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CHANGES DURING FRUIT RIPENING

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INTRODUCTION:

This introduction provides a brief overview of the dynamic transformations occurring during fruit ripening, setting the stage for a deeper exploration of the topic. Fruit ripening is a fascinating biological process characterized by a cascade of biochemical and physiological changes that profoundly impact its sensory attributes and nutritional content.

CHANGES DURING FRUIT RIPENING:

1. Physical changes
2. Biochemical changes
3. Physiological changes

Physical changes:

• **Color changes**: Chlorophyll degradation and synthesis of pigments such as carotenoids and anthocyanins result in alterations in fruit color, transitioning from green to yellow, orange, red, or purple, depending on the fruit type.

• **Size and shape changes:** Some fruits may exhibit slight changes in size and shape during ripening due to cellular expansion and changes in water content.

• **Softening:** Fruit tissue undergoes enzymatic degradation of cell wall components such as pectin, cellulose, and hemicellulose, leading to a decrease in firmness and increased softness.

Biochemical Changes:

• **Cell wall modification**: Enzymatic activities such as polygalacturonase, pectin methyl - esterase, and cellulase lead to the degradation of cell wall components, resulting in fruit softening.

• **Pigment synthesis and degradation:** Chlorophyll breakdown and the synthesis of pigments such as carotenoids and anthocyanins contribute to changes in fruit color during ripening.

• **Protein degradation:** Proteases break down proteins into amino acids, contributing to changes in flavor and aroma.

• **Ethylene production and signaling:** Ethylene is a plant hormone that regulates many aspects of fruit ripening, including softening, color changes, and aroma production. Its synthesis increases during ripening, initiating a cascade of physiological responses.

• **Aroma compound production:** Enzymatic and non-enzymatic reactions lead to the production of volatile compounds responsible for the characteristic aroma of ripe fruits.

Physiological changes:

• **Respiration rate:** The rate of respiration increases during fruit ripening, leading to higher oxygen consumption and carbon dioxide production. This metabolic activity influences energy metabolism and the breakdown of organic compounds.

• **Turgor pressure**: Changes in turgor pressure occur as a result of alterations in cell wall composition and water movement within the fruit tissues, contributing to changes in texture and firmness.

• **Hormonal regulation:** Besides ethylene, other hormones such as auxins, gibberellins, and abscisic acid also play roles in regulating various aspects of fruit ripening, including growth, development, and senescence.

• **Gas exchange:** Fruits undergo changes in gas exchange patterns, including the uptake of oxygen and release of carbon dioxide and ethylene, which are essential for ripening processes and senescence.

CONCLUSION:

During fruit ripening, several changes occur, including alterations in color, texture, flavor, and aroma. These changes are primarily driven by the breakdown of complex molecules such as starches into simpler sugars, degradation of cell walls, and synthesis of pigments and volatile compounds. Overall, fruit ripening enhances palatability and attractiveness to seed dispersers, ultimately facilitating seed dispersal and ensuring reproductive success for the plant.