

autoradiography. The films were processed and the radioactivity in different parts of the plants was measured.

The results indicated that Pacllobutrazol was rapidly translocated upward into the adult leaf petioles and veins; after a few days the radioactivity moved from leaf veins to the whole leaf lamina and then accumulated in peripheral leaf edge. By contrast, very low activity was recovered from the growing tip and from below the treated point of the stem (lower aerial portion and roots). Other seedlings, treated in a single leaf, showed practically no translocation outside of the lamina.

These findings confirm that Pacllobutrazol movement in grape vine occurs mainly apoplastically via the xylem, and thus may contribute to the effective use of this growth retardant in vineyard management.

1472

TRANSPORT OF ETHREL ACROSS CRANBERRY FRUIT CUTICLE AND ITS IMPLICATION IN ANTHOCYANIN ENHANCEMENT UNDER FIELD CONDITIONS
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Damage to the cranberry fruit from late season frost forces farmers to harvest premature fruits. Use of Ethrel to enhance ripening, and thereby color development in fruit have yielded inconsistent results. A chamber was designed to precisely study the transport of Ethrel across cranberry fruit cuticle discs. Ethrel did not permeate as an aqueous solution. In the presence of ethanol the permeation of Ethrel was enhanced in many cuticles. Following this treatment the cuticle again became essentially impermeable to Ethrel in the absence of ethanol. In the field the combination of ethanol and Tergitol mixed with Ethrel gave the highest color enhancement. Two weeks after spray the anthocyanin content was enhanced by about 50% and 30% over the control for the fruits harvested on September 24 and September 30 respectively. Fruit size was not reduced except in the early application on August 26 where the fruit size in some treatments was significantly different from control. In all treatments vines had a normal green appearance and the physical properties of the berries looked normal at the time of the harvest.

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1473

ETHYLENE PRODUCTION IN KIWIFRUIT

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Kiwifruits (*Actinidia chinensis* Planch. cv. Hayward) were harvested in the early November in Shizuoka at full mature stage and stored at 1°C under high relative humidity until used. The fruits produced ethylene at an increasing rate at 21°C after exceeding a threshold level of 0.1 nl/g/h. The increase in ethylene production was accompanied by the rise in respiration and the decrease in flesh firmness. A wide variation in time before the initiation of the surge of ethylene production by individual fruits became less and the time to reach the increased level of ethylene became shorter as the storage period at a low temperature (1°C) increased. The increased rate of ethylene production was parallel to the increased internal ethylene concentration in the tissue. 1-Aminocyclopropane-1-carboxylic acid (ACC) and malonyl ACC contents increased in parallel with the rise in the rate of ethylene production. In vivo ethylene forming enzyme activity also increased with the increase in the rate of ethylene production. ACC synthase activity was observed to be insignificant when the rate of ethylene production was low.

1474

EFFECT OF CONDITIONING ON CHILLING INJURY IN LEMON AND BELL PEPPER FRUITS

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In an attempt to reduce the chilling sensitivity of lemons and bell peppers, fruits were temperature-conditioned prior to storage. Nonconditioned and conditioned (10°C for

5 days) peppers were stored at the recommended 7° or at 1° for 20 days. Chilling injury appeared only in the non-conditioned fruits stored at 1°, and was apparent after 3 days of storage. Conditioning dramatically reduced chilling injury, even after 20 days of 1° storage.

Lemons were conditioned (21° or 27° for 7 days) following degreening at 16°, then stored at 1° or 10° for 21 days. Chilling injury appeared in all treatments stored at 1°, regardless of conditioning treatment; conditioning actually increased the severity of chilling injury in lemons.

Indications that proline and carbohydrate content relate to chilling sensitivity suggest that they may be involved in the conditioning response. Results will be presented relating proline and carbohydrate content during conditioning and storage to the physiological responses associated with chilling of fruits.

1475

DEVELOPMENT OF STRAWBERRY FRUIT IN VITRO: APPLICATION TO THE STUDY OF RIPENING IN NONCLIMACTERIC FRUIT

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Details on the induction and regulation of ripening have largely been derived from studies with climacteric fruit. The applicability of this information to nonclimacteric fruit is not known, and direct study of these fruit is limited by the fact that normal development generally does not continue following harvest. Using procedures developed for studies of cut flowers, we are examining some physiological features of strawberry fruit, a nonclimacteric organ, harvested at an immature stage and maintained in vase solutions. Parameters including fresh and dry weight accumulation, anthocyanin production and firmness of in vitro developed berries will be compared to those of undetached fruit. Effects of ACC, STS, calcium and other factors on the in vitro ripening will be discussed.

1476

CONTROL OF STORAGE ROTS IN NEW ZEALAND RED TAMARILLOS

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The storage life of New Zealand red tamarillos is severely limited by the proliferation of latent infections and saprophytic fungi. The use of hot water and fungicide dips has substantially reduced these disorders in experimental trials allowing a storage life of up to eight weeks at 3.5°C followed by a nine day shelf life at 20°C. Fruit has been inoculated with a range of pathogens and nonpathogens to assess the effect of hot-water, imazalil and prochloraz dip treatments and their time of application on the development of rots. A complimentary in vitro study investigated the effect of fungicide combination and concentration on the fungal growth rates. The implication for the commercial adoption of a post-harvest dipping system will be discussed.

1477

MORPHOLOGICAL CHANGES IN KIWIFRUIT DURING RIPENING

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Structural and ultrastructural changes occurring during the ripening of kiwifruit (*Actinidia deliciosa* var *deliciosa*) at ambient temperature have been investigated. Fruit firmness fell during a two week period from 7.7kg at harvest to 0.6kg at eating ripeness. During this period cells became more spherical and the volume of total and gas filled intercellular space increased. Cell walls of ripe fruit stained poorly at the light and electron microscope level. During ripening, walls expanded extensively and often separated along the line of the middle lamella. However at plasmodesmata connections wall structure resembled that of unexpanded unripe walls. Ultrastructurally the finely fibrous walls became coarsely fibrous, then amorphous. Darkly staining deposits accumulated in some intercellular spaces during early stages of ripening. In ripe fruit similar deposits were also found between the cell wall and plasmalemma. Large numbers of starch grains found in plastids of fruit at harvest were absent from ripe fruit. Plastid and mitochondrial membranes remained intact throughout the ripening period.