

Evaluation of Two New Products with Claimed Ethylene Removal Capacity

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Recently, two products have come to our attention with claims of being able to reduce ethylene levels around horticultural commodities. Peak Fresh® is a plastic film manufactured by Chantler Packaging Inc. The manufacturer claims that the bag will reduce the ethylene level around the produce stored within it. The other product is called Conserver-21® and is not yet commercially available in the United States. Conserver-21(C-21) is a potassium permanganate (KMnO₄) based ethylene scrubber. The C-21 is in an extruded clay (zeolite) matrix, looking like purple rabbit food. The KMnO₄ - clay pellets (7-10 grams) are enclosed within a Tyvek® bag. The manufacturer claims their product is superior to Purafil® (KMnO₄ - aluminum oxide) because it removes more ethylene than does Purafil in high humidity situations.

Both products were tested for their ethylene scrubbing abilities in a static system in both low and high humidities. The C-21 was also tested to determine the total amount of ethylene one sachet could scrub.

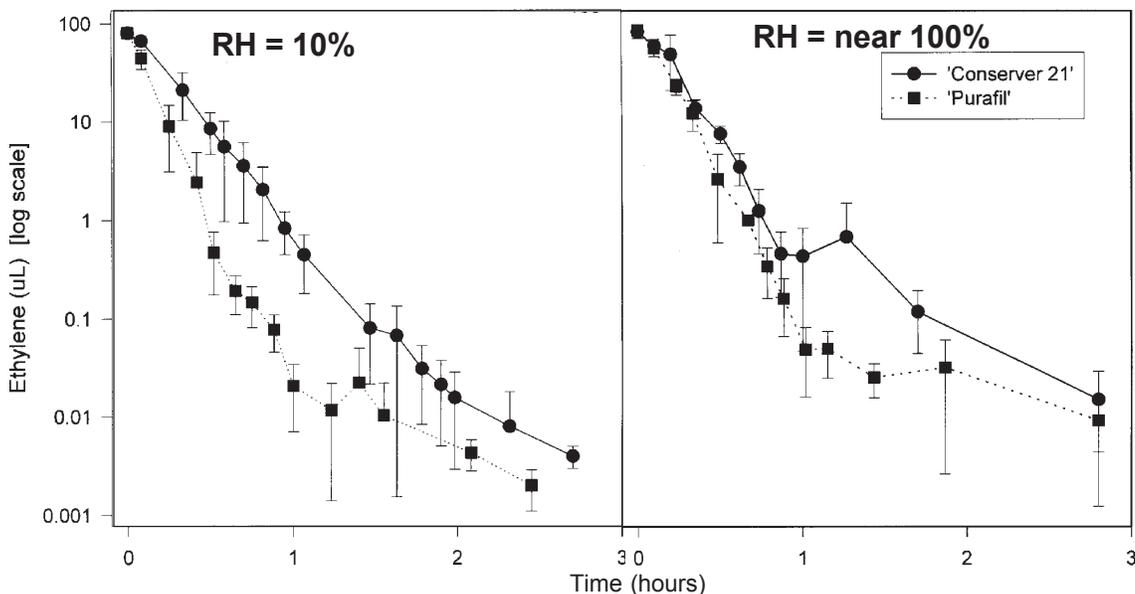
The Peak Fresh bags tested in low and high humidity did not remove a measurable amount of ethylene. These bags were placed in a sealed 1 quart jar

with 1 part ethylene to 1 million parts air (1 ppm). The ethylene concentration was measured for up to 24 hours. There was no difference between the jars with a bag and jars without a bag. The bags could be used to maintain product quality by keeping a high humidity around the product. But based on our evaluation there is not enough ethylene scrubbing capacity to impact product quality.

Conserver-21 proved to be effective at removing ethylene. Tested against an equal amount of Purafil, C-21 had a slightly slower scrubbing rate than Purafil in both low and high humidity conditions (Figure 1). This difference between the two products was smaller under the high humidity environment during the first hour of testing.

A separate experiment was run at 90% RH to determine the total amount of ethylene scrubbed by C-21 and Purafil. On average one sachet of C-21 (7.25 g) scrubbed 12,747 µl of ethylene. An equal amount of Purafil scrubbed 5,983 µl of ethylene. The C-21 removes a greater amount of ethylene than Purafil on a per wt. basis.

Figure 1 The rate of ethylene removal by 7.25g of Conserver-21 or Purafil from a sealed container at two different humidities at 20°C (68°F).



For high value, ethylene sensitive commodities, using scrubbers can be a cost effective method to maintain quality. In most cases, ethylene concentration should be kept below 1 ppm. With kiwifruit exposure to as little as 0.005 to 0.01 ppm ethylene will induce fruit softening. The rate at which the scrubber can remove ethylene is critical to maintain levels below the product's threshold concentration. The capacity of each scrubber to remove ethylene determines the amount that should be included with a given quantity of the commodity. These factors as well as the cost should be considered in selecting the optimum scrubber for each situation.