16º Encontro Nacional de Plantio Direto na Palha

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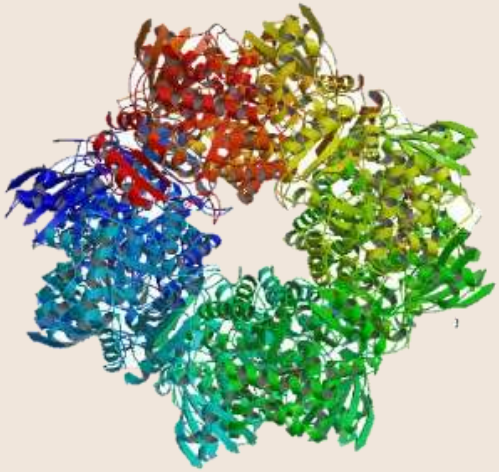
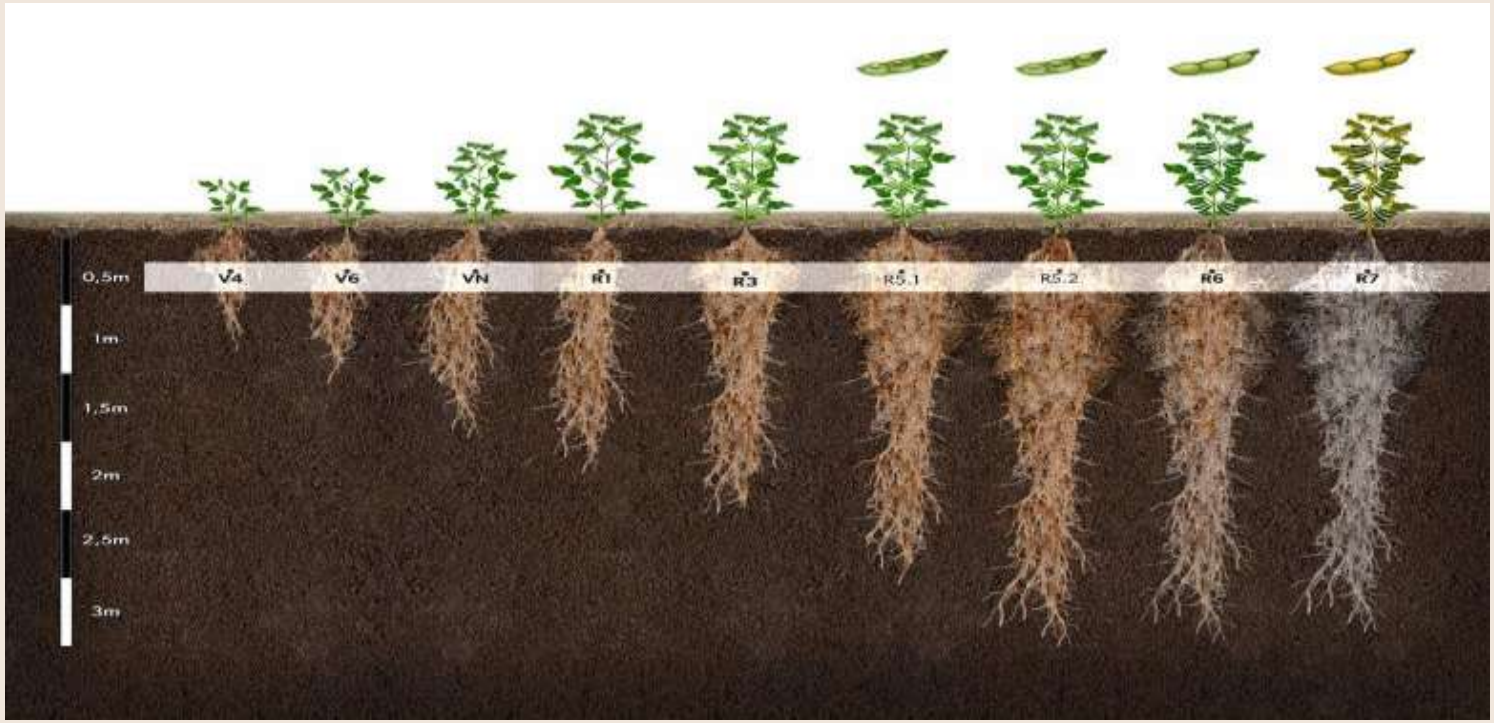
Efeito das raízes na produtividade



MSc. João Dantas

Capacidade de enraizamento da cultura da soja



Dantas & Sako 2017

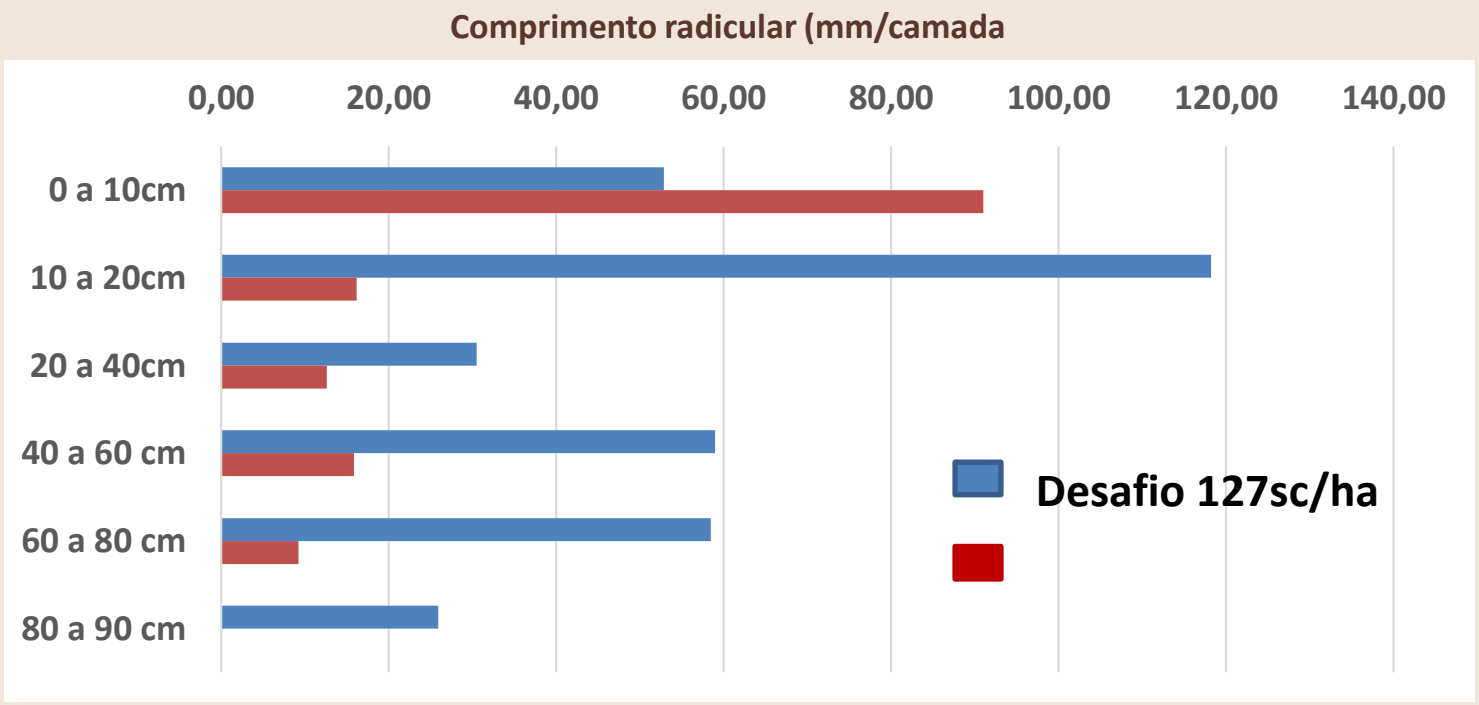
Capacidade de enraizamento da cultura da soja

Dantas & Pontieri 2016

Capacidade de enraizamento da cultura da soja

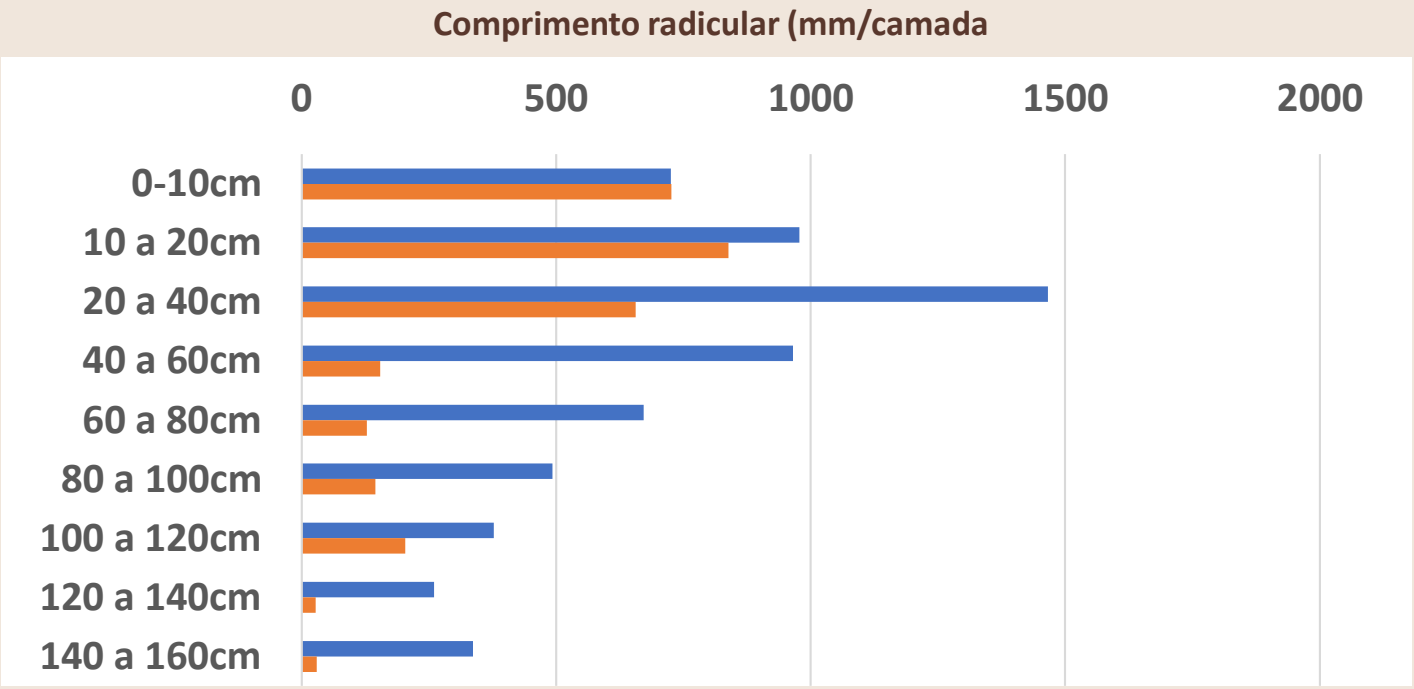
Dantas & Sako 2016

Campeão CESB 2015 Cerrado



Fonte: Cesb & Sako 2015

Campeão CESB 2015 Sudeste



Fonte: Cesb; Dantas & Sako 2015

Capão Bonito - SP Cesb 2015

Fonte: Elizana Baldissera

Formação da biomassa da planta

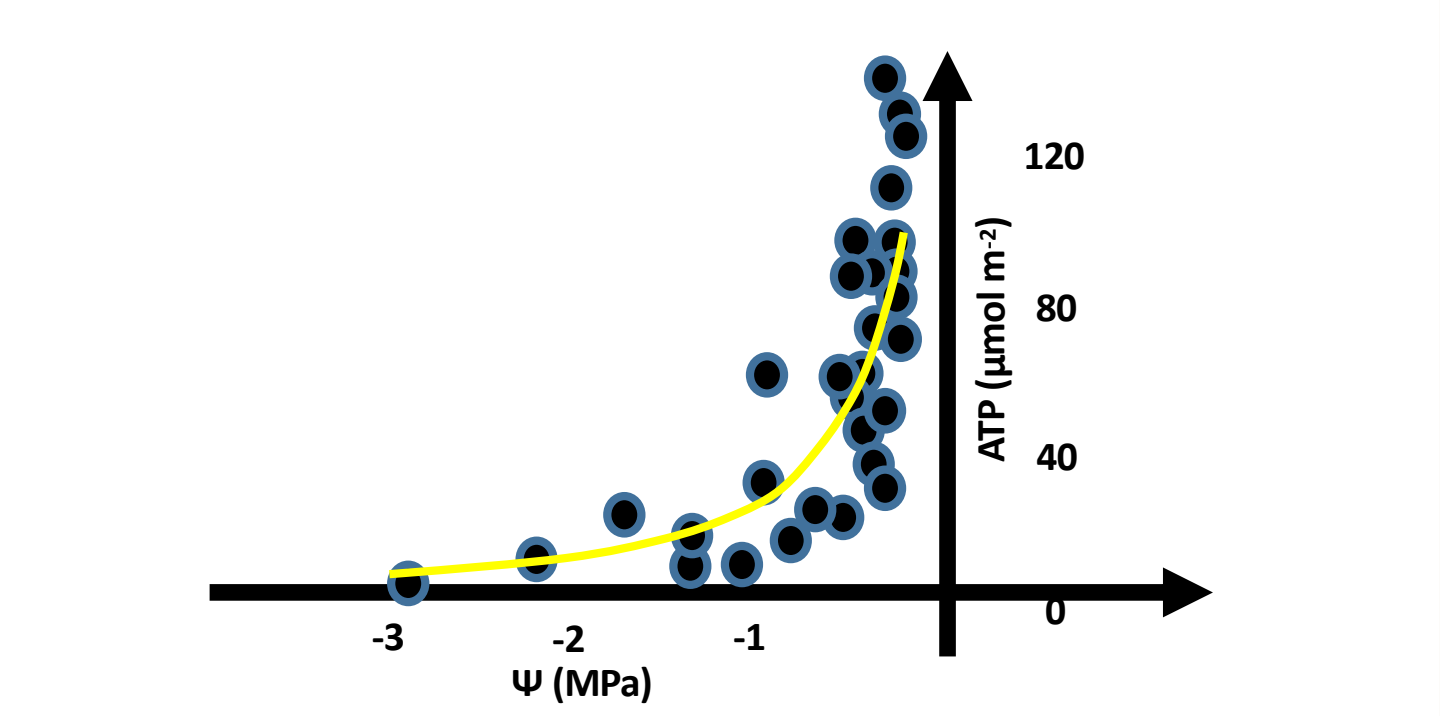
TABLE 5.1
Adequate tissue levels of elements that may be required by plants

Element	Chemical symbol	Concentration in dry matter (% or ppm)[a]	Relative number of atoms with respect to molybdenum
Obtained from water or carbon dioxide			
Hydrogen	H	6	60,000,000
Carbon	C	45	40,000,000
Oxygen	O	45	30,000,000
Obtained from the soil			
Macronutrients			
Nitrogen	N	1.5	1,000,000
Potassium	K	1.0	250,000
Calcium	Ca	0.5	125,000
Magnesium	Mg	0.2	80,000
Phosphorus	P	0.2	60,000
Sulfur	S	0.1	30,000
Silicon	Si	0.1	30,000
Micronutrients			
Chlorine	Cl	100	3,000
Iron	Fe	100	2,000
Boron	B	20	2,000
Manganese	Mn	50	1,000
Sodium	Na	10	400
Zinc	Zn	20	300
Copper	Cu	6	100
Nickel	Ni	0.1	2
Molybdenum	Mo	0.1	1

Source: Epstein 1972, 1999.
[a] The values for the nonmineral elements (H, C, O) and the macronutrients are percentages. The values for micronutrients are expressed in parts per million.

Taiz e Zaiger 2008

Raiz e Fotossíntese



Tezara, Mitchell, Driscoll, Lawlor. Water stress inhibits plant photosynthesis by decreasing coupling fator and ATP. Nature. Vol

Tipos de Estresse

1) Distress térmico
2) Distress luminoso
3) Distress hídrico
4) Anaerobiose
5) Distress alumínio e metais pesados
6) Distress sais

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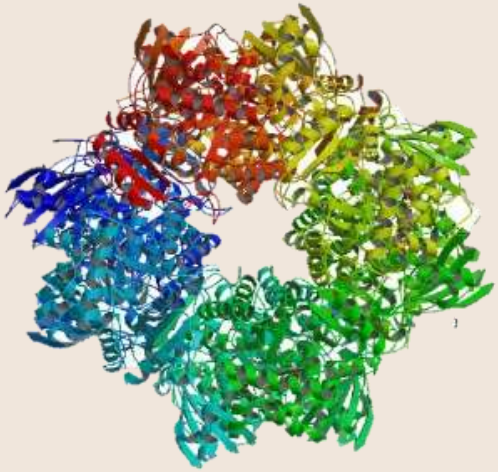
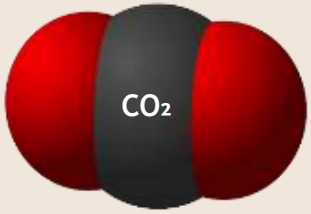
Ribulose-1,5-bisfosfato Carboxilase/Oxigenase
RuBisCO, o pilar que sustenta a vida

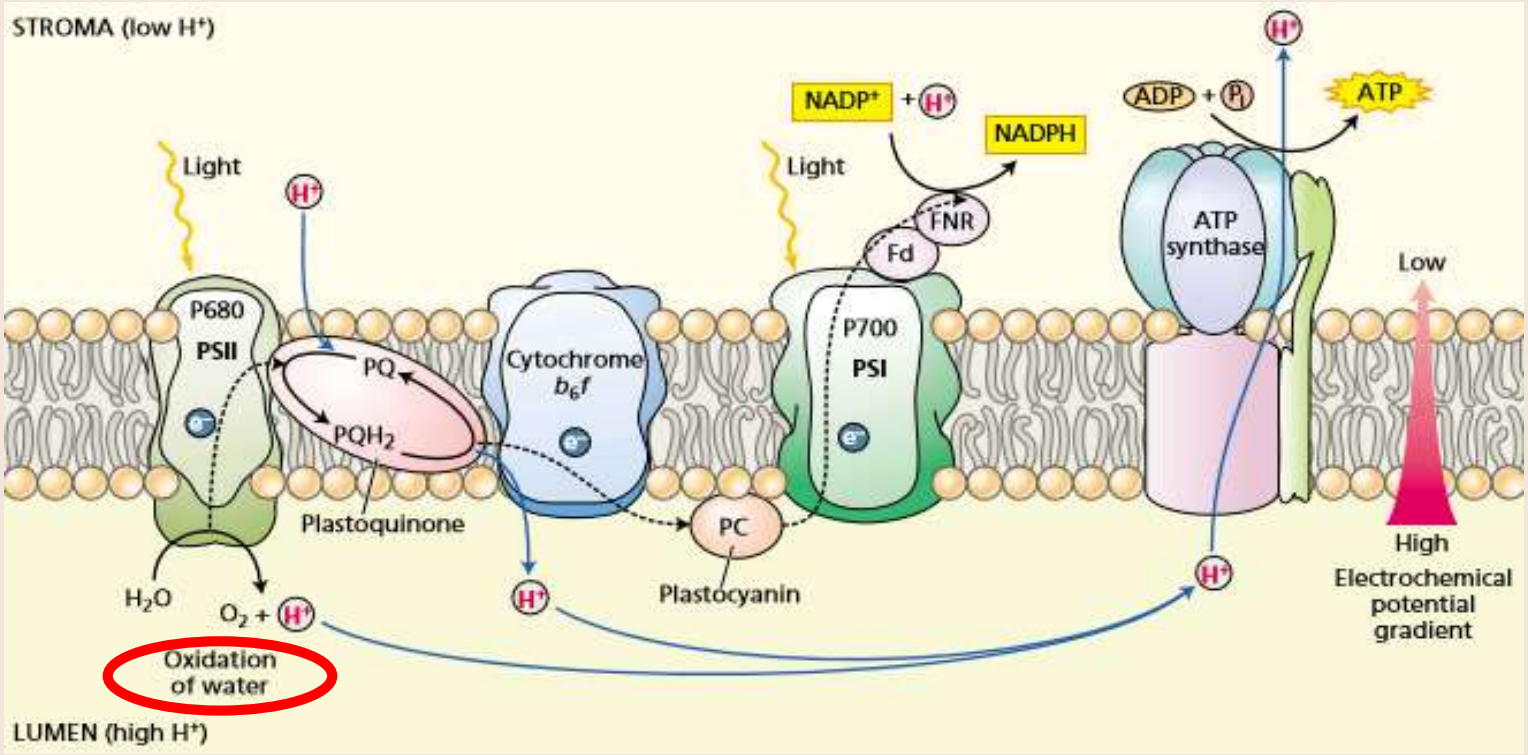
- Proteína mais importante e abundante no mundo.
- 50% da proteína solúvel das plantas C3 (20-30% do N total)
- 30% da proteína solúvel das plantas C4 (5-9% do N total)
- Lenta e pouco seletiva aos substratos
- Mecanismo de dissipação de energia do aparato fotossintético





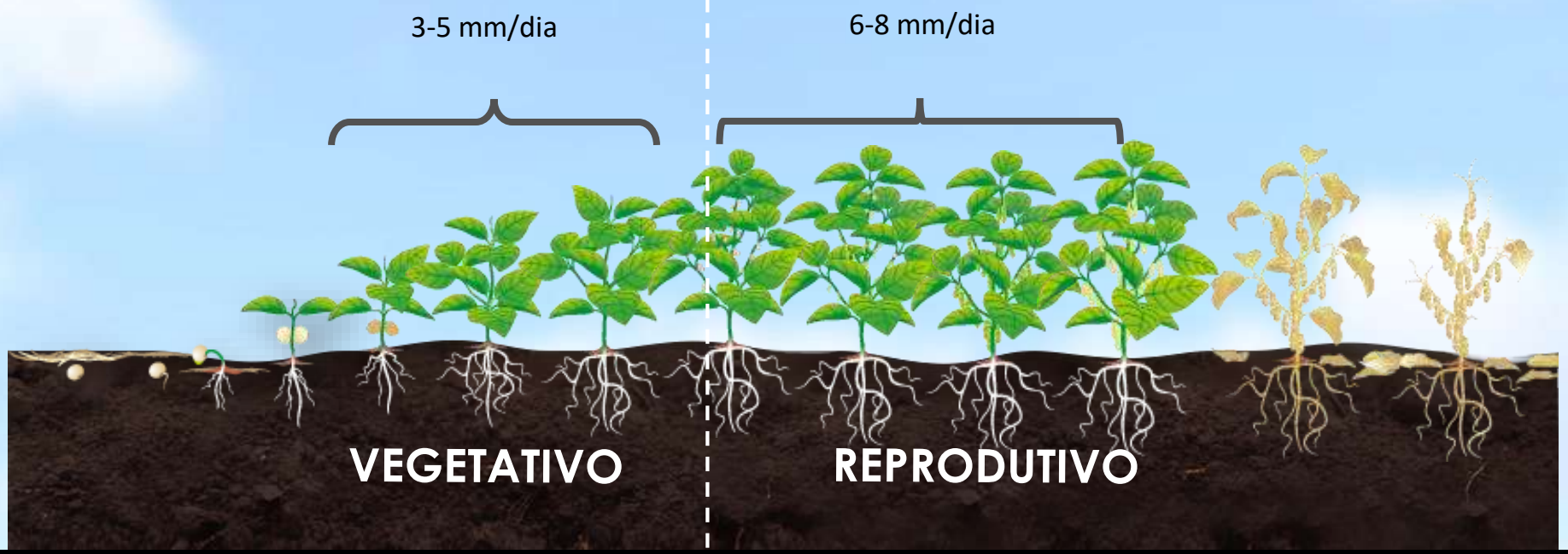
Fonte: Martins,O

Porque a água é importante?



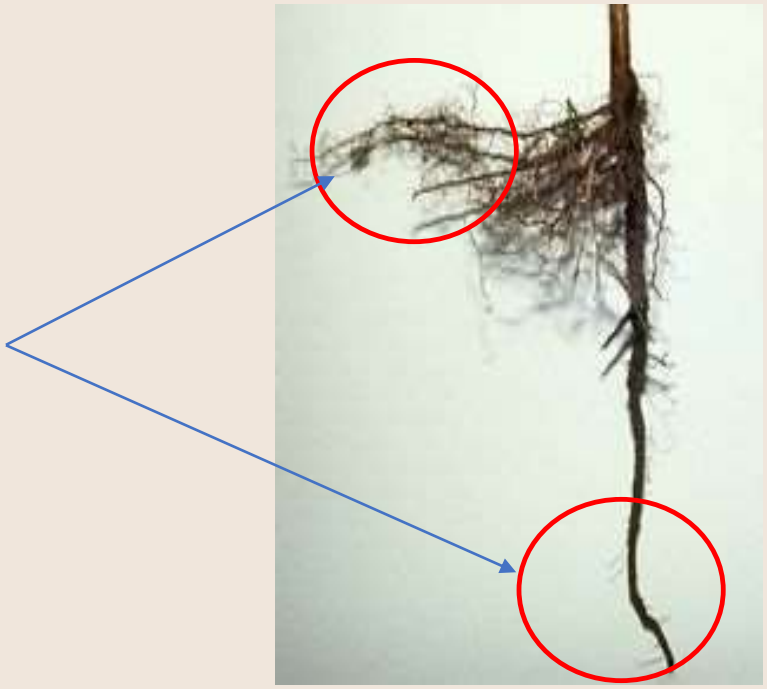
Taiz e Zaiger 2008

Evapotranspiração x Fenologia



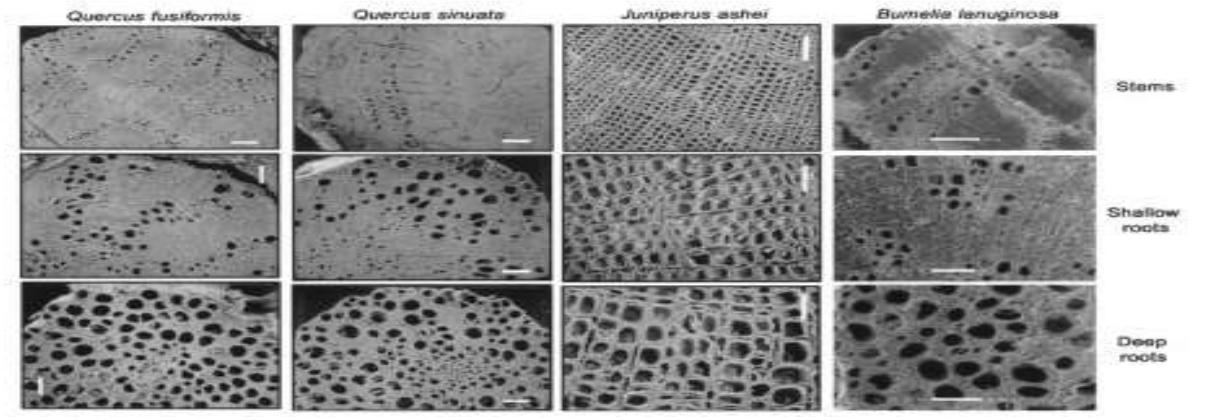
Classificação radicular

As raízes superficiais tem a mesma função do que as mais profundas?



Dantas 2017

Modificação da raiz no perfil



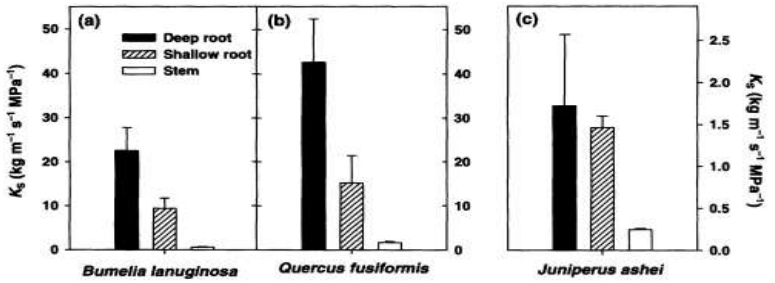
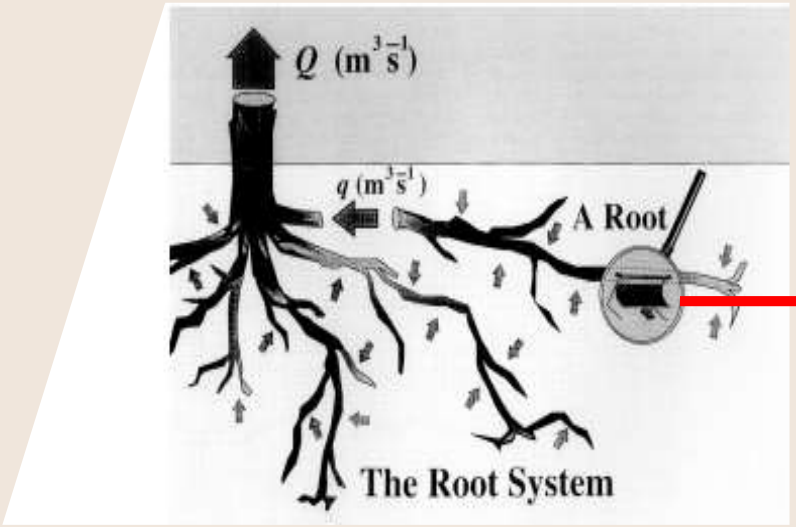
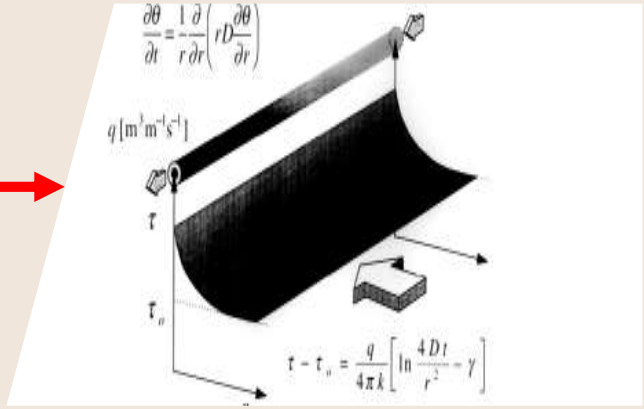


Fig. 4 Specific hydraulic conductivity measured on deep roots, shallow roots and stems for *Bumelia lanuginosa* (a), *Quercus fusiformis* (b) and *Juniperus ashei* (c). Note the *y*-axis scaling change for *J. ashei*. Measurements were made using the Sperry technique (Sperry *et al.*, 1988). Data are mean ± SE. ANOVA results: species effect, $F = 5.58$, $P < 0.0079$; xylem sampling position effect, $F = 9.90$, $P < 0.0004$; species × segment, $F = 2.19$, $P = 0.090$.

McElrone at al.(2004) New Phytologist

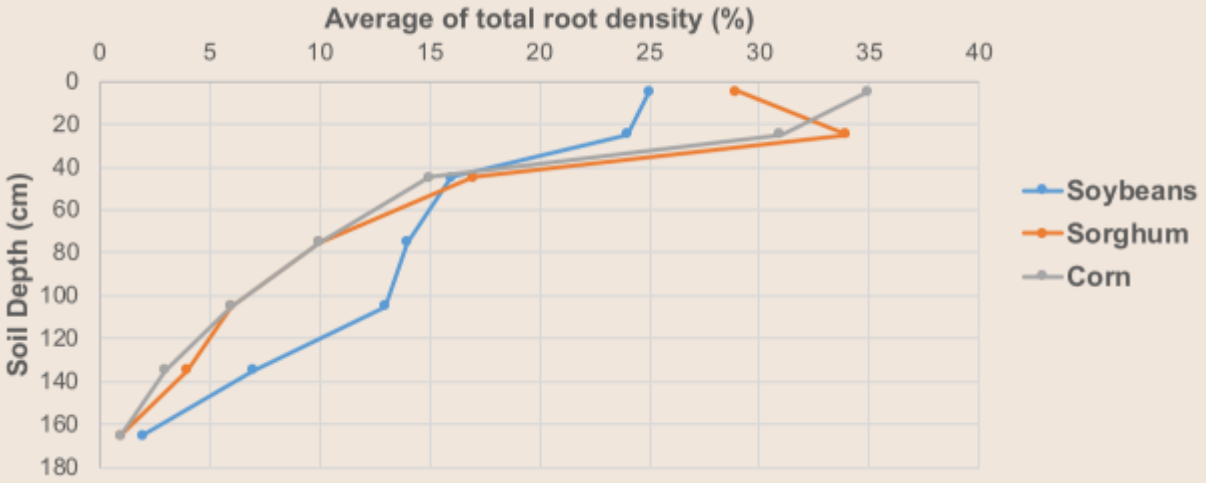
Equação de Gardner 1960





$$\tau - \tau_o = (q/4\pi k)[ln(4Dt/a^2) - \gamma],$$

Distribuição das raízes e absorção de água



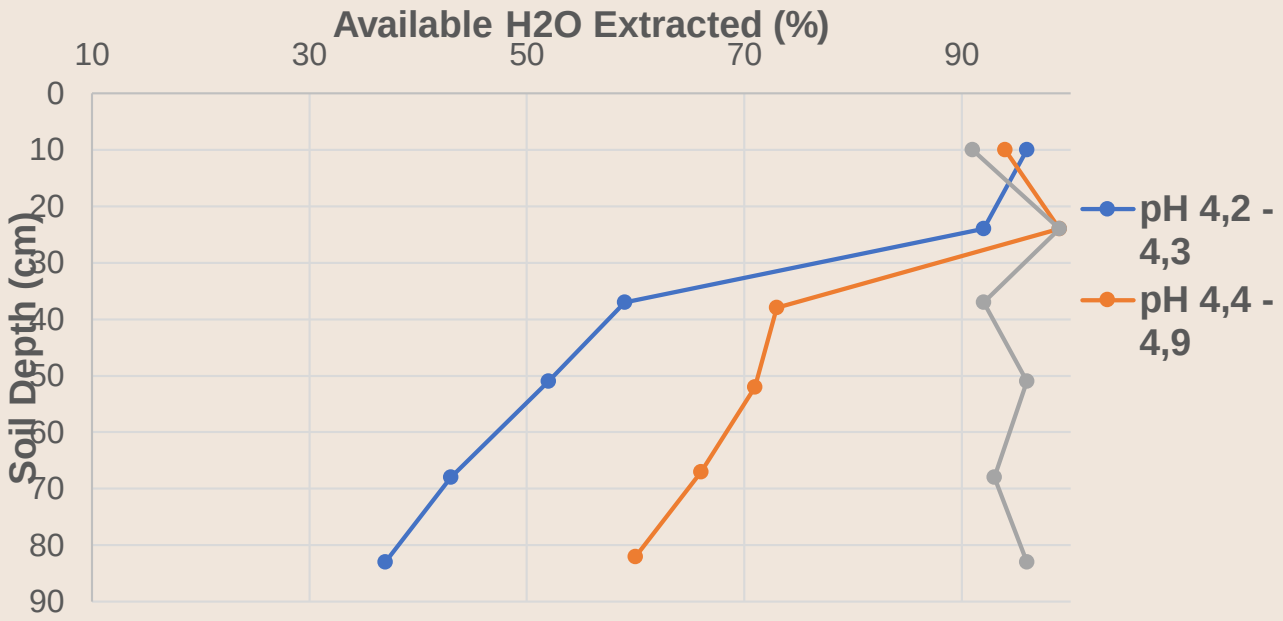
Adaptado de Highes 1980

Distribuição das raízes e absorção de água

Soil Depth (cm)	Depth of water used (mm)			Soil matric potential (bars)			Root density distribuition (cm/cm³)		
	Soybeans	Sorghum	Corn	Soybeans	Sorghum	Corn	Soybeans	Sorghum	Corn
0-15	2.02	2,17	0,99	10,17	10,78	6,2	0,40	1,28	0,96
15-30	0,61	0,87	3,32	10,94	6,34	6,08	0,59	0,56	0,70
30-60	2,62	1,01	0,60	26,00	19,94	16,66	0,30	0,49	0,37
60-90	3,12	1,68	5,30	4,28	2,92	4,30	0,28	0,21	0,25
90-120	1,54	4,45	3,49	8,94	6,87	5,12	0,25	0,11	0,29
120-150	4,36	0,36	-0,63	7,30	4,43	3,08	0,30	0,05	0,06
150-180	-0,38	0,50	0,31	1,99	2,03	2,64	0,18	0,01	0,02
180-210	0,00	0,12	0,12	2,13	2,34	2,20	-	-	-
210-240	0,40	0,32	0,52	1,76	1,60	1,58	-	-	-

Adaptado de Highes 1980

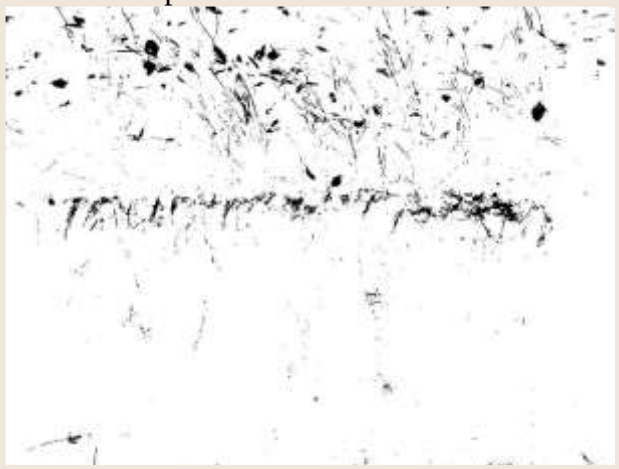
Effect of Subsoil pH on amount of available water extracted by cotton



Adaptado de Adams *et al, 1967*.

Raiz, água e compactação

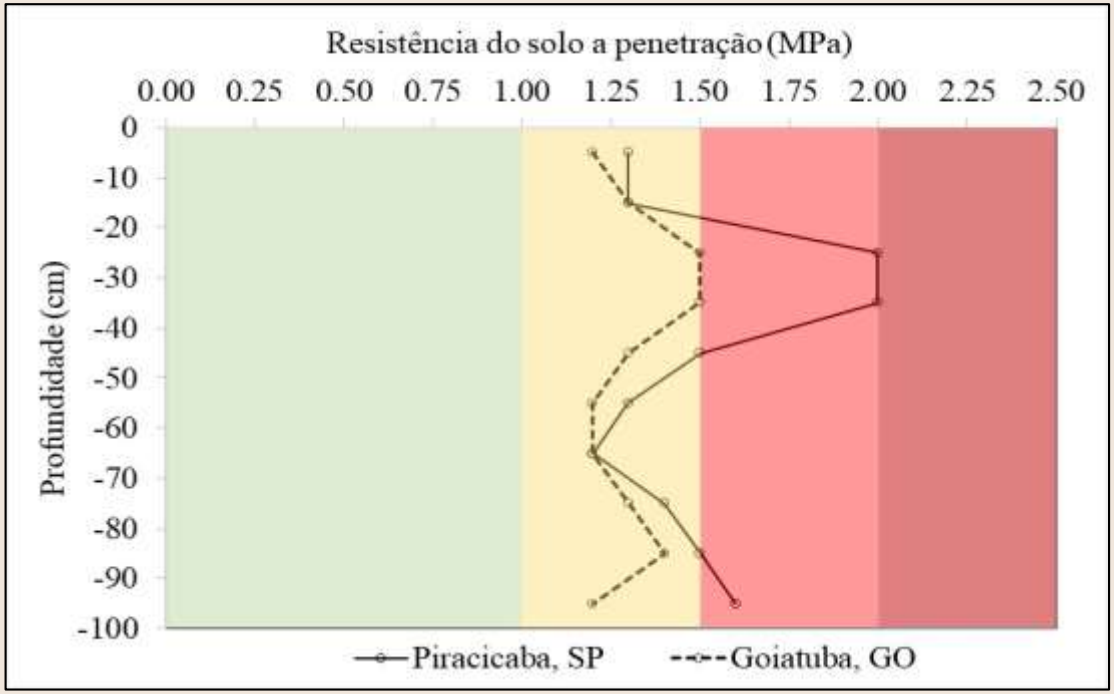
(a) Piracicaba, SP;
Comprimento radicular = 667 cm;
Área superficial = 43 cm²



(b) Goiatuba, GO;
Comprimento radicular = 1836 cm;
Área superficial = 124 cm²

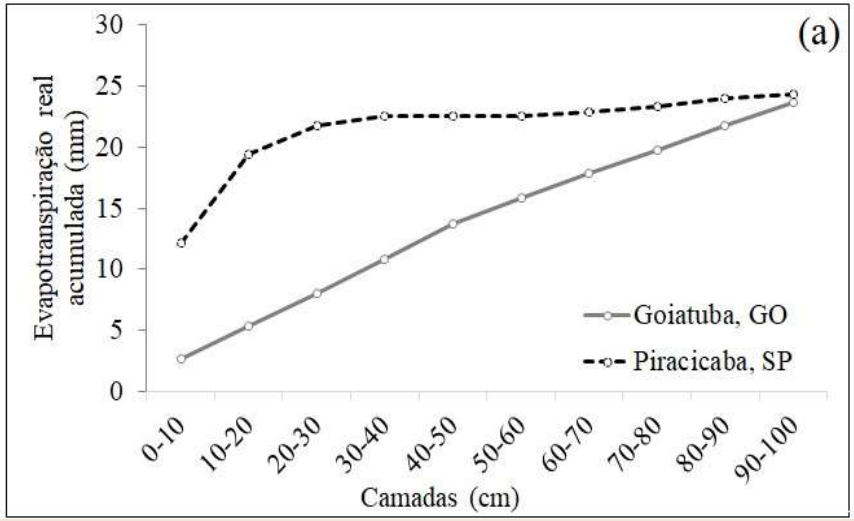
Fonte: Dantas & Dourado 2017

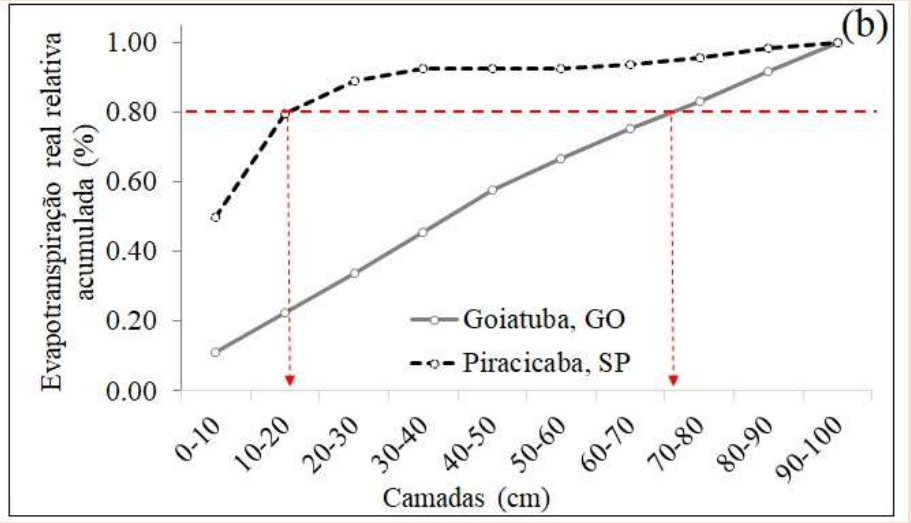
Raiz, água e compactação



Fonte: Dantas & Dourado 2017

Absorção de água no perfil

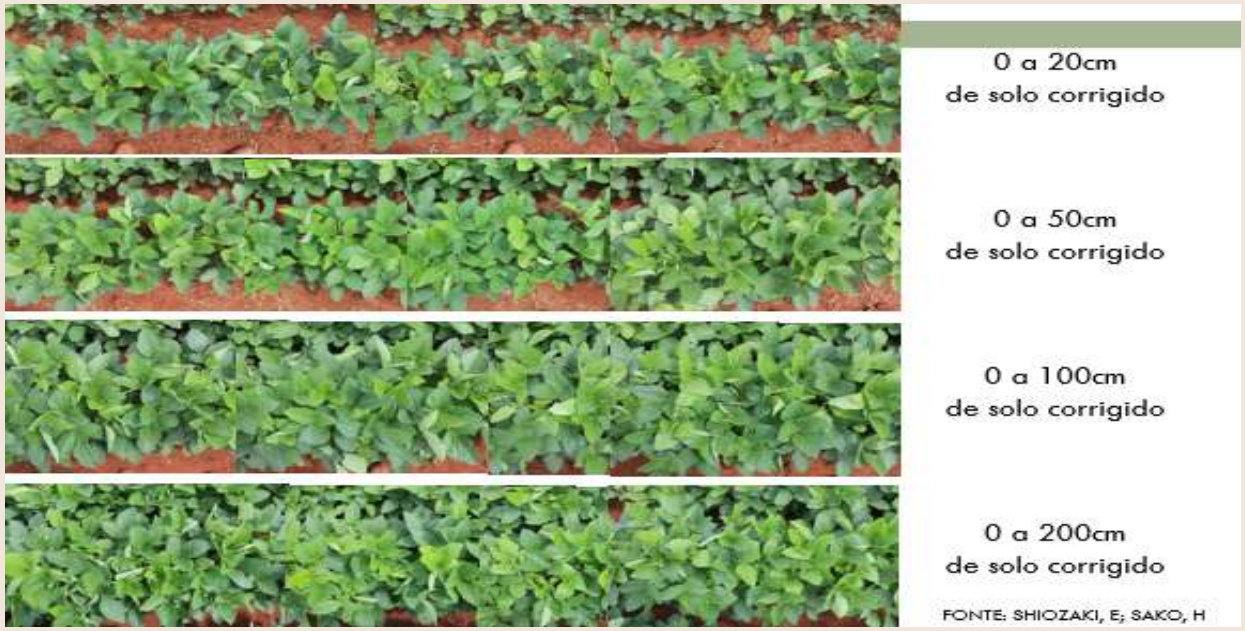




Evapotranspiração real (a) e relativa (b) acumulada por camada a partir da superfície entre os dias 0 e 3 para Piracicaba, SP (a), e em Goiatuba, GO (b).

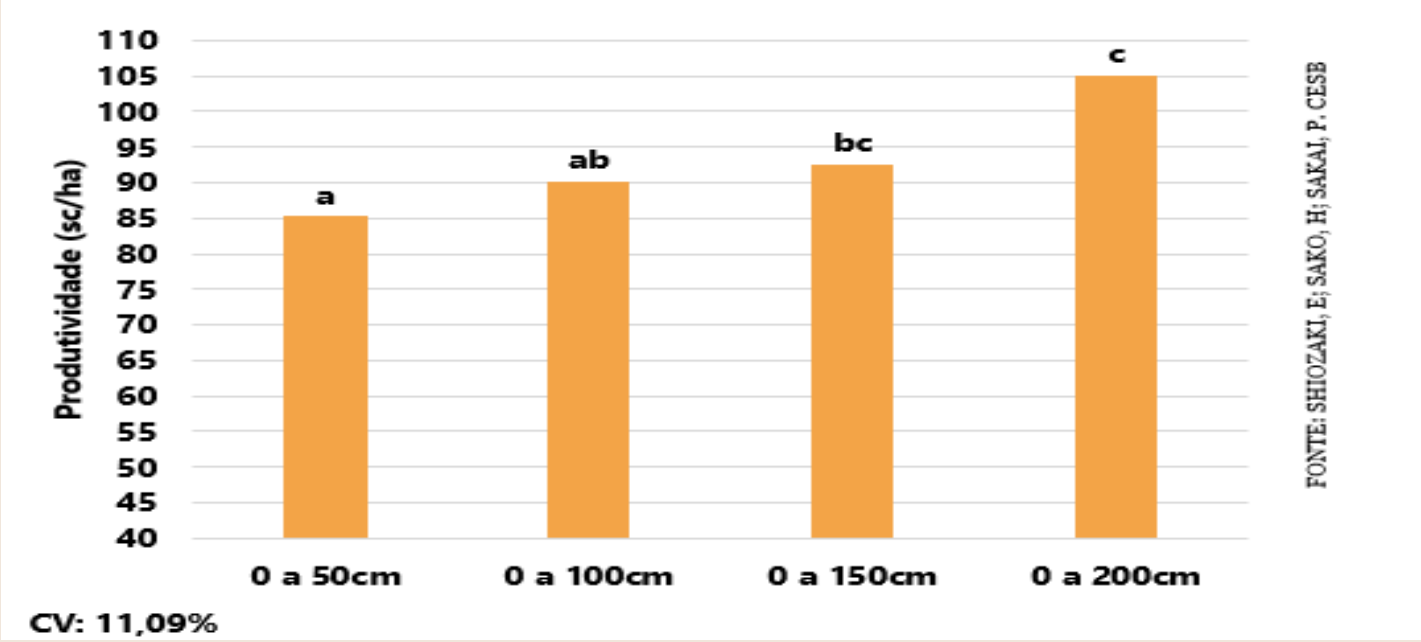
Fonte: Dantas & Dourado 2017

Raiz & produtividade



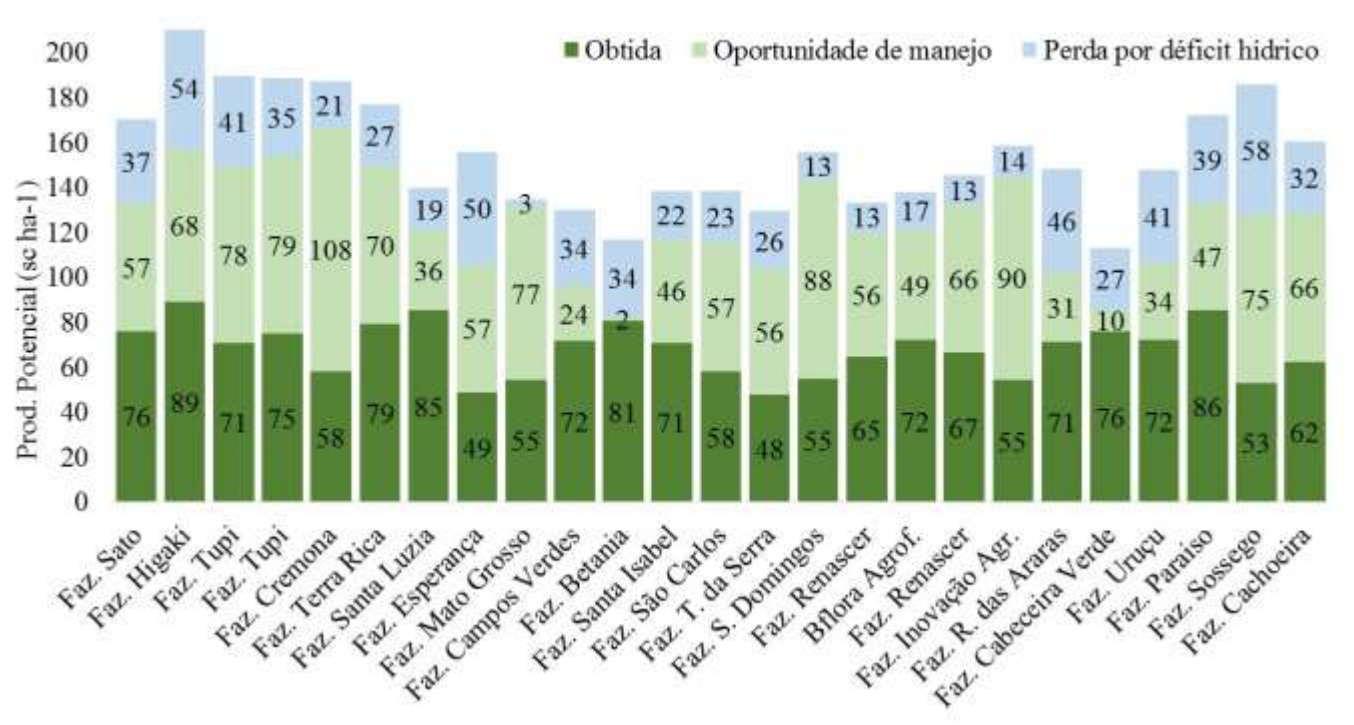
Fonte: Shiozaki,E;Sako,H

Raiz & produtividade



Fonte: Shiozaki,E;Sako,H

Potencial de produção



Fonte: Rafael Battisti

16º Encontro Nacional de Plantio Direto na Palha

Obrigado pela atenção

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