Abstract

Calcium at 0.75%w/v $CaCl_2$ and 1.5%w/v $CaCl_2$, inhibited ripening of both fresh market (caruso) and processing (UC82) tomatoes and resulted in an extended storage period of 2-3 days. The delay in ripening was probably due to the inhibitory effect of calcium on ethylene biosynthesis which was observed in both caruso and UC82 tomatoes.

The above calcium levels inhibited ethylene production in mature green, pink and red tomatoes. Calcium treatment resulted in accumulation of ACC and reduced EFE activity but had no effect on ACC synthase activity or levels of MACC which implied that calcium inhibited ethylene production by inhibiting EFE.

The inhibitory effect of EFE by calcium and the accumulation of ACC were relieved by W-7 while W-5 had no effect. W-7 did not affect ACC synthase activity or MACC concentration. W-7 and W-5 are both calmodulin antagonist with almost an identical chemical structure except that W-7 is a larger molecule which makes it more hydrophobic and therefore binds calmodulin better than W-5. The inhibition of ethylene biosynthesis by calcium is reversed by W-7 and TFP. These results taken together suggest that the inhibition of ethylene by Ca^{+2} is mediated through calmodulin. Calmodulin regulates EFE activity either by direct interaction of the enzyme with Ca^{+2}-calmodulin complex or indirectly through phosphorylation of the enzyme by protein kinase(s). The protein kinase(s) could be either Ca^{+2}- dependent only or Ca^{+2}- calmodulin dependent. As suggested by our results the two regulatory mechanisms could be operating simultaneously.