

# Plant and Soil Sciences eLibrary

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1. Video story
2. Image rich text – story based learning
3. Active learning media
4. Application quiz bank

Menu

## Lesson Outline

Genetic Basis for the Backcross Method

General Considerations

Improvement of More Than One Character

Conclusions

References

## Explore By Main Subject Area

Pesticide Education

Plant Breeding

Crop Production & Natural Resource Management

Crop Technology

Genetics

Horticulture

Nutrition Technology

Plant Physiology

Soil Science

Weed Science

Miscellaneous

Español

Plant and Soil S

## Advanced Backcross Breeding

### General Considerations

When starting a [backcrossing](#) program, there are a few items that a breeder needs to consider.

First of all, backcrossing is most easily conducted if the [character](#) being added is easily selectable. To be easily selected it needs to be simply inherited (although the [backcross](#) approach may be applied to quantitative traits); dominant; and easily recognized in the [hybrid](#) plant.



Fig. 5. Awnless wheat (left) is easy to detect and select from wheat with awns (right).

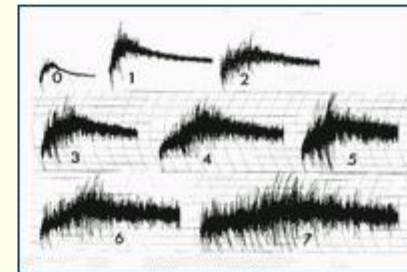
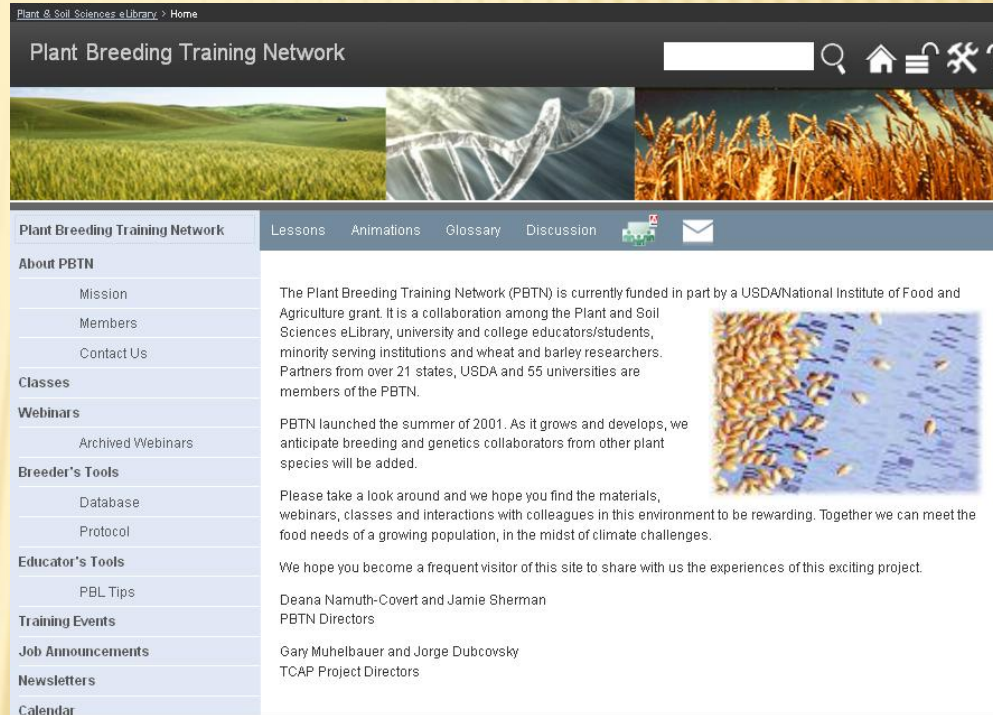


Fig. 6. A more difficult to select for [trait](#) is the bread-making quality of wheat. Mixograph curves used for determining

# Plant Breeder Training Network – Online environment

- + Facilitates shared expertise of 50 researchers in critical content areas
- + Creates opportunities to develop collaborative problem solving skills in digital work environment
- + Repository of interactive animations, videos and lessons that anyone can utilize



The screenshot shows the Plant Breeder Training Network (PBTN) website. The header includes the title "Plant Breeding Training Network" and navigation icons for search, home, and user profile. Below the header is a banner image featuring a green field, a DNA double helix, and golden wheat. The main content area is divided into a left sidebar with a navigation menu and a main content area. The sidebar menu includes sections like "About PBTN", "Classes", "Webinars", "Breeder's Tools", "Educator's Tools", "Training Events", "Job Announcements", "Newsletters", and "Calendar". The main content area displays introductory text about the network's funding and mission, along with a list of PBTN Directors: Deana Namuth-Covert and Jamie Sherman, and Gary Muhelbauer and Jorge Dubcovsky.

Plant & Soil Sciences eLibrary > Home

## Plant Breeding Training Network

Lessons Animations Glossary Discussion

### About PBTN

- Mission
- Members
- Contact Us

### Classes

- Archived Webinars

### Breeder's Tools

- Database
- Protocol

### Educator's Tools

- PBL Tips

### Training Events

### Job Announcements

### Newsletters

### Calendar

The Plant Breeding Training Network (PBTN) is currently funded in part by a USDA/National Institute of Food and Agriculture grant. It is a collaboration among the Plant and Soil Sciences eLibrary, university and college educators/students, minority serving institutions and wheat and barley researchers. Partners from over 21 states, USDA and 55 universities are members of the PBTN.

PBTN launched the summer of 2001. As it grows and develops, we anticipate breeding and genetics collaborators from other plant species will be added.

Please take a look around and we hope you find the materials, webinars, classes and interactions with colleagues in this environment to be rewarding. Together we can meet the food needs of a growing population, in the midst of climate challenges.

We hope you become a frequent visitor of this site to share with us the experiences of this exciting project.

Deana Namuth-Covert and Jamie Sherman  
PBTN Directors

Gary Muhelbauer and Jorge Dubcovsky  
TCAP Project Directors

# Introduction to Plant Breeding Learning Activity:

Click on Step 1 to begin. Follow the steps in order to complete the breeding process. Use the links in the side bar on the right to learn about other important concepts in plant breeding. At each step make sure to answer the notebook question found in the lower left corner of the page.



## Step 1: The Plant Breeder's Goal

### Introduction to Plant Breeding

#### Step 2: Selecting Parents and Making Crosses

Next, the breeder must select parents. Parents have unique traits the breeder wants to have. The important factor to consider is if the parents are crucial for the breeder to make a large number of offspring. The breeder will find plants with the exact combination of traits. The combinations are available for the breeder to select only those with the best genetic combination. The plant has perfect or imperfect flowers. Finally, click on the hyperlinked words in the caption.

#### Information for Teachers

This activity discusses the basic process used in plant breeding, genetic variation, selection and elements of DNA activity. The material is aimed towards high school students.

Click on the following links to see how breeders make crosses in soybeans.

<http://www.youtube.com/watch?v=BGv079rC5zM>

<http://www.youtube.com/watch?v=8IZuCOxiK0E>



Pollen will be taken from the flower above to be used in a cross. This plant will be the male parent.



Anthems are removed from the flower above. The pollen is then placed on the stigma. The flower above will be the female parent.



Notebook

JNBLSE

### Breeder's Notebook

#### Step 2: Selecting Parents and Making Crosses

We need to develop a line that is rust resistant and has high oil content. Look at the parents to the side, and select which ones you want to cross to develop this line. Drag and drop the correct plants, then submit your answer.

A digital interface for selecting parent plants. It features two empty rectangular boxes on the left and right, with a large 'X' symbol in the center between them, indicating a cross. Below the boxes is a blue 'Submit' button.

Parent 1:  
\*High oil  
\*Rust susceptible  
\*High yield  
\*Normal green color

Parent 2:  
\*Low oil  
\*Rust resistant  
\*Low yield  
\*Normal green color

Parent 3:  
\*Medium oil  
\*Rust resistant  
\*Medium yield  
\*Yellow color which can lead to reduced productivity

# Plant Breeding Training Network



Plant Breeding Training Network

Lessons

Animations

Glossary

Discussion



About PBTN



# Plant Breeding Training Network



[Board index](#) > [Plant Breeding Training Network](#) > [General Discussion](#) | [Back to passel](#)



[User Control Panel](#) (0 new messages) • [View your posts](#)

[FAQ](#) • [Members](#) • [Logout \[ dnamuth-covert \]](#)

[ Moderator Control Panel ]

Advanced search

## General Discussion

**NEWTOPIC\***

Mark topics read • 4 topics • Page 1 of 1

TOPICS	REPLIES	VEWS	LAST POST
<b>Bill Gates</b> by <b>dnamuth-covert</b> » Tue May 31, 2011 9:44 am	0	10	by <b>dnamuth-covert</b> Tue May 31, 2011 9:44 am
<b>perennial wheat?</b> by <b>dlee</b> » Mon May 23, 2011 11:10 am	0	28	by <b>dlee</b> Mon May 23, 2011 11:10 am
<b>Topic number 2</b> by <b>dnamuth-covert</b> » Tue May 17, 2011 4:21 pm	0	14	by <b>dnamuth-covert</b> Tue May 17, 2011 4:21 pm



## Plant Breeding Training Network

[Lessons](#) [Animations](#) [Glossary](#) [Discussion](#)  

### About PBTN

- [Mission](#)
- [Members](#)
- [Contact Us](#)

### Classes



### Webinars

- [Archived Webinars](#)

### Breeder's Tools

- [Database](#)
- [Protocol](#)

### Educator's Tools

- [PBL Tips](#)

### Training Events

### Job Announcements

### Newsletters

### Calendar

## TCAP Undergrads



### TCAP Undergrads

[Lessons](#) [Animations](#) [Glossary](#)  

Button 1

Button 2

This will be the location where undergrad students working on various TCAP projects and inte



About PBTN

Mission

Members

Contact Us

Classes

Webinars

Archived Webinars

Breeder's Tools

Database

Protocol

Educator's Tools

PBL Tips

Training Events

Job Announcements

Newsletters

Calendar

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Archived Webinars



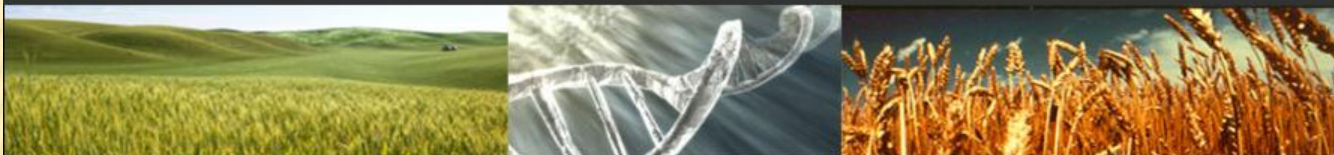
June 2011 Liana Nice from Univ of Minnesota discussed her research on *Utilization of Wild Barley Germplasm through Multiparent Population Development*. Click on the image to view the webinar.

June 2011 Jorge and Tyson shared their lab's experience with CSR. Click on the image to view the webinar. A minor technical glitch: Their slides appear about 3 mins into the talk, or you can scroll back after the webinar runs for a few mins to see those slides.

View a pdf file of [Tyson's slides](#)



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Lessons Animations Glossary Discussion



### About PBTN

- Mission
- Members
- Contact Us

### Classes

### Webinars

- Archived Webinars

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- Database
- Protocol

### Educator's Tools

- PBL Tips

### Training Events

### Job Announcements

### Newsletters

### Calendar

Lessons



### Featured Lessons

#### Overview of Plant Genetic Engineering

Lesson one is a general description of the five steps for genetically engineering a plant.

[View](#) [Print](#) [Take Quiz](#)

#### Real Time PCR - Some Basics

Real time PCR is a laboratory technique for measuring the amount of a specific DNA sequence in a sample.

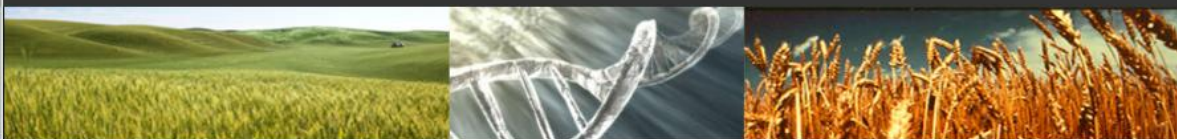
[View](#) [Print](#) [Take Quiz](#)

#### DNA and DNA Extraction

This lesson discusses what DNA is and how it is extracted in the genetic engineering process.

[View](#) [Print](#) [Take Quiz](#)

# Plant Breeding Training Network



## Plant Breeding Training Network

Lessons Animations Glossary Discussion



### Lesson Outline

- Overview and Objectives - DNA and DNA Extraction
- Introduction - DNA and DNA Extraction
- Chromosomes
- DNA Structure
- Genes Encode Proteins
- DNA Extraction
- Summary - DNA and DNA Extraction

### Faculty Instructor



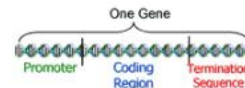
**Deana Namuth-Covert**  
Agronomy & Horticulture Extension Professor

◀ previous topic   next topic ▶   quiz ●

DNA and DNA Extraction

### Introduction - DNA and DNA Extraction

Rate Me



Every gene has a promoter, a coding region, and a termination sequence.

Genetic engineering is the directed addition of new DNA to an organism's genetic makeup, its genome. DNA is the material that makes up genes. Once scientists understood the properties of DNA and how it functions as genetic material, they could envision and invent techniques for genetic engineering.

DNA is the instruction manual for living things. Within the relatively simple double helix structure, DNA holds the coded information for how to make every protein a living organism might need throughout its entire life.

◀ previous topic   next topic ▶



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  - Mission
  - Members
  - Contact Us
- Classes
- Webinars
  - Archived Webinars
- Breeder's Tools
  - Database
  - Protocol
- Educator's Tools
  - PBL Tips
- Training Events
- Job Announcements
- Newsletters
- Calendar

- Lessons
- Animations
- Glossary
- Discussions

View the animations by clicking the 'view' link you are logged in.

New users [Register free here](#) or existing users



All Animations

## Marker Assisted Selection

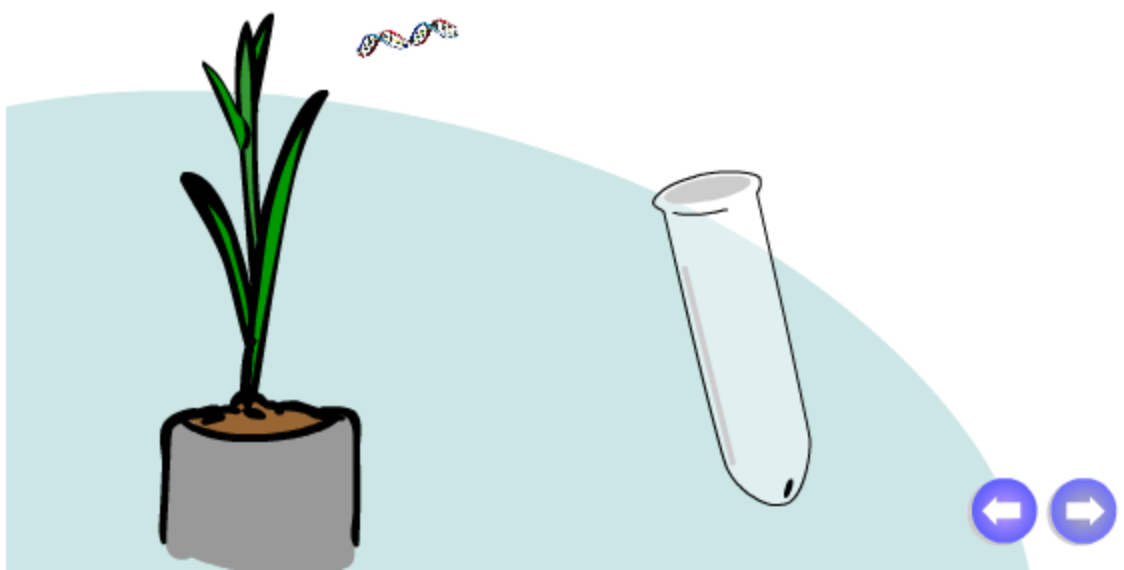
Content Direction and Editing: Jamie Sherman

Developer: Dan Quinn

This production made possible in part through a grant from USDA-CSREES to Wheat CAP (Coordinated Agricultural Project) dedicated to research

## Marker Assisted Selection (MAS)

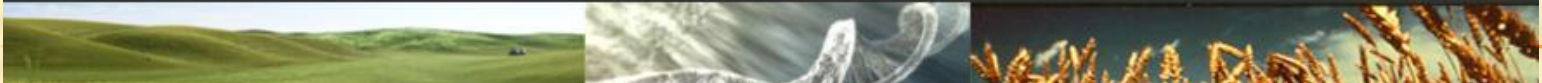
Step 2: DNA Isolation (see DNA and DNA extraction)



**Wheat CAP**  
Agricultural Project



# Plant Breeding Training Network



Plant Breeding Training Network (Sharing) - Adobe Connect

**N** Meeting Layouts Pods Audio



## Notes

11

Today's Grad Student meeting will start at 10:00am Central Time.  
\* Be sure to run the Audio SetUp Wizard:  
    (click on "Meeting" and then "Audio SetUp Wizard")  
\* Close all other programs on your computer to improve speed  
\* If you are not using a headset, mute your mic when not talking (either "control-M" or clicking on mic icon above)  
\* Today's Agenda Items:  
    - Liana's presentation  
    - new PBTN stuff  
    - anything else?

## Video

Start My Webcam

## Attendees (1)

### Hosts (1)

**Deana Namuth-Covert**

Presenters (0)

Participants (0)



## Discussion Notes

11

NAPB Mtg Report:  
\* discussions on intellectual property and future issues you'll be facing  
\* Australia breeder showed that 80% heritable trait needed 2000 individuals to be 50% sure of finding the trait  
\* bioinformatics and large databases, but no uniform formats across species (iPlant; BarleyCAP)  
\* George Bush presidential library!!!!  
\* setting goals for next years  
\* Noble Foundation/drought breeding  
\* Viking in the wheat fields Author: Susan Dworkin...edutainment  
\* list serve available at NAP...

Screen

## Chat (Everyone)

Rebecca - UCD: are you seeing any disease pressure in the field this season that might affect selection this year?

Rebecca - UCD: are you scoring it?

Everyone