Bioenergy development in Algeria

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Advanced biofuels-versus-first generation

The contribution of biofuels is projected to reach 9% of total transport fuel demand in 2013, according to estimates by the International Energy Agency (IEA).

This contribution is expected to increase to 26% of total transportation fuels by 2050, by other scenarios.

First generation biofuels

New generation biofuels

First generation biofuels

Lands used for food crops are converted to biofuels production

Competition with food crops (Corn, palm oil, barley, sugar, sunflower)

Rural population habits changed

Price of necessary food products Increase

Intensive use of water, fertilizers and pesticides

Soil depletion and pollution

Intensive monoculture

Positive ecological balance of biofuels is being negative

New generation biofuels

New generation biofuels are developed, by using new technologies more complex, allowing exploitation of new resources.

Theses resources have to be available, non competitive with food or other important use, and integrated to local development of regions.

Exchanging experiences on biofuels tehnologies, norms and regulations is necessary, for a better adaptation of these technologies to local conditions, in developing countries.

New generation biofuels

The development of local bioenergy systems, and a sustainable management and production of bioenergy will be necessary for development of second-generation biofuels.

On the other hand, third and fourth generation biofuels are being explored by research, such as algae, biohydrogen and bioelectricity using photosynthetic mechanisms.

New generation biofuels

With new generation biofuel, the biofuel industry could benefit from other biomass feedstock, such as cellulose, solid waste, food waste and biodegradable fractions of municipal solid waste.

However, biomass feedstok that will be used for second generation biofuel production is still under consideration.

Since it is being developed mainly from agricultural wastes, other biomass feedstock can be used,

Bioenergy development in Africa

Biomass accounts for 10% of the total global energy sypply, so it is considered as the most important renewable energy source (IPCC 2007; IEA 2008. IEA 2009).

Actually, most of this biomass is used for cooking and heating in a traditional way, mainly as wood, agricultural residues and urban wastes.

In traditional bioenergy systems, the incomplete combustion of wood fuels produce a number of pollutants like Carbon monoxide, sulphur and nitrogen oxides, and particulate matter.

In some cases, these systems contribue to the degradation of ecosystems, through the overexploitation of biomass.

Bioenergy development in Africa

Despite of this : An illustrated example is the production of lignocellulosic biomass in Mozambique which has the capacity to annually contribute up to 2% of global energy supply in the form of bioenergy under a strict sustainability framework.

Second generation biofuels can be competitive when :

- The credits for co-products are included,
- Low cost enzyme production is developed,
- Efficient micro organisms are developed,
- Processus at industrial scale are demonstrated,

Bioenergy development in Africa

Hoogwijk and al showed in 2009 that Africa can supply, through exploitation of adandoned and non productive lands, biofuel industry, in low cost lignocellulosic biomass.

Excluding bioreserves, and assuming the demand for food.

Currently, pilots and demonstration plants are developed in North America, Europe, and some emerging countries, technological and cost problems need to be resolved for the commercial deployment of the next generation biofuels.

Sustainable biofuels production in Africa

Developing countries are considered as good suppliers of biofuels for developed countries, which is supposed to allow them to meet their needs and requirements, and on the other hand to participate to rural areas development.

However sustainability of biofuels is influenced by the scale of the system used to produce feedstock. This influence is negative when the scale is large. Moreover, in Africa, agriculture is not efficient and competitive, to satisfy demand for food and fuels.

JATROPHA In Africa

It has been reported that it is difficult to assess the actual potentiel of Jatropha sector, which is not fully developed. Some projects demonstrate that it is possible to establish jatropha in dry areas, but some others have failed financially.

According to specialists, jatropha can be benfic to local rural development when planted as additionnal crop, without replacing food crops.

Involved stakeholders show some problems associated with jatropha cultivation. This plant considered initially as a crop for marginal land with low water and fertilizers needs, behaves differently in large scale projects.

The plant needs increase to ensure economic viability, it seems to be advantageous for small scale production.

In Algeria

Raw materials for which advanced biofuels technologies have been designed can be slightly different from adequate **raw materials** for biofuels production in developing countries.

For **Algeria**, first generation biofuels from food biomass is not suitable, then new generation biofuels development is more profitable.

This development should be sustainable, the challenge will be to make it in areas, where feedstocks are available, so plants can be installed for a local production and use of biofuels.

Bioenergy development is still at
an experimental stage in research laboratories.

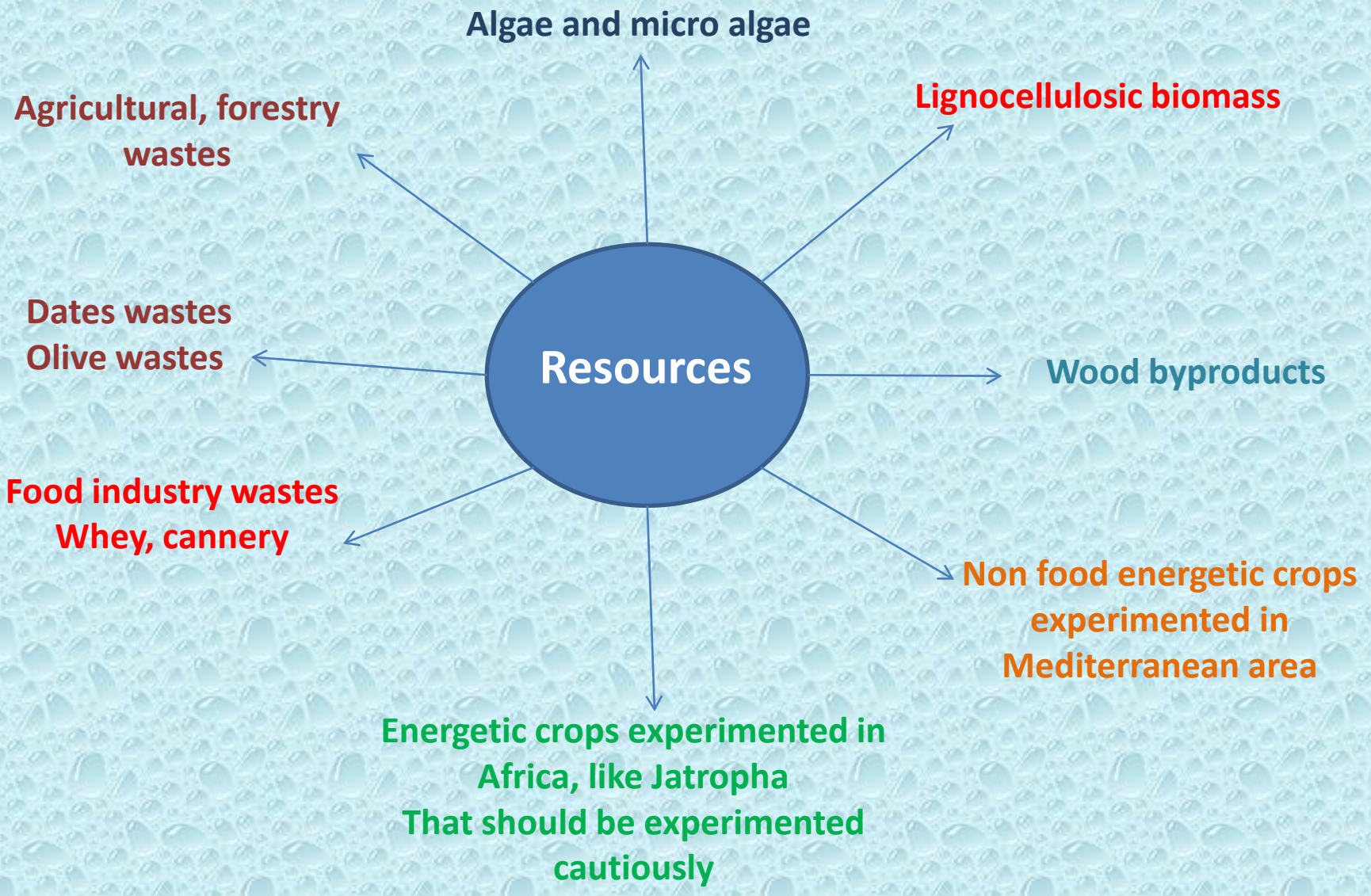
In Algeria

Under development of research in biotechnology, in 1988, the high institution in charge of scientific research introduced officially the theme : Biotechnology application in agricultural and industrial wastes valorization for bioethanol and biogas production.

Currently, under national research programs, most studies on bioenergy concern : biomass and local raw materials assessment, biodiesel and bioethanol production, landfill biogas valorization….

Under the National program of renewable energies development until 2030, the installation of experimental bioenergy plants is planned.

In Algeria : towards new generation biofuels



In Algeria : towards new generation biofuels

For bioenergy development

- Availability of adequate raw materials
- Reduce production costs

Energetic crops

- Marginal lands, available and independant from agricultutal lands,
- Low water and fertilizers needs,
- Specific cultural techniques development,
- Profitable energetic valorisation of agricultural wastes,

In Algeria : towards new generation biofuels

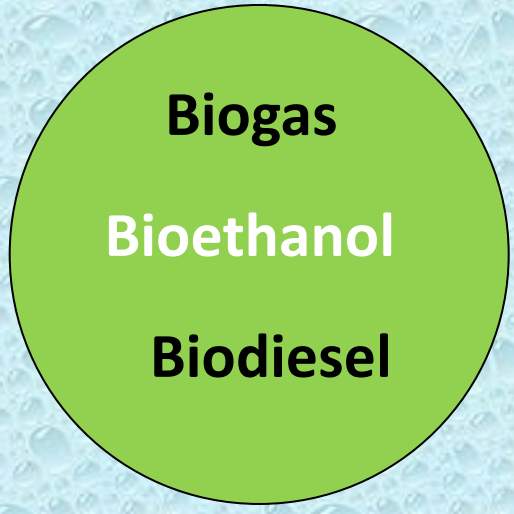
Diversify the potential resources that can be valorisable on bioenergy and high added value byproducts.

Sustainable exploitation of available lands, specially in arid and semi arid areas.

A stable supply and a sustainable use of the raw material, like agricultural, agro industrial, farms, and others, wastes.

Bioenergy should be Fully integrated to agriculture, livestock production.

Biorefinery is an example of integrated bioenergy



Renewable Energies Developement Centre

Bioenergy and Environnement Division

Energetic valorisation of biomass and organic wastes into bioenergy and biofuels,

Assessment of biomass and wastes potential recoverable in bioenergy, in Algeria,

Control of bioenergy and biofuels production,

Designing of **prototypes.**

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Biogas and Biomass Energy

Bioenergetic resources and algae valorisation

Bioalcohol and biodiesel production and valorisation

Environnement and climate change

Ongoing research works

- **Bioethanol** production from sugar substrastes like dates wastes, whey, molasses,
- Isolation and identification of local **microbial agents** involved in biomass recovery to bioenergy, such as yeasts, micro algae,
- The use of **micro algae** for biofuels production and CO_2 resorption,
- Designing of **photobioreactors**,
- Designing of **fermenters** for biogas and bioethanol production,
- **Biogas** production from wastes,
- **Life cycle analysis** for local raw materials and biofuels,
- Water Treatment by **solar photo catalysys**,


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Bioethanol production from dates wastes


Biogas production from farms wastes


Micro algae cultures


Bioethanol production