Title Use of a palladium catalyst to improve the capacity of activated carbon to absorb ethylene, and its effect on tomato ripening

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Abstract

The aims of this work were to study the ethylene adsorption capacity of different types and masses of activated carbon, to predict the performance of the ethylene adsorption process, to improve the removal of ethylene by impregnating granular activated carbon (GAC) with palladium, and to analyse the effect of this product on the removal of ethylene released from tomatoes. In an in vitro system, both GAC and powdered activated carbon (PAC) effectively absorbed exogenous ethylene; GAC was the most effective. Maximum adsorption was achieved with carbon masses of 1.25 g/L or greater. The best model describing the adsorption of ethylene by GAC was the Langmuir isotherm. To increase ethylene removal, a system involving an adsorbent (GAC) and a catalyst (1% palladium) was developed. This was tested in an in vivo experiment involving the removal of ethylene produced by three tomato cultivars inside sealed jars. Ethylene removal led to a delay in tomato ripening; smaller changes in fruit firmness and colour were observed compared to controls. This system could provide a useful way of eliminating ethylene from storage areas and thus maintaining tomato fruit quality, which can be negatively affected by ethylene.