SEED PRODUCTION & BREEDING

In Search of Short Season Northern Grain Amaranth Varieties: Variety Trial of Grain Amaranth (*Amaranthus spp*)

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Research Priorities: Seed Production, Varietal Selection and Breeding

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Objective

Our goal is to generate greater understanding of, and support for the cultivation of amaranth in southern Ontario in order to contribute to food security, and the preservation of Indigenous knowledge and native plants of the Americas.

We aim to determine which varieties of amaranth are best suited for the region of southern Ontario in terms of yield, pest resistance and resilience to changes in weather patterns. Our trials will measure grains only (not greens).

Background

These seed variety trials are part of a larger project to promote amaranth as a tool for promoting the sustainable cultivation, cultural significance and culinary use of amaranth, and how to incorporate it into our daily lives.

Amaranthus sp. has an important story to tell. It is a highly versatile crop – it grows prolifically and is well-known for its capacity to tolerate drastic weather changes. It has been touted as “superfood” due to its unusually high protein, fiber, and iron content, and its greens and seeds were an important staple of the many cultures in the Americas. *Amaranthus retroflexus* (pigweed) is a traditional potherb eaten by indigenous nations here in Ontario, though amaranth grain has not traditionally been eaten. There are three species of the genus *Amaranthus* which produce large seed heads of edible seeds. *A. cruentus* is native to Central America (such as Guatemala and southern Mexico), and *A. hypochondriacus* is native to Mexico (North America)*.* *A. caudatus* is native to the Andean regions of Ecuador, Peru, and Bolivia. Rony is Kakchiquel, one of the indigenous Maya peoples of the midwestern highlands in Guatemala who have been growing amaranth for thousands of years, and he and Myriam have worked in Guatemala to promote the cultivation of amaranth. Amaranth was so important to indigenous people of this idea that the Spanish Crown outlawed the growing of amaranth in the 1500s. Growing these crops in Ontario adds to crop diversity here, which is important for food security and biodiversity resilience. It’s gluten-free properties give it tremendous value-added potential.

Climate-resilient and nutrient-dense, amaranth has a huge potential to support food sovereignty locally and around the world, and to serve as a strategy to adapt to climate change. It also provides a unique opportunity to learn about Indigenous knowledge, particularly Rony's Kakchiquel knowledge, and plants native to the Americas. The seed trials will enable us to determine which is the best species and variety of amaranth to promote in our region.

Research Plan

Time	Task	Methods & Measurements or Action Item
May 1	Covered the space with a tarp to suppress the weeds.	
Last week in May	prepare the beds and apply compost,	
End of May/Beginning of June (Waxing Moon)	Plant seeds	
		Invoice for research expenses
Deadline October 26	Submit data and photos	Submit data and photos to Rebecca
Before November 15	Invoice	Send Sarah invoice for farmer-fee

Experimental Design

One site will be used for this year's variety trial. The trial will be grown at Zócalo Organics, a farm near Hillsburgh, ON.

Evan Elford at OMARFA suggests that, based on their previous trials, we should start by using any varieties/cultivars that are within *Amaranthus hypochondriacus* and exhibit a tight panicle, and that we could also consider *A. cruentus* species as secondary options. In their trials, *A. hypochondriacus* seems to have the best results in terms of plant stand, yield, quality, harvest ease, etc.

Taking this into consideration as well as Rony's experience growing Amaranth in Guatemala, we are going to grow mostly *A. hypochondriacus* varieties but will include one *A. cruentus* variety from Guatemala, and one *A. caudatus* variety in the trial.

We will grow 6 varieties:

1. Plainsman from La Societe des Plantes (hypochandriacus x hibridus)
2. Grain Amaranth by Richters

3. Red Amaranth from Greta's Organic Gardens - (had black seeds even though the information in the catalog and seed pack says that they are white seeds, so I did not plant them since black seeds do not pop when cooked.)
4. Opopeo Amaranth from Annapolis Seeds (Amaranthus hypochondriacus)
5. Atitlan Dorado from IMAP Guatemala
6. Burgundy Amaranth from Greta's Organic Gardens-

Amaranth germinates best when soil temperatures are between 18-24 degrees celsius, which is around the same for sweet corn. This is usually two weeks after the last frost date, so around late May to mid June in southern Ontario.

Due to their small size, shallow planting is required for amaranth seed. A press wheel on the planter can provide essential seed-to-soil contact to insure rapid germination and emergence. A small vegetable planter with the celery or carrot seed plate could be used. For small amounts hand seeding will also work.

Rony will plant two rows of amaranth per bed at a distance of 20 inches (ca. 51 cm) between rows and 10 inches (ca. 25 cm) in rows. He will plant one hundred plants per variety. Rony will plant a row of Corn between the beds of amaranth as a barrier between varieties, since they tend to cross.

Amaranth resembles red-rooted pigweed, especially in the early stages of growth, so it is best to sow seed in rows to make weeding less confusing. Weeding between the rows can be down mechanically but in-row weeding may need to be done by hand.

Most amaranth varieties maintain a high moisture content in the stem and are left until the plants are killed by frost. After a killing frost, the plants dry down and can be harvested mechanically. However, seed will often ripen many weeks before a frost, usually after about three to four months (100-120 days). For hand harvest of small plots, Dan Jason of Salt Spring Seeds says an easy way to gather ripe grain is, in dry weather, to bend the plants over a bucket and rub the seed heads between your hands.

Pigweeds have the amazing ability to flower and go to seed at any stage of their growth and both will cross with their cultivated progeny. The grower who wants pure strains of amaranth must therefore pay close attention to weeds. Additionally, amaranth cultivars will cross with each other, so grow only one kind of each or separate cultivars by as much distance as you can.

Data will be gathered using these observation sheets:
https://docs.google.com/spreadsheets/d/1Tj5Xtd5kHEfAC8Ta-UkU95yxa4HnfDIy-0fXMmBsWu0/edit?usp=sharing

Materials

Please list all the equipment that you need for this project. Indicate "in-kind" under Total Cost for any materials that you already own or have access to. For pre-approved research expenses, for which you will be reimbursed, please indicate cost.

Material	Total Cost*	Note
compost	$110	
seeds	$100	
tarps	$40	
sifter	$30	
string	$20	
a fan	$30	
4 buckets	$20	
	Total: $350	

* For approved research expenses

Farmer-fees: $500 farmer-fee, invoiced to EFAO after farmer-researcher submits data.

Memorandum of Understanding

Farmer-researchers agree to keep an active membership with EFAO throughout the duration of their trial. Reimbursement for research expenses and farmer-fees will be paid to current members only.

Please also refer to efao.ca/farmer-led research for a **Memorandum of Understanding** of other responsibilities. Specifically refer to sections:

- *What is expected of me as a farmer-researcher?*
- *What support will I receive from EFAO as a farmer-researcher?*

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.

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