IV. znanstveno-stručna konferencija: Duhan i duhanski proizvodi-jučer, danas, sutra

Utilization of tobacco waste materials and by-products

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„Application of innovative techniques of the extraction of bioactive components from by-products of plant origin”

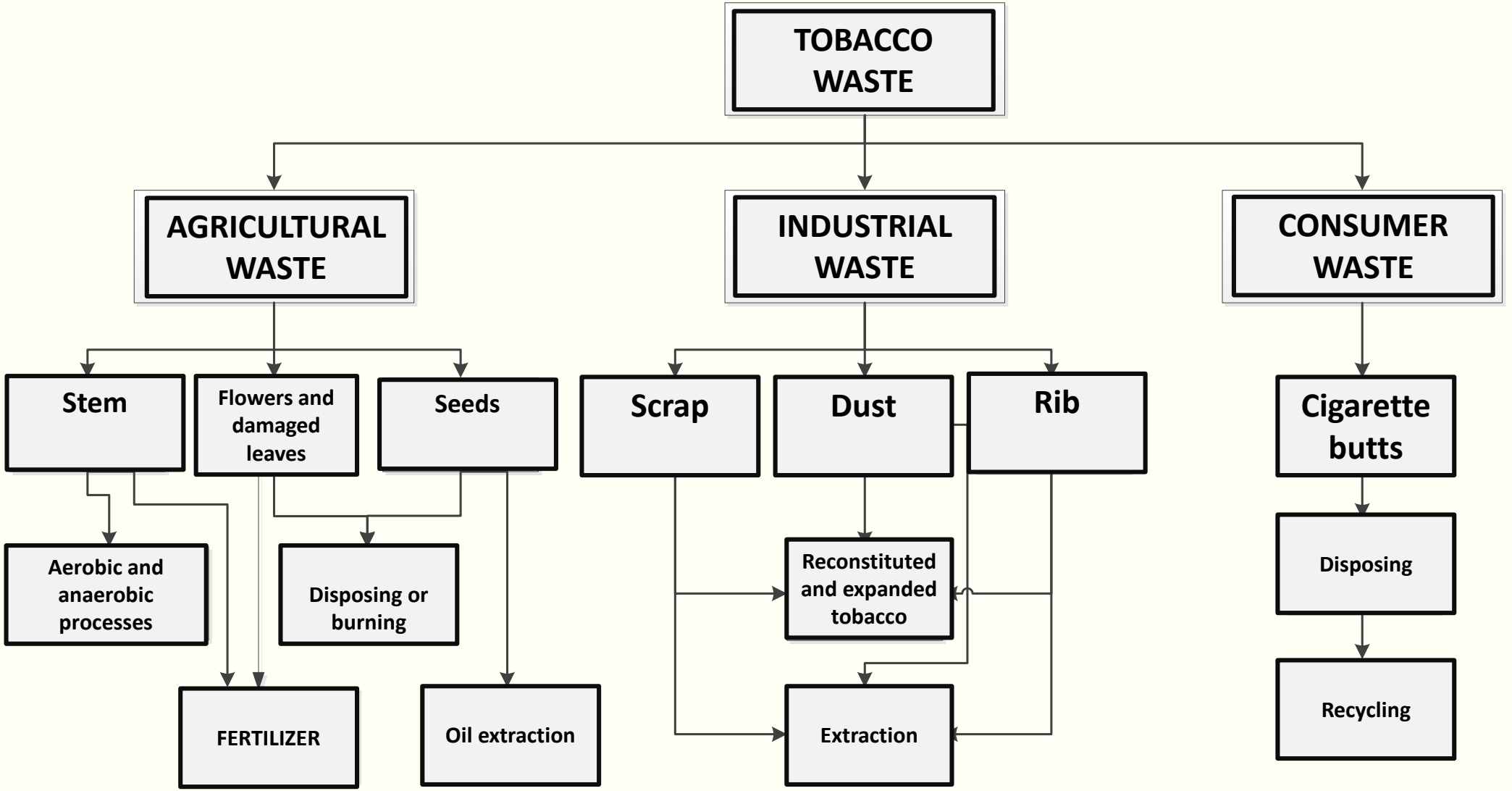
(2018-2023)

Project leader: PhD Stela Jokić, full professor

*(Budget: **1.607.708,72 HRK**)*

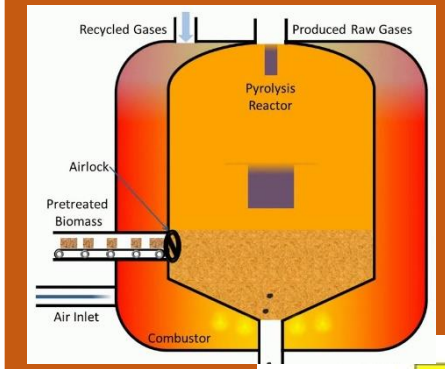
Tobacco and tobacco waste

- *Nicotiana tabacum* L.
- Health and social impact
- Very profitable cash crop
- **Cigarette smoking** is the most common form of tobacco use worldwide
- Other tobacco products: waterpipe tobacco, various smokeless tobacco products, cigars, cigarillos, roll-your-own tobacco, pipe tobacco, bidis and kreteks


TOBACCO WASTE
AGRICULTURAL WASTE
INDUSTRIAL WASTE
CONSUMER WASTE
Stem
Flowers and damaged leaves
Seeds
Scrap
Dust
Rib
Cigarette butts
Aerobic and anaerobic processes
Disposing or burning
Reconstituted and expanded tobacco
Disposing
FERTILIZER
Oil extraction
Extraction
Recycling

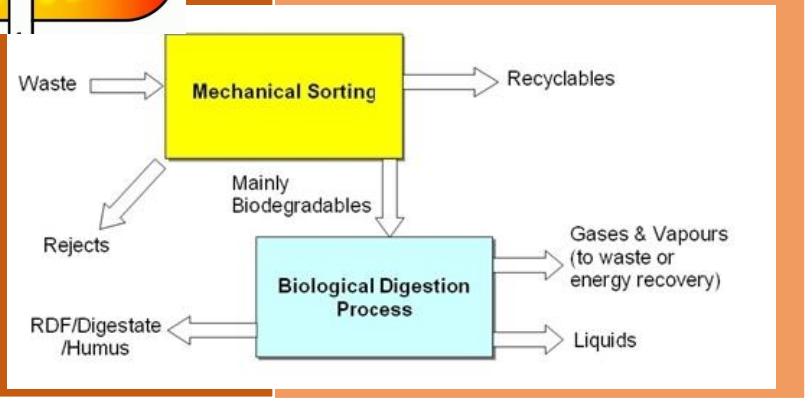
ENERGY PRODUCTION

Biogas and bio-oil



MECHANICAL-BIOLOGICAL PROCESSING

Aerobic composting
Organic fertilizers

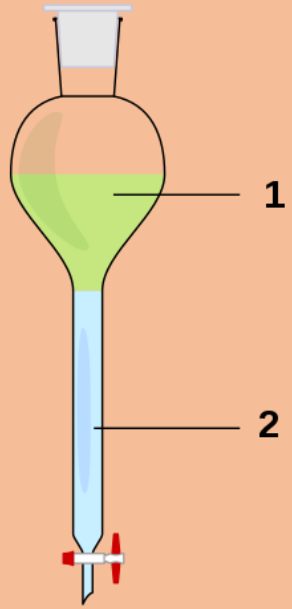


RECONSTITUTED AND EXPANDED TOBACCO

Tobacco products

EXTRACTION

Bioactive compounds

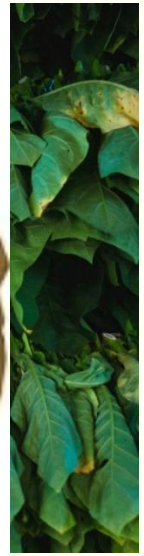


Tobacco industrial waste

SCRAP

DUST

RIB




1. Rib

2. Scrap

3. Dust

Reconstituted Tobacco

- Developed in the 1930s and 1940s to make these waste parts smokable
- To increase sheet strength, the addition of ammonia “to release the pectins in tobacco stems so they may form a gel which becomes the binder in the blended leaf sheet is required”

RECONSTITUTED TOBACCO-SHEET PROCESSES

Papermaking process

- Grounding and mixing of tobacco waste with water
- Laminating into sheets
- Spraying water mixture over the sheets to add the components back in

Slurry type process

- Fiber materials and soluble materials never get separated
- Tobacco waste and binder, both in liquid media all get mixed into water to create a slurry
- Operating in an egg-beater fashion – forming a slurry
- Drying and cutting into sheets

Other processes

- Dust impingement
- Impregnation of web
- Extrusion

Expanded tobacco stem

- The presence of stems in cut tobacco can cause problems in cigarette manufacturing
- Rod breaks, stem holes and changed burning characteristics of the cigarette
- Expanded tobacco-increased bulk density or filling power
- Propellant or expanding agent, with which the tobacco is impregnated and which subsequently generates pressure inside the cells of the tobacco, by means of a phase change from the liquid or solid state to a gaseous state

PROCESSES FOR PRODUCING EXPANDINED TOBACCO

1.DIET (*Dry Ice Expanded Tobacco*)

- Stem and rib is submerged and soaked in liquid carbon dioxide
- Residual liquid is drained and reused
- The liquid CO_2 in the tobacco cells turns to dry ice when the system is unpressurized
- Heating and increasing the volume of the tobacco up to 140 %.

2. HRV (*High Relative Velocity*)

- Tobacco particles are heated for at least 0.5 seconds by contact with a hot gas (nitrogen ili CO_2)
- Convection heating to achieve maximum expansion
- The heating typically takes place in high speed transport dryer to provide turbulence and high heat transfer rates

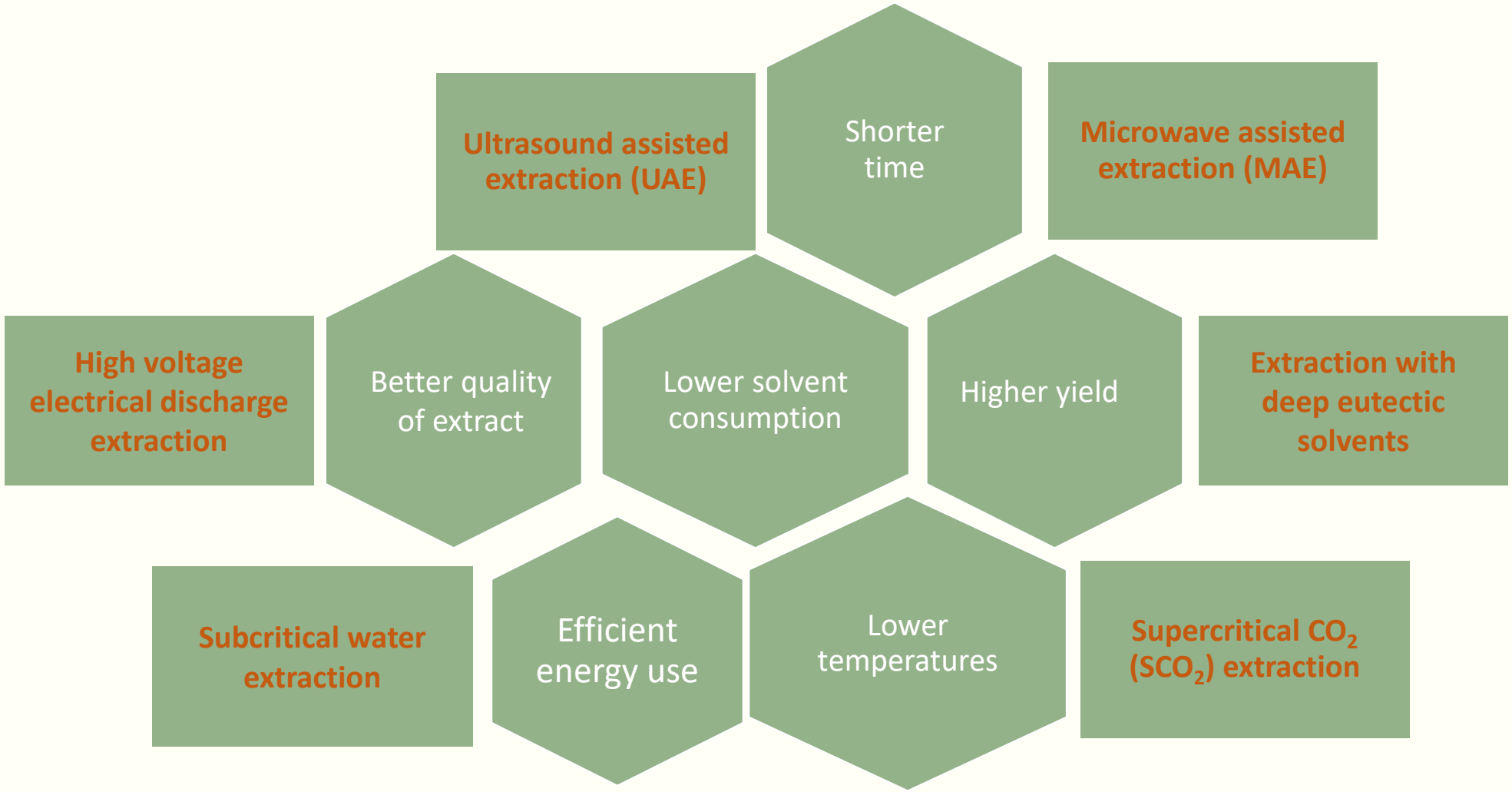
3. Other processes

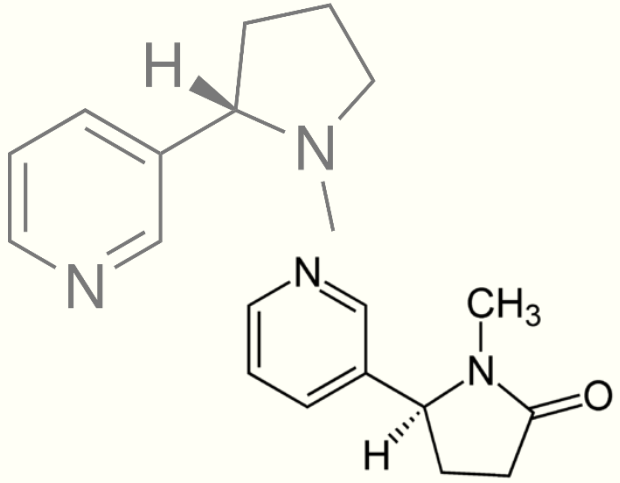
- Ammonium carbonate(Filip Moris patent 1973)
- INCOM expansion processes– NITROGEN (Pressure 100 bar)
- G-13 process -freon 11 (Patent R. J. Reynolds Tobacco Company 1979).
- CRS Hauni process-water

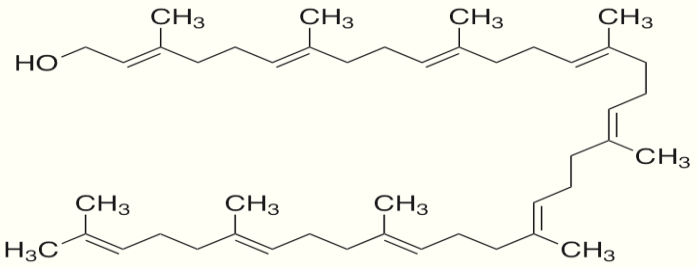
Advantages- easy handling

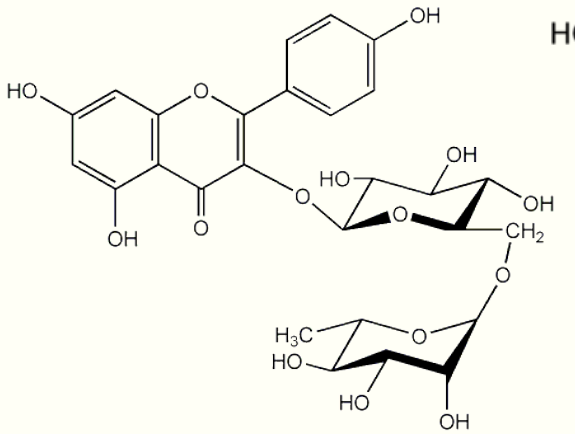
Disadvantages –lower expansion rate

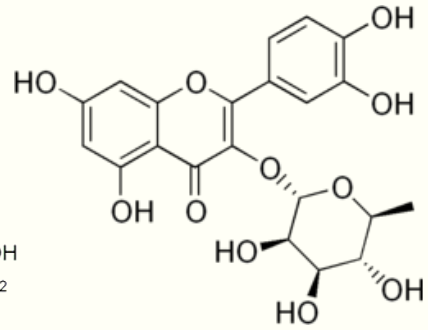
Why green extraction techniques?

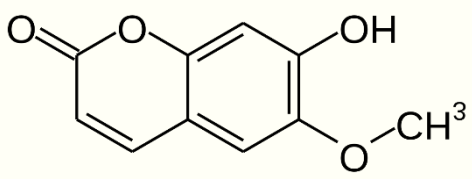






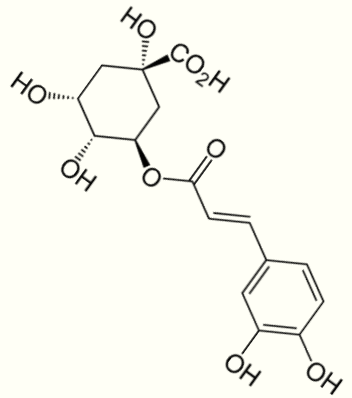


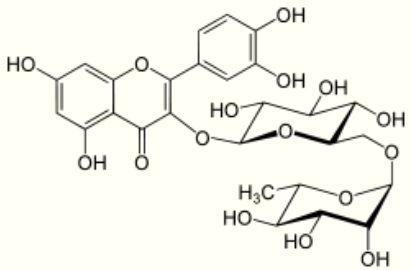


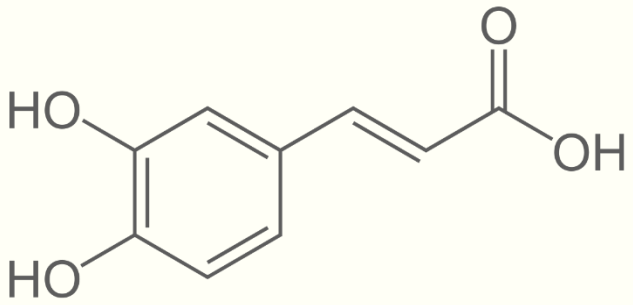


BIOACTIVE COMPOUNDS

- Nicotine
- Solanesol
- Phenolic compounds (chlorogenic acids and rutin)
- Aromatic compounds







Thank you for your attention!