Enda Energy, Environment, Development Programme

BIOFUELS IN SENEGAL
JATROPHA PROGRAM
2007-2012

Source: Ministry of Agriculture, New orientation for the Agriculture Sector Policy, REVA Plan, Special Biofuels Program, March 2007

I. Objective

The main objective of the program is to ensure Senegal's self-sufficiency in biodiesel by 2012 with the production of 1 190 000 000 litres of crude Jatropha oil. This production will represent 1 134 000 000 litres of refined oil which can be used as biodiesel for vehicles as well as to generate power.

It is also the aim of the program to accelerate the modernisation of the agricultural sector, to create 100,000 direct employment opportunities for the local population particularly in the rural areas where the cultivation of jatropha will be mostly undertaken.

The successful implementation of the jatropha program will ensure the diversification of the cultivation of cash crops, reduce the energy bill of households in the country as well as its heavy dependence on imported energy and improve the country's international trade and balance of payment.

Moreover, the program will contribute towards the reduction of environmental pollution caused by vehicle engines; and will also help alleviate poverty and inequality between rural and urban areas.

II. Programme implementation Strategy

- *Organisation for implementation*

In order to implement the program, a ***national technical committee*** in charge of the execution of the biofuels program has been set up and is working under the supervision of the Ministry on Agriculture.

The committee is headed by a national coordinator and supervised by the Chairman of the *National Association of Rural Councillors* (ANCR).

The technical committee also includes technicians from the Ministry of Agriculture, representatives of rural organisations, professional agricultural organisations, local chiefs, the assistant governors in charge of development, representatives of rural youth and women associations, NGOs, development partners as well representatives of development projects and programs.
At the regional and local levels, program supervisors are designated by rural organisations.

- *Plants multiplication*

Being the centre in charge of handling the seedlings, the Senegalese Institute for Agricultural Research (ISRA) will in collaboration with the various national actors and development partners, ensure the production of the needed plants for the implementation of the Biofuels program. The multiplication of plants will mainly be done through the *in vitro* cultivation system as well as in nurseries with about ***25 tons*** of seedlings and a part of which has already been collected in Senegal by the *Food Security Body.*

This multiplication activity of the Jatropha Curcus plant, which targets ***one billion plants***, shall be undertaken with the creation of a large scale *in vitro* cultivation laboratory at ISRA that will benefit from support of the Spanish cooperation (Teneriffe Island, Spain).

The laboratory will also be a subject of scientific collaboration agreement between the Centre for Biotechnological Research (CULTESA) located in Santa Cruz (Teneriffe) and ISRA/Department of Research *on in vitro* cultivation (URCI) for the setting up of *in vitro* multiplication protocols of the *Jatropha curcas* plants, sharing experiences, and training of technicians, etc.

After the multiplication process, the plants will be distributed to the producers and to other entrepreneurs according to the acreage requested. The latter are responsible for the setting up of the plantations.
The technical departments of ISRA, the National Rural and Agricultural Advisory Agency (ANCAR), the Regional Departments for Rural Development (DRDR) as well as that of the Water and Forests,…, will be responsible for training, the supervision of producers and follow-up on the plantations.

As for the Jatropha oil extraction and transformation into biodiesel and power production, it will be a partnership between the government of Senegal and the foreign companies that wish to invest in this sector in the country.

- The setting up of nurseries for plant production and involvement of producers

At the national level, the jatropha nurseries will be set up in the areas that are suitable for multiplication (Niayes, valley of the Senegal River and Anambé).

The farmers will be the owners of the nurseries and will benefit from the training given by ISRA as well as the supervision by the country's technical departments (ISRA, ANCAR, Department of Horticulture, the Senegalese irrigation Authority (SAED), Regional Rural Development Offices, etc.).

- Collection of cuttings

Upon the request of the Ministry of Agriculture, the governors, prefects and sub prefects as well as the local commissions responsible for rural development have identified natural zones with high concentration of *Jatropha curcas.* This census made it possible for the Food Security Body to organise an operation to gather seeds.

Similarly, the collection of local Jatropha ecotypes (cuttings and seedlings) will be organised in the various agro-ecological zones of Senegal as of the first week of the month of July and will be subsequently planted in the rural communities.

III. Initiatives for the programme launching

- *Study undertaken to increase knowledge of the vegetal material existing in Senegal and the mastery of the multiplication techniques of the plants:*

ISRA set up a research program on biofuels in order to contribute towards the implementation of the pilot production program of ***one billion Jatropha plants***. The program would help to ensure the satisfactory level of biomass production and the basis for the setting up of a "biofuels" sector in Senegal.

The activities mainly consisted of:

- Reviewing and compiling of a bibliographic documents on Jatropha: knowledge on the species.

- Putting together a collection of local ecotypes and the conservation of Jatropha and Castor vegetal material under different forms: seedlings from various origins in Senegal in a cold storage, plants grown from semi planted seeds, vitroplants.

- The development of plant multiplication protocols

- Testing of *in vitro* cultivation: *in vitro* germination test, choice of the kinds of explants to be used, mode of disinfecting the explants, cultivation areas to be used, time needed to ensure the full adaptation of *vitroplants…*

- Multiplication tests in nurseries/greenhouse: test of seeds germination, semi-direct planting of Jatropha, cuttings with different sizes cuts (different amounts of knots), use of different dozes of growth hormones, etc.

- One hectare test planting of Jatropha with plants from the nurseries and cuttings

- Setting up of a national technical committee by a ministerial decree for the special Jatropha implementation program.

- Nomination of a National Program Coordinator

- Designation of a program supervisor in the person of the Chairman of the National Association of Rural Councilors of Senegal

- Drawing up of the national Jatropha map

- Conducting a census on the areas for Jatropha cultivation in each rural community.

IV. Estimated cost of program

Cost of the Programme

1st Phase of the Programme:

	Cost (Franc CFA)	*Cost (Euro)*	*Ratios*
Laboratory construction and furniture	458 500 000	705 000	Plant cost from Laboratory: 54 FCFA
Plant multiplication in nurseries	53 441 530 000	82 200 000	
Institutional assistance, training, subsidies for fertilizers, and agric. tools	10 880 000 000	16 700 000	- Subsidy for fertilizers: 100 000 FCFA/Ton - 50% subsidy for agr. Tractors and equipment
Total	64 780 030 000	99 600 000	201 807 F CFA/ Ha *300 Euro / Ha*

V. Operational costs and benefits for farmers starting the first year of production

The annual cost of fertilizer per hectare is 10,000 CFA francs, while the estimated cost of agricultural material per hectare is 20,000 CFA francs. The average annual cost of exploitation from the first to the fifth year of production is estimated at 50,000 CFA francs.

Average cost of production for a hectare of Jatropha

Cost of production for a hectare of jatropha starting from the first year

	1st year	2nd year	3rd year	4th year	5th year	6th year
CFA francs	38.540	44 888	47 608	49 422	51 236	56 813
US Dollar	77,1	89.8	95.2	98.8	102.5	113.6

The Average cost is 48 084 F CFA

	F CFA	US Dollar
Price of jatropha seedlings in India per kilo	340	0,680

The annual head cost of the exploitation by the farmer per hectare is 64,000 CFA francs while the average yield in grains per hectare during the first five years is 5 tons. The intake per hectare is 300,000 CFA francs (60 F multiplied by 5 000 kilograms).

The over all cost of exploitation of a hectare is about 78,000 CFA francs, without subsidy but assuming that the farmer has every means, which actually is not the case.

At any rate, the project is profitable to the farmer even if he sells the unprocessed grains.

In Mali the experience shows that 12 tons of treated seeds could earn 3 630 dollars (about 1 996 500 CFA francs) of income for a profit of 1 430 dollars (about 850 000 CFA francs) when the oil is extracted and the products are sold.

VI. Expected outcomes of the program

The following are the expected outcomes of the program:

- One billion jatropha curcas plants will be grown by the use of the in vitro, nursery and cuttings system;
- 321 000 hectares cultivated (1 000 per hectare per rural community);
- Organisation of producers and representatives of local districts to be trained in cultivating the plant in nurseries, in using cultivation techniques and taking care of plants until the first production 18 months after planting;
- One billion one hundred and ninety million (1 190 000 000) litres of jatropha oil to be produced to meet the national gasoline needs that is estimated at 550 million litres in 2007;
- Bioelectricity and power production launched from local refinery facilities;
- Energy bill of Senegal reduced;

- Households energy bills reduced significantly as a result of energy prices reduction: biofuels prices are comparatively more competitive/cheaper;
- 100 000 directly employments created;
- Technical ability of the organisation of producers and local district agents reinforced;
- Agro-industrial poles set up in each region of Senegal;
- Agricultural income increased and diversified through the use of the opportunities offered by the emergent bioenergy sectors;
- Living condition of the rural population improved thanks to the increase in the satisfaction of their economic and social needs through the use of advanced and adapted technologies as well the significant reduction of poverty;
- The balance of payment improved.

VII- Prerequisites for Program Partnerships

The government of Senegal has outlined a few but very important conditions which should serve as the basis upon which any form of partnership will be built for a mutually rewarding investment in the biofuel sector. These include:

- Setting up of unlimited biofuels operating company: with at least 51% as Senegalese capital;
- Guaranteed prices for farmers production: to ensure massive refund and secure farmers interest;
- Secured Prices for biodiesel sales to the State or to the appropriate institutions: Sales under State-Partner agreement;
- Assistance to the farmers by the promoters through the provision of agricultural inputs and technical expertise;
- Land property: Land to belong to local communities, not to transfer or to lease;
- In-Country processing: Oil production and processing to be done in Senegal.