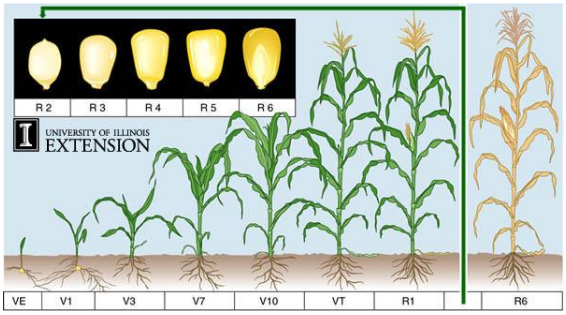
Strand:	Cycles	**Sub-Strand:**	Crop Production

BASIC 9

WEEKLY LESSON PLAN – WEEK 13

Content Standard:	B9.2.3.2 Demonstrate knowledge and understanding of uses of different crops at different maturity stages				
Indicator (s)	B9.2.3.2.1 Observe and record the uses of different crops at different maturity stages. B9.2.3.2.2 Evaluate the importance of knowledge of maturity stages of different crops to human beings		**Performance Indicator:** Learners can analyze the role of maturity stages in agricultural practices, food processing, and trade.		
Week Ending	06-12-2024				
Class	B.S.9	**Class Size:**		**Duration:**	
Subject	Science				
Reference	Science Curriculum, Teachers Resource Pack, Learners Resource Pack, Textbook.				
Teaching / Learning Resources	Chart, Poster, Pictures, YouTube videos		**Core Competencies:**	• Critical Thinking and Problem Solving • Communication and Collaboration.	

DAY/DATE	**PHASE 1 : STARTER**	**PHASE 2: MAIN**	**PHASE 3: REFLECTION**
MONDAY	Using a Chart, explain the different stages of plant growth.	1. Discuss with the Learners about the growth stages of maize and beans. 2. Assist Learners to germinate seeds of maize and beans and observe its growth stages every day and ensure they irrigate it. 3. Assist Learners to compare and contrast the maturity stages of crops and seedlings of the germinated maize and beans. **Corn Growth Stages** Growth stages are bundled in two categories: Vegetative growth stages and Reproductive stages. As I describe each of these stages I will put them into perspective of how timing, watering and temperature can affect the final yield.  **<u>Vegetative Growth Stages</u>** The Vegetative Growth Stages consist of the Emergence Stage, the	Reflect on the growth stages of plants. **Exercise;** Explain the growth stages of Plants.

Leaf Stages and the Tasseling Stage:

- Emergence Stage (VE)
- nth Leaf Stage (Vn)
- Tasseling Stage (VT)

Emergence Stage (VE)
During this stage most of the growth remains below the soil surface. This protects the seed from potential late frost. Soil moisture is important but more importantly is the timing of the planting, the later the planting the lower the yield potential. Below is a chart of general planting dates. These dates will vary as you move north and south of the Corn Belt.

Effect of Planting Dates on Corn Grain Yield

Planting Date	Yield (%) Potential	
1-May	100	Good Planting Range
5-May	97	
10-May	94	
15-May	91	
20-May	88	
25-May	86	
30-May	83	

Leaf Stages (Vn)
The leaf stages are based on the number of leaves (n) on the corn plant. Each leafing stage carries its own significance, I have selected the leafing stages that represent tipping points in the plants potential yield.

V5 – Occurs 14 days after Emergence. Cooler soil temperatures will delay the plant from reaching this stage as well as delaying tassel formation. It will not affect yield, it could lead to a late harvest and a potential of frost damage before harvest.

V9 – Occurs 28 days after Emergence. Flooding at this or earlier stages is a concern as it can kill the plant within a few days. Flooding at later stages is less detrimental because most of the growing is above ground.

V15 – Occurs 56 days after Emergence. Moisture is critical from the V6 – V15 stage. Extended drought can reduce the yields by as much as 25%.

Tasseling Stage (VT)
The tassel is completely visible when the plant has reached its

full height and will begin to shed its pollen. Hail damage is more serious at this time than any other growth period.

Reproductive Growth Stages

There are six stages to the Reproductive Growth Stages:

- Silking
- Blister
- Milk
- Dough
- Dent
- Maturity

Silking (R1)

Occurs about 3 days after the Tasseling Stage. Silk is visible outside the husk. Falling pollen grains are captured by the silk and grow down the silk.

Blister (R2)

Occurs 10 – 14 days after Silking. Between the final growth stage and Blistering moisture is critical. Drought conditions can reduce yield potential by as much as 50%, or 6% per day during a drought.

Milk (R3)

Occurs 20 days after Silking. Stress effect is less now. Kernels are beginning to yellow outside and contain a milky white inner fluid (80% moisture level).

Dough (R4)

Occurs 26 days after Silking. Kernels begin to gain in dry weight and size and have a 'doughy' consistency. An early frost at this stage can be detrimental to the crop with a potential loss of 50%.

Dent (R5)

Occurs 36 days after Silking and should finish about 48 days after Silking. The kernels begin to dry and have a dented appearance. Stress at this point will reduce kernel weight but not kernel number. Frost is the major concern because it can stop dry matter accumulation and cause premature black layer formation, reducing yield.

Maturity (R6)

Occurs 55 days after Silking. All kernels have attained maximum dry weight. Husks and many leaves are no longer green.

Corn Grain Frost Injury Yield Reduction

Kernel Development	Kernel Moisture	Days after Silking	Days to Maturity	Yield Reduction
Dough	70%	26	31-37	35-50%

			Dent	50%	36	20-23	10-20%
			Mid-Dent	40%	48	10-12	4-5%
			Maturity	30 - 35%	55	0	0%

Critical Points of Growth

Tipping Points	Time from Emergence	Concerns
V3	9 - 12	Late frost will not damage plant potential yield
V5	14 - 21	Cooler soil temperatures will slow growth, potential for late harvest
V9	28 - 35	Flooding up until this stage can kill a plant in a few days
V15	56 - 63	Drought conditions from V6 - V15 can reduce yields up to 25%
Tasseling (VT)	60 - 67	Water is still critical and hail can lead to pollen damage
Silking (R1)	63 - 68	Water is critical
Blister (R2)	73 - 78	Drought conditions from V15 - Blister can reduce yields up to 50%
Milk (R3)	83 - 88	Water is critical
Dough (R4)	89 - 94	Frost can reduce yields by 35 - 50%
Dent (R5)	99 - 104	Drought conditions from Blister - Dent can reduce yields up to 25% . Frost can reduce yields by 4 - 20% depending on level of dent
Maturity (R6)	118 - 123	

THURSDAY	Review Learners knowledge on the previous lesson.	1. Discuss with the Learners about the maturity determination of plants. 2. Learners brainstorm to identify the maturity signs of plants. 3. Assist Learners to explain the uses of each maturity stage of different crops to humans, other crops, animals, and the environment. 4. Discuss with the Learners about the differences in maturity stages among the different crops on the different soil media and seed beds. **Different Stages Of Plant Growth**	Through questions and answers, conclude the lesson. **Exercise;** State the maturity stages of crops and their uses.

The phenomena that occur at all stages of plant growth and development, from seed germination through plant collapse, are known as phenological events and are studied by phenology. Due to the long history of the topic, the diversity of scientific methodologies, and the wide range of possible applications, there is no one agreed-upon way to identify the various stages of plant growth. Some approaches are straightforward and broad in scope, while others are comprehensive and specific. However, at this time, the BBCH method is widely employed in smart farming and recommended by the vast majority of scientists working to establish a link between phenology and industrial agriculture .

In the BBCH scale , plant development is broken down into principal and secondary plant growth stages, both numbered 0–9. To avoid substantial shifts from the phenological approach widely used earlier, BBCH adopted a decimal code based on the well-known Zadoks cereal scale. The following are ten stages of plant growth in the BBCH scale:

1. *germination;*
2. *leaf development;*
3. *formation of side shoots;*
4. *stem elongation;*
5. *vegetative plant parts;*
6. *inflorescence emergence;*
7. *flowering;*
8. *fruit development;*
9. *ripening;*
10. *senescence.*

Since the duration of the growth stages of a plant and the phenological events within each vary significantly between species, scientists build comprehensive scales for each species individually. The standard BBCH scale is used for **any species that lacks a dedicated scale or serves as a framework within which individual scales can be developed**. Let's take a close look at the ten basic stages of plant growth by the BBCH scale and what they imply for farmers.

Stage 0: Germination, Sprouting, Or Bud Development

Despite their distinct biological processes, germination, sprouting, and bud development were all lumped under the same primary plant growth stage. Depending on the type of crop, growth phase 0 can last anywhere from a few days to a few weeks. At this point in the plant's development, the seed has sprouted and produced what are called "seed leaves," which are easily distinguished from the mature leaves.
Primarily, the germination and budding stage of plant growth requires the right temperature and oxygen levels. Additionally, it **depletes the nutritional reserves of plants**, potentially leading to nutrient deficiency without additional fertilization. A state of dormancy is often needed beforehand.
At growth phase 0, the crop constantly requires water to kickstart a healthy metabolism. In some cases, watering is also necessary for removing a germination inhibitor from the seed (especially for desert annuals) .

How does the plant growth stage influence insect damage?

At different stages of growth, plants are vulnerable to different pests. In contrast to wireworms, which eat seeds before or just after they germinate , earwigs tend to feed on young shoots, foliage, and flowers.

Stage 1: Leaf Development

The leaf's photosynthetic power is the foundation upon which the entire plant builds. Thus, stage 1 of plant growth is essential for the crop's normal development. All the plant nutrients by this stage of growth will help it through the next phases of its development. Thus, **fertilization is essential**.

Stage 2: Side Shoots Formation Or Tillering

Tillering is the plant growth stage during which new aerial shoots form. Rather than spreading out like rhizomes and stolons, tillers grow vertically. The outcome is a considerable rise in the number of new shoots occurring immediately adjacent to the initial shoot. "Daughter plants" occasionally refer to the new shoots that develop from the "parent plant."

Stage 3: Stem Elongation Or Rosette Growth And Shoot Development

Some parts of the plant, like stems and roots, keep growing throughout the plant's life: this process is called indeterminate growth. New cells are produced at the tips of growing shoots. Growth in stems occurs at many different sites, unlike just a few in the root system.

Stage 4: Development Of Vegetative Plant Parts Or Booting

The development of strong stems and plenty of green leaves characterizes the vegetative stage of plant growth. These processes are critical because photosynthesis relies on sufficient leaf surface area to absorb light. Notably, healthy leaf development usually follows strong root growth.

Stage 5: Inflorescence Emergence Or Heading

Inflorescence emergence is the process by which a cluster of flowers is arranged along a floral axis. Heading refers to the process by which a seed head emerges from the sheath formed by the flag leaf. The fact that this is the start of the reproductive growth phases is the unifying factor that groups these two different biological processes into one phase of plant development.

Stage 6: Flowering

During growth stage 6, flowering plants create the reproductive structures necessary for sexual reproduction. Annuals only live for one year, and their flowering and subsequent demise coincide. In biennials, the first year is spent in the vegetative phase, and the second is devoted to flowering and dying. Most

		perennials will continue to bloom every year if the conditions allow. 	
FRIDAY	Display diagrams and tables illustrating maturity stages of various crops.	1. Assist Learners to explain how crops are classified based on maturity stages (e.g., Kharif, Rabi, Zaid). 2. Discuss with the Learners about the significance of maturity stages in determining crop quality, nutritional value, and human consumption. 3. Present case studies on the effects of improper harvesting due to lack of knowledge on maturity stages. 4. Ask groups of Learners to analyze the consequences of improper harvesting and discuss the following questions: a. How did the lack of knowledge on maturity stages affect crop quality and nutritional value? b. What were the economic and social impacts on farmers, consumers, and the food industry? **Effects of improper harvesting** Improper harvesting can have severe consequences on ecosystems and biodiversity. Here are some key effects: • **Overexploitation**: Overharvesting depletes natural resources, leading to population decline or even extinction of species. This is evident in fisheries, where overfishing has reduced many fish stocks to unsustainable levels. • **Loss of Biodiversity**: Overexploitation of resources can lead to the loss of genetic diversity, as fewer individuals are left to reproduce and maintain healthy populations. • **Ecosystem Disruption**: Improper harvesting can disrupt ecosystem balance, leading to cascading effects on dependent species and habitats. • **Soil Erosion**: Inadequate forestry practices can lead to soil erosion, reducing fertility and increasing sedimentation in waterways. • **Water Pollution**: Poor harvesting practices can contaminate waterways with sediment, nutrients, and pesticides, harming aquatic life and human communities. • **Reduced Ecosystem Services**: Overexploitation of resources can reduce ecosystem services, such as pollination, pest control, and nutrient cycling, compromising ecosystem resilience. • **Negative Economic Impacts**: Improper harvesting can lead to	Ask Learners to reflect on what they have learned and how they can apply it in their daily lives or future careers. **Exercise;** Discuss 5 effects of improper harvesting

		economic losses for communities dependent on sustainable resource use, as well as decreased livelihoods and food security. **Examples:** • Overfishing has depleted many fish populations, threatening the livelihoods of fishing communities and the food security of millions. • Deforestation and poor forestry practices have contributed to soil erosion and water pollution, harming aquatic ecosystems and human health. • Inadequate post-harvest handling and storage of fruits and vegetables, such as tomatoes, can lead to **significant losses and reduced quality, impacting food security and economic viability**.	

Name of Teacher: **School:** **District:**