

## Updated Report – Beach Plum Project, Summer 2002

### Materials and Methods

Fruit samples provided by R. Uva were kept at 35°F until the analysis were performed. A total of 38 lots were studied. A sub-sample of each lot was segregated and kept frozen for additional analysis such as total phenolics and antioxidant capacity.

Whole fruit was evaluated for size, color and pulp yield. Juice samples for chemical analysis were produced by crushing the fruit and manually squeezing through cheesecloth. The prepared samples were analyzed for color, pH, acidity and soluble solids (Brix).

The fruit was evaluated for size by measuring the height, width and depth of 10 randomly selected berries from each lot. The color was measured by placing approximately 15 plums into a glass holder and by taking color readings using a colorimeter (HunterLab UltraScan XE). Pulp yield was estimated by weighing the pulp and the pits manually separated using a single fruit cherry pitter.

Juice measurements were performed using a colorimeter, a pH meter and a manual refractometer for Brix readings. Acidity was determined by a standard titratable acidity procedure. Total phenolics and antioxidant capacity were determined using fruit samples stored frozen at -40°C. The pitted fruit samples were subjected to solvent extraction by adding 20 ml of methanol to approximately 7 g of fruit, followed by homogenization for 2 min, and incubation for 18 hr in total darkness. The samples were centrifuged at 15,000 rpm for 15 min and the supernatant volume was measured. 1:100 dilutions were used for both phenolic content and antioxidant activity measurements.

Total phenolic content was measured by the method developed by Singleton and Rossi using the Folin Ciocalteu reagent. Using gallic acid as a phenolic standard, absorbance was read at 750 nm, and the results were expressed as mg of gallic acid equivalents per 100 g of fruit.

Antioxidant capacity of water soluble compounds (ACW) of selected samples was determined using the photochemiluminometer (photochem). This was done by measuring the inhibition of photochemiluminescence of luminol with ascorbic acid as a standard. The results were calculated and expressed as equivalents of ascorbic acid in mg per 100 g of pitted fruit. All measurements were conducted in duplicates.

### Results – 2001 Harvest

The results show a large variation on all measurements for the beach plum samples studied. The fruit color values showed differences in intensity, hue and lightness. Darker fruit had lower lightness “L” values such as 27.8 while lighter samples had higher values such as 41.9.

Pulp yield varied from a low of 81 to a high of 91 %. See Figure 1 for data presented by farms per state.

Fruit size presented significant and similar variations in the three measurements taken. The height values ranged from 13.5 mm to 19.7 mm, the width ranged from 13.5 mm to 20.8 mm,

and the depth from 14.5 mm to 19.8 mm. The width variation is presented in Figure 2. The beach samples are small in size and compare closer to cherries than to commercial plums.

The soluble solids (Brix) readings in the juice samples ranged from 9.4 to 19.0 (see Figure 3). These values are slightly lower than the reported numbers for commercial plum varieties ranging from 12.8 to 29°Brix.

The acidity varied from 0.7 to 3.2 % (expressed as citric acid), representing very high levels compared to commercial varieties (approx. 0.5 %). Figure 4 shows the field variation. Note that the cultivated samples from MA presented higher values than the other locations.

The pH values ranged from 3.1 to 4.1, showing large differences most likely related to the acid levels presented before. Samples with pH close to 4.0 would be a lot less acid to taste than other fruit samples with pH below 3.5. Figure 5 summarizes the results.

Total phenolic content ranged between 256 mg per 100 g of fruit for light colored samples and 678 mg per 100 g of fruit for darker fruit (see Figure 6). These values are significantly higher (2 to 6 times) than reported numbers for commercial varieties at approximately 111 mg/100 g of fruit. The high values were expected as beach plum is bitter and more astringent than other plums, which normally indicates high concentration of phenolic compounds. The high phenolic content and high acidity restrict the use of the fruit to processed products where blending and dilution are used to counteract the strong taste effect. A few samples had high Brix, lower acidity and relatively low phenolic content, and could be evaluated for potential fresh market or minimally processed products due to a milder flavor.

The antioxidant capacity of water soluble substances of selected samples fell between 87 and 397 mg per 100 g of fruit, indicating that the beach plums are very good source of antioxidants (see Figure 7). The lower numbers corresponded to yellow fruit while the highest numbers represented dark purple samples.

### Processing

Samples of beach plum jam and jelly were produced following customary industry procedures and standards. The plums were pitted with a manual cherry pitter, the pulp was ground with a commercial food processor, blended with sugar and pectin mix, and cooked in a small kettle to make the jam. The jam conformed to the standards of identity with a Brix of 70 and a pH of 3.4. The jelly was prepared by partially chopping the fruit in a food processor, heating the fruit in a kettle to extract the color and flavors, and extracting the juice by squeezing the fruit through cheesecloth. The juice was then mixed with sugar and pectin mix, and cooked in the kettle to make the jelly. The prepared jelly had a Brix of 68 and a pH of 3.1. The jam and jelly samples are being used to explore market opportunities.

Figure 1. Percentage Pulp in Beach Plum Samples - 2001

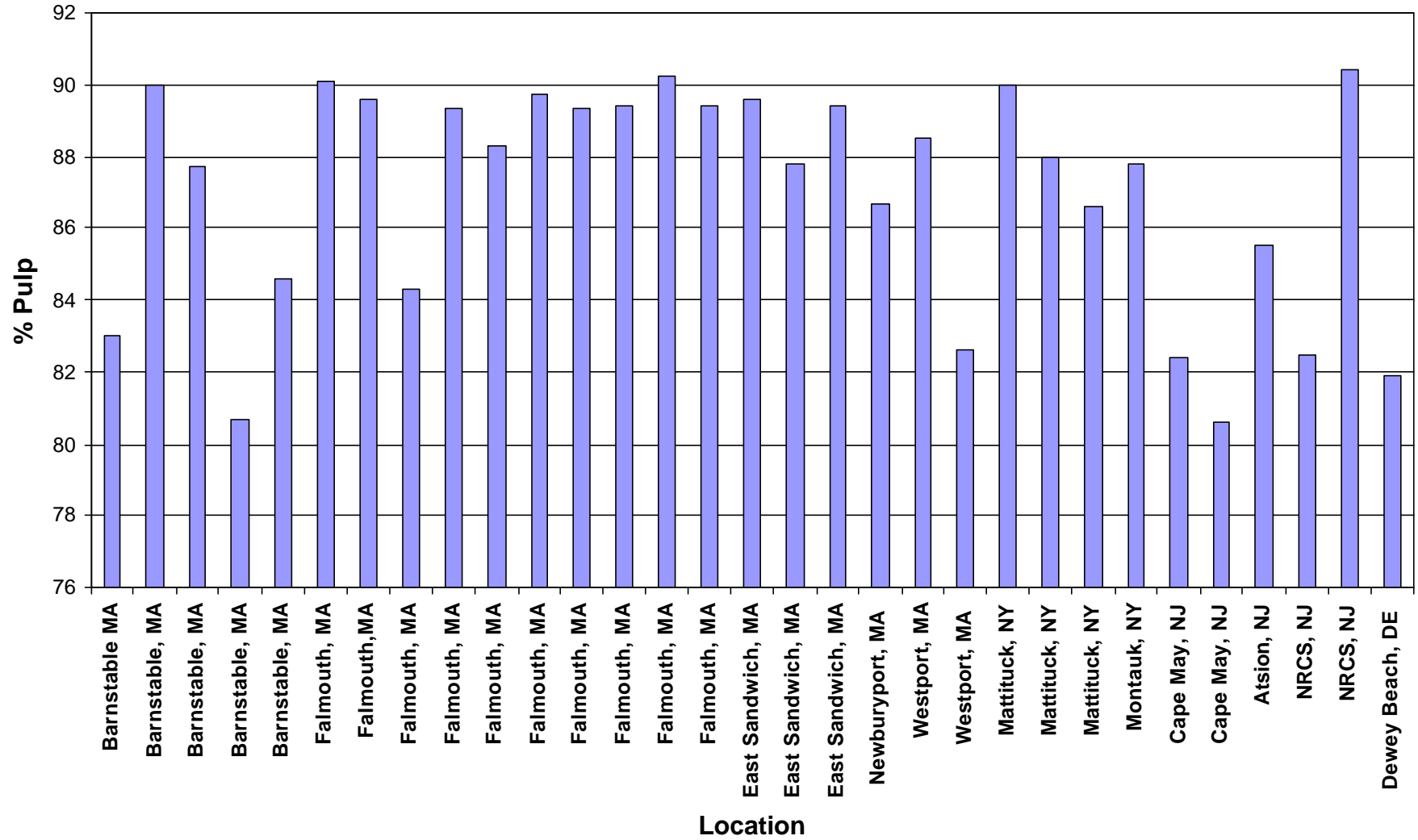


Figure 2. Variation in Fruit Width - 2001 Harvest

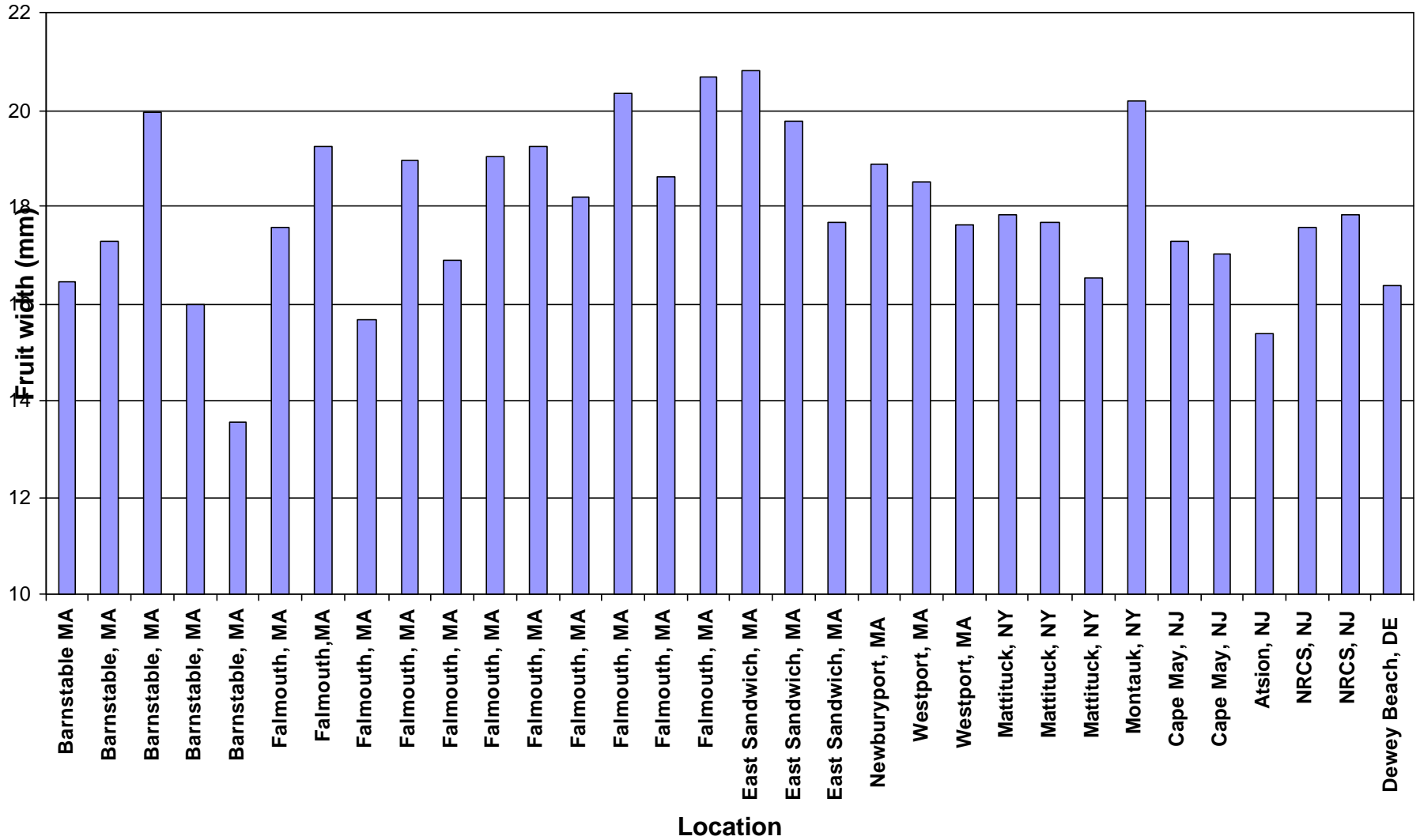


Figure 3. Soluble Solids Content of Beach Plum Samples - 2001 Harvest

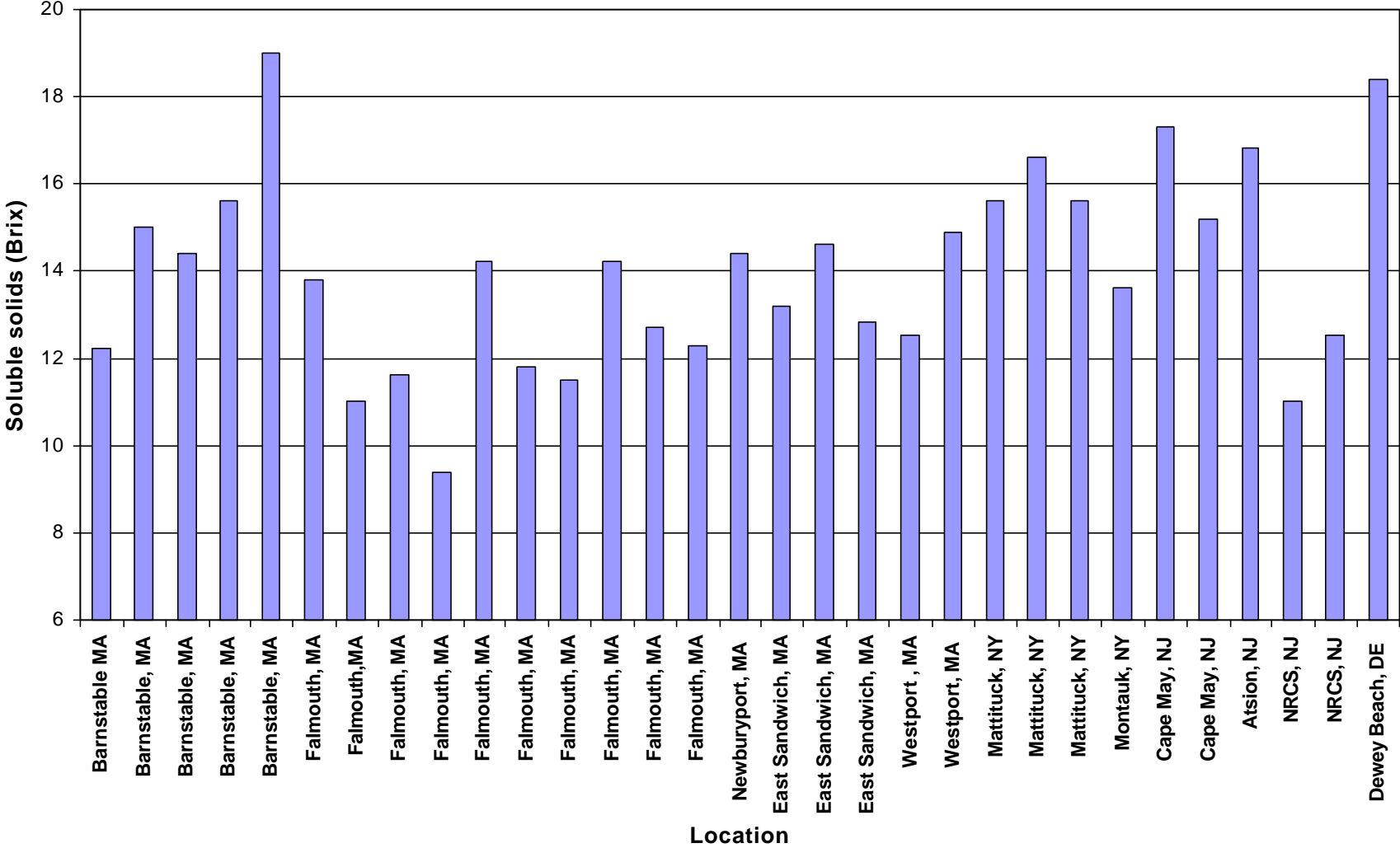


Figure 4. Acidity Levels of Fruit Samples - 2001 Harvest

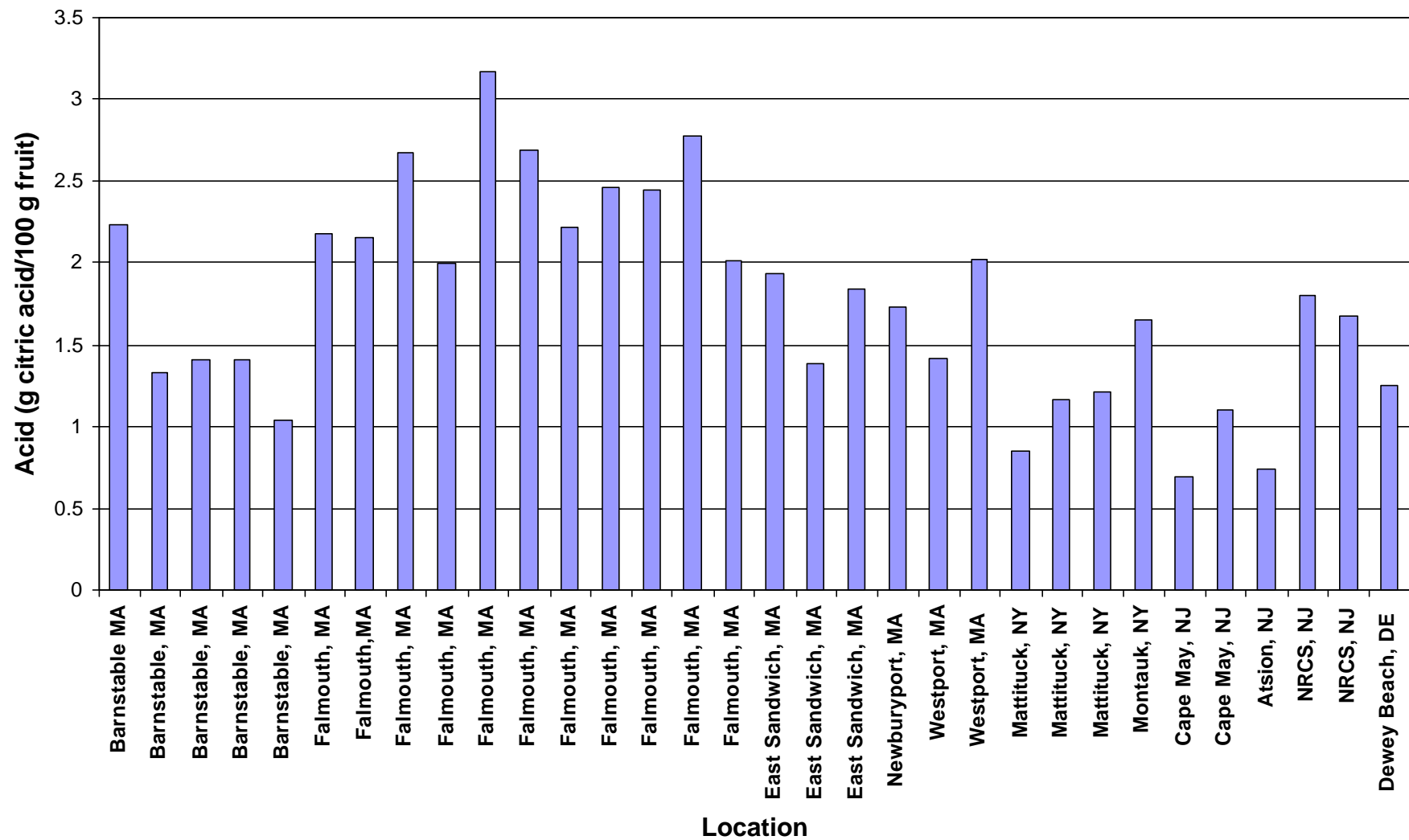
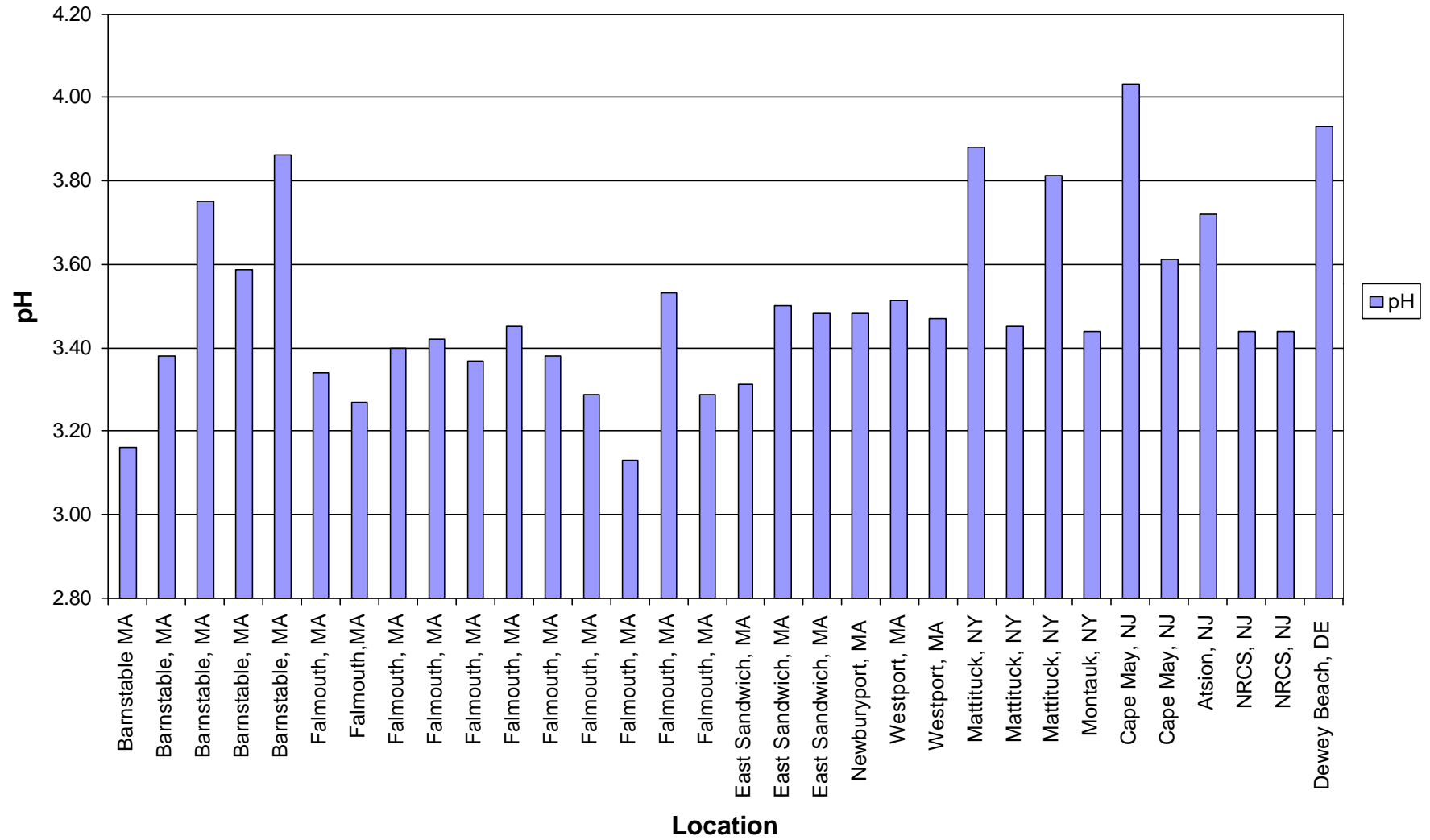
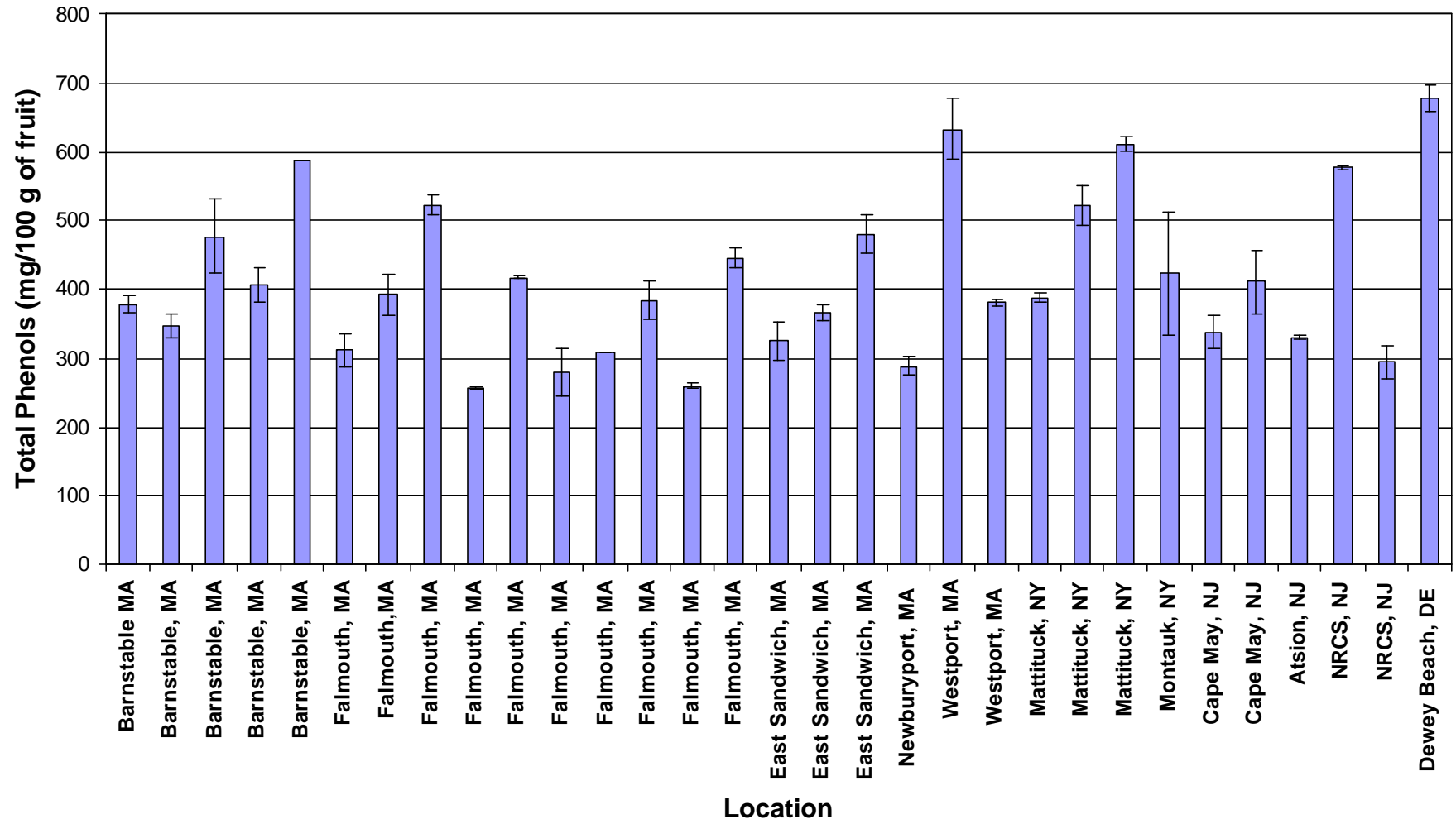


Figure 5. Variation of pH in Beach Plum Samples - 2001 Harvest



**Figure 6. Variation in Total Phenols Measured in Beach Plum Samples - 2001**





**Figure 7. Antioxidant Capacity of Selected Beach Plum Samples - 2001**

