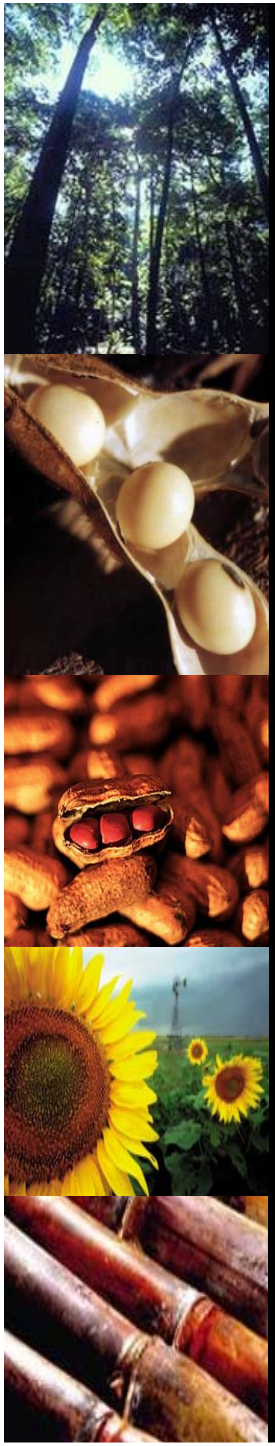
Climatic Risks Zoning and Brazilian biofuels agriculture

Eduardo Delgado Assad
Embrapa

USDA Global Conference on Agricultural Biofuels: Research and Economics
Minneapolis, Minnesota August 20-22,2007



Brazilian Agricultural Zoning

- ✓ Agribusiness GDP in 2006: US$ 180 billions (33% GDP - US$ 500 billion)
- ✓ Agribusiness Exportations: US$ 35 billions (42%)
  Grain production in 2007 :133,4 millions tons
- ✓ Program coordinated by the Department of Agriculture and EMBRAPA (National Institute for Agricultural Research) since 1995
- ✓ Federal Farm Credit Policy
  US$ 8 billion (US$ 2.5 billion for small farmers)

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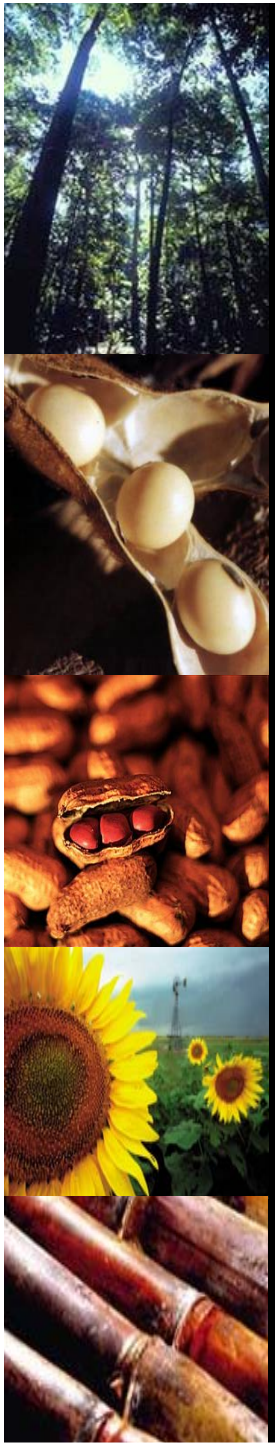

Loss of production: 91/92 e 92/93 (Source: IPEA/UNB)

Product	S. PAULO	BAHIA	Northeast
Rice	30%	34%	47%
Bean	21%	34%	41%
Corn	16%	37%	71%
Soybean	16%	29%	-
Soybean-Irrigated	-	-	32%
Cotton	22%	22%	81%
Castor Oil	-	-	87%

Cause: Water deficiency in critical phases: 60%
Water excess - harvesting: 30%

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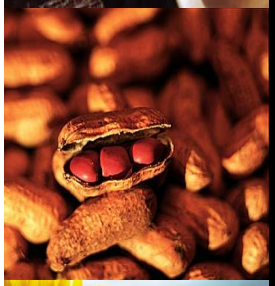

Main Objective

- ✓ Decrease the climate risks
  - ➢ dry spells during flowering and grain-filling (60%)
  - ➢ excessive rain during the harvest period (30%)

Product

- ✓ Planting Calendars
- ✓ Crops: Corn, Soybean, Beans, Rice (Wheat, Sorghum, Fruits, Coffee and biofuel crops)
- ✓ Periods: Dekad (10 days), Oct to Dec (Jan to Dec)
- ✓ Counties / Municipal districts
- ✓ Macro-regions: Central, Southeast ,South and Northeast
- ✓ Risk: less than or equal to 20%

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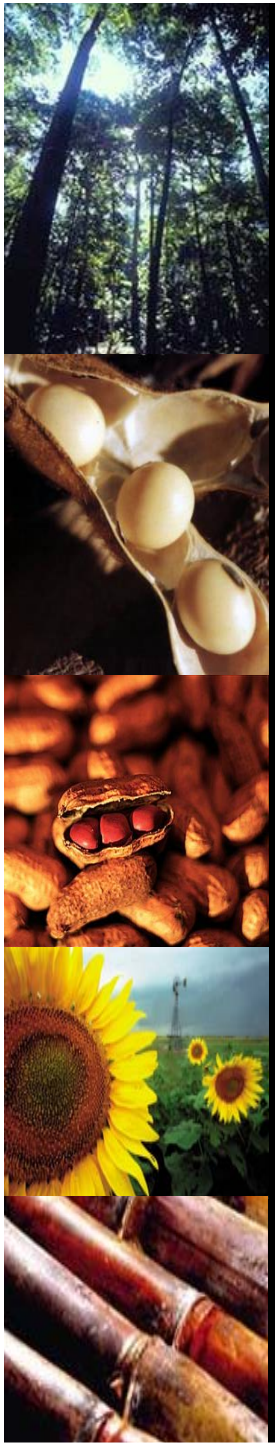
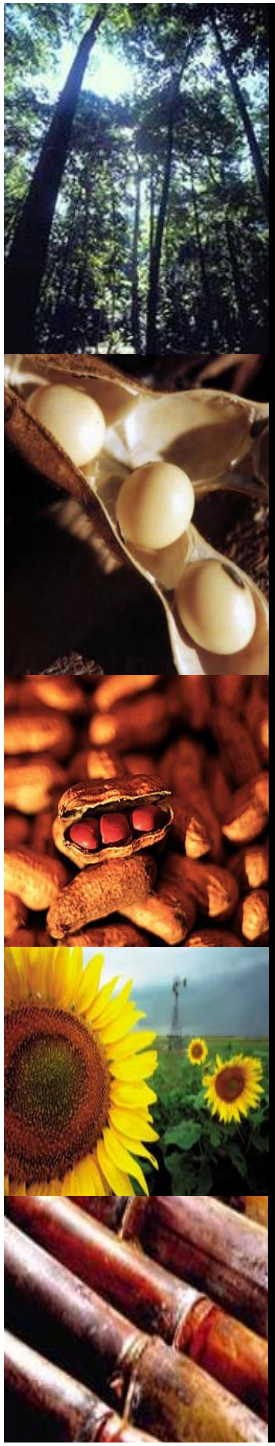


General Methodology

- ✓ Simulation of cumulative water balance for different soil types, planting dates, cycle lengths, ground stations

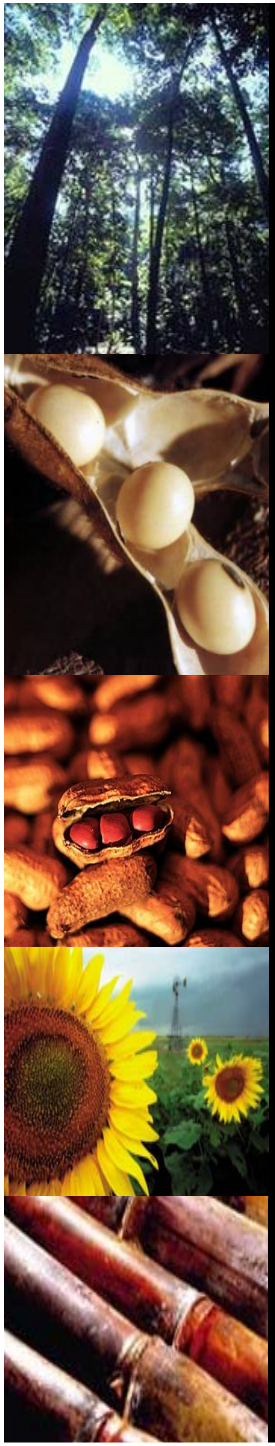
- ✓ Decision criteria / Risk Analysis:
  a) WRSI during reproductive stage ≥ Threshold Value (80% of all simulated years)
  WRSI: Water Requirement Satisfaction Index
  WRSI = actual / maximum evapotranspiration

  b) Excessive rain during harvest

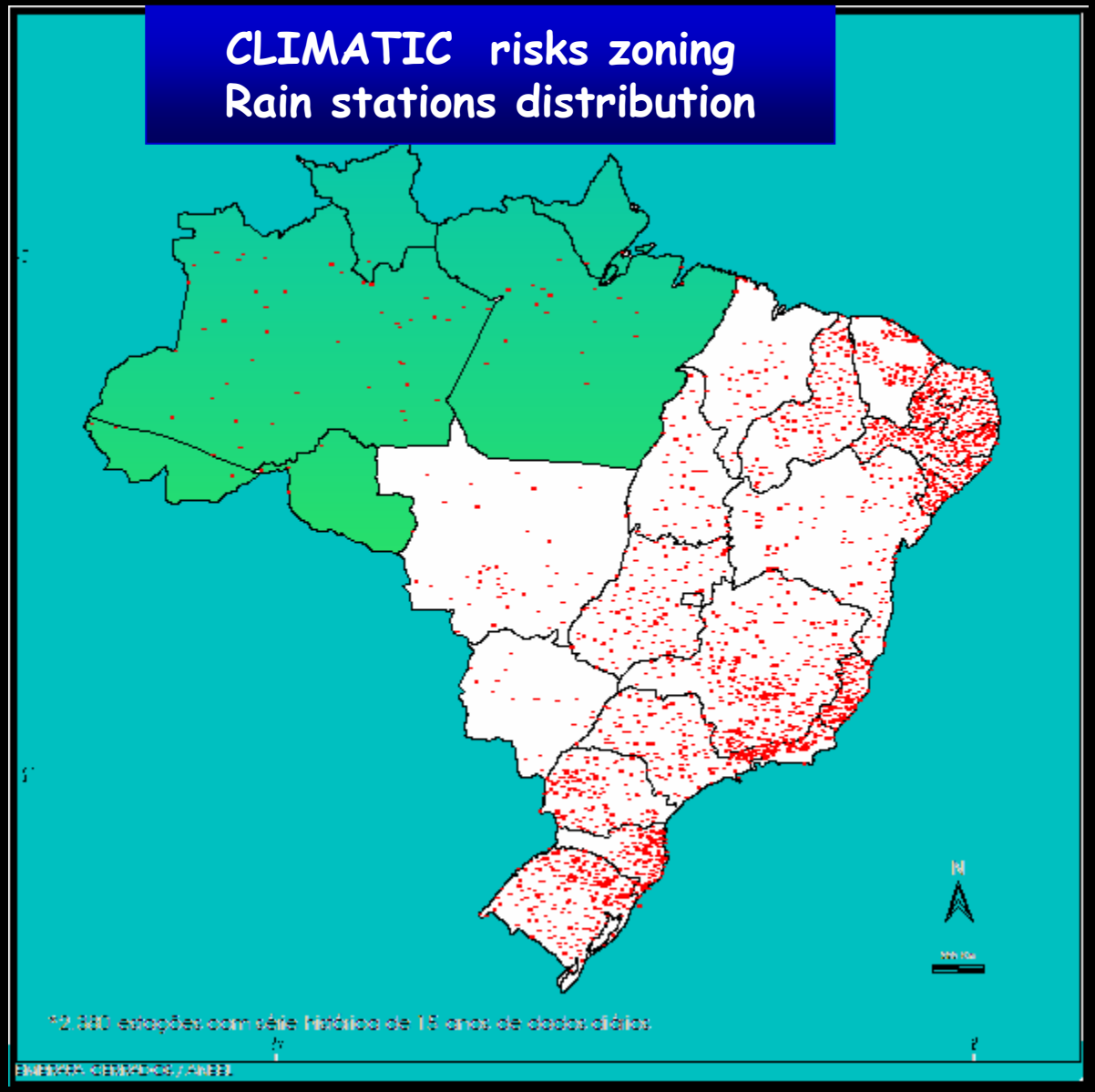


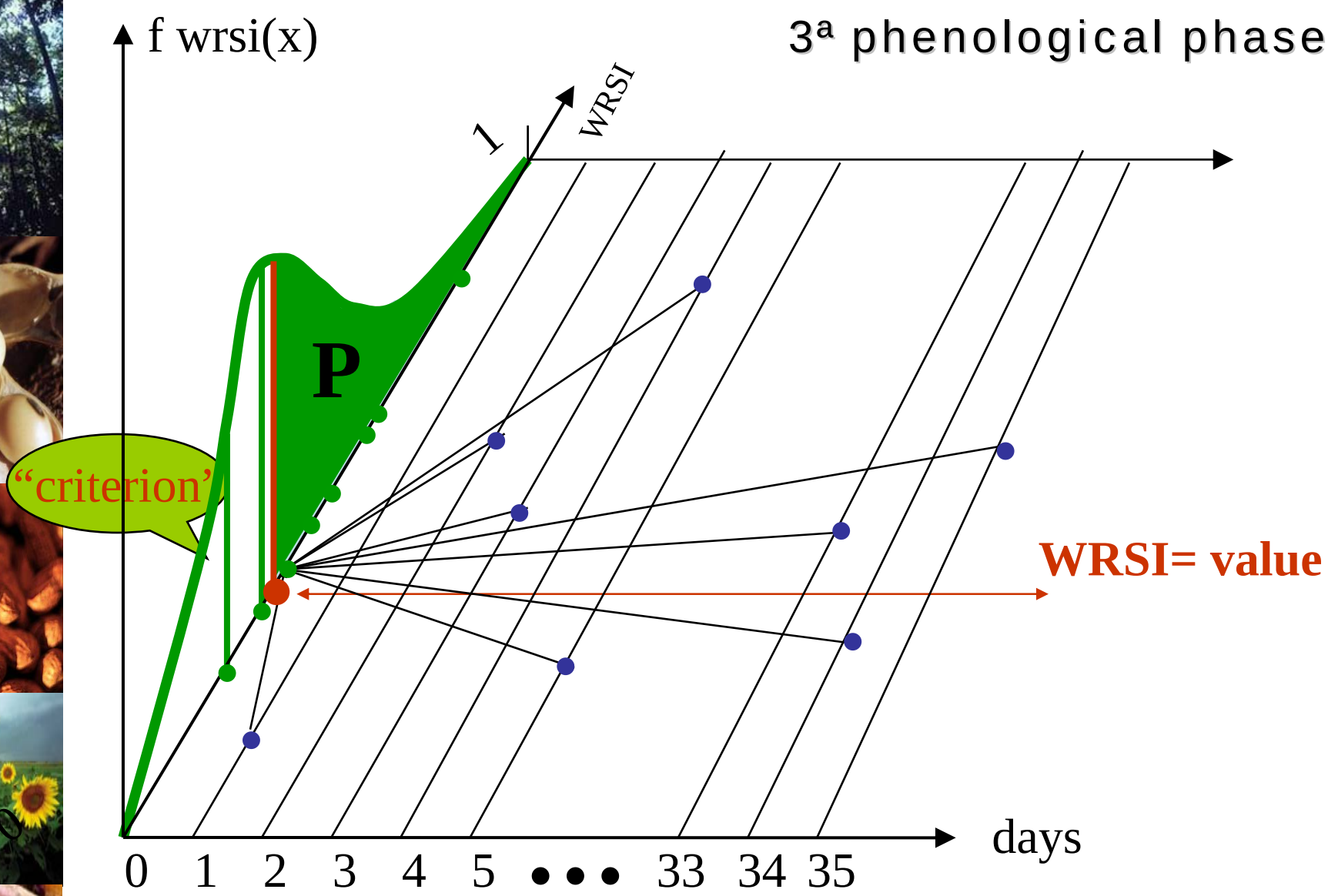
Data Base

- ✓ Length of four growth stages (Initial, Vegetative, Reproductive and Maturity) for early and normal cultivars
- ✓ Length of total growing period
- ✓ Crop coefficient (Kc)
- ✓ Soil water holding capacity
- ✓ Rainfall
- ✓ Evapotranspiration



CLIMATIC risks zoning
Rain stations distribution

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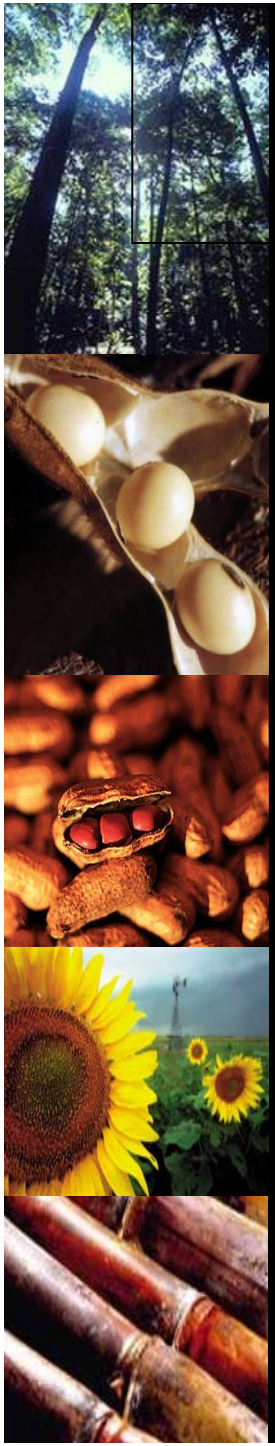

Actually Zoning Crops

- Rice
- Beans
- Corn
- Wheat
- Soybeans
- Sorghun
- Coffee
- Cotton
- Castor Bean
- Apple
- Vigna beans
- Banana
- Cashew nuts
- Barley
- Maninhot
- Oil Palm (2007)
- Sunflower (2007)
- Peanuts (2007
- Rape seed(2007)

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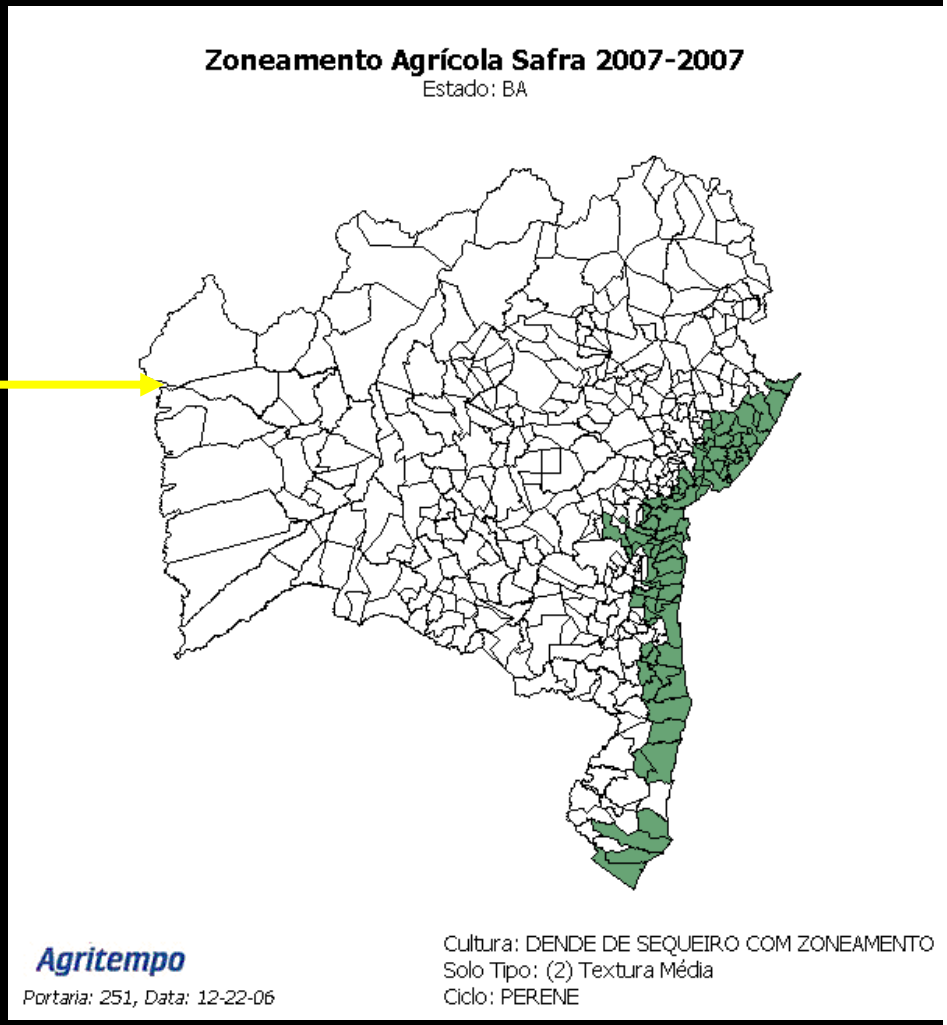
Oil Palm possible surface production with low risk– Bahia State



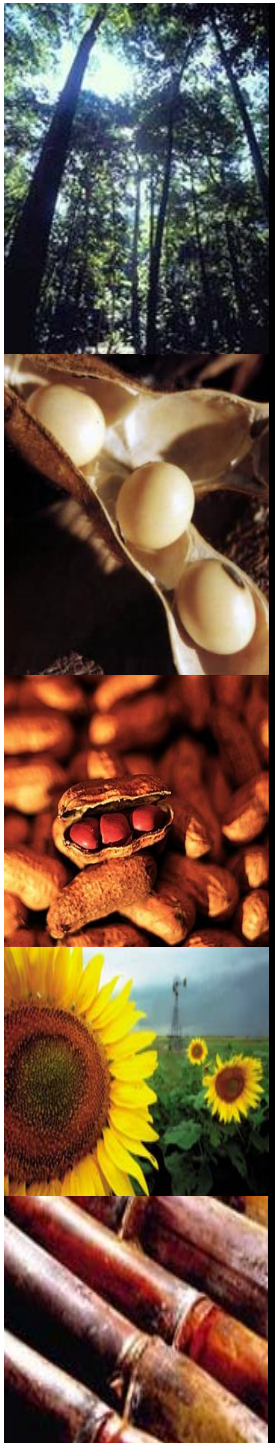
Oil Palm Potential

[Oil] 22%

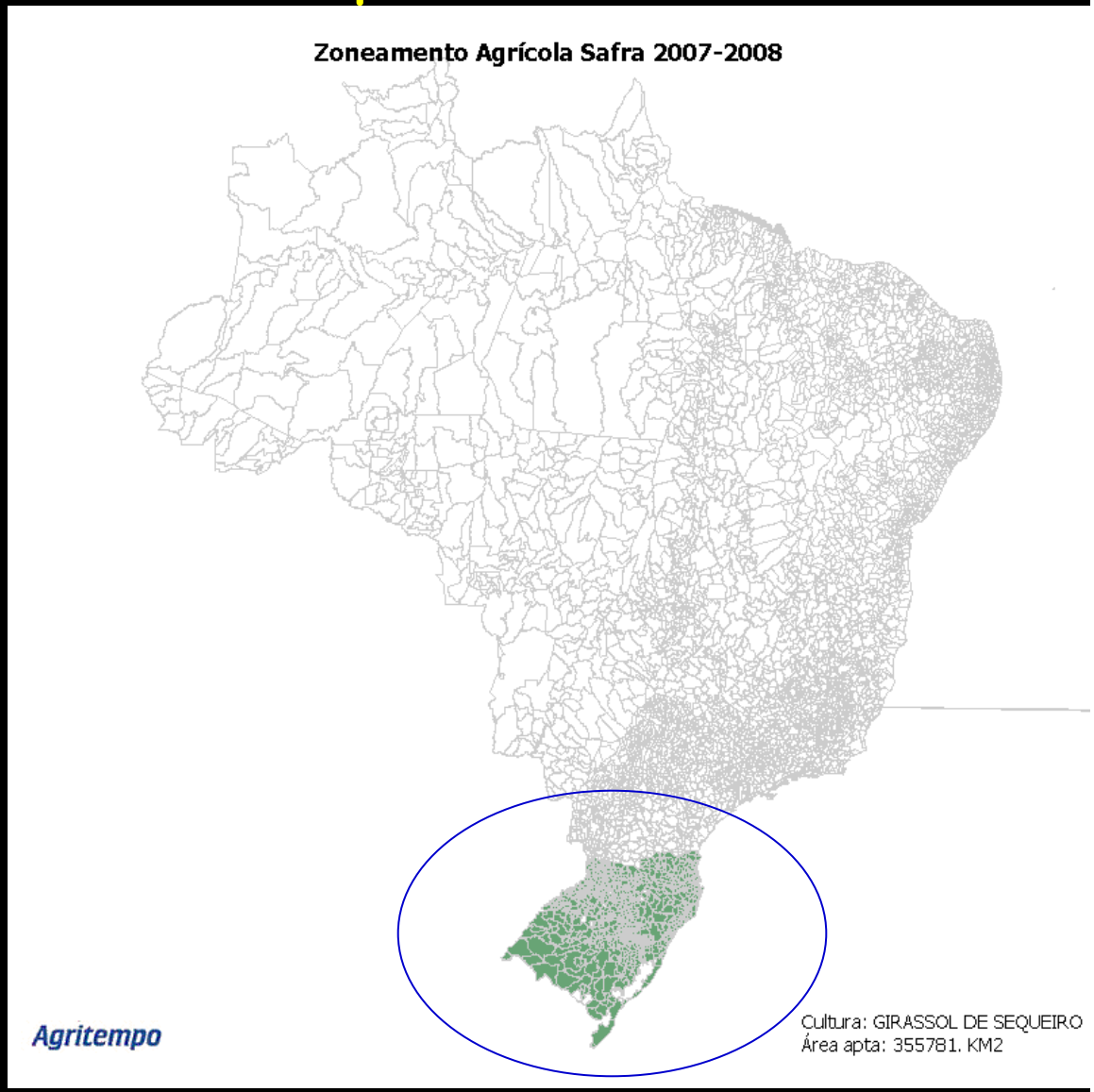
Oil yield 3000 Kg/ha/year

5 ha = one family (5 persons)
Important policy to the small farms

Sunflower possible surface production with low risk



South region



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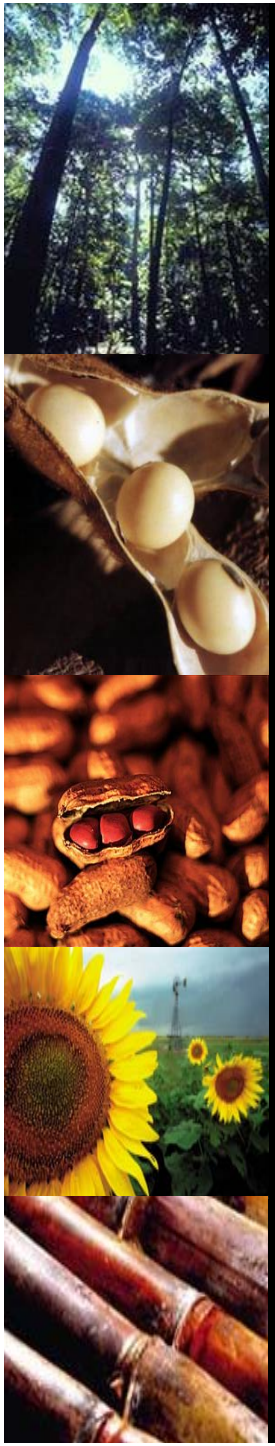
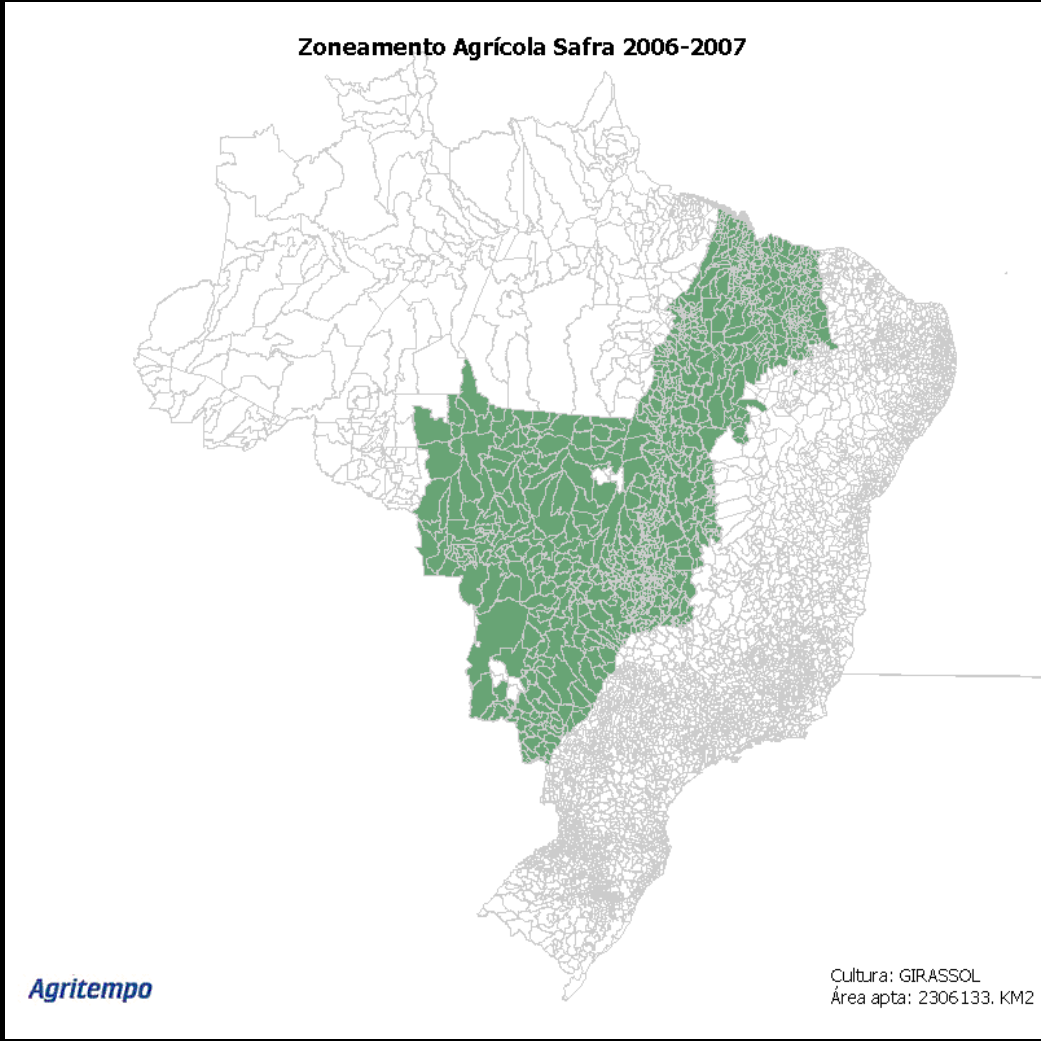


Sunflower possible surface production with low risk

Others regions



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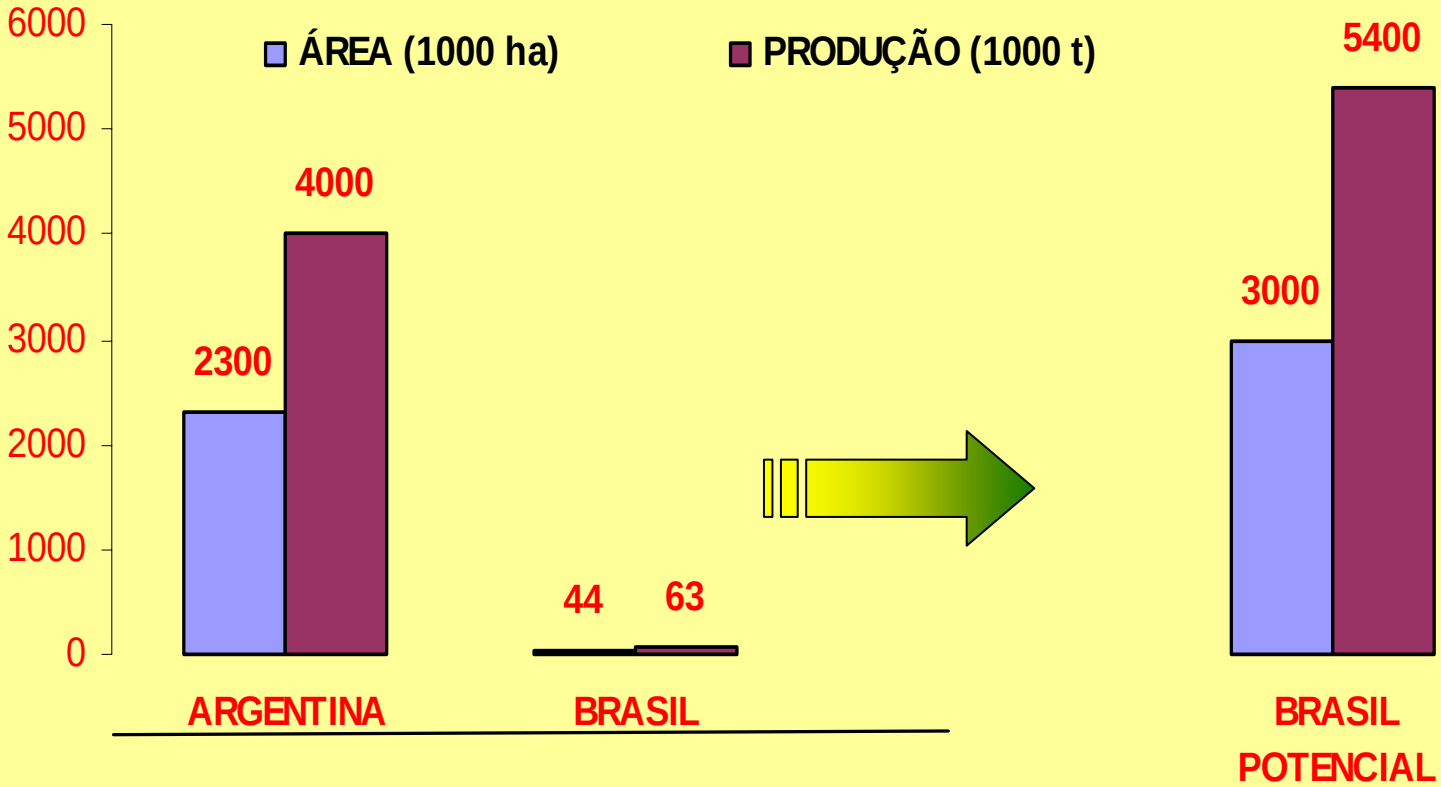
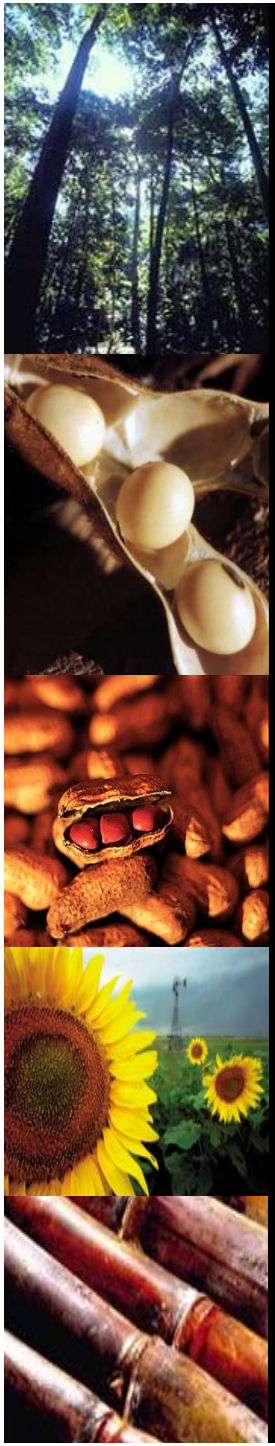
Sunflower Production (2005) [Oil] - 44%

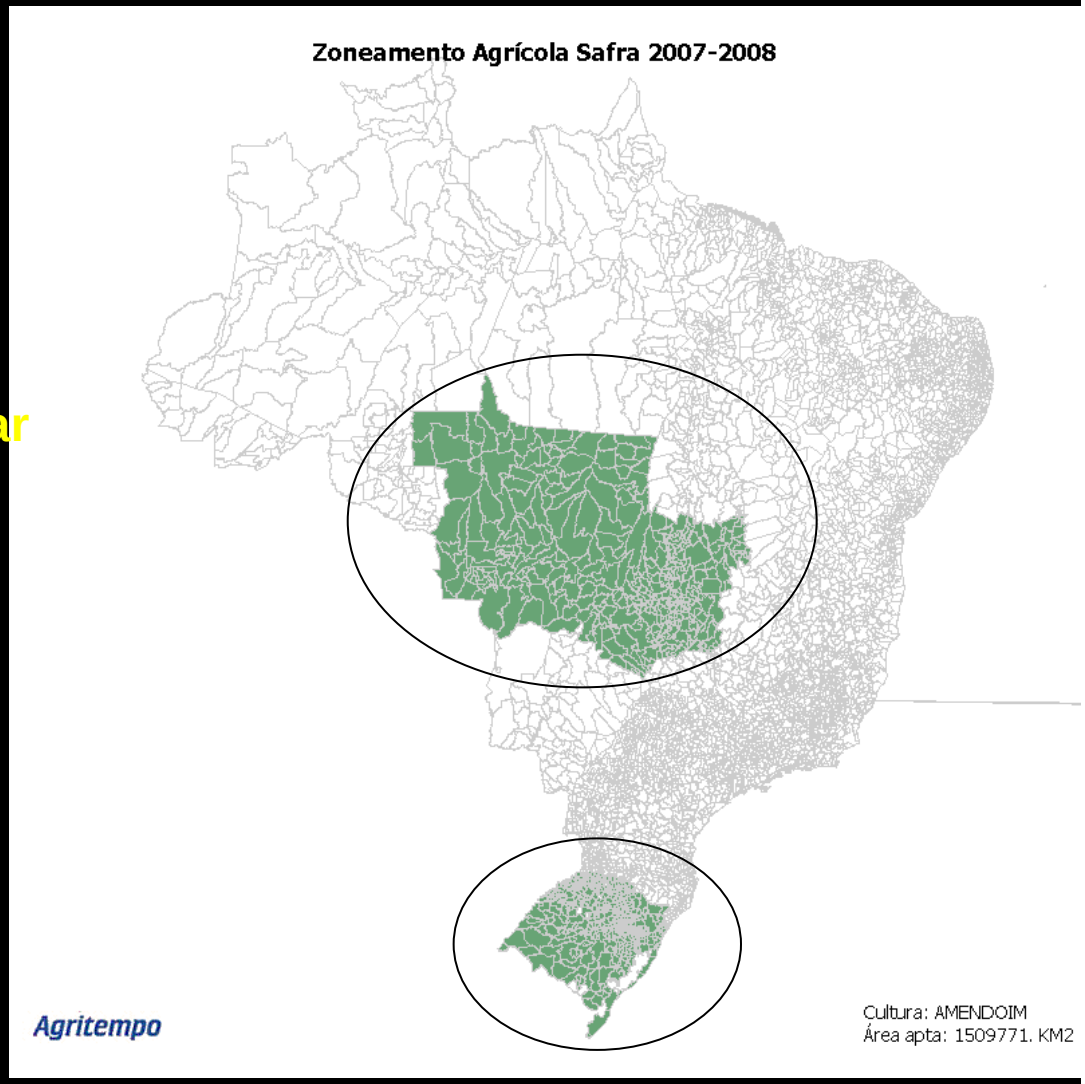
Oil Yield 430 kg/ha/year

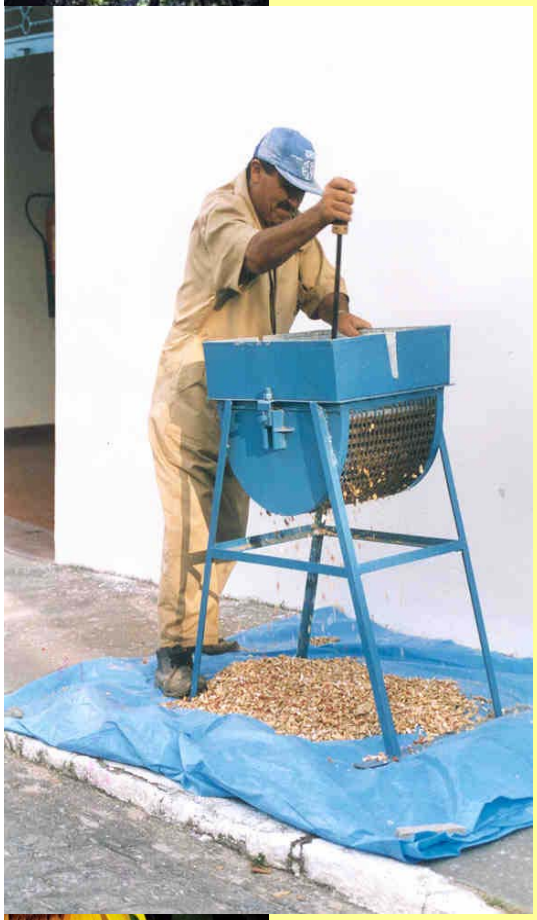




Peanuts possible surface production with low risk

Oil Yield – 600 kg/ha/year

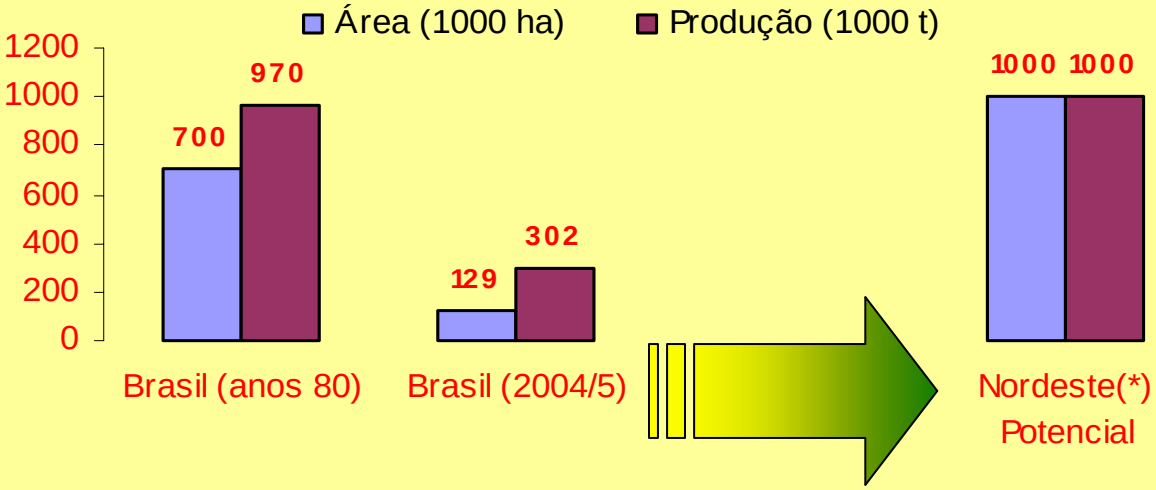


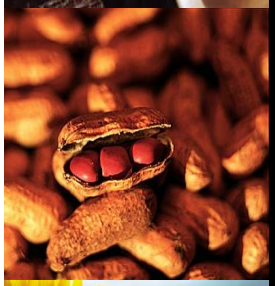


Peanuts

Yield 600kg/ha/year

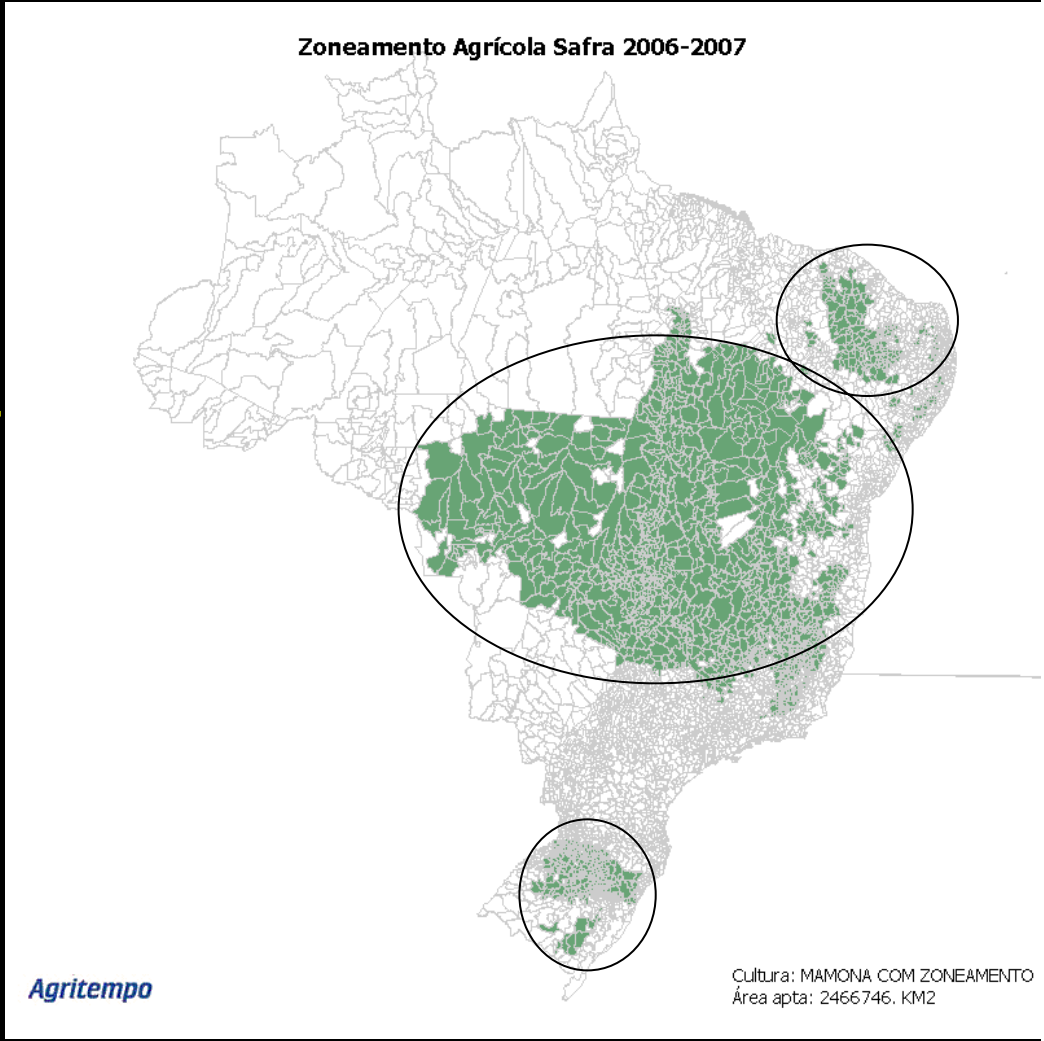
[oil] 50%





Castor Bean possible surface production with low risk

Oil Yield ~ 1000 Kg/ha/year



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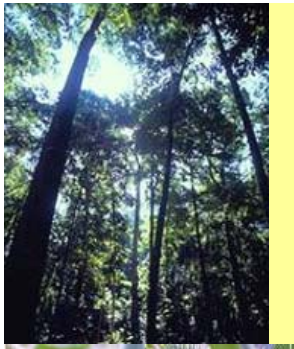
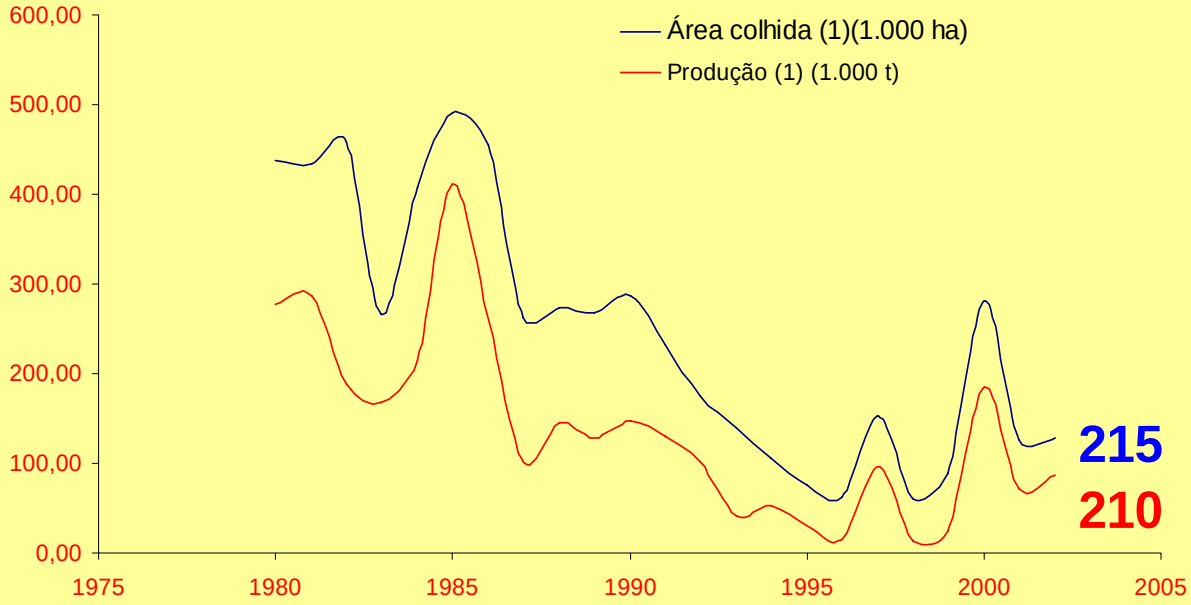
Castor Bean

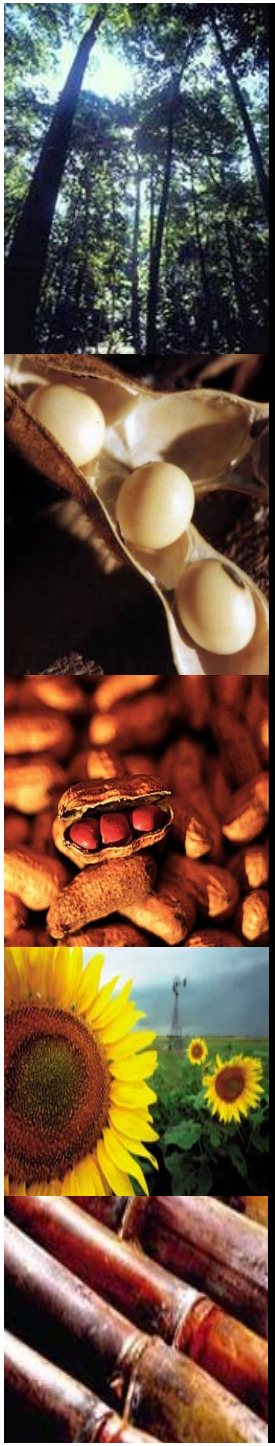
[oil] 48%
Important option for the small farmers



Castor bean

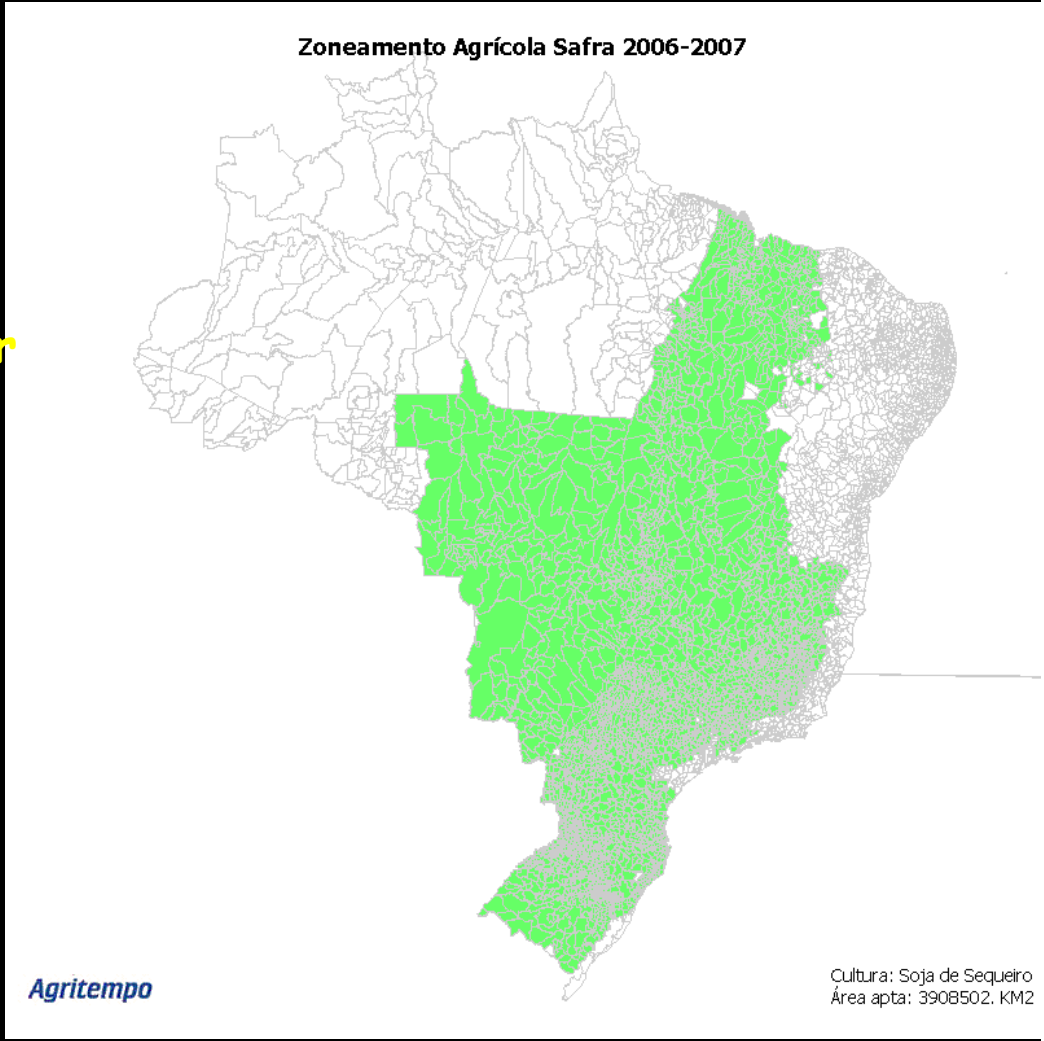
Evolution of castor bean crop in Brazil





Soybean possible surface production with low risk

Oil Yield 500 Kg/ha/year



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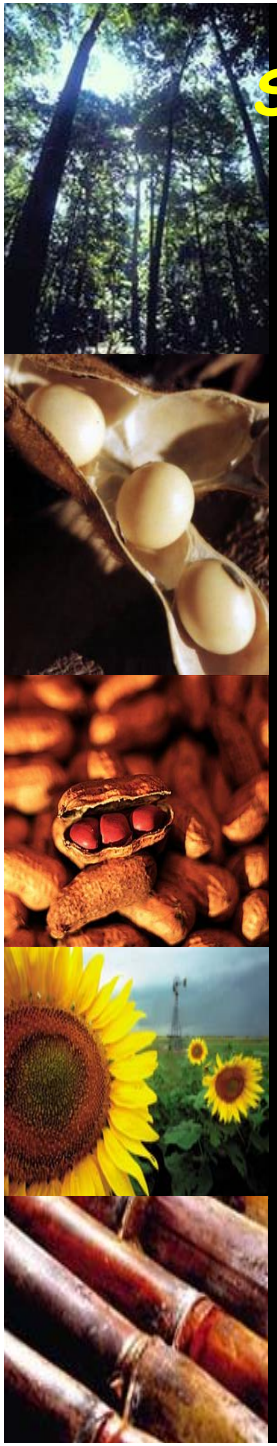
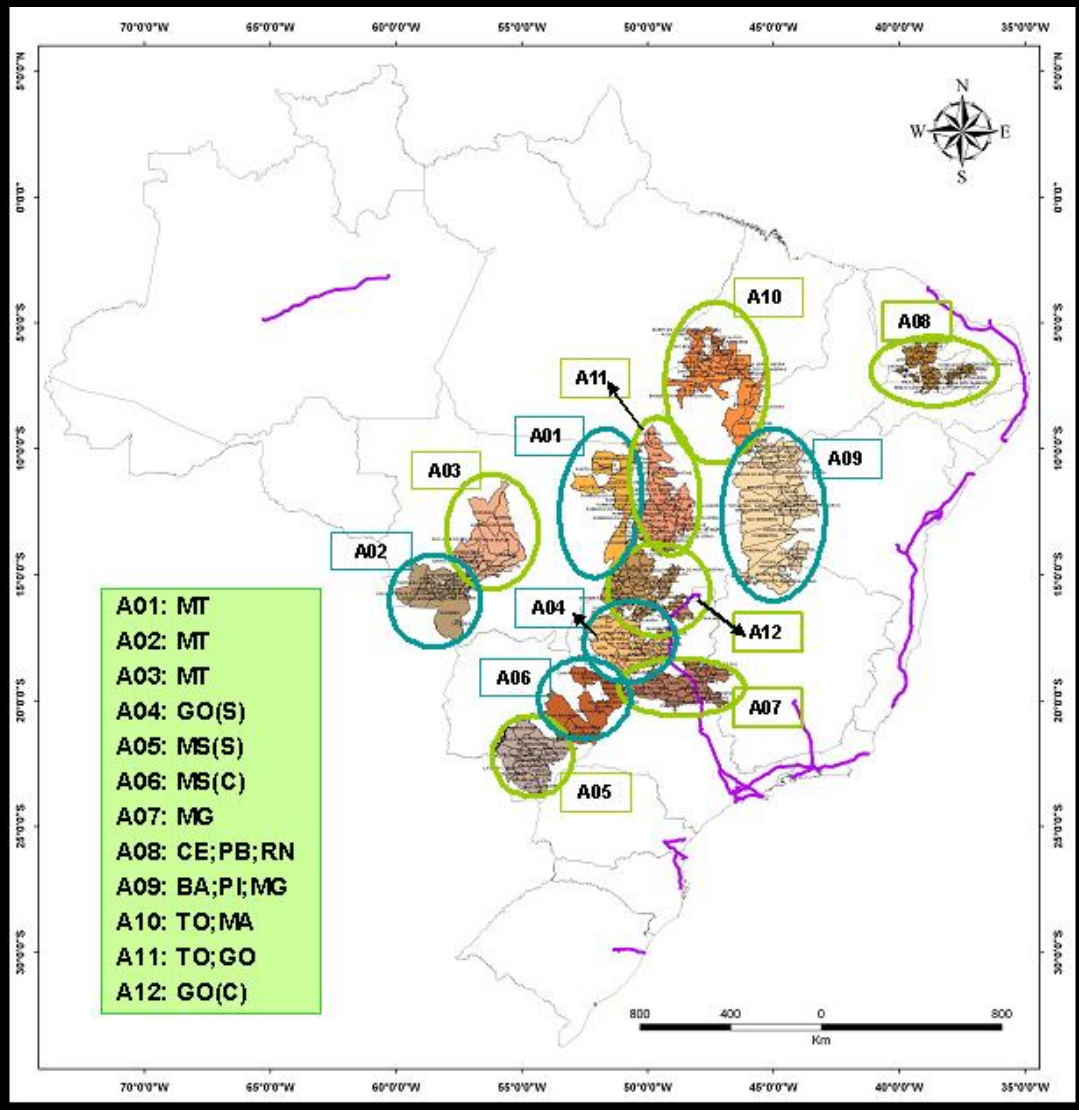
Sugar Cane Preliminar zoning to new areas expansion

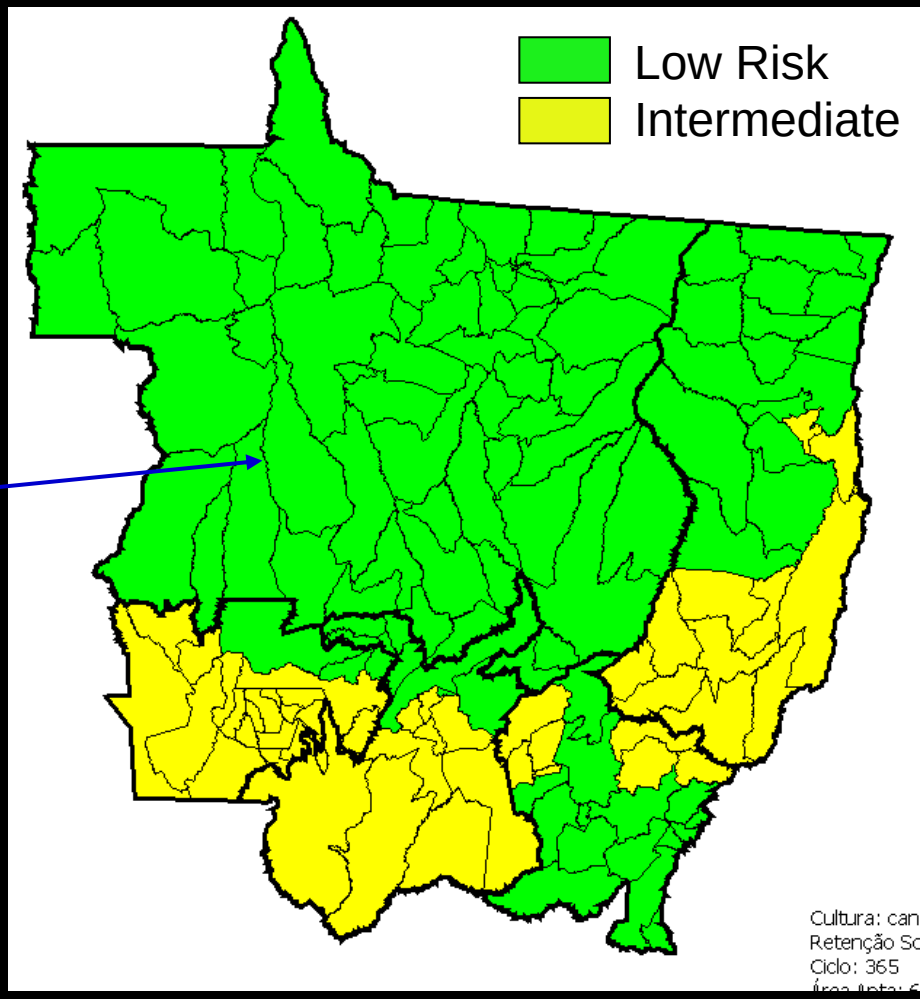


12 regions to expansion of Ethanol production

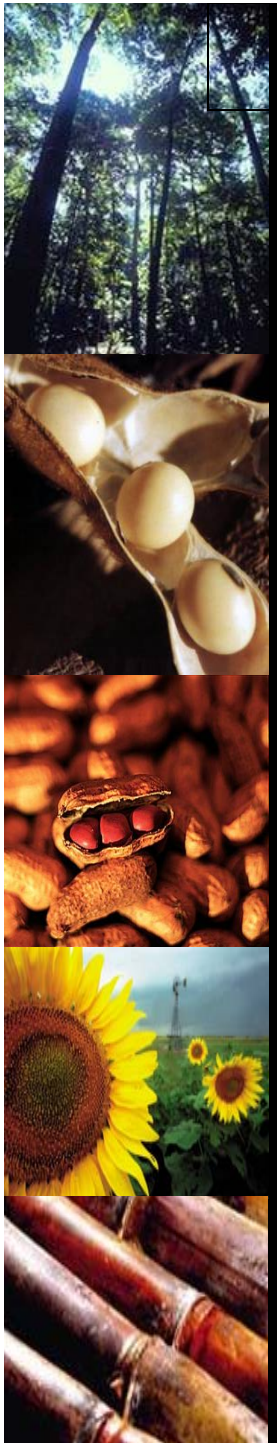


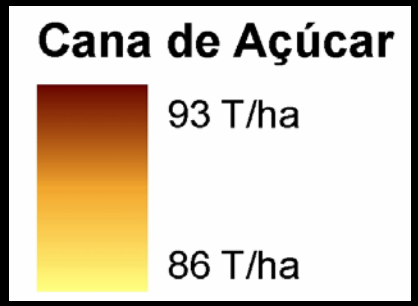
Slide from prof. Luiz Cortez UNICAMP/SP

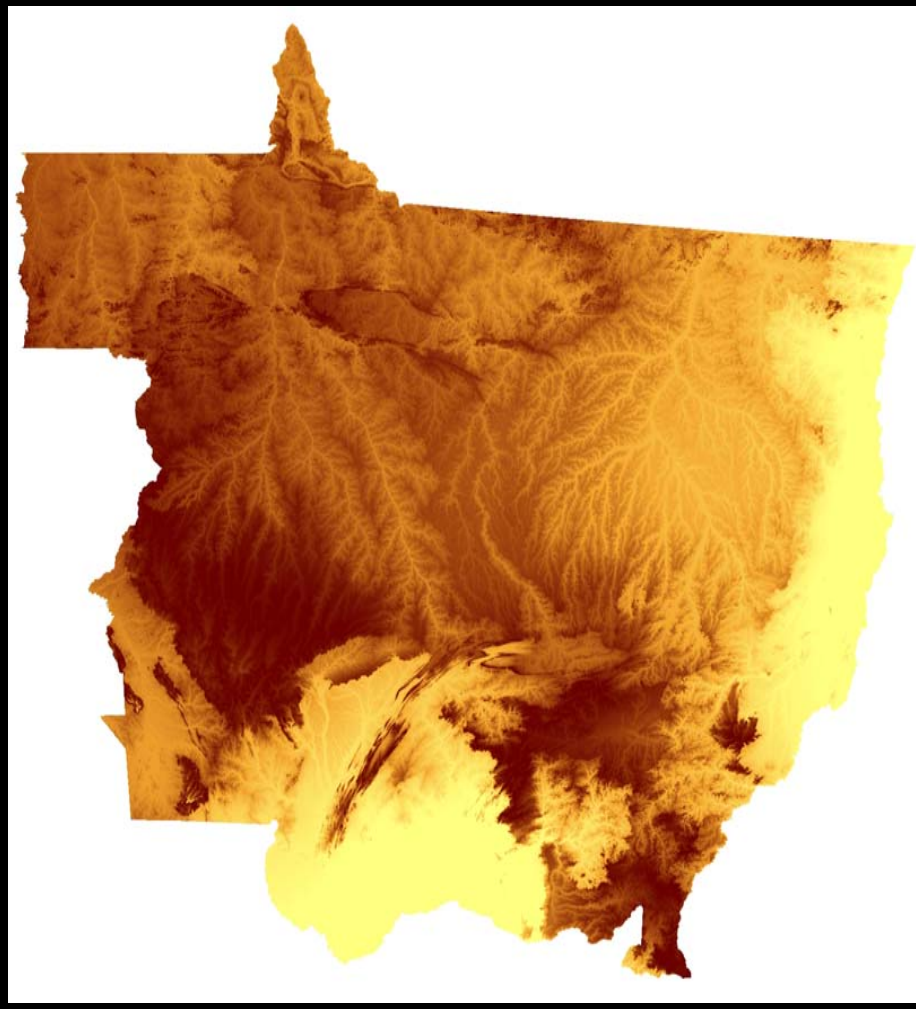
Sugar Cane with low risk Mato Grosso State



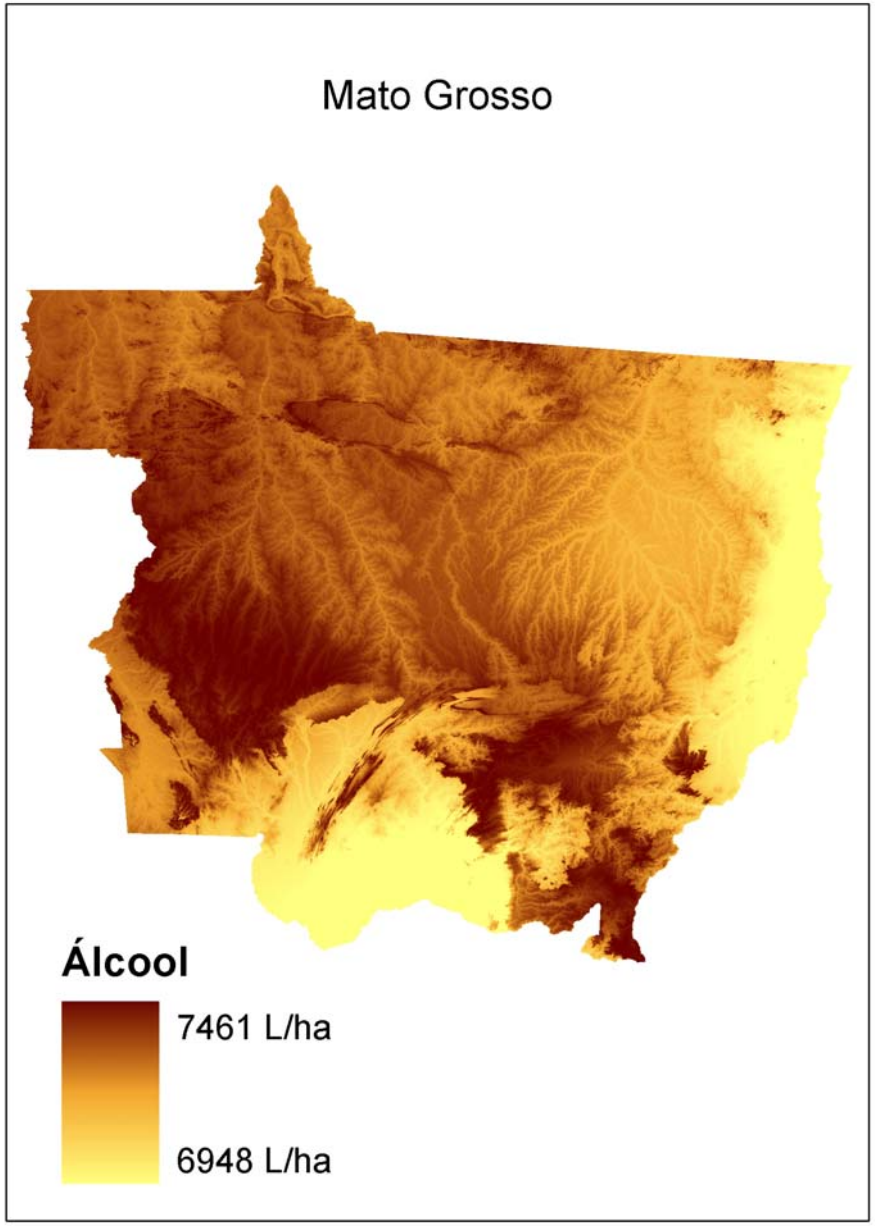
Biomass Potential production



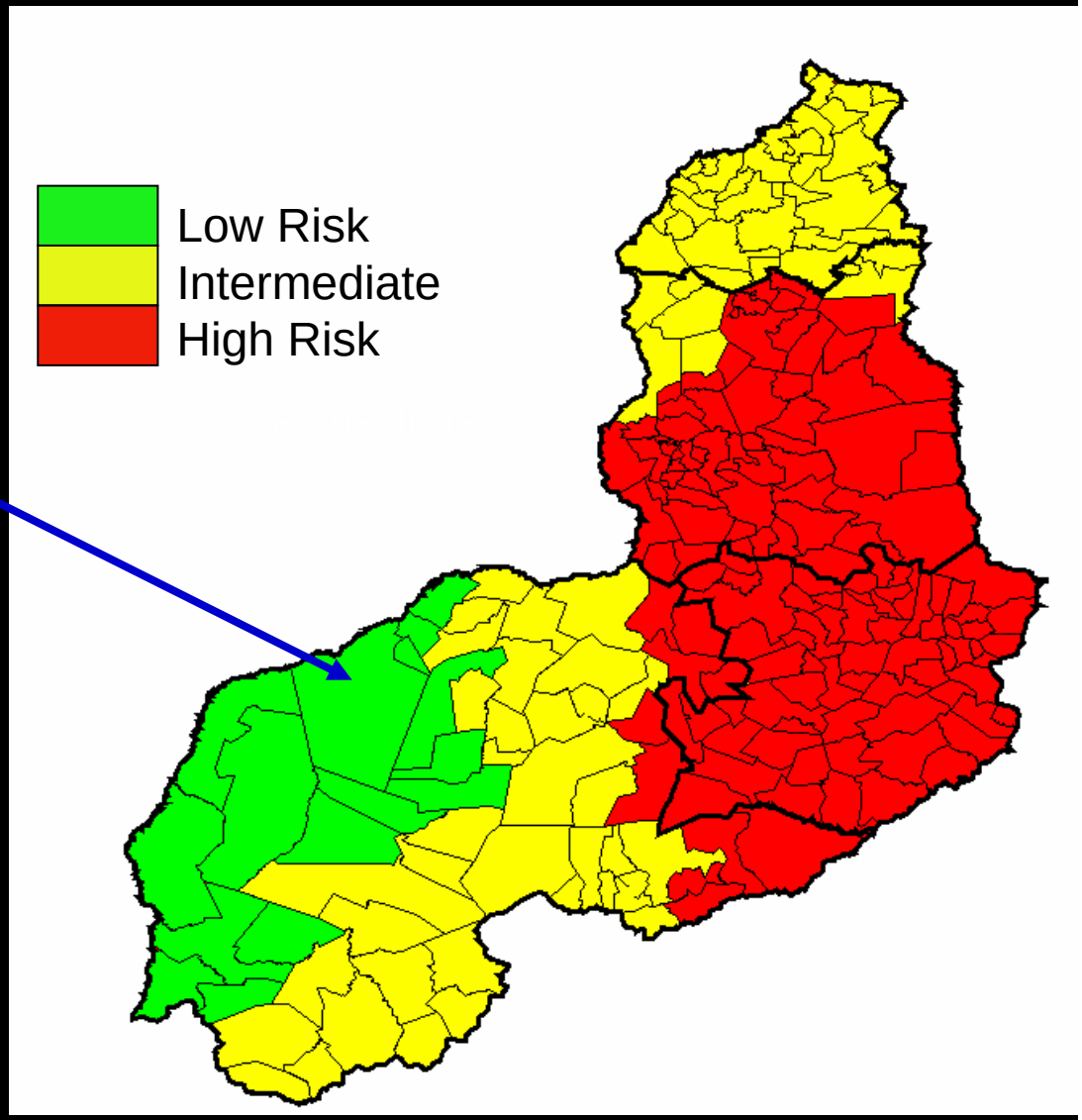




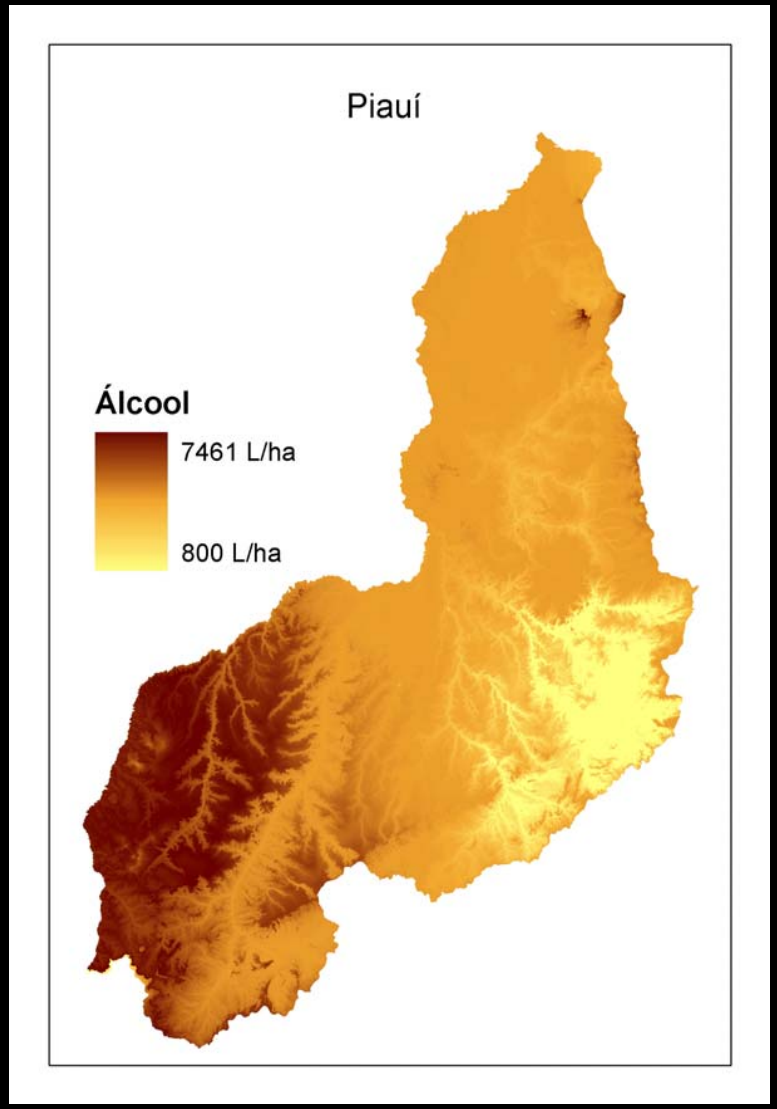
Ethanol potential production

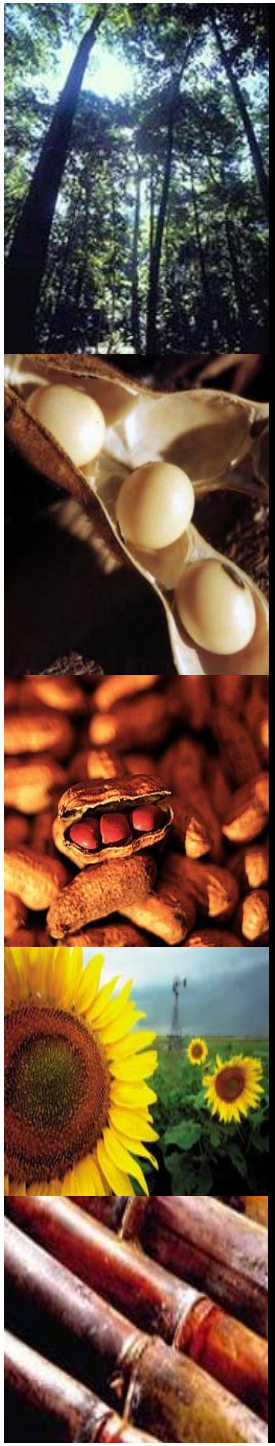


Climatic risks zoning in Piaui State

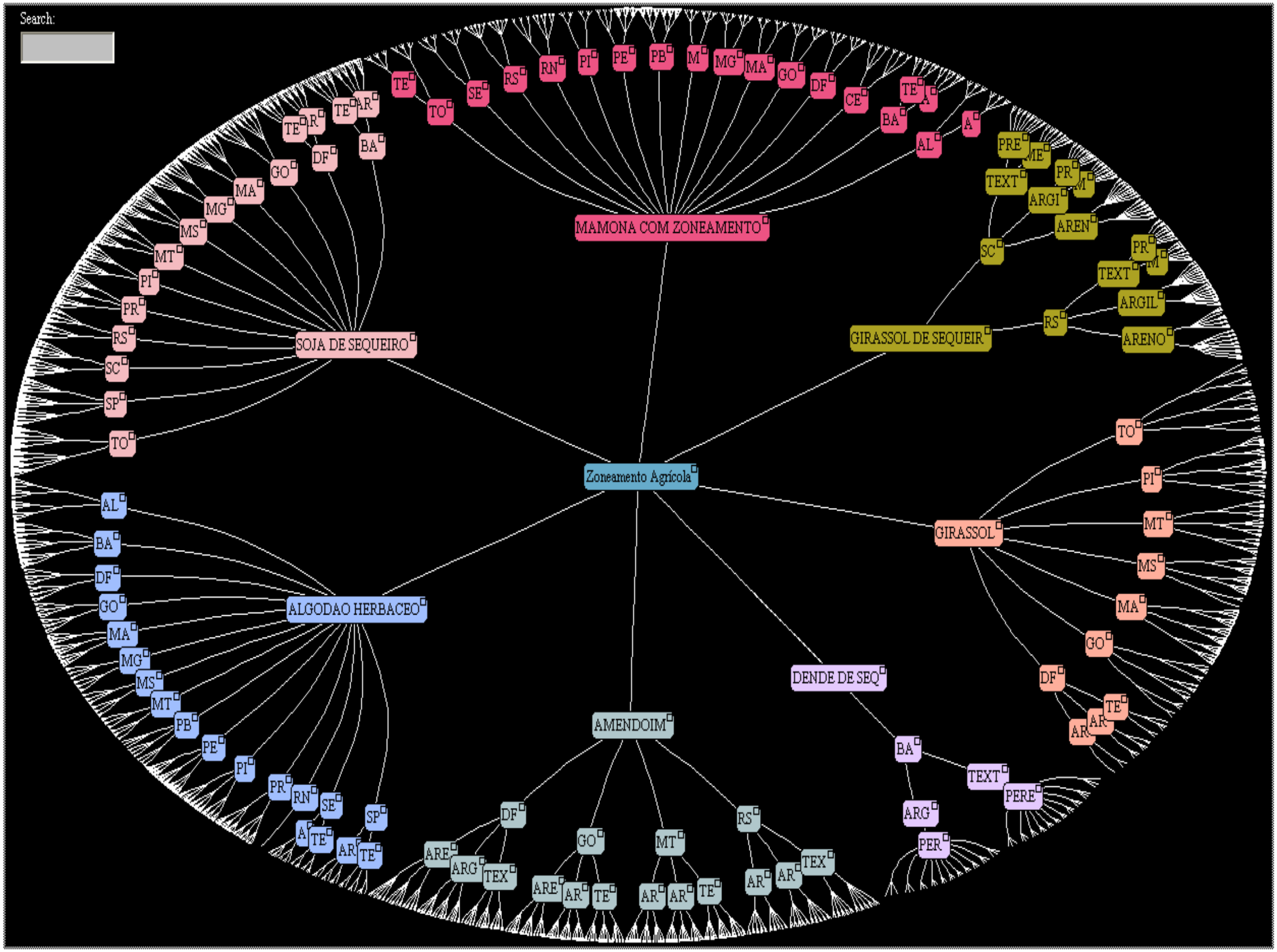


Ethanol potential production





Products Organization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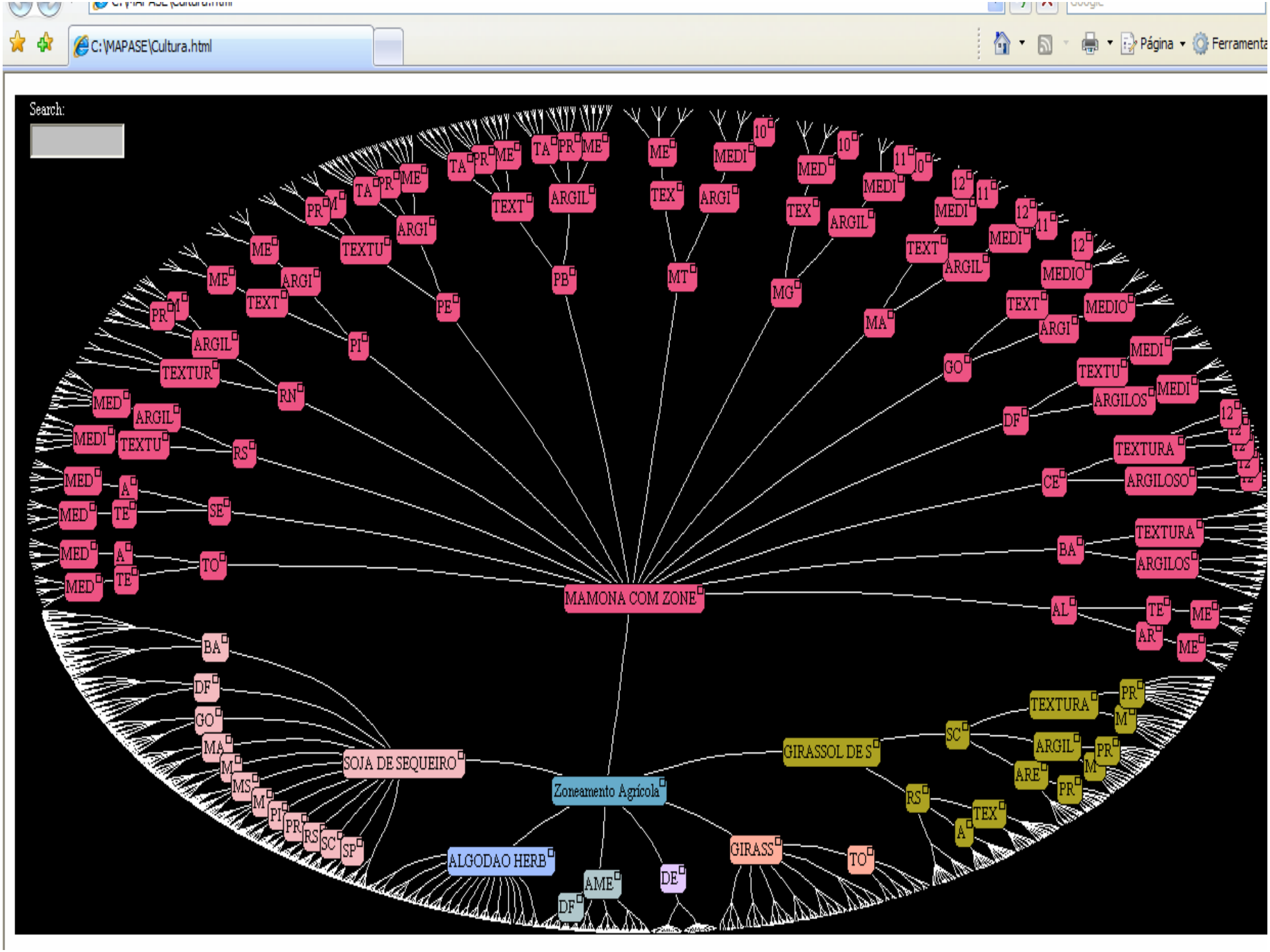
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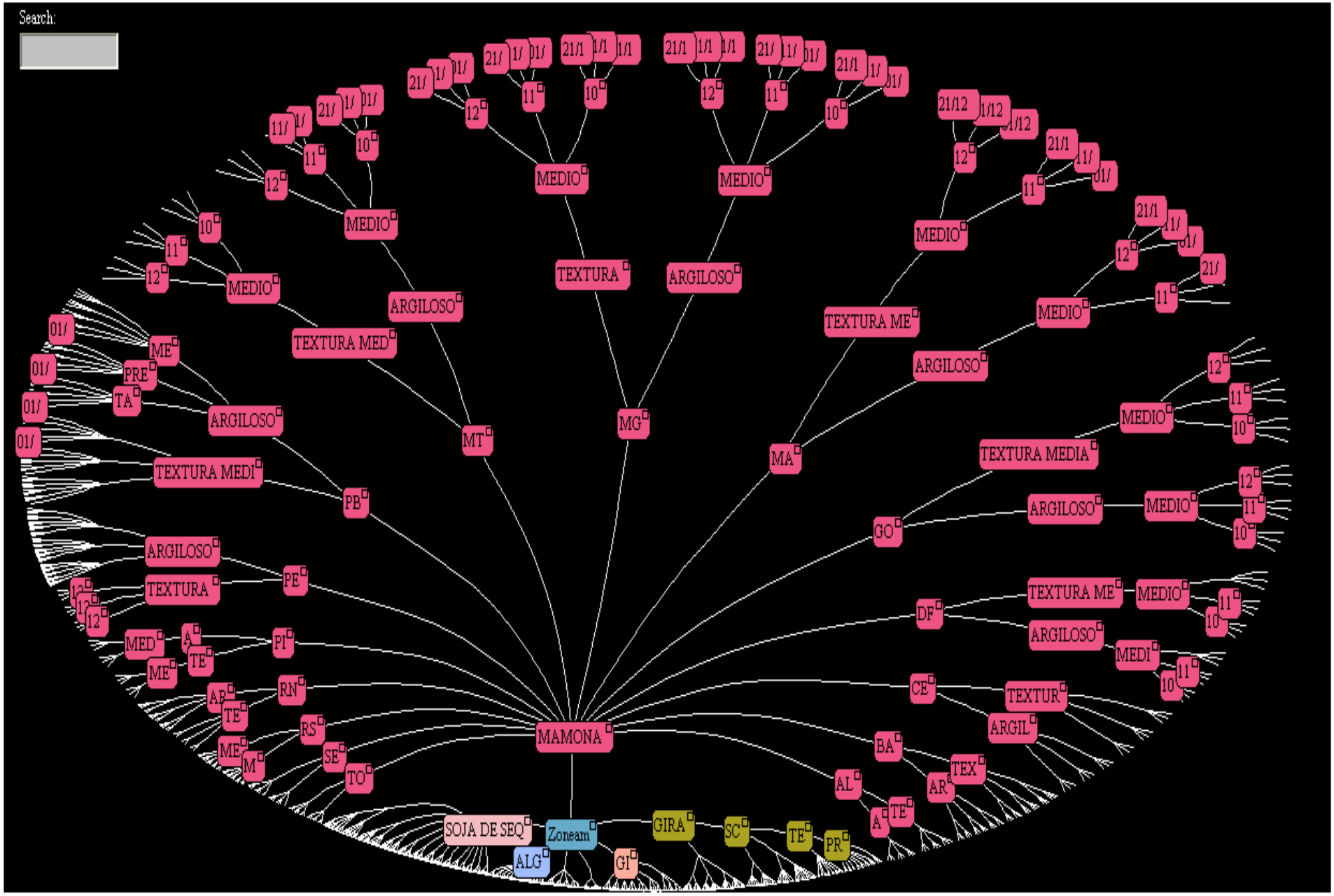

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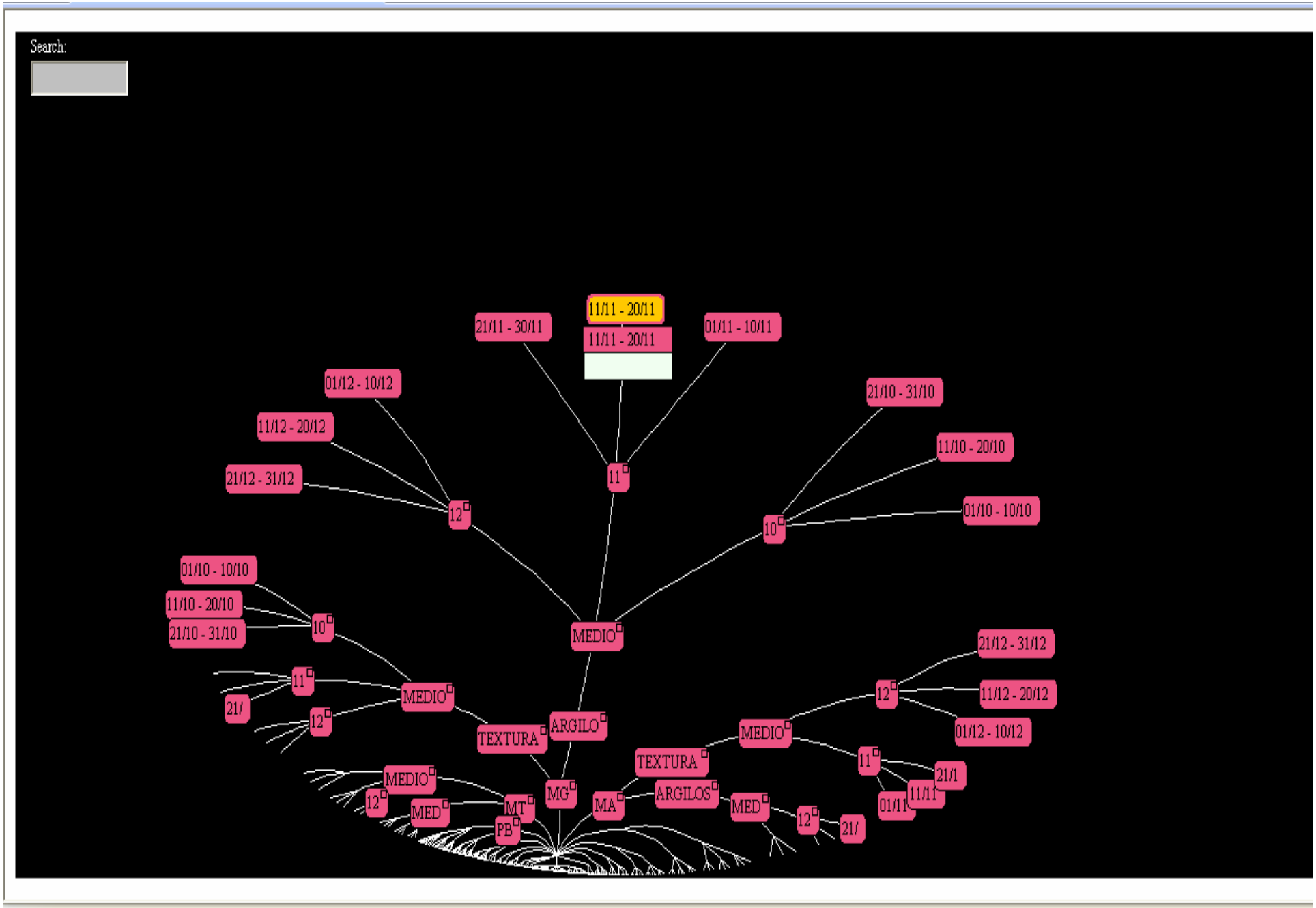

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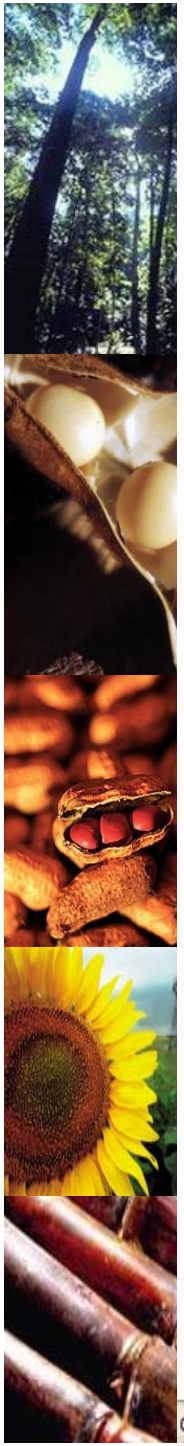
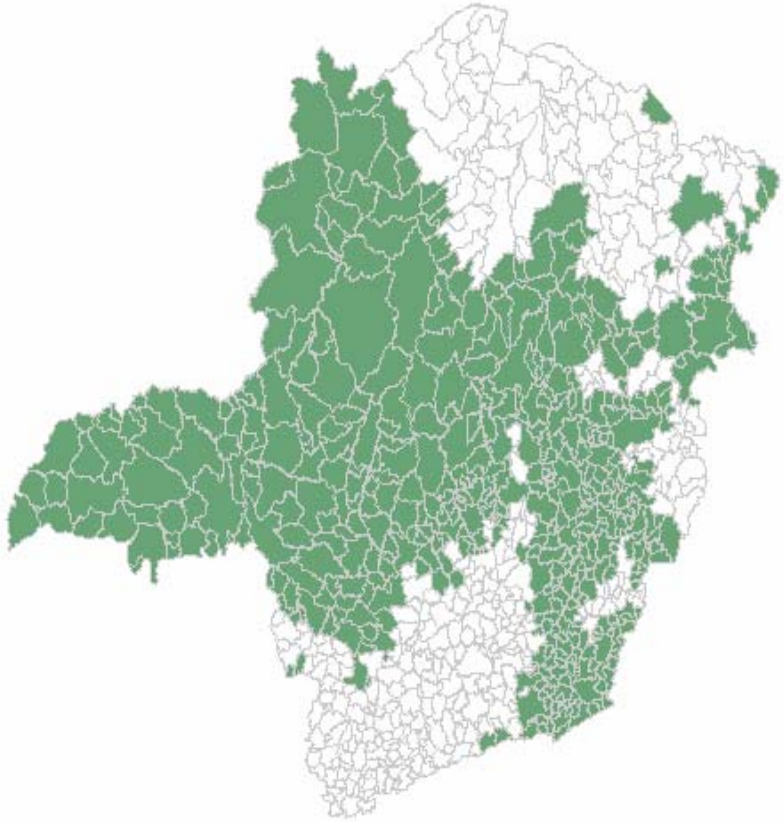


Zoneamento Agrícola Safra 2007-2008

Estado: MG

Municípios com Plantio Favorável em: 11/11 a 20/11



Agritempo

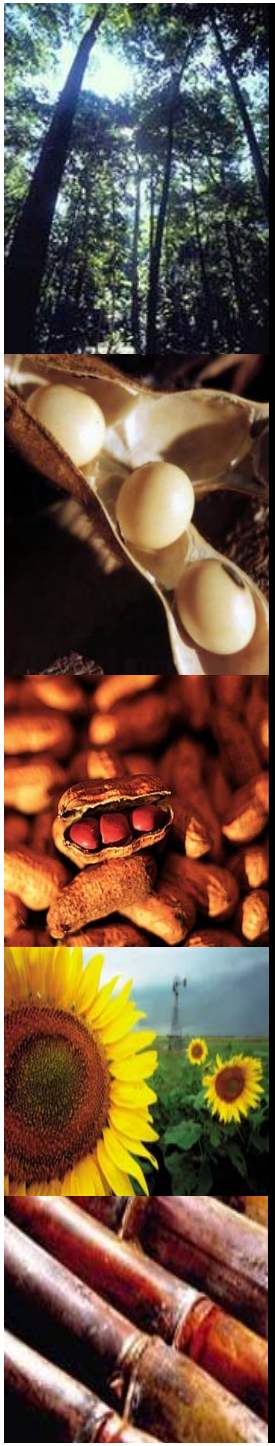
Portaria: 142, Data: 16/7/07

Cultura: MAMONA COM ZONEAMENTO

Solo Tipo: (3) Argiloso

Ciclo: Médio

Concluído



Thanks

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