ECONOMIC VIABILITY OF SELECTED BIOFUEL CROPS IN THE EU

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Fuel Crops …

- Rapeseed (*Brassica Napus*)
  - In Germany, *Central Atlantic* climatic zone
- Sunflower
  - In Northern Greece, *North Mediterranean* climatic zone
- Sweet Sorghum
  - In North Mediterranean climates (Italy)

Rapeseed *(Brassica Napus)* in Germany

- 2004
  - Germany removes taxation from biofuels in order to reduce CO2 emissions
  - Introduction of additional measures to encourage investment in biodiesel production
- 2006
  - After a rapid expansion, Germany becomes the biggest biodiesel producer in the world
  - Sales increase to more than 2 mio tons supplying almost 5% of total transport sales in the country

HBR

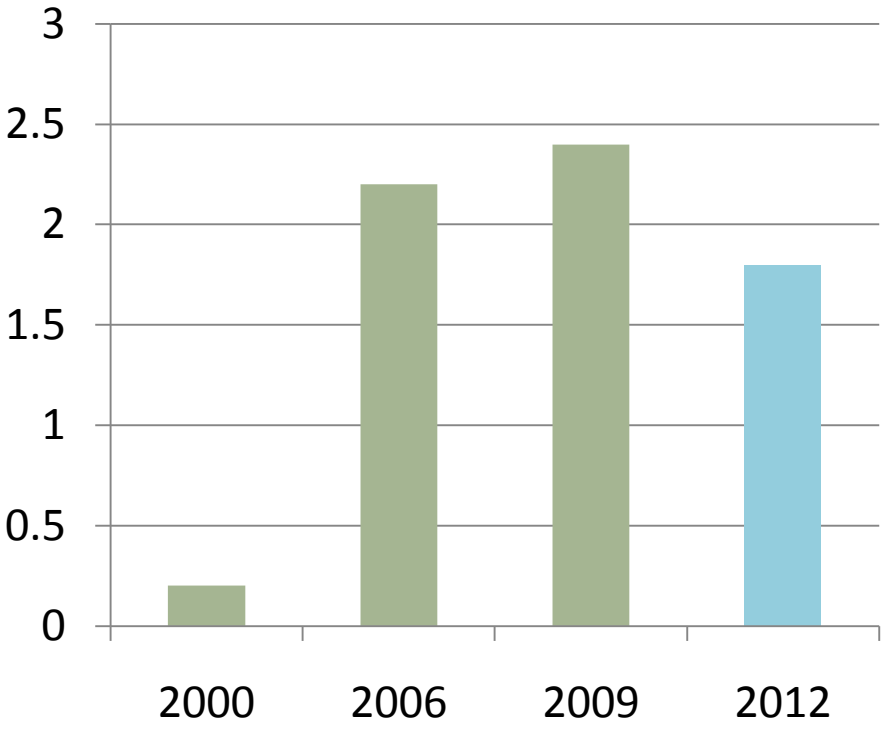
Production and Capacity Development

- 2004
  - Biofuel tax relief
  - Capacity built up
- 2006-7
  - Sales peak at 2.8 m tonnes pa
  - Production hits 2.9 m tonnes
- 2008
  - Biodiesel taxation @ 9 ¢/l
  - Production drops to 2.6 m tonnes
- 2010
  - Biodiesel taxation @ 18 ¢/l
  - Production drops to 2.2 m tonnes
  - Capacity 5 m tonnes pa !!!

Production and Capacity Development

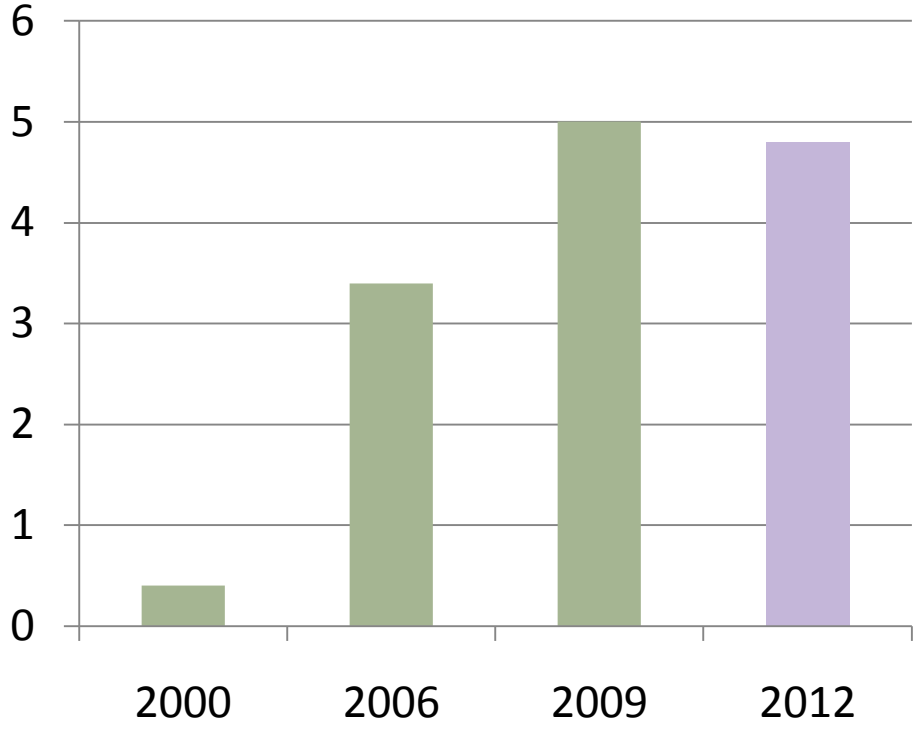
BIODIESLE PRODUCTION

mio tonnes p.a



BIODIESEL CAPACITY BUILDUP

mio tonnes p.a.



- Germany looses top position in 2010
  - After many years of leadership in biodiesel production, Germany is now behind the USA and Argentina, who is developing into a world exporter.

ktonnes	2010	2009
USA	2,500	1,870
ARGENTINA	2,300	1,300
GERMANY	2,200	2,400
FRANCE	2,100	2,000

Energy Balance Efficiency

By the end of 2010	From 2017 though
▪ Biofuels must achieve a 35% reduction in GHG	▪ the EU will require a 50% energy balance efficiency
▪ **RAPESEED meets the target**	▪ **RAPESEED does not meet this higher target!**

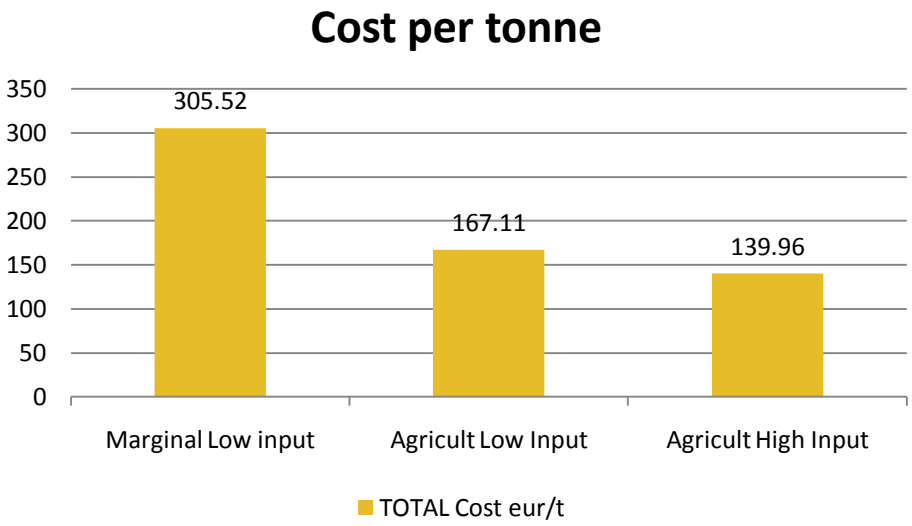
Rapeseed facts

- Yields around 3-5 tonnes per ha
- Cultivation in marginal land is not economic
- The farmer can make a profit if price is higher than 150-200 eur/t, (current price is 270 eur/t)
- Profitability depends on subsidisation of biofuel chains
- Biofuels from South America can gain the market in Europe
- Palm and soy oil are being sold cheaper than rapeseed oil

Rapeseed Cost and Profit Card

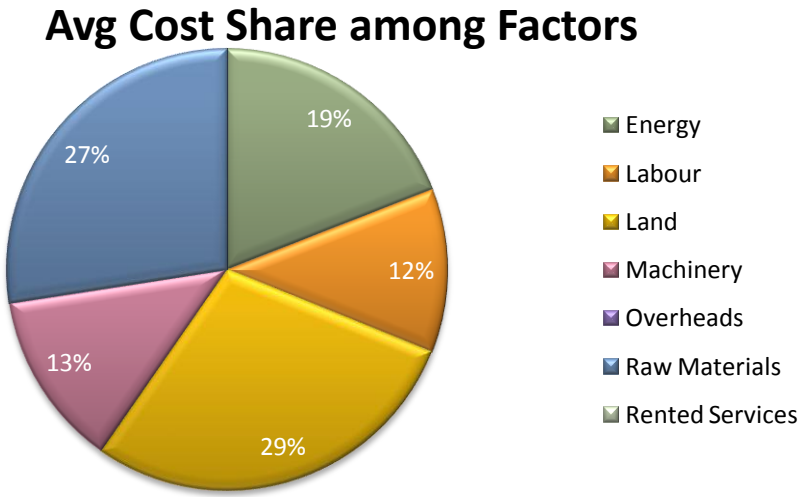
- Very low yields in Marginal land eliminate profits
- Rapeseed on more fertile land generates good profits when selling at 270 eur/t (2008 price)
- Total producer cost is around 150 eur/t
- Farmers are happy with contracted profits between 300 and 600 eur/ha

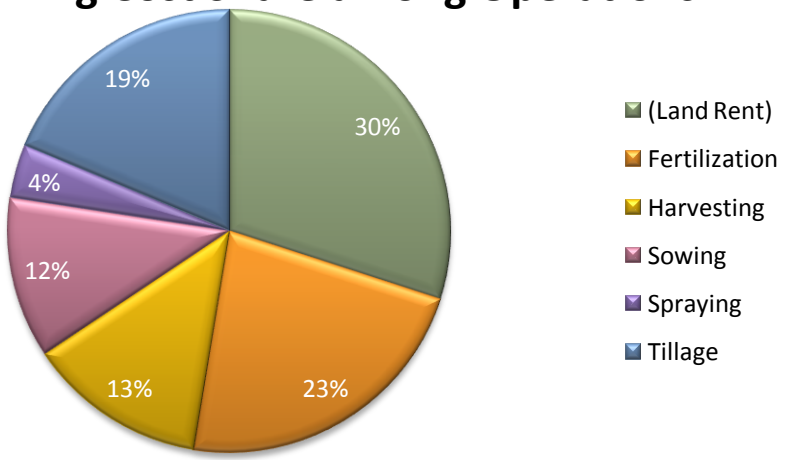
	Marginal Land	Low Agri Land	Hi Agri Land
Yield, t/ha	1.8	3.2	4.8
Cost /t	306	167	140
Sell.Price/t	270	270	270
Profit/t	-36	103	130
Profit/ha	-64	329	624



Rapeseed

- Land and Raw materials make more than 50% of total Rapeseed cost
- Land rent and Fertilisation are also just over 50% of total cost
- Wheat (alternative crop), offers about similar return to land (around 400 to 450 eur/ha)
- However, wheat price fluctuations are not welcome and contracted work with rapeseed may be more attractive



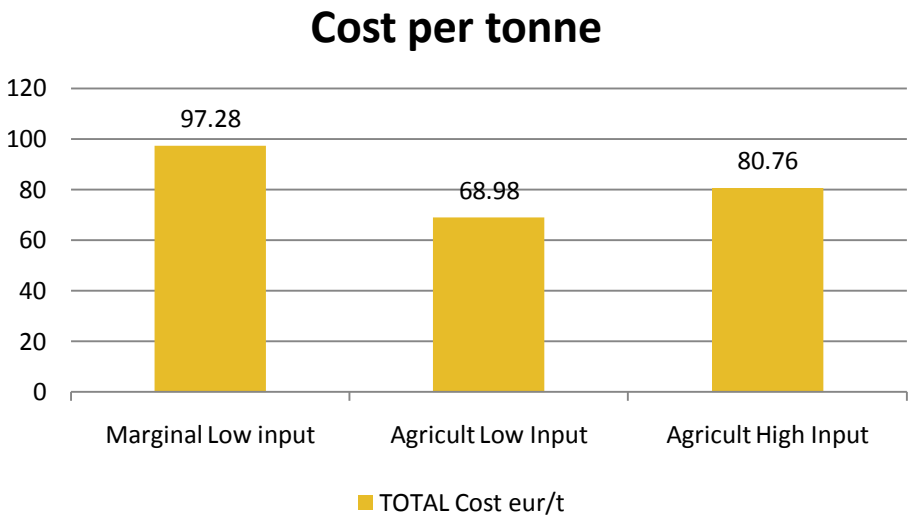


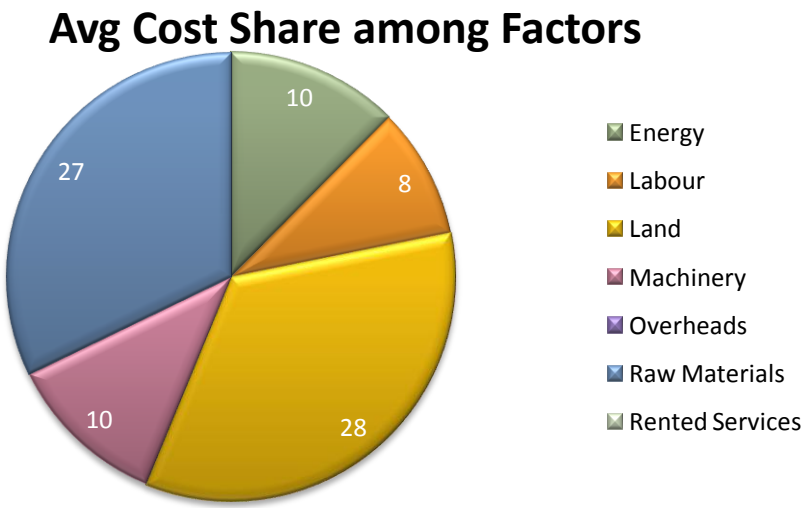
Wheat in Germany (ATC)

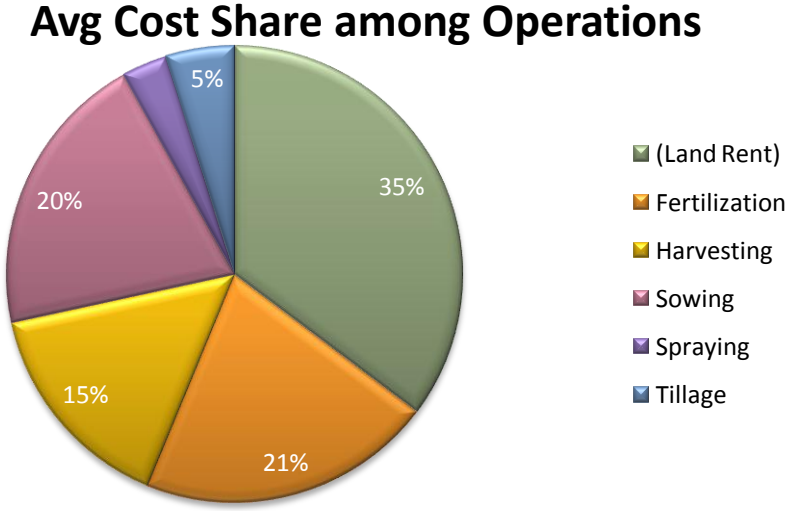
- Good yields of wheat in Germany result in a cost per tonne of about 70 to 100 eur.
- Any wheat selling price above 100 will generate profits to the farmers
- Selling at a pragmatic price of 137 offers the farmer profits in the range of 420-430 eur/ha

Wheat in Germany

	Marginal Land	Low Agri Land	Hi Agri Land
Yield, t/ha	4.7	6.4	7.5
Cost /t	97	69	81
Sell.Price/t	137	137	137
Profit/t	39	68	56
Profit/ha	185	433	419







Rapeseed rotates with cereals. It will be cultivated only if it returns the same profitability

	RAPESEED	WHEAT
Land Rent	197	197
Fertilisation	270	150
Harvesting	95	80
Sowing	65	55
Spraying	26	40
Tillage	150	150
TOTAL Cost €/ha	803	672
Total €/t	230	96
Selling price €/t	270	110
Profit €/t	40.44	14
PROFIT €/ha	**142**	**98**

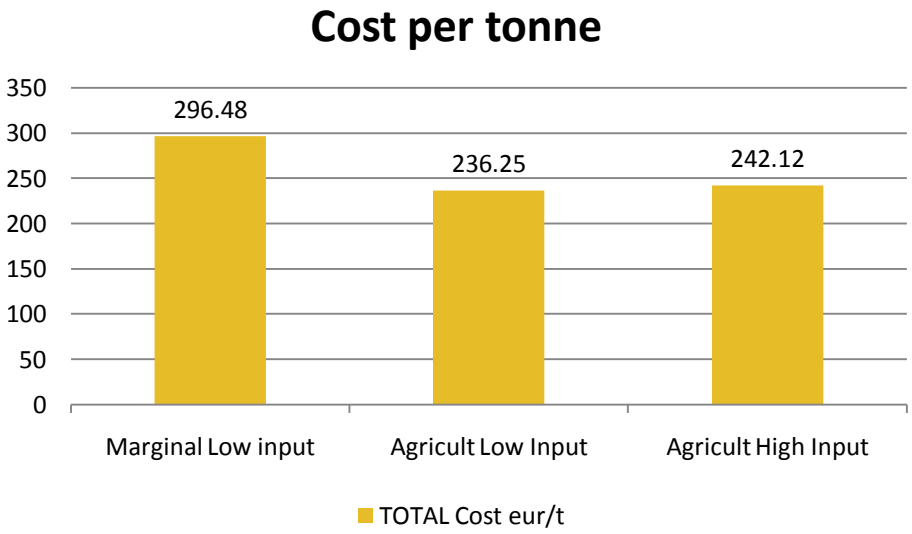
Sunflower in Greece

- Cultivated only in Northern Greece where the climate is not as dry (for many years)
- *Products*: sunflower oil and sunflower seeds
- Tough competition from imports (Turkey, Egypt, etc) at much lower prices
- Tax exemption for biodiesel sales to Greek refineries, only if produced from sunflower of Greek origin – However, most diesel plants in Greece import palm oil as well

Sunflower in N. Greece

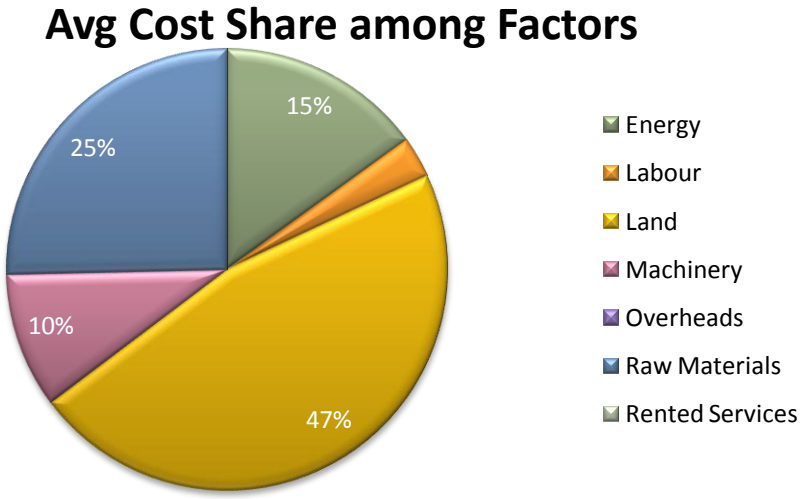
- At a selling price of 237 €/t (2008) the farmer is hardly breaking even
- Very Marginal from an economic point of view – depends on emerging prices
- Cultivation on marginal land (low fertility land) is excluded
- Being a food and an energy crop at the same time, minimises the risk

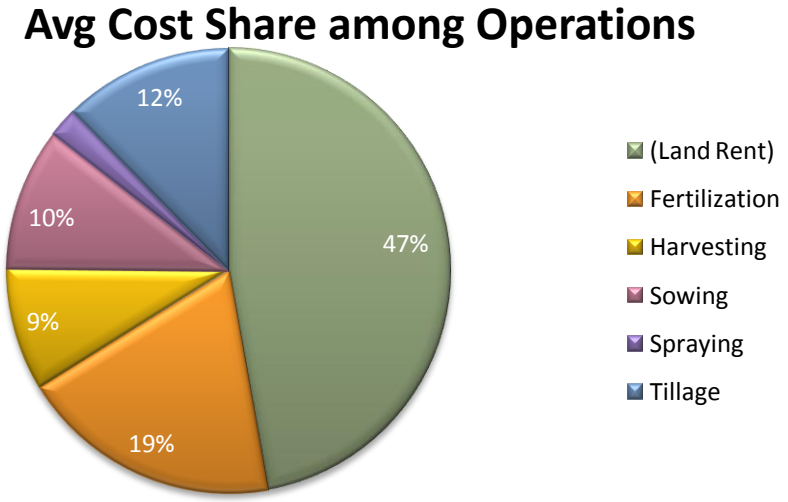
	Marginal Land	Low Agri Land	Hi Agri Land
Yield, t/ha	2.2	3.0	3.5
Cost /t	297	236	242
Sell.Price/t	237	237	237
Profit/t	-60	0.75	-5
Profit/ha	-131	2.25	-18



Sunflower in N. Greece

- Land rent in Greece is quite expensive (389 eur/ha/yr in 2008)
- Half the cost of production is due to land rent
- If irrigated, sunflower yields are higher, but bottom line economics are not improved
- The price of sunflower has been fluctuating significantly





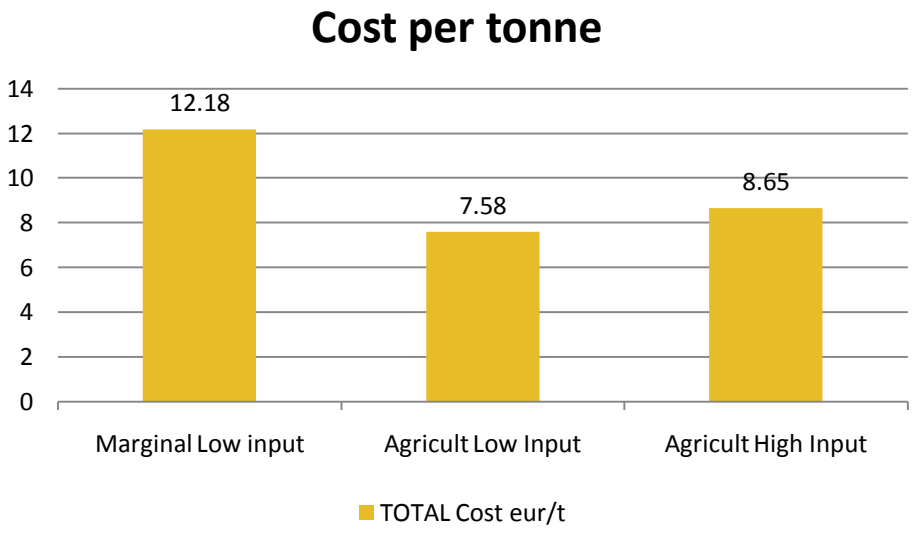
Sweet Sorghum facts

- Not yet fully commercialised
- Can grow in wide range of climates (±40^{o})
- Its market price can be related to the amount of sugar it contains
- Can compete well with cereals, maize and other sugar plants. Requires less inputs.
- Does not require new equipment for its production
- Difficult to store and transport. Needs plant processing other feedstock as well. Sensitive to low temperatures.

Sweet Sorghum in N Italy

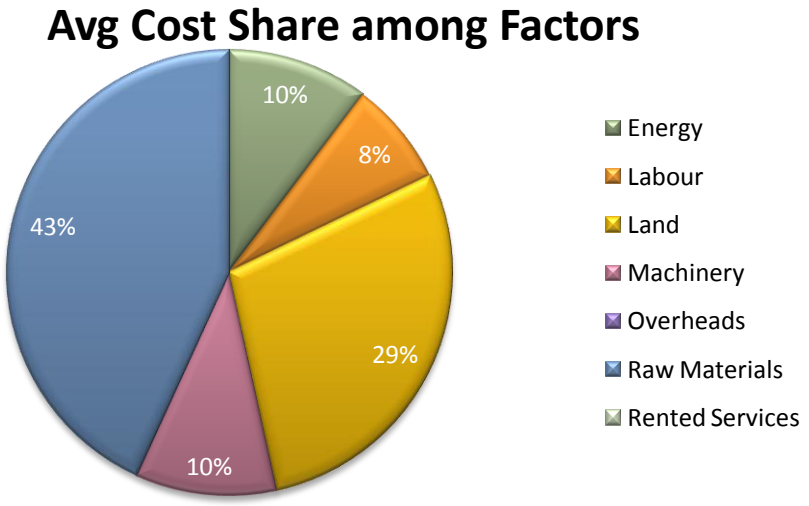
- Selling price is not established, but may be estimated in comparison with prices of other sugar producing plants. 20 eur/t does not seem unreasonable.
- At a production cost of around 10 eur/t, profitability seems secured
- Marginal land cultivation is not as profitable

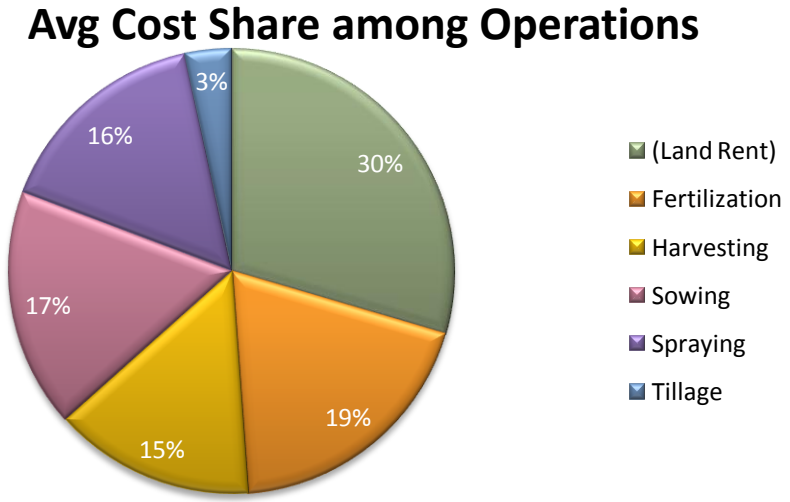
	Marginal Land	Low Agri Land	Hi Agri Land
Yield, t/ha	51	83	100
Cost /t	12.18	7.58	8.65
Sell.Price/t	20	20	20
Profit/t	7.82	12.42	11.35
Profit/ha	399	1,031	1,135



Sweet Sorghum

- It is not irrigated in Italy (in Greece though, if irrigated, economic results are improving)
- 75% of the cost is due to Land rent and Raw materials





Merits of *Sweet Sorghum*

- Yields up to 30 t DM/ha or 100 fresh
- Grain production= 5 t/ha
- Low needs for water, chemicals and energy
- Energy efficiency= 8x
- Ethanol output (L/ha/yr)= 4k -12k (sugarcane= 6k)

Comparison with other sugar crops

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Rapeseed

Subsidy loss – End of season?

"More pure biodiesel would require a new network of petrol stations to be built and for car engines to be modified, and that doesn't make economic sense.

We would like to see the second generation biofuels developed as soon as possible."

Tobias Dunow,
Spokesperson for the German Environment Ministry