

Amaranthus, Millets, Forage Legumes, Spinach, and Miscellaneous Umbelliferae

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Collection Description

Our 8,666 accessions represent 68 genera. *Amaranthus* is our largest genus. *Amaranthus* also gets more seed orders than our other genera. Our most commercially important genus is *Spinacia* (spinach). The 68 genera are in six plant families.

Families	Genera	Accessions	Notes
Amaranthaceae	5	3,385	Mostly <i>Amaranthus</i> and <i>Celosia</i>
Apiaceae	41	1,070	Mostly <i>Anethum</i> , <i>Coriandrum</i> , and <i>Petroselinum</i>
Chenopodiaceae	4	635	Mostly <i>Chenopodium</i> and <i>Spinacia</i>
Fabaceae	7	1,179	Mostly <i>Melilotus</i>
Lamiaceae	1	23	The mint family includes <i>Perilla</i>
Poaceae	10	2,375	The grass family includes the millets

Crop Uses

<i>Amaranthus</i>	white seeded grain, vegetable, and ornamental
<i>Chenopodium</i>	grain
<i>Celosia</i>	ornamental, and vegetable
<i>Echinochloa</i>	grain and fodder
<i>Melilotus</i>	forage, and soil improvement
<i>Panicum</i>	grain, and bird food
<i>Perilla</i>	oilseed, vegetable, food pigment, ornamental
Apiaceae	spice seeds, vegetables, ornamentals
<i>Setaria</i>	grain, and bird food
<i>Spinacia</i>	vegetable



Our Apiaceae collection includes *Ferula* pictured here, and related plants including cilantro, parsley, fennel, lovage, and many minor genera.



We maintain the millet crops: barnyard millet, foxtail millet, and proso millet. In some countries these are staple foods in the United States they are grown for bird food.



This is a new dwarf amaranth breeding line. We are breeding enhanced cultivated amaranths with new traits including non shattering seed cases, dwarfism, and disease resistance.

Impact

Our germplasm supports research projects world wide. It is often used for pilot studies of crop adaptation. The spinach germplasm collection is a resource used since the 1940's to discover resistance to newly evolving forms of blue mold disease.

We anticipate advances in plant breeding by identifying useful traits such as male sterility and non-shattering seed cases.

In *Amaranthus*, *Chenopodium*, and *Setaria* the collection is the basis for research publications improving the understanding of systematics and taxonomy.

Five improved lines of *Amaranthus* are available from Iowa State University from our enhancement breeding. All of these have genes for non-shattering seed cases. Non-shattering is in two grain producing species used in health food niche markets. The non-shattering trait is in two ornamental lines where it prevents seeds from falling on to tables in cut flower use.



2004 Guinness World Record Tallest Amaranth, 4.61 m (15.12 ft) grown at the NCRPIS, Ames Iowa (PI 553076 *Amaranthus australis*).

Management Challenges

The challenge for our group is to produce genetically clean seed stocks of a diverse set of out-crossing germplasm that is often not adapted here in Iowa. For example: Plastic tents in the winter greenhouse work well for *Amaranthus*, *Chenopodium*, and the millets: *Echinochloa*, *Panicum*, and *Setaria*.

Our *Melilotus* transplanting protocol is timed to avoid the egg laying season of destructive insects.

Recent advances in breaking the dormancy of wild spinach seeds will allow us to improve seed production.

The methods we use continue to benefit from innovations. We are always seeking new ideas.

Selected References

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Amaranth seed regeneration tents in the Iowa State University, Agronomy Department greenhouse. The plastic tents control pollen movement.



The spinach collection includes cultivated types with round seeds and wild types with spiny seed clusters. The wild types are a potential source of new disease resistance, but they have seed dormancy that makes cultivation difficult.