CARBON DIOXIDE FUMIGATION AS A METHYL BROMIDE ALTERNATIVE FOR THE DRIED FIG INDUSTRY

A. Guray Ferizli Mevlut Emekci*
University of Ankara, Faculty of Agriculture, Department of Plant Protection 06110 Diskapi, Ankara-TURKEY

Turkey is one of the most important producing and exporting countries of dried fruit (figs, raisins, apricots, hazelnut, pistachio etc.). To control pests that infest these commodities in storage, methyl bromide (MB) is the only existing suitable fumigant. Compared to the other dried fruits, dried fig production is the most heavily threatened, since Turkey is the world leader in this dried fruit trade with an annual production amounting to some 50.000 tons, comprising 60 to 75% of the international market. The main post-harvest problem in the dried fig industry is the presence of storage pests. Compared to the other dried fruits, dried fig production is the most heavily threatened. At present, depending upon specifications stipulated by the importers, the main control measure is still MB fumigation. However, the progressive phase-out of the use of MB will have a serious impact on industries and consumers that rely on it for post-harvest commodity treatments.

In this series of experiments, carbon dioxide (CO_2) fumigation of dried figs, as an alternative to MB, was carried out in a flexible storage unit (5 tonnes capacity Volcani Cube storage unit also known as Cocoons™) for three, four and five days exposure periods. The unit was loaded with 3.5 tonnes of dried figs inside perforated plastic boxes. Test insects were *Plodia interpunctella* (larvae), *Oryzaephilus surinamensis* (adults and eggs) and *Carpoglyphus lactis* (mixed stages). They were introduced into the boxes inside perforated plastic containers The storage unit was equipped with temperature/relative humidity loggers (Onset Co. USA, model: Hobo). To sample the intergranular atmospheric composition, PVC tubing (3-mm i.d.) was inserted to the bottom and upper part of the storage unit and led out of the storage unit through a sealed gasket. Then, the storage unit was closed using a gas-tight zipper. CO_2 from a steel cylinder was flushed into the unit from the base section of the cube after a low pressure or partial vacuum was obtained from upper section of the unit. Gas introduction was repeated 3 or 4 times after creating a partial vacuum within the unit When the desired gas concentrations were reached, the unit was left in an inflated condition and the gas inlet and outlet taps were closed. CO_2 and oxygen (O_2) concentrations in the unit were then monitored daily by an analyser equipped with a thermal conductivity detector, and an electrochemical detector respectively, for the above-mentioned exposure periods.

The results showed that O_2 concentrations in the containers decreased to 0,8% and CO_2 concentrations increased to 96%. For the following 5 days both O_2 and CO_2 concentrations remained stable. The level of gas tightness of the unit contributed to minimal changes in gas composition during the experiments. This study indicates that dried figs can be effectively disinfested by CO_2 without the use of MB.