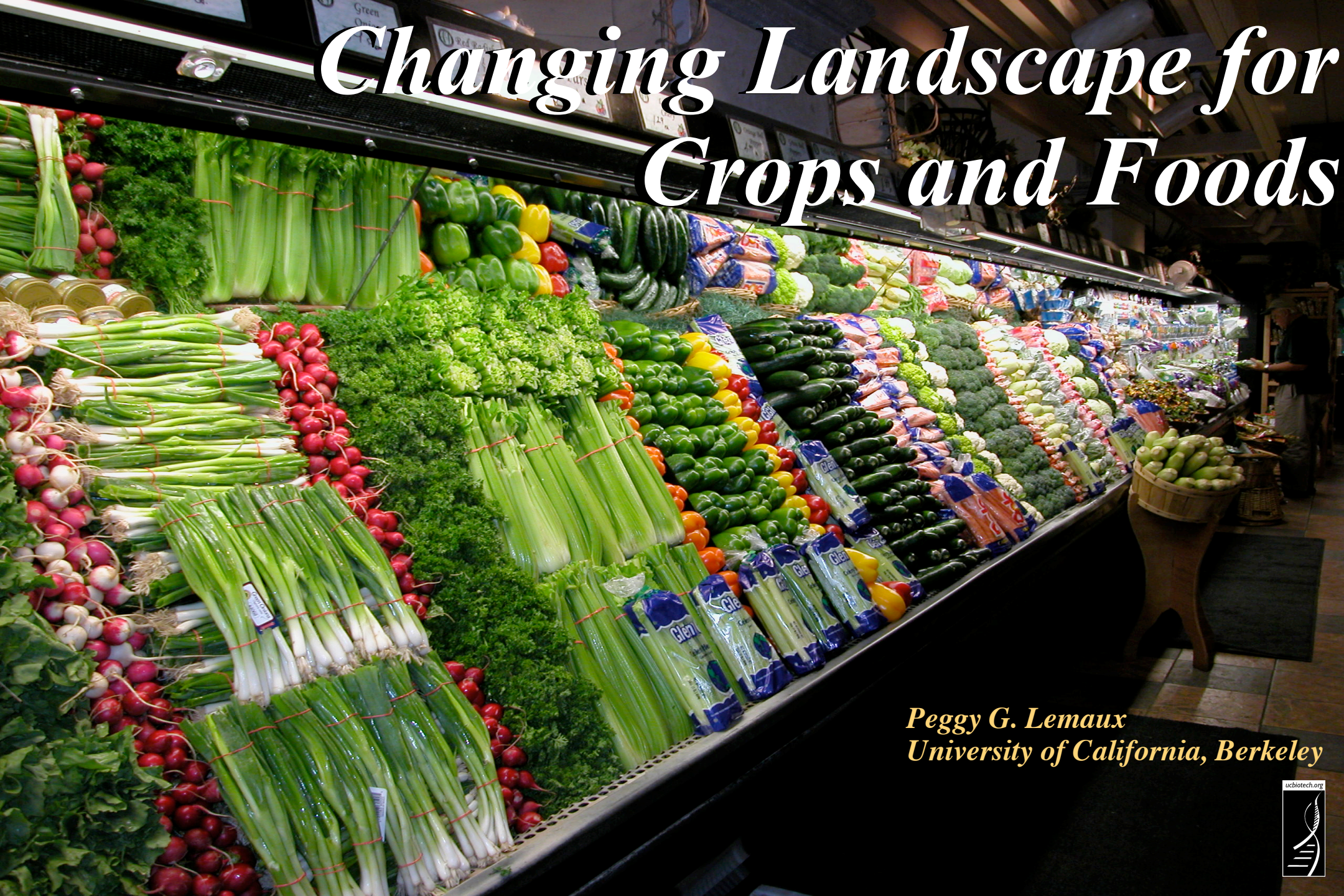
Changing Landscape for Crops and Foods



Peggy G. Lemaux
University of California, Berkeley

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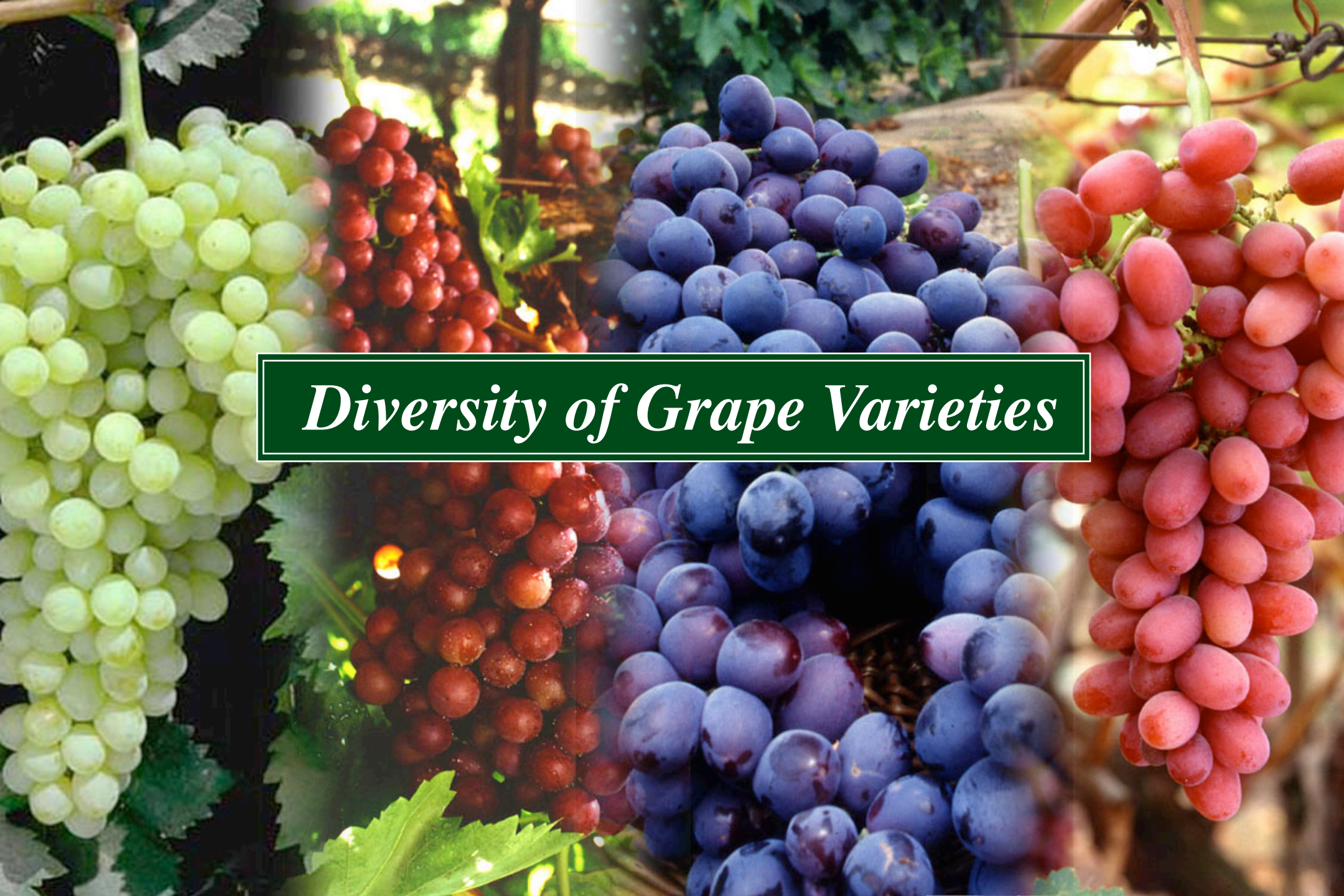

Diversity of Grape Varieties

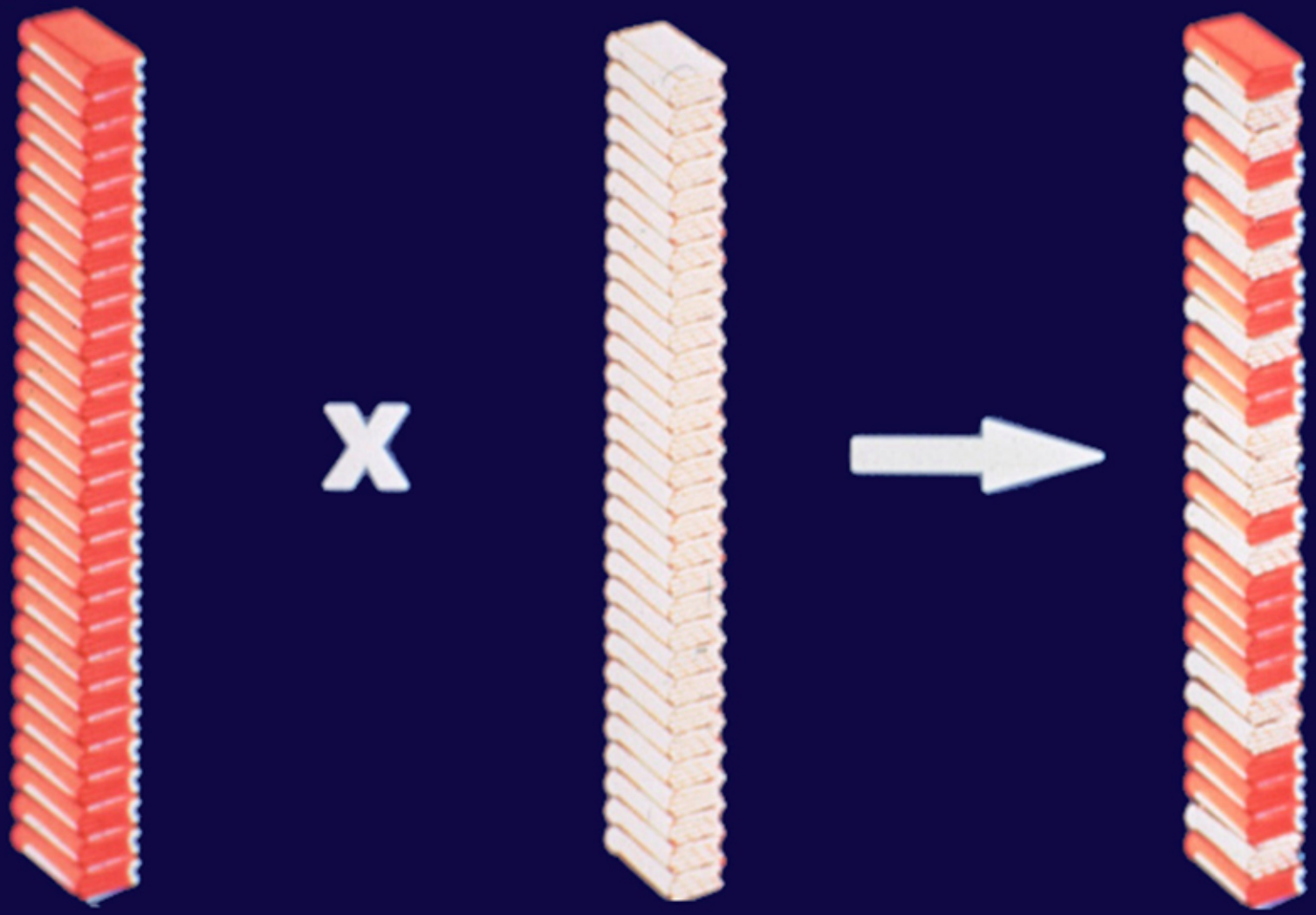
Information in the grape genome

...CTGACCTAATGCCGTA...

52 books
1000 pages each

52 books
(or 52,000 pages)

Hybridization or cross breeding



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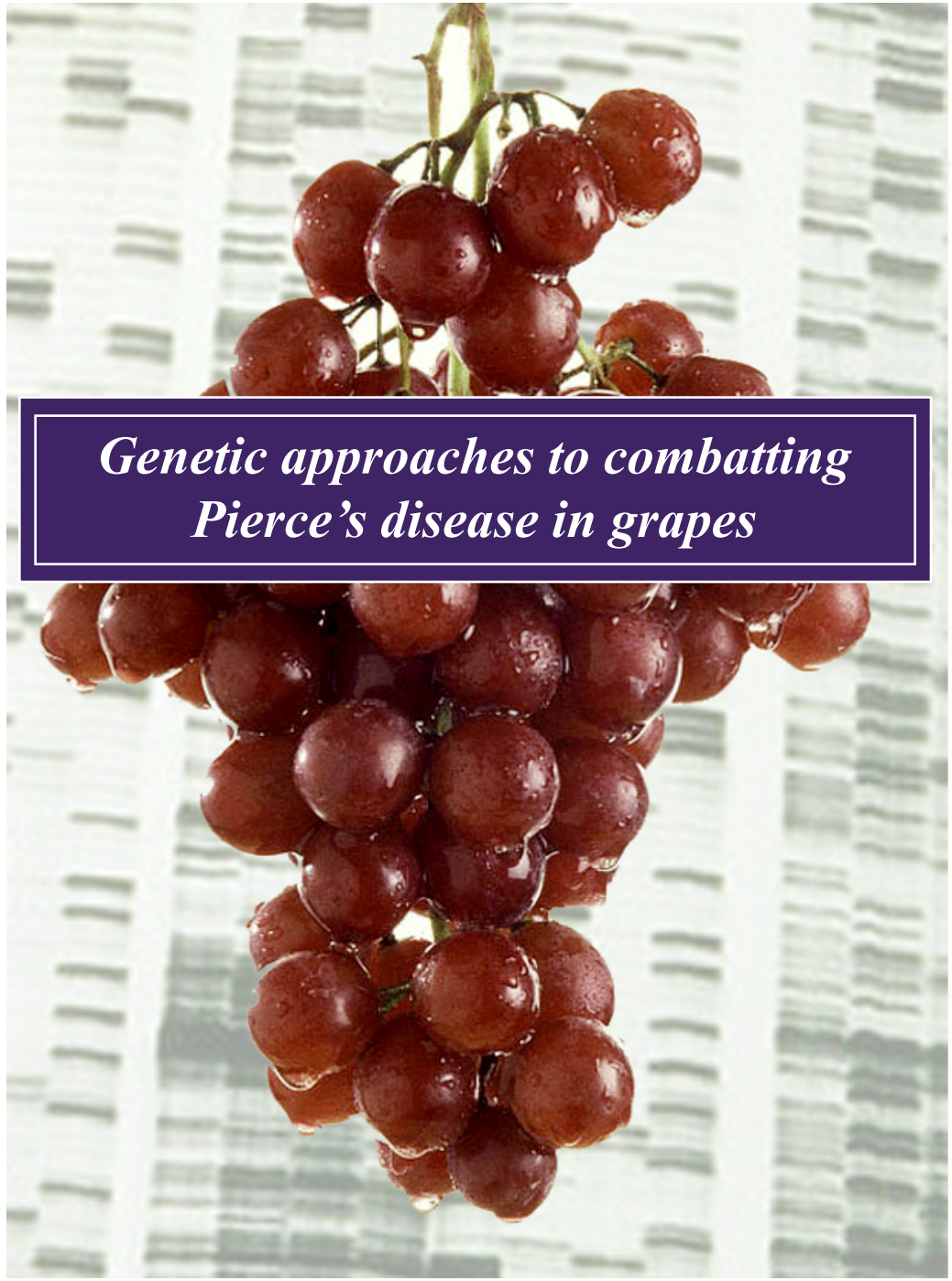

Genetic approaches to combatting Pierce's disease in grapes

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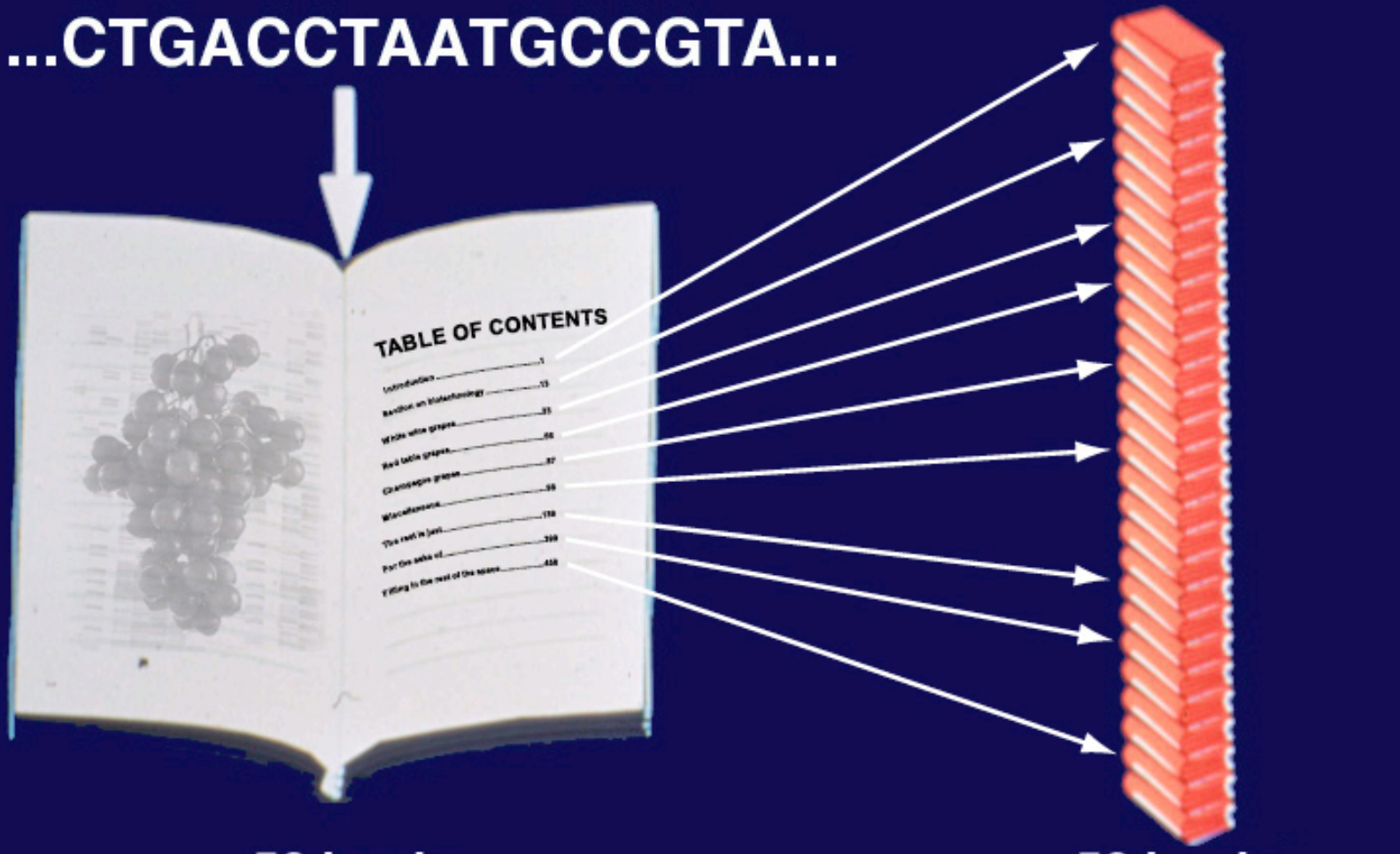
Table of contents for genes in grapes

...CTGACCTAATGCCGTA...



52 books
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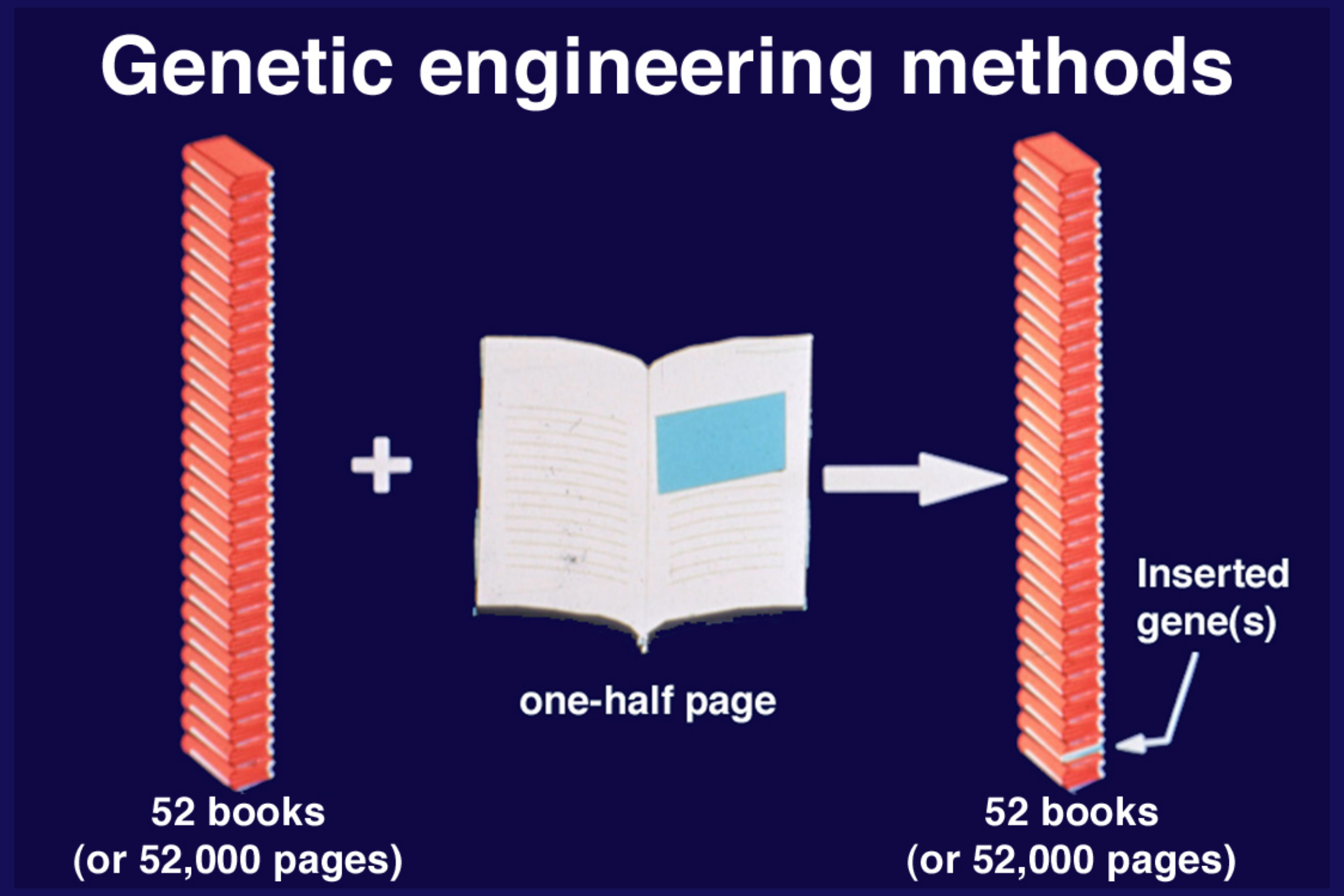
Genetic engineering methods



Classical Breeding *compared to* *Genetic Engineering*

Classical Breeding	*Genetic Engineering*
Utilizes plant machinery in the plant.	Utilizes plant machinery in the laboratory.
Genetic exchange is random process involving entire genome.	Genetic exchange is involves specific, single gene.
Only between closely related species.	Source of gene from any living organism.
Control of when and where genes are expressed not controlled by breeder.	Control of when and where gene is expressed can be controlled precisely.

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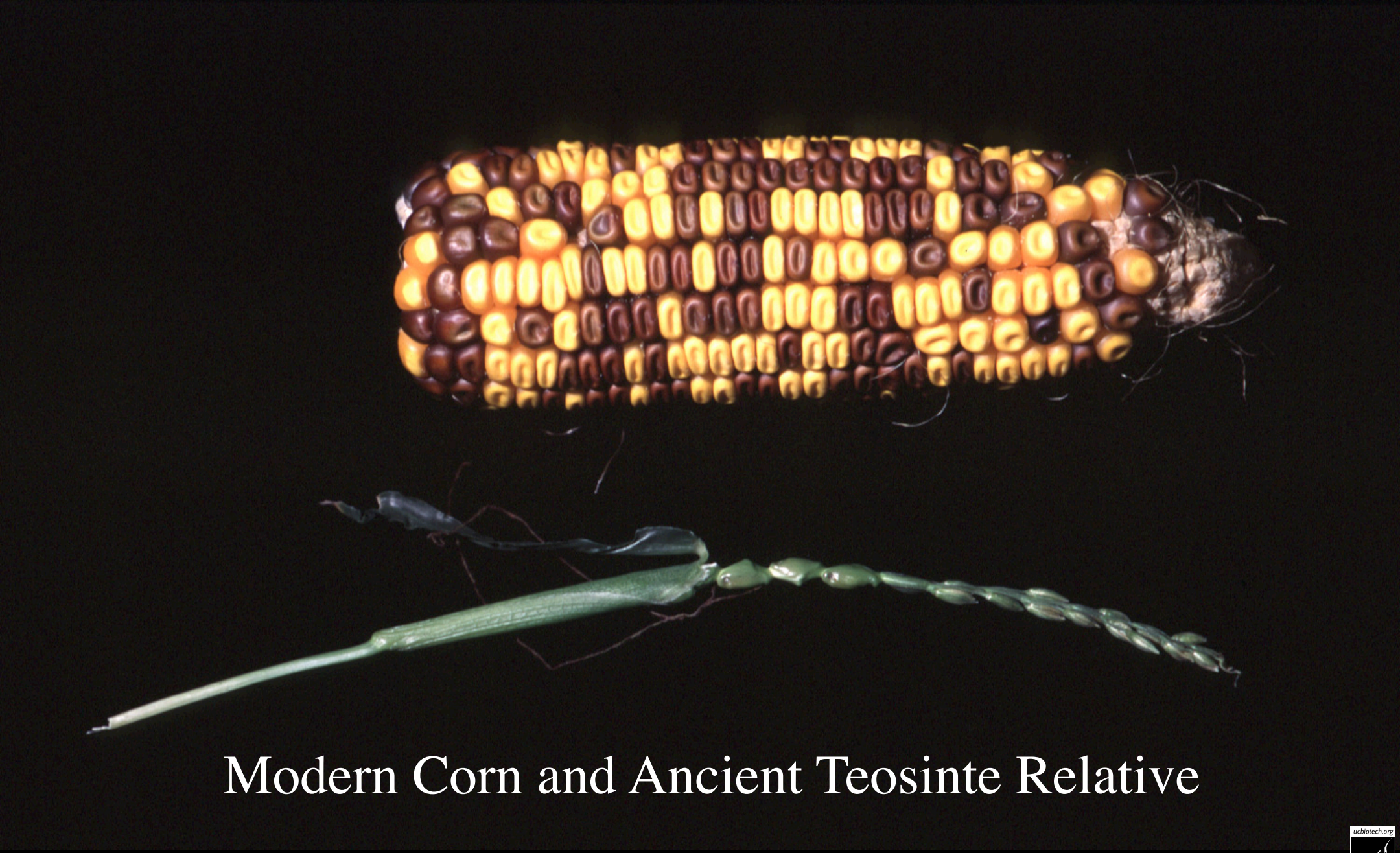

Modern Corn and Ancient Teosinte Relative

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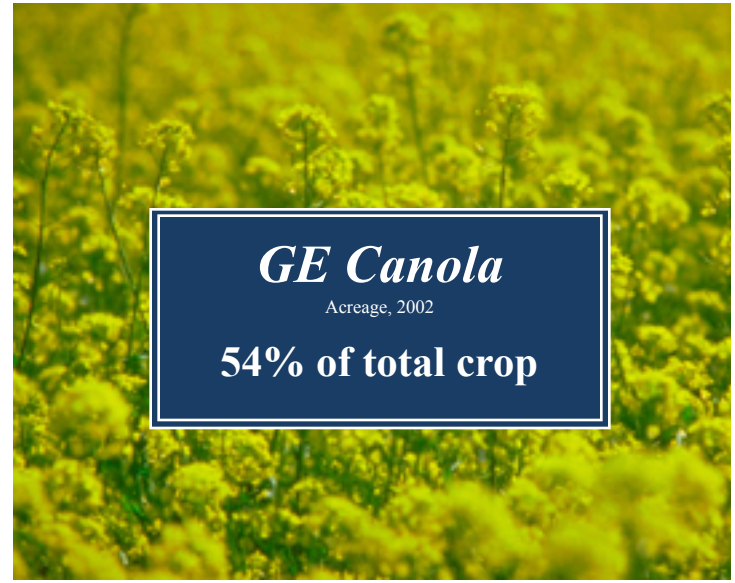

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Wish-Bone
Original Edensoy
Great for Frying, Baking and Salads
ProSobe
Soy Formula
Nutri-Grain
Betty Crocker
Creamy Deluxe
Silken Tofu
Extra Firm
Soygold
Multi-Purpose Industrial Solvent
Ken & Robert's Veggie Burger
Truly Amazing
Veggie
Tofu Wieners
Low Fat
Natural Touch
Okara Pattie
Made with Organic Soybeans
Okara is the Flavorful Protein-Rich, High Fiber Center of Golden Soybeans
Nacho Cheese
Snickers
Milky Way
3 Musketeers
Wet 'n' Wild
Via Satellite
125 mL ±5%
100
75
50
AT&T breaks
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Fruits and vegetables resulting from biotechnology

- Vine-ripe tomatoes with extended shelf life
- Yellow crookneck squash with viral resistance
- Higher solids tomatoes
- Potatoes resistant to viruses and insects; and
- Virus-resistant papaya

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Sample of possible engineered fruits and vegetables

- Strawberries resistant to molds
- Tomatoes not attacked by root nematodes
- Grapes resistant to Pierce's Disease
- Drought tolerant lettuce
- Peppers resistant to bacterial diseases
- Potatoes no longer susceptible to blight
- Sugar pine resistant to white pine blister rust
- Frost-tolerant pears

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What, if anything are you concerned about when it comes to food safety?

	Jan. 2001	Sept. 2001	Aug. 2002	Apr. 2003
• Packaging	27%	18%	17%	15%
• Food Handling/Preparation	23%	38%	42%	41%
• Other	19%	12%	7%	9%
• Disease/Contamination	16%	32%	41%	28%
• Chemicals/Pesticides in Food	10%	5%	8%	7%
• Altered/Engineered Food	2%	2%	2%	1%
• Nothing	9%	3%	4%	5%

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Food and Environmental Safety Issues Raise Important Questions

Regulatory Systems in the U.S. (existing regulations)

USDA

- Field testing
  - permits
  - notifications
- Determination of non-regulated status

FDA

- Food safety
- Feed safety

EPA

- Pesticidal plants
  - tolerance exemption
  - registrations
- Herbicide registration

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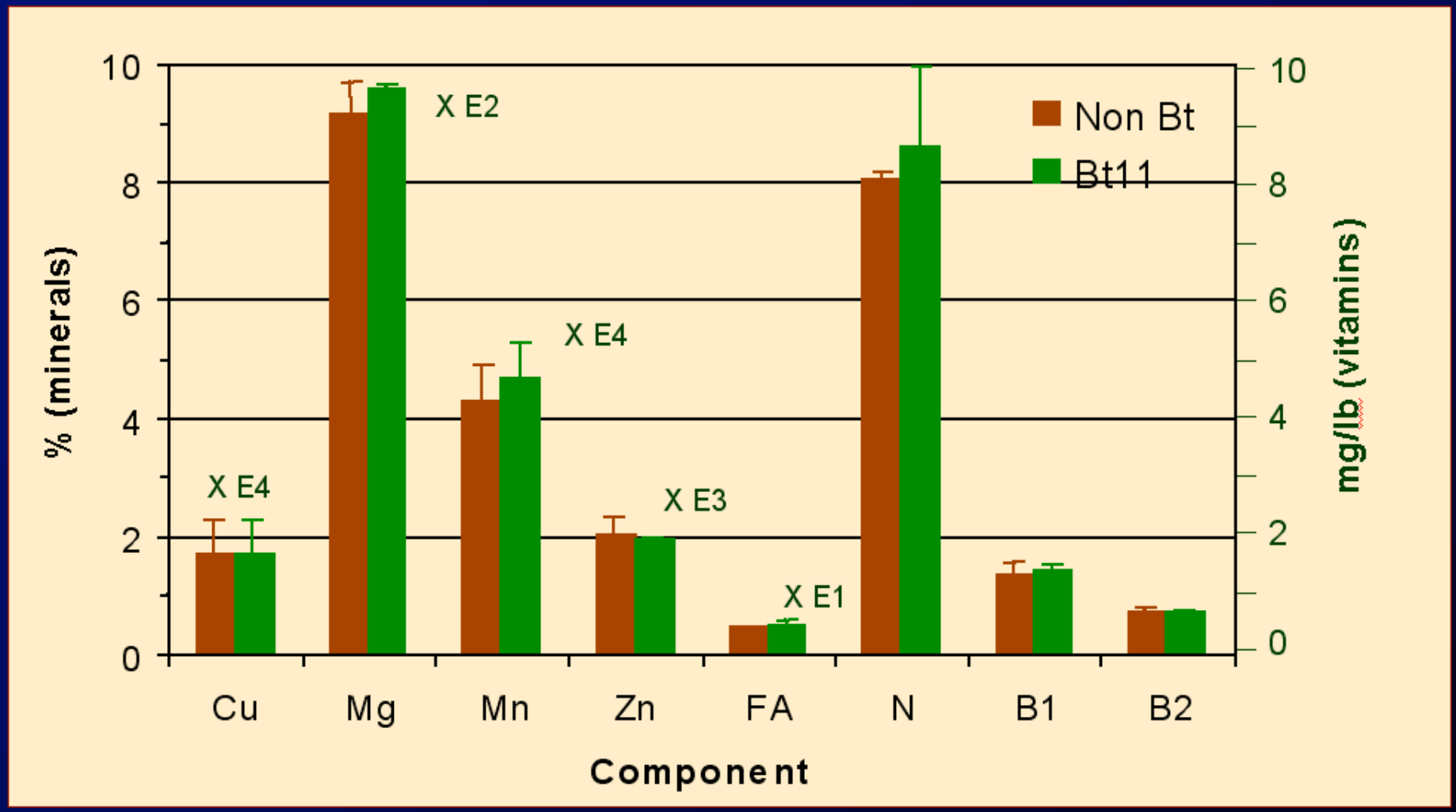
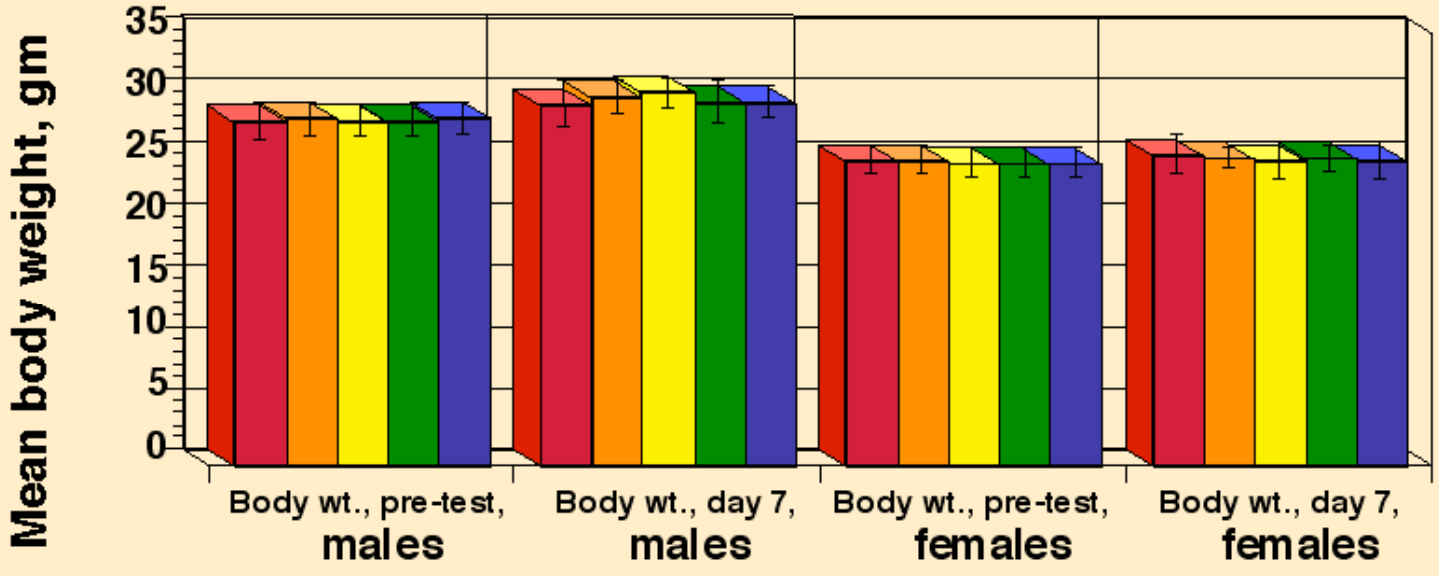
Compositional Equivalence: Mineral and Vitamin



These results have been generated on event Bt11. Data showing similar mineral and vitamin composition have been generated on the other corn events.

Toxicity Assessment: Roundup Ready/CP4 EPSPS protein

No deleterious effects at highest dose (572mg/kg)



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Kraft Food recalls all taco shells sold nationwide under Taco Bell Brand

SOURCE: Washington Post, September 19, 2000

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Large Scale Grain Movement by Rail

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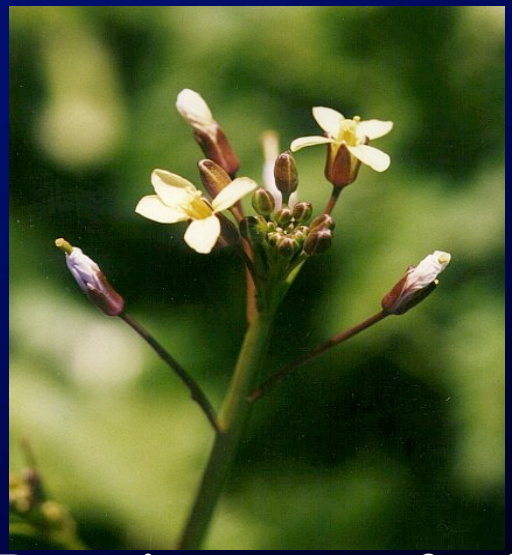
Movement of genes between crop species and wild relatives

Charlock

Canola

Wild radish

Buchan weed



Brassica tournefortii

Gene flow from rice to weedy red rice

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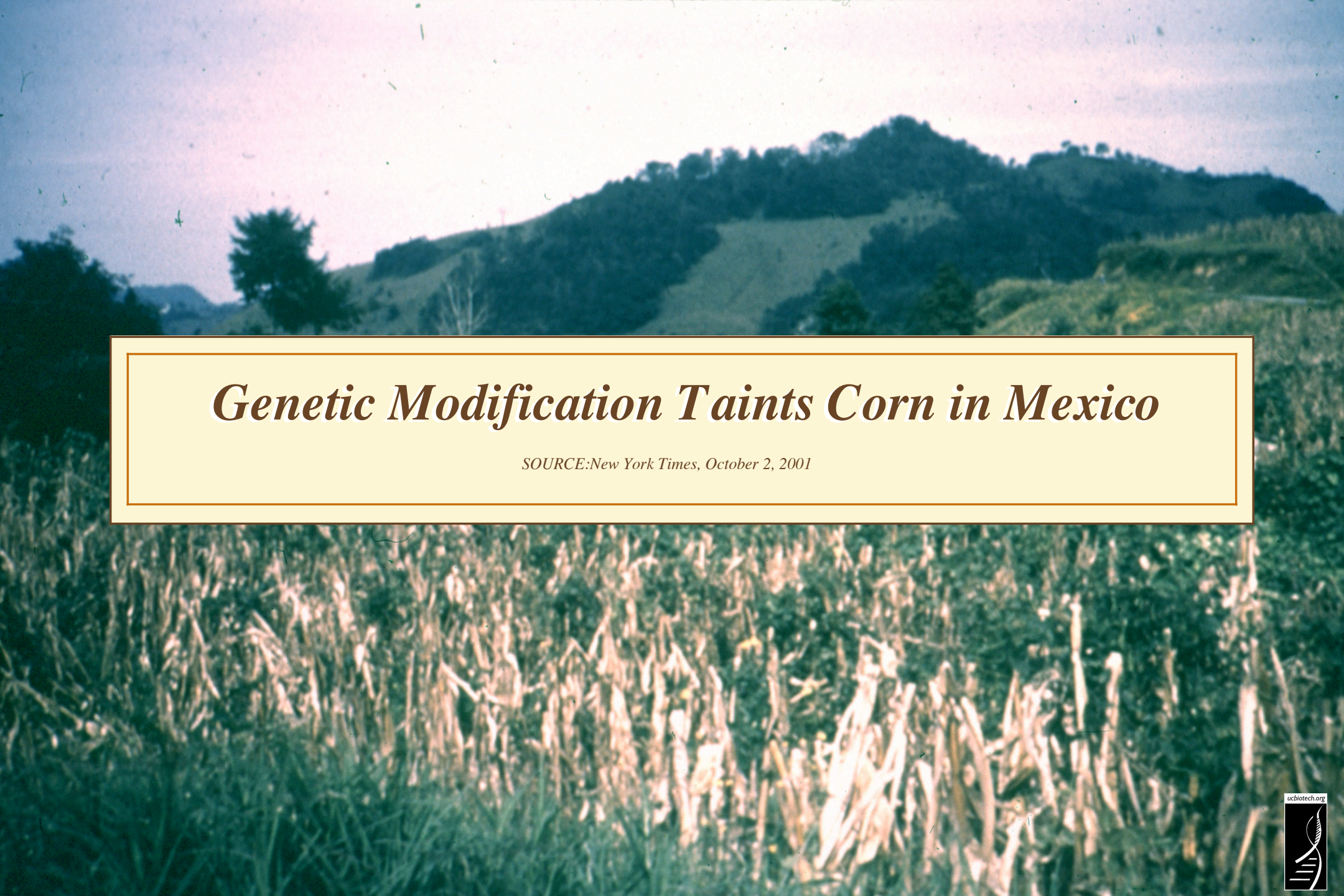

Genetic Modification Taints Corn in Mexico

SOURCE:New York Times, October 2, 2001

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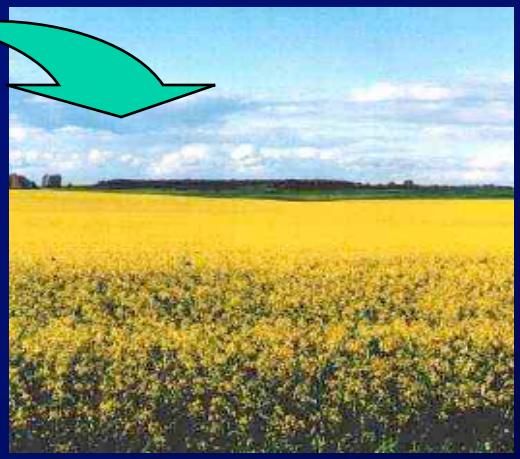
Consequences of pollen spread from GE crops to organic crops in the field

GM canola



non-GM canola

Will an organic farmer automatically lose his accreditation if his crop is found contaminated with a GE crop?

SOURCE: AMS National Organic Program Q&A

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No.

"As long as an organic operation has not used excluded methods and takes reasonable steps to avoid contact with the products of excluded methods, as detailed in their approved organic system plan, the unintentional presence of the products of excluded methods should not affect the status of an organic product or operation."

SOURCE: AMS National Organic Program Q&A

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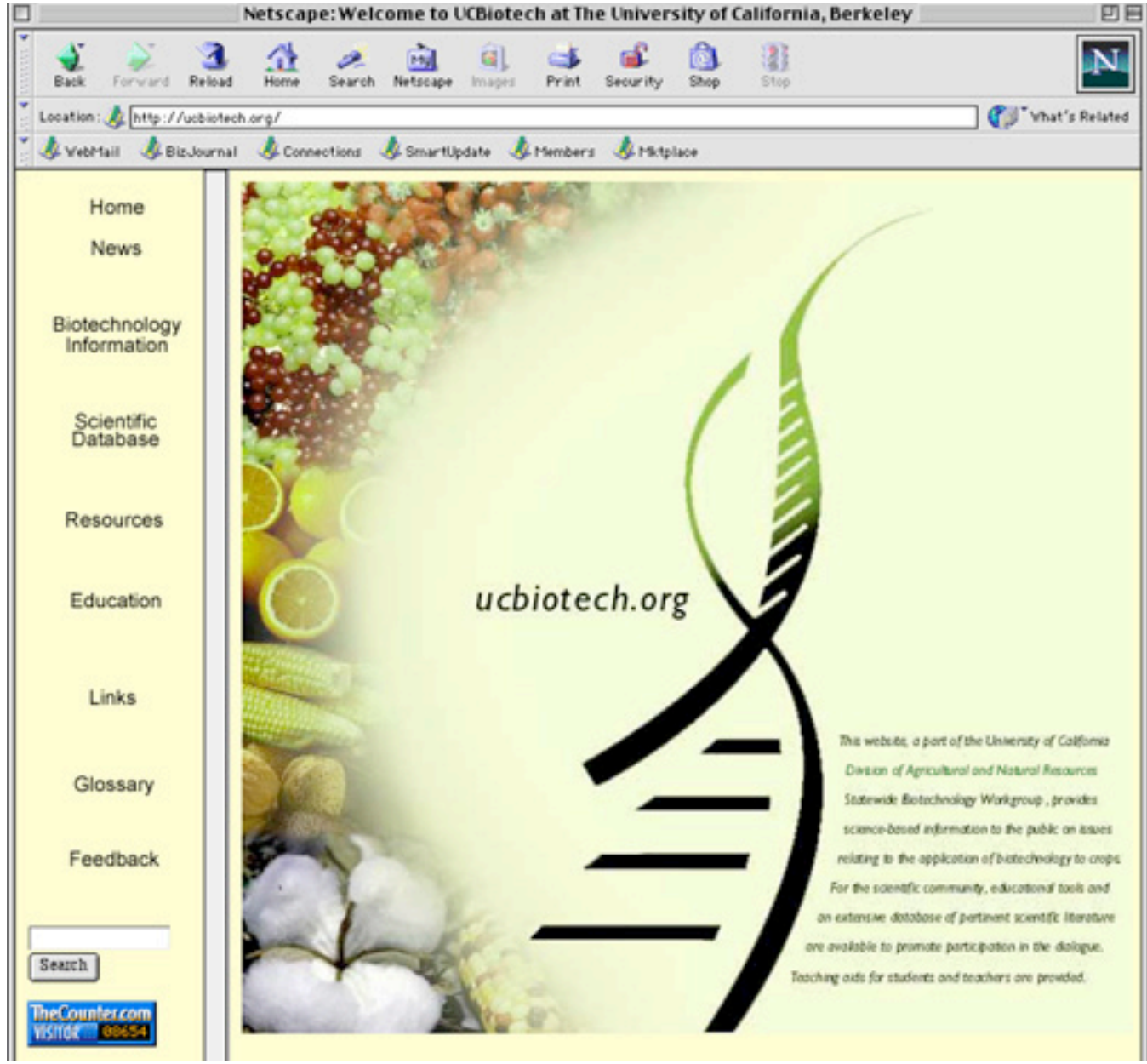
Netscape: Welcome to UCBiotech at The University of California, Berkeley
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Forward
Reload
Home
Search
Netscape
Images
Print
Security
Shop
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SmartUpdate
Members
Mktplace
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Resources
Education
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Glossary
Feedback
Search
TheCounter.com
VISITOR 88654
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This website, a part of the University of California Division of Agricultural and Natural Resources Statewide Biotechnology Workgroup, provides science-based information to the public on issues relating to the application of biotechnology to crops. For the scientific community, educational tools and an extensive database of pertinent scientific literature are available to promote participation in the dialogue. Teaching aids for students and teachers are provided.