

them fresh for longer, especially important for long-distance shipping.

- 4) Smarter logistics: Understanding fruit maturity helps plan the supply chain better. This means less waste and lower costs because bananas are harvested and transported more efficiently.
- 5) Happier consumers: People can choose bananas at their preferred ripeness, reducing food waste and increasing satisfaction.
- 6) Consistent quality: Harvesting at the right time means consistent quality for consumers, which builds trust and loyalty.
- 7) More Sales: High-quality bananas sell better, leading to increased revenue for growers and sellers. This encourages investment in quality and innovation.

IV) Techniques For Assessing Maturity Of Banana Fruit

Techniques employed in assessing the maturity of banana fruit to determine the optimal time for harvest, transportation, and marketing include the following:

1) Visual Inspection:

- Visual inspection entails examining the external characteristics of the banana fruit.
- Parameters such as skin color, firmness, size, and the presence of ridges or angularities are observed.
- Ripe bananas typically exhibit a yellow coloration, while unripe ones tend to be green. Brown spots or blemishes may indicate overripeness.
- Additionally, the shape and size of the fruit provide cues about its maturity level.

2) Physical Examination:

- This involves assessing the texture, firmness, and other physical attributes of the banana fruit.
- Gently squeezing the fruit helps evaluate its firmness; ripe bananas yield slightly to pressure without being too soft.

- Aroma and ease of detachment from the bunch are also considered.
- Physical examination complements visual inspection by providing a tactile assessment of ripeness.

3) Laboratory Analysis:

- Laboratory analysis employs sophisticated techniques, often used in research or large-scale commercial operations.
- Instruments such as refractometers, spectrophotometers, and penetrometers measure parameters like sugar content, starch content, pH level, and pulp firmness.
- These analyses yield precise quantitative data, enhancing the accuracy of maturity and quality determination.
- Laboratory analysis is particularly valuable when visual and physical inspection alone are insufficient or when precise measurements are necessary for quality control purposes.

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MATURITY INDICES IN BANANA FRUITS





Introduction

Maturity indices in bananas are signs or characteristics used to determine the stage of ripeness or maturity of banana fruits. These signs include color, size, texture and changes inside the fruit. Checking maturity helps ensure bananas are picked and eaten when they taste the best, are most nutritious, and stay fresh longer. It's crucial for farmers, sellers, and buyers to understand these signs to make smart choices when growing, selling and buying bananas. Farmers should know that bananas take time to grow, usually between 9 to 14 months. However, tissue culture bananas grow faster, typically in 9-12 months, while regular ones take longer, about 12-14 months. Additionally, ripe bananas can look different; some turn yellow while others stay green.

Banana Maturity Indices

I) Banana Fruit Finger Characteristics

Among the various indices used to determine banana maturity, one of the most common methods relies on assessing the characteristics of the fruit fingers. These indices include size, shape and color.

- **Size:** Size plays a crucial role in assessing banana maturity. The width of individual predetermined fingers from the bunch is measured using calipers to determine their harvest readiness. This measurement, known as the caliper grade, helps ascertain the maturity level of the bananas.
- **Shape:** Shape is another key indicator of banana

maturity, with the angularity of the fruit fingers serving as a gauge. Generally, a more rounded cross-section indicates a higher level of maturity. Bananas are considered mature for harvesting when their fingers are approximately 3/4 round, corresponding to 75% maturity.



Light three-quarters: Sharp angular edges



Full-three-quarters: have angular edges⁴



The fruits are almost rounded



Fully mature with well-rounded shape

(Photo by: Gathambiri, 2024)

- **Color:** Peel color changes as the bananas mature. The green color is mostly degraded in desert varieties.



Proper color development at ripe stage when harvest at full maturity

II) Other Characteristics for Determining Banana Maturity

- **Texture:** A ripe banana feels soft when gently pressed, while an immature one is firm and hard.
- **Taste:** Ripe bananas are sweet and flavorful, while unripe ones are starchy and lacking sweetness.
- **Starch Content:** Immature bananas have more starch, which turns into sugars as they ripen.
- **Sugar Content:** Ripe bananas have more sugar, making them sweet. This increase in sweetness happens as they ripen.

III) Benefits of understanding Banana Fruit Maturity Indices

Understanding banana fruit maturity indices is beneficial for everyone involved in the banana supply chain:

- 1) **Better quality:** Harvesting bananas at the right time means tastier fruit. Picking them too early can make them bland, while waiting too long can lead to overripeness.
- 2) **Tastier and healthier bananas:** Knowing when to pick bananas ensures they are at their best in terms of taste, texture, and nutrition, encouraging repurchase and fostering healthier eating habits among consumers.
- 3) **Improved handling:** Growers can use maturity indices to handle bananas better after harvest. Proper packaging and storage techniques keep