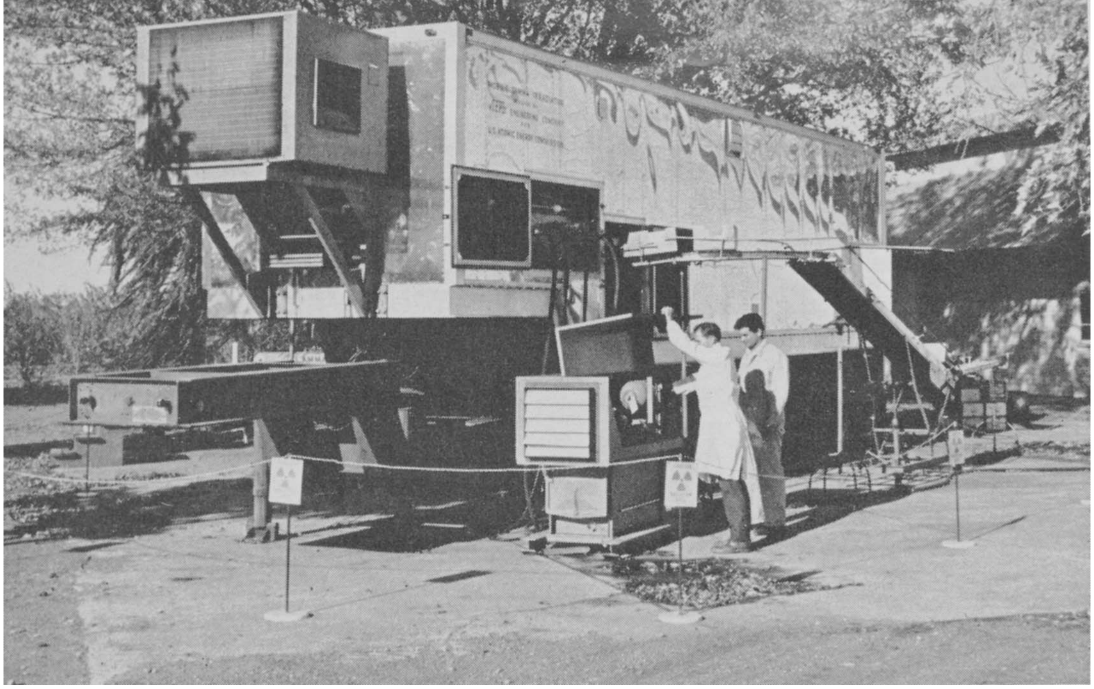

F. P. GUERRERO

The Mobile Gamma Irradiator, showing the input conveyor, the outboard hydraulic system, and the refrigeration unit mounted at the top of the front end of the trailer.

MOBILE GAMMA IRRADIATOR

SINCE THE INSTALLATION on the Davis campus of the Mark II Gamma Irradiator in 1962, research in food irradiation progressed to the point that it was desirable to begin semi-commercial test shipments involving large quantities of fruits and vegetables—to evaluate the effects of actual transit on irradiated fruits and vegetables.

To accomplish the irradiation of large quantities of fruits and vegetables, the Division of Isotopes Development of the U. S. Atomic Energy Commission contracted for the construction of the Mobile Gamma Irradiator (MGI). The MGI was designed by Vitro Engineering Corporation of New York. The unit was fabricated at the Georgia-Lockheed Company and delivered to the Department of Pomology on the Davis campus of the University in June, 1966.

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Trailer assembly

The components of the MGI are mounted on a 40-foot heavy-duty, dual trailer assembly supported by four dual-wheel axles and a landing gear. The total weight of the unit excluding tractor is 56 tons.

The radiation source consists of 19 Brookhaven National Laboratory (BNL) standard strips of cobalt-60 with a total activity of 80,000 curies. Each strip is doubly encapsulated in stainless steel and placed in a stainless steel envelope. This assembly constitutes the cobalt-60 "plaque." When not in use, the plaque is kept in a 4- × 4- × 3-ft storage cask with walls of 11-inch-thick lead, plus 1-inch-thick steel. The cask weighs 7.65 tons, is removable, and can be shipped separately for repairs or source renewal.

The 9½- × 5- × 5-ft irradiation chamber consists of lead walls 9 inches thick, lined inside and out with ½-inch steel weldments, and weighs 28 tons.

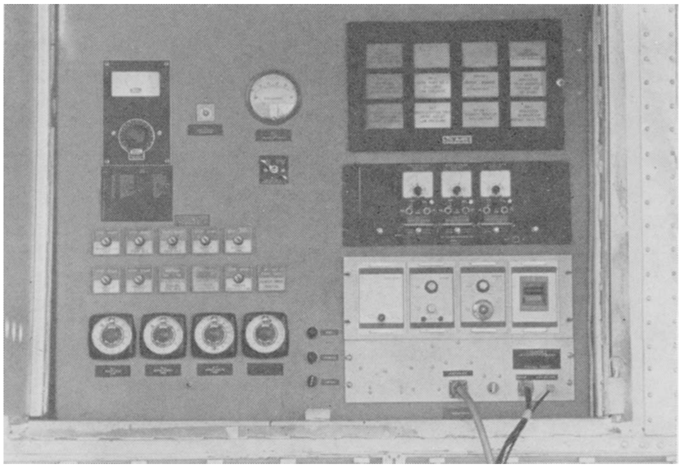
The irradiation chamber has room for eight commodity carriers which are aluminum boxes capable of containing two strawberry trays or one "L.A. lug." The commodity carriers are positioned around the plaque in a rectangular configuration during irradiation and are propelled through the irradiation chamber by a series of 12 hydraulic rods. To achieve a uniform exposure to the gamma rays, the carriers are moved sequentially into eight dwell positions around the plaque. The dose absorbed is directly related to the time in the field.

Conveyor system

The conveyor system consists of two electrically powered belt conveyors, two 90-degree power turns, and about 40 ft of roller-skate conveyor. This system moves the carriers up to the input elevator where the hydraulic system takes over and moves them into the irradiating positions. After the carriers leave the irradiation chamber, they are ejected onto the output conveyor and returned to the rear of the MGI.

The air conditioning and refrigeration system provides low-temperature brine (40% methanol, 60% water) to coils embedded in the walls and cap of the irradiation chamber. The system also provides controlled-temperature air moving at 125

E. C. MAXIE

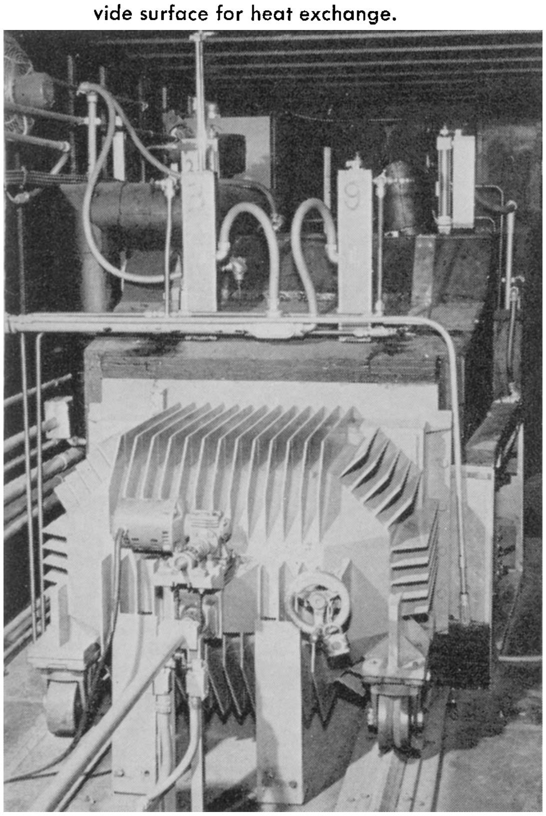


A view of the instrument panel of the Mobile Gamma Irradiator. Thermostat and temperature monitors at top left. Indicator lights, controls and timers at bottom left. Top right, annunciator panel and radiation monitor controls. Bottom right, modules for product monitor.

cfm through the chamber to maintain the desired temperature of the commodity and eliminate ozone formed by action of gamma rays on atmospheric oxygen.

The operation of the MGI is controlled at the instrument panel where the operator can adjust dwell time, defrost interval, defrost duration, and temperature. Included at the panel are temperature monitors and an annunciator panel which indicates malfunctions that may occur in some of the units of the MGI.

A view of the cask containing the cobalt plaque in the Mobile Gamma Irradiator. The fins provide surface for heat exchange.



In addition to the safety provided by the lead shielding of the cask and irradiator body, various electrical and mechanical safety devices have been installed to insure the safe operation of the MGI. To monitor the irradiation levels outside the chamber, three monitors are located at strategic points. They are connected to stations at the instrument panel and activate alarms if the radiation level exceeds the preset level. A second device is the key-interlock system which precludes opening of the access door to the irradiation chamber if the rotary gate of the cask is not closed and locked. A radiation survey of the MGI was made to determine any areas of high-intensity radiation. Also, an isodose rope barrier is set up around the MGI to exclude all personnel during the time the unit is in operation.

The through-put capacity of the unit is dependent on two factors: the radiation dose; and weight of the fruits or vegetables per carrier. At the present the unit can irradiate 625 lbs of strawberries per hour at 200 Krad, and up to 5,600 lbs of potatoes per hour at a dose of 10 Krad.

Since the arrival of the MGI, work conducted with the unit has involved two test shipments of strawberries, two tests to study the effects of irradiation on tomatoes and honeydew melons, and the irradiation of 28 tons of bananas and 50 tons of strawberries for two-year animal feeding studies. Future plans involve a series of test shipments of various fruits and vegetables.

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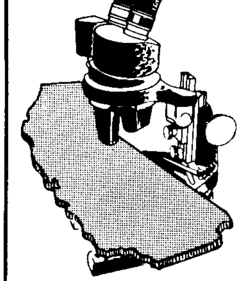
RESEARCH PREVIEWS



A continuing program of research in many aspects of agriculture is carried on at University campuses, field stations, leased areas, and many temporary plots loaned by cooperating landowners throughout the state. Listed below are some of the projects currently under way, but on which no formal progress reports can yet be made.

MECHANIZATION VS. PESTS

Experiment Station and Extension Service staff members are cooperating on experiments to evaluate the effect of mechanization of certain crops on conventional pest control measures. It is felt, for instance, that the lower seeding rates made possible by precision planting (for example) may necessitate better pest control to insure desired plant densities. Precision-planted fields do not allow for as high a plant mortality rate as those planted in the traditional way.

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UNWANTED PLANT STUDIES

Botanists at Davis, Berkeley, and Los Angeles are studying groupings of some uncultivated (usually unwanted) plants occurring in California. The botanists feel that it may be possible to control several unwanted plants by eradication of just one that may influence the growth of the others.

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LIVESTOCK DISEASES

Veterinary scientists at Davis are working with nine other experiment stations, Extension Service workers, and cooperating ranchers in the western states to study several diseases of livestock that cause reproductive failure. The origin and cause of some of these diseases remain a complete mystery. As a by-product the researchers hope to develop methods of control and prevention of infertility and abortion.

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CHEMICALS FROM BARK?

In many logging operations the bark on cut trees presents only problems of removal and disposal. Researchers at the Forest Products Laboratory in Richmond are trying to learn more about how to use bark; what chemicals may be extracted from it and how these chemicals may be put to efficient use in agriculture and manufacturing.