jang single row push seeder to plant 2 or 4 rows of quinoa in each plot (10' by 140') on each of the planting dates (every 7-10 days) in each variety.

He will plant one screen block for each treatment as follows:

1. Planting one (DATE)
2. Planting two (DATE)
3. Planting three (DATE)
4. Planting four (DATE)

1. Transplant one (DATE)
2. Transplant two (DATE)

#### Statistical model

This trial will be a screening trial, and we will not perform statistical analysis unless sub-samples are taken?

### Measurements

#### *Quantitative and Qualitative*

#### Crop management records

The following information will be collected on this sheet **once per planting**:

- Seeding date for each planting

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- Transplant date
- Fertilizer applications (rates, amounts, and date)
- Weed control
- Other products or notes
- DOC LINK

### Emergence

The following information will be collected on this sheet **14 days post planting for each of the 4 cell seeding dates.**

Dean will record the number of plants which have emerged from the 600 planted seed cells.

- Total number of emerged plants of 600 cells planted
- DOC LINK

### Overall Plant Vigour Rating

The following information will be collected on this sheet **once during the season:**

- Overall plant vigour looks at seedling size, health, and growth rate after transplant
- Overall plant vigour will be taken once around **2 month after transplant**
  - Rating scale from very poor (1) to very high (5) [1=very low (0-20%); 2=low (20-40%); 3=moderate (40-60%); 4=high (60-80%); and 5=very high (80-100%)]
- Dean will also take observation notes
- DOC LINK

| Evaluation Rubric |  | 1                            | 2                    | 3   | 4             | 5   |                   |
|-------------------|--|------------------------------|----------------------|---|---------------|---|-------------------|
| Trait             | Guidelines   | Poor                         | Fair                 | Acceptable                                      | Good          | Outstanding                                 | Timing            |
| <b>Vigour</b>     | <i>How vigorous (i.e. robust, fast-growing, resilient to stress, etc) is this variety?</i> | Weak and slow-growing plants | Below average vigour | Acceptable growth and some resilience to stress | Strong growth | Exceptional growth and resilience to stress | <i>Mid-Season</i> |

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### Overall Plant Hardiness

Dean will measure hardiness **once per season on this sheet 6-8 weeks after each transplant count.**

- Total number of surviving transplants 2 weeks post transplant DOC LINK

### Maturation

The following information will be collected on this sheet **over the weeks as plants start to mature until full maturity.** Dean will mark the dates when each plot has approximately 10%, 50%, and 100% plant maturity at the end of the season.

- DOC LINK

### Yield

- The following information will be collected on this sheet **once at harvest:**
  - Seeding date
  - Yield (KG/lbs)
- DOC LINK

### Photos

Please take photos of the following times/items:

- Farmer-researches with FLRP sign
- Field preparation
- Seeding for all dates
- Emergence
- Differences among treatments and between varieties
- Pest and disease
- Flowering/ flowers
- Crop at maturity
- Harvest actions shot
- Other

### Research Plan

Please note that if data is submitted after the submission deadline, EFAO staff cannot guarantee that your data will be analyzed and written up before the Research Symposium and/or the next growing season.

| Time | Task | Methods & Measurements or Action Item |
|------|------|---------------------------------------|
|------|------|---------------------------------------|

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|                   |                                |  |
|-------------------|--------------------------------|--|
| Planting 1        |                                |  |
| May 10            | Seeding                        |  |
|                   | Emergence                      |  |
| August?           | Maturity                       |  |
| September October | Harvest                        |  |
| October           | Vigour and<br>Hardiness Rating |  |
| Planting 2        |                                |  |
| (Date)            | Seeding                        |  |
| 14 and 21 days    | Emergence                      |  |
| August?           | Maturity                       |  |
| September October | Harvest                        |  |
| October           | Vigour and<br>Hardiness Rating |  |
| Planting 3        |                                |  |
| (Date)            | Seeding                        |  |
| 14 and 21 days    | Emergence                      |  |
| August?           | Maturity                       |  |
| September October | Harvest                        |  |
| October           | Vigour and<br>Hardiness Rating |  |
| Planting 4        |                                |  |
| (Date)            | Seeding                        |  |
| 14 and 21 days    | Emergence                      |  |

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|                       |  |   |
|-----------------------|--|---|
| August?               | Maturity   |   |
| September October     | Harvest  |   |
| October               | Vigour and Hardiness Rating  |   |
| December 31, 2022     | Farmer-fee and research expense invoice with receipts for expenses | Submit invoices at this site: <a href="https://efao.ca/data/">https://efao.ca/data/</a> |
| January/February 2023 | Finalize and publish research report                               | Work with EFAO staff to review polished research report for publication.                |

### Staff check-ins

How/what times does Dean want Dillon to Check in

### Materials

Please list all materials, supplies and equipment that will be reimbursed for this project. If possible, please also indicate a short-list of any in-kind materials, supplies and equipment that you will use.

| Material                                       | Unit | Quantity Required | Total Cost* |
|--|------|-------------------|-------------|
| Quinoa seed                                    |      |                   | ~100        |
| Bags, etc for keeping yield separate           |      |                   | ~30         |
| Stakes or flags                                |      |                   | ~30         |
| Screens for Allis Chalmers All-Crop 72 combine |      |                   | ~400        |
| <b>Total</b>                                   |      |                   | ~560        |

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### Farmer-fee

A \$500 farmer-fee can be collected for the 2022 season after all data and photos have been submitted to the EFAO research staff.

### Invoices for Farmer-Fees & Reimbursements

#### Research expenses

- Submit an **invoice along with copies of receipts** for all qualified expenses using form found at <https://efao.ca/data/>
- **Deadline:** December 31, 2022

#### Farmer-fee

- Submit an **invoice** for your farmer-fee using form found at <https://efao.ca/data/>
- **Deadline:** December 31, 2022

### Memorandum of Understanding

Please fill out the MOU at <https://airtable.com/shrlAcZ7bowmTQwvd>

#### EFAO Account Information

As a farmer-researcher, you must maintain current membership with EFAO throughout the duration of your trial.

We use your mailing address to deliver cheques, farmer-led research signs and any trial supplies.

To check the status of your membership, log in here:

<https://efao.z2systems.com/np/clients/efao/login.jsp> or contact Martina, [martina@efao.ca](mailto:martina@efao.ca).

#### Farmer-fees and Reimbursements

I agree with the following:

- The deadline for reimbursements and farmer-fees is December 31, 2022.
- To receive reimbursement for qualified research expenses, I will submit an invoice and copies of receipts at the form found at <https://efao.ca/data/>.
- To receive my farmer-fee, I will submit an invoice to <https://efao.ca/data/> after I have submitted the final data and photos.



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### Photo Use

We like to share snippets and stories of farmer-led research through EFAO's print publication, e-newsletter and social media accounts, using photos and updates that you send us. We will credit you when we use any photos.

Choices (Select all that apply on the MOU):

- EFAO has my permission to share photos in EFAO's print publications
- EFAO has my permission to share photos in EFAO's e-newsletters
- EFAO has my permission to share photos in EFAO's social media
- I do not want my photos share in these ways
- Other

### Farmer-Led Research Agreement

I agree with the following:

- I will complete my trial to the best of my ability following the written protocol.
- If circumstances change and I am unable to conduct my trial, I will notify EFAO staff as soon as possible.
- I will keep in contact with EFAO staff with updates and questions, or to make changes to my protocol .
- I will submit data to the EFAO by the date specified in the written protocol.
- I acknowledge that if I submit data after the submission deadline outlined in the written protocol, EFAO staff cannot guarantee that my data will be analyzed and written up before the Research Symposium and/or the next growing season.
- I will work with EFAO staff to interpret data and write the research report.
- I will take photos of my project throughout the season(s).

### Program Participation

There are several farmer-led research events held throughout the year including webinars, field days, and the Research Symposium. The Research Symposium is held in conjunction with the annual EFAO Conference at the end of November/early December.

When and where possible I will:

- Attend farmer-led research events, including webinars and field days
- Attend and present my research findings at the Research Symposium
- I will complete the feedback survey related to the program

## EFAO 2022: Research Protocol

### Data Use

You own all data generated on your farm as part of your farmer-led research trial with EFAO. You can notify EFAO at any time to remove EFAO's privileges to use and share your data, photos and farm information. To opt out of sharing your data, please contact Sarah Larsen via email ([sarah@efao.ca](mailto:sarah@efao.ca)) or mobile (226-582-0626).

I agree with the following:

- By participating in the EFAO's FLRP, I agree to share with the EFAO the data collected as part of my trial, along with photos of the project and any farm information (e.g. soil type, previous farm practices, and soil tests) that I deem relevant.
- By sharing my data, photos, and farm information with EFAO, I agree that EFAO can use this information in research reports, posters, and summaries of my trial (e.g. summaries on the EFAO blog and in EFAO's print publication).
- I understand that I can notify EFAO at any time to remove EFAO's privileges to use and share my data, photos, and farm information.

### Signature

Please fill out the MOU at <https://airtable.com/shrlAcZ7bowmTQwvd>