

NDSU

EXTENSION



2024

field to FORK

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Upcoming Webinars

- **April 3 - Being Creative and Safe With Fruit and Vegetable Preparation and Storage**
- Julie Garden-Robinson, Professor and Extension Food and Nutrition Specialist, NDSU
- **April 10 - Play It Safe! Safe Changes to Tested Canning Recipes**
- Karen Blakeslee, Extension Associate, Kansas State University

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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.

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March 27

How to Grow Garlic and Other Alliums

Harlene Hatterman Valenti, Plant Sciences Professor, NDSU



INTRODUCTION/GARLIC

- Genus Allium
 - One of the largest flowering plant groups in the amaryllis family (Amaryllidaceae).
 - Consists of hundreds of wild and cultivated scented bulbous herbs.
 - Requires 6+ wks chilly weather for optimal bulb or head production.
- Garlic Uses
 - Food processing, culinary preparation, medicinal, condiment, etc.
- Garlic Bioactive Components
 - Allicin
 - Alliin
 - G-glutamylcystine
 - Polyphenols, etc.
- ~ 11 million tons garlic produced annually on 2.5 million acres of land (United Nations Food and Agriculture Organization (FAO)).
- Because of effectiveness in treating many different cancers and diseases, garlic consumption has increased, especially in the USA.

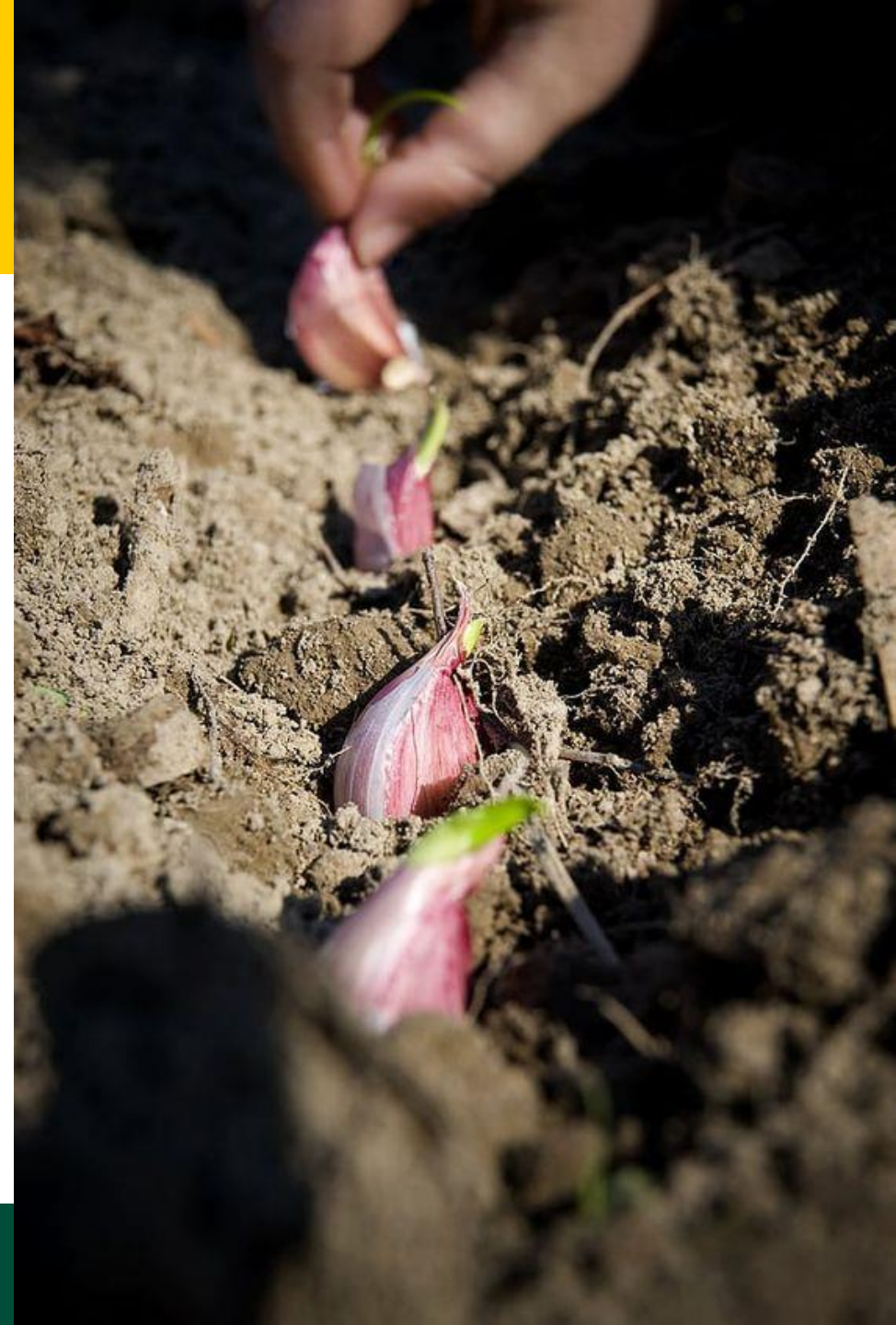
Production/Management

- Soil
 - Well drained sandy-clay loam soil
 - pH of 6-6.8
- Nutrition
 - N:P:K(70-125:150:100 lb/A) depending on soil test
 - Split N to 25 lb before planting, side-dress 20 lb every 3 wk and stop 4-6 wk before harvest
- Irrigation
 - Drip irrigation
 - 1 inch/wk. or 2 inch/wk. during hotter climate
- Garlic type
 - Hardneck cultivars



Production/Management

- Planting time
 - Fall 6-8 wks before ground freezes
- Spacing
 - 12 – 36 inch rows
 - 3 – 6 inches between cloves
- Depth
 - 3 – 4 inches
 - Top of clove twice the depth of the clove height
- Mulching: 4-6" in cold climate (10-15cm)
- Weed control
 - Mulch



Production/Management

- Scapes
 - Must be removed. Can consume.
- Harvesting
 - 60% of the leaves turn brown
- Hand pulling with the help of the soil fork
- Curing and storage
 - Avoid field curing – sun scald.
 - Temperature: 75-80 F
 - Netted bags for air circulation 1-2 wks
 - Long-term storage 30-32 F and low R.H (60-70%)
- Storing for seed
 - 50 F and R.H. 65-70% (< 50 F breaks dormancy, >65 F delays sprouting).

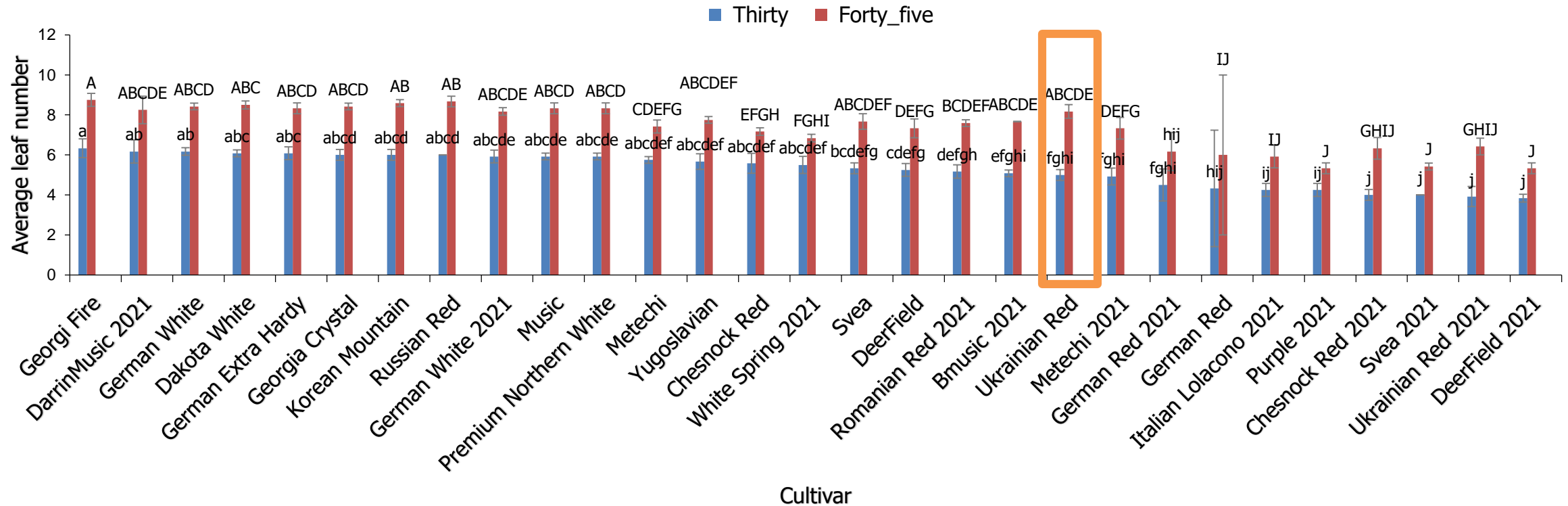


Cultivars

| | | | | | |
|-------------------|--------------|-----------------------|--------------------|------------------------|-------------------|
| German White | Metechi 2021 | Ukrainian Red 2021 | Georgia Fire | Dakota White | Svea 2021 |
| Music | Chesnock Red | White Spring 2021 | German Extra Hardy | Svea | Chesnock Red 2021 |
| Georgia Crystal | Metechi | Yugoslavian | DeerField 2021 | Premium Northern White | German White 2021 |
| Darrin Music 2021 | DeerField | Italian Loiacono 2021 | Ukrainian Red | Bmusic 2021 | German Red |
| Russian Red | Purple 2021 | Korean Mountain | Romanian Red 2021 | German Red 2021 | |

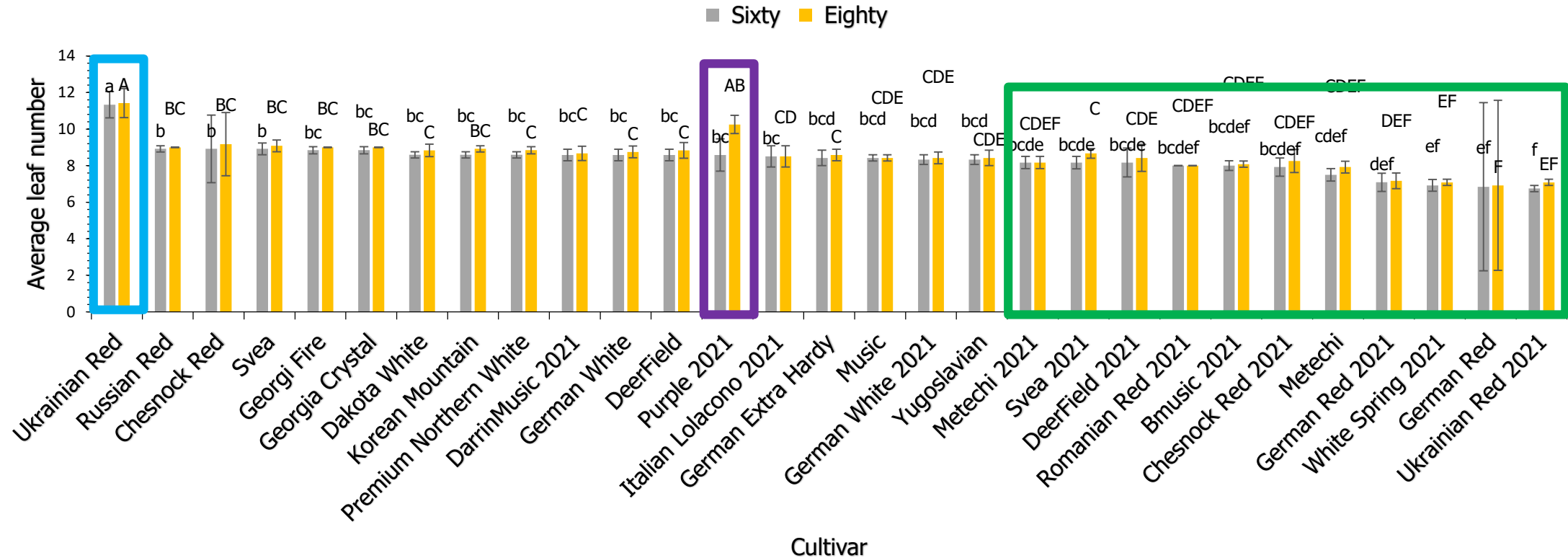
Results: Leaf Number

Average number of leaves at different days after sprouting/emergence

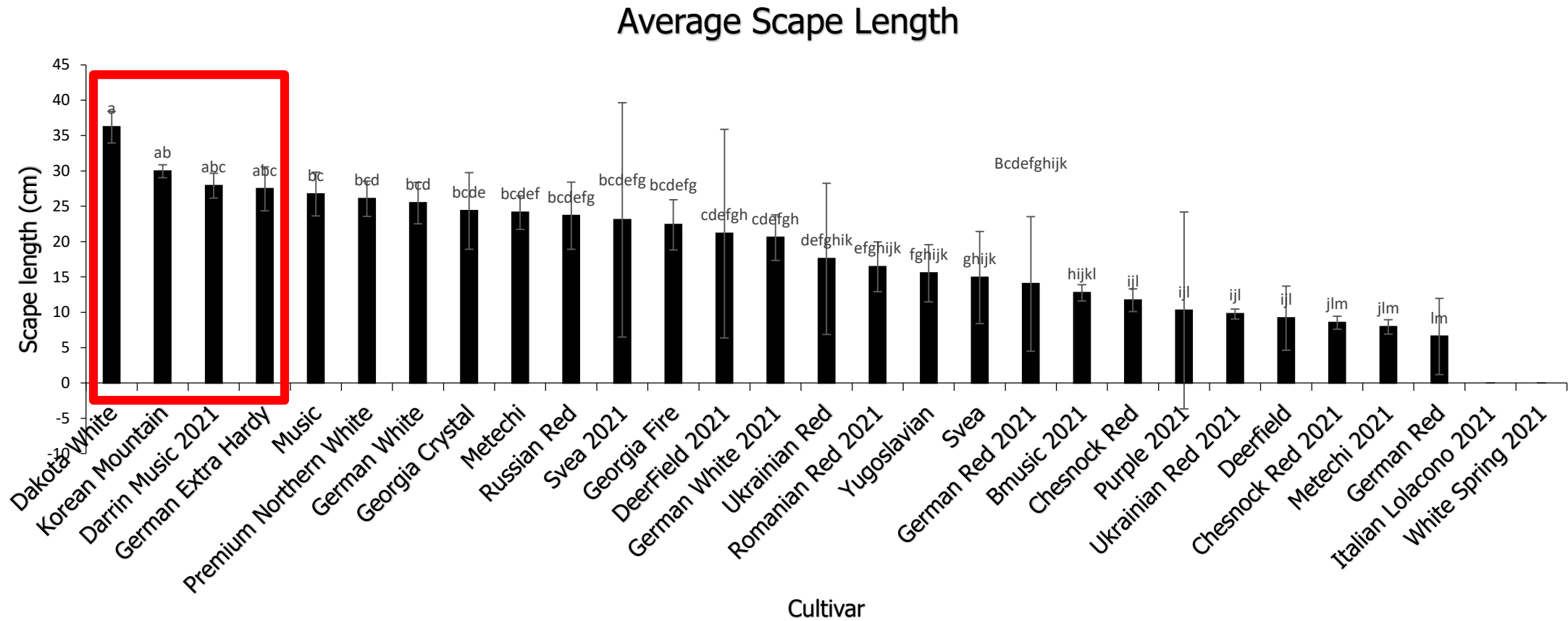


Results: Leaf Number

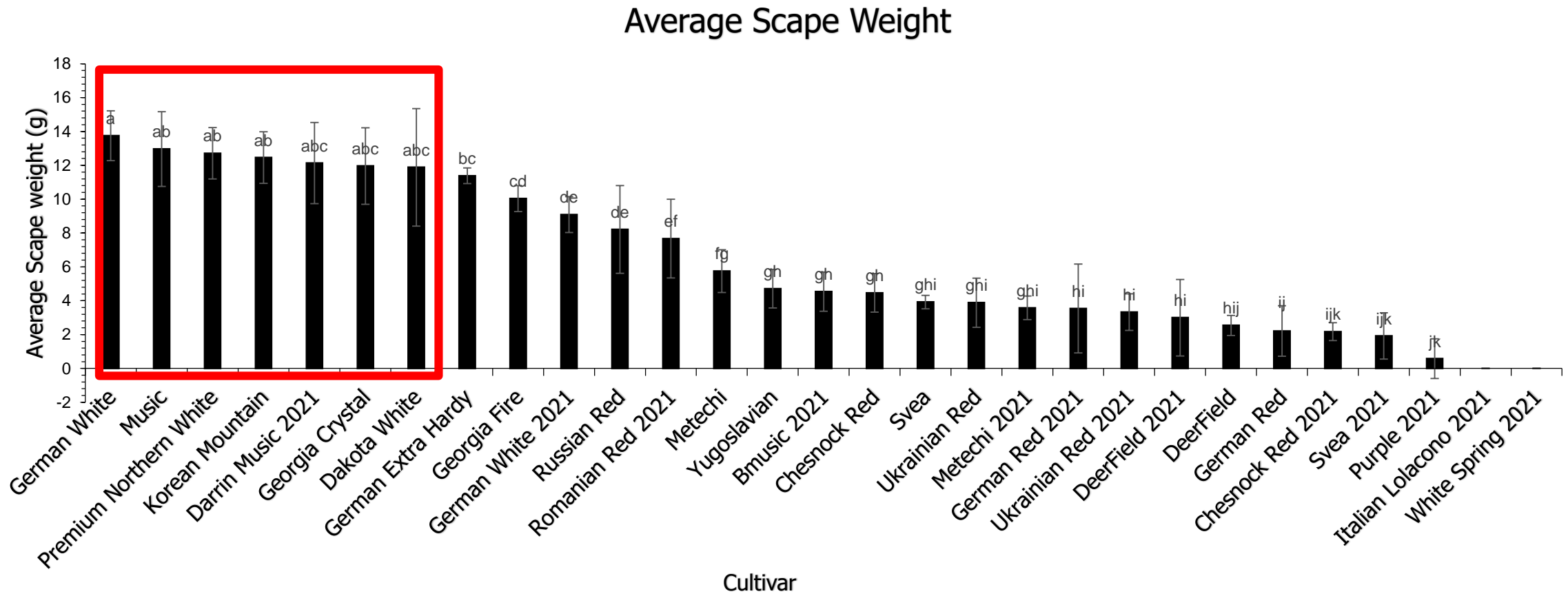
Average number of leaves at different days after sprouting/emergence



Results: Scape Length



Results: Scape Weight



Results: Bulb Diameter

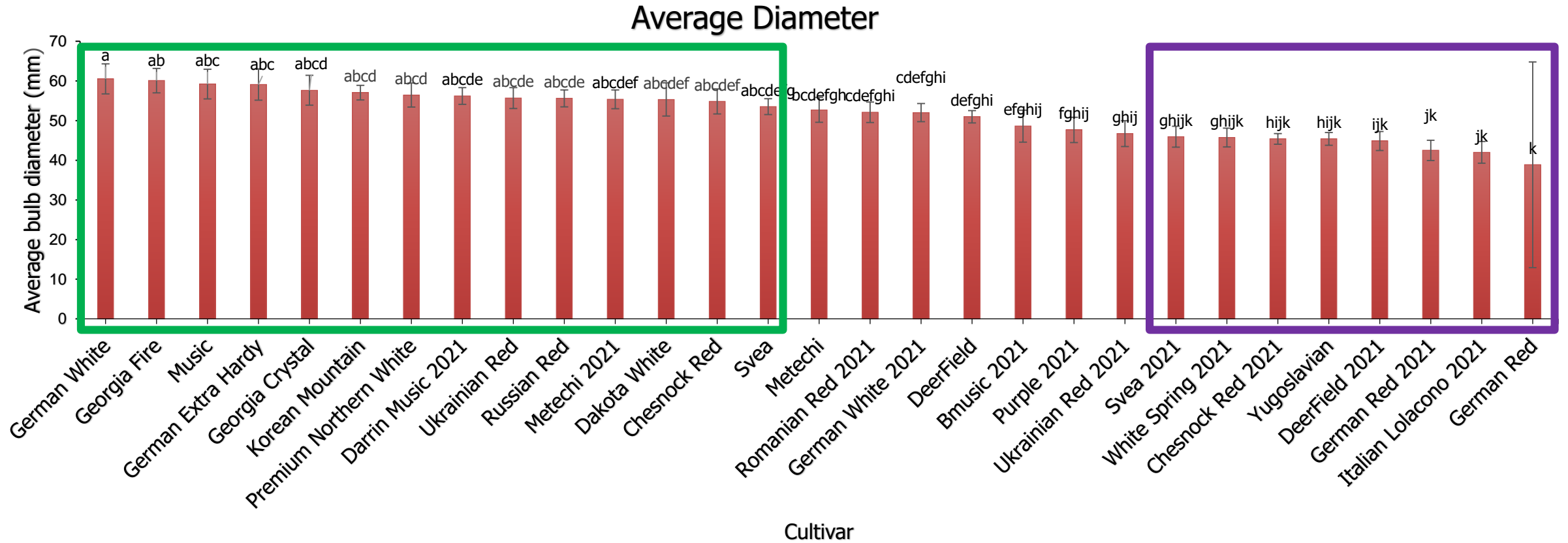


Fig.1 Average bulb diameter across all varieties after curing for two weeks

Results: Bulb Weight

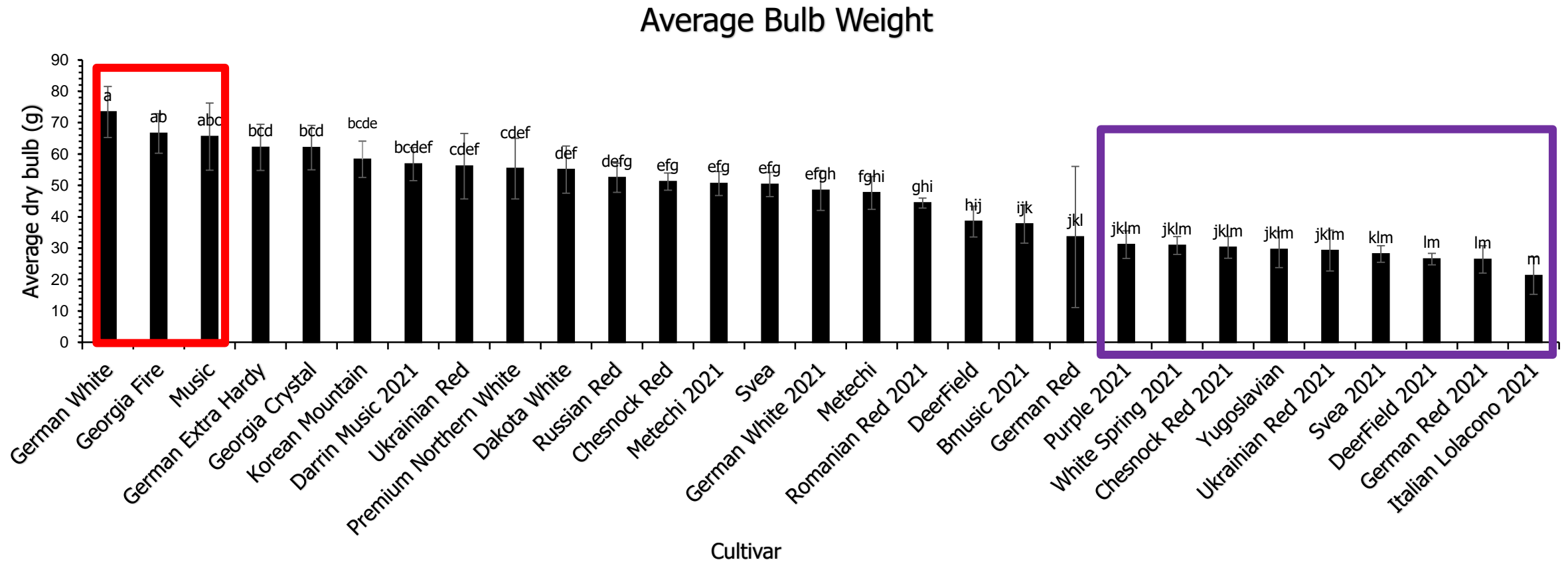


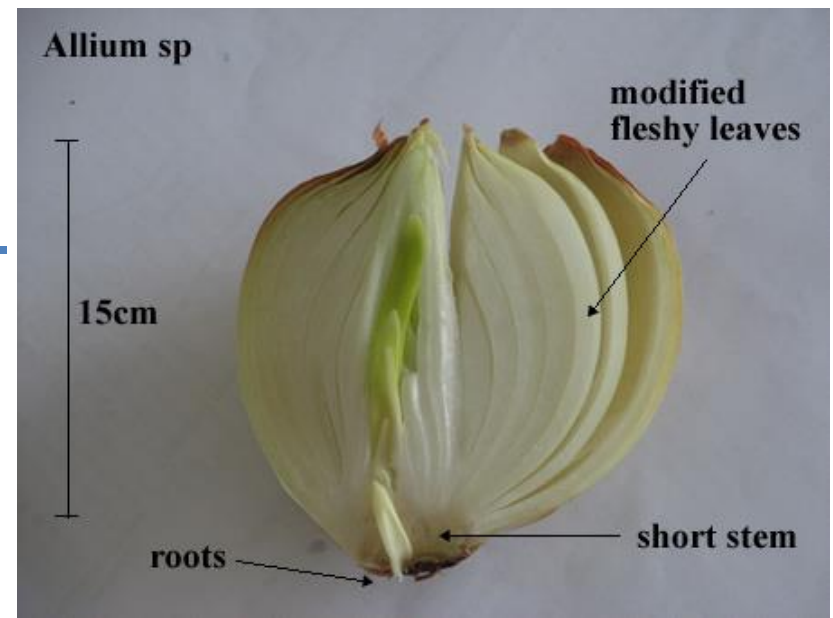
Fig.2 Average bulb weight across all varieties

Conclusion

- The average number of leaves was similar until 60 days after sprouting when 'Ukrainian Red' produced the highest number of leaves.
- 'Dakota White and 'German white' ' produced the longest and the heaviest scapes respectively while 'Italian Loiacono' and 'White Spring' did not produce scapes.
- Numerous cultivars produced bulbs with a diameter of approximately 2.4 inches, but only 'German White' had bulbs that weighed over 2.5 oz. (0.15 lbs.).
- 'German White' appeared to be the most adapted to North Dakota environmental conditions while 'Italian Loiacono' and 'German Red' were the least adapted.

Onion basics

- Biennial monocot.
- Concentric, swollen leaf bases.
- Axillary buds form at the base of each leaf.
- Hollow leaves emerge from inside the previously formed leaf.
- Bulbing is determined by photoperiod and temperature.
- Bulb size and rate of bulb development depends on plant size at bulbing.



Formation of storage organs in response to photoperiod

Classification

- Day neutral
- Long day (short night)
- Short day (long night)

Vegetable crop

- Carrots, beets, turnips, radishes
- Onions, garlic
- Potatoes, sweet potatoes, yams, cassavas

Onion types

- American: pungent, 2-3” diam., globe shaped that stores well.
- European: Bermuda and Spanish types
 - Spanish: mild, 4-5” diam., round that are used for the fresh market and ring processing.
 - Bermuda: mild and adapted to southern latitudes for winter production. Poor for storing.
- F1 hybrids – more vigorous and uniform than open-pollinated cultivars but have limited adaptation.

Other classifications

- Skin color: red, white, yellow
- Taste: mild, pungent
- Shape: round, flat, globe
- Minimum photoperiod: short day (12-13 hr), intermediate day (13-14 hr), long day (14-16 hr).
 - Short- and intermediate-day cultivars require long growing season (180 days).

Sets vs. Seed

- Higher vigor in less favorable spring conditions
- Consistent stand establishment but costly
- Earlier maturing, shorter growing season

Sets

Seed

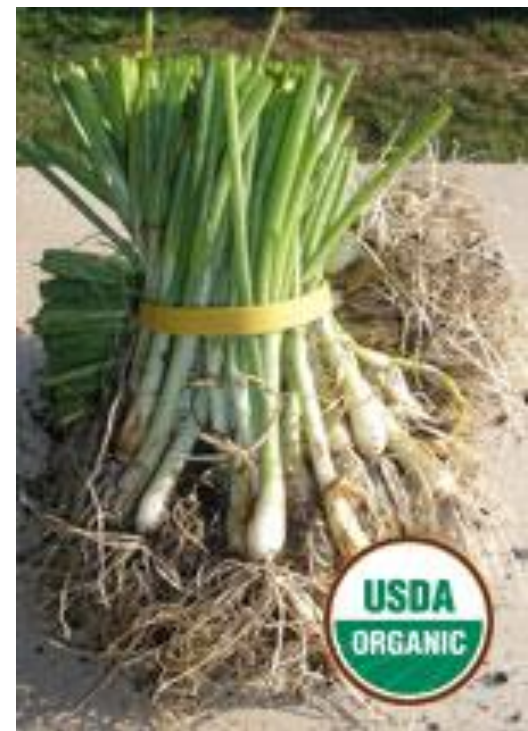


- Usually double rows with 8-12” between rows.
- Seed planted 0.25-1” deep.
- Seed germinates at soil temp. above 35 F (75 F is optimum).
- Need to plant as early as possible.



Transplants

- Need 8-9 wks in a greenhouse.
- Care to avoid vernalization.
- Costly, so used mainly for early market or late maturing (Spanish) in northern states.



Sets

- Use sets < 0.5 " diam.
- Larger sets used for green onions.
- 3-4 wks earlier than seeded onions.

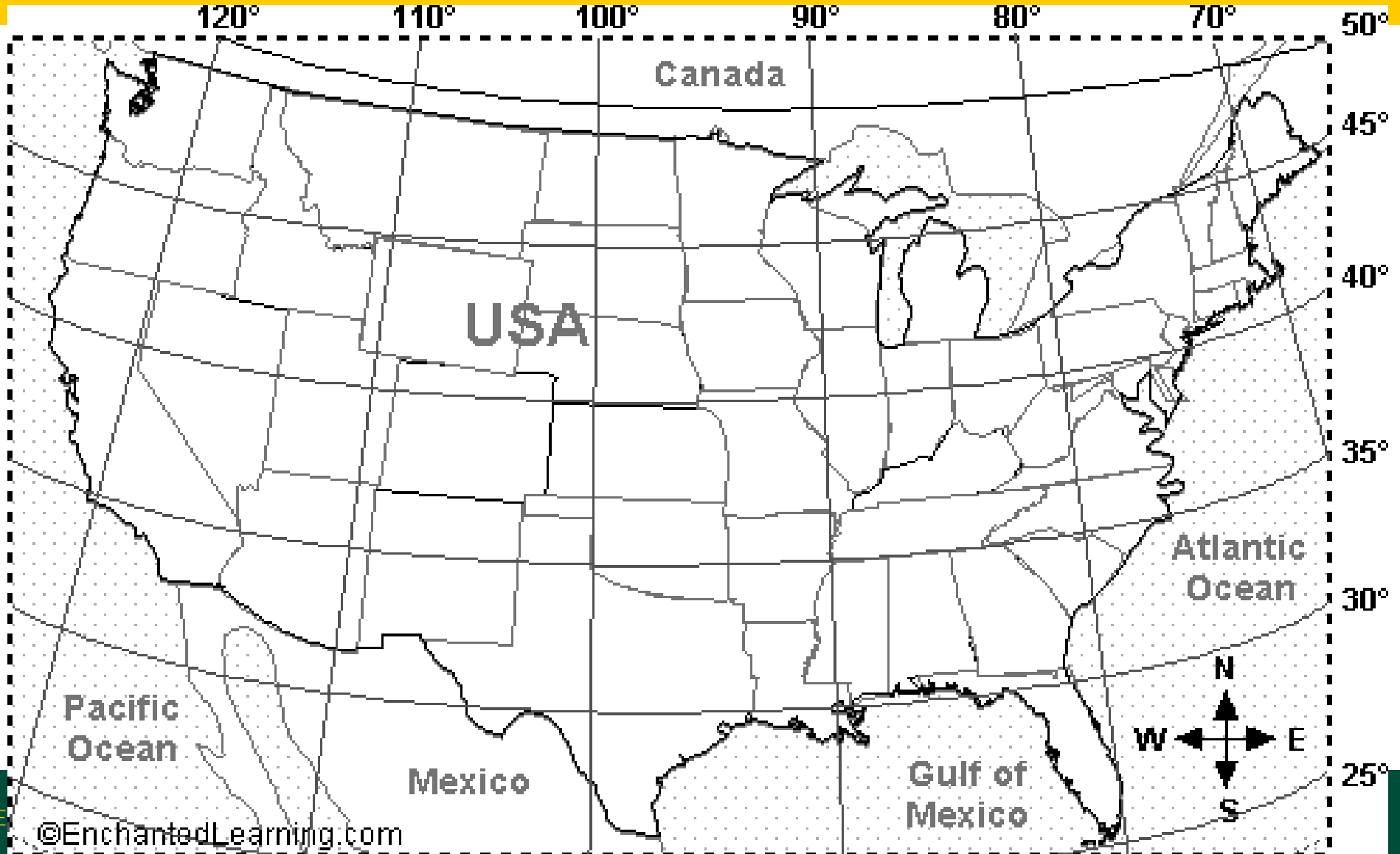


Cultural practices



- Spacing
- Weed control
- Water
 - 1"/wk during seedling stage
 - 1.5"/wk during bulbing stage
 - stop when tops start to fall over
- Fertility
 - 10-20-10 ½ cup/10 ft row incorporated before transplanting
 - 34-0-0 ½ cup/10 ft row every 2-3 wks (soft neck).

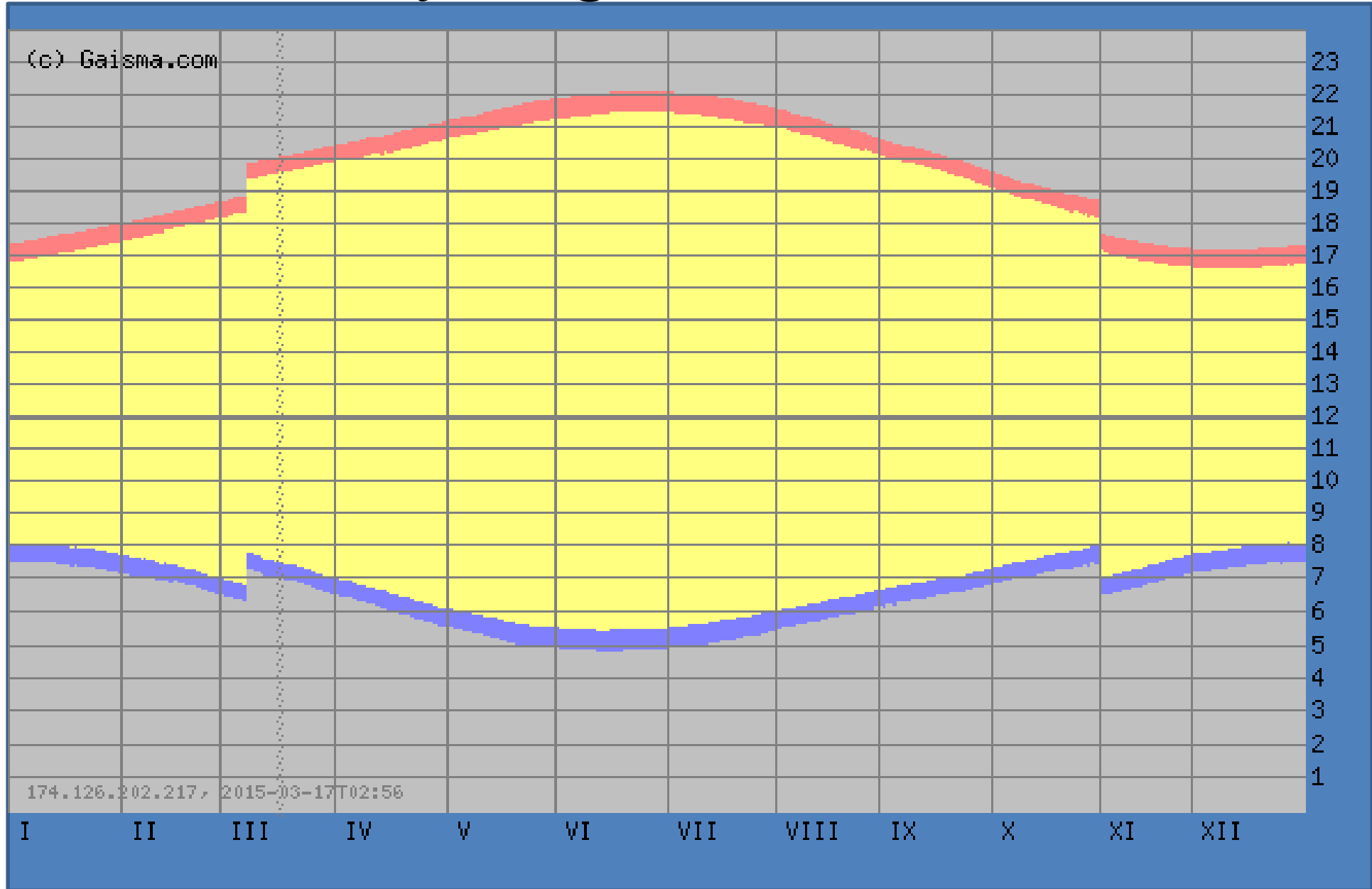
What controls bulbing?



Fargo, North Dakota, - Sunrise, sunset, dawn and dusk times, table.

| Date | Sunrise | Sunset | Length | Change | Dawn | Dusk | Length | Change |
|--------------|---------|--------|--------|--------------|-------|-------|--------|--------------|
| March 16 | 07:38 | 19:34 | 11:56 | | 07:08 | 20:04 | 12:56 | |
| March 17 | 07:36 | 19:35 | 11:59 | 00:03 longer | 07:06 | 20:06 | 13:00 | 00:04 longer |
| March 23 | 07:25 | 19:44 | 12:19 | 00:23 longer | 06:54 | 20:14 | 13:20 | 00:24 longer |
| March 30 | 07:11 | 19:53 | 12:42 | 00:46 longer | 06:40 | 20:24 | 13:44 | 00:48 longer |
| April 13 | 06:40 | 20:15 | 13:35 | 01:39 longer | 06:08 | 20:47 | 14:39 | 01:43 longer |
| May 11 | 05:52 | 20:55 | 15:03 | 03:07 longer | 05:17 | 21:31 | 16:14 | 03:18 longer |
| June 7 | 05:32 | 21:23 | 15:51 | 03:55 longer | 04:53 | 22:03 | 17:10 | 04:14 longer |
| September 21 | 07:03 | 19:41 | 12:38 | 00:42 longer | 06:33 | 20:12 | 13:39 | 00:43 longer |

Daylength over time



Why do my onions flower?

Plants/sets beyond the juvenile stage (5 leaves) are sensitive to vernalization.

Plants exposed to alternating warm and cold temps that cause the plant to go dormant and resume growth will prematurely flower.

Results in smaller bulbs that do not store.

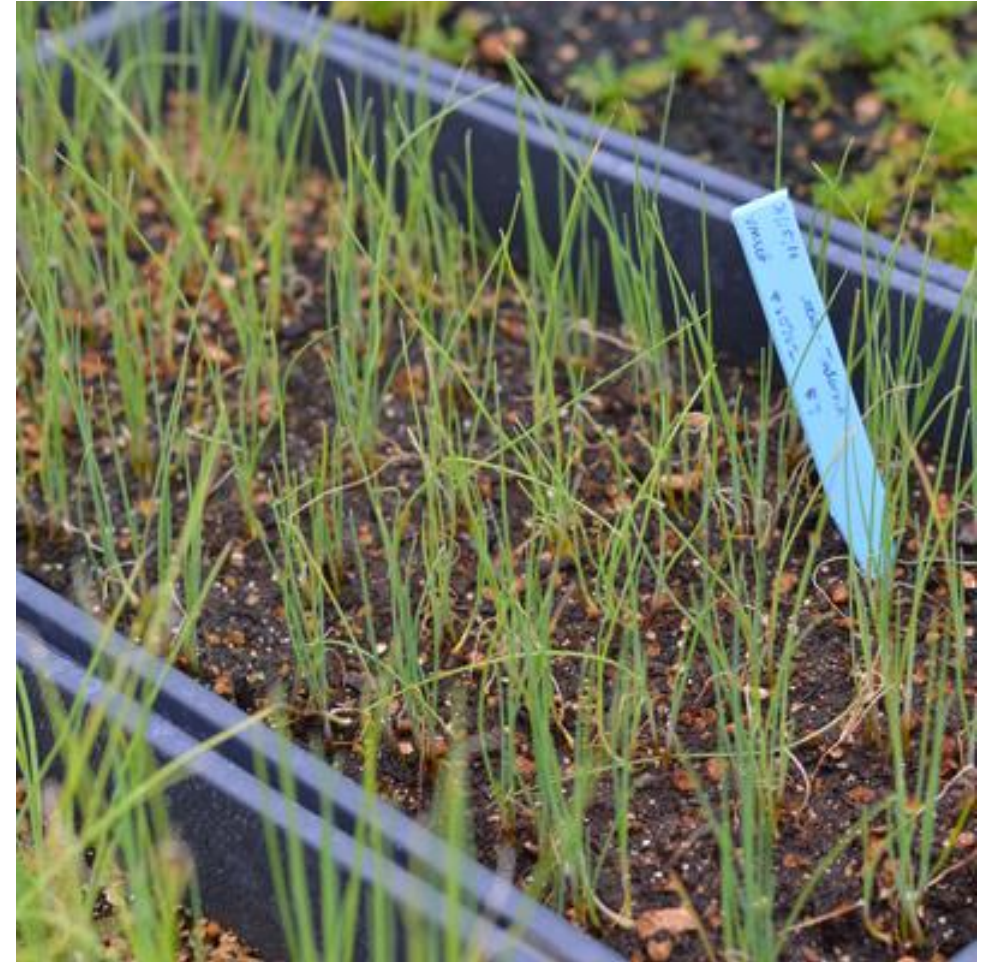
Growing Leeks

- Most leeks need 120 to 150 days.
- Start seeds indoors and transplant early spring.
- Hill the plants to produce a longer white shaft, or plant in a furrow and fill in.
- Leeks have shallow root systems and need 1 inch/wk water.
- Leeks are tolerant of cold, so you can delay harvest until after the first frosts.



Transplanting

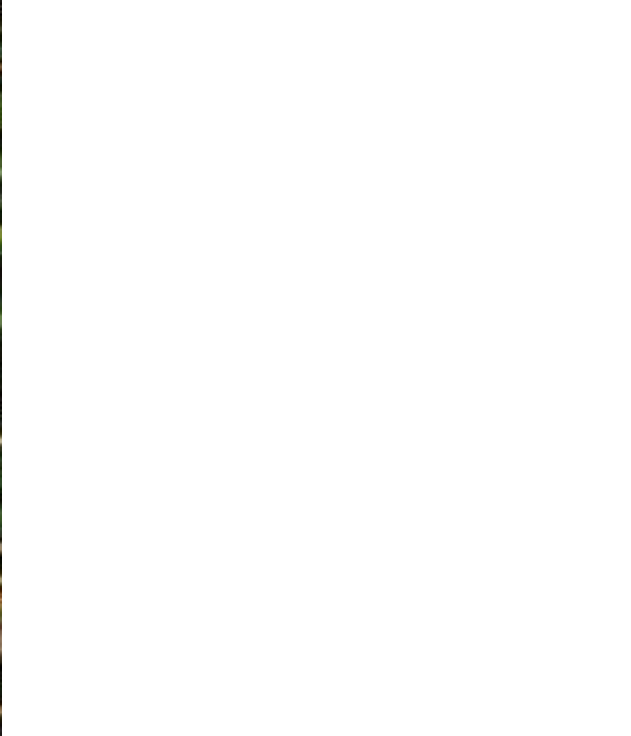
- Start seeds indoors in late February or March.
- Transplants should be 10-15 weeks old when planted.
- Acclimate transplants prior to planting outside.
- Need daytime temp. of ≥ 45 F.
- Plant 2-6 inches apart, 12-36 inches between rows.
- Fertilize like onions.



Harvest

- Depending on cultivar, mature when stem diameter is $\geq 0.5 - 1$ inch.
- Gently twist and pull or dig to harvest.
- Thoroughly clean before using as soil may be between leaves.
- You can eat both the green leaves and the white shaft.





Questions?



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