2014 ASA MEETING

INCREASING SOYBEAN YIELD: BRAZIL'S CHALLENGES

E. Francisco, G. Câmara, L. Prochnow, V. Casarin

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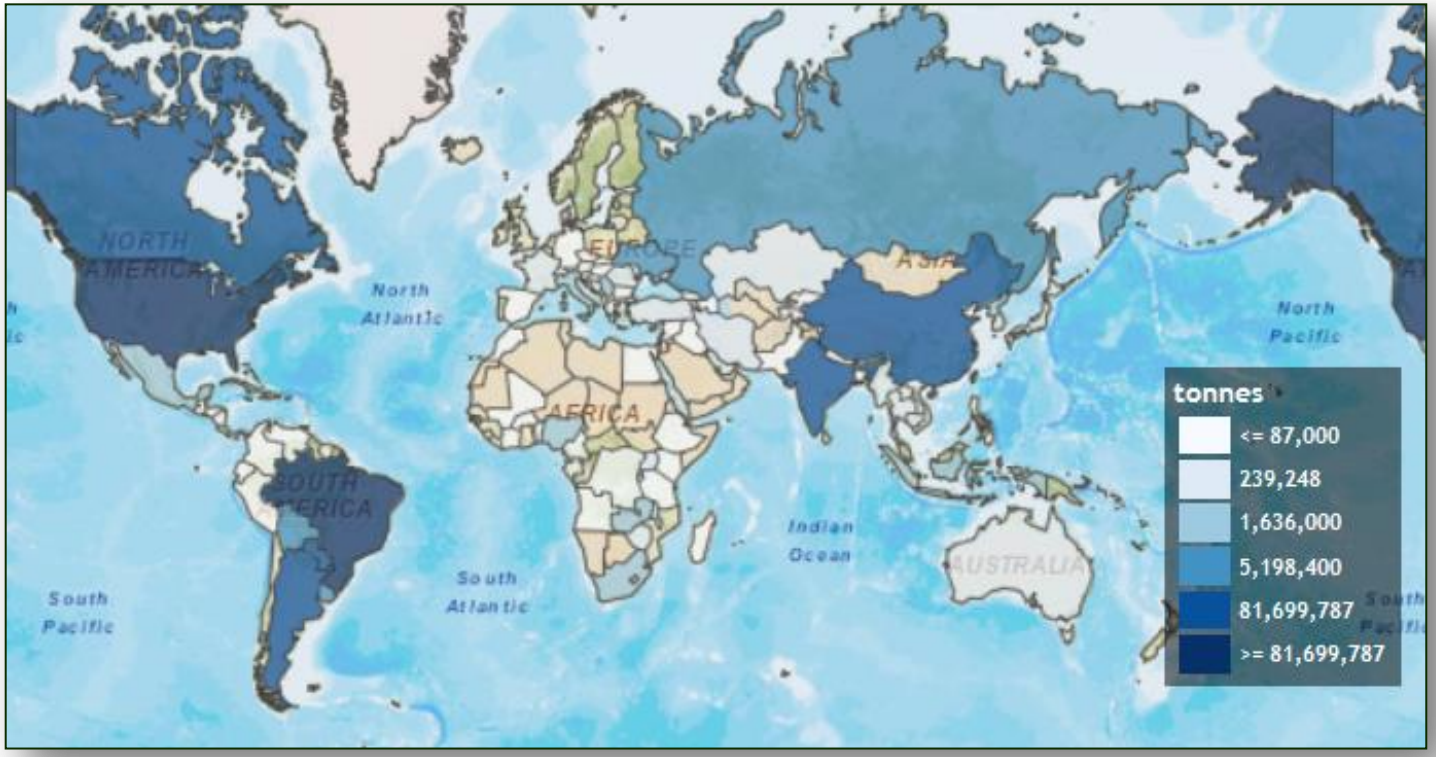
Soybean World Production in 2013



Country	Production, x10⁶ MT (%)
USA	89.5 (32)
Brazil	81.7 (29)
Argenti	49.3 (18)
World	276.4

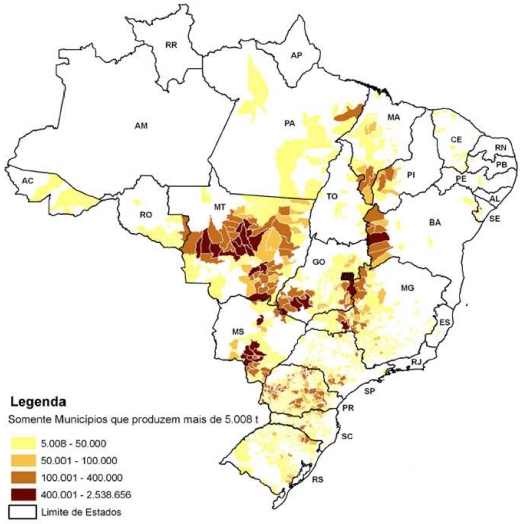
Source: FAOSTAT, 2014

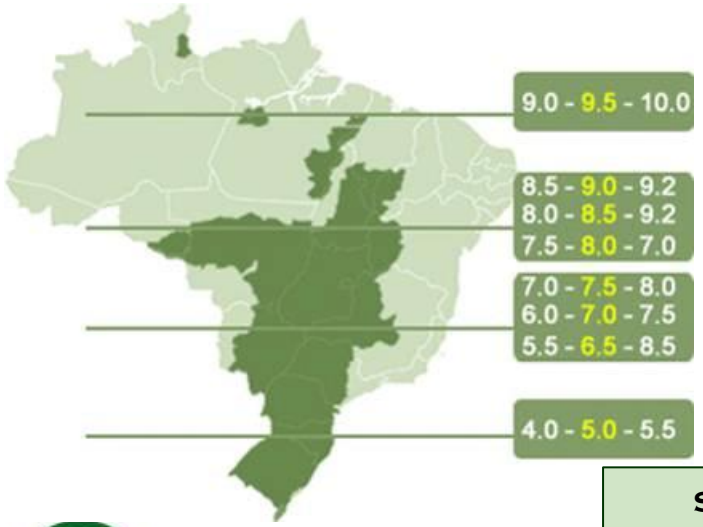
Soybean Production in Brazil

Geographic regions of Brazil

Geographic distribution of soybean

Soybean production by county





Soybean cultivated groups

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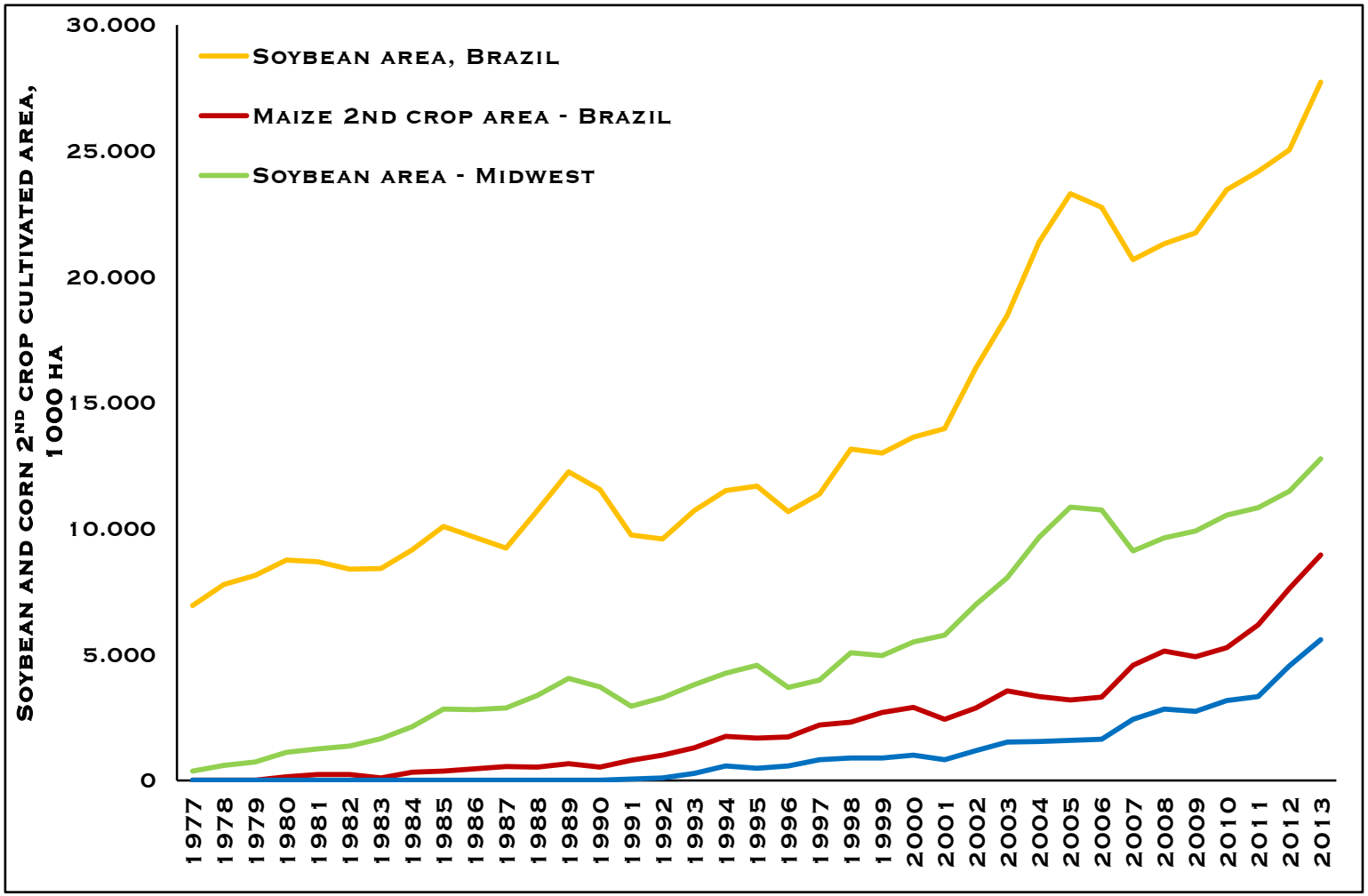
Soybean & Maize: Cropped Land in Brazil



Source: CONAB (2013)

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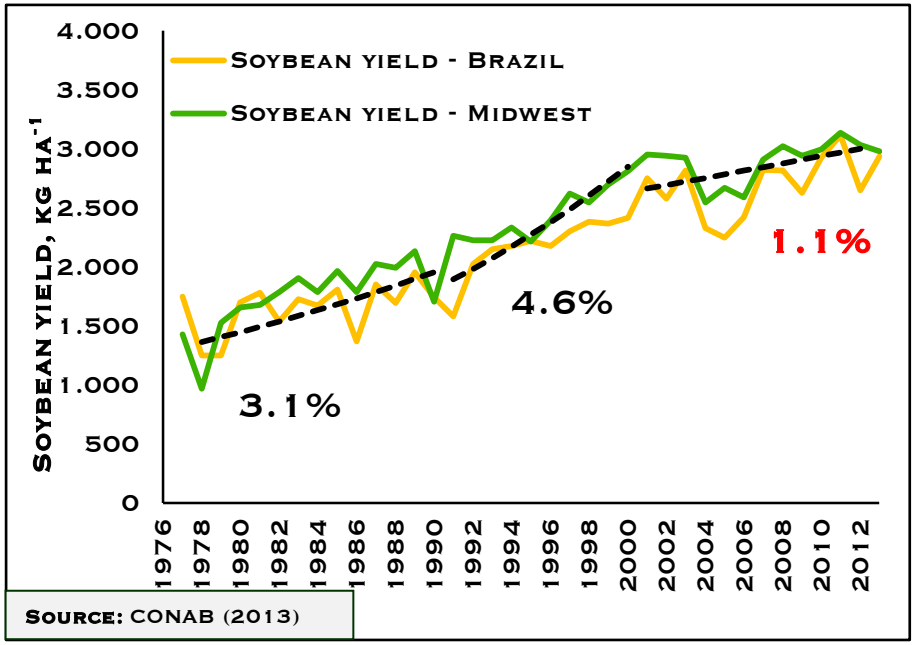
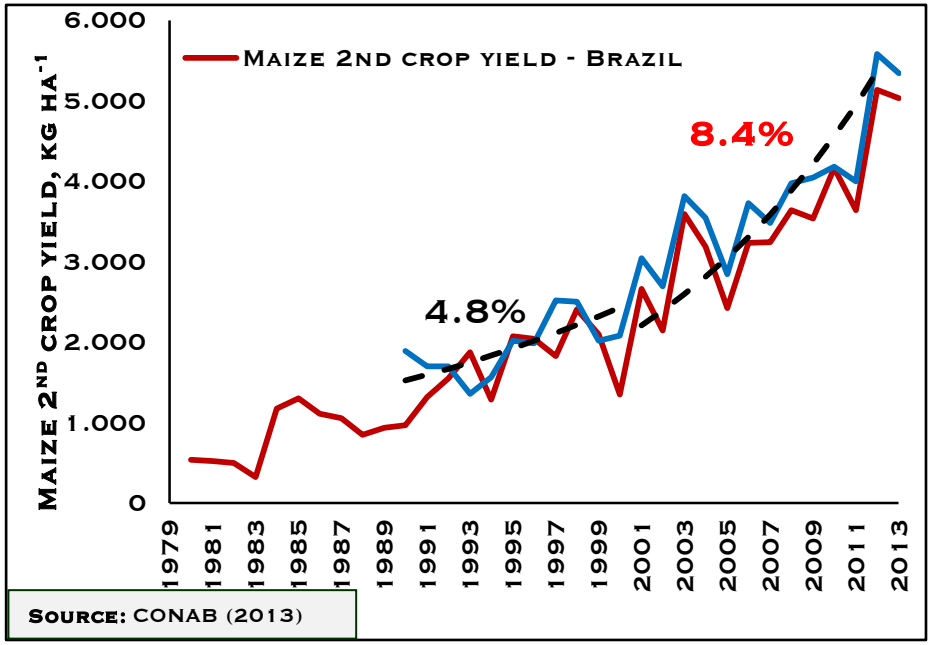
Soybean & Maize: Average Yield in Brazil



Source: CONAB (2013)



Source: CONAB (2013)

- 1980s
  - ✓ Slow advance of soybean into the Cerrado (Midwest)
  - ✓ Beginning of no-tillage adoption
- 1990s
  - ✓ Strong advance of soybean into the Cerrado (Midwest)
  - ✓ New/adapted cultivars: low latitudes, resistant to stem canker and cyst nematode
- 2000s
  - ✓ Introduction of Asian Rust
  - ✓ Soil compaction in old no-tillage
  - ✓ High population of nematodes (pratylenchus)

- 1990s
  - ✓ Slow advance as 2nd crop following soybean in the Cerrado (Midwest)
- 2000s
  - ✓ Strong advance as 2nd crop following soybean in the Cerrado (Midwest) with new/adapted hybrids including traits (Bt resistance) and high yield potential

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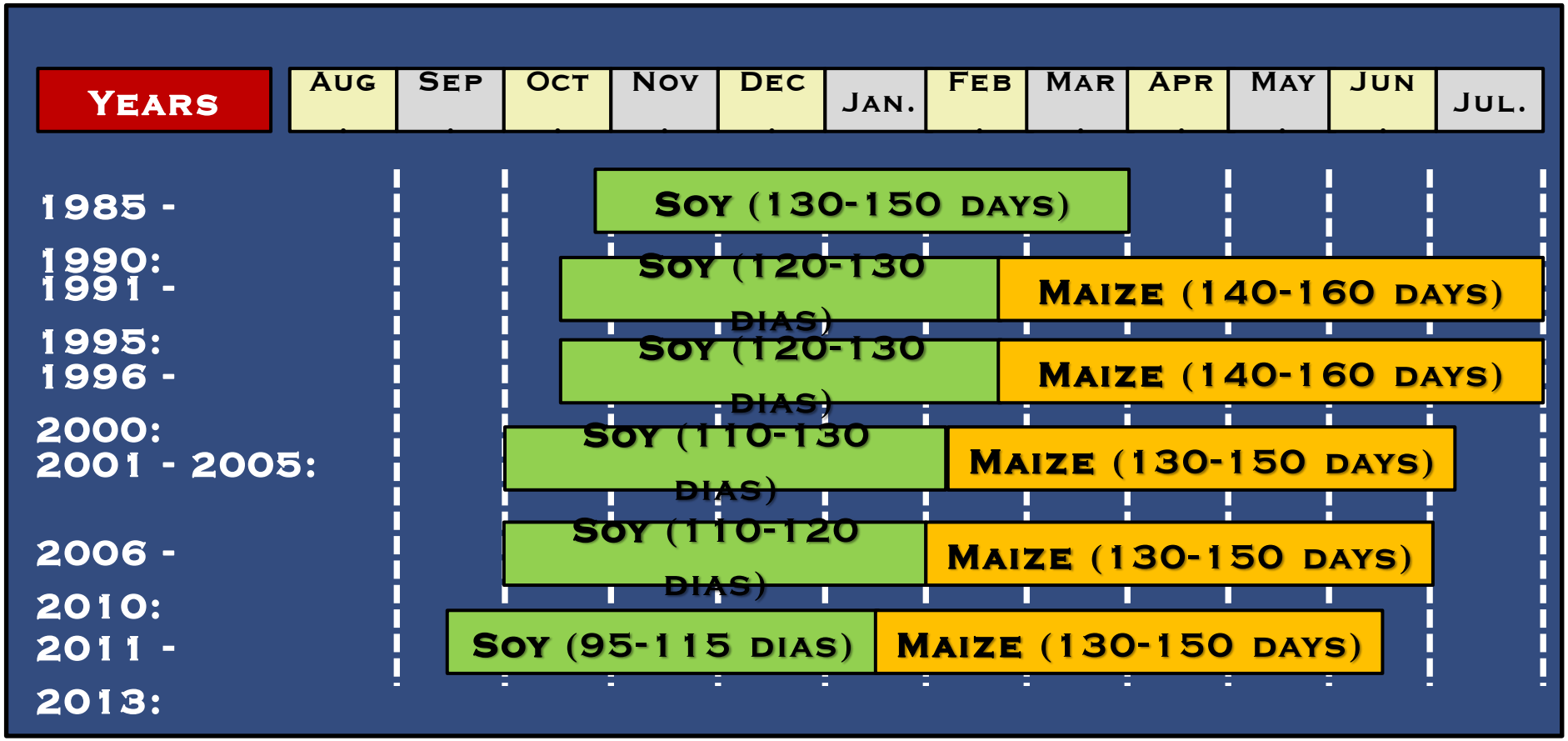
Agronomic Challenges for High Yielding Soybean Systems

1. Early Seeding and Short Maturity Cultivars



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Agronomic Challenges for High Yielding Soybean Systems

2. Biological N Fixation

Soil temperature in response to soil management and depth (Tukey, p>0.05).

Soil management	Depth (cm)									
	0		2		4		6		8	
No-till system	41.0	A	34.2	a	32.9	A	32.5	A	32.1	A
Conventional	60.		45.		42.	B	41.2	B	40.0	B

Source: Research Foundation MT, 2012 (unpublished data)

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Agronomic Challenges for High Yielding Soybean Systems

3. Broadcast P Application

Soil chemical parameters† of a soybean field under no-till system in different profile depth

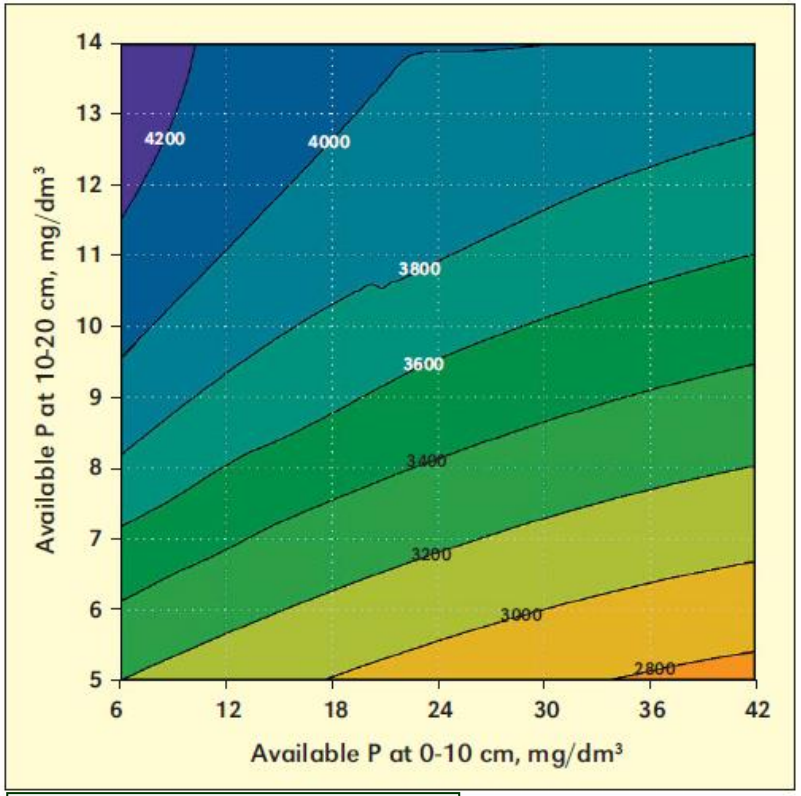
† Clay content: 340 g/kg

‡ P and K extracted by Mehlich 1; Ca, Mg and Al extracted by KCl 1 mol/L

Depth (cm)	pH	Nutrient levels‡					CEC	BS
	CaCl2	P	K	Ca	Mg	Al		
		mg dm^{-3}		cmol$_c$ dm^{-3}				%
0-5	5.4	34	48	2.7	0.0	0.0	6.5	56
5-10	4.6	14	31	1.4	0.3	0.3	5.9	34
10-15	4.4	6	20	0.9	0.4	0.5	5.1	25
15-20	4.2	2	13	0.2	0.6	0.6	4.2	15

Source: Research Foundation MT, 2010 (unpublished data)

Soybean yield in response to available P (Mehlich 1) in the 0 to 10 cm and 10 to 20 cm soil layers



Source: Oliveira Jr. and Castro (2013)

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Agronomic Challenges for High Yielding Soybean Systems

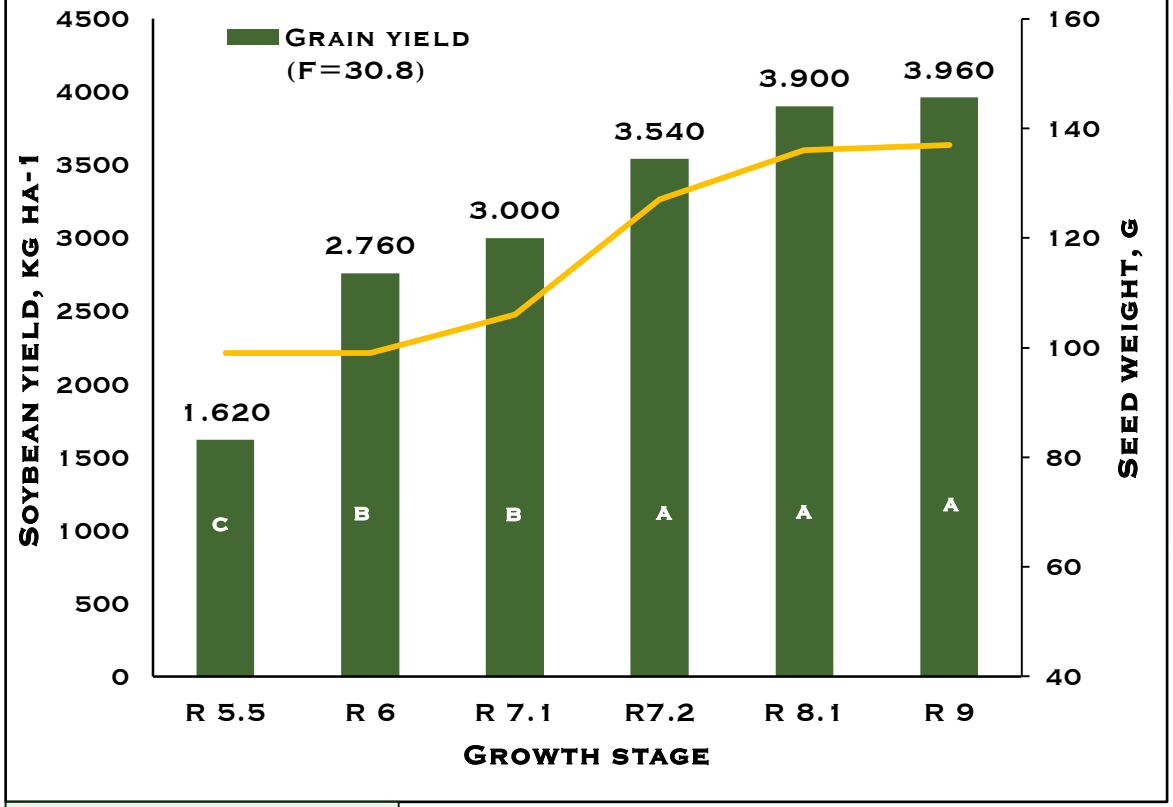
4. Soybean on Sandy Soils

- ✓ Although sandy soils (<15% clay) in Brazil are not recommended for annual cropping, expansion of cultivated land made farming these soils an important reality
- ✓ Most limiting nutrients are NKBS
- ✓ With no crop residue, high temperatures have great consequences for BNF

Agronomic Challenges for High Yielding Soybean Systems

5. Early Desiccation for an Early Harvest

Soybean yield and seed weight in response to early desiccation



Source: Kappes et al. (2012)

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General Comments

- ✓ High soybean yields (4,000 kg/ha) in Brazil are common in regions where the agronomic practices are used correctly.
- ✓ Ecological intensification ot the cropping system represents a huge advantage for regions where two or more crops can be grown in a season, but it is highly dependent on a fast operational system to crop vast areas in a short time.


Thanks for your attention!
IPNI
International Plant Nutrition Institute
Website:
http://brasil.ipni.net
efrancisco@ipni.net
Phone:
+55 (19) 3433-3254
dirceugassen.com