

Research proposal

Reduction of tannins in compressed cashew apple juice

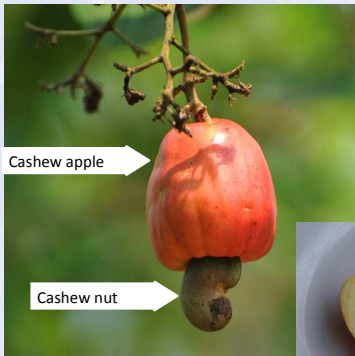
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Cashew apple utilization in VN

- Left to rot in the fields, due to:
 - The juice is very astringent (0.35% tannins)
 - Highly perishable
 - Lack of processing knowledge

Cashew fruit



Value of cashew apple juice

In 100 mL (USDA)

- 219 mg Vit C (5 times that of orange juice)
- 260 mg magnesium (higher than that of orange juice)
- 565 potassium (twice that of orange juice)

Cashew in VN

- Planting area in 2012: 355,050 ha
- Annual production of dried nuts in 2012: 264,800 metric tonnes (processed into kernels, > 90% for exportation, among the largest exporters)
 - 286,607 tonnes raw nuts, given raw nut:cashew apple ~ 1:8
 - 2,292,856 tonnes cashew apple, containing 85% juice. If 65% of the juice is extracted
 - ~ 1.267 million tonnes juice

What have been done in VN

Several attempts have been done to investigate the uses of the compressed juice for production of:

- Cashew apple juice
- Alcoholic beverage
- Vinegar
 - **Not successful in term of consumers' acceptance due to the high astringency.**
 - **Consumption of high amount of tannins may also increase the risk of low protein assimilation (Morton, J. 1987)**

Objectives of the proposed research

- Reduction of tannins/astringency of cashew apple juice
- Maintain/ improve the sensorial properties
- Retain as highest as possible the nutritional values (vitamines, minerals)

WP2: Tannin removal treatments

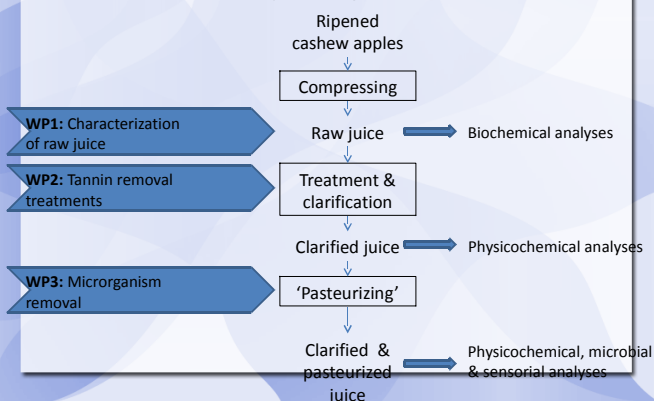
Objectives:

- Investigate and compare the possibilities of using different techniques to reduce tannins

Techniques to be considered

- Known/published techniques: using starch, gelatin, adsorbent resin (PVP - Polyvinylpyrrolidone, PVPP – polyvinylpolypyrrolidone)
- Other potential techniques:
- Precipitation with proteins (?)
- Adsorption with modified clay (Arellano-Cardenas et al, 2012, *Clays and Clay Minerals* 60:153-161) (?)
- ...
- Combination of several of the above techniques

Process procedure and proposed work packages



WP2: Tannin removal treatments

Treatment

- Addition of varying concentrations of the mentioned agents → reaction → the clarified juice is separated from the precipitation/slurry by spontaneous settling and/or centrifugation
- Treatment parameters: added concentrations, treatment time, pH, temperature

Evaluation

- Reduction in tannins
- Retention of other nutrients: sugars, proteins, vitamins, minerals
- Yield of the clarified juice
- Changes in other physicochemical values: pH, color, turbidity, viscosity ...
- Sensory evaluation (e.g., carried out after pasteurization)

WP1: Characterization of raw juice

Objective:

- Characterization of raw juice, supporting the subsequent WPs

Parameters to be analyzed (according varieties present in VN, e.g.)

- pH, acidity, color, viscosity
- Total solids
- Concentrations of tannins, sugars, proteins, vitamin C, minerals ...

WP3: Microorganism removal

Objectives:

- Investigate two methods, namely thermal pasteurization and microfiltration (cold pasteurization), for removal of microorganisms
- Target: to create a safe product with a desired shelf life while retaining highest quality of the clarified juices. Microfiltration may also help to improve the transparency

Treatment

- Thermal pasteurization: different temperature/time combinations
- Microfiltration: pore sizes of the membrane

WP3: Microorganism removal

Evaluation:

- Possible further reduction in tannins
- Retention of other nutrients: sugars, proteins, vitamins, minerals
- Changes in other physicochemical values: pH, color, turbidity, viscosity ...
- Sensory evaluation
- Microbial and physicochemical stability during storage under refrigerating conditions (in bottle)

–Thank you!!!

Influences of the work

- Utilization of the cashew apples in Vietnam (huge amount, which is underutilized or not utilized at all)
- Increase in benefits for farmers, processors
- Creation of jobs for local people
- The clarified juice can be further processed into other products: blended fruit juice, fermented beverage, vinegar, concentrated juice, fruit powder, ...

References

- This proposal is inspired by a number of published works of researchers in India, Brazil, some African countries, France, and Vietnam