



INSTITUTE OF FOOD AND
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PACKINGHOUSE NEWSLETTER

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A NEW FUNGICIDE

Imazalil, which has been in our fungicide testing program for some years, has recently been approved for use on Florida citrus fruits. Approval was granted for a year under a temporary Section 18 emergency clearance because of the need for a material to control green mold resistant to benomyl (Benlate) and thiabendazole (TBZ). Treated fruit (eliminations) may be utilized for juice and by-products.

Imazalil is quite effective against Penicillium digitatum (green mold), including resistant strains, slightly less effective than benomyl or TBZ for stem-end rot control, and ineffective against sour and citrus brown rot. Imazalil is labeled for use in a wash tank (500 ppm), drench (750 ppm), and nonrecovery water (1000 ppm) or water wax (2000 ppm) spray application. The material is an expensive product that merits careful and selective use where resistant molds are known to be present, as in houses packing lemons where fungicide-treated fruit are held in coloring rooms for several weeks.

Present suppliers and their trade names for imazalil are:

Brogdex	Bromazil
FMC Corporation	Freshgard 68
Janssen Pharmaceutica	Fungaflor
Decco Tiltbelt, Pennwalt	Deccozil and Deccozil EC-289

Other companies wishing to distribute imazalil, but not currently having an EPA-approved label and trade name, should contact: Mr. William R. Goodwine, Agricultural Products Manager, Janssen R. and D., 501 George Street, New Brunswick, NJ 08903, Phone: (201) 524-9706. Suppliers are reminded that all postharvest citrus chemicals must be registered with the Division of Fruit and Vegetable Inspection, P. O. Box 1072, Winter Haven, FL 33880, Phone: (813) 294-3511 (see Packinghouse Newsletter No. 109, March 13, 1980).

As of time of writing, imazalil is approved in USA (Section 18 clearances in Florida, California and Arizona), FAO/WHO (Codex), Belgium, Denmark, Finland, France, West Germany, Ireland, Netherlands (Holland), New Zealand, Norway, Spain, Sweden, Switzerland, South Africa and Australia. Residue tolerances of whole fruit range from 2 to 10 ppm (see Packinghouse Newsletter No. 119, July 10, 1981). Imazalil is not approved in Canada or Japan. Imazalil will not satisfy the Florida requirement for a postharvest citrus fungicide at this time.

To comply with Federal requirements, containers filled with fungicide-treated citrus fruit must be labeled with the common name of the fungicide(s) and the reason for use. When a bagmaster carton is so labeled, the bags of fruit packed in the carton do not require individual fungicide labels.

The label could read:

"Imazalil and thiabendazole used as fungicides"

Labels must declare all fungicides used and must not include fungicides that are not used.

G. Eldon Brown
Florida Department of Citrus

Bill Grierson, AREC
Lake Alfred

IS PLASTIC FILM WRAPPING OF CITRUS A PRACTICAL PROPOSITION?

Interest in plastic film wrapping of individual citrus fruits was first aroused in Australia in 1978 by Israeli scientist, Dr. S. Ben Yehoshua. He showed that citrus fruit individually sealed in high density polyethylene film was maintained in a fresh condition for several months after harvest.

Since then, further work has been carried out by the South Australian Department of Agriculture and two machines manufactured by Koor for wrapping citrus fruits in plastic film have been imported from Israel and installed in packing sheds at Waikerie and Mildura.

Scientists, packers and engineers in other parts of the world have become interested and at least three companies are developing film wrapping machines. Alternative plastic films, including low density polyethylene, PVC and various co-polymers, are being tested. The alternative plastic films are more transparent than high density polyethylene and look better at the point of sale. Brand names can be printed on to the film in an attractive way, eliminating the need for individually stamping each fruit.

Plastic film wraps work by reducing the rate of water loss from the fruit. This in turn slows the deterioration of the fruit which is normally accelerated by weight loss. Cold storage of citrus at temperatures low enough to slow deterioration is not possible because the fruit is susceptible to cold injury which causes sunken brown pits and scalding on the rind. Fruit wrapped in plastic film can be stored at temperatures of 16 to 22°C (60 to 72°F).

Waikerie Co-op. Producers Ltd. have wrapped grapefruit in H.D.P. film to extend the marketing season through the months of December, January and February when the quality of fruit left to hang on the tree is poor. Several hundred tons of grapefruit were film wrapped and stored at Waikerie in the seasons 1980 and 1981 and much has been learned from the commercial operation.

If fruit is to be stored for an extended period of time, only quality fruit should be selected and harvested at the peak of maturity. In order to obtain a commercial extension of the marketing season, it is necessary to delay the maturation of the fruit by field spraying with G.A. and 2,4-D.

Proper postharvest treatment with fungicide is essential for long-term storage of film wrapped citrus. Treatment with 2,4-D is also recommended. 2,4-D slows deterioration of the stem end of the fruit and prevents Fusarium and Alternaria fungi from invading the tissue and eventually causing complete breakdown.

Having the 2,4-D in the dip ensures that each fruit comes in contact with the hormone and the fruit is treated at the earliest possible stage but 2,4-D can pose a disposal problem when it comes time to change the dip. If it is added to the wax, there may not be complete cover with some units. Adding 2,4-D to the wax has convenience in its favor but whatever method is used a complete cover is necessary.

It has been suggested that waxing may be unnecessary with film wrapped citrus but so far this has not been tested in the market place in Australia.

After dipping, normal careful grading, sorting, sizing, waxing and fungicide application during the run over the grader, sets up the best of the fruit for the wrapping machine. Injury points on the grader have more significance with fruit which is to be film wrapped and stored because wastage will inevitably show up in time whenever injury occurs.

The Koor machines used in Australia have a theoretical capacity for wrapping four fruits per second but in practice the thru-put has been a lot less than that. Some factors which combine to lower the efficiency of the machines at this stage are: 1) difficulty in keeping the elevators full all the time, 2) time lost in replacing plastic film, 3) time used in adjusting to each run of a size, 4) the worst feature of all is the difficulty in maintaining the critical temperature of the hot knives which cut and seal the plastic film. Waikerie Co-op. Producers have put a lot of time and effort into overcoming this critical temperature problem.

The Koor machine works best with near spherical fruit such as oranges and grapefruit. Lemons can be wrapped but the risks of fruit injury are greater as lemons pass through the machine so that consequent infection and wastage are increased with this fruit. Since there are obvious benefits to be gained from storage of lemons, it is probable that future developments in film wrapping machines will pay more attention to them.

Plastic film wrapped citrus should be kept cool but not cold. 16 to 22°C are ideal storage temperatures with short periods of a few degrees above or below that range being tolerated. These temperatures can be achieved by using a simple cold night air storage system.

The arid South Australian citrus growing areas generally have cool nights even in mid-summer. A suitable storage space for film wrapped citrus can be constructed by spraying 50 mm of foam polyurethane on the inside of a suitable building and ventilating it with cold night air whenever the temperature outside is colder than room temperature. This can be achieved automatically by fitting a differential thermostat.

Citrus fruit wrapped in film can be transported to overseas markets at higher temperatures than are generally used at present. It may be possible to use nonrefrigerated containers to take advantage of lower freight costs.

The marketing season for citrus fruits can be extended without the need for investment of large amounts of capital in cool storage.

The quality of citrus purchased by the consumer will be maintained until the fruit is eaten.

Contamination of fruit from other fruit which develops wastage is avoided.

There is still a lot to learn about both the market potential and the technical problems of film wrapped citrus. A lot of work and money is being invested in the development of the concept in several citrus growing countries. Obviously the people involved have a lot of faith in the possibilities of plastic film wrapping for citrus.

Barry Tugwell & Kevin Gillespie
Packingshed Newsletter No. 9
March 16, 1982
Dept. of Agriculture
Waikerie 5330 South Australia

Scientists at Lake Alfred and Orlando are continuing to work on individual film wrapping of citrus fruit, also known as UniPack.

Editor

AVAILABLE PUBLICATIONS

Available from Dr. W. Wardowski, AREC, 700 Expt. Sta. Rd., Lake Alfred, FL 33850

"Harvesting Florida citrus for overseas markets" by W. Grierson. Proc. Fla. State Hort. Soc. 94:252-254. 1981.

"Packinghouse operations and shipping conditions of citrus for export" by W. F. Wardowski. Proc. Fla. State Hort. Sci. 94:254-256. 1981.


"Regulatory actions affecting the use of ethylene dibromide in quarantine fumigation of citrus fruits" by M. A. Ismail, J. O. Craig and W. M. Miller. Proc. Fla. State Hort. Soc. 94:263-266. 1981.

"Trends in energy use in Florida citrus packinghouses" by W. M. Miller, W. F. Wardowski and S. Nagy. Food Technology 36(5):227-230. 1982

Available from Dr. T. T. Hatton, USDA, 2120 Camden Rd., Orlando, FL 32803

"Reducing chilling injury of grapefruit by prestorage conditioning" by T. T. Hatton and R. H. Cubbedge. USDA, ARS, Advances in Agricultural Technology: AAT-S-25. June 1982.

This newsletter is published at a cost of \$85.26 or 6 cents per copy, to give the latest news to the packinghouse industry


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