



BIOFUELS : PRESENT STATUS AND POTENTIAL IN RAJASTHAN

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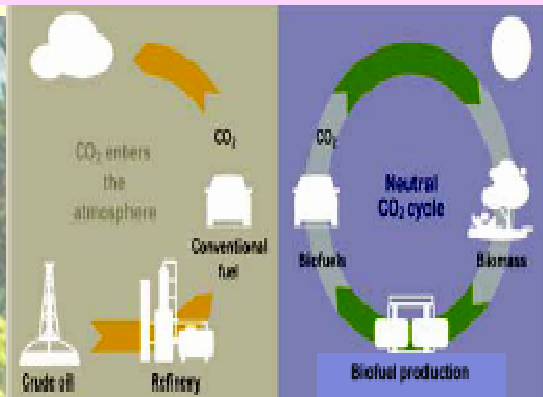
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BIOFUELS – RATIONALE



Reduction of
GHG-emissions

Support for
domestic agriculture

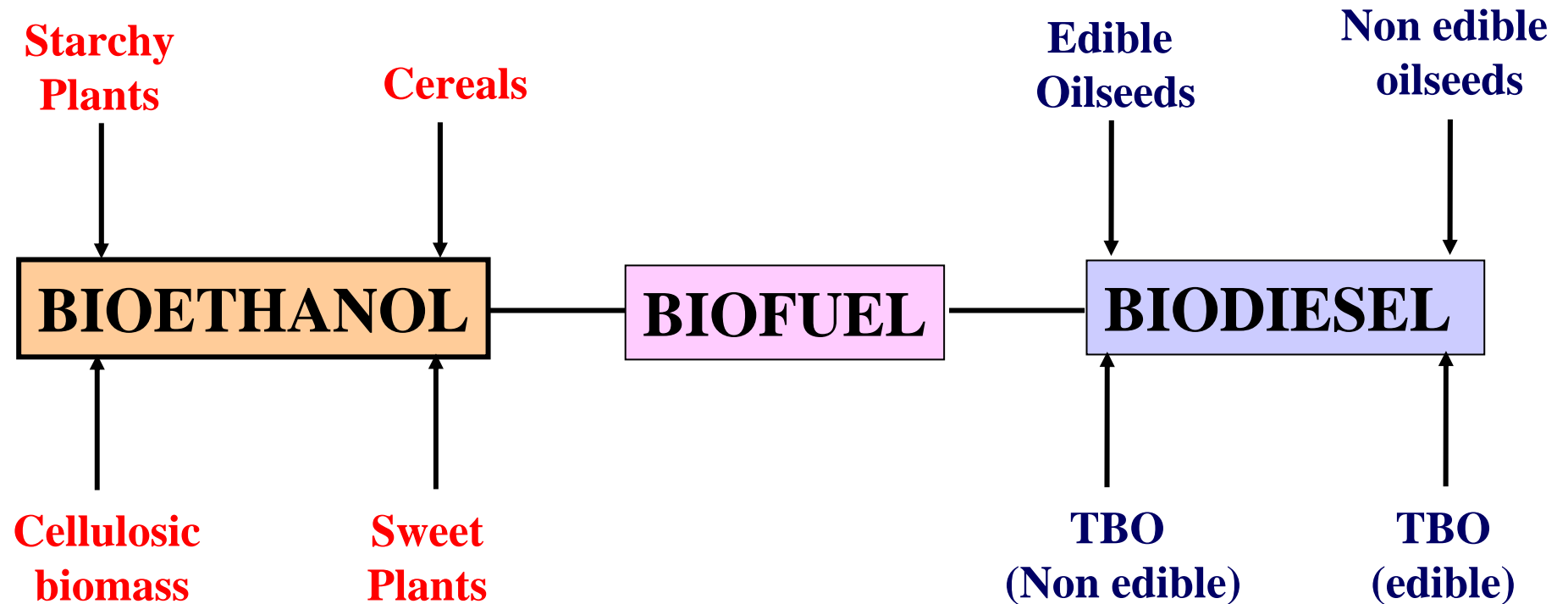
Reduced dependence
from oil imports

Emission
reduction

Employment
effects



COMPONENTS



PROJECTIONS

Gasoline and Diesel Use in India (Mt)

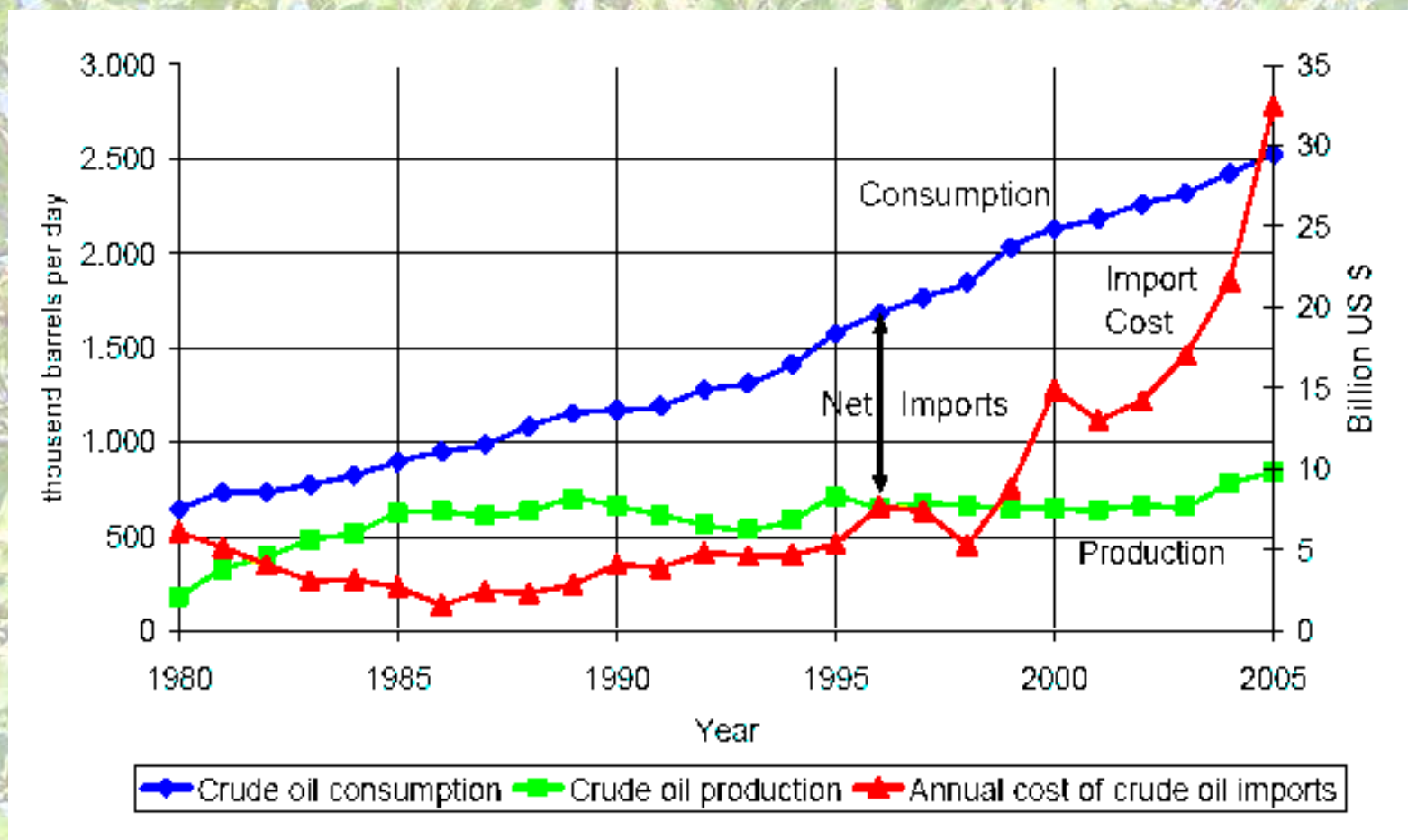
Period	Gasoline (MS)	Diesel (HSD)
2001-02	7.07	39.8
2006-07	10.1	52.3
2011-12	12.8	66.9
2016-17	16.4	83.6

MS = Motor spirit

HSD – High Speed Diesel

CONSUMPTION AND PRODUCTION

Gap between India's oil consumption and indigenous oil production



WHY BIO DIESEL

- ❖ India is using 80% diesel and 20% petrol driven vehicles.
- ❖ Crops distilled into bioethanol require very specific agroclimatic condition for sustained production.
- ❖ Biethanol is a high maintenance fuel.
- ❖ Transportation is responsible for 25% of the worlds energy related GHG and the share is rising.
- ❖ Biodiesel crops can grow in large area, requires less maintenance.
- ❖ Biodiesel crops require less investment.
- ❖ Biodiesel poses no threat to human health.
- ❖ Require no separate infrastructure for storage and transportation.
- ❖ More reduction of emissions.

AREA AND PRODUCTION OF OILSEED CROPS (2004-05) IN RAJASTHAN

S. No.	Crops	Area 000' ha	Production 000' t	Productivity (kg/ha)
1.	Sesamum	446.7	148.7	333
2	Groundnut	287.8	446.8	1553
3	Soybean	621.9	886.5	1425
4	Mustard	3286.6	3857.3	1174
5	Taramira	395.1	113.4	287
1	Castor	92.00	86.1	936
2	Linseed	3.00	2.3	743
1.	Sugarcane	5.7	276.6	48330
2.	Potato	3.1	48.2	15351
3.	Sweet potato	2.1	6.1	2924
4.	Jowar	573	266	464

PLANT IDEOTYPE FOR BIODIESEL

- ❖ **High photosynthetic rates**
- ❖ **High oil content**
- ❖ **Stem with high cellulose and low lignin**
- ❖ **Roots with high lignin contribute more soil carbon**
- ❖ **Plants with low N fertilizer requirement**
- ❖ **Low ash content**
- ❖ **Non edible seeds**
- ❖ **Drought tolerant, low irrigation crop**
- ❖ **Produce renewable and dependable fuel for Agri. & transport sector.**



CHARACTERISTIC OF BIOFUEL PLANTS

Particulars	Jatropha	Karanj	Mahua
Ecosystem	Semi arid to humid	Semi arid to humid	Sub-humid
Rainfall	200-1000mm	500-2000mm	500-1000mm
Soil	Stony, Clayloam, Well drained	Clay loam well drained	Sandy to clay loam
Plant suitability	Wasteland, live fence, green caping of bunds, shallow soils	Field boundary, wasteland, tank foreshore, valleys, road sides	Field boundary, wasteland, well drained soils
Plant habit	Mostly bush	Tree	Tree
Leaves	Not palatable	Mulch Silk Worms	Not Palatable
Gestation	3 years	5-7 years	8 years
Seed yield/tree	1.5-2.5 kg	15-24 kg	50-65 kg
Oil content	25-39 %	27-39%	28-40%

NATURAL BIOFUEL PLANTATIONS IN RAJASTHAN

Jatropha	South, South west part Udaipur, Rajsamand, Chittorgarh, Bhilwara, Dungarpur, Banswara, Sirohi, Foot hills of Pali "Adivasyon Ki Laxmi" Medicinal value Protect tribal houses due to heavy rain Grow upto 25 ft height, yielded under adverse conditions Area : 13 -15 thousand ha Production : 7 -10 thousand tonnes Price : Rs. 15/kg
Karanj	South, South west, South east Tribals collect seeds Area & Production - Not estimated Price : Rs. 10/kg
Mahua	Aravalli range of south, south west Tribals collect flower and seed flower - edible Price flowers Rs. 25/kg seed Rs. 15/kg

BIOFUELS FROM ERODED SOILS IN RAJASTHAN

GOAL

- To produce biodiesel from indigenous *Jatropha* plant
- To develop and utilize wasteland not suitable for food production & improve environment
- To use state of the art agricultural technique for best harvest
- To create employment opportunities in rural areas
- To promote organic Farming by using deoiled cake.

STATUS

- Identified potential area of *Jatropha*
- BFA earmarked wasteland in selected district
- Availability of quality seed
- Government declare purchase price Rs. 7/ kg.

BENEFITS

- Recovery of wasteland
- Creating local jobs and purchasing power
- Aid sustainable mobility in rural districts of Rajasthan
- Feasibility and practicality of renewable fuels for domestic energy use.
- Sustainable energy source

LUP OF RAJASTHAN

S. No.	Category	Area (Lakh ha)
1.	Geographical	342.66
2.	Forest	26.6
3.	Not available for cultivation	42.6
a.	Non agril. uses	17.6
b.	Barren & uncultivated	25.0
4.	Other uncultivated (Excluding fallow)	62.68
a.	Permanent pasture & grazing	17.08
b.	Misc. trees & grooves	0.14
c.	Culturable waste	45.46
5.	Fallow	36.82
a.	Fallow other than current fallow	24.07
b.	Current fallow	12.75
6.	Net area sown	173.94
7.	Total Cropped area	216.64
8.	Area sown more than once	42.26
9.	Gross irrigated area	63.93
10.	Net irrigated area	52.39
11.	Cropping intensity (%)	125.00

WASTE LAND OF RAJASTHAN

S. No.	Land category	Area (L ha)	Area under selected districts (L ha)
1.	Gullied Ravinous	4.95	1.44
2.	Land with/ Without scrub	27.15	9.64
3.	Waterlogged & marshy	0.29	0.00
4.	Saline/alkaline/coastal	2.72	0.33
5.	Degraded forest	12.54	6.48
6.	Degraded grazing pastures	12.21	3.28
7.	Degraded under plantation	0.02	0.02
8.	Sand inland coastal	40.64	0.13
9.	Mining industrial	0.13	0.05
10.	Barren rocky/stony	4.80	1.63
11.	Steep sloping	0.18	0.07
	Total	105.6	23.07

TYPES OF LAND SUITED FOR JATROPHA

- ❖ Degraded forests
- ❖ Revenue village land close to forests
- ❖ Community lands managed by panchayats
- ❖ Community lands managed by Governments
- ❖ Pasture/ Fallow lands held by the farmers.
- ❖ Wasteland held by farmers
- ❖ Low productivity lands
- ❖ Lands occupied in field boundaries

SUITABILITY OF JATROPHA TO SOUTH RAJASTHAN

- ❖ We can easily introduce this crop as a border hedge in the field as the plant is a non-browsing species.
- ❖ Wasteland can be utilized for cultivation as this crop tolerate water stress.
- ❖ Low but stable income source for tribals in drought year.
- ❖ Hilly terrain and valleys in Aravalli ranges
- ❖ Diversified crops and cropping systems.
- ❖ Employment generation and checking migration of tribals
- ❖ Good transport facilities
- ❖ Tribal dominated area
- ❖ Mild temperature during winter
- ❖ Community power generation as tribals are living in scattered houses on hillocks
- ❖ More availability of land under field boundaries due to fragmented land holdings
- ❖ Farmers having maximum area under wasteland in comparison to other states.
- ❖ 83% area is unirrigated.

AGRO CLIMATIC ZONES OF RAJASTHAN

Zone	District Covered	Rainfall mm	Temp °C		Soils
			Max	Min	
1a	Barmer, part of Jodhpur	200-370	40	8	Desert, Sand dunes, Coarse sand Aeolian, calcareous
1b	Srigangangar Hanumangarh	100-350	42	4.7	Alluvial calcareous, high soluble salt & exch. Na.
1c	Bikaner, Churu Jaisalmer	100-350	48	3.0	Desert, Sand dunes, Aeolian, Loamy coarse, calcareous
11a	Nagaur, Sikar, Part of Churu	300-500	39.7	5.3	Sandy loam, red soils in depression
11b	Jalore, Pali, part of Sirohi, Jodhpur	300-500	38	4.9	Red desert, Sierozems
111a	Jaipur, Ajmer, Dausa Tonk	500-700	40.6	8.3	Sierozem, Alluvial lithosol, brown, foot hills
111b	Alwar Dholpur Bharatpur, S. Madhopur	500-700	40	8.2	Alluvial, Water logged, Calcareous
IVa	Bhilwara, Sirohi Udaipur	500-900	38.6	8.1	Lithosol, foot hills, alluvial
IVb	Dungarpur, Udaipur, Banswara and Chittorgarh	500-1100	39	7.2	Reddish, Medium well drained, calcareous shallow on hills
V	Kota, Jhalawar, Bundi and Baran	650-1000	42.6	10.6	Black of alluvial, clay loam

INITIATIVES BY GOVERNMENT OF RAJASTHAN

S.No.	Districts	Area (000' ha)
1	Udaipur	204.1
2	Sirohi	159.5
3	Chittorgarh	168.4
4	Rajsamand	194
5	Dungarpur	127.8
6	Banswara	173

S.No.	Districts	Area (000' ha)
7	Kota	94.5
8	Bhilwara	304.8
9	Jhalawar	265.3
10	Bundi	199.6
11	Baran	215.8
	Total	2106.8

STRATEGIES FOR AREA EXPANSION IN RAJASTHAN

Area can be put under Jatropha

- ❖ Around 2-3% Agri. Land (132.1 lakh ha) as hedges/windbreak/water harvesting.
- ❖ Adoption as agroforestry on private/community/pasture land
- ❖ 10% of current fallow (66.9 lakh ha) and other fallow land (32.6 lakh ha) lands
- ❖ Most of the barren and uncultivated land (25 lakh ha)
- ❖ A good portion of culturable wasteland (48.7 lakh ha)
- ❖ Non agril. Uses land as land adjoining railway track, roads, canals and public land (17.6 lakh ha).
- ❖ 10 % of degraded forest land (25.6 lakh ha).
- ❖ Problematic soils

PRESENT NEEDS

- ❖ **Development of Improved and high yielding varieties alongwith agrotechnologies suited to diverse agroclimatic condition**
- ❖ **The collection and marketing of Jatropha seeds be organized with appropriate marketing agencies support at village/tehsil level so that tribals get remunerative prices for their collections. This will also put check on premature harvest of seed.**
- ❖ **Identification of suitable Jatropha crop combination with appropriate varieties.**
- ❖ **Organization of awareness programme at village level.**
- ❖ **Strengthening of research and FLD for back stopping.**

COLLECTION OF UNRIPE FRUITS



WASTE LAND AND PLANTATION



JATROPHA A DIFFERENT LOCATION





