The National Institute of Research – Development for Machines and Installations Designed for Agriculture and Food Industry – INMA

EsiTech 2020 - International Conference on Sustainable Future and Environmental Science

Studies on the invasiveness tendencies associated to several technical plants cultivated for the production of biofuels

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The use of technical plants in the production of biofuels: opportunities and difficulties

The current context and new trends in biofuels

- The problem of occupying agricultural lands with energy crops in competition with food crops
- Identification of new sources of biofuels, easily adaptable on poor soils or contaminated soils

Opportunities

- Identification of new / improved technical plants with high biofuels production potential to solve main issues related to classical energy crops (rapeseed culture)
- Use adaptive capacities to grow well in unfriendly environments, even in polluted or poor in nutrients soils. The plant is growing rapidly, producing large amounts of biomass and offers the possibility to be harvested up to 2 times a year, therefore presents a high potential to be used in the field of biofuel production
- Some plants have a honey potential, helping local insect populations

Drawbacks

- Plant's capacity to multiply easily showing an invasive behavior
- It is difficult to establish another culture after energy crops

Objectives

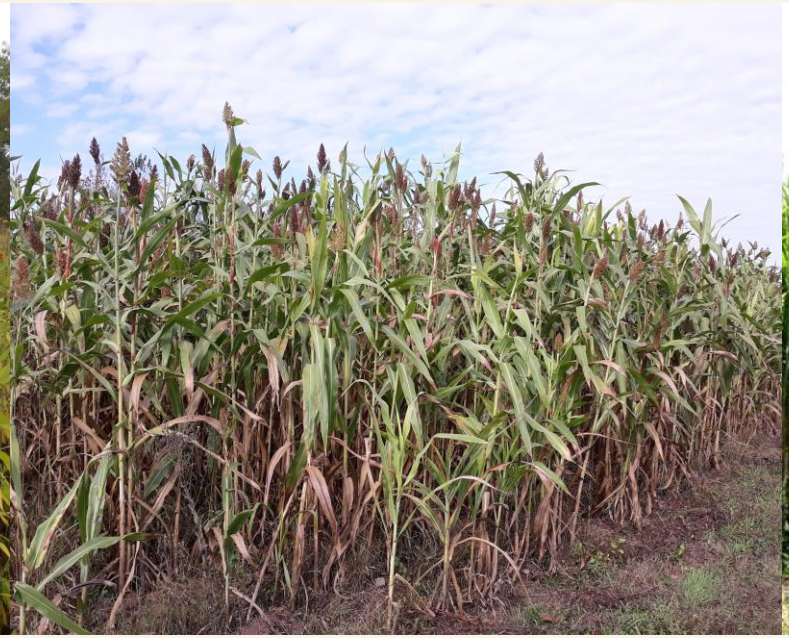
- Assess the invasiveness behavior of three technical plants used for the production of biofuels, namely Jerusalem artichoke, Sweet sorghum and Miscanthus in controlled agricultural crops

- Analysis on the production of biofuels from technical plants

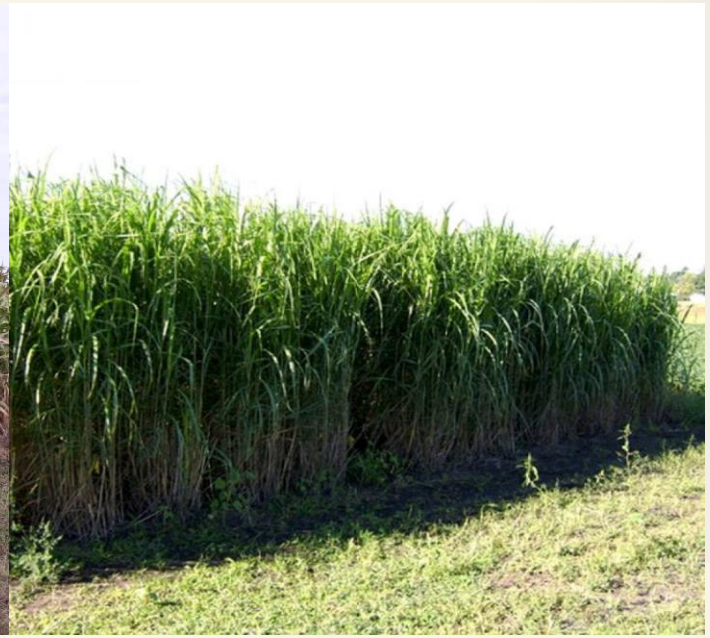
- Analysis of the effect of technical plants role in controlling local weeds

Jerusalem artichoke

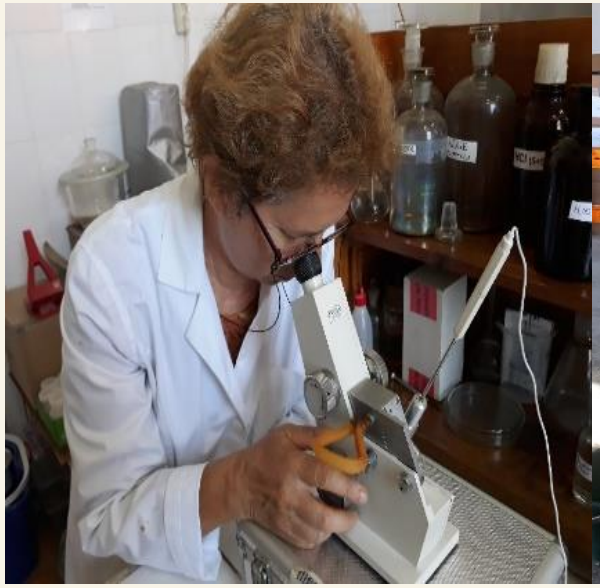
Sweet sorghum



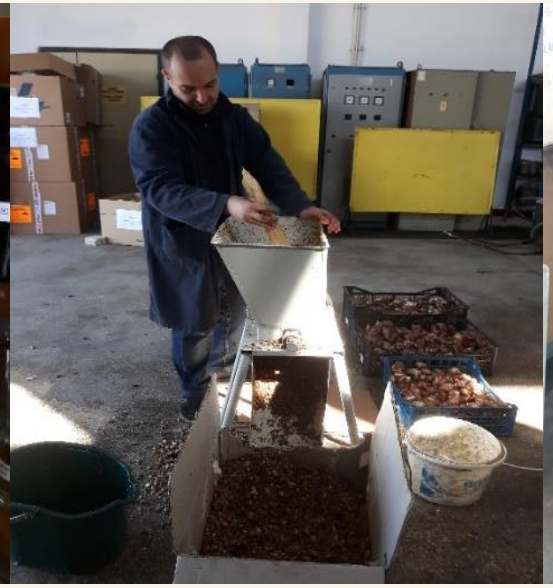
Miscanthus



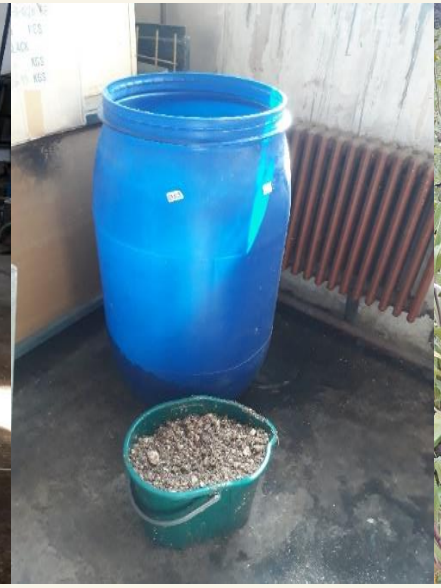
Jerusalem artichoke



Performing analyzes



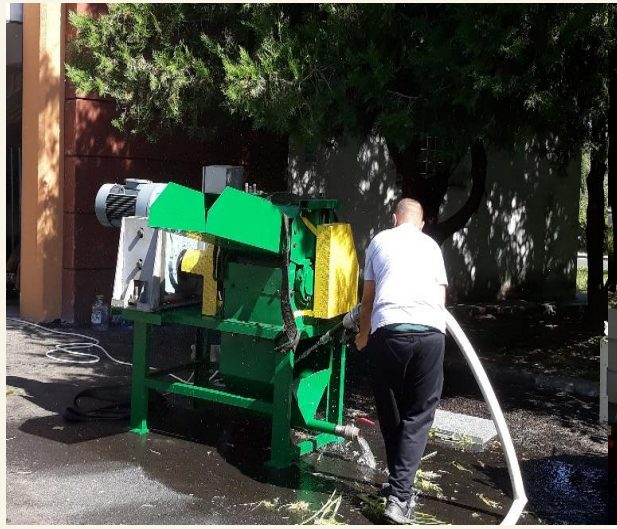
Chopping and grinding



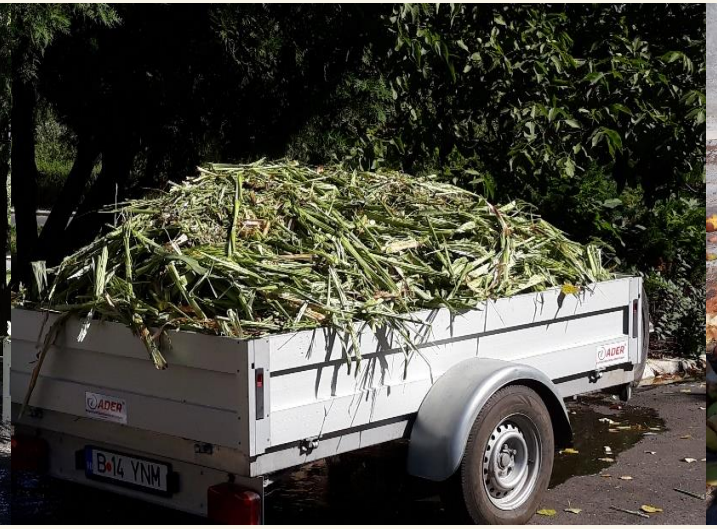
Fermentation and distillation

Evaluation of potential invasiveness

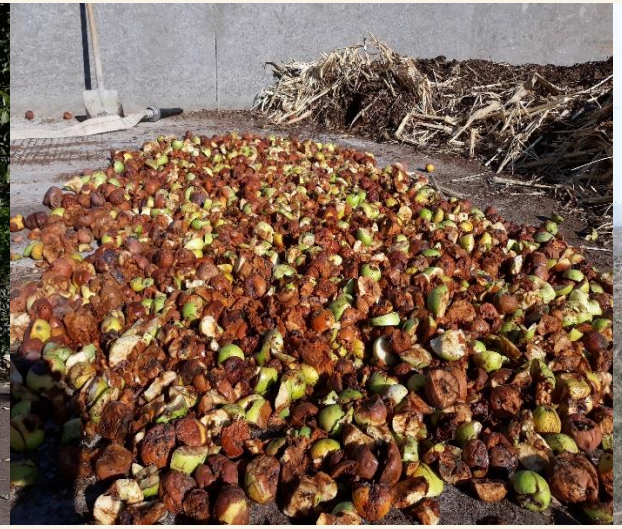
Sweet sorghum



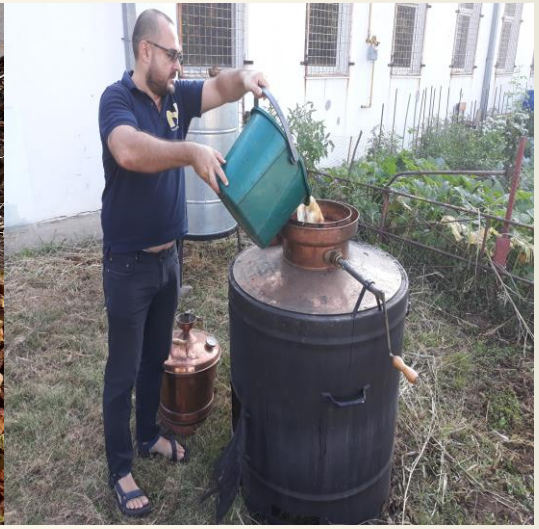
Chopping and squeezing sorghum stalks



Fermentation for biogas production



Making a compound consisting of apple residues and sorghum juice to optimize fermentation



Fermentation distillation for ethanol production

Conclusions

1. Jerusalem artichoke showed good growth in difficult conditions and in less fertile soils, the culture was not irrigated, the humidity being regulated only by rain with a productivity per hectare 21-43% lower than crops that benefited from all the works and treatments. Although it has a good ethanol production potential, the process is complicated requiring the conversion of inulin (carbohydrate) into sugars for fermentation.

- The plants have proven to be extremely effective in controlling local weeds (1-4% of other plants have been identified in the J.A. crop).
- Establishment of other crops on less fertile soils after J.A. it is extremely difficult, because there are many small tubers remaining in the soil after harvesting.

2. Sweet sorghum - sorghum juice was extracted and mixed with apple residues (to avoid rapid degradation of the juice). The problem in sorghum crops is the very short harvesting period to obtain the maximum amount of sugars, in order to obtain biofuels.

- There were differences in the quantities of juice produced, between irrigated and non-irrigated crops of 18%.

- The plants have proven to be effective in controlling local weeds (5-7% of other plants)

3. Miscanthus - It has shown a low potential for obtaining ethanol, its main advantage is incineration in order to obtain heat.

- effective in controlling local weeds (1-4% of other plant in the crop)

THANK YOU FOR YOUR ATTENTION

ACKNOWLEDGEMENT

This work was supported by a grant of the Romanian Ministry of Research and Innovation CCDI - UEFISCDI, "COMPLEX SYSTEM OF INTEGRAL CAPITALIZATION OF AGRICULTURAL SPECIES WITH ENERGY AND FOOD POTENTIAL", project number PN-III-P1-1.2-PCCDI-2017-0566, Contract no. 9PCCDI/2018.