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Antitranspirants: Vapor Gard and Wilt Pruf[1] Maintained the Quality of Hamlin Orange Fruits.

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ABSTRACT

Film forming antitranspirants significantly reduced weight loss of 'Hamlin' orange fruits stored for 10 weeks at room temperature (15±3°C). Vapor Gard (VG) at 1% and Wild Pruf (WP) at 10% reduced weight loss by 45 and 32 percent, respectively. Juice extract was significantly higher in treated fruits than in control. VG at 1% was far superior to WP in reducing weight loss. Fruits treated with VG were fresher than the control and were marketable after 3 months of holding. Both antitranspirant materials had no effect on acidity and ascorbic acid. Time of storage had a significant effect on Titratable acidity (TA), pH, juice and ascorbic acid contents. Total soluble solids (TSS), however, showed a significant increase which was attributed to a concentration effect.

INTRODUCTION

Vapor Gard and Wilt Pruf are film forming antitranspirants (AT). The film forming AT were reported to reduce transpiration rate by 25 to 80 percent depends on material and plant tissue used (3, 4, 6, 7). A manifests its action by increasing the diffusion resistance to water vapor from stomata (3). It was reported that preharvest spray of Valencia orange trees with 3% Pinolene (Vapor Gard) decreased weight loss and improved the appearance of the fruits. Decreasing weight losses during storage and marketing is of great economical importance. The objectives of this paper was to study the effect of Vapor Gard and Wilt Pruf, on major chemical constituents attributes to 'Hamlin' orange quality.

MATERIALS AND METHODS

Fruits of 'Hamlin' orange *Citrus sinensis* (L.) grown on Rangpur lime rootstock were harvested from Faculty of Agriculture Research Farm, Alfateh University on November 24, 1976. The fruits were sorted after one week of holding at room temperature to eliminate decayed fruits. Medium size fruits were treated dip, for 3

[1] *Vapor Gard (Miller Chemical and Fertilizers Corp., Hanover, Pen., U.S.A.).*

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minutes in one of the following treatments: Vapor Gard 1%, Wilt Pruf 10% and Benomyl (Benlate) at 600 ppm alone or mixed with the antitranspirants. The fruits were held at room temperature in wooden boxes of 9–10 kg each at 15 ± 3°C and r.h. of 45–65 percent. Two replicates of one box each were assigned per treatment. Changes in fruit weight, juice content, pH, titratable acidity, total soluble solids, and ascorbic acid were determined every 10 days on four fruit samples drawn randomly. Changes in weight loss were determined on 10 individual fruits per treatment. Titratable acidity and Ascorbic acid were determined according to AOAC method (2). TSS was determined by Zeiss refractometer. The data was statistically analyzed.

RESULTS AND DISCUSSION

Fruit Weight

Antitranspirants VG at 1% and WP at 10% maintained the appearance of 'Hamlin' orange fruits during storage. The fruits were fresh, firm and glossy in appearance. VG was superior to WP in maintaining the appearance and marketability of 'Hamlin' orange fruits. VG treated fruits were classified marketable, as judged by appearance after 10 weeks storage. Fruits treated with VG and WP were fresher and showed 45 and 32 percent, less weight loss respectively, than control (Fig. 1) as a result of reducing the diffusion of water vapor from stomates on fruit surface (3).

Juice extract was significantly higher in VG and WP treated fruits than in control throughout storage period (Fig. 2a). Control and benomyl treated fruits showed a significant decrease in juice content at the end of the experiment. Juice extract from control, VG, and WP treated fruits decreased by 18.8, 8.1 and 7.7 percent, respectively after 10 weeks of storage. VG and WP treated fruits contained 17.4 and 10.9 percent, respectively more juice content than the control fruits. The higher juice content in VG and WP treated fruits is due to the effect of antitranspirants on fruit water loss (Fig. 1). Antitranspirants were reported to reduce water loss (1).

Total Soluble Solids (TSS)

Generally TSS showed a gradual increase throughout storage period. TSS of control and benomyl treated fruits increased significantly after one month of storage while TSS of VG and WP treated was not significantly different from that at harves. (Fig. 2b). The increase in TSS of control and benomyl treated fruits is due to concentration effect as judged by weight loss (Fig. 1) and juice content (Fig. 2a).

Acidity

Treatment has no significant effect on acidity. However, time of storage has a significant effect on acidity. Acidity decreased significantly after 20 days of storage. A second marked decrease occured after 40 days of storage (Fig. 3a), the decrease in acidity resulted in an increase in juice pH (Fig. 3b). Changes in acidity were attributed to changes in citric acid, the predominant acid in citrus fruits (7, 8). Acidity was reported to decrease by storage (9). Citrus fruits are devoid from starch (8, 10). Fruit cells are able to utilize organic acids as substrate during respiration (8). Thus the decrease in acidity during storage could have been due to utilization of citric acid in the process of respiration during storage.

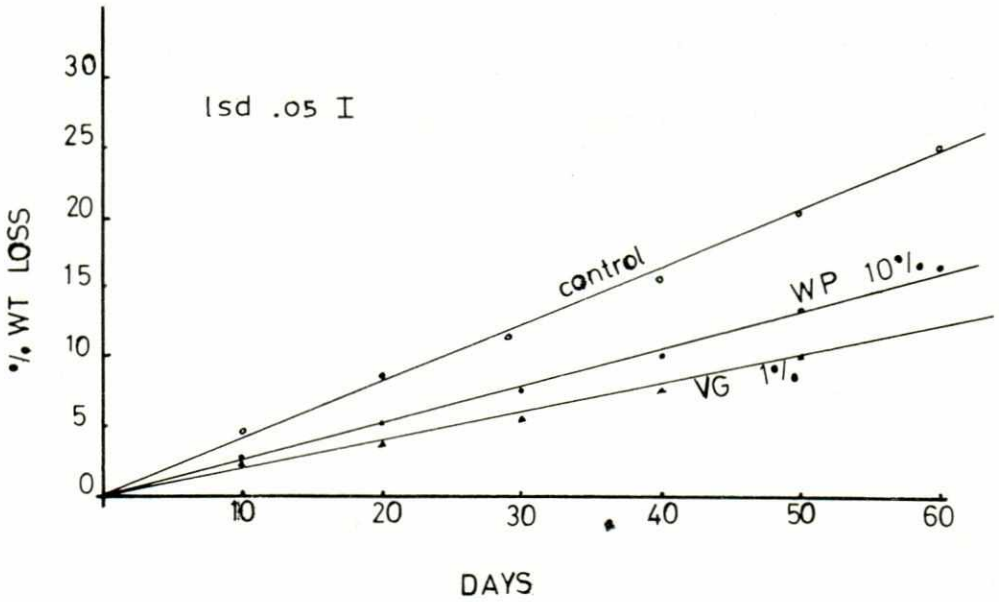

Fig. 1. The effect of Vapor Gard (VG) and Wilt Pruf (WP) on weight loss of Hamlin orange fruits during storage.

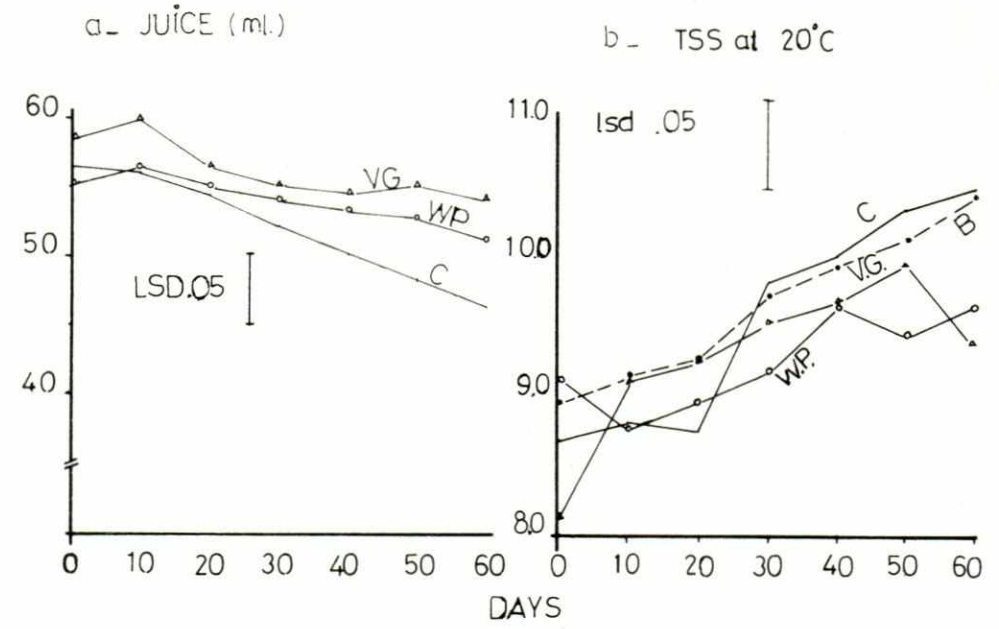

Fig. 2. The effect of Vapor Gard (VG) and Wilf Pruf (WP) on: a. Juice extract, b. Total soluble solids (TSS) of Hamlin orange fruits during storage.

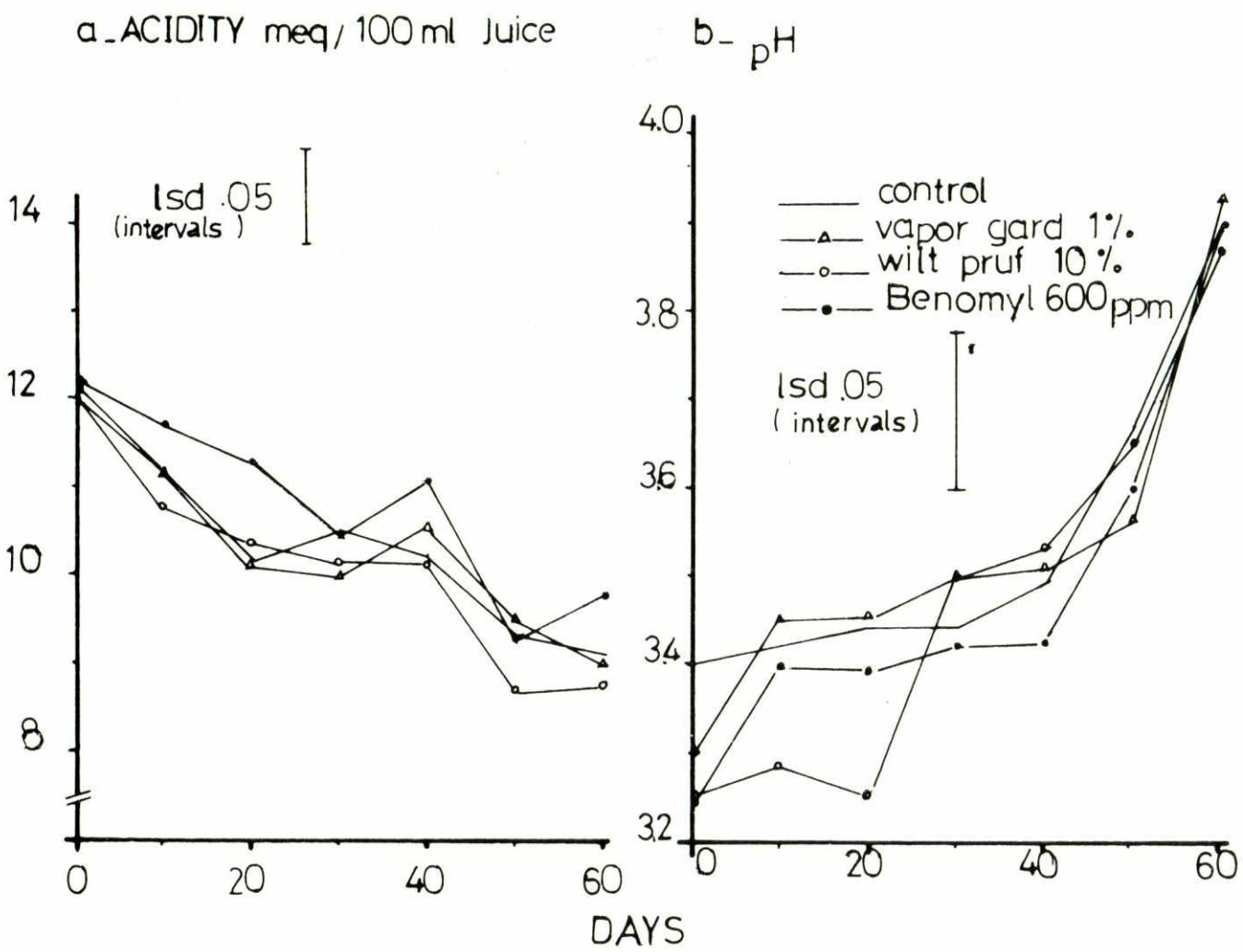

Fig. 3. The effect of Vapor Gard (VG) and Wilt Pruf (WP) on: a. Acidity, b. pH of Hamlin orange fruits during storage.

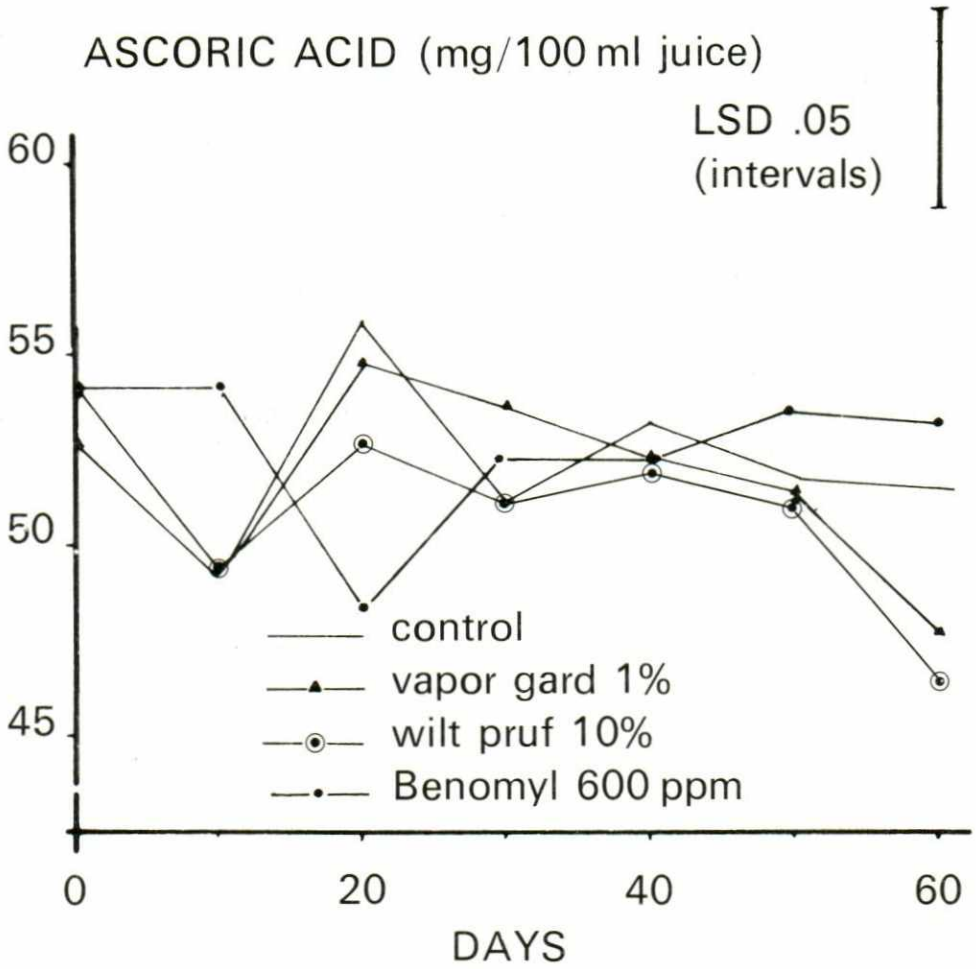

Fig. 4. The effect of Vapor Gard (VG) and Wilt Pruf (WP) on Ascorbic acid content of Hamlin orange fruits during storage.

Ascorbic acid

Ascorbic acid fluctuates during storage. Only VG and WP showed a significant decrease in ascorbic acid at the end of storage period. Ascorbic acid content of control and benomyl treated fruits remained unchanged throughout storage period (Fig. 4). Ascorbic acid is known to be stable in fruit juices (8). The stability of the ascorbic acid is due to presence of high concentrations of polybasic or polyhydroxy acids such as citric acid and malic acid (8, 9). Both acids are the most important acids in citrus fruits. It is also possible that the ascorbic acid losses during storage was over-shadowed by the concentration effect, since the control fruits had more than 18 percent less juice at end of storage than antitranspirant treated fruits (Fig. 2a).

In summary freshly harvested 'Hamlin' orange fruits contained an average of 57 ml juice per fruit; pH ranged from 3.35 to 3.55; TA, 12 meq/100 ml juice; TSS 8.9 percent; and ascorbic acid 54 mg/100 ml juice. Treatment with antitranspirants or benomyl had

no effect on ascorbic acid, acidity, and pH. However, time of storage has a significant effect on TSS, juice content, and acidity. Ascorbic acid content remained unchanged after 10 weeks of storage. Fruits treated with VG and WP mixed with benomyl behaved similar to those treated with VG or WP alone, therefore, data were not reported. It is concluded that postharvest treatment with Vapor Gard and Wilt Pruf would extend the storage and shelf life of orange fruits without affecting their quality.

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المواد المضادة للنتح : فيبورجارد وولت بروف للمحافظة على جودة ثمار البرتقال صنف هاملين

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المستخلص

المواد المضادة للنتح أدت إلى تقليل فقد الوزن في برتقال صنف هاملين أثناء التخزين لمدة ١٠ أسابيع تحت درجة حرارة ١٥±٣ م° . وقد وجد أن مادة الفيبور جارد بتركيز ١٪ كانت أكثر كفاءة من مادة ولت بروف بتركيز ١٠٪ ، وادت مادتي فيبور جارد وولت بروف إلى تقليل الفقد في الوزن بنسبة ٤٥ ، ٣٢٪ على التوالي . وأن الثمار المعاملة بالمواد المضادة للنتح كانت أكثر طزاجة من الثمار الغير معاملة وصالحة للتسويق بعد نهاية فترة التخزين ووجد أن كلا المادتين لا تأثير لها على الحموضة وحمض الأسكوربيك (فيتامين ج) بينما أدى التخزين إلى تقليل الحموضة وزيادة المواد الصلبة الذائبة .