

Corn Stalk Model Curriculum



This curriculum was created with the help of Professor John Sawyer, Department of Agronomy at Iowa State University. A main resource in this curriculum was the use of his publication, “Nutrient Deficiencies and Application Injuries in Field Crops” which is located here: <https://store.extension.iastate.edu/Product/2418>, for further resource use to supplement this curriculum.

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Table of Contents

Curriculum Structure..... 4

Lesson Structure..... 5

Lesson One – Corn Stalk Anatomy and Nutrient Deficiencies..... 6

 FOCUS: Introduction to Corn Stalk Anatomy 7

 LEARN: Corn Stalk Nutrient Deficiencies..... 10

 REVIEW: Corn Stalk Nutrient Deficiency Identification..... 17

Corn Stalk Model Curriculum

The curriculum was created to help instruct and understand the different nutrient deficiencies that can happen during the corn stalk growing cycle.

Curriculum Structure

The *Corn Stalk Model* curriculum is composed of the following lessons. Approximate lesson times are included.

Lesson	Title	Approximate Time
One	FOCUS: Introduction to Corn Stalk Anatomy	10-15 minutes
One	LEARN: Corn Stalk Nutrient Deficiencies	20-30 minutes
One	REVIEW: Corn Stalk Nutrient Deficiency Identification	10-15 minutes
	Total	1 hour

Lesson Structure

Each lesson begins with an Overview, Lesson Objectives and a Lesson at a Glance table which lists the lesson activities, materials required, suggested preparation steps and approximate class time.

Lesson Sections

The actual lesson follows the overview, which will contain some of the sections described below. Most lessons are designed to be completed within 45 minutes.

FOCUS

Every lesson begins with a FOCUS activity intended to capture participants' attention. This may be in the form of a small or large class discussion, a game, a review of previous lesson information or a demonstration. During this activity, participants are introduced to the topic of the lesson.

LEARN

The LEARN activity in each lesson varies in its presentation mode. It may be a slide presentation, group activity, or demonstration.

REVIEW

The majority of lessons end with a REVIEW activity intended to briefly review the lesson's key messages or main points.

Lesson One – Corn Stalk Anatomy and Nutrient Deficiencies

Lesson Overview

This lesson will focus on basic corn stalk anatomy and on the eight nutrient deficiencies found to negatively affect the corn plant during its growing cycle.

Lesson Objectives

After completing this lesson, participants will:

- Understand the main anatomical parts of corn plants
- Learn 8 unique nutrient deficiencies that are common in corn plants
- Learn the features and visual issues that the eight different deficiencies cause on corn plants

Lesson at a Glance

Activity	Materials	Preparation	Approximate class time
FOCUS	• <i>Corn Plant Anatomy Worksheet</i> • <i>Corn Plant Anatomy Worksheet – Answer Key</i> • <i>Corn Stalk Model</i> slide presentation • Pen/pencil	1. Print/photocopy <i>Corn Plant Anatomy Worksheet</i> (one per participant) 2. Prepare <i>Corn Stalk Model</i> slide presentation for viewing	10-15 minutes
LEARN	• <i>Corn Stalk Model</i> slide presentation • <i>Corn Stalk Deficiencies Note Sheet</i> • Pen/pencil	1. Print/photocopy <i>Corn Stalk Deficiencies Note Sheet</i> (one per participant) 2. Prepare <i>Corn Stalk Model</i> slide presentation for viewing	20-30 minutes
REVIEW	• <i>Corn Stalk Deficiencies ID</i> worksheet • <i>Corn Stalk Deficiencies ID</i> worksheet – Answer Key • Colored Pencils/Markers • Pen/pencil	1. Print/photocopy <i>Corn Stalk Deficiencies ID</i> worksheet (two per participant)	10-15 minutes

Lesson 1 – Corn Stalk Anatomy and Nutrient Deficiencies

FOCUS: Introduction to Corn Stalk Anatomy

10-15 minutes

Purpose:

Participants work to understand the anatomy of a corn plant

Materials:

- *Corn Plant Anatomy Worksheet*
- *Corn Plant Anatomy Worksheet – Answer Key*
- *Corn Stalk Model* slide presentation
- Pen/pencil

Facilitation Steps:

1. Hand out the *Corn Plant Anatomy Worksheet* to the participants.
2. Give participants 5 minutes to answer the questions on the worksheet by themselves before starting the slide presentation.
3. Present slides 1-4 of the *Corn Stalk Model* slide presentation.
4. Have students review their worksheets during the presentation and see how many answers they got correct.

Facilitator Notes:

Slide 2:

Corn Anatomy

- Stalks average between 7-9 feet in height but can vary based on environment and nutrients.
- Average stalks produce 14-20 leaves.
- Average stalks produce one ear of corn; however, two or three ears can be found on some corn plants.
- Corn ears can have anywhere between 500-1200 kernels on a single ear of corn, depending on their development.

Slide 3:

Corn Stalk Anatomy

1. **Tassel:** the top and male part of the corn plant. It contains the pollen.

2. **Leaf:** a grown corn plant has 14-20 leaves per plant. Some leaves will fall off before the plant fully tassels. Leaves are the location of photosynthesis.
3. **Silk:** the stigma and style of the female part of the ear. Pollen lands on the stigma and then travels down the style and fertilizes the ovary, which develops into a kernel of corn at the other end of that strand of corn silk.
4. **Husk:** the leaf structure that wraps around the ear of corn and helps protect the corn.
5. **Ear:** the structure that contains the kernels of corn that form after fertilization.
6. **Kernel:** the corn seed, which is used for food or to make another corn plant.

Slide 4:

Corn Stalk Anatomy

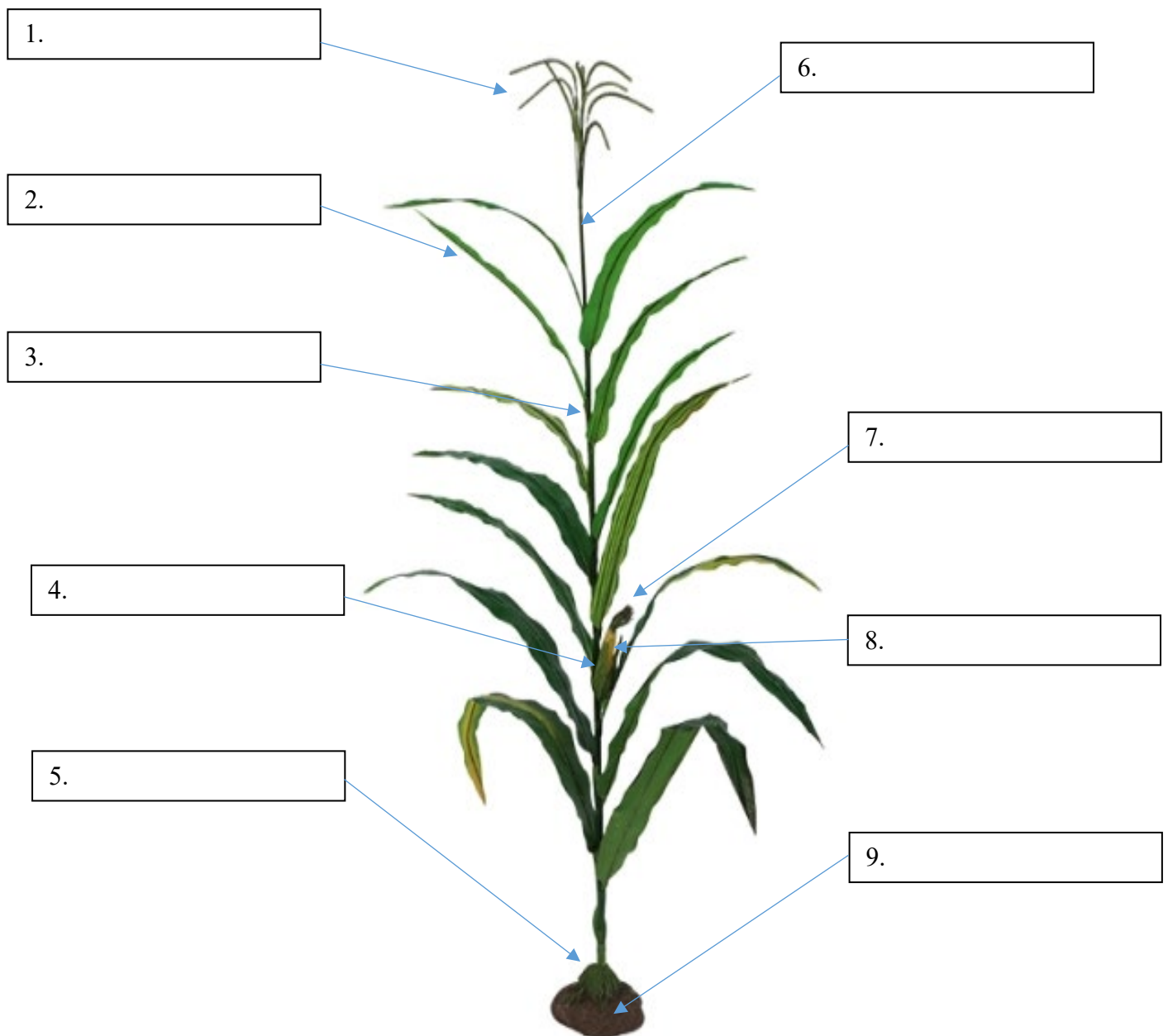
7. **Node:** the place on the stem where new growth occurs. Leaves, roots, ears, and tassels form from a node.
8. **Stalk:** the main structure of the corn plant, also the stem of the plant. It is the pathway for nutrients to move up and down the plant.
9. **Brace Root:** the roots that form above ground and grow down into the soil to keep the plant standing.
10. **Roots:** grow underground and bring water and nutrients to the rest of the plant.

Name: _____ Class: _____

Corn Stalk Anatomy Worksheet

Using the word bank, fill in the anatomy of the corn stalk.

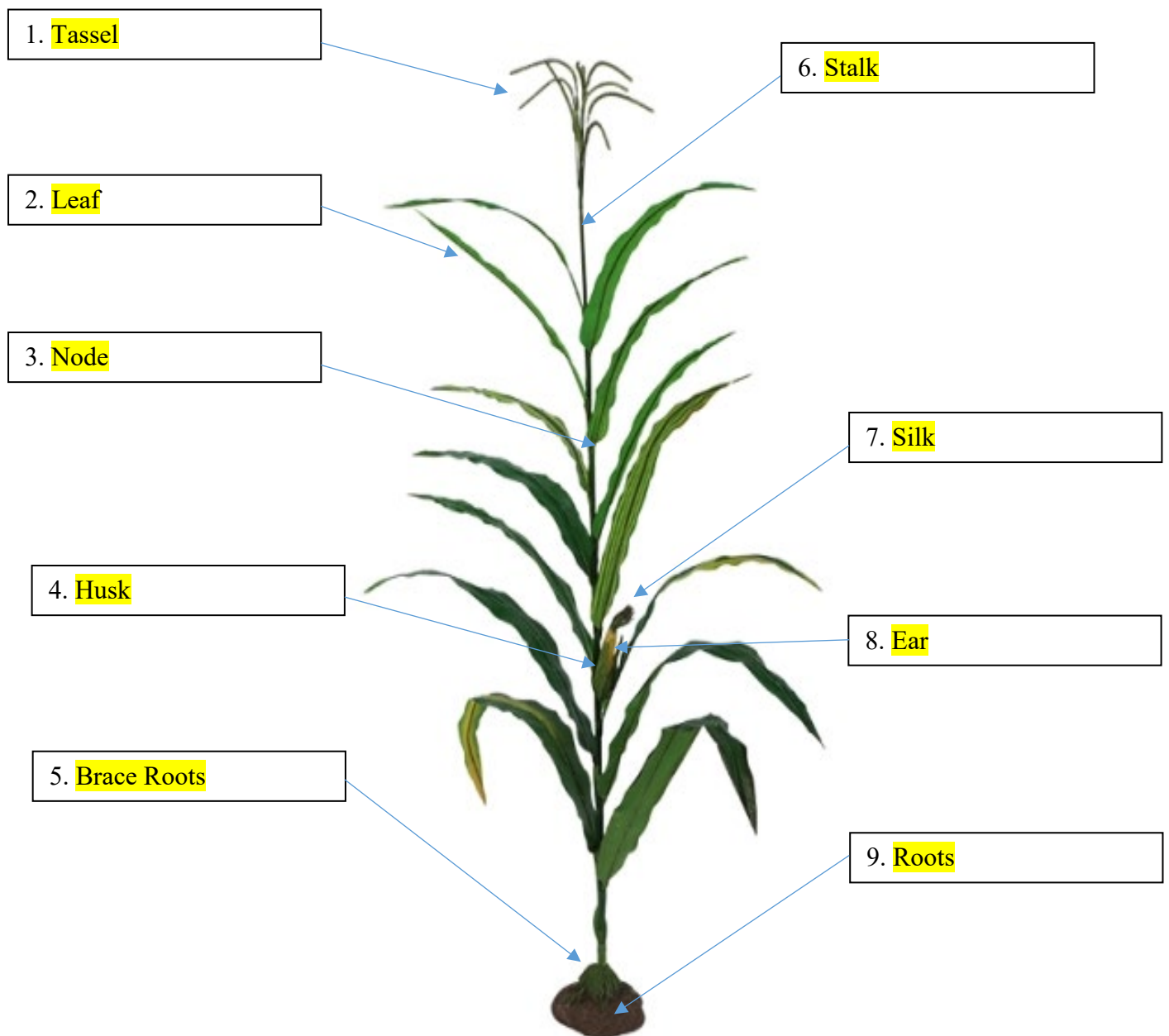
Roots	Node	Ear	Husk	Silk	Leaf	Stalk	Brace	Roots	Tassel
-------	------	-----	------	------	------	-------	-------	-------	--------



Corn Stalk Anatomy Worksheet – Answer Key

Using the word bank, fill in the anatomy of the Corn Stalk.

Roots Node Ear Husk Silk Leaf Stalk Brace Roots Tassel



LEARN: Corn Stalk Nutrient Deficiencies

20-30 minutes

Purpose:

Participants will work in groups to complete a puzzle, testing their knowledge of corn stalk anatomy.

Materials:

- *Corn Stalk Model* slide presentation
- *Corn Stalk Deficiencies Note Sheet*
- Pen/pencil

Facilitation Steps:

1. Hand out the *Corn Stalk Deficiencies Note Sheet* to each participant.
2. Present slides 6-14 of the *Corn Stalk Model* slide presentation.
3. Have the participants take notes during the presentation.

Facilitator Notes:

Slide 6:

Healthy Leaf

General Info:

- Healthy leaves do not lack the proper nutrients for health growth
- Plant leaves are strong and deep in color

Visual Identification:

- Dark green to green plant color
- No major color changes from the top of the leaf to the bottom
- Leaves have full color in the veins and chlorotic tissue

Environmental Conditions:

- Nutrient rich soil
- Best pH is usually between 5.5-7.0

Slide 7:

Deficiency: Nitrogen

General Info:

- Nitrogen is a mobile nutrient in the plant; it starts at lower, older leaves and then moves up the plant as deficiency persists
- Plants may be lighter in color
- Older leaves are affected first

Visual Identification:

- V-shaped yellowing starting at the tip and moves down the midrib toward the base of the leaf
- Reds and purples may intensify
- Older leaves turn yellow, then dry out
- May shed

Environmental Conditions:

- Cold soil
- Dry soil
- Sandy soil
- Inadequate fertilization
- Flooded or ponded soil when temperature is warm
- Corn rootworm injury

Slide 8:

Deficiency: Phosphorus

General Info:

- Usually visible on young corn plants
- Death of tissue may follow
- Root growth can be poor
- Lower stems may be purplish
- Delays maturity

Visual Identification:

- Dark green leaf with red/purple leaf tips & margins
- Purplish tint on leaves

Environmental Conditions:

- Cold soil
- Soil too wet or too dry
- Compacted soils
- Root injury due to insects, herbicides, fertilizers or cultivation

Slide 9:

Deficiency: Potassium

General Info:

- Bronzing and dying of leaf margin
- Spotting between veins
- Brown spots throughout the leaf
- Will wilt readily

Visual Identification:

- Browning and death at the tip and margins
- Yellowing as it moves to the middle of leaf

Environmental Conditions:

- Dry soil
- Compacted soil
- Wet soil
- Sandy soil
- Organic soil

Slide 10:

Deficiency: Magnesium

General Info:

- Mottled yellow between veins
- Veins themselves will stay green
- Older leaves affected first
- May get dead spots around the edge of the leaf
- Striping will occur on lower leaves first

Visual Identification:

- Yellow-green striping
- Yellow areas may turn brown and die

Environmental Conditions:

- Acidic soils
- Sandy soils
- Moderate to high rainfall areas

Slide 11:

Deficiency: Zinc

General Info:

- Spotting of older leaves
- Central bud and leaves turn white, forming a broad band of tissue through the midrib.
- May reduce the size of the leaf due to deficiency

Visual Identification:

- Pale yellow to white between veins
- Light striping with whitish color
- Leaf tip usually stays green
- Pale in color of greens

Environmental Conditions:

- Plants can usually outgrow this deficiency
- Acidic soils
- Low organic material in soil
- Cool, wet soil

Slide 12:

Deficiency: Sulfur

General Info:

- Yellowing of the whole leaf and plant
- Usually starts with younger leaves
- Plants may be light green
- Stunted and exhibit delayed maturity

Visual Identification:

- Striping of the upper leaves may occur
- Usually more noticeable on younger plants
- More yellow by the base of the leaf, greener toward the leaf tip

Environmental Conditions:

- Acidic, sandy soil
- Soil with low organic material
- Cold, dry soils
- Issue may disappear as temperature and moisture conditions improve

Slide 13:

Deficiency: Iron

General Info:

- Yellow or white areas on young leaves
- Older leaves may stay green
- Veins typically stay green
- Chlorotic tissue turns pale yellow or white

Visual Identification:

- Pale color of yellow or white on the plant
- Veins usually light green in color
- Chlorotic tissue turns pale yellow

Environmental Conditions:

- Acidic soils
- Cold, wet soils
- Poorly aerated soils

Slide 14:

Deficiency: Boron

General Info:

- Youngest leaves may become lighter green
- May be distorted in leaf structure
- Reduced flowering and failure to fully grow
- May become breakable

Visual Identification:

- Unrolled leaves
- Lack of tip fill
- Leaves curl up
- May look like the leaf is scorched

Environmental Conditions:

- Sandy soil
- Moderate soil pH
- Drought
- Soil with low organic material

Name: _____ Class: _____

Corn Stalk Deficiencies Note Sheet

Fill in notes during the presentation.

Healthy Leaf

General Info:

-
- Plant leaves are strong and deep in color

Visual Identification:

- Dark green to green plant color
- No major color changes from the top of the leaf to the bottom
- Leaves have full color in the veins and chlorotic tissue

Environmental Conditions:

- Nutrient rich soil
- Best pH is usually between _____ - _____

Deficiency: Nitrogen

General Info:

- Mobile nutrient in the plant; it starts at lower, older leaves and then moves up the plant as deficiency persists
- Plants may be lighter in color
-

Visual Identification:

- V-shaped yellowing starting at the tip and moving down the midrib toward the base of the leaf
- Reds and purples may intensify
- Older leaves yellow, then dry out
-

Environmental Conditions:

- Cold soil
- Dry soil
- Sandy soil
- Inadequate fertilization
- _____ or _____ soil when temperature is warm

Deficiency: Phosphorus

General Info:

- Usually visible on young corn plants
-
- Root growth can be poor
- Lower stems may be purplish
- Delays maturity

Visual Identification:

- Dark green leaf with red/purple leaf tips & margins
-

Environmental Conditions:

- Cold soil
- Soil too wet or too dry
-
- Root injury due to insects, herbicides, fertilizers or cultivation

Deficiency: Potassium

General Info:

- Bronzing and dying of leaf margin
- Spotting between veins
-
- Will wilt readily

Visual Identification:

- Browning and death at the tip and margins
- Yellowing as it moves to the middle of leaf

Environmental Conditions:

-
- Compacted soil
- Wet soil
- Sandy soil
- Organic soil

Deficiency: Magnesium

General Info:

- Mottled yellow between veins
- Veins themselves will stay green
-
- May get dead spots around the edge of the leaf
- Striping will occur on lower leaves first

Visual Identification:

-
- Yellow areas may turn brown and die

Environmental Conditions:

- Acidic soils
- Sandy soils
- Moderate to high rainfall areas

Deficiency: Zinc

General Info:

-
- Central bud and leaves turn white forming a broad band of white tissue through the midrib.
- May reduce the size of the leaf due to deficiency

Visual Identification:

- Pale yellow to white between veins
-
- Leaf tip usually stays green
- Pale in color of greens

Environmental Conditions:

- Plants can usually outgrow this deficiency
-
- Low organic material in soil
- Cool, wet soil

Deficiency: Sulfur

General Info:

- Yellowing of the whole leaf and plant
- Usually starts with younger leaves
-
- Stunted and exhibit delayed maturity

Visual Identification:

- Striping of the upper leaves may occur
- Usually more noticeable on younger plants
-

Environmental Conditions:

- Acidic, sandy soil
- Soil with low organic material
-
- Issue may disappear as temperature and moisture conditions improve

Deficiency: Iron

General Info:

- Yellow or white areas on young leaves
-
- Veins typically stay green
- Chlorotic tissue turns pale yellow or white

Visual Identification:

- Pale color of yellow or white on the plant
-
- Chlorotic tissue turns pale yellow

Environmental Conditions:

- Acidic soils
- Cold, wet soils
-

Deficiency: Boron

General Info:

- Youngest leaves may become lighter green
-
- Reduced flowering and failure to fully grow
- May become breakable

Visual Identification:

-
- Lack of tip fill
- Leaves curl up
- May look like the leaf is scorched

Environmental Conditions:

- Sandy soil
- High soil pH
- Drought
- Low soil organic material

REVIEW: Corn Stalk Nutrient Deficiency Identification

10-15 minutes

Purpose:

Participants will work in groups to complete a puzzle, testing their knowledge of the corn stalk anatomy.

Materials:

- *Corn Stalk Deficiencies ID Worksheet*
- *Corn Stalk Model* slide presentation
- Colored Pencils/Markers
- Pen/pencil

Facilitation Steps:

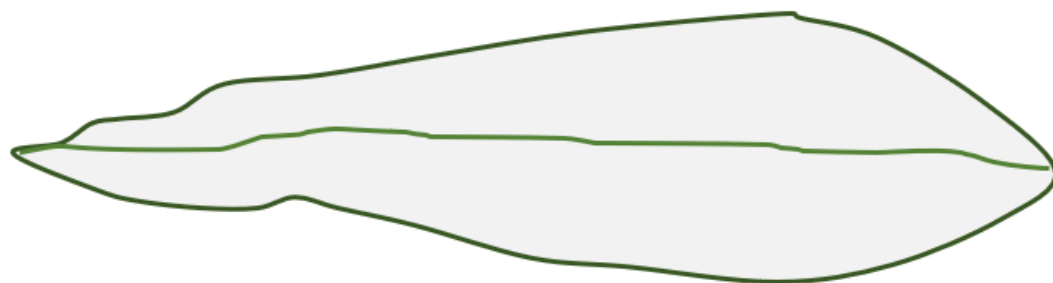
1. Hand out two pages of the *Corn Stalk Deficiencies ID Worksheet* to each participant.
2. Use the photos of each deficiency in the *Corn Stalk Model* slide presentation to identify the correct markings and correct the worksheet.

Name: _____ Class: _____

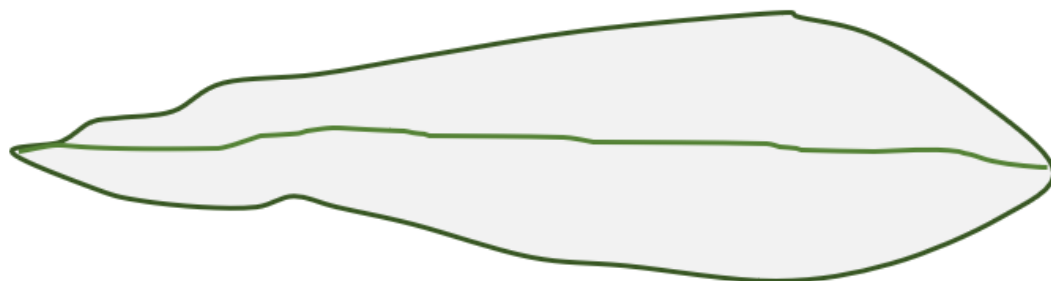
Corn Stalk Deficiency ID Worksheet

Write the name of the nutrient deficiency then draw and color the leaves with the identifying markings of the different corn plant deficiencies.

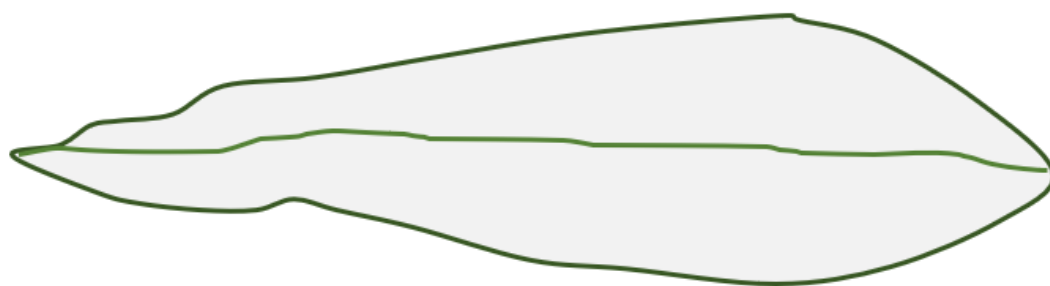
Deficiency: _____



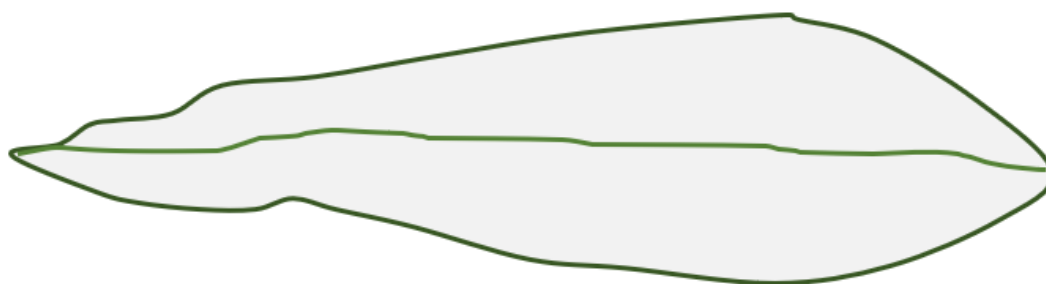
Deficiency: _____



Deficiency: _____



Deficiency: _____

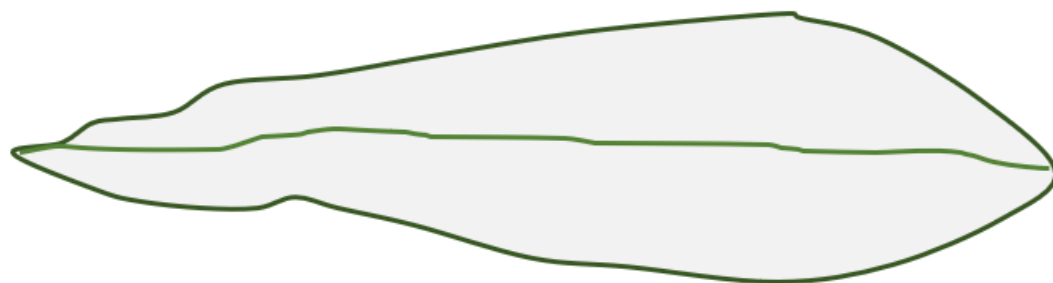


Name: _____ Class: _____

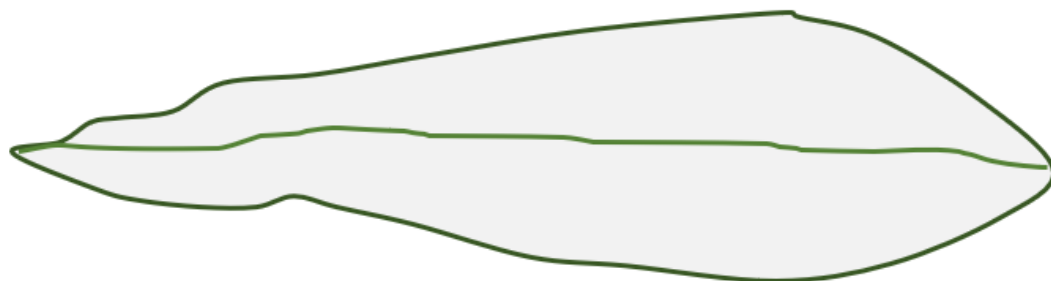
Corn Stalk Deficiency ID Worksheet

Write the name of the nutrient deficiency then draw and color the leaves with the identifying markings of the different corn plant deficiencies.

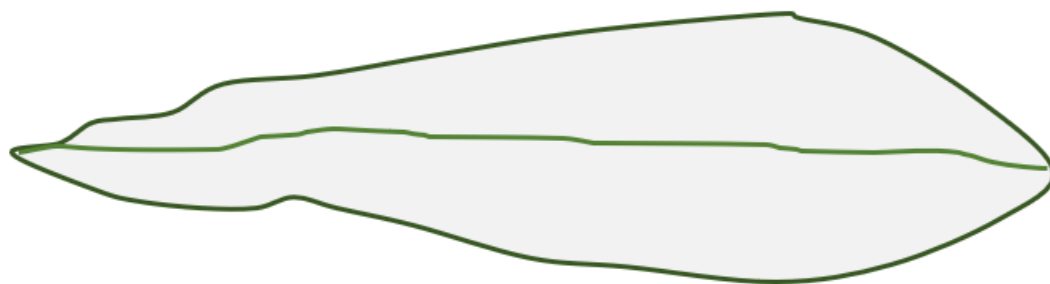
Deficiency: _____



Deficiency: _____



Deficiency: _____



Deficiency: _____

