

SUMMARY

The Illinois Department of Agriculture, via the Specialty Crop Block Grant Program funded a recent study in SIUC that showed that processing has an impact on bitter melon's antidiabetic, antioxidant and sensory properties.

This study determined the effects of different processing methods, i.e. canning, air drying, pickling, blanching and freezing, freezing, stir frying and freeze- drying has on the vegetable's antidiabetic ability- invitro using α -amylase and α -glucosidase enzymes, DPPH free radical scavenging, and analyzing the sensory quality post stir frying.

Freeze-dried bitter melons presented the best antidiabetic, antioxidant and sensory qualities. Thermally processed bitter melons (air drying and canning) presented significantly lower antidiabetic and antioxidant properties. However, air dried bitter melons that were stir fried and used for the sensory analysis were not significantly different from the freeze-dried ones and presented the second-best sensory quality in terms of overall liking and taste.

For More Information

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Effects of Processing on Bitter Melons' Antidiabetic, Antioxidant and Sensory Qualities.



Freeze-dried bitter melon slices



Pickled bitter melon slices



Canned bitter melon slices



Air-dried melon slices



Stir-fried bitter melon slices

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BACKGROUND

Bitter melon (*Momordica charantia*) is a tropical vegetable known for its bitter flavor and widespread use in Asian, African, and Caribbean cuisines and traditional medicine. It is rich in essential nutrients and bioactive compounds that support blood sugar regulation and offer antioxidant and anti-inflammatory benefits. It is commonly consumed fresh, stir-fried, or as tea, it is also processed by drying, pickling, canning, or freezing to improve taste and shelf life.

In this study, bitter melons were processed using seven methods: freeze-drying, air-drying, canning, blanching & freezing, pickling, stir-frying, and freezing. Extracts were prepared from each sample using aqueous methanol to isolate bioactive compounds for analysis. Each extract was then assessed for antidiabetic activity (via α -amylase and α -glucosidase inhibition assays) and antioxidant capacity (using the DPPH scavenging assay). The processed bitter melons were also stir-fried and subjected to sensory evaluation by an untrained panel using a 9-point hedonic scale to determine consumer preferences.

RESULTS

The findings from this research revealed that processing significantly affected bioactivity. Non-thermal methods such as freeze drying and pickling (particularly with 120–180 ml vinegar concentrations in 300ml total volume) preserved the highest antioxidant activity (76–79%) and exhibited strong inhibitory effects on α -amylase (69–73%) and α -glucosidase (73–76%), indicating enhanced antidiabetic potential.

On the other hand, thermally intensive methods like canning and air drying led to a notable decrease in antioxidant activity (53–59%), α -amylase (43–48%) and α -glucosidase (62–63%) inhibitory effectiveness. Stir-frying, though a thermal method, showed superior antioxidant retention (68%) as compared to the frozen variations (61–66%), likely due to enhanced extractability of bioactive from oil-aided cooking and shorter exposure time.

For sensory evaluation, which was conducted using stir-fried versions of all processed samples, participants demonstrated the highest overall liking for



freeze-dried and air-dried samples, especially among individuals familiar with bitter melon. There were no significant differences in appearance or aroma ratings, but taste and overall acceptability varied significantly across processing methods, showing the influence of processing on both functional quality and consumer preference.

BITTER MELON STIR FRYING



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