CONTROLLED ATMOSPHERE TREATMENT FOR COMMODITIES

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Department of Defense (DoD) established a partnership with commodity experts from American President Lines, TransFRESH Corp., and the University of California at Davis, in an effort to increase the shelf life of fresh fruits and vegetables shipped to overseas customers. The Team incorporated specific controlled atmospheres to extend the commodity shelf life and in addition, the low oxygen regimes controlled the quarantinable surface insects.

Recent technological advances have resulted in the development of modified and controlled atmosphere sea transport shipping containers used by commercial exporters to extend commodity shelf life and to kill insects and other pests. Increased use of this technology has been driven by new innovations and developments that have allowed transporters to maintain extremely low oxygen and ethylene concentrations resulting in both decreased commodity decay rates and control of pests.

Controlled atmosphere technology has revolutionized overseas commodity transport for the Department of Defense. The technology has resulted in substantial economic savings for the Department of Defense because the use of controlled atmosphere marine containers has allowed DoD to switch from air to surface transport. In 1993, estimated annual cost savings for DoD totaled $2.9 million.

Controlled atmosphere is a process where natural atmospheric gas constituents are manipulated to create a specialized environment which protects and extends the storage life of a given product. It is an advanced post harvest tool used in conjunction with strict temperature control, to limit the availability of oxygen to fresh fruit and vegetables and prevent the aging process during ocean transit. The aging process is curtailed by reducing tissue respiration.

The initial test was to ship over 120 perishable line items to Guam with a potential in-container time of 16 days and to achieve a marketability of 4-7 days on arrival. This was accomplished by creating eight different groupings of produce according to temperature and atmosphere compatibility's which were then given specific alphanumeric designations for container reference. In some cases, the optimum temperatures and atmospheres of individual commodities were compromised to enable these groupings. The results were virtually all commodities benefited with outstanding marketability at a significantly reduced cost.

All fresh fruits and vegetables shipped by the DoD into Guam, are subjected to a rigorous quarantine inspection. If during this inspection the presence of "live" surface insects (aphids and thrips) are uncovered the commodities are quarantine. The quarantined products in Guam, are fumigated then discarded disallowing any opportunity for

recoupment of cost. The phytotoxin methyl bromide is a frequently used fumigant of infested produce arriving in Guam that can reduce the shelf life of sensitive lettuces to just 2-3 days, depending on the temperature at the time of treatment. Three days of retailing damaged product will not compensate fumigation and subsequent salvage costs. Controlled atmosphere was looked upon two years ago as a potential solution to methyl bromide.

Research continues as a disinfestation tool in both private and government sectors. Cooperative laboratory and field tests conducted by TransFRESH Corp., Special Commodities Services LLC., Defense Subsistence Office Richmond, and Defense Personnel Support Center, were aimed at screening effective treatments against aphids, thrips, and scale insects in cargoes of mixed produce to Guam and Okinawa. The laboratory trials have shown that shock treatments are effective without harming the produce. Field trials have confirmed laboratory trials but also demonstrate the shortcomings of older equipment inability to maintain those effective atmospheres.

These trials will continue as new equipment becomes available and more laboratory data is collected on produce tolerance to low oxygen environments.