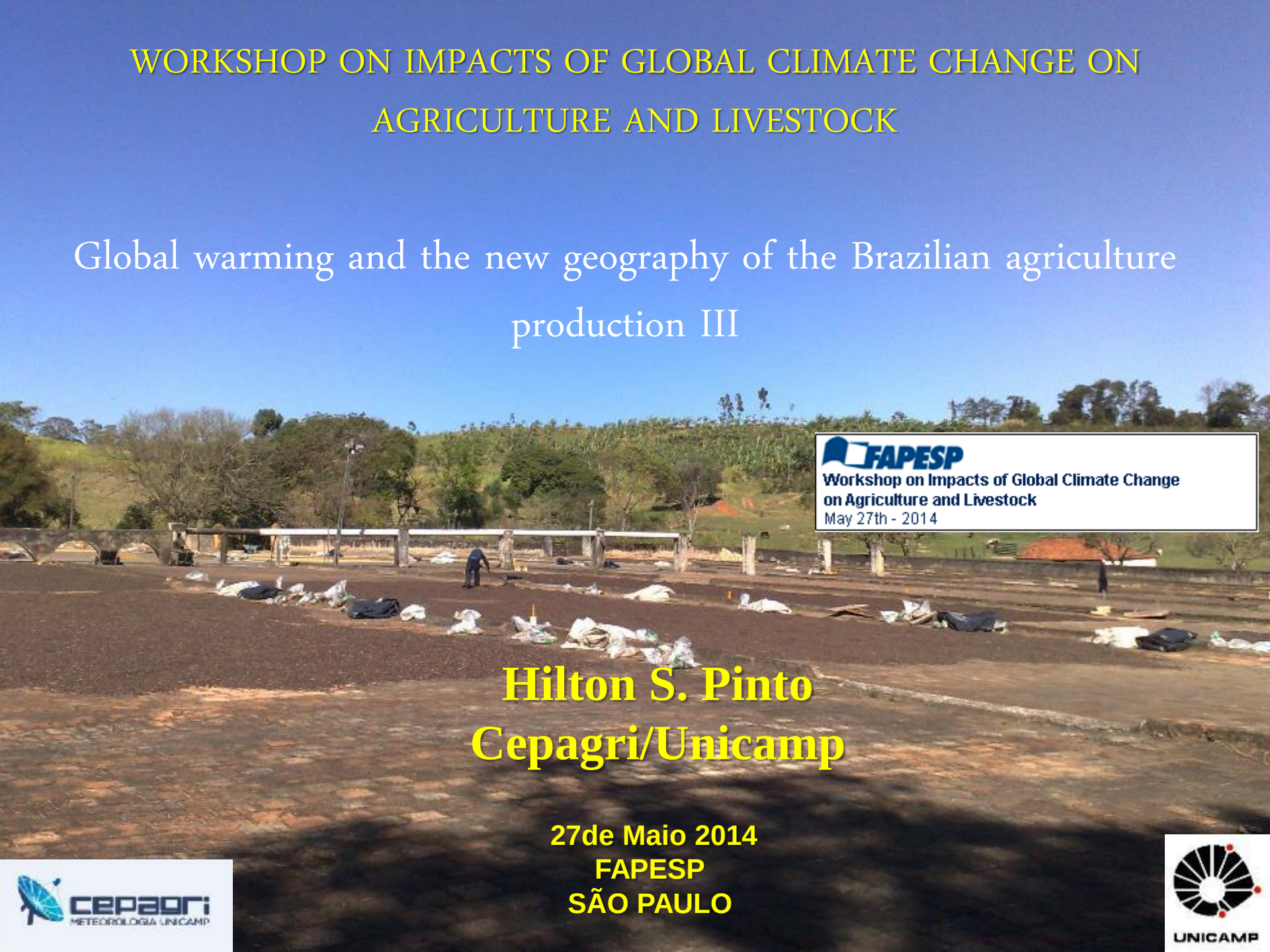
WORKSHOP ON IMPACTS OF GLOBAL CLIMATE CHANGE ON AGRICULTURE AND LIVESTOCK

Global warming and the new geography of the Brazilian agriculture production III

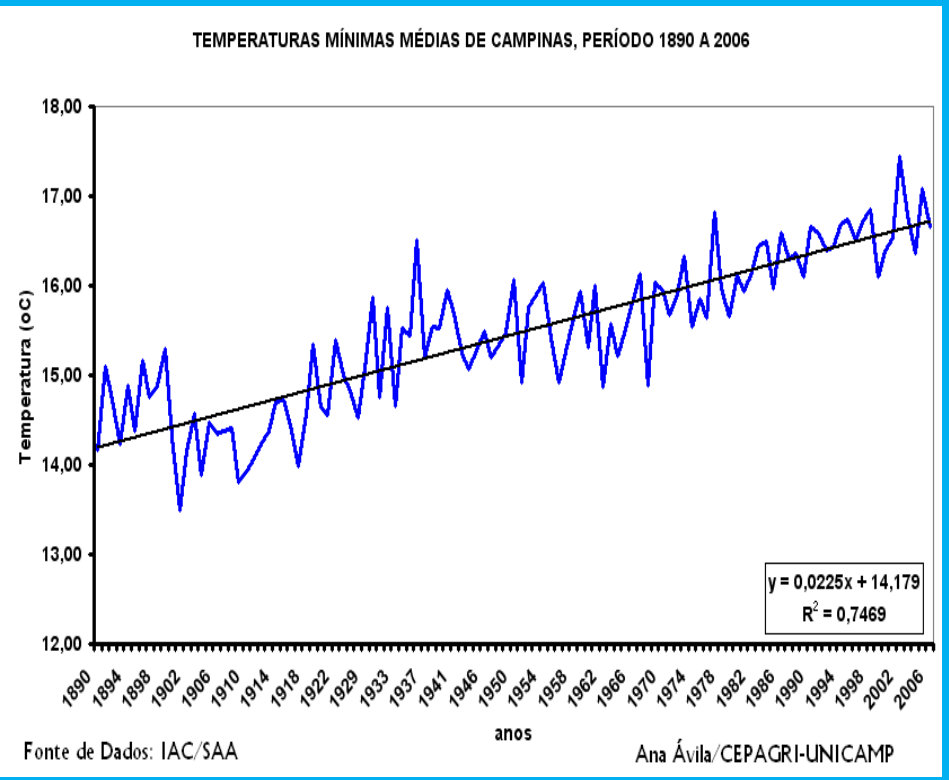


Hilton S. Pinto
Cepagri/Unicamp

27de Maio 2014
FAPESP
SÃO PAULO

cepagri METEOROLOGIA UNICAMP

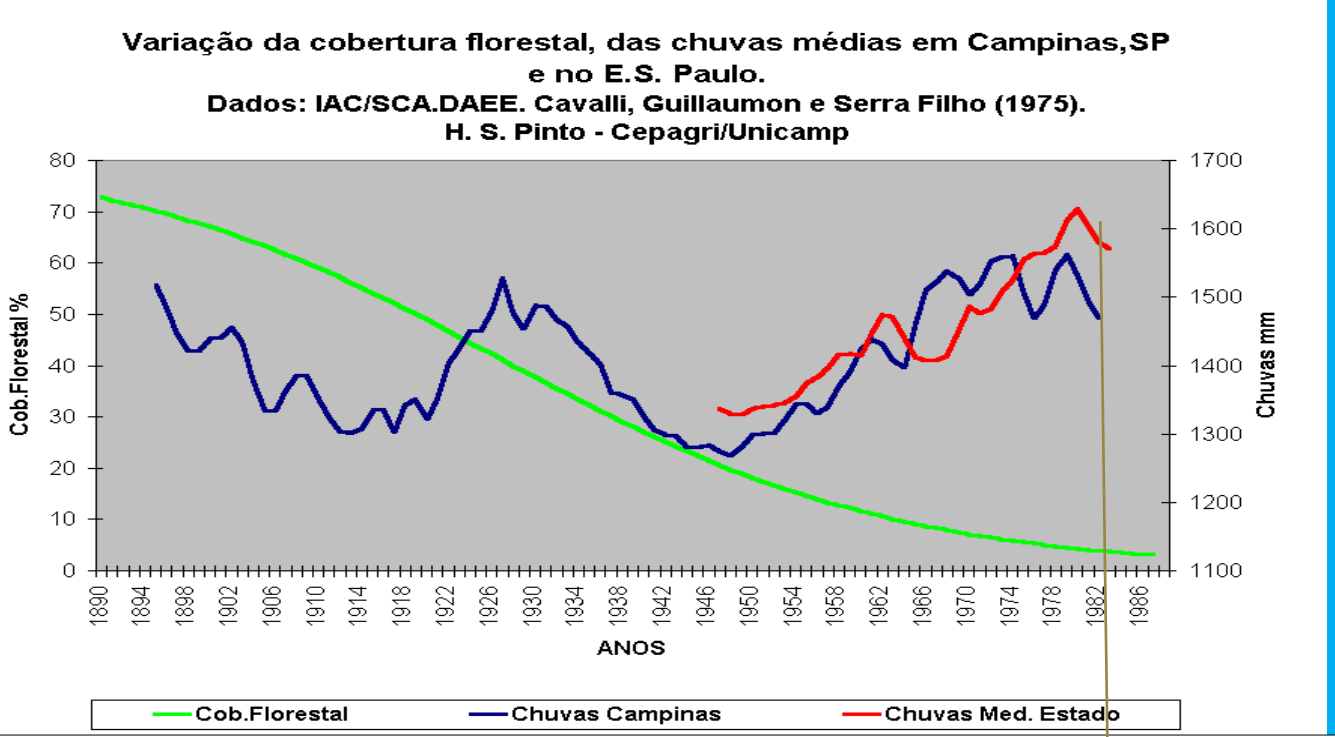
UNICAMP



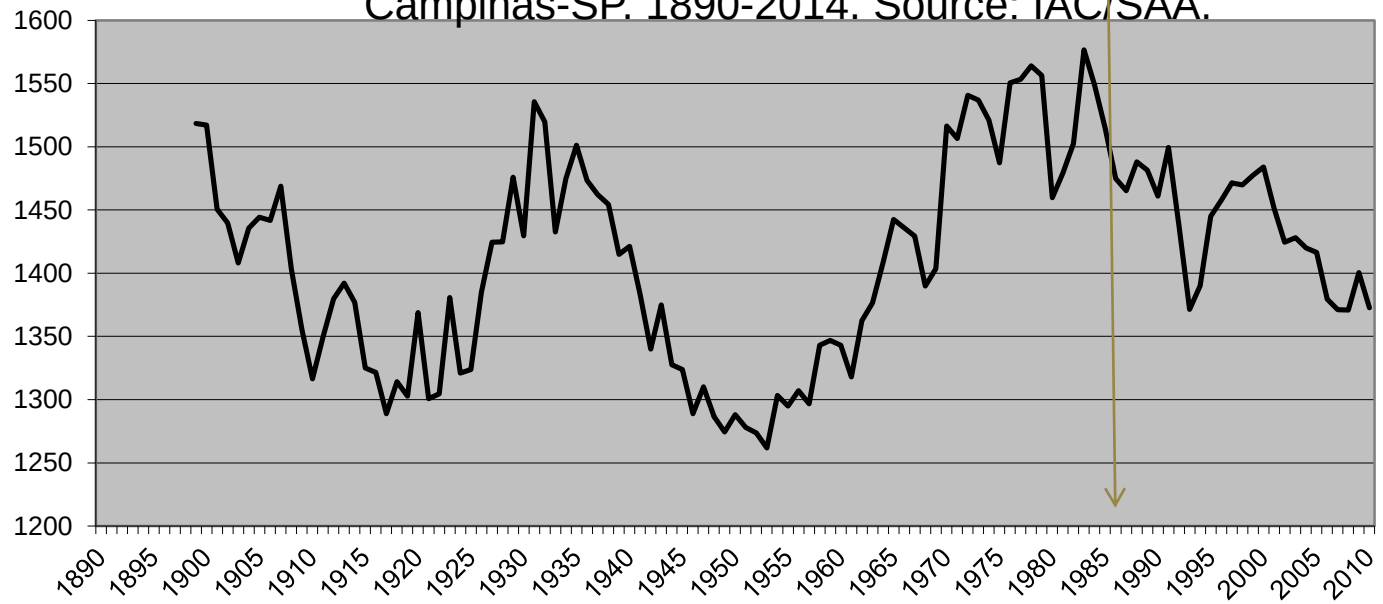
CHUVAS E TEMPERATURAS 2013-2014.

- 2013 foi o ano mais seco desde 1988, com um total de 1186 mm.
  - Choveu 239 mm abaixo da média (1425 mm).
- O mês de Dezembro foi o mais seco desde 1988, com 83 mm. Média é de 207 mm.
- O total de chuvas da Primavera foi de 294 mm, 260 mm abaixo da média (554mm)
- O total de chuvas do Verão foi de 367mm , 496 abaixo do normal (863mm)
- Temperatura média max. Janeiro = 33,4°C. (Média = 30,0°C)
- Temperatura média max. Fevereiro = 34,1°C. (Média = 30,6°C)

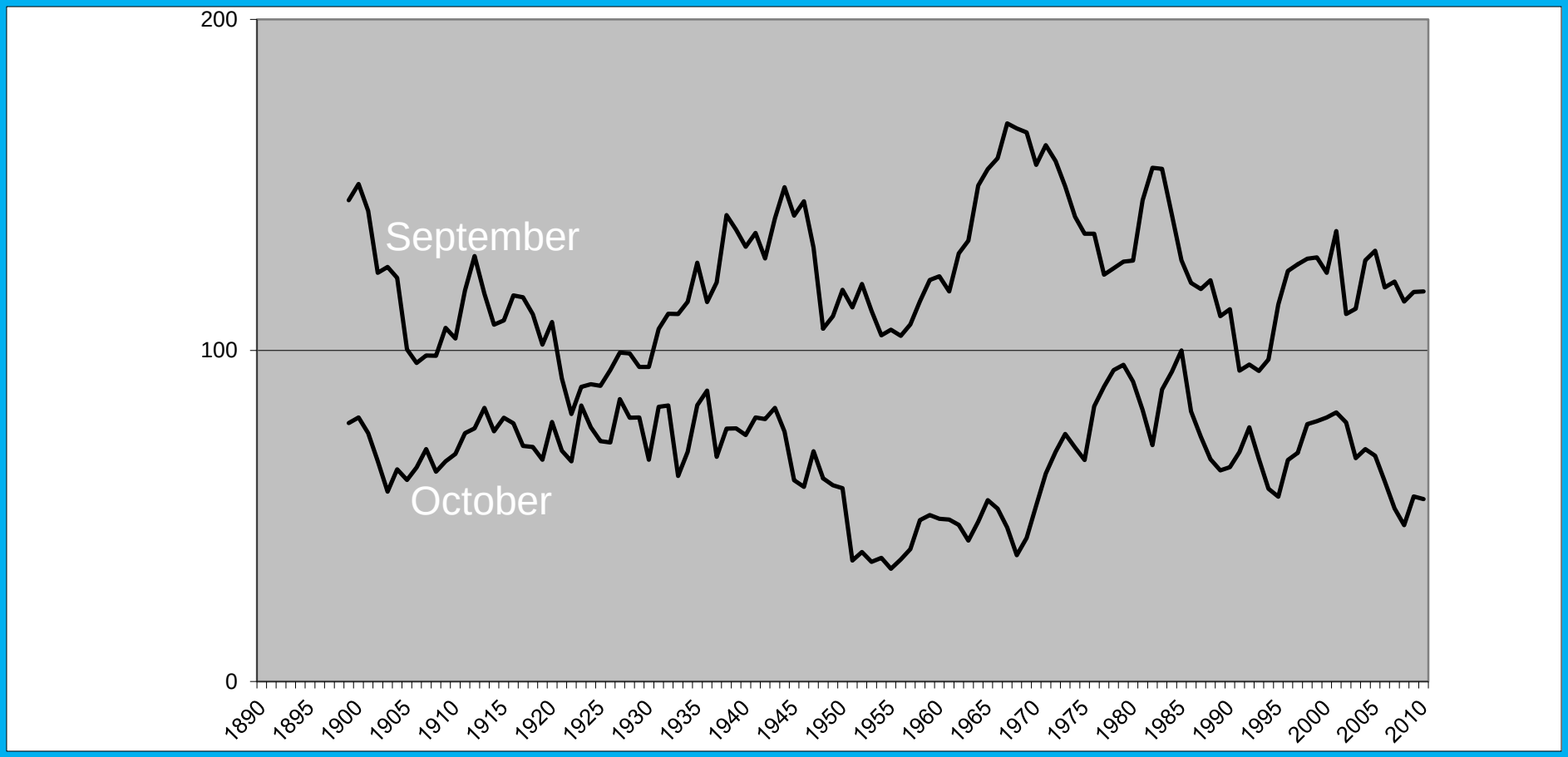
Meses	2012	2013	2014	Média
Setembro	36	31		61,8
Outubro	89	105		123,1
Novembro	65	76		163,4
Dezembro	152	82		207,5
Janeiro	320	221	153	274
Fevereiro	139	125	12	192
Março	70	241	104	162
Abril	163	96	74	67
Maio	64	82	25 (Dia 26)	59



Moving average - 10 years order- of total year rainfall in milimeters. Campinas-SP. 1890-2014. Source: IAC/SAA.



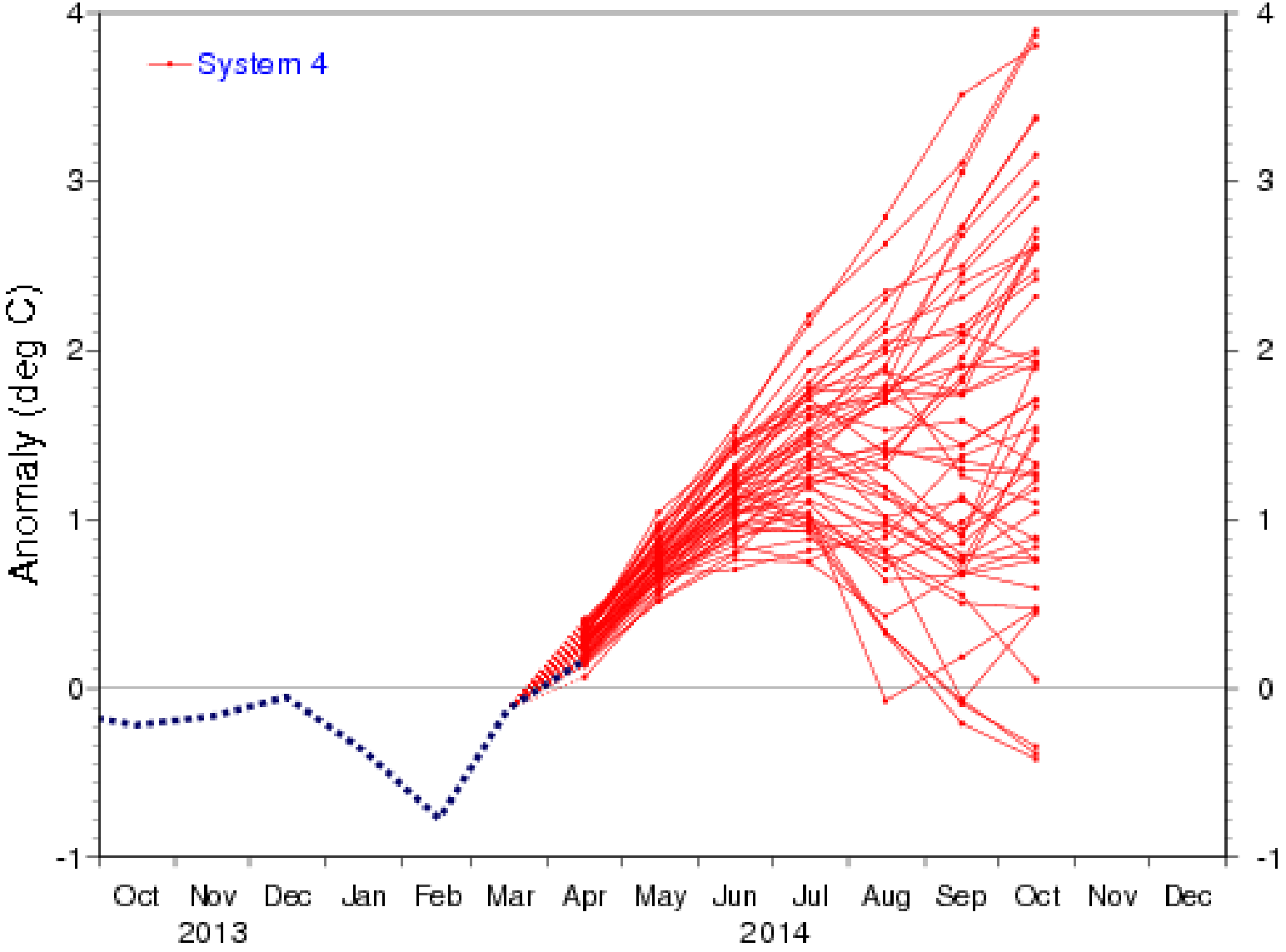
Rainfall variability in Campinas-SP in September and October from 1890 to 2014

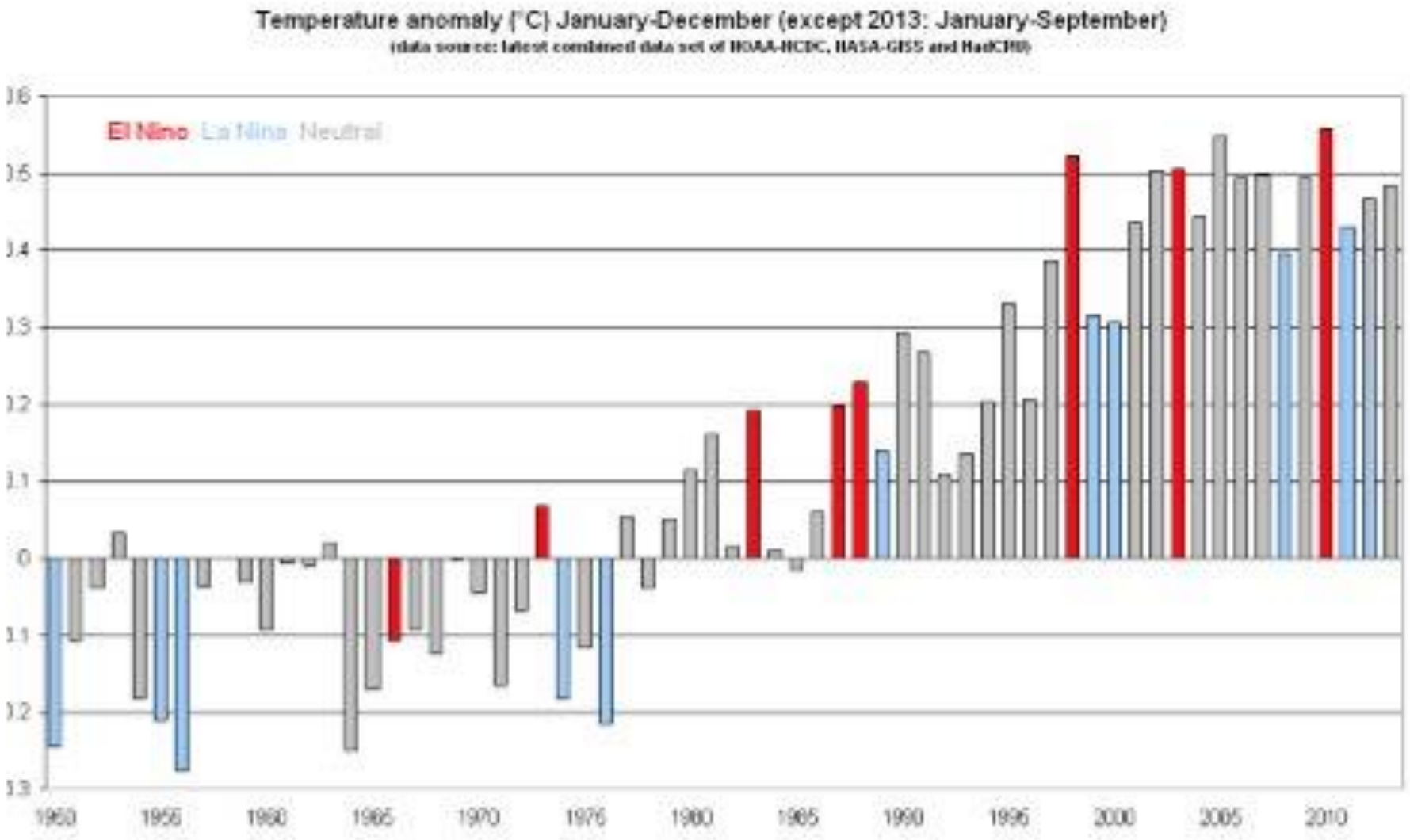


Grain production in Brasil (million tons) and cultivated areas (million ha) 1991-2014.

Fonte: CONAB/MAPA. Elaboração: SPA/MAPA
* Estimativa

Produtos: Algodão, amendoin, arroz, feijão, girassol, mamona, milho, soja, sorgo, culturas de inverno, trigo e triticale.


NINO3 SST anomaly plume
ECMWF forecast from 1 Apr 2014
Monthly mean anomalies relative to NCEP OIv2 1981-2010 climatology
System 4
Anomaly (deg C)
4
3
2
1
0
-1
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2013
2014
©ECMWF


Temperature anomaly (°C) January-December (except 2013: January-September)
(data source: latest combined data set of NOAA-NCDC, NASA-GISS and HadCRU)
El Niño
La Niña
Neutral
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010


IAPAR 16/09/2008: P. Caramori

Candle Buds

T>32C

Star Flowers
(Abortion)

Londrina, PR
Dia 29/09/2009
temperatura 33ºC

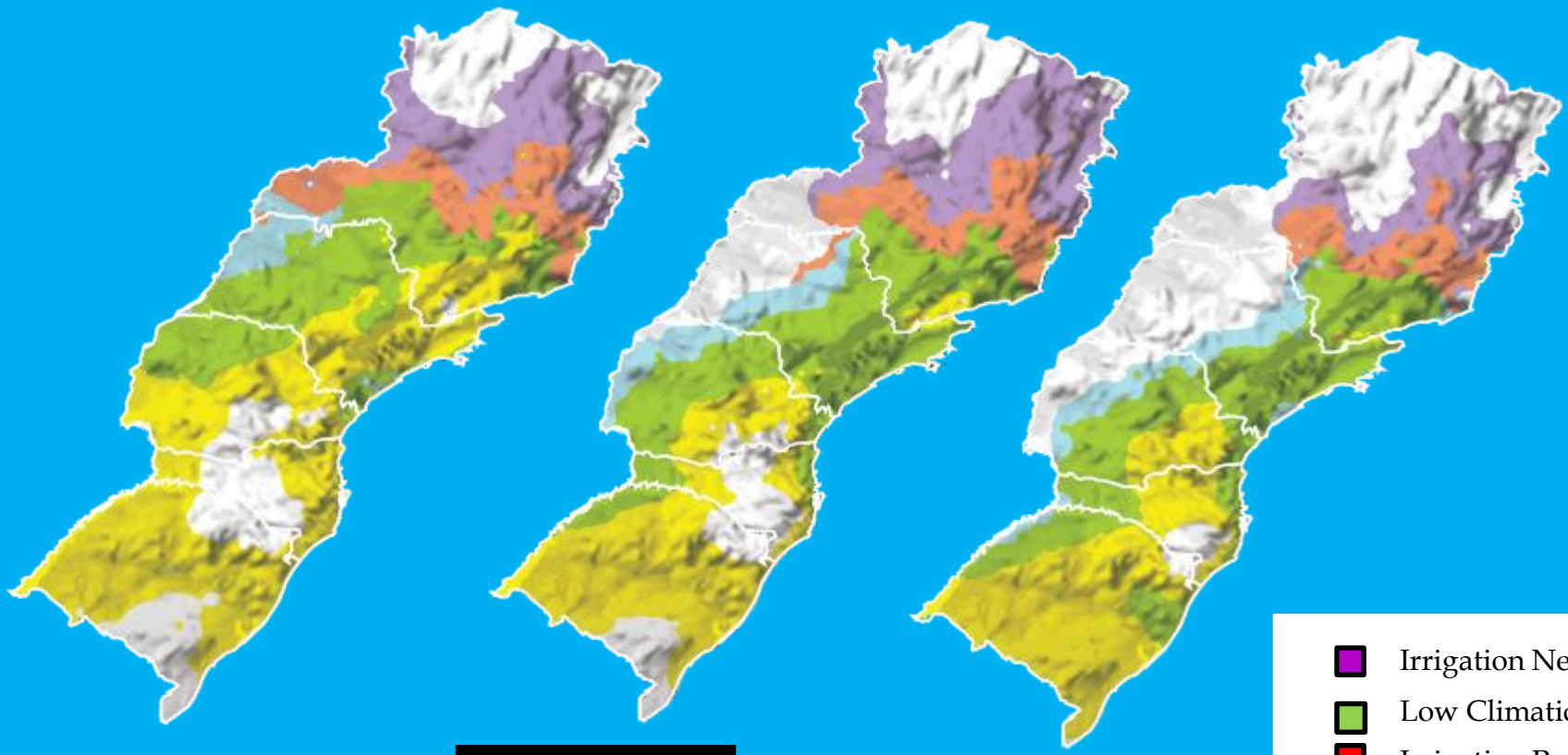
Cortesia: P. Caramori - IAPAR

Arabica Coffee

Actual Risk Zoning
Base Year – 2010
(Official Risk Zoning)

Scenary A2
Year - 2020

Scenary A2
Year- 2050



9,48%

17,15%

- Irrigation Necessary
- Low Climatic Risk
- Irrigation Recommended
- Frost Risk
- High Temperature Risk
- High Climatic Risk

CULTURAS AGRÍCOLAS EM SÃO PAULO

Só cana-de-açúcar e áreas plantadas com seringueiras não perderam espaço no Estado

	1998	2008	Variação, em %
Seringueira (pés em produção)	11.564.706	19.331.414	67
Cana (em hectares)	2.544.284	4.596.693	81
Milho (em hectares)	699.625	654.137	-7
Milho-safrinha (em hectares)	383.067	245.694	-36
Soja (em hectares)	521.398	444.747	-15
Laranja (pés em produção)	197.508.971	190.000.509	-4
Café (pés em produção)	324.007	206.076	-36

Fonte: IEA (Instituto de Estudos Agrícolas do Paraná)

Table 3 Percent change in area of low risk from climate change

Crops	2020		2030	
	Optimistic %	Pessimistic %	Optimistic %	Pessimistic %
Cotton	-4.6	-4.8	-4.6	-4.9
Rice	-10	-7.4	-9.1	-9.9
Sugarcane[1]	107	101	108	91
Soybean	-13	-24	-15	-28
Rainfed wheat	-41	-15.3	-31.2	-20
Bean (summer season)	-54.2	-55.5	-54.5	-57.1
Bean (autumn season)	-63.7	-68.4	-65.8	-69.7
Maize (summer season)	-12	-19	-13	-22
Maize (autumn season)	-6.1	-13	-7.2	-15.3
Pasture[2]	-34.4	-37.1	-34.9	-38.3

[1]Sugarcane includes potential (new) areas not just current areas of production
[2]Pasture value = productivity.

World Bank Report (P118037)
Pinto, H. S. &Assad, E. D.
Impacts of Climate Change on
Brazilian Agriculture - May, 2012

CROP	Production 2010/11 Million ton (Agric.Min.)	Projection 2020/21 Million ton (Agric.Min.)	Projection* 2020/21 Million ton (Model)	Potential areas for planting related to 2010/11
Corn	54,50	65,5	45,78	-16%
Soybean	70,10	86,5	53,28	-24%
Rice	12,83	13,7	11,88	-7,4%
Sugarcane	630	825	1.285	+104%
Cotton	1,60	2,40	1,52	-4,7%
Coffee	54,0**	70,6**	48,9**	-9,5%

*Projection do not consider any adaptation , mitigation or new technolgy adoption
World Bank Report
**Million of 60Kg bags

Impacts of Climate Change on Brazilian Agriculture

[P118037]

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Dr. Andre Nassar, ICONE[3], Brazil

Dr. Leila Harfuch, ICONE, Brazil

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Barbara Farinelli, World Bank, Brazil

Mark Lundell, World Bank, Brazil

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LCSAR, World Bank, USA

[1] The Brazilian Enterprise for Agricultural Research
[2] University of Campinas, Sao Paulo
[3] The Brazilian Institute for International Trade Negotiations
[4] The Brazilian Institute for Space Research

a. In the absence of climate change, cropland is projected to increase to 17 million hectares in 2030 compared to observed area of cropland in 2009. Due to climate change impacts, however, all the scenarios simulated, result in a reduction of cropland in 2020 and 2030.

b. In the pessimistic scenario Brazil could have 10.6 million hectares less land allocated to agriculture in 2030 as a result of climate change with the South Region being the worst impacted losing close to 5 million ha by 2030.

By the year 2050

BRAZILIAN GROSS DOMESTIC PRODUCT = R$10 TRILLION

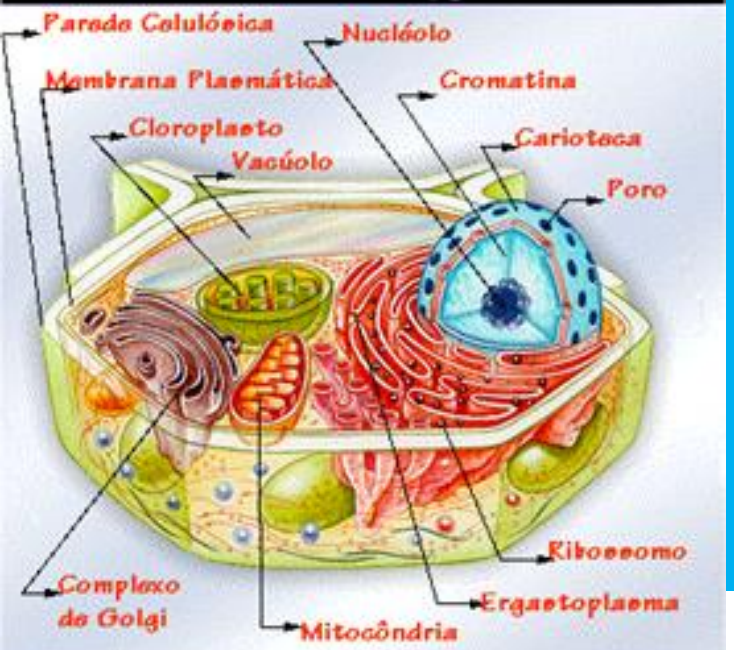
INACTION EFFECTS:

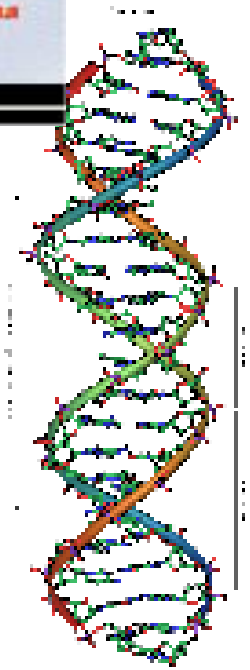
CLIMATE IMPACT:

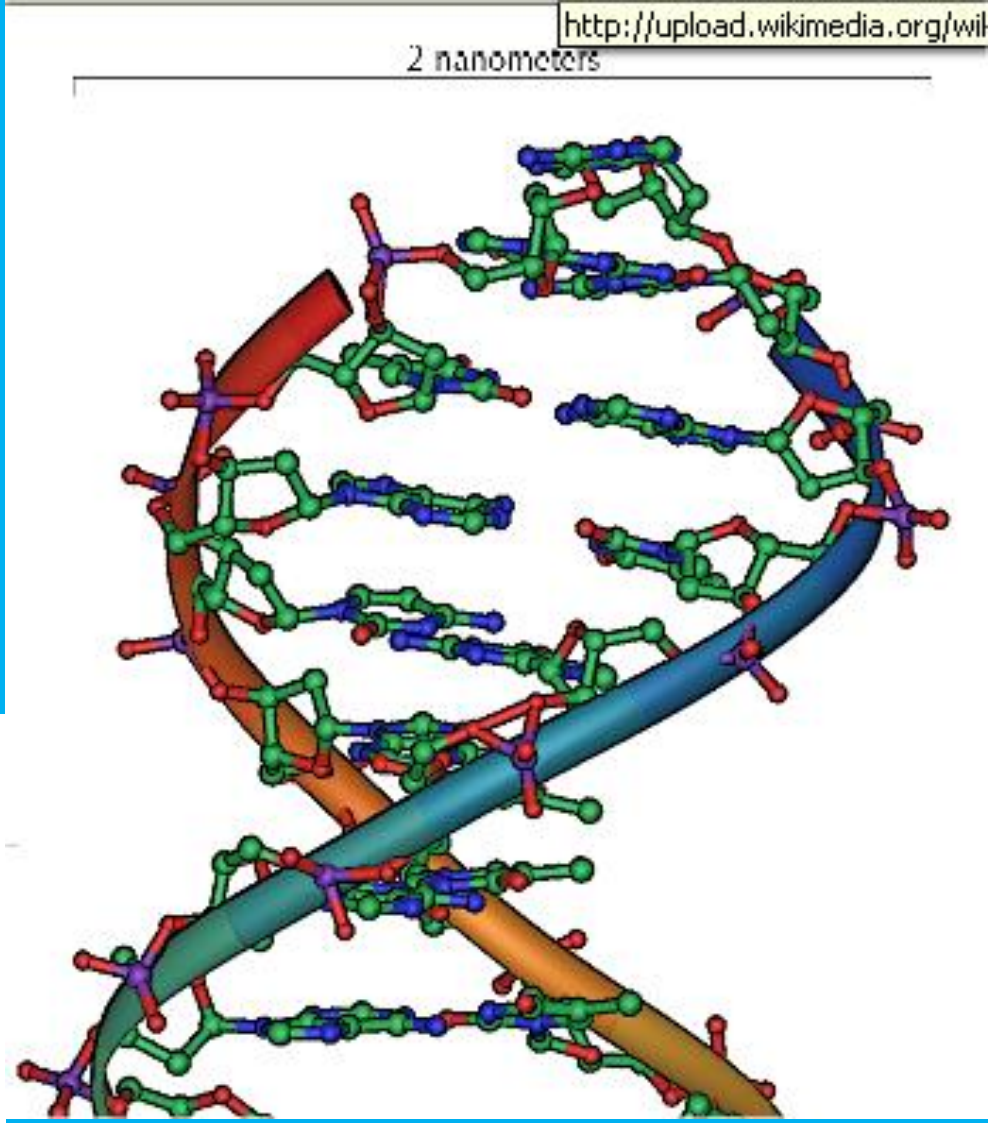
REDUCTION BETWEEN USD 480 BILLION AND 2.4 TRILLION
=
1 GDP every 40 years = 2,5%/Year

Hilton S. Pinto & Eduardo Assad: Agricultural Production
In: The Economics of Climate Change
Margulis S. & Dubeaux, C. B. S., 2011.
FeaUsp-World Bank

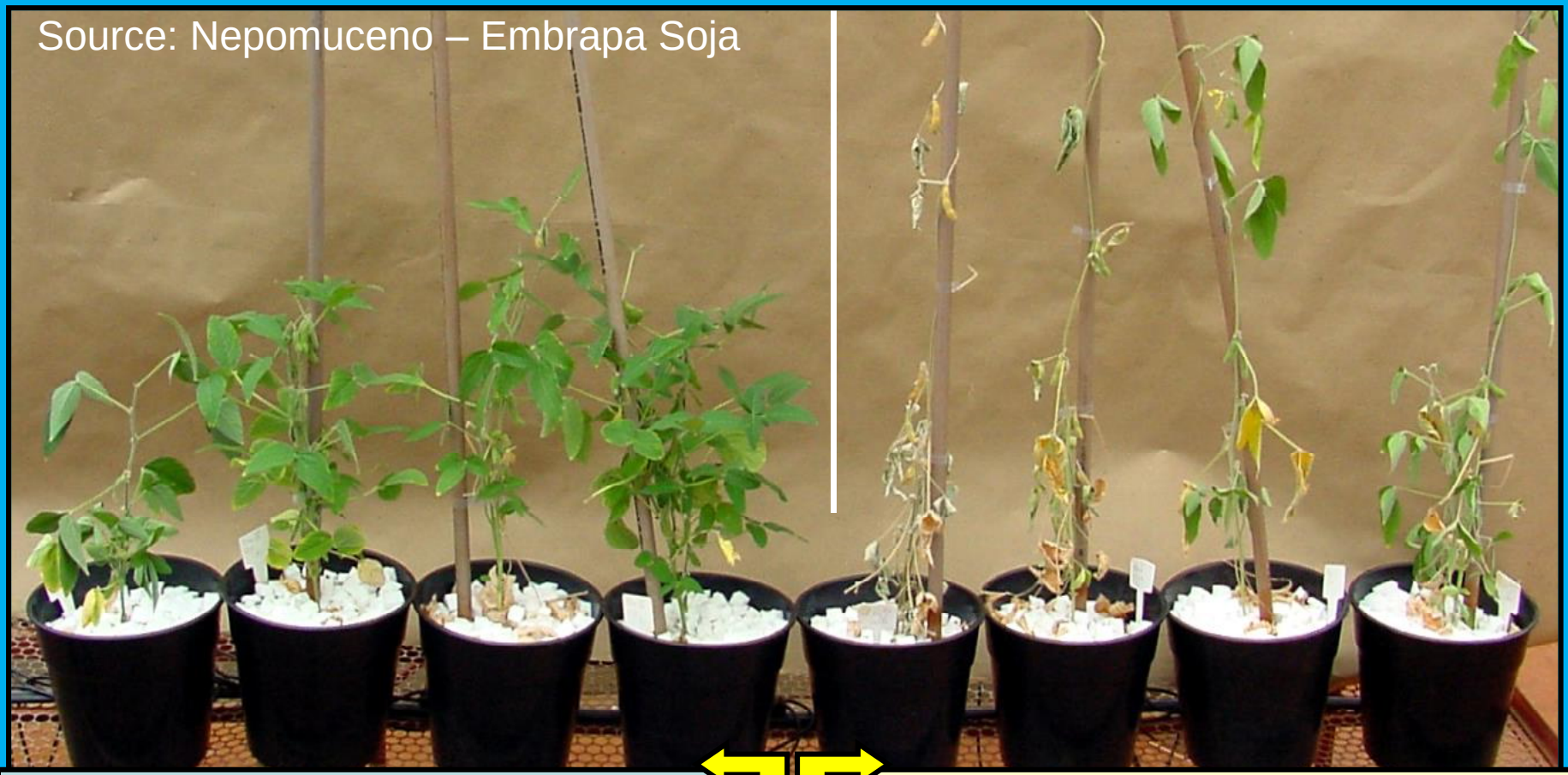
Celula Vegetal







Drought tolerant gene in soybean



P58 (BR-16 with gene)
2.5% soil moisture

BR-16 without gene
2.5% soil moisture

Costs/benefits of Adaptation
Plant breeding – Year 2020
Total = US$532.8 million/year

Cultures	Plant Breeding Million US$/YEAR	BENEFIT / COST
RICE	18.9	8,2
COTTON	21.1	10,7
COFFEE	57.8	15,4
BEAN	28.3	7,1
SOYBEAN	210.0	16,7
CORN	196.7	4,3

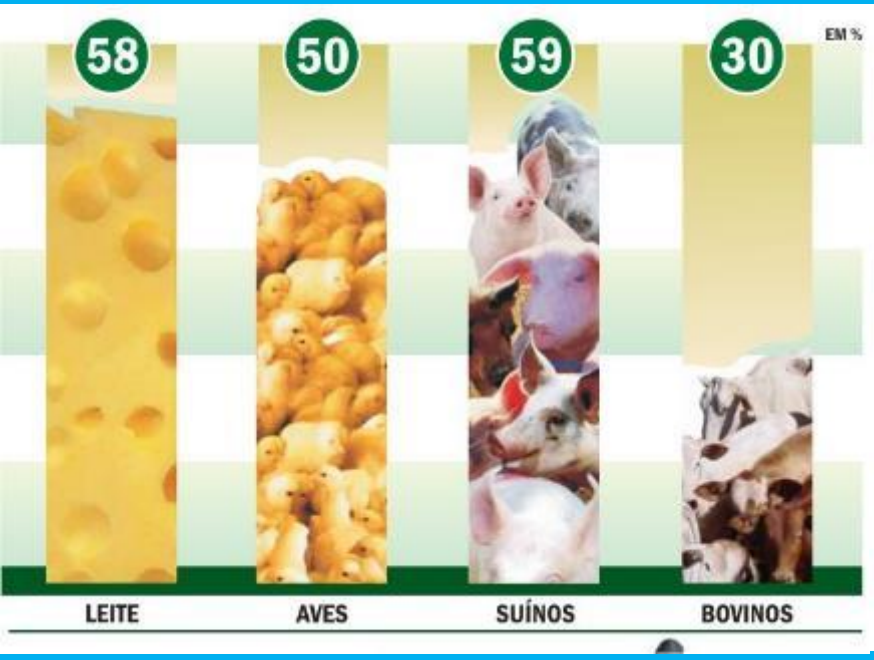
SEGURANÇA ALIMENTAR

AGRICULTURA FAMILIAR NO BRASIL - PRODUÇÃO DE ALIMENTOS BÁSICOS

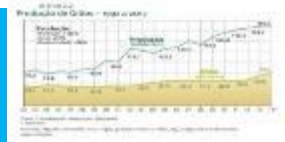
NÚMERO DE PROPRIEDADES: CERCA DE 5,2 MILHÕES

PRODUÇÃO - ATENDE CERCA DE 70% DA POPULAÇÃO

PRODUTIVIDADE ATUAL – 30 A 50% DO POTENCIAL



EXTENSÃO RURAL - BRASIL: 45.000 AGRÔNOMOS



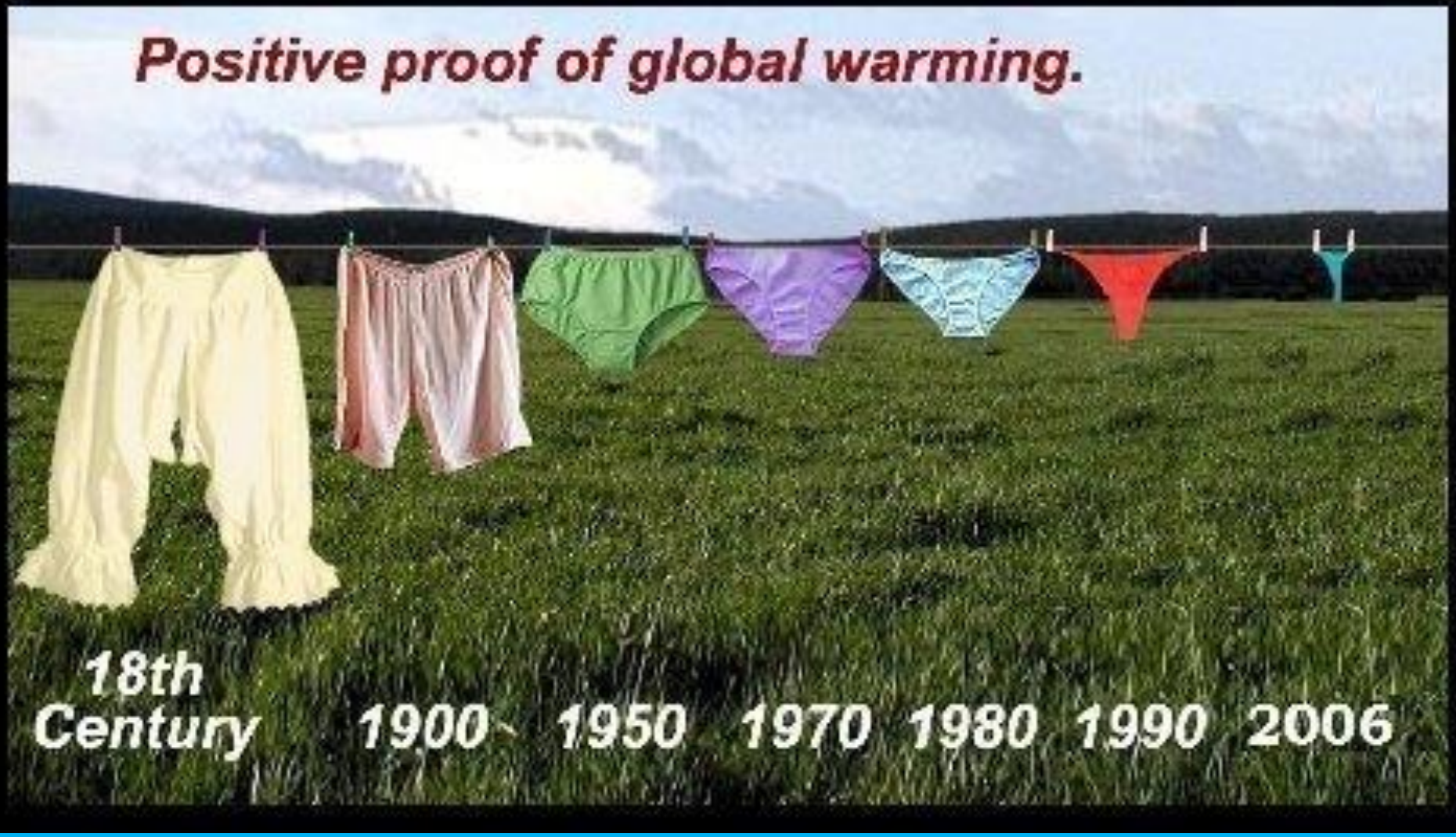







CO_2 eq in soils at 0-30cm and 0-5cm depths in 102 pastures sampled in different biomes.

Biomes	Number of sampled pastures	CO_2eq (0-30cm)	CO_2eq (0-5cm)
		ton/ha	
Cerrado	57	169,46	38,80
Mata Atlântica	23	257,73	62,23
Pampa	5	208,84	63,58
Transição Cerrado/Mata Atlântica	6	184,85	45,24
Transição Cerrado/Pantanal	4	136,57	32,64
Transição Cerrado/Caatinga	7	111,81	26,23
Total	102	1069,26	268,72



That’s all…thanks