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Techno-economic study of ethanol production from low grade dates

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Introduction:

Algeria is one of the important dates-producing countries with a yearly production of about 850.000 tons. With more than one thousand varieties, however only 30% of this product is of good quality, and the rest is consumed locally or directly fed to the cattle . Our research shows that the area of study (Touggourt) so rich with date palms these trees are very resistant to hot climate and because of their *dates* proximity contain 50% of sugars compared to the dry weight of the fruit they are qualified to produce high-purity *ethanol*.

The global trend seeking to find a non-polluting energies and *environmentally* friendly such as the use of biofuels as an alternative to organic, puts *bio-ethanol* fuel on top of possible alternative energies.

Keywords: Bio-ethanol, Dates, Fermentation, Photovoltaic pumping , Environment.

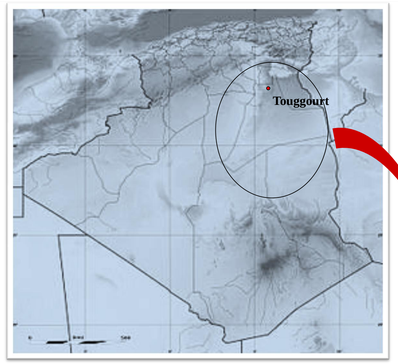
Objectif:

The main Objectives of this study are:

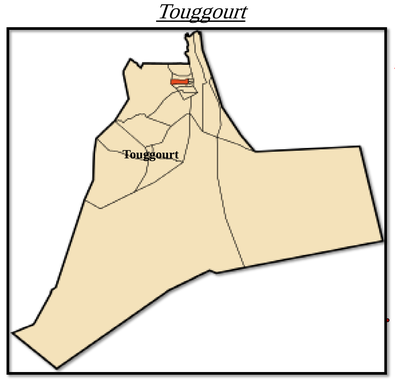
- **transforming low quality types of *dates* and no consumed date (Deglet-Beida) into *bioethanol* using biotechnology technical.**
- **The application of a *photovoltaic pumping* system to reduce agriculture palms cost (mainly the irrigation cost)**
- **Estimation of *bio-ethanol* extraction from low grade *dates* (Deglet-Beida).**

Methodology:

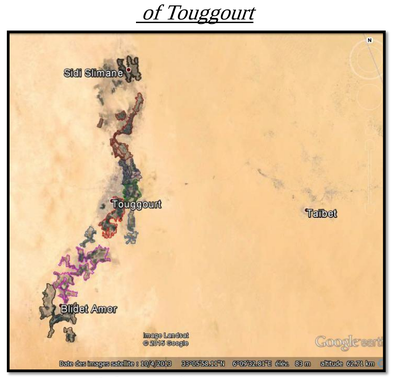
- **By using Google Earth in Touggourt region, the surfaces planted by palms are determined with plotting their contours.**
- **Then, these contours are exported to Arcgis software to present them as geo-referenced surfaces with their parameters. The water resources are so necessary to present using Arcgis (this work is planned for the next stapes)**
- **eventually, an experience of *ethanol* extraction from Deglet-Beida we going to realized in the laboratory.**



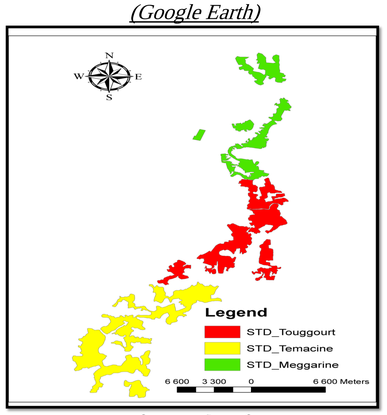
Geographical location of Touggourt



Administrative situation of Touggourt



Palms surfaces contours (Google Earth)

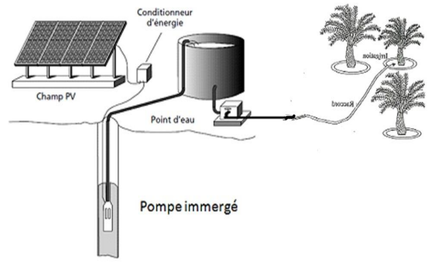


geo-referenced surfaces (Arcgis)

Photovoltaic pumping:

There are several potential can be exploited as an alternative electric energy as:

- **Photovoltaic system connected to electrolysis + fuel cell.**
- **Photovoltaic system connected to the wind turbine. But as the study site, the solar energy is the best solution.**



Photovoltaic system connected to the water tank

By using a trend model of *Photovoltaic pumping bio-ethanol* can reach competitive price in comparison to subsidized gasoline, provide a lot of jobs, keep the fossils resources and protect the *environment*.

Dates:

Ghars **Deglet-Nour** **Deglet-Beida**

Deglet-Nour, Deglet-Beida and Ghars are The most important dates produced in Touggourt and are species that underpin this study For example Deglet-Beida is one of the dry *dates* kind, it have a spinning shape and a Brown-Blond to beige color, and it contains 74% sugar compared to the dry weight of the fruit. The price of Deglet –Beida is between 50 DA to 100 DA or 0.47 € and 0.95 € for Kg. Because of the dry consistence of this *dates*, it was not consumed locally and it export mainly to the south's African countries where it enters in many transformation and Agro-Alimentair industries.

Bio-ethanol:

The *bio-ethanol* is extracted by the *fermentation* of sugars contained in some plants for example sugar cane and sweet potato or grain such as corn and wheat following the next reaction.

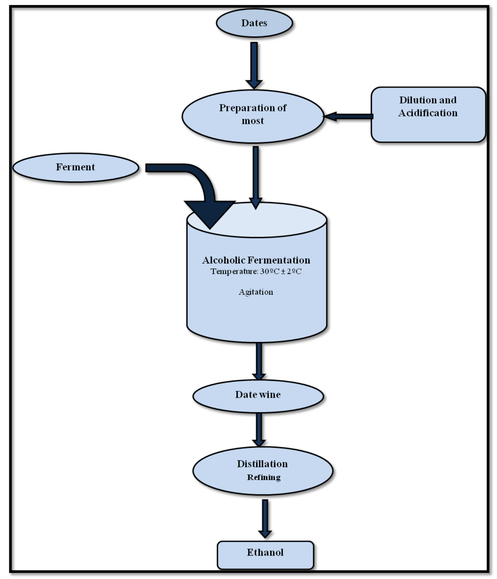
Sugar + Ferment ==> Ethanol + CO2 +Energy

$$C_6H_{12}O_6 \rightarrow 2\ C_2H_5OH + 2\ CO_2$$

***Bioethanol* is used as fuel for production of heat and electricity. Also, it can be added to gasoline to use as fuel for cars.**

Alcoholic production process:

The production of *ethanol* from dates is based on the following steps: The preparation of most of *dates*, the process of alcoholic *fermentation*, the distillation and rectification.



process diagramme