

Effects of Divalent Cation on Crisp Palatability of Pickles and Its Mechanism  
 -On the mechanism of the changes in the hardness during growing of ume fruit-

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The mechanism of changes in hardness during growing of ume fruit (*Prunus mume* Sieb. et Zucc) were investigated as follows : (1) The contents of pectic substances, metal elements, organic acids and the hardness of "Shirokaga" apricot were analyzed for about 1 month from the end of May to the beginning of July, 1989. (2) Ume fruit AIS (ethylalcohol-insoluble substances) solution containing malic acid or citric acid were allowed to stand overnight. The composition of pectic substances in each AIS was then estimated by successive fractionation with different extractants according to solubility, expressed as water soluble (WSP), hot water soluble (HWSP), hexametaphosphate soluble (HXSP), hot 0.05N HCl soluble pectin (HSP), respectively. (3) The purified pectic substance solution containing calcium lactate and malic acid, or citric acid or the mixture of these organic acids, were allowed to stand overnight, and then dialyzed for 12 days to eliminate the excess calcium lactate and organic acid. The Ca content in each of the pectic substances was then determined by atomic absorption spectrometry. The results obtained were as follows : (1) Malic acid content of ume fruits reached a maximum in the middle of June and decreased markedly with fruit growth, whereas the citric acid content of the ume fruits increased gradually with fruit growth, followed by an appreciable increase after the middle of June. (2) The calcium content of the AIS changed little until the middle of June, but decreased gradually with fruit growth. (3) The ratio of HSP to total pectin decreased gradually after the last ten days of June. On the other hand, the ratio of HWSP to total pectin showed a remarkable increase after the last ten days of June. (4) The addition of organic acid to the AIS solution led to the changes of HSP and HXSP to WSP and HWSP in the order of citric acid > malic acid. (5) The addition of organic acids to purified pectic substance solution containing Ca lactate caused a decrease of Ca content in the pectic substance in the order of citric acid > malic acid.

From these results, it was presumed that the increase in citric acid occurring during fruit growth gives rise to chelate binding of divalent cations combined with pectic substances, and the release of these divalent cations, changing HXSP and HSP to WSP and HWSP to some degree, consequently causes a decrease in the hardness during growth of ume fruit.