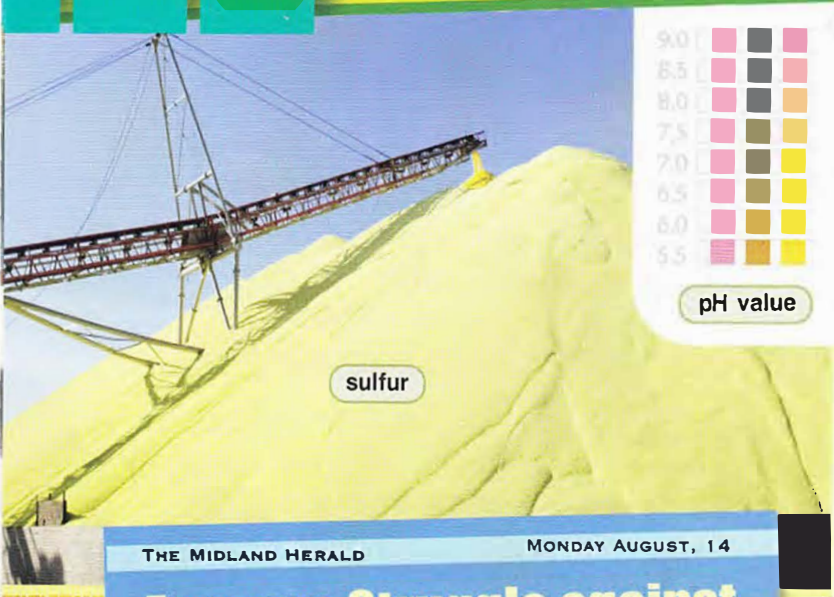
6 Salts and acidity



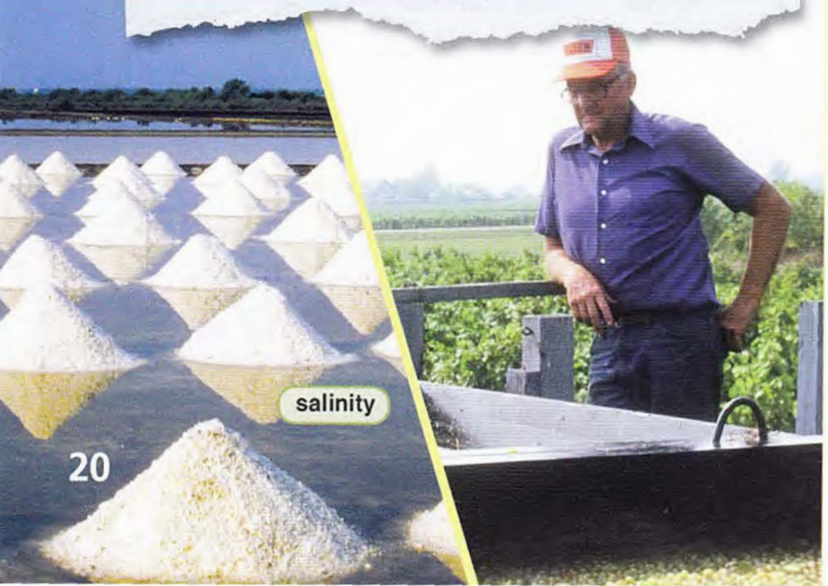
THE MIDLAND HERALD MONDAY AUGUST, 14

Farmers Struggle against Salt and Acid

WAYNESBORO - Martin Harrison has been a farmer for half a century. Recently, his crops have grown poorly. The culprit: rising **salinity** and **acidity** along with decreasing **sodicity**.

Harrison's farm is located in Brown County, an area known for its rich farmland with little risk for salinity problems. Historically, the **primary salinity** of the soils there was low. That started to change two years ago when drought arrived. Farmers began irrigating their fields with well water. That water has high potassium, chloride, and **sulfur** content. At first there were no problems. However, mineral deposits built up. This resulted in the increased **secondary salinity** of the soil. It also made the soil acidic and **alkaline**.

Harrison started to notice problems last summer. His tomato plants died. The soil had become **toxic** to several other vegetables as well. He now increases the soil's **pH value** by adding **lime**. But that is just a temporary solution to the problems caused by irrigation. Until the drought ends, crop yields will suffer.



Get ready!

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

1 How does salt get into soil?
2 How can farmers reduce acid levels in soil?

Reading

2 Read the newspaper article. Then, choose the correct answers.

1 What changed the soil's primary salinity?
- A saline deposits in the soil
- B acids from rainwater
- C minerals from well water
- D toxins from fertilizer

2 How does the farmer improve his soil?
- A He plants fewer crops.
- B He adds lime to the soil.
- C He irrigates in the summer.
- D He increases the salinity.

3 When can you infer the crops will grow properly again?
- A when farmers can stop irrigating
- B when the pH value of the soil is lowered
- C when sulfur content in the soil increases
- D when farmers purify the well water

Vocabulary

3 Match the words (1-5) with the definitions (A-E).

1 __ acidity
2 __ alkaline
3 __ sodicity
4 __ primary salinity
5 __ lime

- A the amount of sodium in the soil
- B the amount of acid in the soil
- C a substance added to improve soil
- D salt that is in soil from natural processes
- E having a pH value greater than 7.0

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

1 Plants won't grow in soil with too much alkaline metal. _ _ _ i _ m
2 Some substances are harmful to plants. t _ _ _ c
3 Irrigation leads to an increase in the salt level changed by land use and management. _ _ c o n _ _ _ _ s _ l _ _ _ _ _
4 Chemicals can alter soil's measure of acidity or alkalinity. _ H _ a _ _ _
5 The soil has high metallic element levels. _ u l _ _ _
6 What is the concentration of salt of the soil? s _ _ _ _ _ t _

5 Listen and read the newspaper article again. What is wrong with the soil on Harrison's farm?

Listening

6 Listen to a conversation between two farmers. Mark the following statements as true (T) or false (F).

1 __ Both farmers have acidic soil.
2 __ Adding lime raises soil's salinity.
3 __ The man's crops grow well in acidic soil.

7 Listen again and complete the conversation.

Farmer 1: All this irrigated water is making my fields acidic. **1** _____ _____ _____?

Farmer 2: Yeah, I have the same problem. I've heard of a few fixes, though.

Farmer 1: Have **2** _____ _____ _____?

Farmer 2: Only one so far. I've **3** _____ _____ _____ my fertilizer.

Farmer 1: What are the results?

Farmer 2: Well, **4** _____ _____ the pH to 7.5.

Farmer 1: That's good, right?

Farmer 2: It is and it isn't. It works for now. **5** _____ _____ _____ time I irrigate, that'll change again. Do you see **6** _____ _____ _____?

Speaking

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

USE LANGUAGE SUCH AS:

This irrigated water is making my fields acidic.
I've heard of a few fixes.
What are the results?

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

- acidic soil
- treatment methods
- future plans

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

Writing

9 Use the conversation from Task 8 to fill out the farmer's plan to lower soil acidity.

Problem: _____

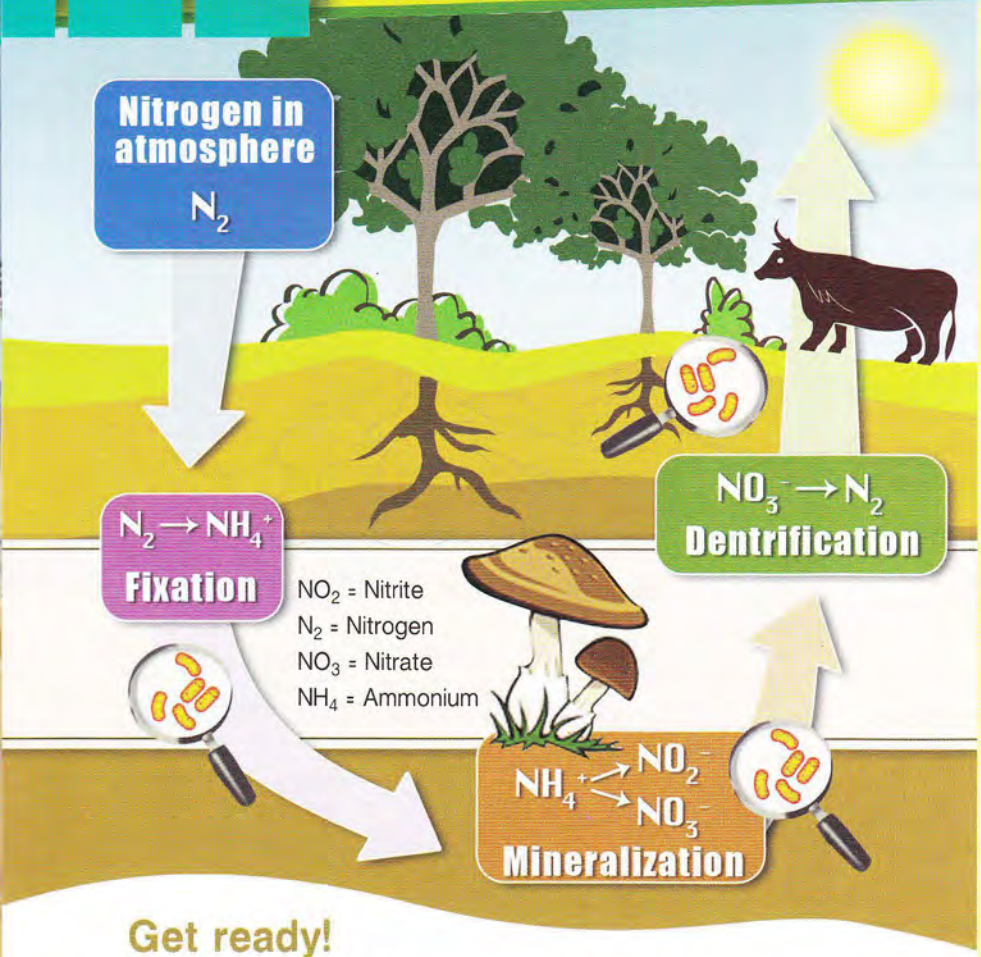
Possible Solution: _____

Pros: _____

Cons: _____

Plan for next year: _____

10 The nitrogen cycle



Nitrogen is a crucial nutrient for growing plants. Without the **nitrogen cycle**, which restores **nutrient-poor** soil, plants could not survive. During this cycle, nitrogen takes on many forms. It starts in the atmosphere as nitrogen gas. In this form, plants cannot absorb it. That changes after **fixation**, the next phase of the nitrogen cycle. During fixation, bacteria turn nitrogen into **ammonia**. In the next phase, mineralization, **decomposers** in the soil turn ammonia into **nitrites** and **nitrates**–forms of nitrogen that plants can use. Finally, during **dentrification**, bacteria reduce nitrates back into nitrogen gas.

Of course, the nitrogen cycle can also have negative effects. For example, it produces chemicals like **nitrous oxide**. When this substance leaks into bodies of water, **eutrophication** occurs. This build-up of algae can ruin a water supply. Unfortunately, commercial farming produces a great deal of such chemicals. A challenge facing modern farmers is to reduce their contribution to this harmful aspect of the nitrogen cycle.

Get ready!

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

1 How is nitrogen added to soil?
2 Why must farmers monitor nitrogen levels in soil?

Reading

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

1 __ Plants cannot survive without nitrogen.
2 __ During fixation, decomposers turn ammonia into nitrogen.
3 __ Nitrous oxide can cause algae build up in water supplies.

Vocabulary

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

1 **ammonia / nitrous oxide**
A _____ is a component in many fertilizers.
B _____ is a toxic product of the nitrogen cycle.

2 **eutrophication / dentrification**
A _____ restores nitrogen in the air.
B _____ occurred in the pond due to fertilizer runoff.

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

1 __ fixation
2 __ decomposer
3 __ nitrite
4 __ nutrient-poor
5 __ nitrate
6 __ nitrogen cycle

A not having the right amount of minerals to be healthy
B substance that bacteria create from ammonia
C the processes by which nitrogen is changed into chemical forms
D the process of converting nitrogen into ammonia
E substance that bacteria create from nitrites
F organism that turns dead animals or plants into chemical nutrients

5 Listen and read the textbook passage again. **At what stage can plants start to absorb nitrogen gas?**

Listening

6 Listen to a conversation between two farmers. **Choose the correct answers.**

1 Why are the farmers concerned about using fertilizer?

A It might set back the current harvest.
B It could affect the water supply.
C It can reduce the nitrogen in the soil.
D It may cause damage to the cover crop.

2 What will the farmers do with the south field?

A irrigate it more often
B leave the field fallow next year
C finishing harvesting its legumes
D plant nitrogen restoring crops in it

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

Farmer 1: So, what should we do with the south field?
Farmer 2: I'm not sure what you mean.
Farmer 1: Well, this year's yield is pretty low. The soil might be nutrient poor.
Farmer 2: What do you suggest?
Farmer 1: We could plant legumes.
Farmer 2: I'm not **1** _____ _____.
Farmer 1: Well, **2** _____ _____ the soil is low on nitrogen. We could use legumes as this year's cover crop.
Farmer 2: **3** _____, _____ _____. Just have the legumes restore the nitrogen.
Farmer 1: Exactly. It's better than using too much fertilizer. I don't want our **4** _____ _____ getting damaged.
Farmer 2: Well, I think that's a good idea. Let's **5** _____ _____ _____ this year's harvest. We still have a few days left.
Farmer 1: Sounds good. Then we can sit down and **6** _____ _____ what legumes to plant.

Speaking

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

USE LANGUAGE SUCH AS:

What should we do with the south field?
We could use legumes as the cover crop.
It's better than using too much fertilizer.

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

- nitrogen in the fields
- fertilizer
- legumes

Student B: You are a farmer. Talk to Student A about nitrogen in the fields.

Writing

9 **Use the conversation from Task 8 to fill out the farmer's schedule.**

Harvest and Planting Schedule

South Field

1 _____
_____

2 _____
_____

3 _____
_____