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## PREPARING ARIZONA CITRUS FRUITS FOR MARKET

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Careful Picking, Grading and Packing Are Paramount in the Successful Marketing of Citrus Fruits on the Modern Standardized Market

**T**HE problem of the successful picking, grading, packing and storing of citrus fruit is closely related to the successful marketing problem. The problem of the grower is to determine grades that will appeal to the consumer, packs that will make an attractive appearance on the display stand, and methods of storing that will hold the fruit in a first class condition until a suitable market can be found for it. Soundness and good keeping quality are of fundamental importance in the successful disposal of a perishable fruit crop. No system of marketing can procure for the grower the highest market price for his product unless it is delivered in sound condition, so that it will remain in good merchantable condition for a sufficient time to allow for proper distribution to the consumer. If the grower can not deliver his fruit at the market in good, sound, attractive condition, the money and labor invested in his orchard enterprise are largely if not wholly wasted.

The losses from the decay of fruits in transit and on the market are due primarily to fungi which attack and cause decay and rotting of the fruit.

Broadly speaking, these fungi may be divided into two classes; parasitic and saprophytic. Parasitic fungi have the power to attack and cause decay in sound, uninjured fruit. Saprophytic fungi usually can gain entrance and cause decay only through injuries, mechanical abrasions, or breaks in the skin or cells composing it. It is safe to say that more than ninety-five per cent of the decay of citrus fruits occurring on arrival at the market and during the first ten days after arrival are due to attacks of fungi gaining entrance only through injuries of some kind.

There is not only the direct loss of fruit through decay but there are also indirect losses which may be attributed to three causes: first, to depreciation in prices of fruit actually sound; second, to proportionately high overhead expenses of handling a perish-



Damaged Fruits Such as These Find no Place on the Market and Must be Thrown Out

able product which develops great waste and spoilage in transit and after arrival at the market; and third, to a reputation for poor keeping quality. It can be readily seen that the importance of proper preparation of fruit for market cannot be over emphasized.

A brief review of the citrus industry in the Salt River Valley will show the growing importance of this industry in Arizona. Last year a total of three hundred carloads of citrus fruit were shipped from Phoenix, and of this number two hundred carloads were grapefruit. The fruit is handled through a cooperative organization, The Arizona Citrus Growers' Association. They maintain their own up-to-date packing house. The majority of the fruit grown in the valley is handled through this plant, securing for the growers the advantages of the latest methods and machinery in the economical preparation of fruit for the market. The present plant was built in 1921 and has a capacity of 1500 cars per season. The season extends from October to June. The order of importance of the varieties grown, based on the amounts grown, is as follows: Clayton grapefruit

first, Marsh Seedless grapefruit second, Washington Naval oranges third, Sweet Seedling oranges fourth, and Valencia oranges fifth. The present tendency in new plantings is to plant Marsh Seedless grapefruit and Valencia oranges. Lemons are handled throughout the year but this crop is of minor importance at present. Arizona grapefruit is marketed largely in California while the oranges are placed on the eastern market.

### Preparing the Fruit for Market

Unless the fruit is properly handled in the field at the time of picking the care exercised in the handling of the fruit in the packing house and the provisions of machinery and equipment especially designed to handle the fruit both economically and carefully are largely wasted. One of the most common as well as the most serious types of injury made in picking is what is known as "clipper cutting." In cutting the fruit from the branch the skin is often cut or punctured with the point of the clippers. Another common fault in picking is failure to cut the stem as close as possible. A long sharp and jagged stem projecting from the orange may injure all the

(Continued on next page)

fruit with which it comes in contact in the picking bag, field box, brushes, packing bin and the packed box. After the fruit is properly clipped it should be placed in the picking bag by hand, not dropped or thrown in as is too frequently done.

From the field the fruit is taken directly to the packing house where it is colored, cleaned, graded and packed. Upon arrival at the packing house the fruit is taken to the sweating rooms in the field boxes. This sweating process is necessary to color the fruit properly. Citrus fruits ripen or rather reach the proper sugar content stage before they color and it is necessary to put them through a sweating process to secure an even color on the fruit. The sweating rooms are usually about ten by ten feet in size and for best results should be air tight and fire proof. The common medium used for coloring citrus fruit is carbon monoxide gas. The room is kept at a fairly warm temperature, with a fair amount of humidity. The fruit is left in the sweating room sixty to ninety hours depending upon the degree of ripeness when placed in the bin.

In the last few years a new method of coloring has been devised known as the Ethylene gas method. The method consists in releasing a measured amount of ethylene gas into an ordinary sweat room or under tents where the fruit is stored. When the inclosures are reasonably tight one cubic foot of gas to five thousand cubic feet of air space is sufficient. One cubic foot of gas morning and noon and two at night is the usual application. Seventy-five to eighty degrees F. is the optimum temperature for coloring. One special advantage of this gas is that it penetrates evenly throughout the room and the fruit is colored evenly. It has also been found that the fruit will develop additional color for twenty-four hours after being removed from the room or tent so it is not necessary to leave them exposed to the gas until fully colored.

After the fruit is properly colored it is started through the process of cleaning, grading and packing. Arizona fruit is produced under such ideal conditions that washing the fruit is not necessary, all the cleaning required being a thorough brushing of the fruit. This is done by running the fruit over a series of revolving brushes that remove any particles of dirt or dust that are on the fruit.

The next step is grading. The fruit is run on the grading belt directly from the cleaner. Grading is done by hand, usually by women specially

trained for the work. All damaged fruit, greatly oversized or undersized and odd shaped fruits are removed entirely. The remaining fruit is then separated according to grade and carried on separate carriers to the sizer.

Fruits entirely free from blemish are classed as first grade and fruits slightly damaged or odd shaped are classed as seconds. The tendency now is to establish more uniform regulations regarding grading, to market certain grades under established brands, and never to ship under such brands any but fruit coming up to the specified grade. The uniformity of grading and the dependability of grades do much to establish the reputation of particular brands on the market. On the way to the sizer the fruit is run through a stamping machine where the trade name is placed on each individual fruit. The trade names used for oranges are: First grade, Sunflower; second grade, Goldenrod. For grape fruit the trade names are: First grade, Arizona Desert Sweet; second grade, Cactus. This system of stamping the fruit is of great value for identification of the fruit on the market and is an efficient and economical means of advertising Arizona fruit.

Separate sizers are provided for each grade and one bin for each size of a grade. Accuracy in sizing is of great importance in determining the appearance of the pack and the price paid for the fruit on the market.

After the fruit is sized properly it is ready for the packers. Good packing involves both science and art. Next to soundness and keeping quality the appearance and attractiveness of the pack are the greatest factors in determining the market price of fruit. The fruit is placed in the box in its respective order of arrangement according to the size. Each size of fruit has its own order of arrangement and the size is designated in the packing house and on the market not by the diameter of each fruit but by the number required to fill a box. The sizes are as follows:

**ORANGES**

Size (No. per box)	Av. diameter in inches
96	3 3-8
112	3 1-4
126	3 1-8
150	3
176	2 7-8
200	2 3-4
216	2 5-8
250	2 1-2
288	2 3-8

The most common sizes being 126, 150, 176, 200, and 216 to the box.

**GRAPEFRUIT**

Size	Av. diameter in inches
64	3 5-8
80	3 1-2
96	3 3-8
126	3 1-8
150	3

A very high pack is customary so that the covers must be forced on with a machine thus preventing any movement of the fruit in the box. The disadvantage of this method is that in squeezing the fruits down into the ends of the box by means of the cover many of the fruits are injured, resulting in decay in transit. The best pack for all purposes is a firm moderately high one, all of the fruit being packed in tightly from bottom to top. In the packing of citrus fruit each fruit is wrapped in thin tissue paper, different sizes of paper being used in accordance with the size of the fruit being packed. The name of the grower, association or marketing organization with its brand or trade mark is generally printed on the wrapping paper.

After the fruit is properly packed it is ready for shipment. Space will not permit a detailed account of the method of loading the fruit in the cars. Sufficient to say that it is of great importance that the boxes be so loaded in the car that there will be no shifting or breakage in transit.

The Arizona citrus fruit industry is still in its infancy. The present acreage is about 7500 acres with many new orchards going in every year. There is a very large area in Arizona ideally located with regard to climatic conditions, with good soil and water supply, awaiting the time when desirable nursery stock can be secured. Rigid state quarantine laws prevent the introduction of nursery stock from out of state sources and it is to these same laws that we are indebted for the fact that Arizona is free from citrus scale and other serious citrus pests. The citrus growing districts of Arizona are particularly fortunate in being able to grow a product of superior quality. Blessed with an ideal hot dry summer climate and a mild winter climate that imparts an excellent flavor to the fruit, there is every reason to believe that with proper methods in picking, grading and packing, Arizona fruit will continue to top the market and pay a premium to the grower fortunate enough to own an orchard in Arizona.