



burn-down herbicide

conventional tillage

crop residue

polyculture

winter wheat

## Diversification

### Overview -

Farmers benefit from understanding diversification. This section outlines benefits of **diversifying** and some ways to do it.

**Why diversify?** - Diversifying a **crop system** offers farmers economic and environmental benefits.

Many farmers use **conventional tillage** because they think it is cheaper. That is not always true in the long term.

**Conservation tillage** methods that rely on diversification can be more expensive at first. However, they protect the long-term health of the soil.

There are environmental benefits as well. Diversified fields are healthier. Farmers often find they use fewer fertilizers and **burn-down herbicides** after they diversify.

**How to diversify** - We suggest you start by contacting your local agricultural extension office. They can help you make informed decisions about which crops are most suitable.

Next, you need to research the market for those crops. Determine which crops are economical.

Finally, consider if you want to use **crop rotation** or **polyculture**. With the former, farmers often leave a section of their fields **fallow**. If they also use **zero tillage** methods, they will leave **crop residues** in place. Unfortunately, fallow fields mean less available cropland at a given time. On the other hand, many popular crops, such as **winter wheat** and **spring wheat**, are not suitable for polyculture. So making this decision requires careful thought.

## Get ready!

1 Before you read the passage, talk about these questions.

- How can conventional tilling damage soil?
- What are some types of cropping systems? What are their strengths and weaknesses?

## Reading

2 Read the publication on cropping systems. Then, choose the correct answers.

- What is the passage mostly about?
  - the price of conventional tillage
  - the environmental effects of fertilizer
  - the diversification of crop systems
  - the market price for various crops
- Which is NOT advice given in the passage?
  - research the market for crops
  - select a method of crop diversification
  - contact the agricultural extension office
  - use herbicides after diversification
- What is the drawback to a fallow field?
  - It results in less available land for crops.
  - It has herbicide residues that harm crops.
  - It becomes less suitable for polyculture.
  - It must be fertilized before planting again.

## Vocabulary

3 Match the words (1-6) with the definitions (A-F).

- |                    |                            |
|--------------------|----------------------------|
| 1 ___ fallow       | 4 ___ conventional tillage |
| 2 ___ zero tillage | 5 ___ crop residue         |
| 3 ___ polyculture  | 6 ___ spring wheat         |

- parts of plants left in the field after harvest
- growing different plants in the same field
- having no crops
- the standard cropping system
- a crop that is harvested in summer or fall
- a technique for growing crops without tilling

**4** Write a word that is similar in meaning to the underlined part.

- 1 A practice that prevents water and soil loss protects fields.  
\_o \_ \_ \_ \_ \_ t \_ \_ n t \_ \_ \_ \_ e
- 2 Wheat that is planted in the fall is harvested in the spring.  
w \_ \_ \_ \_ \_ w \_ \_ \_ \_ \_
- 3 Use the weedkiller before planting.  
\_ \_ \_ n-d \_ \_ \_ \_ e \_ \_ \_ \_ \_ e
- 4 The process of growing different crops one after the other on a field improves soil quality. c \_ \_ \_ r \_ \_ \_ \_ \_ n
- 5 There are several methods of growing crops.  
\_ \_ \_ p s \_ s \_ \_ \_ s
- 6 Increase the variety of your crops to reduce fertilizer use.  
d \_ \_ \_ r \_ \_ \_ \_

**5** Listen to the publication on cropping systems again. What is a negative effect of crop rotation?

**Listening**

**6** Listen to a conversation between a farmer and an assistant. Mark the following statements as true (T) or false (F).

- 1 \_\_\_ Rotating crops will require less fertilizer.
- 2 \_\_\_ They plan to plant crops in all five fields.
- 3 \_\_\_ Planting peanuts will deplete the soil.

**7** Listen again and complete the conversation.

**Farmer:** We're going to 1 \_\_\_\_\_ our crops in the spring.

**Assistant:** Why do you want to do that?

**Farmer:** Well, it'll allow us to 2 \_\_\_\_\_ more and to use less 3 \_\_\_\_\_.

**Assistant:** So, 4 \_\_\_\_\_ do we do this?

**Farmer:** First, we 5 \_\_\_\_\_ five separate sections. One each for wheat, corn, soybeans, and peanuts.

**Assistant:** Peanuts?

**Farmer:** Wheat takes 6 \_\_\_\_\_ the soil. Once we plant a crop of peanuts in that field, the nitrates will be replenished. So we can grow wheat there again.

**Assistant:** Now you said five sections, but there are only four crops.

**Farmer:** That's because the fifth section will be left fallow. 7 \_\_\_\_\_.

**Assistant:** Let me guess, that helps the soil replenish too.

**Speaking**

**8** With a partner, act out the roles below based on Task 7. Then, switch roles.

**USE LANGUAGE SUCH AS:**

*We're going to start ... in the spring.*

*Wheat depletes the soil.*

*The fifth section will be fallow.*

**Student A:** You are a farmer. Talk to Student B about:

- crop rotation
- wheat and peanuts
- fallow fields

**Student B:** You are a farmer's assistant. Talk to Student A about next year's cropping system.

**Writing**

**9** Use the conversation from Task 8 and the publication and dialogue to write a schedule for next year's cropping system. Include: the type of system, crops, and field.

**Crops schedule**

System: \_\_\_\_\_

\_\_\_\_\_

Crops: \_\_\_\_\_

\_\_\_\_\_

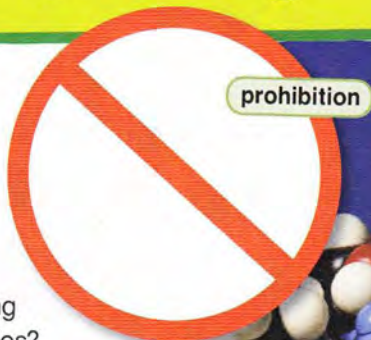
Fields: \_\_\_\_\_

\_\_\_\_\_

## Get ready!

1 Before you read the passage, talk about these questions.

- 1 How can bioengineering improve animal industries?
- 2 What are some concerns about bioengineering?



prohibition

genes

biotechnology

## Animal Bioengineering

National Association of Bioengineers  
(NAB) Westphalia University

### Friday March 18

4:30 pm Registration • Parker Hall lobby

5:30 pm Keynote Address

Chapman Ballroom. Keynote speaker Dr. Mary Gilbertson will describe her research in **genetic engineering**.

### Saturday March 19

8:30 am – 12:00 pm Presentations, Parker Hall

Group A: Room 119

**Transgenic organisms.** Dr. Meyers White talks about current research and newly developed transgenic organisms and their benefits.

Group B: Room 106

**Biotechnology applications in agriculture.** Dr. Francis Gray discusses three promising new directions for biotechnology in agriculture.

2:00 pm – 4:00 pm Poster Session

Rorschach Exhibition Area

### Sunday March 18

8:30 am – 12:00 pm Presentations, Parker Hall

Group A: Room 119

**Cloning bacteria and other microorganisms:** engineering applications. Dr. Ursula Prsybysic and Dr. William Shawcross present on the latest engineering applications.

Group B: Room 106

**Genes, gene expression, and gene enhancement:** new techniques for producing favorable outcomes. Dr. Samel Perez discusses a set of techniques developed by Camber University.

2:00 pm – 3:00 pm Closing Remarks

Chapman Ballroom. Dr. Whitaker will discuss **societal concerns** about bioengineering. How might we face greater **regulation** of our research and even **prohibition**?



cloning

## Reading

2 Read the conference schedule. Then, mark the following statements as true (T) or false (F).

- 1  The keynote speaker will address biotechnology in agriculture.
- 2  On Sunday, group B attends a presentation on cloning bacteria.
- 3  The closing remarks will discuss concerns with bioengineering.

## Vocabulary

3 Match the words (1-6) with the definitions (A-F).

- |                                       |  |
|---------------------------------------|--|
| 1 <input type="checkbox"/> cloning    | 4 <input type="checkbox"/> prohibition         |
| 2 <input type="checkbox"/> gene       | 5 <input type="checkbox"/> expression          |
| 3 <input type="checkbox"/> transgenic | 6 <input type="checkbox"/> genetic engineering |

- A the appearance of a trait  
 B making a copy of an organism  
 C a segment of DNA  
 D banning something  
 E altering genetic material  
 F having artificially introduced genetic material

4 Read the sentence pair. Choose where the words best fit the blanks.

1 **gene enhancement / regulation**

- A \_\_\_\_\_ can create stronger animals.  
 B There is strict \_\_\_\_\_ of genetic research.

2 **biotechnology / societal concerns**

- A There are many \_\_\_\_\_ about cloning.  
 B Robert wants to work in the \_\_\_\_\_ field.

- 5 🎧 Listen and read the conference schedule again. What is Dr. Meyers White going to talk about?

## Listening

- 6 🎧 Listen to a conversation between an interviewer and a speaker. Choose the correct answers.

- 1 What is the interview mostly about?  
 A the benefits of bioengineering in agriculture  
 B the government's support of biotechnology  
 C the health risks of bioengineered foods  
 D the impact of consumer's concerns
- 2 What does the speaker suggest as a solution?  
 A opposing government regulations  
 B communicating better with consumers  
 C publishing the latest scientific discoveries  
 D testing transgenic products more often

- 7 🎧 Listen again and complete the conversation.

**Interviewer:** So, what are the challenges of agricultural bioengineering?

**Speaker:** Well consumers fear that genetically modified 1 \_\_\_\_\_.

**Interviewer:** Shouldn't people be worried about eating genetically modified food?

**Speaker:** Not at all. 2 \_\_\_\_\_ genetically modified food is safe to eat. We just need to do a better job of communicating this with the public.

**Interviewer:** What do you think will happen if you don't 3 \_\_\_\_\_ about genetically modified foods?

**Speaker:** 4 \_\_\_\_\_ consumers have been very vocal. Governments there have responded by 5 \_\_\_\_\_ of agriculture. In some cases, they have responded by prohibiting all genetically modified products. This is not what we want to happen.

**Interviewer:** 6 \_\_\_\_\_!

## Speaking

- 8 With a partner, act out the roles below based on Task 7. Then, switch roles.

### USE LANGUAGE SUCH AS:

*What are the challenges of bioengineering ...*  
*Consumers fear that ...*  
*Some governments have ...*

**Student A:** You are a reporter. Interview student B. Talk about:

- challenges
- consumer opinion
- government response

**Student B:** You are a speaker at a conference, answer student A's questions.

## Writing

- 9 Use the conversation from Task 8 to write notes about the challenges of bioengineering. Include the challenges and consequences.

### Bioengineering

Challenges: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Consequences: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

