ARE WE GOING TO EMPLOY CONTROLLED ATMOSPHERE STORAGE OF APPLES IN OHIO?

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Controlled atmosphere storage of apples is steadily increasing in the northeast and in Michigan. Will Ohio benefit from the use of this type of storage? To answer this question, it is necessary to review the marketing situation in this state. With a relatively large market close to the centers of production, Ohio has a ready market for the sale of its fresh fruit. Many growers maintain road-side stands or sell to others who have these stands. Orderly marketing of Ohio apples has been favored for many years. This means that when this fruit is mature, much of it moves immediately into market channels. Some of this fruit is stored in refrigerated storages for one or two months only. Marketing specialists report that storage of apples in Ohio does not always return a profit on the operation. All of these factors have an important bearing on the value of controlled atmosphere storage.

It seems unlikely that this new type of storage is necessary for fruit that is to be held for the holiday trade. To be sure, it does increase considerably the shelf life of apples. However, fruit held in conventional cold storage, if properly handled on the markets, provides excellent quality for the consumer. Thus it would appear that CA storage is not required for this orderly marketed fruit nor would it necessarily pay for the additional cost of this new method of storage. On the other hand the few large growers in this state who may require lengthy storage of their large crops should be interested in the possibilities of CA storage and for the same reason that influences growers elsewhere to make this investment.

If our growers are to benefit from CA storage, they will have to hold some of their apples for late winter, spring and summer marketing and face competition with CA stored apples where ever they appear. Ohio growers then may or may not benefit from CA storage and should investigate thoroughly before constructing such a storage.

What is involved in CA storage?

Growers should know that CA storages require gas tight rooms. This is accomplished by the use of steel linings, certain grades of plywood or "Foamglas" insulation with special joint treatment. This will cost in the neighborhood of 25% more than a conventional storage. An atmospheric washer employing caustic soda solution must be used to maintain the proper concentration of carbon dioxide. This adds 2 cents per box to the annual costs for the soda used, and the initial equipment cost

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may be $200. Another $100 will go for an all-glass gas analyzer and air blower fan. Several other pieces of equipment such as temperature and humidity indicators, gas mask, air tight door, etc., may cost another $200.

Since the storage atmosphere must be analyzed and scrubbed twice daily, it may require an extra man's time if the grower must be away on other business. Other equipment such as an activated cocoanut shell carbon air purification machine and breather bag is recommended.

General Operation.

Not all varieties respond equally well to CA storage. Some even respond adversely. Ohio varieties which may be gas stored are: McIntosh, Delicious, Golden Delicious, Rome Beauty, Northern Spy, Stayman Winesap, Baldwin, Jonathan and Macoun. Mixing varieties is permissable if they mature at the same time. McIntosh and Macoun may be stored together, also Delicious, Golden Delicious, Rome Beauty and Stayman Winesap together, as well as Jonathan and Baldwin.

Fruit disorders are better controlled in CA storages, but not entirely controlled. Considerable improvement in control is had with scald, ordinary decay, bitter pit, brown core, soft scald, soggy breakdown and internal browning.

Particular attention must be paid to correct maturity, prompt storage (within 24 hours after picking), careful handling, high grade and high quality fruit, prompt filling of the room (10 to 14 days), proper stacking, entirely filling the room and close control over temperature and humidity.

Advantages and disadvantages

Storage life is markedly increased, in some cases doubled. Shelf life greatly increased; a very striking effect of CA storage. Scald is reduced by approximately one-third. Other disorders greatly reduced and some completely prevented. Mice and rats are completely controlled.

Apples cannot be inspected frequently unless an air mask or oxygen mask is used. Not all varieties can be stored in the same room. It is more expensive than conventional storage. A definite speculative risk is involved, especially for long storage.

Precautions

The room must be gas tight to result in a low oxygen atmosphere. Only a full room will lower the oxygen to a low enough level fast enough. Only high quality fruit of proper maturity will justify

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the added expense involved. The room must be filled in 10 to 14 days. A proper atmosphere must be selected and maintained by twice daily checks to a close tolerance. The relative humidity must be maintained at 90 to 95 percent. The apples must be properly stacked and good air circulation provided. Never enter the room without an air mask or oxygen mask. Control odors in the room. Handle the caustic soda solution so as not to burn your skin, lungs, or clothes.

Source material for this mimeograph and for further reading:

Cornell Extension Bulletin 759, May, 1958. Controlled-Atmosphere Storage of Apples by R. M. Smock. New York State College of Agriculture, Extension Service, Ithaca, N.Y.

Massachusetts Experiment Station Bulletin 505, August, 1958. Design Details and Performance Characteristics of a Douglas Fir Plywood CA Apple Storage, by John W. Zahradnik and F. W. Southwick. University of Mass., College of Agriculture, Amherst, Mass.

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