

The Use of Microwave Blanch Technology as an Alternative Preparation Method for Freezing Collard Greens (*Brassica oleracea*) at Home

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Most home food preservers do not realize that microwave blanching is an option when preparing fresh vegetables for frozen storage. Previous research indicated that microwave blanching may be the best method for maintaining nutrients and physical attributes when preserving vegetables for home freezing. Thus far, only lower wattage microwave blanch research has been conducted on selected vegetables. Further studies are necessary to determine the effect of the higher wattage microwave effects on vegetables.

The objective of the study was to determine if microwave blanching, using varying wattages, is a suitable alternative method for preparing collard greens (*Brassica oleracea*) for home freezing.

Freshly harvested collard greens (CG) were blanched for 3 min in covered containers using: boiling water (BW), steam (ST) and three different wattage microwaves including 1000 watt (MW1), 1200 watt (MW2), and 1300 watt (MW3). Samples were ice-cooled, placed in freezer bags, and stored at -18°C for 6 months. Enzyme activity (peroxidase and lipoxylase) and physical parameters (moisture, texture and color) were measured prior to blanching, immediately following blanch treatments and after 4 and 6 months of frozen storage. Retention of ascorbic acid (AA), calcium (Ca), iron (Fe) and potassium (K) and sensory characteristics were assessed after 6 months of frozen storage.

Peroxidase activity (POD) was reduced from 0.3-0.35 units in fresh, unblanched samples to 0.001-0.028 units in blanched CG. Lipoxylase activity (LOX) was reduced from 6160-6700 units in fresh, unblanched CG to 2410-4370 units in blanched samples. These enzymes when active catalyze the oxidative deterioration of vegetables. All blanching methods increased greenness of samples. Moisture content for the blanched samples averaged 78% for all treatments, except BW which averaged 61%. No significant moisture difference ($p>0.05$) was found among the MW1, MW2, MW3 and ST treatments. Texture (maximum force) was lowest at 757 N for the BW treatment and highest for ST blanched treatment (1605 N). Lower texture values can be attributed to a greater cooking effect for the BW treatment. There was no significant texture difference ($p>0.05$) among the microwave treatments. The MW1 treatment retained the highest percentage (93%) of ascorbic acid (32.9 mg/100g). The BW treatment had the largest (47%) ascorbic acid loss (16.8 mg/100g) due to leaching effects. No significant difference in ascorbic acid retention ($p>0.05$) among the microwave treatments was observed. The MW3 treatment retained 92% Ca (4474 mg/kg), 81% Fe (145 mg/kg) and 96% K (2310 mg/kg) which was significantly better than any other blanching treatment. Sensory evaluation (multiple comparison ranking) tested preference using frozen commercial collard greens as a control versus the 5 blanch treatments. There was no significant difference among the treatments for preference.

The study indicated that the overall quality of MW blanched collard greens (for all three wattages) was as good as or superior to BW and ST blanched vegetables. Further, it was also ascertained that MW blanching is a suitable alternative to ST or BW blanching when preparing vegetables for home freezing.