

Harvest Maturity Indices

Bora is harvested at a young stage, before the seeds and pods development. Bora requires about 7 weeks from seeding until the start of harvest, depending on cultivar and environmental conditions. The harvest period typically continues over a period of about 6 to 8 weeks. Pod length and pod diameter are the two principal indices of harvest maturity.

Bora is typically harvested when the pods have reached a minimum length of 38 cm (15 inches). However, some markets prefer longer pods of up to 76 cm (30 inches). Pod length is significantly influenced by vigor of the plant and cultivar. Strong plants may produce pods of 90 cm (35.5 inches) in length. The highest quality pods are straight, crisp, and uniform in colour.

Pod diameter enlarges with maturity. Bora should be harvested when the pods have reached about 1 cm (0.4 inches) in diameter. At this size the immature seeds will be slightly bulging outward. Bora should be harvested before the seeds fill out the pods. Pod diameter should be no larger than 1.25 cm (0.5 inches). Over-mature pods are tough and fibrous.

Harvest Methods

Bora should be harvested by pinching the stem with the thumbnail pressed against the index finger. A short section of the stem should remain attached to the pod. The pods should not be torn or pulled off the plant. Also, the pod should never be severed below the stem, as this creates an open wound in the pod. Rough handling of the pods during harvest should be avoided as this will result in tissue damage and subsequent decay. Bora should never be packed tightly in the harvest container or allowed to remain in the sun for extended periods. Do not put damaged, diseased, or culled pods in the same harvest container as the marketable pods.

Harvesting should be done during the coolest time of the day, which typically is in the early morning. However, picking should not begin until the moisture on the plants has evaporated. Harvesting after the pods have dried will help prevent the spread of disease. Harvest every other day or every third day. The

harvest container should be well-ventilated and not contain more than about 10 kg (22 lb) of pods in order to avoid over-heating.

Preparation for Market

Bora is very fragile and must be prepared for market within several hours after picking. Exposure to the sun will soon result in pod shriveling and poor quality. Bora held at ambient temperatures for 1 hour before cooling will lose about 2% of its original weight, and up to 10% if the delay in cooling is 5 hours.

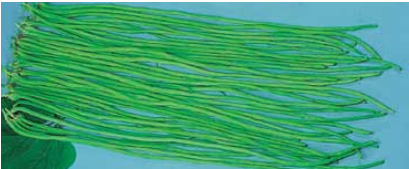
Cleaning

The first step in market preparation is cleaning the produce. This is typically done by spreading the pods out in a shallow layer on top of a clean, flat surface. Any pod found with a stem longer than 1 cm should be re-trimmed to a shorter length. Bora should be cleaned by removing any leaves, stems, broken pods, blossom remains, insect-damaged, or partially decayed pods.

Generally, bora should not be washed because of the likelihood of spreading disease or decay organisms. However, the Barbados export market requires a postharvest wash treatment for phytosanitary reasons. In this case, bora should be submerged in clean water, with 150 ppm hypochlorous acid (household bleach) maintained at a pH of 6.5. This is equal to 2 oz of household bleach (such as Marvex) per 5 gallons of water, or .3 liters of bleach per 100 liters of water. Following the washing treatment, the bora pods should be air dried on a clean, flat surface or wire screen before sorting and grading.

Sorting/Grading

The bora pods should be sorted according to length, maturity (diameter), and appearance. The pods in each bundle should be equal in length and diameter. Pod colour should be typical of the cultivar. Pods with noticeable



blemishes, spots, insect damage, wounding, or decay should be discarded.

The pods should be well-formed and straight, uniform in colour with a fresh appearance, and tender but firm. They should snap easily when bent. Freshness is indicated by a distinct snap when the pod is broken. The pods should have no bulge or only a slight bulge, which shows that the bora is tender with immature seeds.

Packing

Bora is typically wrapped in bunches for marketing. Exporters prefer to purchase bora in larger bunches, while domestic markets prefer smaller bunches.

Large sacks should not be used for packing bora because the pods will rapidly heat and wilt due to restricted ventilation. Well-ventilated fiberboard cartons provide more protection and are recommended, especially for export. Bora should be loosely packed within the carton to allow for adequate heat dissipation.



Temperature Management

Bora should be cooled to 5°C (42°F) immediately after harvest to maintain its quality and crisp texture. At this temperature, bora will have a 7 day market life. Pods that are not cooled will quickly wilt and have only a 1 or 2 day market life. Postharvest decay will also occur faster at ambient temperatures. The best way to keep bora cool is to loosely stack the pods on a clean surface inside a cold room with high humidity and good air flow.

Hydrocooling, the process of bringing chilled water into contact with the pods, is the quickest method of cooling bora. However, if hydrocooling is used, the water must be very clean and properly sanitized with 150 ppm hypochlorous acid to prevent postharvest decay. The water pH should be maintained at 6.5 for best sanitation. Although hydrocooling is the best method of cooling, it should be used only if there is proper sanitation and

refrigeration available for a continuous cool chain during market distribution. Pods allowed to re-warm will have moisture on their surface, which are good conditions for the development of postharvest decay.

Storing bora at temperatures less than 4°C (42°F) will result in chilling injury (CI). Signs of CI include surface pitting, brown streaks, a dullness of the pod colour, and increased risk of decay.

Relative Humidity

Bora is highly prone to wilting and loss of crispness if the postharvest relative humidity (RH) is low. Pod shriveling and limpness happen after about 5% weight loss. In order to minimize wilting and quality loss, bora should be held at 95% RH. A semi-permeable plastic film around the bora inside the carton will create a high RH microenvironment and minimize moisture loss.

Principal Postharvest Diseases

Bora is very delicate and vulnerable to fungal and bacterial diseases. In order to minimize postharvest decay, good field sanitation practices should be followed and the pods should always be harvested when the surface has dried. Bora should be harvested and handled with care to avoid wounding of the pod surface. Also, the pods should be cooled to 5°C immediately after harvest and moisture condensation on the pod surface should be avoided.

Cottony Leak

The first symptoms of cottony leak are dark spots of irregular shape, which enlarge rapidly at ambient temperatures. Under humid conditions, a white cottony mould may cover the pod and liquid may leak from the rotting tissue. Mould from infected pods will spread to healthy pods, forming nests of decay.



Rhizopus Rot

Rhizopus rot initially appears as small water-soaked spots on the pod surface. The decayed spots enlarge and become soft and

watery, with considerable leakage of fluid. Grayish-white masses of mould develop over the infected area. A distinctive sour odour may accompany the decay. Nests of mould and decaying pods form within a carton of packed bora.



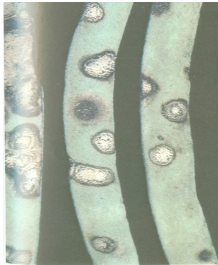
Watery Soft Rot

Watery soft rot, also known as white mould, is a common pod disease of bora during periods of prolonged wet weather. Symptoms begin as water-soaked spots that soon turn brown and become covered with a dense white mould.



Anthracnose

The first symptoms appear as dark specks or blotches on the pod surface. Individual lesions may become sunken and are typically gray or black in the center. They may combine and discolour much of the pod.



Bacterial Soft Rot

Bacterial soft rot is a secondary decay organism that attacks tissue weakened by injury, sunscald, chilling injury, or fungal attack. Soft rot rapidly develops under warm, moist storage conditions. Pods become soft, slimy, and foul smelling.



For additional information contact:

New Guyana Marketing Corporation (NGMC)
87 Robb & Alexander Sts., Georgetown, Guyana
Tel: 226-8255, 226-2219

National Agricultural Research Institute (NARI)
Mon Repos, East Coast Demerara, Guyana Tel: 220 2950



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BORA

Postharvest Care and Market Preparation
Information Sheet



This information sheet provides growers and agriculture extension personnel with a summary of the recommended harvest and postharvest handling practices for bora. A more technical and detailed bulletin is available from the New Guyana Marketing Corporation (NGMC) and the National Agricultural Research Institute (NARI).