Isolation Techniques for Saving Seeds

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Reasons to Save Seeds

- Reproduce varieties that do well in your area
- Ensure long-term survival of excellent varieties
- Saves money
- Ensure clean, pure seed

Introduction to Seed Saving

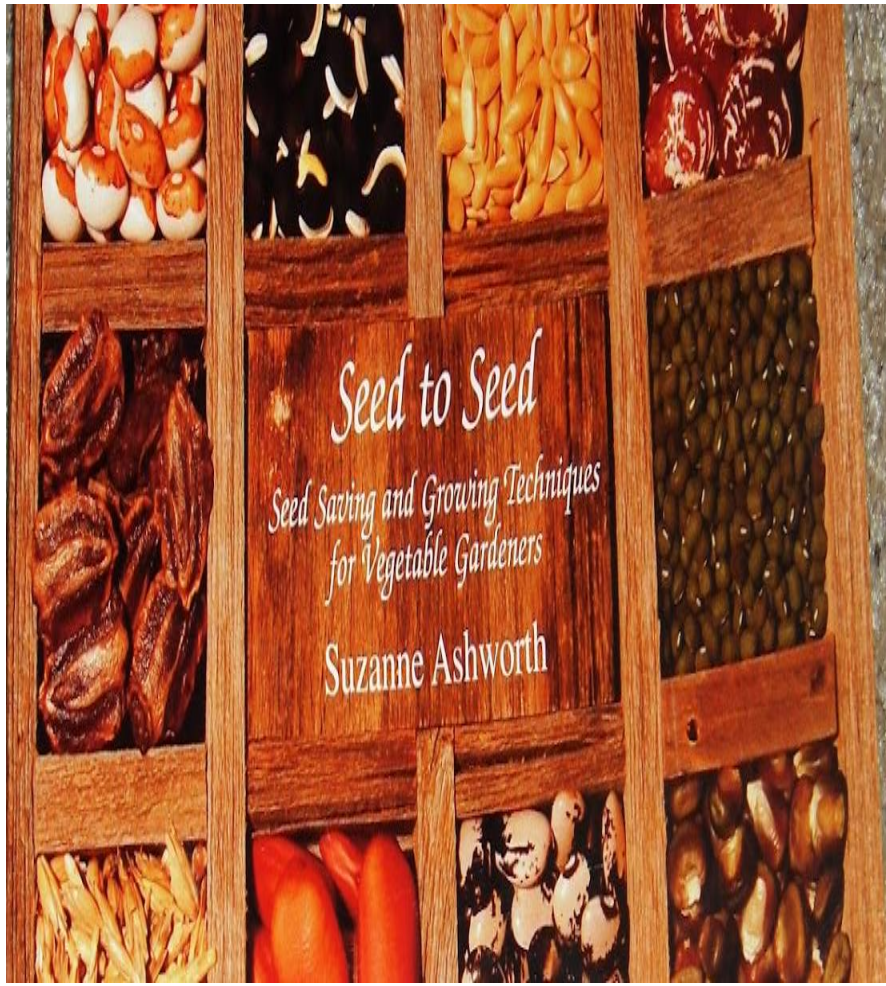
- Ancient art practiced since the dawn of agriculture
- Humans have altered plant genetics through selective seed saving since they first engaged in agriculture
- Seed was saved from plants with better flavor, larger consumable parts, higher yield
- Example: wild chiltepins vs. modern chile pepper varieties)

Heirloom and Landrace Varieties

- In past history, our ancestors did not have access to commercial seed
- Seed was saved from the best, most productive plants year after year, generation after generation
- Heirloom and landrace cultivars resulted from these efforts
- Uniformity (or lack of it) depend on care taken in saving seed

Seed Saving & Breeding?

- Every time an individual saves ‘pure’ seed they are also engaged in breeding
- Weak plants that didn’t survive to set seed are not brought forward
- If seed is saved from plants with particular attributes, the breeding process is increased



Seed Saving & Breeding

Save seed from plants with particular qualities to improve:

- Yield
- Early maturity
- Flavor
- Disease or pest resistance
- Appearance
- Your choice….

Seed Saving

- *Seed must be saved to ensure no or minimal out-crossing to preserve integrity of the variety*

- Knowledge of the vegetable crop is critical for successful seed saving:
  -Flower biology; how are seed pollinated?
  -Genus and species; what will cross-pollinate with the crop?
  -Is inbreeding depression a concern; if so, how large of a plant population is needed to prevent?

Chile Peppers

- Genus: *Capsicum*
- Species:

*C. annuum (*majority grown in NM)
C. *baccatum* (ex. The *Aji* peppers)
C. *chinense* (ex. *Habanero* peppers)
C. frutescens (ex. Tabasco peppers*)*
C. pubescens (ex. Rocoto peppers*)*

Capsicum annuum

- Includes NM varieties, bell peppers jalapeños, poblanos, cayenne, chiltepins & northern New Mexico landraces
- These can all easily cross-pollinate


X

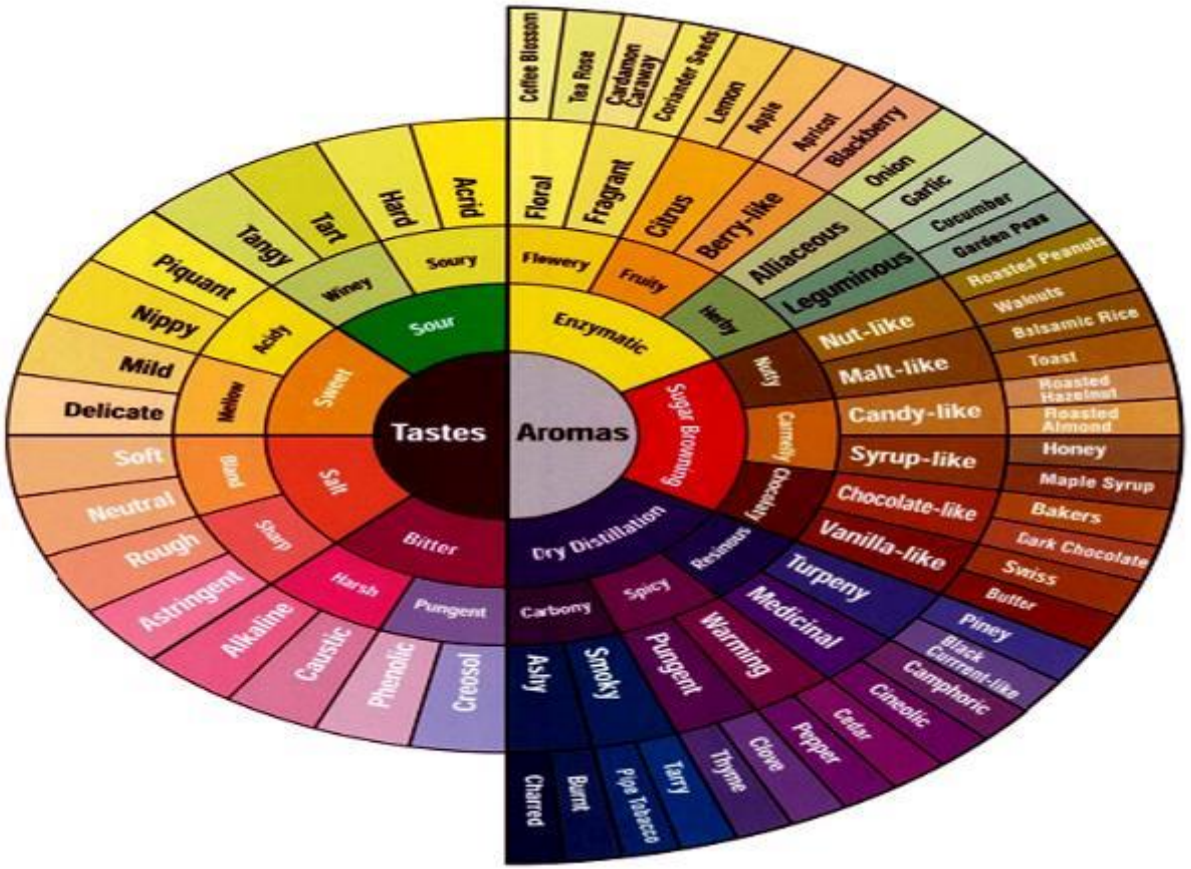
X


Criteria and Priorities

1. Crop maturity in your locale.

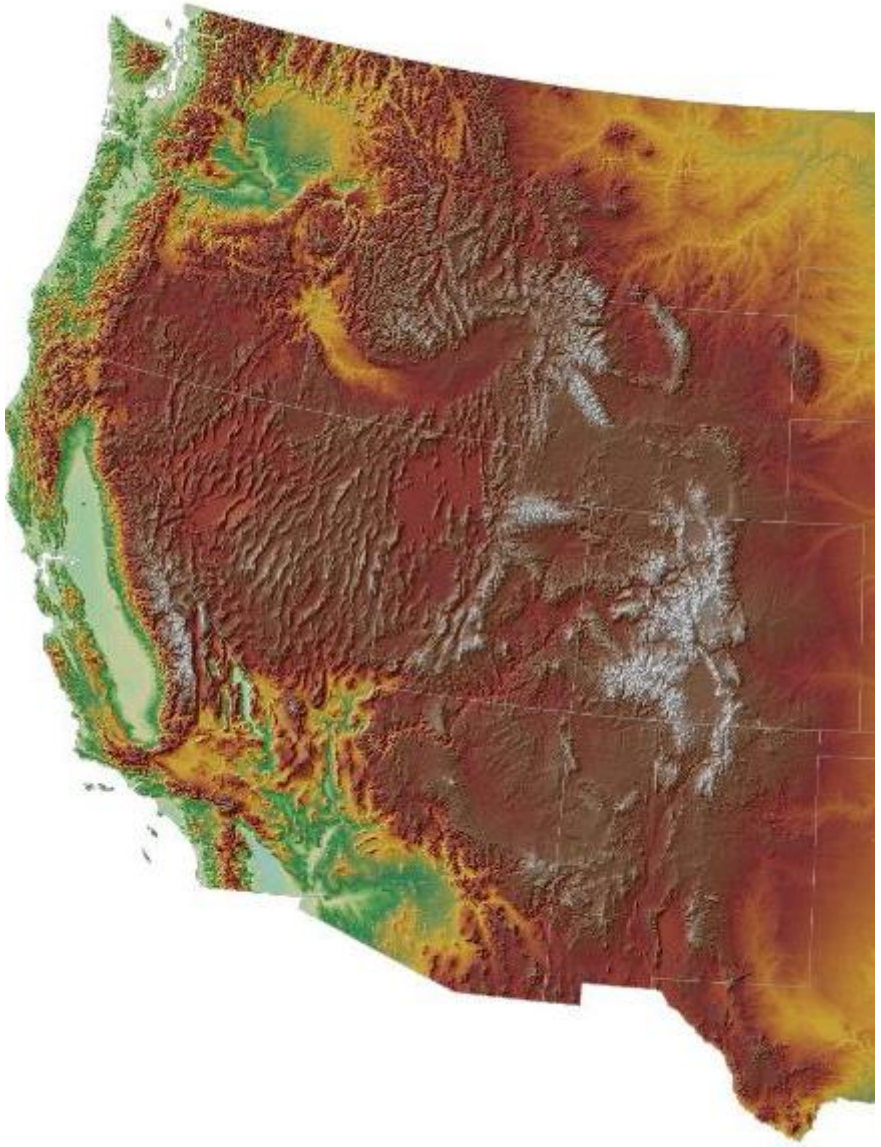
Criteria and Priorities

2. Excellent Flavor.



Criteria and Priorities

3. Locally adapted and traditional landrace / heirloom varieties of the greater Southwest and Western States.



Criteria and Priorities

4. Crops that are adapted to high elevations.

   - Tibetan Lhasa chile pepper

   - Maiz Blanco Relumbroso de Truchas

Photo Courtesy of C. Havlik, NMSU

Criteria and Priorities

- Crops that are adapted to high latitudes.
  - Tanana Tomato
  - Kria Icelandic Barley

Photo Courtesy of C. Havlik, NMSU

Criteria and Priorities

- I like a good story behind the seed.
  – Horace Pippin's Peppers

Buena Mulatta Pepper

Fish Pepper

Golden Honey Pepper

Caging for Seed Purity

- If you lack isolation, seed cages can be used to produce true-to-type seed for vegetable cultivars that are cross-pollinated by insects

- Procedure used for NMSU's Chile Pepper Breeding Program

Isolation: Big and Small

Photo Courtesy of C. Havlik, NMSU

Isolation: Big and Small

Photo Courtesy of C. Havlik, NMSU

Photo Courtesy of C. Havlik, NMSU

Smaller-scale - Blossom Bags

- For vegetables with self-pollinating, perfect flowers
- Cover flowers during fruit set to prevent cross-pollination by insects
- Place over flowers before pollen is shed
- Remove after fruit have set (be sure to mark bagged fruit that set)

Photo Courtesy of C. Havlik, NMSU

Isolation: Big and Small

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Isolation: Big and Small

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Tricks of the trade

1. Buy the seed 2. Ask for the seed 3. Buy the red dried fruit

4. Create a “spy network”

The Human Element

- Movement of people and seed
- Seed snaphot
- They would naturally cross with chiles already there (many of which also came from other places), same with corn, squash and beans, etc
- Integrity of the person to person agreement

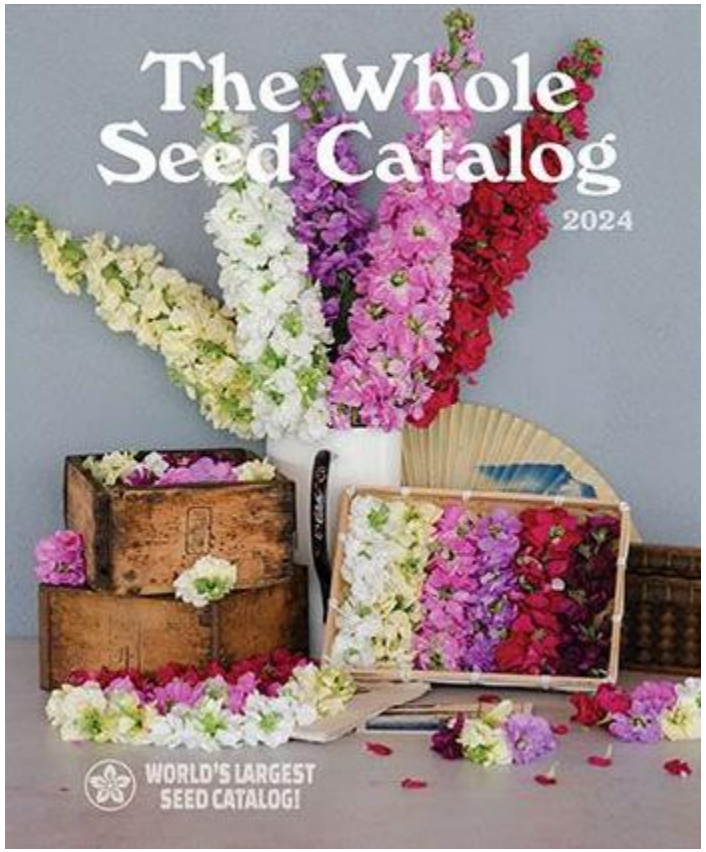
Preservation Efforts

- Rematriation of seeds to their communities of origin
- Seed increases

Photo Courtesy of C. Havlik, NMSU

Cataloging and Naming

- Landrace/ Heirloom
- Family Name/ Accession
- Tribal Name
- Geographic Location and Watershed
- Source



Examples

Landrace/ Heirloom	Family Name/ Accession	Tribal Name	Geographic Location and Watershed	Source
Acoma Pueblo		Haak'u	Acoma Pueblo, NM (Rio San Jose)	The Chile Woman/ Susan Wesland
Canyon de Chelly		Tséyi	Canyon de Chelly, AZ (Chinle Wash)	U-ga-ta Conservation
Casados Native	Casados		El Guique, NM (Rio Grande)	Native Seeds/SEARCH
Casados Native	PI661078		El Guique, NM (Rio Grande)	GRIN-Global
Jemez Pueblo	Fragua	Walatowa	Jemez Pueblo, NM (Jemez River)	Roger Fragua
San Felipe Pueblo	Candelaria	Katishtya	San Felipe Pueblo, NM (Rio Grande)	Harold Candelaria
San Jose			San Jose, San Miguel del Vado Land Grant, NM (Pecos River)	Unknown/ obtained at a seed swap by Noble Brooks Read
Tomé Nativo			Tomé, Tomé Land Grant, NM (Rio Grande)	Tomé Hill Billy's Chile

Labeling out in the Field

Cucurbits

- Squash
- Pumpkins
- Gourds
- Cucumbers
- Melons

- What do we know about cucurbits?

Squash/Pumpkin

- Different cultivars of the same species will easily cross-pollinate:
  - Separate different squash cultivars of the same species by at least 1/2 mile to ensure minimal cross-pollination between cultivars
  - Alternatively, hand pollinate and cover flowers

Squash – Hand Pollination

- In early evening, cover or seal female and male flowers that will open the next morning

- Brush pollen from male flower (or flowers) onto female flower's stigma

Squash – Hand Pollination

- Re-cover female flower until fruit sets
- Be sure to mark hand-pollinated fruit

Corn (*Zea mays*)

- Primarily cross-pollinated with wind-borne pollen
- Inbreeding depression may occur; plant population > 200 recommended

Silks = Female Flowers

Tassels = Male Flowers

Seed Storage

- Optimum Storage
  - Dry, cool, dark place
  - Refrigerate if possible
  - Temps below 50˚ F
  - Humidity below 50%

- Life expectancy depends on the type & storage conditions
- High temperatures kill seed*!*

Seed Viability

- Maximum storage time for minimum 50% germination under optimum conditions
  -Broccoli seed: 5 years
  -Chile seed: 4 years
  -Onion seed: 2 years (70% required)
  -Spinach seed: 4 years
  -Squash seed: 7 years
  -Tomato seed: 5 years

Prevent Seed Mixing

- Despite great effort in preventing cross-pollination through caging and isolating cultivars, you can quickly sabotage your efforts by accidently mixing seed!

- Carefully clean and check table surfaces, implements, and containers

- When cleaning and sanitizing different seed lots, watch for hidden, stray seeds

Prepare to Save Seed

- Does this crop self-, or cross-pollinate; or does it do both?
- Is this crop wind or insect pollinated?
- What is the species designation of this vegetable? Are there other varieties of the same species being grown close enough to cross-pollinate? How about ‘weedy’ relatives?
- Is it an annual or biennial vegetable?

Seed Saving Checklist

- Research your vegetable; different types require different isolation considerations & population sizes
- Only harvest seed from healthy, vigorous plants that also exhibit desired characteristics for the cultivar
- Harvest seed from fully mature fruit
- Don’t allow stray seeds to contaminate seed lots

Prepare to Save Seed

- Do ***not*** save seed from plants that appear sick or stunted
  -You may be preserving weak genetics, less able to withstand local biotic and abiotic pressures
  -Some diseases are seed borne (either externally or internally); example: Bacterial leaf spot may be harbored inside of seed

- Always save seed from plants that exhibit preferred characteristics, such as high yield, great flavor, vigorous growth

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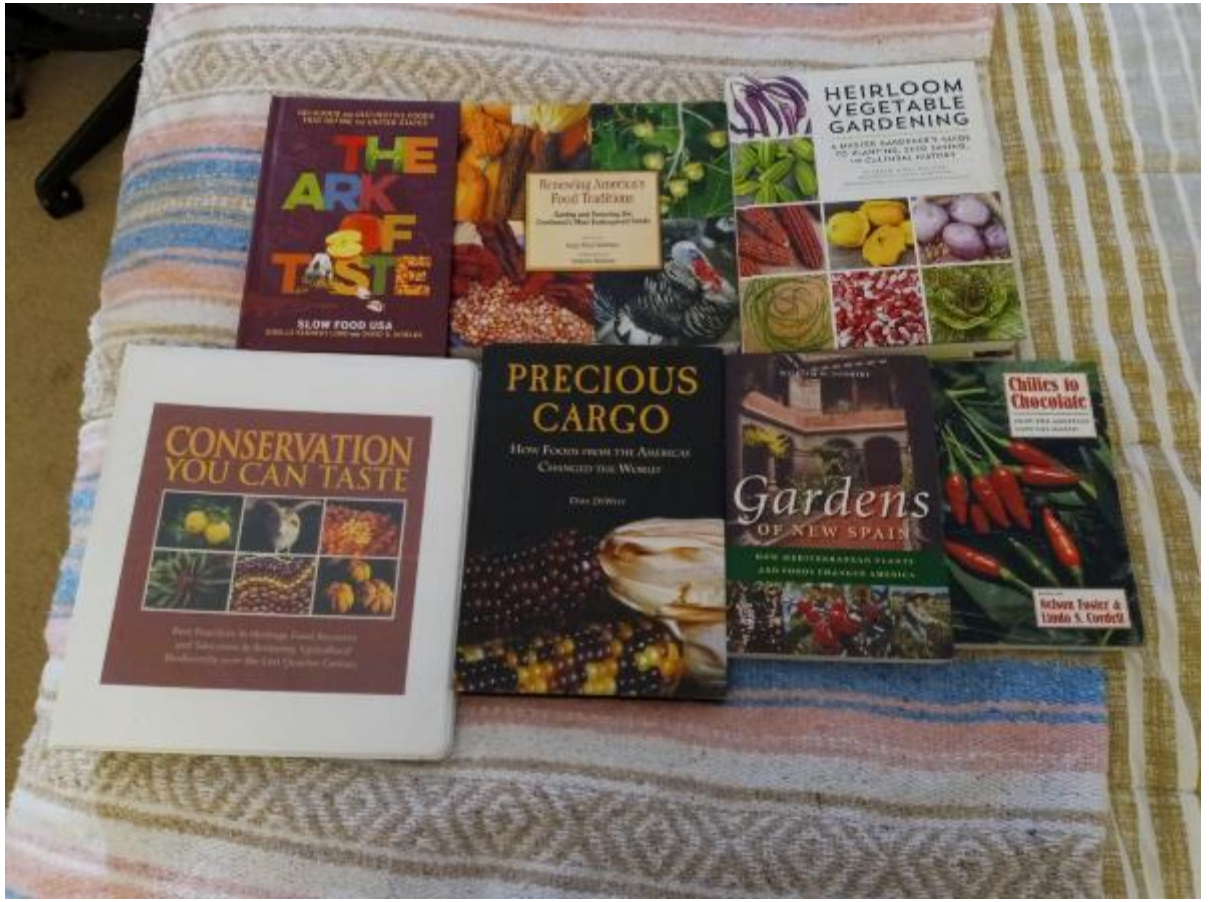
Seed Saving Checklist

- Don’t save seed from hybrids (F1) – it will not produce uniform plants
- Don’t save seed from plants cross-pollinated by different cultivars - it will not produce uniform plants
- ***Unless you’re embarking on breeding a new cultivar!***

Great Sources of Information



Great Sources of Information

- *"Seed to Seed: Seed Saving and Growing Techniques for Vegetable Gardeners"* by Suzanne Ashworth
  "The Organic Seed Grower" by John Navazio
- "Save Our Seeds" by Bevin Cohen and Jere Gettle
- "*The Seed Garden: The Art and Practice of Seed Saving*" by Lee Buttala, Shanyn Siegel, et al.
- "*Breed Your Own Vegetable Varieties: The Gardener's and Farmer's Guide to Plant Breeding and Seed Saving*" by Carol Deppe
- "*Landrace Gardening: Food Security through Biodiversity and Promiscuous Pollination*" by Joseph Lofthouse

My Personal Seedbank

Support your small seed houses

- Native Seeds/ SEARCH
- Seed Savers Exchange
- Baker Creek Heirloom Seeds
- Experimental Farm Network
- Farm Direct Seeds
- Great Lakes Staple Seeds
- Hardy Seeds
- High Desert Seed + Gardens
- High Ground Gardens
- J & L Garden Seeds
- Roughwood Seed Collection
- Siskiyou Seeds
- Small House Farm
- The Buffalo Seed Company
- Wild Boar Seeds
- Wild Garden Seed
- Wild Mountain Seeds

Questions and Contact

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