

Proceedings of the First International Tropical Fruit Short Course: The Avocado.

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HARVESTING AND POSTHARVEST HANDLING OF AVOCADOS

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Individual fruit size of the avocado is such that harvesting, unlike the situation in citrus, is within the capability of the owner of small hectarage. This applies particularly under the selective size-picking program required by the shipping schedule for each variety in Florida. The heaviest volume is moved, however, by crews employed by packinghouses or grove service companies.

The Dade County terrain, where most of the avocados are grown in Florida, is flat and the rock structure is such that people and equipment can move freely through the orchards under even the wettest of conditions. The hedging or pruning programs presently in use limit tree spread sufficiently to permit good access for harvesting and fruit movement from the groves.

The annual harvesting of Florida avocados begins in June, when the West Indian varieties are ready and is usually completed in February. Although the heaviest volume is during October, November and December, more plantings in recent years of the earlier varieties (West Indian) have resulted in an increased movement during July and August.

Harvesting is governed by an annual shipping schedule which establishes the calendar date that each variety may first be shipped during the harvesting season, providing that individual fruit meet a required minimum weight or size (diameter). This schedule is the result of ripening tests conducted during past seasons and kept viable by current sampling of representative orchards. Implementation of this program is by a Federal Avocado Marketing Agreement which has been in effect in Florida since 1954.

In The Field

Basic harvesting equipment must include some means of size or weight measurement in the field. This is usually accomplished by the use of a small piece of lightweight plywood cut with a circular opening for checking the required diameter. It can be attached to a cord and worn around the neck of the picker.

Most ground crews use aluminum picking poles with cutter head and bag for fruit not easily reached by hand. The canvas picking bag used elsewhere can be uncomfortable in high humidity and temperature conditions encountered in South Florida. A plastic bucket, holding about 18 liters, is used instead to accumulate the fruit, and is usually stationed on the ground near the picker. Clippers are not in general use and the stem of the avocado is snapped off at the base. When full, the

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bucket is emptied into a plywood pallet bin which may either be stationed at intervals in the grove for pickup by a forklift, or on a trailer or truck moving with the crew. Bushel boxes are still in use in some instances as field containers.

Improvements have been made in 3-wheeled, self-propelled, hydraulically-powered equipment for positioning the worker in areas of the tree not easily reached from i In-ground. This has been an important step in providing avocado harvesting that is faster and less damaging to the fruit. Three or 4 of these vehicles may be serviced by 1 tilt operator to keep pallet bins close to the vehicle operator for later recovery and movement to a nearby truck when full. The vehicle operator picks with both hands, and fills a large hopper equipped with a canvas sleeve for emptying. This hopper is located on the picking platform in front of the operator, and can hold about 150 kg, making it possible to fill a standard pallet bin in 3 trips.

The pallet bin most generally in use measures 119 x 119 x 61 cm and is constructed from plywood treated for prevention of decay. A shallow or "half-bin" measuring only 35.5 cm in depth is also in use. Advantages of this smaller bin include ease of handling in the field and a reduction in the buildup of heat inside the bin due to the lesser mass of fruit. Less bruising is also believed to occur and added ventilation is provided by the extra spacing when stacked.

The trip to the packinghouse with the filled bins is usually a short one. Although fruit is precooled in some instances, it is not a general practice, and grading and packing usually take place shortly after fruit arrival.

At The Packinghouse

Equipment for automatically unstacking and dumping pallet bins is in general use. The fruit moves from the dumper onto belts moving at different speeds for uniformity of flow movement or into a reservoir from which 1 roller conveyor moves the fruit on to the next station. Leaves, twigs, other refuse is dropped out between rollers at this stage. Soft roller brushes then remove the dust and spray residues, sometimes with the addition of a water spray, if needed.

Grading is next, with the fruit passing before the graders on revolving steel rollers which turn the fruit for better observation. Fungus-caused skin defects and harvesting cuts and bruises are principal factors in grade reduction. Under the Marketing Agreement, 3 grades are permitted for shipment in regulated containers, with fruit of lower quality going to processing or to local sales in non-regulated containers. Many packinghouses make a combination pack of first grade and second grade fruit under one label, with a second label combining second and some third grade fruit. The lower range of third grade fruit, in this instance, goes out in non-regulated containers for local sales or for processing.

Sizing is accomplished by use of drop-roll sizers or, in some instances, weight sizers, which require the placement of fruit in cups moving over balance stations. Fruit may be dropped out in 8-12 size separations for packing and marketing uniformity. Each size flows either into circular packing tubs capable of being revolved for even filling or into inclined bins for bulk or place pack.

Packing is by hand, and fruit is usually arranged in the packing container in rows on trays of styrofoam patterned with cup impressions. In some instances, loose wood wool and wood wool pads are used. Some bulk-packing is done in the 2 larger containers, using wood wool pads as cushions on the bottom of the container.

Since packed fruit is subject to inspection by the Federal-State Inspection Service in Florida, a representative of this service is usually on station in the larger houses during the normal packing day. For houses with smaller packs, inspection is called for, or the packed fruit is brought to 1 of the larger houses for inspection and certification by the inspector on duty there.

Containers

Container dimensions are standardized under the Federal Marketing Agreement for avocados, with 3 types of containers in general use. These are the single-layer flat, the 2-layer double or lug and for larger fruit, a container usually referred to as a "Bruce Box". Minimum net weights for these 3 containers are 5.67, 11.34 and, depending upon the variety, either 14.52 or 15.42 kg respectively.

Florida avocado handlers are registered with The Florida Avocado Administrative Committee and each handler must register his packinghouse labels with the committee to show specific grade. In addition to a distinctive label to indicate grade, each container must bear the name and address of the handler. In general practice, the count and variety of the avocado is also shown.

Packing containers are usually made up at the packinghouse on forming equipment furnished by the corrugated paperboard manufacturers who supply the blanks. Folded and sealed types are in use, as well as ones with lids which, may be snapped into place. The largest of the 3 containers is usually a 2-piece telescope-type, similar to the one used in the citrus industry.

All must be well-ventilated, with either circular or slotted openings, and of sufficient durability to withstand the demands of cross-country travel when stacked. They must also be capable of resisting breakdown from damp conditions.

Loading the Truck

Stacking the load in the truck for satisfactory shipment to destination requires careful arrangement for adequate air movement throughout the load. Uniformity of height between stacks of various-sized containers must also be programmed to prevent damage in transit. Each stack is spaced, and each layer of containers is loaded on narrow strips of wood to prevent shifting of the load during transit.

The shipping clerk usually checks each truck upon arrival and before loading, to ensure that the refrigeration equipment is functioning satisfactorily and that good circulation of air will take place. Temperatures are usually set to maintain 9-10°C, and, in some cases, sealed recording instruments are installed within the load so that temperature performance may be established in the event of an unsatisfactory fruit condition upon arrival at destination.

Summary

The harvesting of avocados in Florida is controlled by a Federal Marketing Agreement which regulates the time of picking. Weight and size are the determining factors for each variety under the harvesting plan by calendar date.

Use of equipment for mechanically positioning the picker and for loading in the field is increasing. Ground crews use picking poles and plastic buckets for accumulating the fruit for transfer to plywood bins, which may be on narrow trailers, flat-bed trucks or moved about by fork-lift operators.

At the packinghouse, drop-roll sizers make size separations by diameter, although some sight sizers are still in use. Three grades are authorized, but many handlers pack combination packs under a first and second label. Avocados are arranged by hand, either by place-pack or by bulking in 3 sizes of containers standardized by the Marketing Agreement. Packed fruit is subject to inspection by the Federal-State Inspection Service.

Packed avocados in ventilated, durable containers are carefully spaced in stacks and layers in refrigerated trucks maintaining temperatures from 9-10°C. Some automatic monitoring of temperatures enroute is practiced.