Plant Environment
Abiotic Factors:

Abiotic Factors:

Temperature and Its Effects on Plants

Subtitle: Understanding the Role of Temperature in Plant Growth and Development

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Introduction

- Temperature is a key abiotic factor influencing plant life.
- It affects growth, metabolism, photosynthesis, respiration, and reproduction.
- Plants have optimal temperature ranges beyond which growth is affected negatively.

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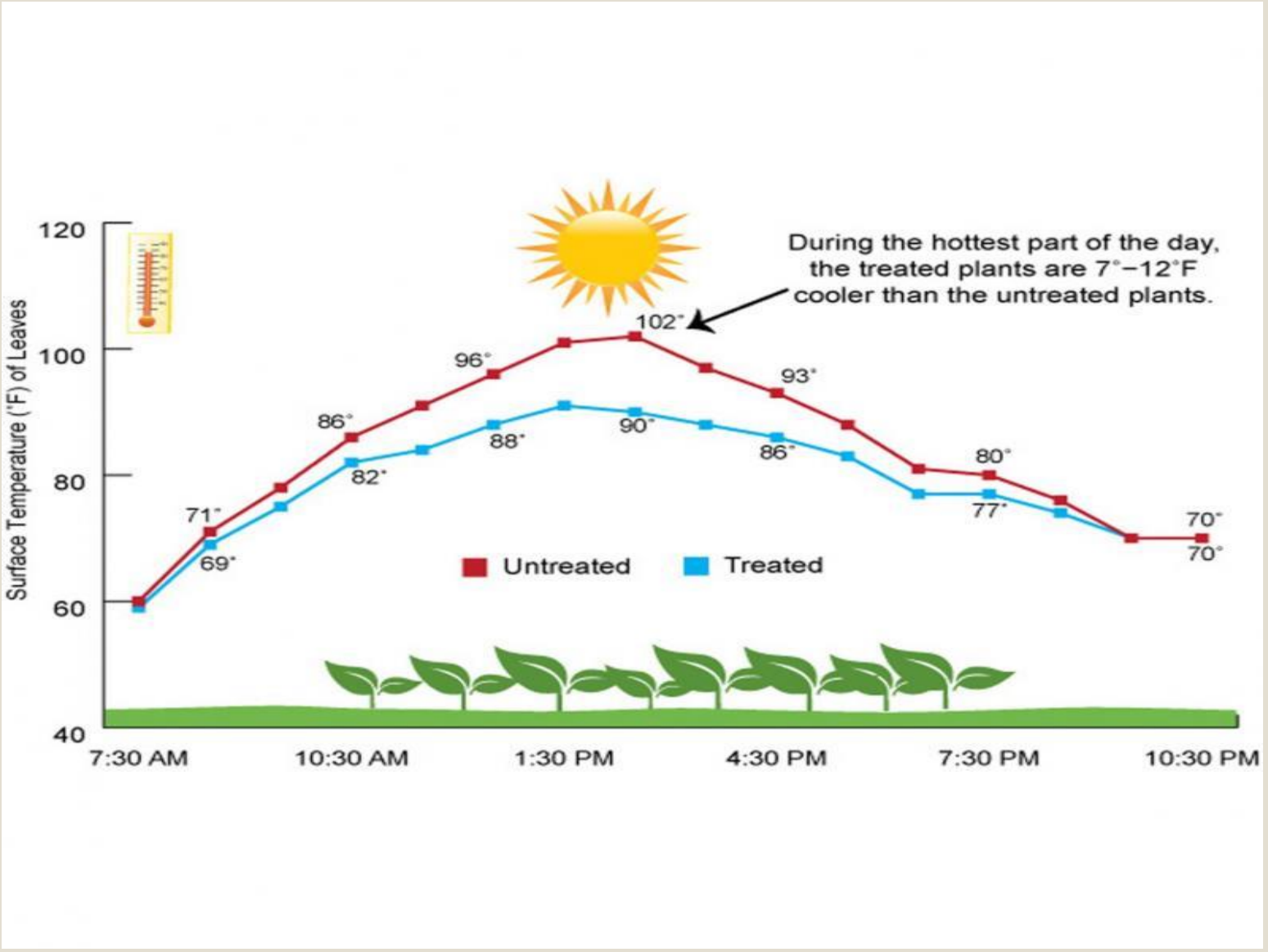
Temperature on affects growth in plant



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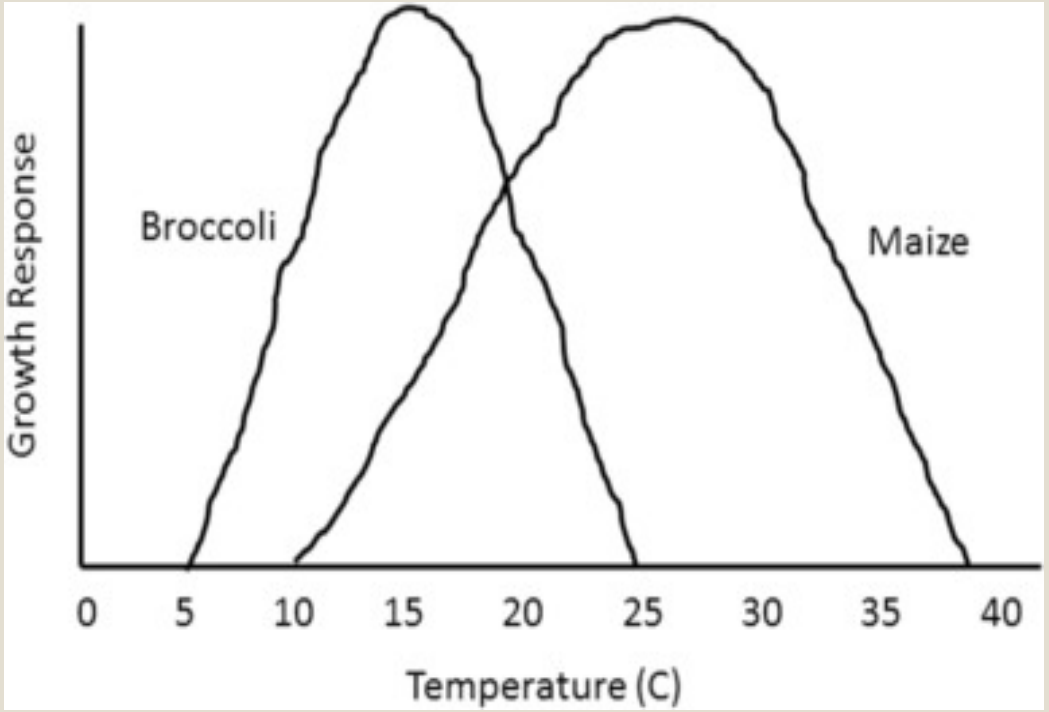
Rate of plant growth and development is dependent upon the temperature surrounding the plant and each species of plants has a specific temperature range represented by a minimum, maximum, and optimum.

Vegetative development (node and leaf appearance rate) increases as temperatures rise to the species optimum level.



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Temperature on affects metabolism photosynthesis in plant

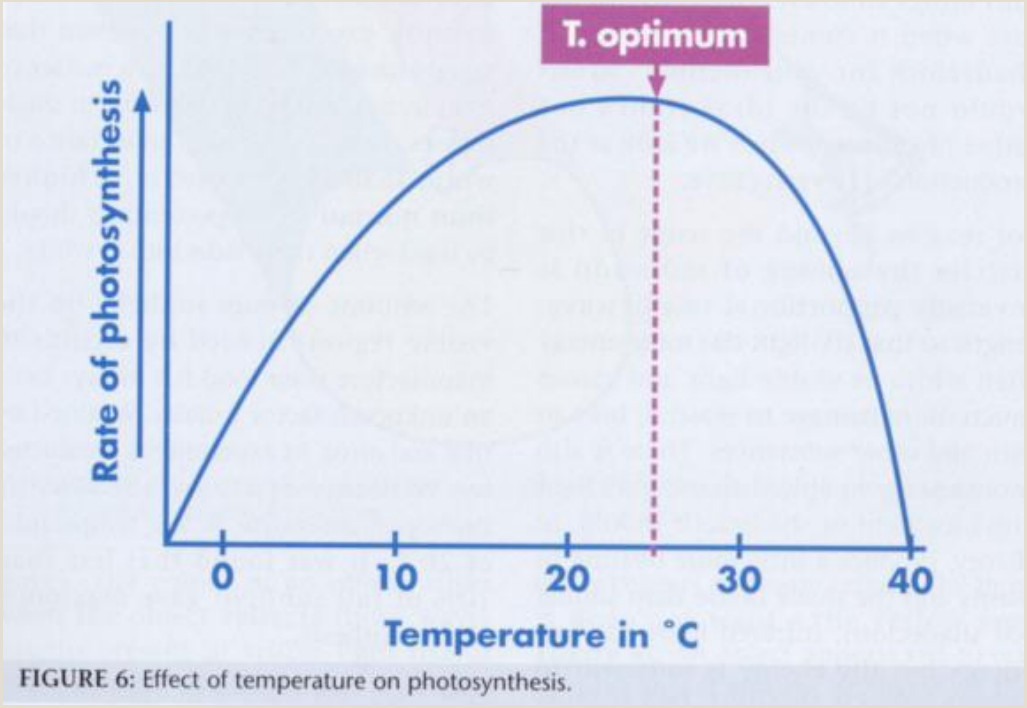
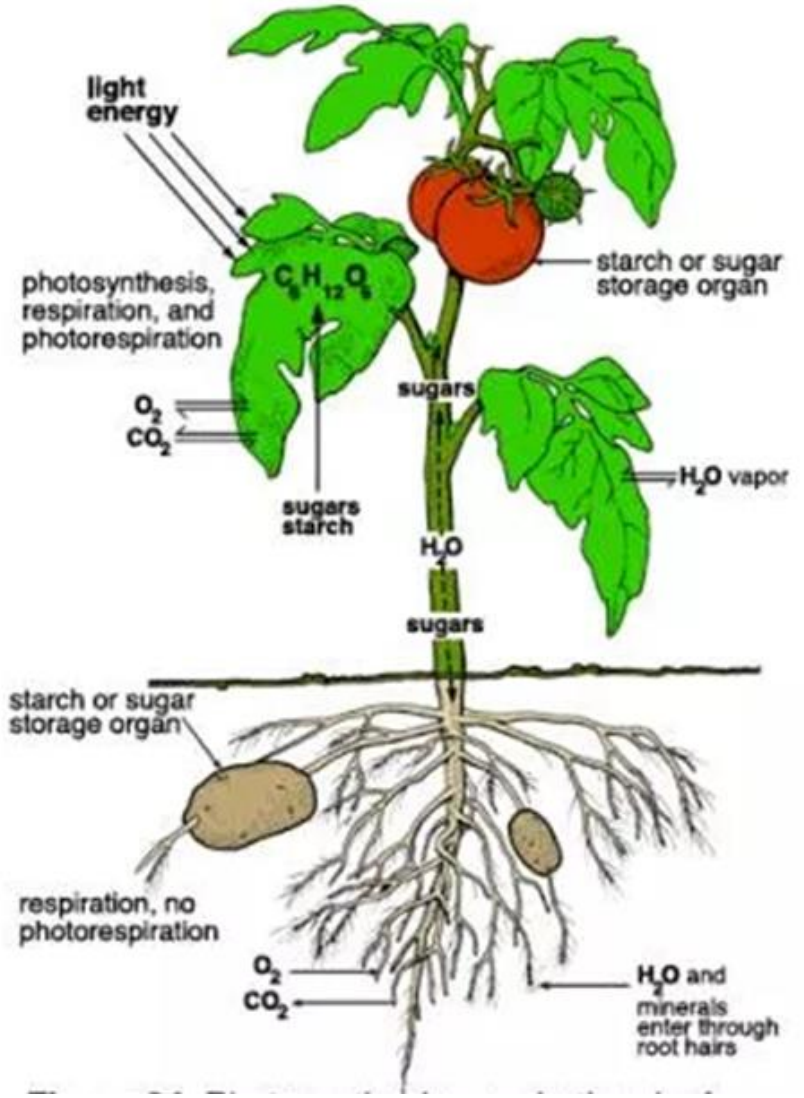


FIGURE 6: Effect of temperature on photosynthesis.

Plant Metabolism



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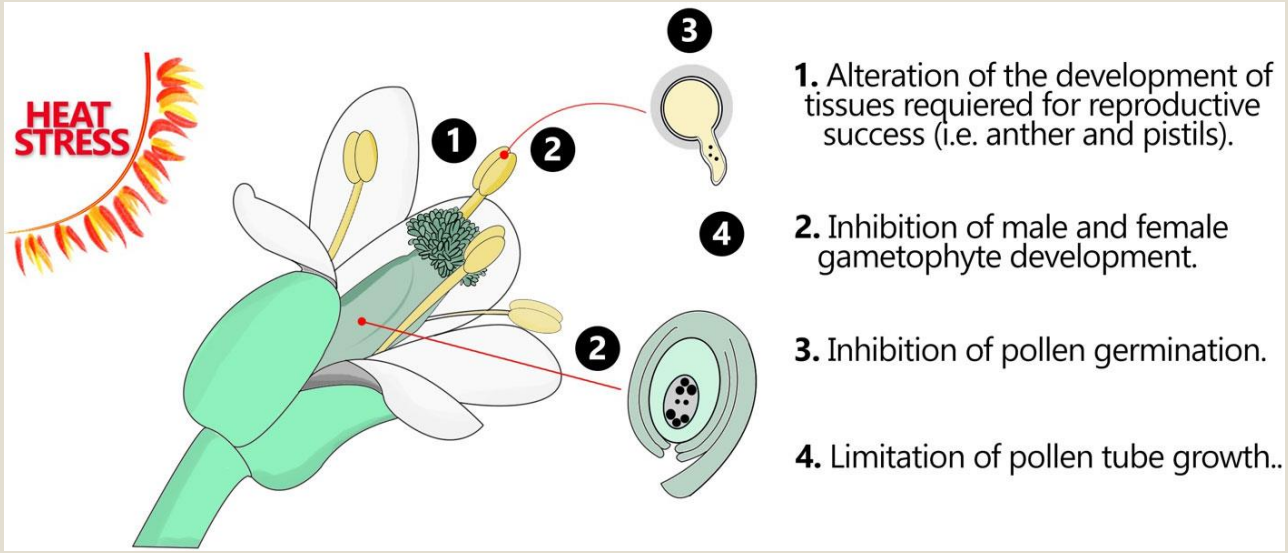
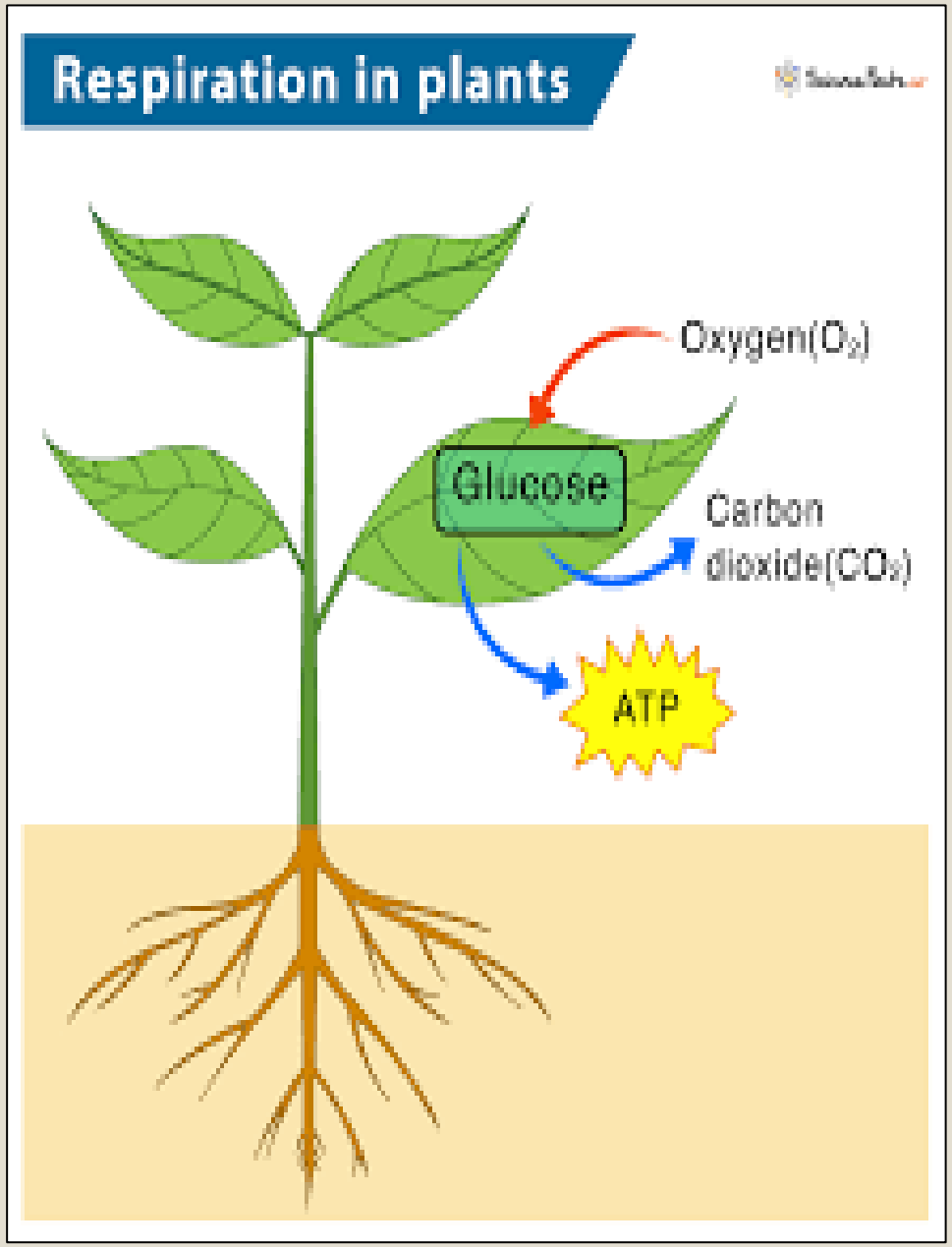
Temperature on affects respiration, and reproduction in plant

respiration is the conversion of carbohydrates into energy





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Temperature Ranges and Plant Categories

- **Cold-Tolerant Plants (Cryophytes): Survive in freezing temperatures (e.g., pine trees, Sweet Peas).**
- **Temperate Plants: Grow in moderate climates (e.g., wheat, oak trees).**
- **Tropical Plants: Thrive in warm temperatures (e.g., banana, mango, palm trees).**

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Effects of High Temperature on Plants

- ✓ **Increased Respiration Rate: Reduces energy storage.**
- ✓ **Wilting and Water Loss: Due to high transpiration rates.**
- ✓ **Protein Denaturation: Enzyme malfunction and reduced metabolism.**
- ✓ **Heat Stress: Leads to poor flowering and reduced yield.**

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Effects of Low Temperature on Plants

- **Slow Metabolism: Reduced growth and photosynthesis.**
- **Frost Damage: Ice crystals is rupture plant cells.**
- **Delayed Germination: Seeds require specific temperature for germination.**
- **Dormancy Induction: Some plants enter the dormancy phase to survive in the cold seasons.**

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Adaptations of Plants to Temperature Variations

- **Morphological Adaptations: Thick cuticles, small leaves (reduce water loss).**
- **Physiological Adaptations: Antifreeze proteins in cold-resistant plants.**
- **Behavioral Adaptations: Deciduous plants shed leaves to conserve energy in winter.**

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Role of Temperature in Agriculture

- ✓ **Crop Selection: Farmers grow temperature-suitable crops.**
- ✓ **Greenhouse Technology: Regulates temperature for optimal plant growth.**

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Climate Change and Temperature Effects

- **Global Warming: Rising temperatures alter plant distribution and yield.**
- **Heatwaves & Droughts: Stress plants, reducing productivity.**
- **Extreme Cold Events: Affect sensitive crops and ecosystems.**

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Thanks for listening