







NDSU | EXTENSION


2026 Field to Fork

www.ag.ndsu.edu/food

NDSU EXTENSION

EXTENDING KNOWLEDGE » CHANGING LIVES

Upcoming Webinars

- **April 1 – Safe home canning: Start with the recipe, finish with confidence**

  Karen Blakeslee, Kansas State University Extension associate

- **April 8 - Safer solutions: Natural insecticides to manage garden insects**

  Janet Knodel, NDSU professor and entomologist

Zoom Webinar

You are viewing Scott Swanson's screen

View Options

Presenter

Audio Settings

Chat

Raise Hand

Q&A

Leave

- **Please complete the short online survey** that will be emailed to you after today's webinar. It will take just a couple minutes!
- Be sure to sign up for an opportunity to win a prize in the drawing. After submitting the survey, a form to fill out with your name/address will appear.

Acknowledgement: This project was made possible with funding from the North Dakota Department of Agriculture through the U.S. Department of Agriculture's Specialty Crop Block Grant program. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the USDA.

March 25

Roots, fruits, and shoots: Edible plant parts

Asunta (Susie) Thompson,
NDSU associate professor and potato breeder
Johansen-Thompson Endowed Professor in Potato Breeding

Horticultural Crops

- Floriculture – the science of flower growing and culture
- Olericulture – the science of vegetable growing and culture
- Ornamental horticulture – growth of trees and shrubs
- Pomology – the science of fruit growing and culture

What Makes A Crop Horticultural Rather Than Agronomic?

They are highly ‘intensive’ relative to field crop production

- Labor
- Irrigation
- Fertilization
- Pest protection
- Sustainable practices
- Post-harvest handling

Vegetables

Herbaceous plants cultivated for food, as cabbage, potato, bean, etc.; also the edible part or parts of such plants as prepared for market or table.

Webster's Dictionary

Characteristics of Vegetables

- Herbaceous
- Edible portions high in moisture content
- Perishable, require special handling
- Fresh consumption and processing

All America Selection

Vegetable Production

- Highly ‘intensive’ relative to field crop production
  - labor
  - irrigation
  - fertilization
  - pest protection
  - sustainable practices
  - post-harvest handling

Climatic requirements

- Temperature
  - cool season crops
  - warm season crops
  - production ‘suitable’ climate
- Water availability
- Day length
- Soil preferences

Classifying Vegetables

NDSU | EXTENSION

Systems for Classification

- Botanical description
- Temperature requirement and hardiness
- Life cycle
- Edible plant part
- Others

Botanical Descriptions

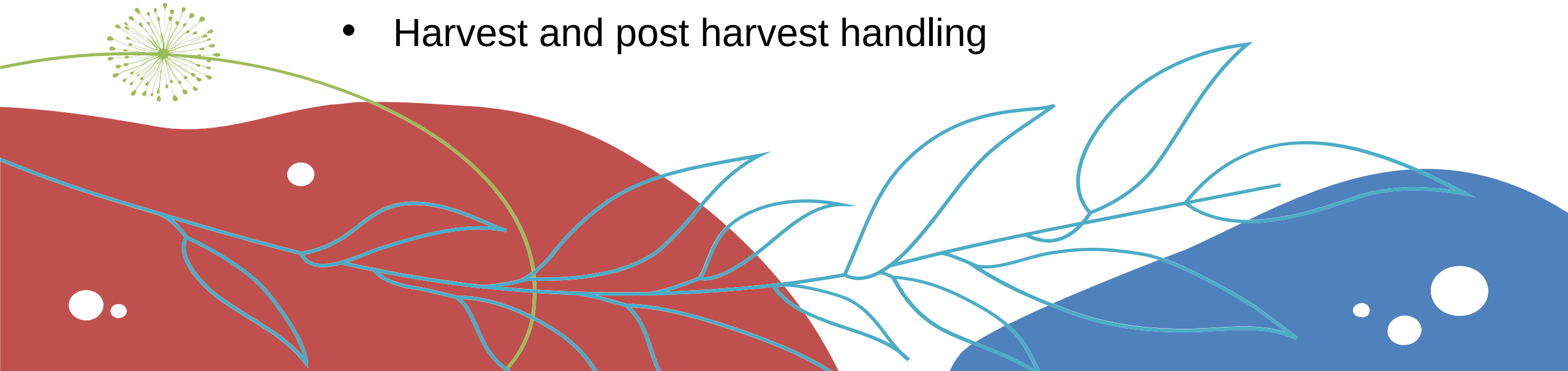
- Developed by Carl Linneaus (1735)
- Based on morphological characteristics
- Today also based on molecular markers

Botanical Descriptions Include:

- Division - Spermatophyta
- Class - Angiospermae
- Subclasses - Monocotyledoneae and Dicotyledoneae
- Family
- Genus
- Species - the basic unit
- Cultivar

Advantages Of Botanical Descriptions

- Internationally recognized, understood and used
- Climatic requirements of a particular family or genus are usually similar
- Disease and insect controls are often quite similar for related genera
- Harvest and post harvest handling



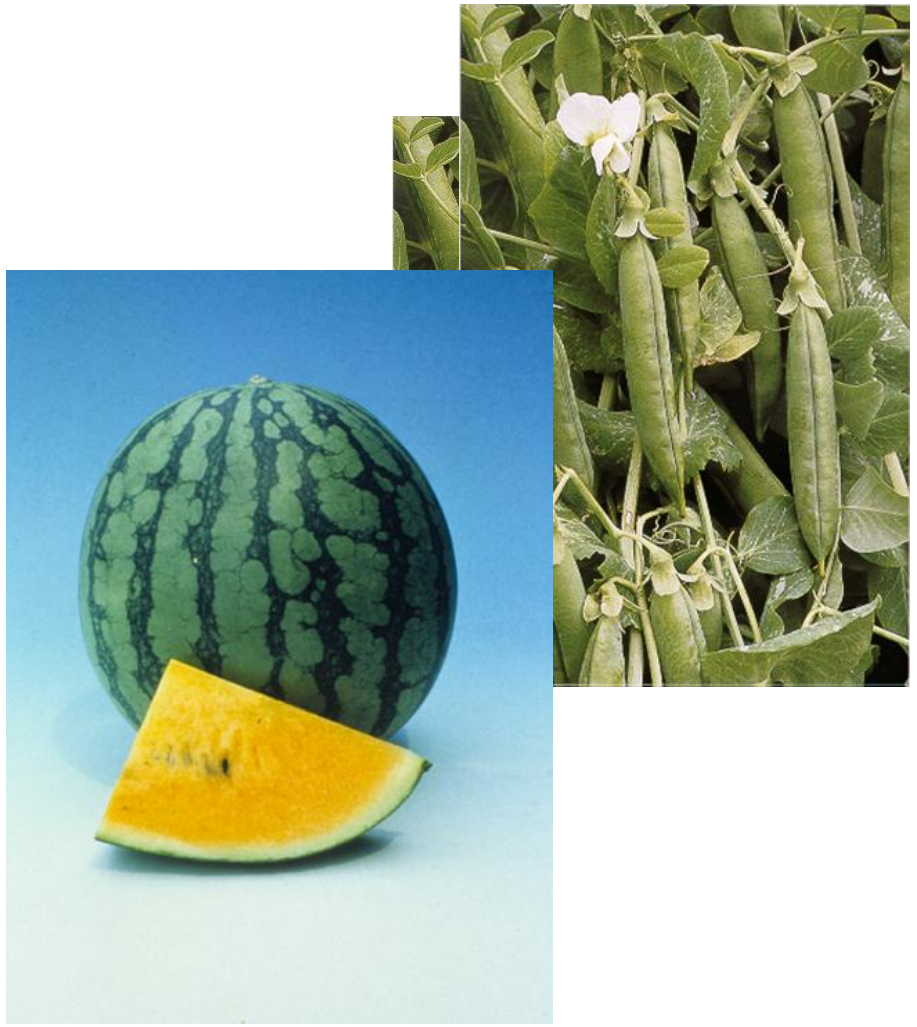
Vegetable Families

- Apiaceae (Carrot Family)
  - Carrot, celery & parsley
- Asteraceae (Sunflower Family)
  - Chicory, endive & lettuce
- Brassicaceae (Mustard Family)
  - Broccoli, Brussels sprouts, cabbage, cauliflower, Chinese cabbage, collard, kale, kohlrabi, mustard, radish, rutabaga & turnip
- Chenopodiaceae (Goosefoot Family)
  - Beet, chard & spinach
- Cucurbitaceae (Gourd Family)
  - Cantaloupe, cucumber, pumpkin, squash & watermelon
- Fabacae (Pea or Pulse Family)
  - Bean, pea & peanut
- Liliaceae (Lily Family)
  - Asparagus, chive, garlic, leek, onion & shallot
- Poaceae (Grass Family)
  - Corn
- Solanaceae (Nightshade Family)
  - Eggplant, pepper, potato & tomato

Adapted from 'Complete Guide to Vegetables, Fruit & Herbs', Meredith Books, 2004

Temperature requirement and hardiness

- Cool season crops
  - 12-20C (50-75F)
  - hardy
  - half-hardy
- Warm season crops
  - 18C (65-90F)
  - tender
  - very tender



American Selection Committee and Burpee The Complete Vegetable and Herb Gardener, 1997

Classification based on life cycle

- Annual
  - broccoli, cauliflower, lettuce, pea, potato, pumpkin, radish
- Biennial
  - beet, Brussels sprout, cabbage, carrot, onion, parsnip, turnip
- Perennial
  - asparagus, chive, eggplant, garlic, pepper, rhubarb

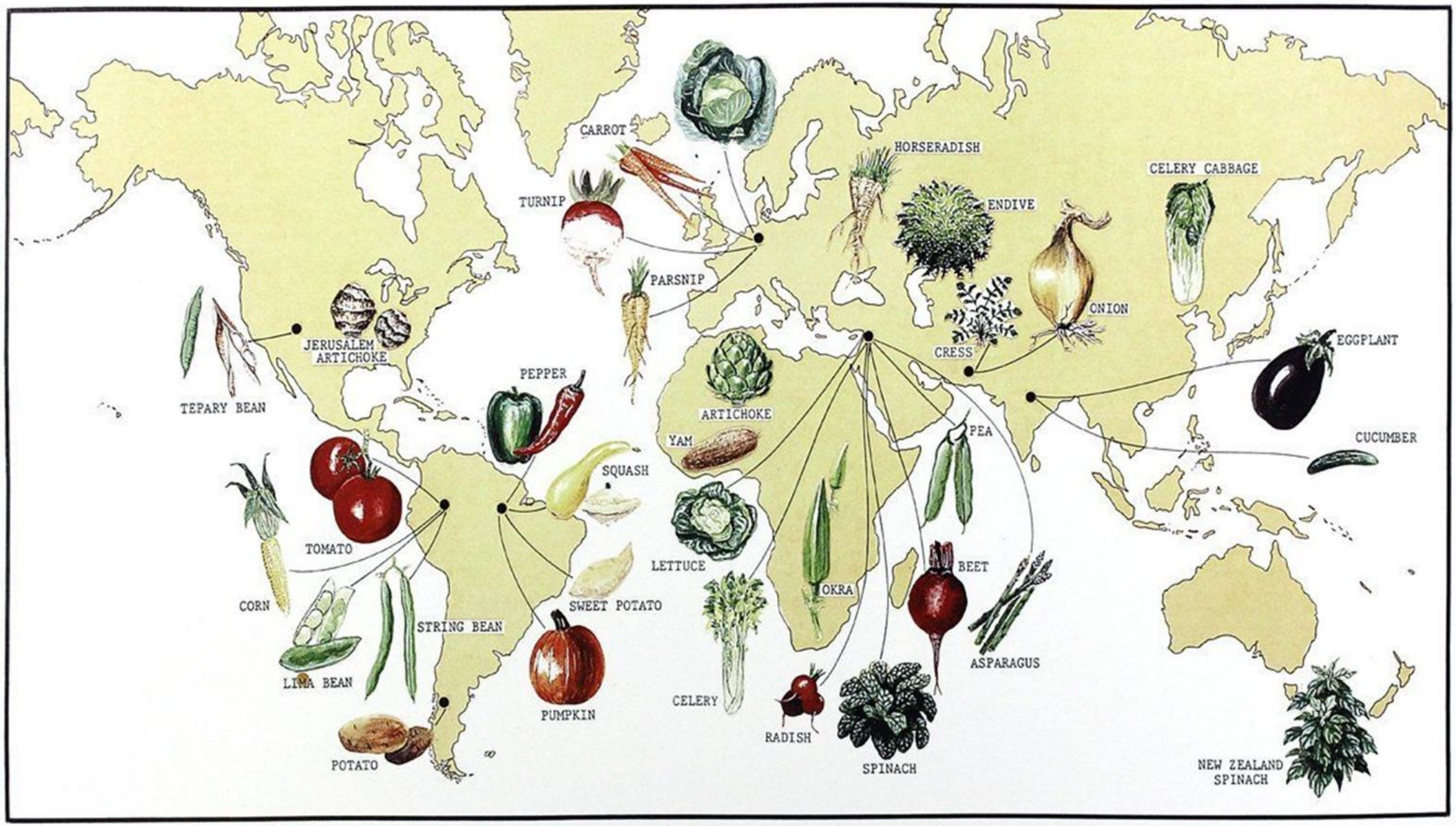
Burpee The Complete Vegetable and Herb Gardener, 1997

Other Systems of Classification

- Germination temperature
- Method of propagation
- Response to photoperiod in relation to flowering, bulbing, and tuberization
- Depth of rooting
- Length of growing season
- Many others

Centers of Origin

- Plants gathered in wild
- Domestication
- Time varies depending upon species
- No major vegetable crops originated in the US
  - Jerusalem artichoke, tepary beans, and sunflowers



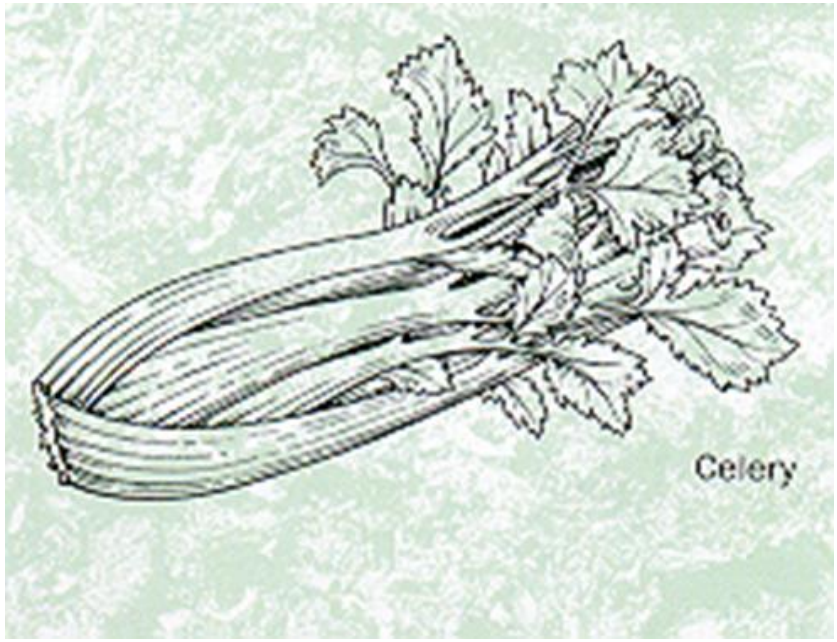
P. Duke ©

CENTERS OF ORIGIN FOR SOME VEGETABLES

Changes in wild plants during domestication

- Gigantism
- Seeds
- Response to temperature and photoperiod
- Changes in shape
- Reduced

Classification Based on Edible Plant Part



Rodale's Illustrated Encyclopedia of Organic Gardening, 2002

- Root - beet, turnip
- Bulb - onion, garlic
- Stem - asparagus
- Flower - cauliflower
- Tuber - potato
- Immature fruit - squash
- Mature fruit - tomato
- Leaf - lettuce, cabbage
- Petiole - celery
- Seed - bean

Production Hints

Soils
Fertility
Pest management
Moisture

Relative Ease of Transplanting Vegetables

Easy	Moderate	Require Special Care
Beets	Celery	Cucumbers
Broccoli	Eggplants	Muskmelons
Brussels sprouts	Onions	Summer squashes
Cabbage	Peppers	Sweet corn
Cauliflower		Watermelons
Chard		
Lettuce		
Tomatoes		

(Lorenz, O.A. and D.N. Maynard.1988. Knott's Handbook for Vegetable Growers, 3rd ed. John Wiley & Sons, Inc., New York.)

Harvest Hints - Maturity Indices

Index	Examples
Heat units during development	Peas, sweet corn
Development of abscission layer	Muskmelons
Drying of foliage	Potato
Drying of tops	Garlic, onions
Surface morphology/structure	Tomato, muskmelons
Size	Most vegetables
Color (external)	Most vegetables
Shape (compactness)	Broccoli, cauliflower
Tenderness	Peas

Based on Swiader and Ware, 2002

Storage

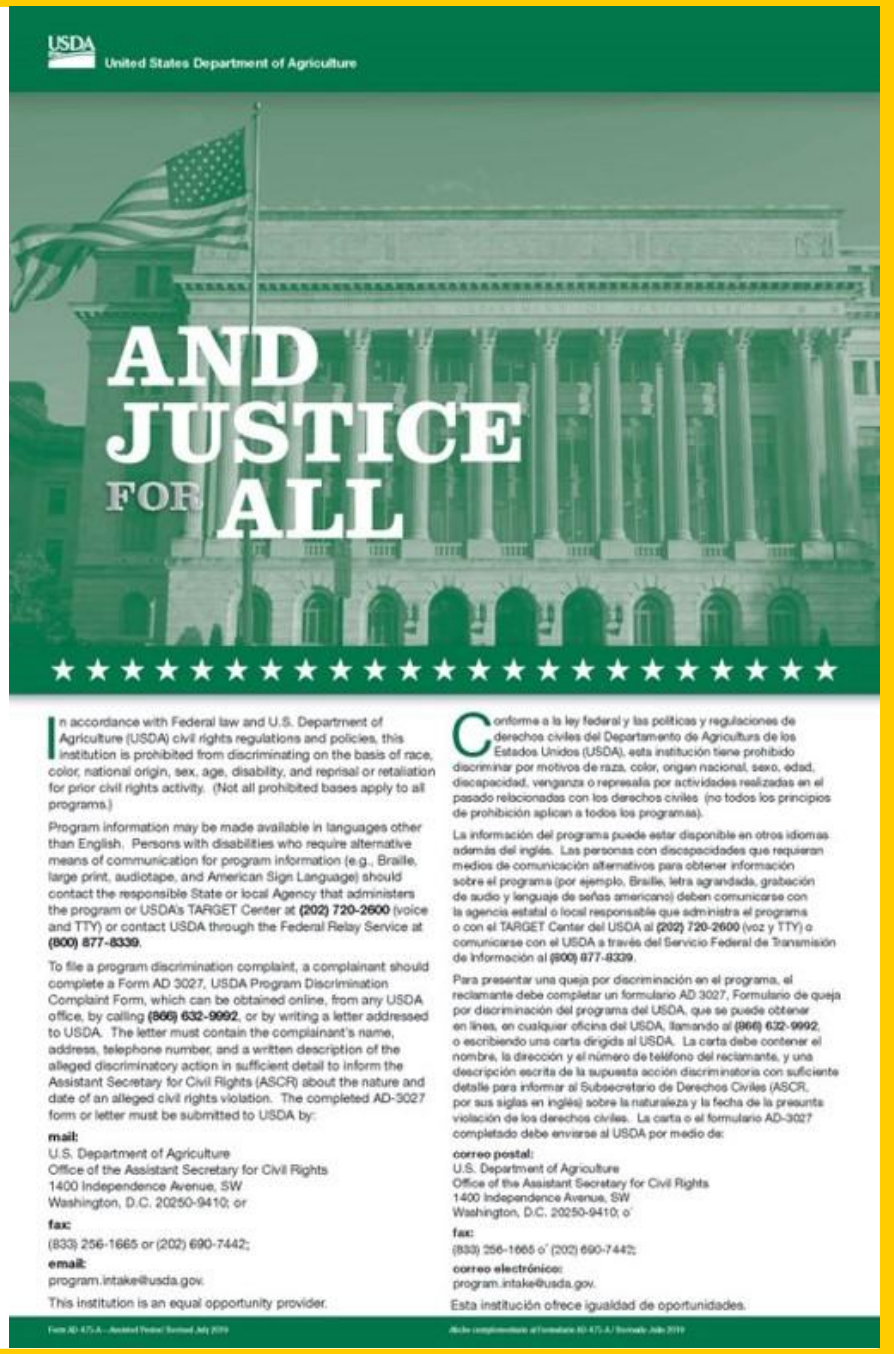
Vegetable	Temp (F)	RH (%)	Shelf Life
Asparagus	32-35F	95	2-3 weeks
Beans (snap)	41-46	90-95	7-10 days
Broccoli	32	90-95	10-14 days
Carrots	32	95-100	1-3 months
Celery	32	98-100	1-2 months
Eggplants	50-54	90-95	1 week
Lettuce	32	98-100	2-3 weeks
Peas	32	95-98	1-2 weeks
Potatoes	39	90-95	4-8 months
Squashes (winter)	50-54	60	1-3 months

Based on Swiader and Ware, 2002

Nondiscrimination Statement

NDSU does not discriminate in its programs and activities on the basis of age, color, gender expression/identity, genetic information, marital status, national origin, participation in lawful off-campus activity, physical or mental disability, pregnancy, public assistance status, race, religion, sex, sexual orientation, spousal relationship to current employee, or veteran status, as applicable. Direct inquiries to Vice Provost, Title IX/ADA Coordinator, Old Main 100, 701-231-7708, ndsu.eoaa@ndsu.edu. This publication will be made available in alternative formats for people with disabilities upon request, 701-231-7881.

NDSU | EXTENSION




NDSU
EXTENSION
2026
Field to Fork
www.ag.ndsu.edu/food
NDSU EXTENSION
EXTENDING KNOWLEDGE ›› CHANGING LIVES