Jatropha *curcas L.*
Current development and potentialities in Europe

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Jatropha curcas L.

- Wild Euphorbiaceae
- Shrub of some meters high and planted for some tens years
- Drought resistant
- Fears water logging and frost
- Not photosensitive
- Flowering as long as the environmental conditions are good
- Production beginning from 3rd-4th year old
- All the parts are toxic: there is one "less toxic" ecotype
- Harvest is made by hand
- Realistic productivity

  800-1500 kg seeds/ha
- Seeds contain 25-38% of oil

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Generalities

- Native from Mexico. Fossil traces in Peru
- Importation by the Portuguese in Cape Verde islands, then in Africa and Asia (→low genetic variability in these regions)
- Medicinal plant (ιατρον=medicine, φαγω= I eat)
- Plant mainly used for live fences (plot boundary marker and against animals)
- Oil is used for traditional production of soap (women)
- First tests of bio fuel in Office of Niger in Mali in 1941, after 2nd world war, systematic experimentation in France
- At beginning of the eighties, Special Energy Programme is set up in Mali by GTZ in Mali
- Opening of Indian project of Nashick in 1986, closed in 2003 because of the to low productivity (1250 kg/ha of seeds)
- In 1990, in Nicaragua, the beginning of theTempate project with Austrian cooperation. 1000 ha planted. Gave up in 2000 because of many technical and management problems .

In term of surfaces

- General position by GEXSI **in 2008**

  In the world : 900 000ha

  Objectives 2010 : 5 million of ha; 2015 : 13 million……

- Today, difficulties to obtain information

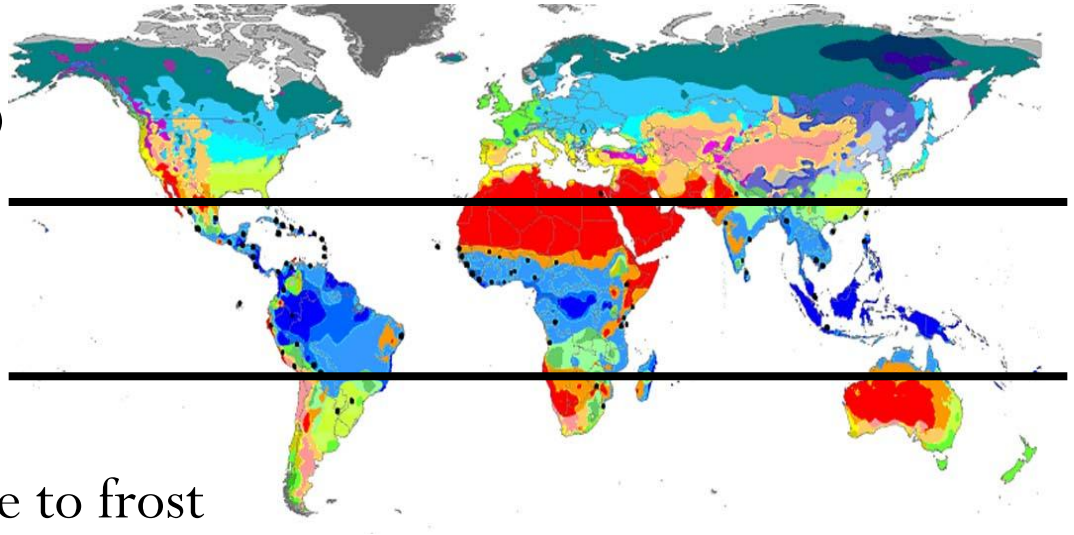
  Private projects : standby or stopped

  Publics project, mainly axed to local development, in progression

  Methodology for carbon credit in the process to be solved

Ecology

- Present in arid regions to humid tropics (25°N, 30°S)
- Rainfall 750-3000 mm. Stand long dry season of many months (succulent plant with falling leaves)



- Altitude 0-1800 m. Sensible to frost
- Can grow on poor but drained soils
- Fears hydromorphy
- Important interactions with climate and soil environment

Agronomy

- Installation from seedling (1000-2000 plants /ha)
- Importance of good installation (soil)
- Fertilization needed in case of economical production (good yield)
- Presence of predators and diseases
- Necessity of pruning
- Flowering spread out

- **Marginal production in marginal soils**

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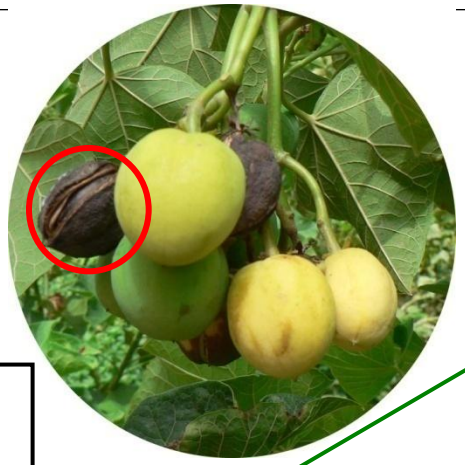

JATROPHA FRUIT

JATROPHA SHELL

37.5%

JATROPHA SEED

62.5%

JATROPHA OIL

25-35%

JATROPHA SEED CAKE

JATROPHA HUSK

JATROPHA SEED KERNELS

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Harvest

- Harvests
  - Painful operations with a risk of sensitization
  - Several operations are necessary
  - Important working time 60 men*day/ha for a productivity of 1500 kg/ha (cotton 35 men*day/ha)
  - Actually, priority to harvest feed crops
  - Dehusking : by hand. 200 men*day/ha for 1500 kg/ha harvest. With hand powered machine : 15 men*day/ha

Oil used as fuel

- Pure oil or blend

In old engines technology and with some precautions

Problem of minority components (Phospholipids gums and waxes)

- **Oil pressing conditions**

- With biodiesel production

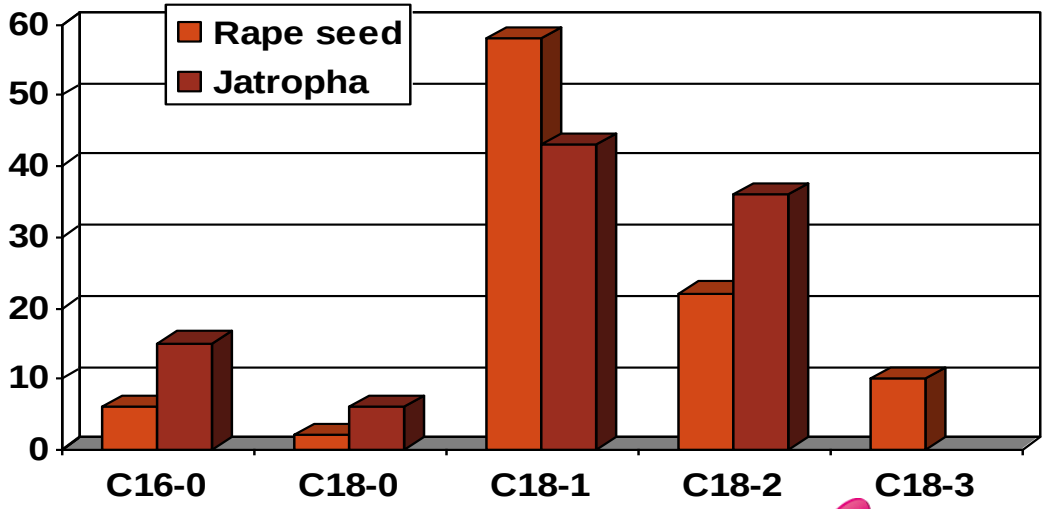
Equivalent to diesel

Problem of level of free fatty acids

FFA < 3% (base etherification)

- **Storage conditions**
- **Extraction conditions**

	GO	JC	RS	MERS	MEJ
Density	0,83	0,92	0,92	0,88	0,88
Trouble point	-9°	2°	-4°	-4°	3°
Flash point	65°	235°	285°	183°	160°
Calorific value	44	39	37	38	40



What production ?

- Valuation of production in term of bio fuel
  - Local market : short circuit : use in pure oil

    Local interest, either in substitution of diesel, or/and for creation of new economic activities
  - National market (bio diesel in a centralize unit)

    Price set by the government
  - International market ?
  - Carbon credits bonus
- Valuation of co products and by products ?

Co products, by products

- Co products
  - Biocides (insecticide, larvicide, molluscicide…)
  - Bio products (coagulant et anti-coagulant, anti-tumoral, anti-inflammatory, abortive…)
- By products
  - Press cake 2/3 of the seeds : toxic
    - → **Fertiliser? (equivalent to a poultry manure).**
    - → **Possible compost**
    - → **Combustible**
    - → **Animal feeding (Phytotoxicity ?)**
- Carbon credits
  - Reforestation 5 t of C/ha for a 3,5 years old crop
  - Fuel substitution 0,7 t of C/ha/y

Interest for Europe ?

- No possibility of cultivation in the main part (to frost)
- Low productivity (low yield and hand made operations)
- Production in tropical countries for Europe :
  - Agro industrial model, not adapted to the actual cropping system and ethic problems about soil monopolization
  - Small scale model : possibility for jatropha as a cash crop if price interesting for farmer and buyer. Evaluation in Mali of cost of jatropha seeds : 0.15 €/kg or 0.60 € of seeds /oil litre but….
  - Bio fuel needed also in these countries not only to limit oil bill but to participate to rural development.

Conclusion

- Jatropha is a badly known plant
- Studies started rather recently
- "Excitation" in 2007-2008 .....
- Awakening on behalf of the protagonists
- Scientific works especially targeted on varietal improvement, increase in the output & detoxification
- Sure interest of valorization in short circuit
- Insertion in the current systems of production?
- Production of biocarburant on an international scale??
- Persistence of the interest for in this plant?


THANK YOU