

# Update on Lettuce Fusarium Research

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# Status of Fusarium wilt in Yuma

- In 2001, *Fusarium oxysporum* f.sp. *lactucae* was recovered from diseased plants from six different sites.
- In 2002 (to date), the disease has been confirmed in five new sites.

# How to minimize the spread of *Fusarium oxysporum* f. sp. *lactucae*

- Avoid transport of infected plant debris and soil from an infested field into a “clean” field.

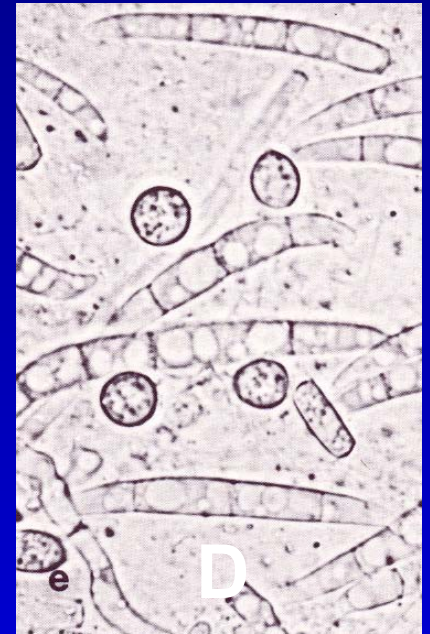
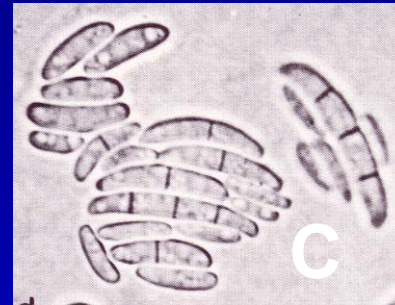
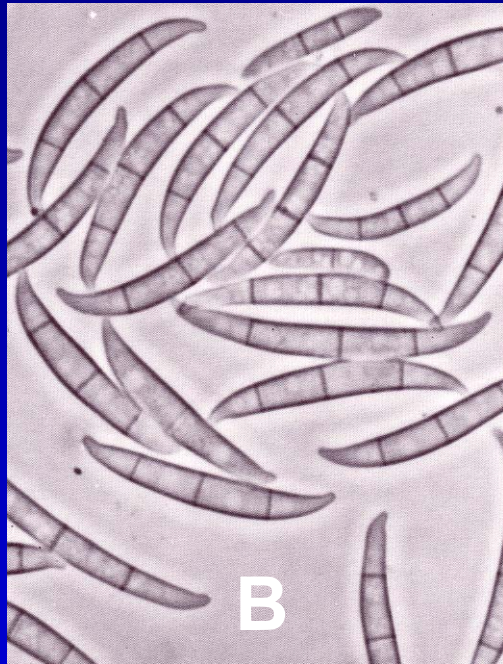
# *Fusarium oxysporum*

- Comprises 40 to 70% of the total *Fusarium* population in soil.
- Very active saprophyte (nonpathogenic phase).
- When pathogenic, it primarily causes symptoms of wilt and sometimes root rot.
- There are over 75 different formae speciales of *Fusarium oxysporum*.

# What is a *formae specialis*?

- This is a sub-species categorization based on physiological or biochemical characteristics, particularly with respect to pathogenicity and host range.

# *Fusarium oxysporum* f.sp. *lactucae*



A = mycelium growing on agar

B = macroconidia

C = microconidia

D = chlamydospores + macroconidia

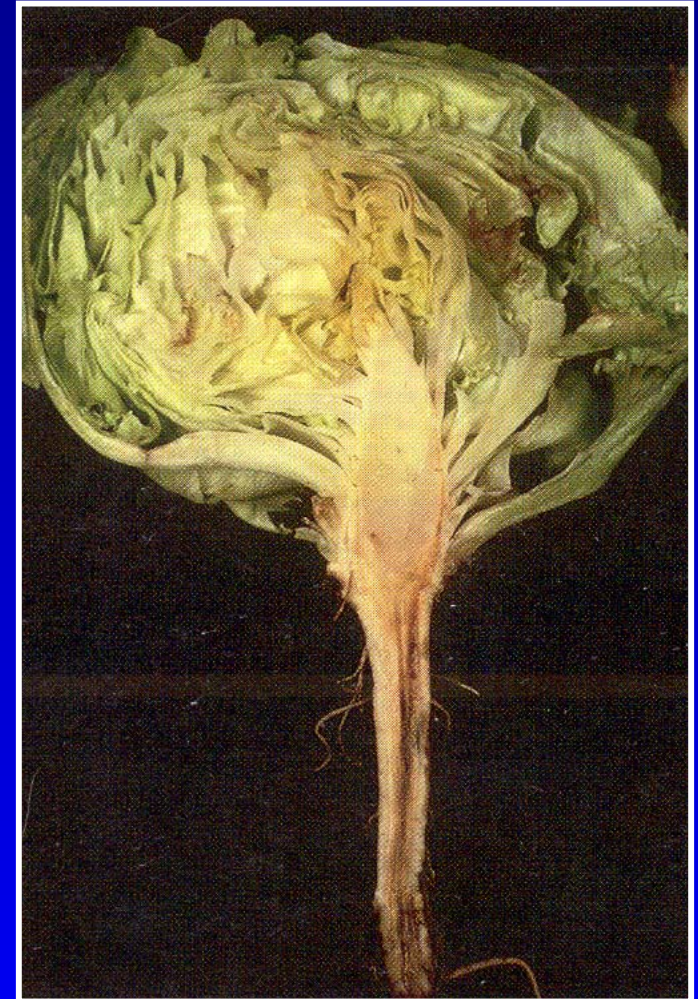
# Symptoms of Fusarium wilt on lettuce

- Seedling stage

- Death of some plants.
- Red streak through the cortex of the crown and upper root.

- Older plants

- Brown streaks in the vascular system of the crown.
- Reddish brown discoloration of the crown and upper root cortex.



# Fusarium wilt of lettuce





# Fusarium wilt of lettuce



**Genetic tolerance or resistance is the most effective disease management tool for most wilt diseases caused by *Fusarium oxysporum* on other crops.**

# Lettuce cultivar evaluation trial

- Trial is being conducted in a field with a history of Fusarium wilt of lettuce.
- Lettuce cultivars are being planted at three different planting dates.
- The replicate plot size is two beds 150 ft. in length, with 4 replicate plots per cultivar arranged in a randomized complete block design.
- Disease development will be monitored from thinning until plant maturity.

# Cooperators in this study

## "The coalition"

- ) Arizona Department of Agriculture
- ) Arizona Iceberg Lettuce Research Council
- ) Coronation Peak Ranches
- ) Keithly-Williams Seed
- ) Seed Trade Association of Arizona
- ) Select Seed of Arizona, Inc.
- ) University of Arizona
- ) USDA
- ) Yuma Vegetable Shippers Association

# More cooperators

- ) Central Valley Seed
- ) Coastal Seed Co.
- ) Harris Moran Seed Co.
- ) Orsetti Seed Co.
- ) Paragon Seed Co.
- ) Progeny Advanced Genetics
- ) Pybas Seed Co.
- ) Seminis Vegetable Seed Co.
- ) Synergene Seed and Technology
- ) Three Star Seed Co.

# Lettuce cultivar evaluation trial

**First planting**

**Second planting**

**Third planting**

**Wet date: Sep. 7  
Terminated: Nov. 8**

**Wet date: Oct. 17  
In progress**

**Wet date: Dec. 5**

# Head lettuce cultivars

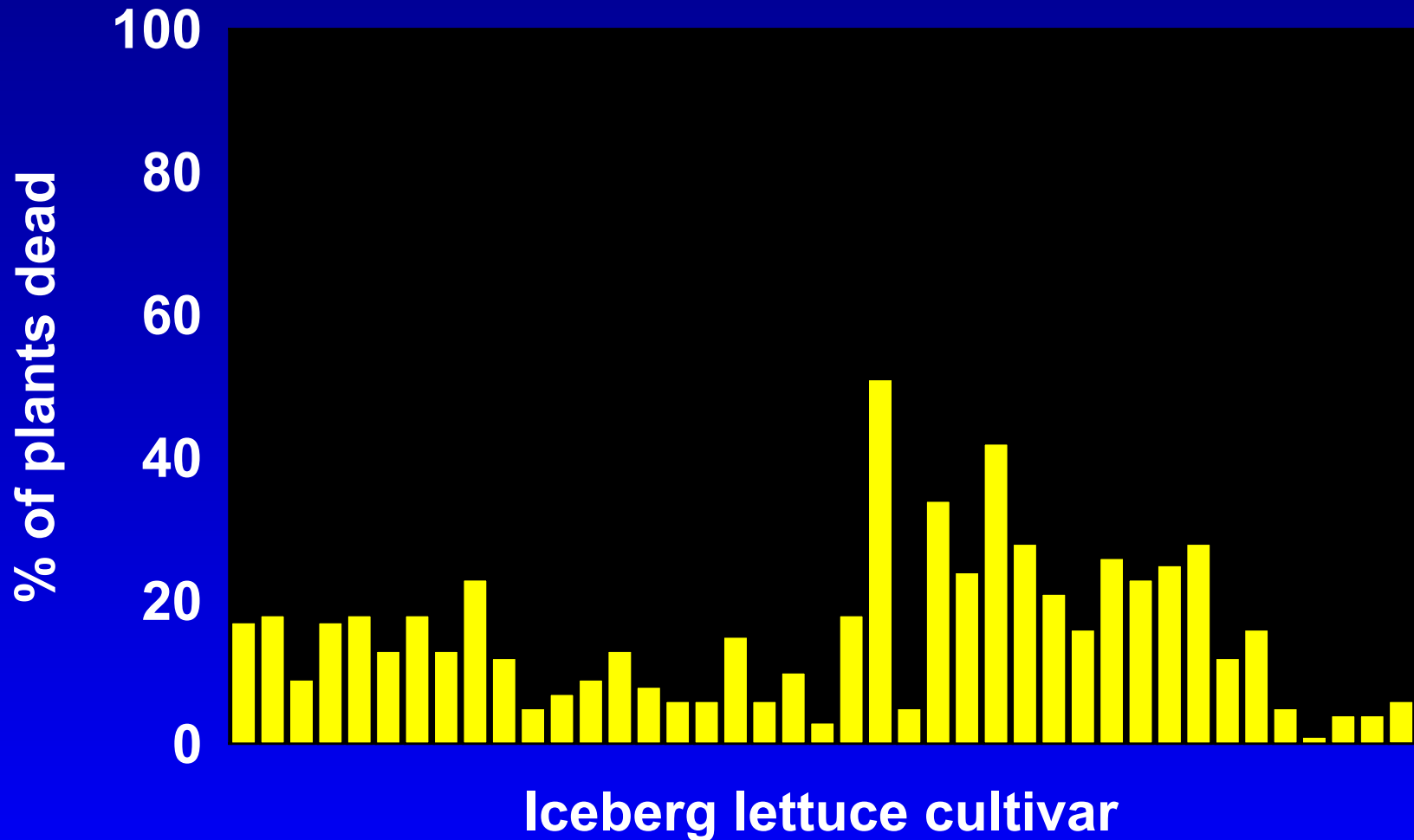
<b>Acacia</b>	<b>Emperor</b>	<b>La Quinta</b>	<b>Snowbird</b>
<b>Annie</b>	<b>Fallgreen</b>	<b>Lighthouse</b>	<b>Spector</b>
<b>Beacon</b>	<b>Fortuna</b>	<b>Milestone</b>	<b>Sun Devil</b>
<b>Buccaneer</b>	<b>Green Pack</b>	<b>Mohawk</b>	<b>Tradition</b>
<b>Cavalier</b>	<b>Grand Max</b>	<b>Monarch</b>	<b>Tres Equis</b>
<b>Crusader</b>	<b>Heatmaster</b>	<b>Palma</b>	<b>Valley Green</b>
<b>Desert Heat</b>	<b>Husky</b>	<b>Raider</b>	<b>Valley Queen</b>
<b>Desert Queen</b>	<b>Javelina</b>	<b>Sahara</b>	<b>Wellton</b>
<b>Desert Storm</b>	<b>Kahuna</b>	<b>Sharpshooter</b>	<b>No names (4)</b>
<b>Diamond Back</b>	<b>Laguna Fresca</b>	<b>Sniper</b>	

# Other lettuce cultivars

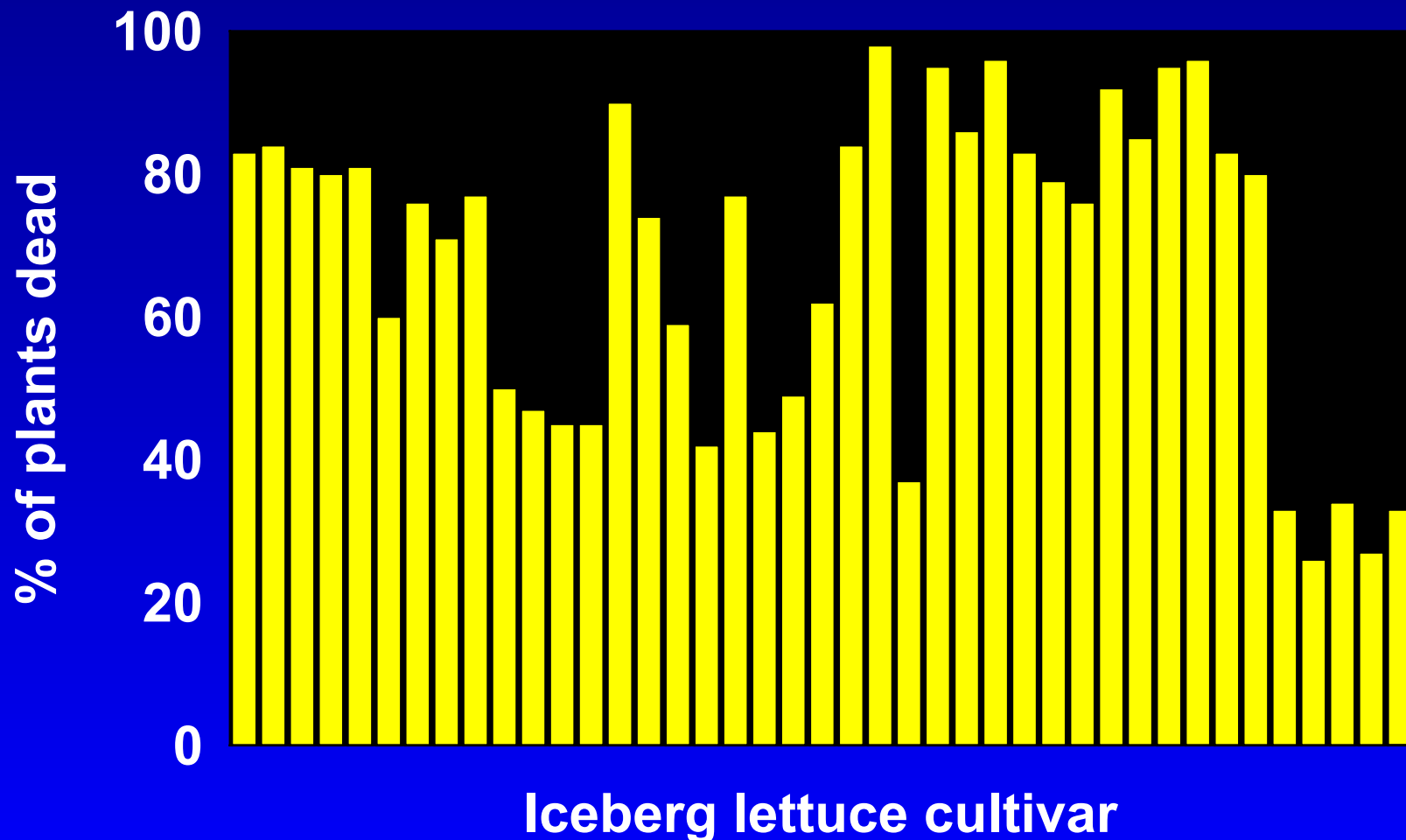
<b>BOS 9021</b>	<b>Encanto</b>	<b>North Star</b>	<b>Robusto</b>
<b>Clemente</b>	<b>Fresheart</b>	<b>Optima</b>	<b>Slugger</b>
<b>Coastal Star</b>	<b>Green Forest</b>	<b>Paragon PIC</b>	<b>Triton</b>
<b>Conquistador</b>	<b>Green Towers</b>	<b>PIC</b>	<b>Two Star</b>
<b>Darkland COS</b>	<b>King Louie</b>	<b>Red Fox</b>	<b>Vulcan</b>
<b>DF 7</b>	<b>Marin</b>	<b>Red Tide</b>	<b>Western Red</b>



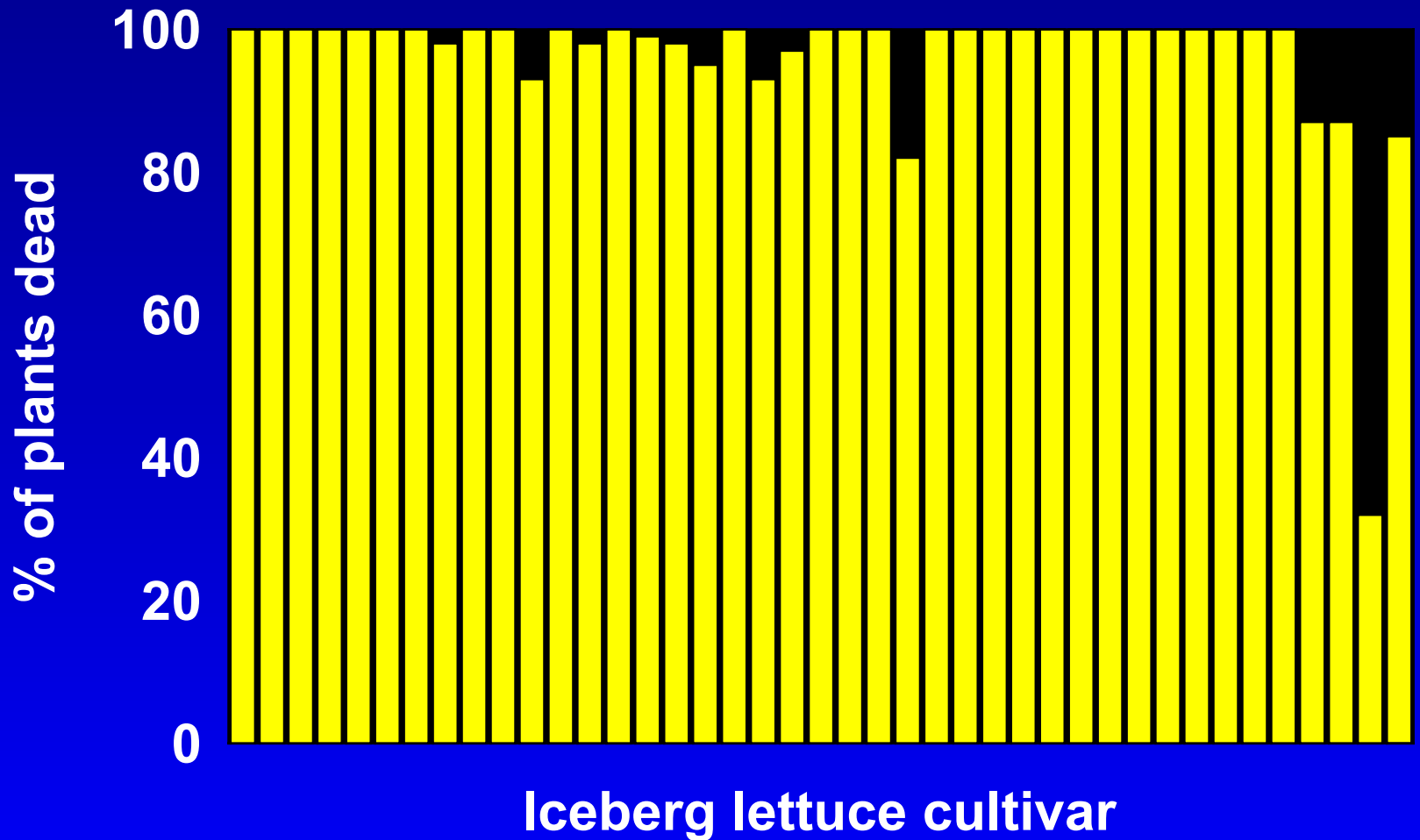
# Percentage of plants dead per cultivar 25 days after wet date



# Percentage of plants dead per cultivar 37 days after wet date



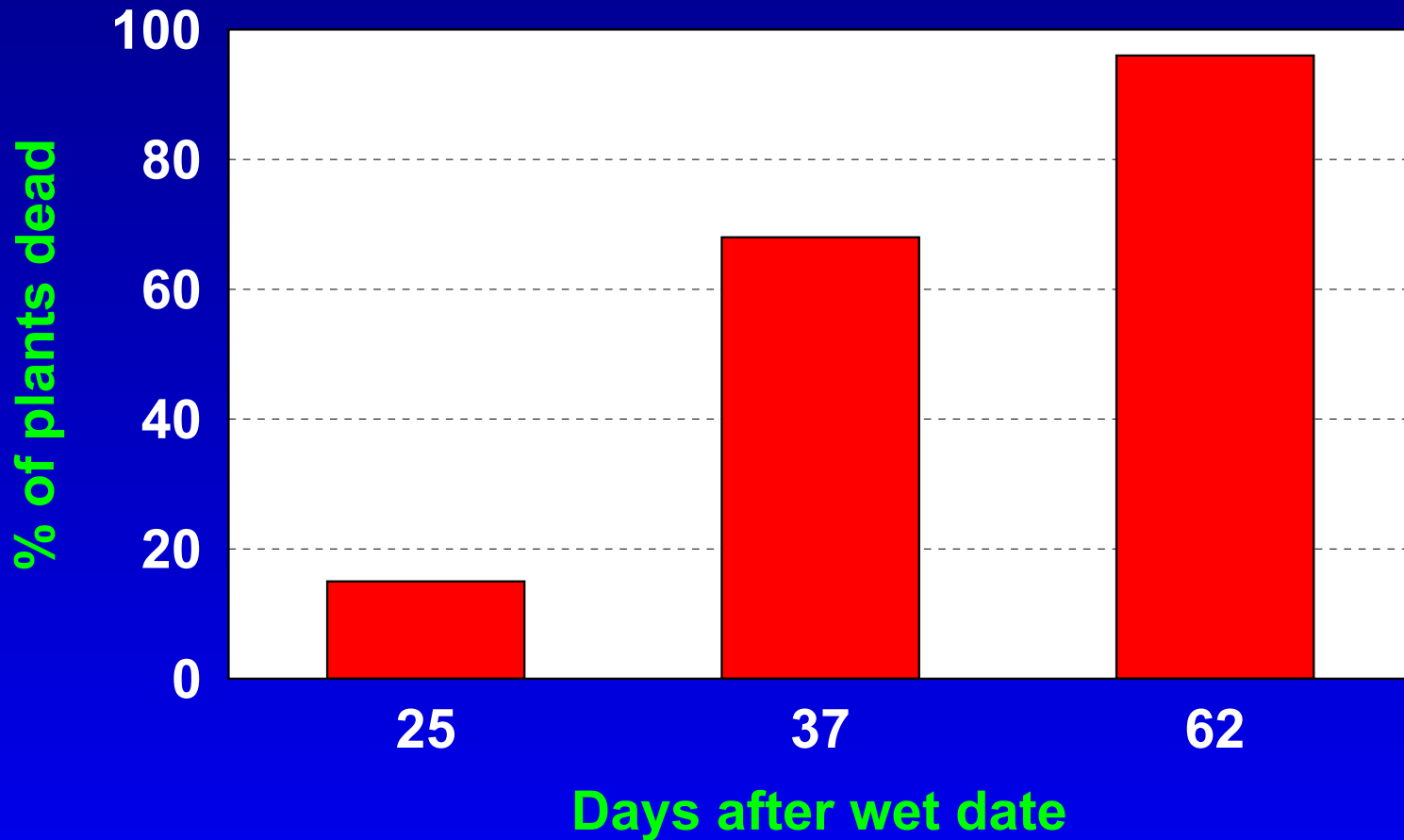
# Percentage of plants dead per cultivar 62 days after wet date (Plant maturity)



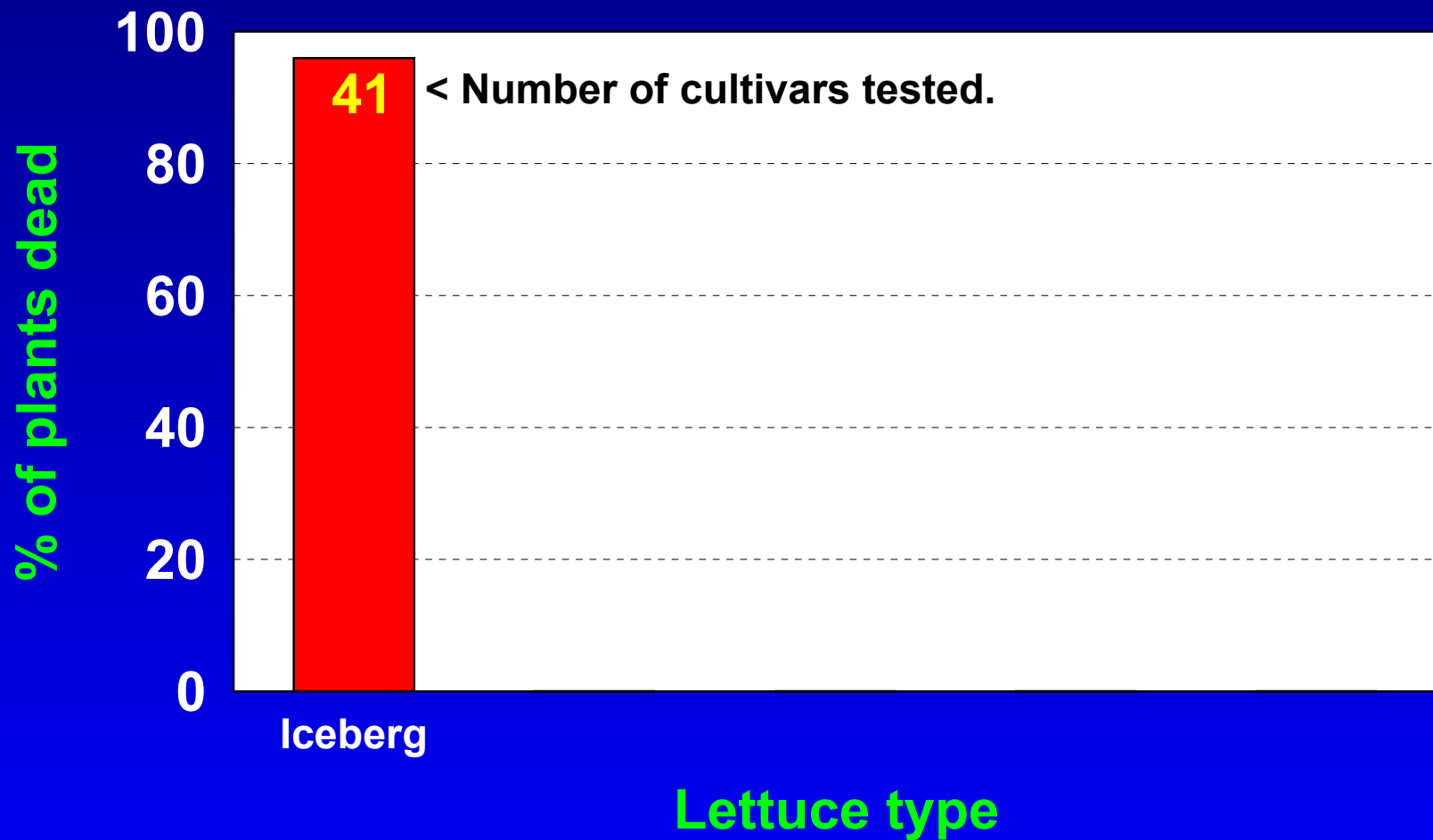
# Lettuce cultivar evaluation trial: Head lettuce



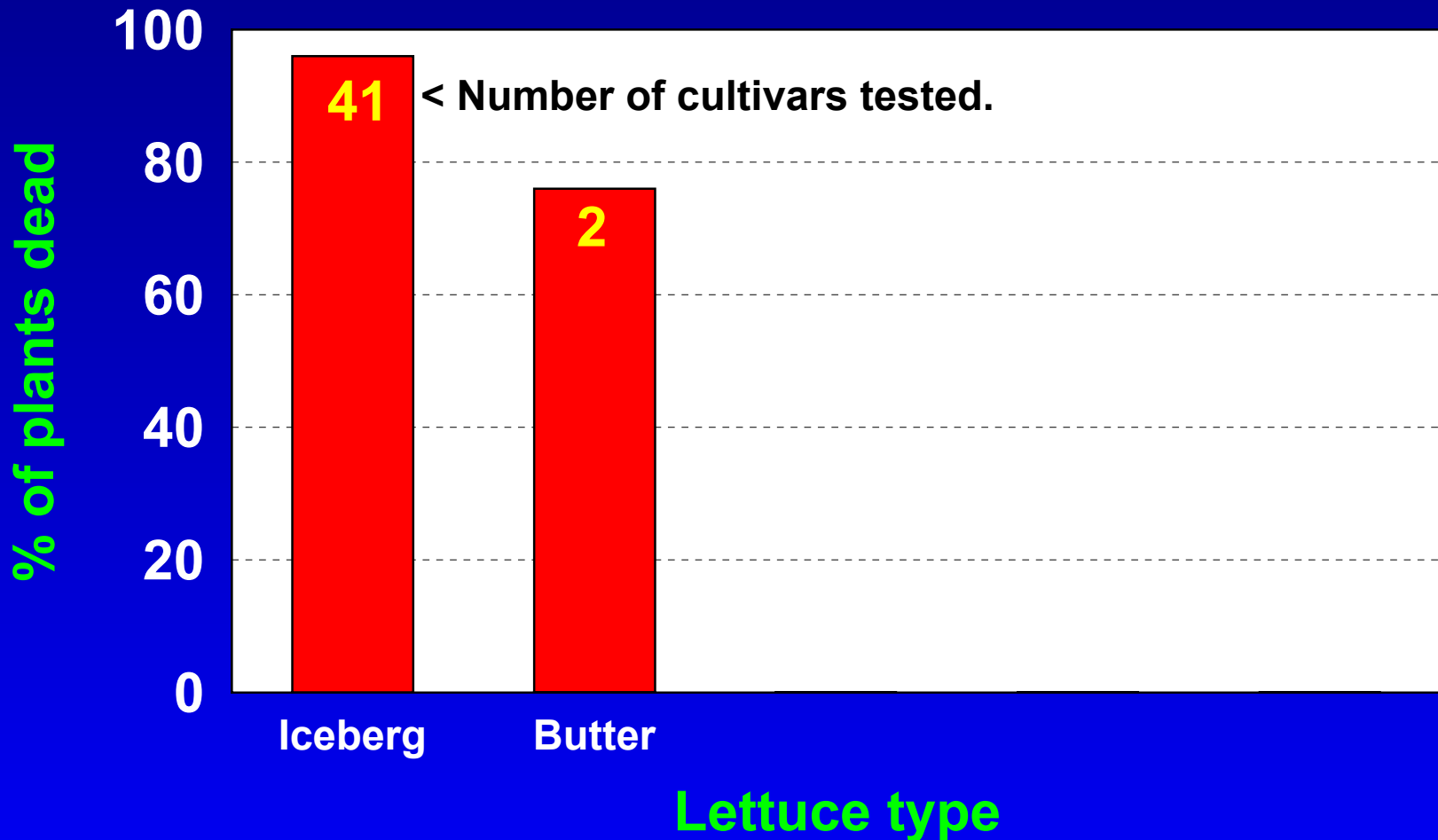
# Mean percentage of iceberg lettuce plants dead at various growth stages



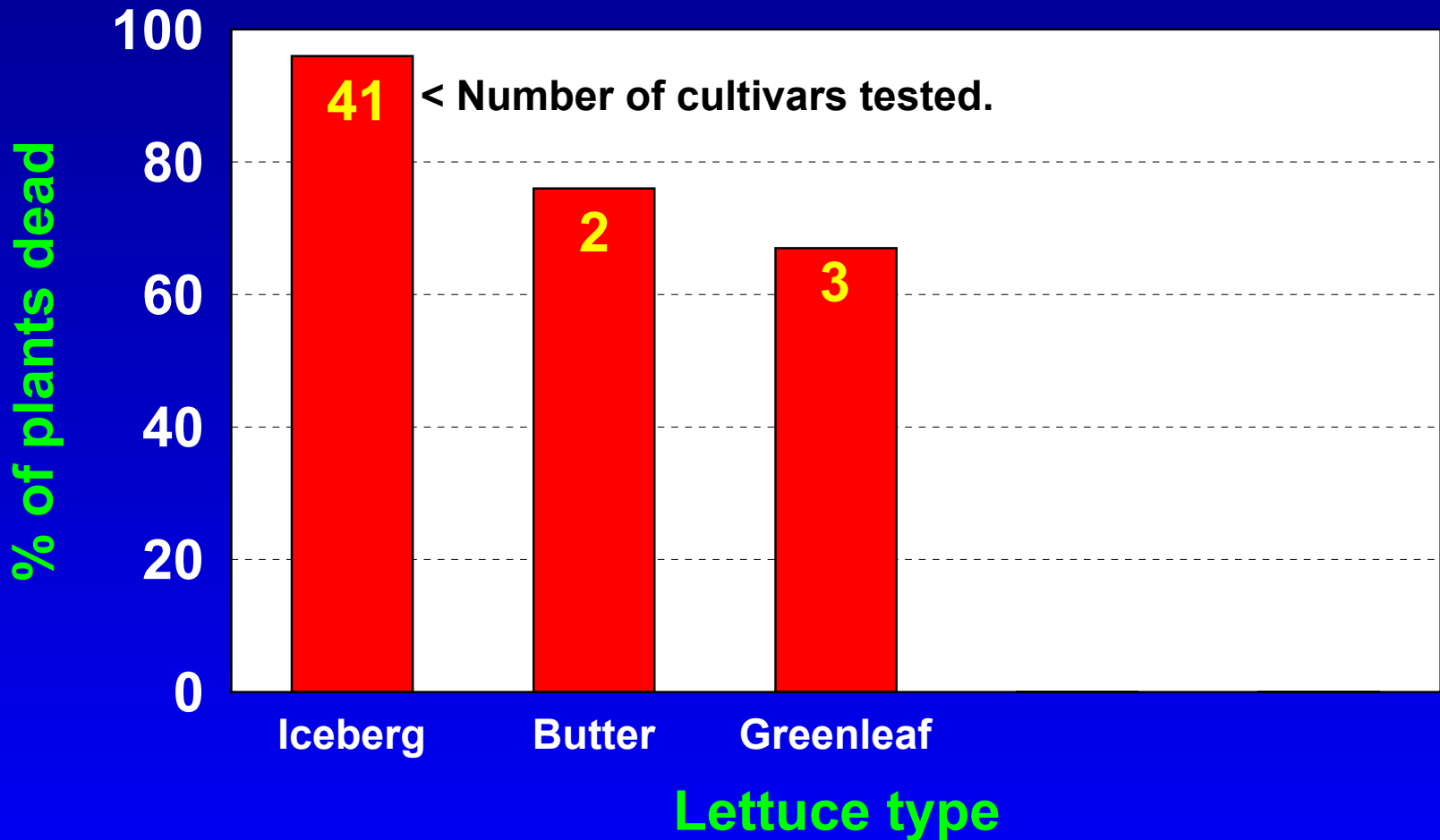
# Mean percentage of different types of lettuce plants dead at maturity



# Mean percentage of different types of lettuce plants dead at maturity

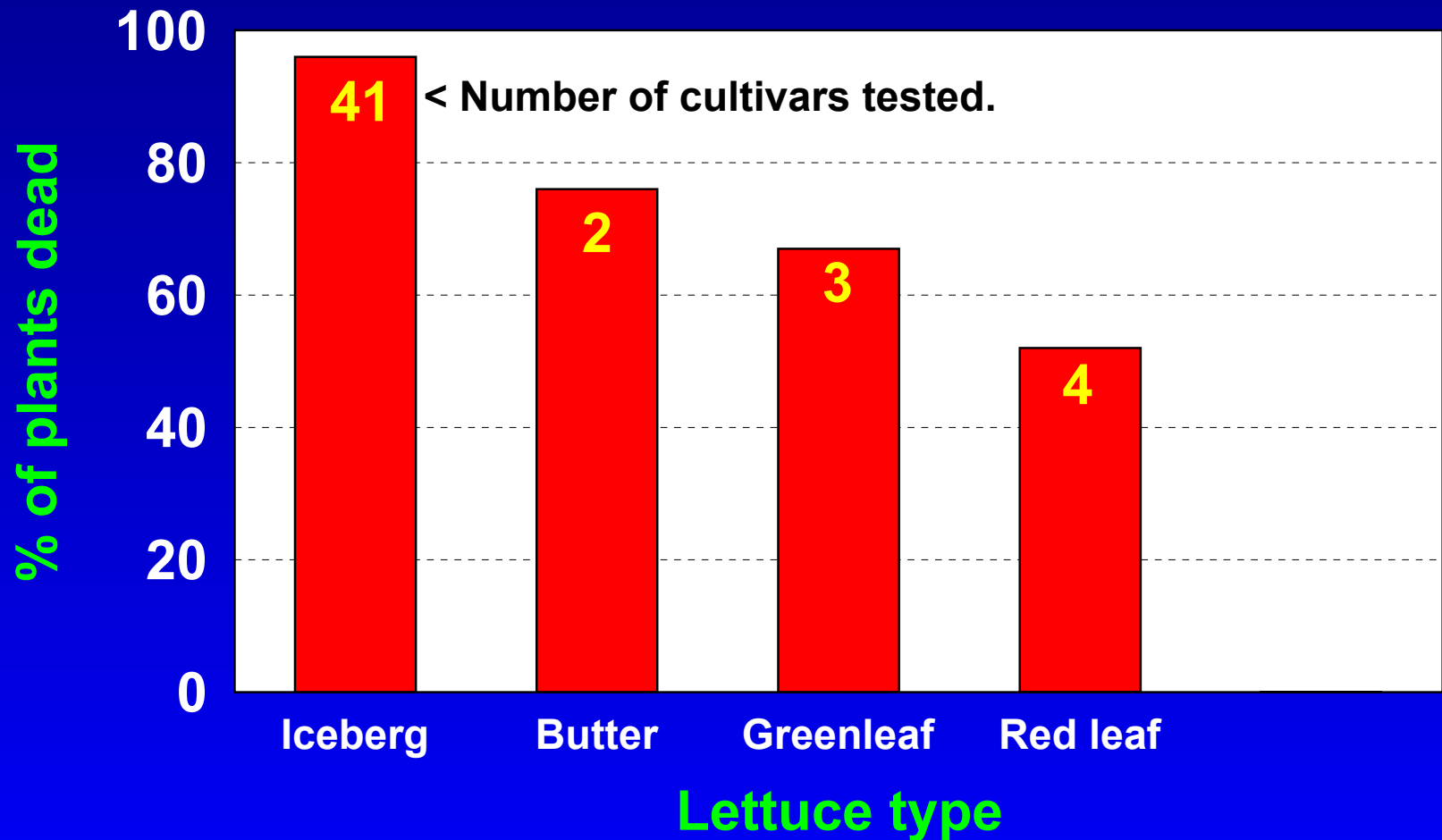


# Mean percentage of different types of lettuce plants dead at maturity

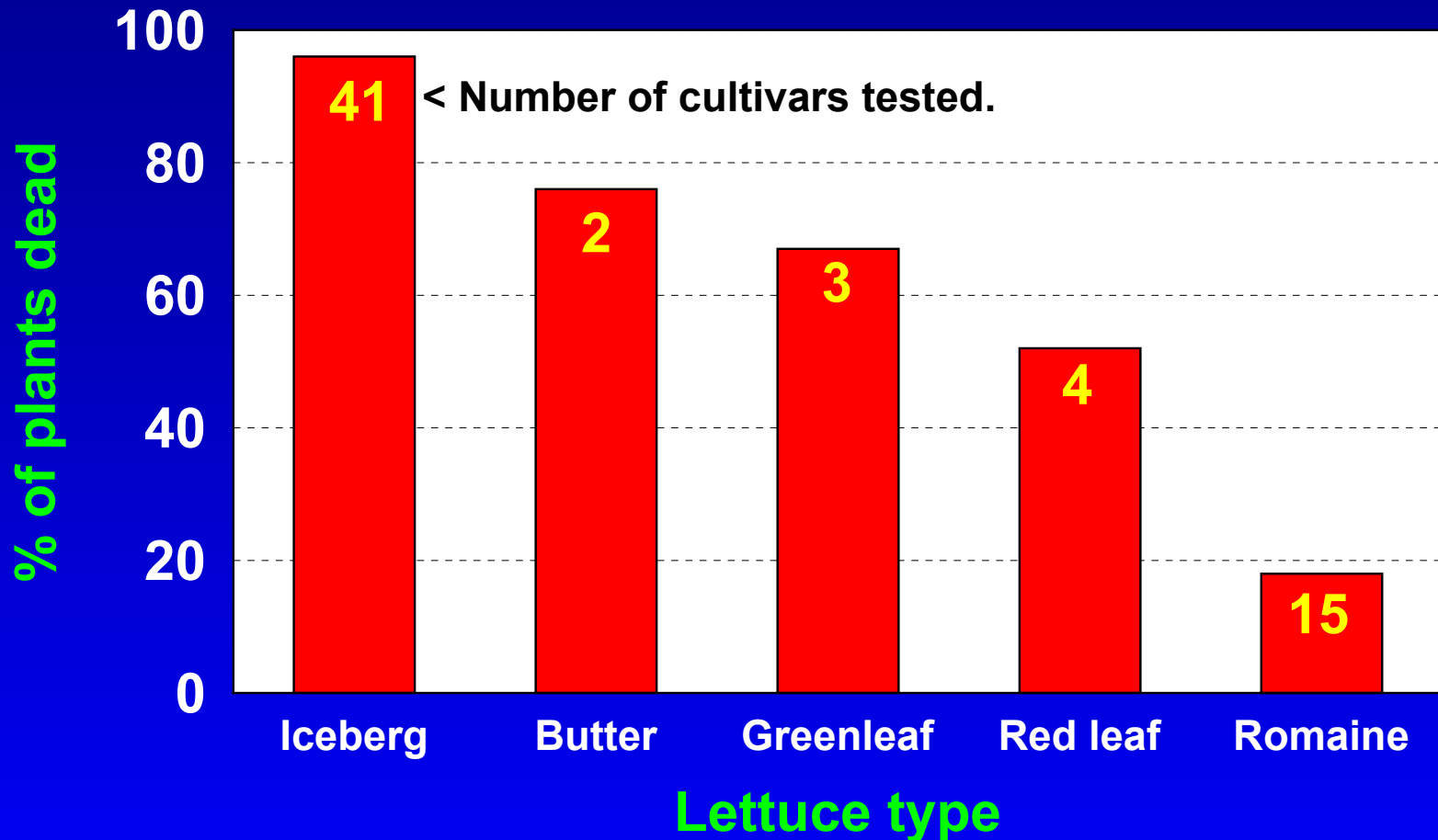




# Mean percentage of different types of lettuce plants dead at maturity



# Mean percentage of different types of lettuce plants dead at maturity



# Lettuce cultivar evaluation trial: Romaine vs. head lettuce



**Further research is needed to confirm the preliminary findings presented this morning.**