LEOPOLD CENTER
FOR SUSTAINABLE AGRICULTURE

Enhancing value and marketing options for pawpaw by developing pulp separation and preservation techniques

Abstract: Project investigators tested the potential for production and utilization of the pawpaw as an alternative crop for Iowa fruit growers. Fruit from an ongoing trial was processed and preserved for future marketing.

Principal Investigator:

Patrick O'Malley
Iowa State University
Extension and Outreach
Iowa City

Co-investigator:
Lester Wilson
Food Science
Iowa State University

Budget:
$11,929 for year one
$12,009 for year two

Q How can producers process and store pawpaws?

A Processing can be done by a commercial pulper and pawpaws proved to be adaptable to freezing, either as an intact fruit or as pulp.

MARKETING

Background

Pawpaw is the largest tree fruit native to the United States. Commonly known as the "poor man's banana," a pawpaw may reach up to 1 lb. in weight. Pawpaws grow wild in the rich hardwood forests of 25 states in the eastern United States, ranging from northern Florida to southern Ontario (Canada) and as far west as eastern Nebraska and parts of Iowa. The plan for this project was to utilize the pawpaw fruits from an ongoing pawpaw cultivar trial orchard to test methods of pulp separation from skin and seed and then determine how best to preserve the resulting pulp.

An established and fruit-bearing pawpaw cultivar trial orchard consisting of 220 trees at the Louisa County Conservation Chinkapin Bluff Recreation Area (previously partially funded by the Leopold Center) was maintained and harvested to supply the fruit for testing. The pulp separation was conducted at Iowa State University using the Food Science and Human Nutrition Department's existing pulper (located in the Center for Crops Utilization Pilot Plant) in the ISU Food Science Department labs.

Partners in this project were: the Louisa County Conservation Board, which provided land and mowed between rows of pawpaw; Red Fern Farm, currently the largest pawpaw grower in Iowa, represented by Tom Wahl, who provided consulting on growing and processing pawpaws and help with outreach; Ray Grogan, pawpaw grower of Iowa/Arkansas, who helped with maintenance and harvesting of pawpaws: Patrick O'Malley, who maintained trees, harvested, arranged transportation of fruit to ISU, and presented outreach of project results; and Lester Wilson, who worked on mechanical processing methods and preservation.

Objectives of the project were to:

1. Grow and maintain existing 1-acre pawpaw patch in Louisa County, Iowa to provide fruit for experimentation. Provide at least 200 lbs. of fruit per year to ISU Food Science Laboratory.
2. Use harvested fruit to practice different techniques in pulp separation and preservation. Determine best method of removing skin and seed from pulp.
3. Provide results to current and potential pawpaw growers and also to general public. Develop and contribute educational information and presentations to the Leopold Center, ISU Extension, Practical Farmers of Iowa, Northern Nut Grow-

Pawpaw pulp running through the pulper.

ers, *Pomona* (a quarterly journal from The North America Fruit Explorers), Iowa Fruit and Vegetable Growers (IFVGA) and others

Approach and methods

Objective 1 was achieved by partners previously listed. Six hundred pounds of pawpaw fruit from Chinkapin Bluff trial were provided to the ISU Food Science Department in 2009 and 400 pounds in 2010. Objective 2 was accomplished by Lester Wilson using the Food Science and Human Nutrition Department's pulper.

Objective 3 went forward with several outreach events.

- Patrick O'Malley hosted an Iowa Nut Growers Association Field Day in September 2009, which included a stop at the pawpaw trial located at the Chinkapin Bluffs Recreation Area. The papaw trial was explained, as was the Leopold Center's involvement in the trial and the current pulp processing activities. Fruit from the trial was sampled and received generally very good reviews from the approximately 40 participants.
- A nearly identical field day at the pawpaw trial location was held for about 20 Iowa Master Conservationists on September 26, 2009.
- In June 2010 a field day for more than 50 IFVGA members was held at the trial site.
- In 2011 and 2012, O'Malley partnered with New Pioneer Coop (Coralville and Iowa City) to highlight pawpaws during their Fall Equinox Festivals.
- In 2010 O'Malley presented at the Iowa Organic Conference on pawpaws and the work on this grant.
- In September 2011, O'Malley presented results from this grant at the International Pawpaw Conference in Frankfort, KY.

Results and discussion

In 2009, 600 pounds of pawpaw fruit from the Louisa County site were grown, picked, and delivered to the Center for Crops Utilization Pilot Plant. After several attempts, the last run through the modified pulper produced a yield of 53 percent seed- and skin-free pulp. The pulp was frozen with and without ascorbic acid and then analyzed and evaluated for content and recipe use. The presence of ascorbic acid reduced browning of the pulp.

In 2010, 400 pounds of pawpaw fruit were sorted according to ripeness. The underripened fruits were left in the refrigerator to continue slow ripening until needed. Some were frozen immediately for later processing. The ripe fruits were processed in the pilot plant to obtain pulp using the same modified equipment and method as the previous year's successful run. This provided crop year effects, as well as a replication of the process. Length-wise halved fruits were fed into the pulper with much less jamming at the feeding tank end of the pulper, and pulp was obtained successfully. The food-grade rubber curved blades in the pulping cylinder were able to propel the fruit through the cylinder and (literally) shot out the skins and seeds through the waste spout at the other end of the pulper. Fewer broken seeds were found than in 2009. All of the broken seeds were found at the exit of the pulper, and all had the same breakage pattern (broken in half with a clean split). The pulp was stored in airtight containers in the -20o C (-4o F) freezer.

Pawpaw pulp collected in a bucket.

Conclusions

The objectives were achieved for the most part. The project showed that skin and seed could be successfully separated from the pulp by a mechanical pulper. This process yielded pulp that exceeded 50 percent of the weight of the fruit. There was still some hand labor involved since the process seemed to work more efficiently when the fruits were sliced lengthwise. The resulting pulp could then be stored in the freezer until used in existing recipes for pawpaws. See: http://www.pawpaw.kysu.edu/pawpaw/recipes.htm

The mechanical pulper used in this project appeared to be effective. However, the cost of the system (estimated at over $7,000) may be well out of reach of the small grower. A modification of a Roma Food Strainer might be a cheaper alternative worth exploring.

Impact of results

This project will give pawpaw growers more confidence to plant trees knowing that 1) there are ways other than hand pulping to separate seed and skin from the pulp and 2) the pulp can be frozen for later use. A pawpaw grower in Keota, Iowa, Levi Lyle, currently is freezing the pulp and selling it during the off-season.

Education and outreach

O'Malley displayed pawpaws as an integral part of the Hometown Harvest of Southeast Iowa Food Crawl in September 2012. He has provided additional publicity for the project through radio interviews on WHO-Radio in Des Moines and Iowa Public Radio. An article in Iowa Outdoors (October 2008) featured O'Malley growing pawpaws. Pawpaw recipes, which were included in the article, appeared on the Iowa Outdoors website. http://www.iowadnr.gov/magazine/index.html.

Cooperative efforts were provided by previously mentioned private growers, Louisa County Conservation, ISU Extension and Outreach, ISU Food Science Department., New Pioneer Coop, and Hometown Harvest.

Leveraged funds

No additional funds were leveraged by this project.

***For more information, contact**:*
Patrick O'Malley, ISU Extension and Outreach, 3109 Old HWY 218 S, Iowa City, Iowa 52246; (319) 337-7864, e-mail omall@iastate.edu