

## EUROPEAN PREFERENCES FOR PACKAGING OF SELECTED FRESH PRODUCE

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**Abstract.** European receivers of fresh produce were contacted as to their preferences for packing, packaging, handling and product presentation for selected fresh fruit and vegetables. European receivers prefer all products to be unitized on wood pallets. Packaging is generally in corrugated fiberboard shipping containers. Net weight is generally less per package than in the U.S. Size of shipping containers and pallets should be metric along with all net weights. Packaging needs to be functional and also attractive with multiple-colored printing.

The European Marketing Research Center was established in 1969 to assist the U.S. agricultural industry with exports to Europe. Total U.S. exports to the European community for 1989 was \$6.6 billion and exports of fresh fruits and vegetables was \$1.1 billion (1). The leading fresh produce items exported to Europe are grapefruit, apples, pears and grapes. Many other produce items are exported annually with volume depending upon supply and demand. Supply from Southern Hemisphere countries has increased during winter months when exports from the U.S. to Europe are at their highest. However, demand from European receivers and consumers are not solely dependent upon supply or price. Quality and packaging is also important, if not more important than supply and price. Packaging of fresh produce in Europe has become very functional and unique.

Since the European Marketing Research Center has been established, reports have been published in 1981 and 1984 describing the packaging of fresh produce in Europe (2, 5). These reports provided the U.S. fresh fruit and vegetable industry with information about packaging preferences of European receivers. The purpose of this paper is to present updated information about packaging preferences and commodity presentation features for several selected fresh produce items that are of interest to Florida shippers. This report will provide the shippers with information to enhance the acceptability and salability of their products in the European market.

### Results and Discussion

In general, packaging of fresh produce in Europe is very functional and in some cases better than packaging within the U.S. European receivers prefer smaller sized shipping containers. The physical dimensions of the shipping containers should be metrically identified and fit the accommodating metric sized pallets. The two sizes of unit

bases (120 x 100 cm and 120 x 80 cm) used were established by the Organization of Economic Cooperation and Development. The 120 x 80 cm pallet is preferred by most grocery chainstores and one major chainstore places all products in the stores on these pallets. Today, almost all locally grown fresh produce is unitized (stacking of shipping containers on pallets) at shipping points within Europe. Most surface shipped imports of fresh produce are also unitized for shipment from the exporting country to Europe. Most air shipments to Europe may not be unitized, but are unitized upon arrival. Very few break-bulk shipments are not unitized. All unitization is on wooden pallets and in most cases the wooden pallets are reuseable. In most cases, the pallets are designed for 4-way entry. As of January 1, 1990, all softwood pallets used for export to EEC countries must be made of kiln dried or treated lumber to kill pine wood nematodes.

The securing techniques to stabilize shipping containers rigidly on pallet bases are very important. It is very important to properly secure containers to the pallets for export because of the long and sometimes rough transit. The most preferred securing technique is the use of horizontal and vertical nonmetal straps. Many exporting countries also use vertical corner boards and sometimes top corner boards to prevent damage to the shipping containers. Wrap-around netting materials are also very popular and can be as functional as strapping.

Detailed product presentation and packaging is presented for the following selected fresh fruits and vegetables.

### Fruits

All fruit should be clean and free of scars, blemishes and bruises. Fruit should be mature and well colored.

*Avocados and mangoes.* The preferred shipping container for this commodity group is a full- or part-telescope, corrugated fiberboard box. The fruit can be tray-packed or place-packed. If place-packed, the fruit should be tissue wrapped or protected with paper pads, shredded paper, or foam. Most receivers prefer a single layer shipping container. Uniformity of size and color within the box is of utmost importance. Receivers prefer larger mangoes, but smaller avocados. A 4.5 or 5 kg net weight per box is the most acceptable weight. Generally, very large fruit is not acceptable for the European market. Well colored mangoes are preferred to the greener ones.

*Blueberries and strawberries.* The preferred method of packing berries is 8 or 12 consumer units per shipping container. The shipping container should be a tray-type with a one-piece design which is either glued or folded together. Tray-type shipping containers should interlock vertically by utilizing tabs at the end of the box to interlock into the bottom surface of the box above. There is considerable difference in the net weight (ranging from 200 to 500 g) per consumer unit. Most receivers prefer that imported berries be packed 200-250 g per package. The 200 g or even smaller consumer packages are desired when the price per unit is relatively high and, conversely, 500 g package is desired when the price is relatively low. The net

weight per consumer unit must be guaranteed. Receivers and consumers want a clear plastic cup either closed with a rigid plastic top or overwrapped for product visibility.

*Carambola.* Receivers prefer a full- or part-telescope, corrugated fiberboard box for carambolas. The interior of the box needs to be well padded and individual carambola needs to be protected with tissue paper or other wrapping material. The carambola should be packed upright with the stem end down. The box must be of sufficient strength to withstand overhead weight. Both the sweet and sour types are available in Europe, but more consumers prefer the sweeter carambola. Uniformity of sizing and color within a box is a necessity. Net weight per box will depend upon the size of the carambola, but should be about 4.5 kg.

*Limes.* A full- or part-telescope, corrugated fiberboard box is preferred for limes. Generally interior packaging materials are not required. Uniformity of fruit size within the box is important. Limes should be fresh and green, not overmature and yellow. A net weight of 4.5 kg per box is preferred. Smaller limes are more desirable than larger limes.

*Grapefruit and oranges.* Most of the Mediterranean countries use an open-top wooden crate with or without netting over the top. However, most receivers prefer a full-telescope, corrugated fiberboard box containing 12 to 17 kg per box for imported citrus. The box must be strong enough to support overhead weight. Many countries exporting citrus to Europe are using double-walled bottoms and/or waxed interiors for the full-telescope corrugated fiberboard box. U.S. boxes for citrus tend to bulge showing box damage with resultant damage to product. Wrapping of some oranges is practiced by a few exporters and the labeling of individual fruit is becoming widely acceptable, particularly for grapefruit. All grapefruit and oranges are place-packed by layers (3 to 6 depending on size) and the number of fruit per box indicates the size. Generally, smaller grapefruit (size 40-64) are preferred in Europe to the larger fruit.

*Mandarins.* Again, most Mediterranean countries use an open-top wooden crate with or without netting over the top for mandarins. Other exporters to Europe, generally use a full-telescope, corrugated fiberboard box containing 10 to 15 kg. The mandarins are place-packed and in some instances tray-packed. Tray-packing of mandarins is recommended for long distance export to Europe to protect the fruit from bruising. Some receivers prefer half-sized boxes of only 2 or 3 layers depending on size of the fruit.

*Watermelons.* The desired shipping container for watermelons is a one-piece regular-slotted corrugated fiberboard box containing 12 to 15 kg per box. The box should have dividers between the melons and be of sufficient strength to withstand overhead weight. The watermelons within the box needs to be of uniform size. European consumers prefer the smallest sized cultivars of 2 to 5 kg per melon instead of the larger sized cultivars predominantly grown in the U.S. The new "ice-box" cultivars 'Minilee' and 'Mickylee' (3, 6) and the smaller sized seedless cultivars (4, 7) would be ideal for export to Europe.

## Vegetables

It is of great importance that all vegetables are clean and free of soil residue.

*Broccoli.* Broccoli has become very popular in Europe in the past five years. Most broccoli is packed in wooden

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crates or waxed corrugated fiberboard boxes containing 5 to 6 kg. The one-piece, regular slotted, corrugated fiberboard box is preferred by most importers. Most broccoli sold in Europe is film wrapped. Last year one shipper from the U.S. shipped broccoli successfully in fiberboard boxes with package slush ice and with top ice in van containers. Broccoli heads within a box should be of uniform size and weigh about 250 g per head.

*Carrots.* The preferred method for shipping carrots from the U.S. to Europe is a one-piece regular-slotted, corrugated fiberboard box containing 12 or 15 kg. Some shippers may use mesh bags but extreme care needs to be taken to prevent bruising of carrots on the bottom layers of the pallet. Carrots should be packed in 500 or 1,000 g film bag packages. Uniformity of carrot size within packaged lots is important. Mini carrots need to be in 200-250 g packages.

*Celery and Chinese cabbage.* The preferred shipping container for celery and Chinese cabbage is either the one-piece regular slotted or full-telescope corrugated fiberboard box. The fiberboard needs to be waxed. The desired net weight is between 10 and 12 kg with a few importers preferring net weights of 15 kg per box. Most receivers prefer 18 or 24 units per box. Individual stalks should weigh 500 to 600 g each and be trimmed to about 28 cm (11 inches) in length. Some receivers prefer celery hearts trimmed to 23 cm (9 inches). Most receivers prefer that these commodities be packaged in film bags or sleeves.

*Eggplant, green beans and peppers.* For this group a full-telescope corrugated fiberboard box is preferred. For green beans a net weight of 4.5 or 5 kg and for eggplants and peppers a net weight of 5 or 6 kg per box is desired. Some green bean boxes are separated into halves with a divider. Uniform size within a box is of utmost importance. Eggplants are generally wrapped with tissue paper. Peppers within a box should be uniformly colored; green, red, etc. Some peppers going to Scandinavian countries are being individually film wrapped. Most green beans are jumble-packed, but a few shippers and some receivers prefer them place-packed, where all beans are packed lengthwise. Most eggplants are preferred place-packed, whereas peppers are divided between jumble- as well as place-packed. Most imported peppers arriving in Europe are place-packed in tray-type boxes.

*Iceberg lettuce.* The preferred method for shipping iceberg lettuce is to individually wrap each head and pack 6 to 12 heads per box weighing about 6 kg. A few receivers prefer 20 or 24 heads per box. All receivers prefer their lettuce in corrugated fiberboard boxes either in a tray type box or a regular slotted box. Uniformity of head size and weight is considered important. The desired per head weight is about 400 to 500 g.

*Sweet corn.* Most sweet corn in Europe is packed 2 and sometimes 3 ears per tray and overwrapped with film. The ears are trimmed to 15 to 20 cm in length and partially or totally stripped of husks. The trays of sweet corn are packed in a tray-type or corrugated fiberboard box. Ten to 20 consumer packages are packed in the shipping container. Sweet corn is becoming more established in the European diet.

*Tomatoes.* Most tomatoes in Europe are grown indoors and are vine ripe. Small tomatoes are generally jumble-packed while larger tomatoes are place-packed one layer per box either on a tray or with dividers, or cell-packed. Small tomatoes can be packed in either part- or full-tele-

scope corrugated fiberboard boxes or in tray-type fiberboard boxes. Tomatoes are packed with 5 to 7 kg per box. The preferred method for larger "beef stake" tomatoes is 7 kg per box. Uniform size and color within a box is of utmost importance. Cherry tomatoes are generally packed in clear and rigid plastic consumer packages containing 500 g per package. Ten to 12 packages are packed per tray-type fiberboard box.

### Conclusions

Exporters should be aware that Western Europe is a major market for high quality fresh produce from many exporting countries. Normally, Florida producers of fresh produce can supply the European market during the winter months. However, competition from Southern Hemisphere countries can be expected. These countries are dependent on the export of their produce to Western Europe. But, more importantly, their shippers are willing to pack and ship the product the way the European receivers and consumers want. In order for U.S. shippers to compete on the European market, we must also supply what the market wants. If the market wants green beans packed in 5 kg fiberboard boxes, then we must comply in order to be successful exporters.

In general, we can conclude that fresh produce must be clean, well graded and sized, and packed the way the importers want. Sizing within the European market is much more vigorous than within the U.S. European importers must market within Europe according to the European regulations. Commodities must be clean and free of foreign residues. We see fresh grapes rejected for import to Western Europe because of dust residue and celery with soil residue on the stalks being refused entry. Net weight preferences per shipping container are of utmost importance. Importers generally expressed a strong preference of a certain net weight for a given commodity. In the fu-

ture, a maximum of 10 to 12 kg per shipping container may be enforced by the labor unions. Some retail chainstores are already requesting apples, pears and citrus to be packed in smaller-sized shipping units. Packaging needs to be functional and attractive. Multi-colored shipping containers are becoming the norm.

Fresh produce shippers in Florida and the remainder of the U.S. can be successful in exporting to Europe. However, they must be willing to make changes in their methods of product presentation and packaging. Successful exporting also depends on supplying what the market wants as far as cultivars of fresh produce are concerned. For example, European importers have asked for smaller watermelons for many years. The ultimate derived benefit from fresh produce exports will be increased returns from your production efforts.

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## EFFECTIVENESS OF CHEMICAL POSTHARVEST TREATMENTS FOR AVOCADO ANTHRACNOSE CONTROL

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**Abstract.** Suspensions of benomyl and prochloraz were compared as postharvest control of anthracnose (*Colletotrichum gloeosporioides*) on 'Pinkerton' avocados (*Persea americana* Mill.). Mature-green avocados were immersed for 20 seconds in the chemical suspension. Fruit were then held for 16 days at 13 C followed by ripening at 24 C before evaluation for anthracnose. Treatment in 0.2% prochloraz and in 0.05% benomyl plus 0.05% prochloraz satisfactorily controlled anthracnose after 16 days storage at 13 C.

Avocado (*Persea americana* Mill.) production throughout the world, including Florida has increased dramatically over these past 50 years. The production in California and Florida has reached a level that has affected marketing so severely that numerous acres have been removed from production in both states. Florida now has 10,076 acres (4,080 ha) of avocado producing a crop valued at over \$17 million (1). Probably the most serious pest which threatens avocado production and marketing throughout the tropical world is avocado anthracnose caused by *Colletotrichum gloeosporioides* (Penz.) Sacc. (2, 4, 8, 12). Avocado anthracnose comes from fruit infected prior to harvest by *Colletotrichum gloeosporioides* (11,12).

It is almost impossible to obtain anthracnose-free avocado fruit in spite of rigorous field applications of fungicides effectively reducing the disease (5,7,8,1). Once *C. gloeosporioides* establishes itself in the fruit of avocado, it becomes impossible to control, especially in the cultivars

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