Germplasm Resources

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Presentation Credit: Dr. David Francis, The Ohio State University

Why do we need diverse germplasm?

Resistance/tolerance to new and emerging diseases

Resilience to heat, cold, draught, flood

Variety of shapes, sizes, colors

Perception of flavor quality

Renewed interest in niche markets (growers and seed suppliers)

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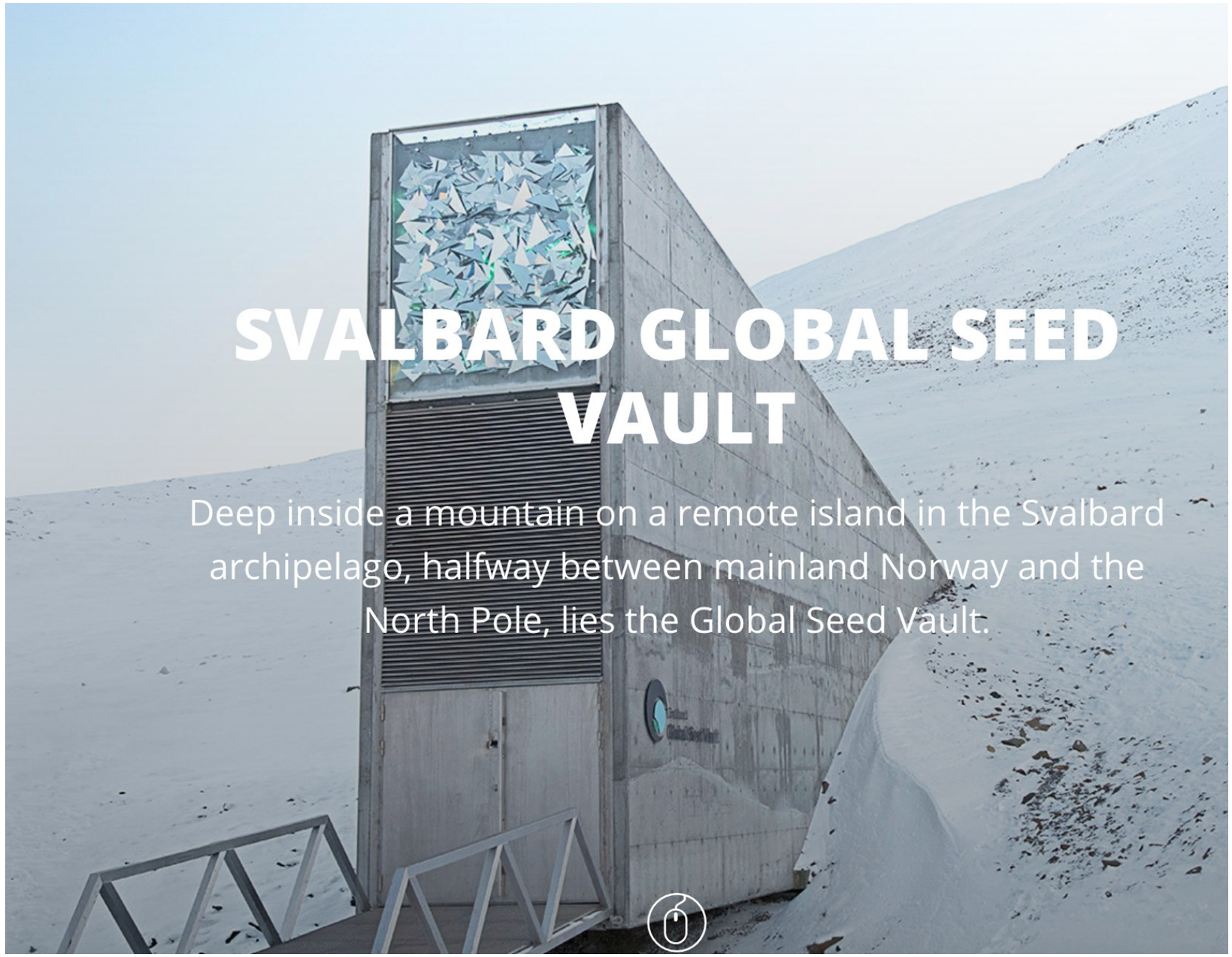
Where to go for “lost” varieties or new varieties

Getting resources from living collections

NPGS
OSSI

Maintaining the integrity of a variety (vs creating a new variety as in hacking hybrids)



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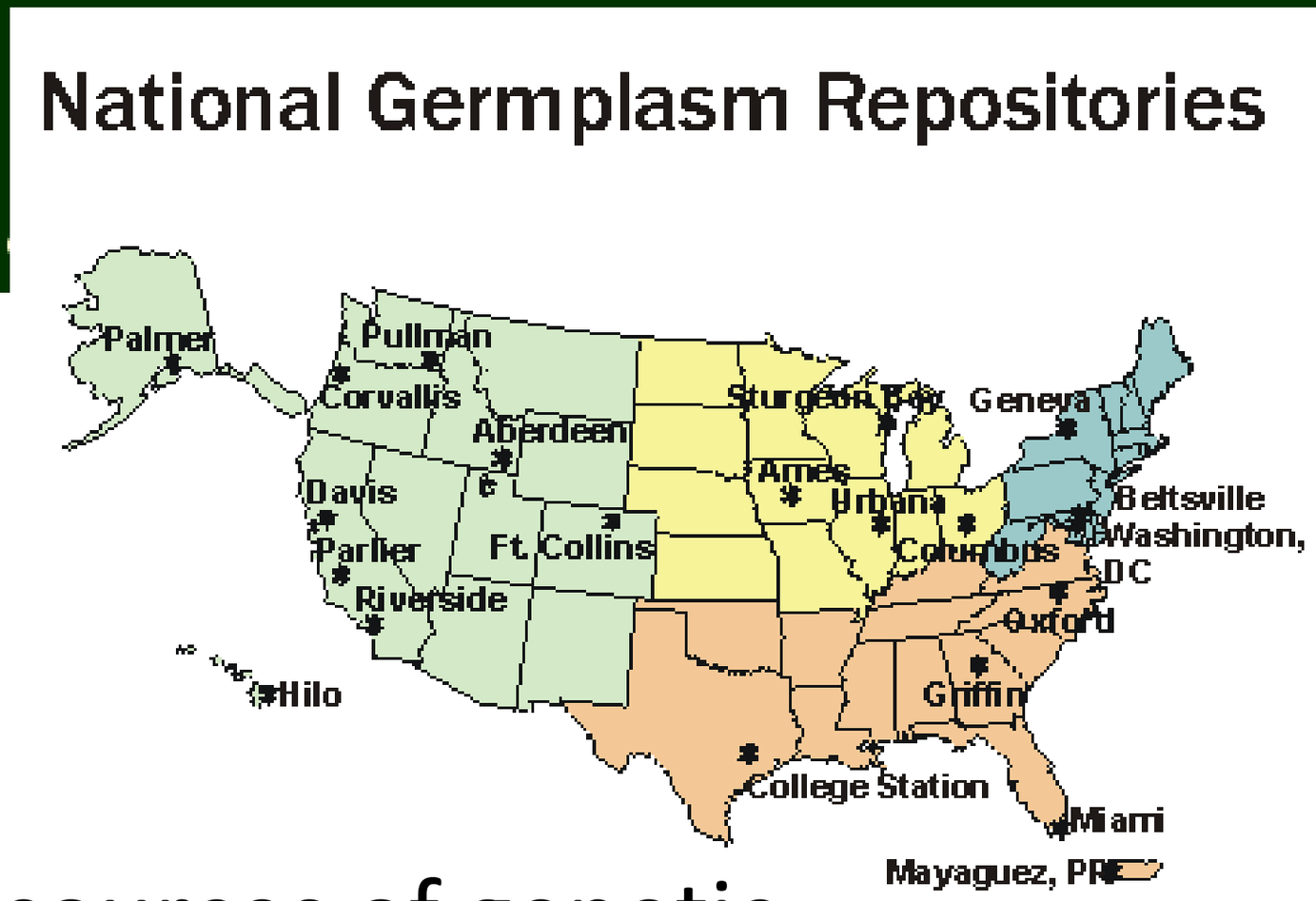
Germplasm is a collection of genetic resources. Germplasm is living tissue from which new plants can be grown. It can be a seed or another plant part – a leaf, a piece of stem, pollen or even just a few cells that can be turned into a whole plant.

National Plant Germplasm System

United States Department of Agriculture
Agricultural Research Service

| Home | Collections | Search GRIN | Request Germplasm | pcGRIN |



Ex Situ collections

Where do we look for sources of genetic variation available to the public?

Presentation Credit: Dr. David Francis, The Ohio State University

https://www.ars-grin.gov/npgs/

National Plant Germplasm System

Global food availability and security is based on intensive agricultural production. Over the past century, this intensification has relied heavily on producing crops with increasing genetic uniformity. Although these practices have benefits, they also include the risks of increasing the vulnerability of crops to pests, diseases, and environmental stress.

Plant breeding and associated scientific research is essential to meet the ongoing challenges of producing plants for food, fiber, animal feeds, industrial and medicinal purposes, and for landscape and ornamental uses. It is important to collect and conserve living plant material, both to help solve immediate agricultural production problems as well as safeguard plant genetic diversity for future needs. This mission is more essential than ever because the loss of genetic diversity is accelerating with threats from many factors including global urbanization, habitat changes associated with climate, and changes in land use related to population growth and economic development.

Related Topics

- NPGS Collections
- Crop Germplasm Committees
- Repository Home Pages
- PI Books volumes 1 through 217
- Links

Presentation Credit: Dr. David Francis, The Ohio State University

Example of Crop-Specific Germplasm Repository (TGRC):

Applications Places System Thu Feb 4, 11:46 AM David

Tomato Genetics Resource Center - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://tgrc.ucdavis.edu/

Most Visited Getting Started Latest Headlines

C.M. Rick

TGRC

Tomato Genetics Resource Center

The C.M. Rick Tomato Genetics Resource Center (TGRC) is a genebank of wild relatives, monogenic mutants and miscellaneous genetic stocks of tomato. The Center is named for the late Dr. Charles M. Rick, who established much of the collection through his research and plant collecting activities. Located in the Dept. of Plant Sciences, University of California at Davis, the TGRC is also integrated with the National Plant Germplasm System (NPGS). The TGRC facilitates research on tomato by providing seed samples of its accessions to interested scientists worldwide. Information on our stocks and instructions for submitting seed requests are provided below....
[Click_here_for_more_Information on the TGRC]

Search TGRC

Stock Maintenance Guidlines

Seed germination

Growing & reproducing wild species

Key to the tomato species

Identification of trisomics

GA, ABA, thiamine mutants

Maintenance of Solanum species by grafting

Seed Catalogue

TGRC Stock Lists from TGC

Download Wild Species [33KB PDF file]

Monogenic Mutants [960KB PDF file]

Miscellaneous Genetic Stocks [201KB PDF file]

Database Queries

Accessions

Geographic Data on

Dr. Charles M. Rick
(1915-2002)
Biography by:

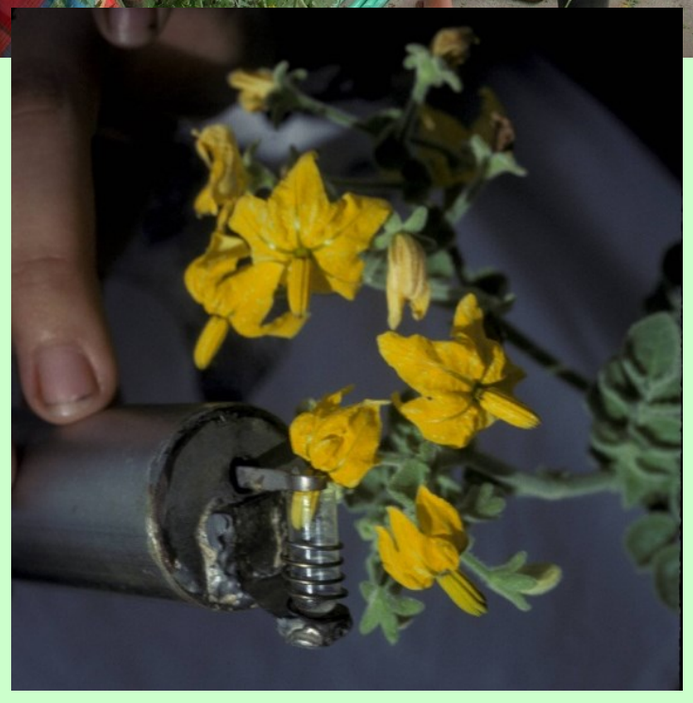
Done

*Unsaved Document 1... Tomato Genetics Reso... Untitled 1 - OpenOffice...

Presentation Credit: Dr. David Francis, The Ohio State University

Example of Germplasm Repository Functions (TGRC)

What do centers do? Seed amplifications



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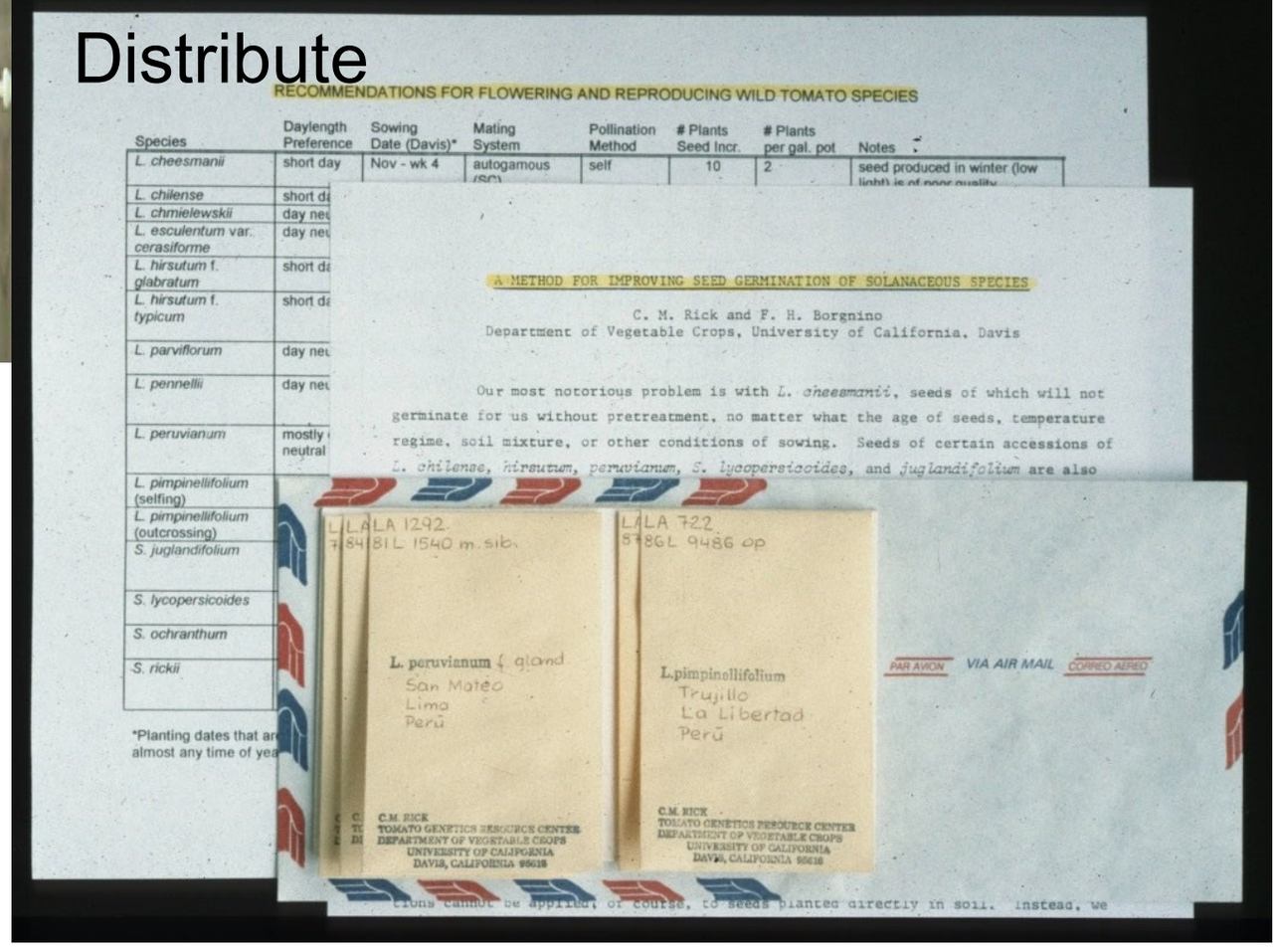
Example of Germplasm Repository Functions (TGRC): amplify, store and distribute

Seed cleaning

Seed storage

Distribute



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Searching by

Taxonomy

Characteristics

Origin

Name

PVP Status (including expired)

Germplasm Resource Information Network (GRIN)
National Plant Germplasm System (NPGS)

Presentation Credit: Dr. David Francis, The Ohio State University

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U.S. National Plant Germplasm System

Accessions ▸ Descriptors ▸ GRIN Taxonomy ▸ View Cart Reports My Profile ▸ About GRIN-Global ▸ Help

NPGS Home Page > Descriptors > Descriptors

Choose Crop:

SUGARBEET
SUGARCANE
SUNFLOWER
SWEET-CLOVER
SWEETPOTATO
SWITCH GRASS
TARO
TARWI
TEFF
TOBACCO
TOMATILLO
TOMATO
TREE-TOMATO
TREFOIL
TRIADENUM
TRIGONELLA
TRITICALE
UMBELS-MISC
VACCINIUM
VANILLA

New Search

CROP TRUST Bioversity international USDA

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NPGS Home Page > Descriptors > Descriptors

Choose Crop: TOMATO (Click this link to go to crop page)

TOMATO New Search

Choose descriptor(s): Clear Descriptor Choices

General information (COMMENT)

Choose All Comment Descriptors | Clear All Comment Descriptors

☐ BULLETIN ☐ GENESTK ☐ TABLENUM

Growth descriptors (GROWTH)

Choose All Growth Descriptors | Clear All Growth Descriptors

☐ GROWTH ☐ HABIT ☐ PLANTSIZE ☐ PLANTSIZE2 ☐ VINEGROWTH

Morphological descriptors (MORPHOLOGY)

Choose All Morphology Descriptors | Clear All Morphology Descriptors

☐ CRACKC	☐ FRTSHAPE1	☐ MAXDIAM3	☐ MINDIAM2	☐ MINLOCS
☐ CRACKR	☐ FRTSHAPE2	☐ MAXFASC	☐ MINDIAM3	☐ PEDICEL
☐ ENDSCARCON	☐ FRTSHAPE3	☐ MAXFRTDIAM	☐ MINFASC	☐ PUFFINESS

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NPGS Home Page > Accessions > General

Query Criteria:

Search String: Tomato AND Ohio

Search For: Tomato AND Ohio Match All Terms **Retrieve:** Accessions

Accessions: Include unavailable Include historic With images With NCBI link With genomic data

Advanced Search Criteria **Return up to** 500 accessions Search

Allow Multiple Lines

Actions...

Select: All, None, Inverse, Highlighted Options: Show 25 items << < 1 - 25 of 95 > >> Export...

Group By: Plant ID	Plant Name	Taxonomy	Origin	Material	Maintained By	Availability
PI 644760	Ohio Crack Resistant Red	Solanum lycopersicum	United States, Ohio	Seed	NE9	Add to Cart
PI 645269	Heinz 14451 VF	Solanum lycopersicum	United States, Ohio	Seed	NE9	Add to Cart
PI 645270	E S 58 (FST)	Solanum lycopersicum	United States, Ohio	Seed	NE9	Add to Cart
PI 645271	Heinz 14456 VF	Solanum lycopersicum	United States, Ohio	Seed	NE9	Add to Cart
PI 645272	Heinz 15489	Solanum lycopersicum	United States, Ohio	Seed	NE9	Add to Cart
PI 645273	Heinz 1630	Solanum lycopersicum	United States, Ohio	Seed	NE9	Add to Cart
PI 645407	Ohio 736	Solanum lycopersicum	United States, Ohio	Seed	NE9	Add to Cart
PI 645408	Ohio 7663	Solanum lycopersicum	United States, Ohio	Seed	NE9	Add to Cart
PI 634845	Ohio 7681	Solanum lycopersicum	United States, Ohio	Seed	NE9	Add to Cart

Presentation Credit: Dr. David Francis, The Ohio State University

Searching for Heirlooms

Examples (using C Male's description):

Commercial Heirloom

Gold Ball (Livingston's)

Alexander Livingston

Family Heirloom

Brandywine (Sudduth/Quisenberry)

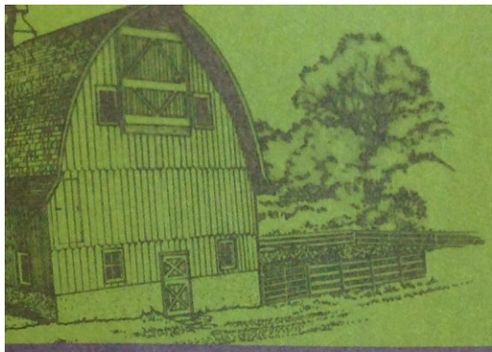
Created Heirloom

Green Zebra

Mystery Heirloom

Ananas Noire

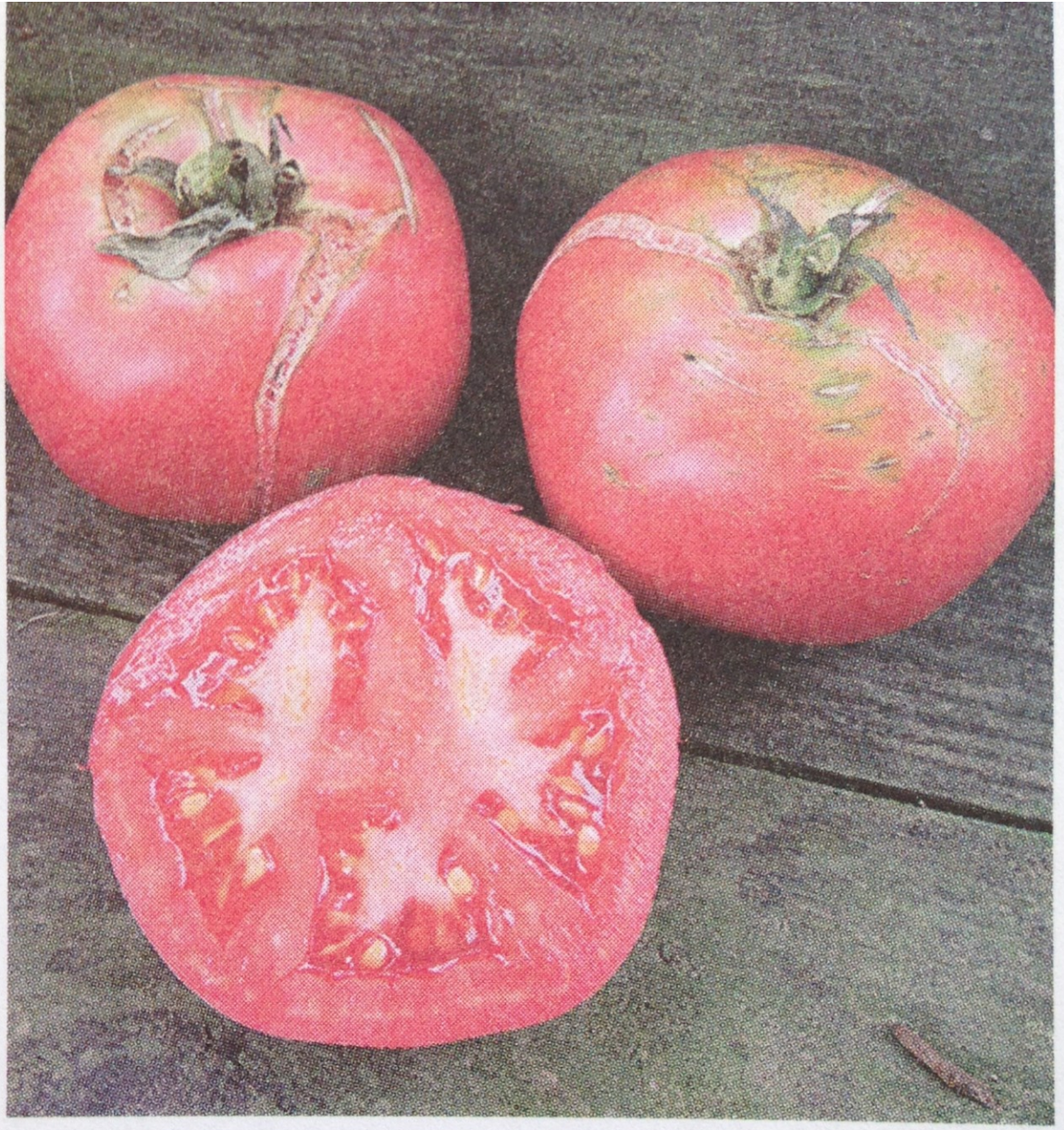
Presentation Credit: Dr. David Francis, The Ohio State University



The Heritage Farm Companion

Membership Publication of Seed Savers Exchange ☙ Spring 2017

Presentation Credit: Dr. David Francis, The Ohio State University



Livingston's 'Main Crop Pink,' *accession 125776—acquired from Craig LeHoullier, who first acquired it from the USDA—was reviewed and confirmed. Its fruit is a good match to historic descriptions of the tomato, first introduced in 1941.*

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NPGS Home Page > Accessions > General

Query Criteria:

Search String: Solanum lycopersicum
'country of origin' Country equals United States
'accession plant name' contains 'Livingston'

Search For: Solanum lycopersicum ☑ Match All Terms **Retrieve:** Accessions

Accessions: ☐ Include unavailable ☐ Include historic ☐ With images ☐ With NCBI link ☐ With genomic data

Advanced Search Criteria **Return up to** 500 accessions Search

☐ Allow Multiple Lines

Actions...

Select: All, None, Inverse, Highlighted Options: Show All items << < 1 - 2 of 2 > >> Export...

Group By: Plant ID	Plant Name	Taxonomy	Origin	Material	Maintained By	Availability
PI 645030	Livingstons Stone 3049	Solanum lycopersicum	United States, Wyoming	Seed	NE9	Add to Cart
PI 645085	Livingstons Magnus	Solanum lycopersicum	United States, Wyoming	Seed	NE9	Add to Cart

Show All items << < 1 - 2 of 2 > >>

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Query Criteria:

Search String: Solanum lycopersicum
'country of origin' Country equals United States
'accession plant name' contains 'Gold'

Search For: Solanum lycopersicum ☑ Match All Terms **Retrieve:** Accessions

Accessions: ☐ Include unavailable ☐ Include historic ☐ With images ☐ With NCBI link ☐ With genomic data

Advanced Search Criteria **Return up to** 500 accessions Search

☐ Allow Multiple Lines

Actions...

Select: All, None, Inverse, Highlighted Options: Show All items << < 1 - 19 of 19 > >> Export...

Group By: Plant ID	Plant Name	Taxonomy	Origin	Material	Maintained By	Availability
PI 644800	Minigold	Solanum lycopersicum	United States, Minnesota	Seed	NE9	Add to Cart
PI 634834	Golden Glory	Solanum lycopersicum	United States, Wyoming	Seed	NE9	Add to Cart
PI 644931	Golden Nugget	Solanum lycopersicum	United States, Wyoming	Seed	NE9	Add to Cart
PI 645077	Golden Beauty	Solanum lycopersicum	United States, Wyoming	Seed	NE9	Add to Cart
PI 633487	Isbells Golden Colossal	Solanum lycopersicum	United States, Wyoming	Seed	NE9	Add to Cart
PI 634838	Golden Jubilee	Solanum lycopersicum	United States, Wyoming	Seed	NE9	Add to Cart
PI 645101	Ponderosa Golden	Solanum lycopersicum	United States, Wyoming	Seed	NE9	Add to Cart
PI 645122	Golden Bison	Solanum lycopersicum	United States, Wyoming	Seed	NE9	Add to Cart
PI 647469	Golden Tomboy F1	Solanum lycopersicum	United States	Seed	NE9	Add to Cart
PI 234254	Gold Ball	Solanum lycopersicum	United States	Seed	NE9	Add to Cart

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Query Criteria:

Search String:
'taxonomy common name' equal to 'tomato'
'accession plant name' contains 'Black'

Search For: Match All Terms **Display:** Accessions

Accessions: Include unavailable | Include historic | With images | With NCBI link | With genomic data

Advanced Search Criteria **Return up to** 500 accessions **Search**

Alternative Search method using a list of accession identifiers

Actions...

Select: All, None, Inverse, Highlighted Options: Show All items << < 1 - 3 of 3 > >> Export...

Group By: Plant ID	Plant Name	Taxonomy	Origin	Material	Maintained By	Availability
PI 270217	Blackhawk	Solanum lycopersicum	United States	Seed	NE9	Add to Cart
PI 639207	Black Cherry	Solanum lycopersicum var. lycopersicum	United States, Florida	Seed	NE9	Add to Cart
PI 639208	Black from Tula	Solanum lycopersicum var. lycopersicum	Russian Federation, Tula	Seed	NE9	Add to Cart

Show All items << < 1 - 3 of 3 > >>

Presentation Credit: Dr. David Francis, The Ohio State University

PI 639207

Status:	Available
Amt Distributed:	50 count
Type Distributed:	Seed

Solanum lycopersicum L. var. lycopersicum

'Black Cherry'

Add to My Favorites

Add to Order

Developed from:	Florida United States
Maintained by:	Northeast Regional PI Station
NPGS received:	29-Sep-2004
PI assigned:	2005
Inventory volume:	214
Backup location:	
Life form:	Annual
Pedigree:	
Improvement status:	Cultivar
Reproductive uniformity:	
Form received:	Seed

Accession names and identifiers

Black Cherry	
Type:	Cultivar name
04PG2	
Type:	Site identifier

Narrative

Indeterminate. Days to maturity: 65. Heirloom variety. Described as looking like beautiful large, dusky purple grapes; they have that rich flavor that makes black tomatoes famous. Market growers report that this fruit picks clean from the stem and is produced in abundance on vigorous, tall plants. Very unique and delicious.

Presentation Credit: Dr. David Francis, The Ohio State University

Accession Details

Black Cherry is also available at the TGRC where the focus is on the gene conferring the “black” fruit character

LA4451
Status: Active
Available for international shipment: Yes
Taxon *(Lycopersicon)*: *L. esculentum cerasiforme*
Taxon *(Solanum)*: *S. lycopersicum*
Name: Black Cherry
Donor(s): Cornelius Barry
Mating System: Autogamous-SC
Sporophytic Chromosome Number: 24
Categories: Monogenic
Accession year: 2010

Genes: gf^4

Presentation Credit: Dr. David Francis, The Ohio State University

Take home message:

You will need to use different search strategies to find what you are looking for (and, it is probably there, though finding it may require persistence).

The USDA's National Plant Germplasm System Collection Contains:

5,880 Tomato Accessions
4,863 Pepper Accessions
3,790 Corn Accessions (from just the U.S.)
etc..

Presentation Credit: Dr. David Francis, The Ohio State University

A source of new material without “IP”

Open Source Seed Initiative http://osseeds.org/seeds/

OSSI ‘Freed’ Seed

The following varieties have been designated as Open Source by the people who bred them. OSSI does not sell seed of these varieties but seed is available from our Seed Company Partners. Sources of seed for each variety are listed here.

New Category! **Bred for Organic Systems.** Varieties that have been bred on land managed using organic practices (certified and uncertified) are labeled as ‘Bred for Organic Systems’ above the variety description. You can also select ‘Bred for Organic Systems’ to search for these varieties.

Note: If you select ‘commercially available’ you will only see varieties that are being sold commercially. If you select ‘finished varieties’, breeding populations will be excluded.

Variety Name | Crop | Plant Breeder | Seed Company Partners

Bred for Organic Systems | Commercial Availability | Finished Varieties

Presentation Credit: Dr. David Francis, The Ohio State University

Open Source Seed Initiative http://osseeds.org/seeds/

Note: If you select 'commercially available' you will only see varieties that are being sold commercially. If you select 'finished varieties', t
[illegible] will be excluded.

open source seed initiative

ABOUT SEEDS COMMUNITY GET INVOLVED MAGAZINE CONTACT DONATE SHOP 0

Variety Name | Crop | Plant Breeder | Seed Company Partners

× Tomato

Bred for Organic Systems | Commercial Availability | Finished Varieties

1 - 19 / 19

Estate

Crop: Tomato
Latin name: *Solanum lycopersicum*
Plant Breeder: Frank Morton, Wild Garden Seed
Date Pledged: 1/30/2017

Bred for Organic Systems

This comes from the crossing of three varieties that worked for us over the years. Stupice x Homestead was later crossed to Peron Sprayless when we lived in the cold hills. Peron provided a smooth round lushness that is very upscale in appearances. Terrific full tomato flavor, large juice-filled locules, and a meaty heart. Grows to about 6-7' with fruits 3-3½".Farm Original Variety!

'Home Stoop'

Crop: Tomato
Latin name: *Solanum lycopersicum*
Plant Breeder: Frank Morton, Wild Garden Seed
Date Pledged: 1/30/2017

Bred for Organic Systems

Stupice' was introduced to the US by Abundant Life Seed Foundation along with a number of other East European varieties circa 1980, and immediately found a home on every mountain homestead in the Northwest. Damp hardy and cool adapted, it delivered great flavor and results in marginal situations, but the fruits were small. 'Homestead' was once a commercial variety in Florida, an exact opposite of the Northwest climate and soil. It came to us as a free seed packet with a subscription to National Gardening

Presentation Credit: Dr. David Francis, The Ohio State University

Once you've found that special variety (lost Heirloom or new) , how do you maintain genetic purity?

(Distinct, Uniform, and Stable features of a cultivated type)

Important Considerations:

Reproductive biology of the plant (relative degree of inbreeding and outbreeding)

- Flower structure
- Self-incompatibility

Pollen dispersal (wind, insect)

Presentation Credit: Dr. David Francis, The Ohio State University

Corn is “monoecious”: there are separate male and female flowers on the same plant (enforces out-breeding) and bagging is used to preserve integrity

Presentation Credit: Dr. David Francis, The Ohio State University

Other examples of bagging

Presentation Credit: Dr. David Francis, The Ohio State University

diatex.com agrotextile
bluemaize.net
Jill Henderson (c)

Presentation Credit: Dr. David Francis, The Ohio State University

Presentation Credit: Dr. David Francis, The Ohio State University

Seed cleaning

Treat seed to minimize spread of seed-borne pathogens (viruses and bacteria).

Acid (HCl), Bleach, TSP, heat…

Drying tomato seeds

Packing
Storage

Storage: Dry and Cool; exclude rodents and insects

Presentation Credit: Dr. David Francis, The Ohio State University

Conclusions:
There are readily available sources of germplasm (old and new)

Knowing something about the botany (flower structure, mating system, etc…) of your crop is important to preserve the integrity of a variety. If outcrossing is a possibility, use bags or screens to exclude outcrossing.

Hands-on Session:
Harvest seed at physiological maturity

Seed treatment may be important for reducing seed-borne diseases

Proper seed storage (dry and cool) is important

May need to protect seed from rodents and insects

Presentation Credit: Dr. David Francis, The Ohio State University

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Questions, comments, discussion?

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