maroon was very attractive in carrots cut as coins or sticks. The maroon and orange color would serve as the perfect way to identify and promote this new variety. Several additional generations were required using extensive laboratory testing for low terpenoids (strong carrot flavors), high sugars, high carotene, and crispy texture. Thousands of carrot roots were analyzed and selected for those qualities and for the dark maroon exterior and orange interior colors. The few best for those characteristics were intercrossed, and re-selected for their adaptation when grown under Texas climatic conditions.

080

Carotenoid, Tocopherol, and Ascorbate Variability in Cruciferous Vegetables

*A.C. Kurilich**[1], *G.J. Tsau*[2], *L. Howard*[2], *A. Brown*[1], *B.P. Klein*[2], *E.H. Jeffery*[2], *M. Kushad*[1], *M.A. Wallig*[4], *and J.A. Juvik*[1]; Depts. of [1]Natural Resources and Environmental Sciences, [2]Food Science and Human Nutrition, and [3]Vet. Pathobiology, Univ. of Illinois, Urbana, IL 61801

Antioxidants have been associated with reduced risk of cardiovascular disease and several types of cancer. Recent studies indicate that cruciferous vegetables contain high levels of these antioxidants. We assayed the edible portions of 52 broccoli and 13 cabbage, kale, cauliflower, and Brussels sprouts genotypes to determine variability of α-carotene, β-carotene, α-tocopherol, γ-tocopherol, and ascorbate within and between varieties of *Brassica oleracea*. Emphasis was placed on broccoli due to its economic importance and consumer preference. Samples of each genotype in replicated trials were harvested at fresh-market stage, frozen immediately in liquid nitrogen, and placed in –80 °C. HPLC with an amine column was used to measure ascorbate in fresh, frozen samples. Tissue for carotenoid and tocopherol analysis was freeze-dried prior to extraction. Carotenoid and tocopherol concentrations were simultaneously measured using a reverse-phase HPLC system developed in our laboratory. Results indicate that there is substantial variability both within and between varieties. Kale had the highest levels of these compounds, followed by broccoli and Brussels Sprouts with intermediate levels, then by cabbage and cauliflower which were relatively poor sources. Based on dry weight, broccoli heads ranged (in mg/g) from 0–2.9, 23–94, 24–222, and 2-–5 for α-carotene, β-carotene, α-tocopherol, and γ-tocopherol, respectively. The range of ascorbate was 54–120 mg/100 g fresh weight. These results contradict the general perception that all broccoli lines are equally beneficial in potential disease prevention. The information gained from this study can be used to help consumers select foods that promote a healthy lifestyle and in breeding programs to develop new germplasm that will enhance the antioxidant potential of our food supply.

081

Methyl Jasmonate Inhibits Postharvest Sprouting of Radishes

*Chien Y. Wang**; Horticultural Crops Quality Lab., Plant Sciences Inst., USDA–ARS, Beltsville, MD 20705-2350

Treatment of topped radishes (*Raphanus sativus* L., cv. Cherry Belle) with methyl jasmonate was effective in inhibiting postharvest sprouting of new leaves and the growth of roots. Radishes were trimmed to 10-mm tops and dipped in various methyl jasmonate suspensions for 3 min. After storage at 15 °C for 7 days, the growths of new leaves were 26, 22, 7, 3, and 1 mm in 0, 10^{-5}, 10^{-4}, 10^{-3}, or 2×10^{-3} M methyl jasmonate-treated radishes, respectively. The lengths of root growth were also reduced by methyl jasmonate particularly at higher concentrations. These treatments also substantially reduced weight loss possibly as a secondary effect. Fumigation with methyl jasmonate vapor in enclosed containers was also effective in inhibiting the sprouting of leaves and root growth, but to a lesser extent than dipping treatments. Radishes stored at 0 °C did not show any new growth of leaves or roots, and therefore were not affected by the methyl jasmonate treatments.

082

Factors Affecting Seed Coat Yellowing of Pinto Beans

*Muharrem Ergun**, *E.T. Paparozzi*, *D. Nuland*, *D.P. Coyne*, and *D. Smith*; Univ. of Nebraska, Lincoln, NE 68583-0724

The pinto bean breeding line 94-4 (*Phaseolus vulgaris* L.) showed seed coat yellowing in on-farm field trials in Nebraska in 1996. After reviewing weather data, sprinkler irrigation appeared to be one of the cultural factors involved with increase in seed coat yellowing. Cultural conditions were again investigated in 1997 in on-farm trials. In one test half of the NE 94-4 plants were cut and combined promptly while the other half of the cut plants were left on the ground, rained upon, and combined later. Seed from the pods of former and latter treatments were compared for degree of seed coat yellowing. Yellowing was recorded visually by determining percentage of the yellow area on a bean seed. The seed from the pods of the cut wetted plants showed more discoloration than seed from the plants that were not rained on. In another experiment two or four samples (40 g each) were taken from each of seven cultivars as well as NE 94-4 to determine degree of yellow discoloration of seed. The percent seed coat yellowing of the varieties/line was as follows: 'Apache' 12.5%, 'Bill Z' 14.9%, 'Buckskin' 20.7%, 'Chase' 9.2%, 'NE-94-4' 54.1%, '179' 48%, 'Vision' 35.5%, 'Winchester' 10%. Results of pigment extraction and simulated irrigation experiments will be presented in order to better explain the cause of pinto seed coat yellowing.

083

Changes in Sensory Quality of Minimally Processed Cantaloupe Stored in Controlled Atmospheres

Silvina I. Portela and *Marita I. Cantwell**; Dept. of Vegetable Crops, Univ. of California, Davis, CA 95616

The effects of a range of controlled atmospheres (CA) on sensory quality and acetaldehyde and ethanol concentrations in minimally processed cantaloupe melon were studied. Cylinders (1.8 diam x 3.5–4.0 cm) were prepared from cantaloupe melons cv. Durango harvested at commercial maturity. Pieces were stored in air or six CA (1.5 and 3% O_2, air + 7.5 or 15% CO_2, and 3% O_2 + 7.5 or 15% CO_2) for 15 days at 5 °C. After 9 days of storage, the pieces stored at 5 °C were firm, had high chroma values and visual quality and aroma scores, and low decay and off-odor scores. Elevated CO_2 concentrations reduced microbial counts and the combination of CO_2 with 3% O_2 provided additional control. All CA treatments with CO_2 maintained visual quality above the limits of salability at 15 days, while quality of air-stored pieces was poor. The same CA also reduced loss of typical cantaloupe aroma and development of off-odors. Acetaldehyde concentrations increased after 9 days, but then declined. Ethanol levels increased linearly with time in pieces stored in low O_2 alone or with CO_2. Pieces stored in CA had higher soluble solids than those stored in air. Pieces prepared with a sharp borer maintained visual quality scores longer than those prepared with a blunt borer due to the development of surface translucency and color changes. The sharpness of the borers did not affect the development of decay nor the loss of characteristic aroma.

084

Low Temperatures and High CO_2 Atmospheres Best Maintain the Quality of Fresh-cut Jicama (*Pachyrhizus erosus*)

*M. Cantwell**, *E.N. Aquino-Bolaños*, *E. Mercado-Silva*, and *G. Peiser*; Dept. of Vegetable Crops, Univ. of California, Davis, CA 95616 USA; Depto. Investigación y Posgrado en Alimentos, Universidad Autónoma de Querétaro, Querétaro, Mexico

The jicama is a chilling-sensitive specialty root vegetable used fresh for its crisp sweet-starchy pulp. Our objective was to evaluate a range of storage temperatures and controlled atmospheres potentially useful to preserve the quality of minimally processed jicama. Jicama root pulp was cut into 1.8 x 4-cm cylinders, washed in chlorinated water, drained, and stored in glass containers at a range of temperatures from 0 to 15 °C in air, or at 5 and 10 °C in controlled atmospheres (0.3, 3, and 21% O_2 with 0, 5%, 10%, or 20% CO_2). Pieces were evaluated after 0, 4, 8, 12, or 16 days for visual quality, color, texture, and composition (soluble solids, ethanol, acetaldehyde). Total aerobic plate counts were determined on samples from some atmospheres. At temperatures >5 °C, browning was the most significant cause of quality loss. High CO_2 atmospheres retarded the development of brown discoloration at 10 °C. During storage at 0 or 5 °C in air, quality loss was principally due to yeast and bacterial growth. The 10% CO_2 atmospheres helped maintain the white color and crisp texture of the pieces and retarded microbial growth. Atmospheres with 20% CO_2 damaged jicama stored longer than 8 days. Atmospheres of 3% O_2 or air with 10% CO_2 resulted in acetaldehyde and ethanol concentrations 4 and >10 times those of air-stored pieces after 8 days at 5 °C. Although the jicama root is chilling-sensitive, our results demonstrate that the quality of the minimally processed product is best maintained with low temperatures in combination with high CO_2 atmospheres.