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Sustainable intensification: A case study based on a farm in Lucas do Rio Verde, Mato Grosso, Brazil

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2017 ASA MEETING



Brazil: the country



- ✓ Pretty much a tropical country.
- ✓ Pretty large country: 5th in extension in the world.
- ✓ 47% of South America.

Brazil: Potential for Agribusiness

SOIL

- ✓ 100 M ha of new land
- ✓ 170 M ha of pasture land



CLIMA

- ✓ Gener. > 1.200 mm rain/year.
- ✓ Excelent solar radiation.



WATER

- ✓ About 25% of the available water in the world



LABOR

- ✓ Technical and operational



RESEARCH

- ✓ Basic and applied



Capuaba Farm

Lucas do Rio Verde, Mato Grosso, Brazil



Lucas do
Rio Verde

Cerrado

Monocropping in the Brazilian cerrado:

✓ Decrease in SOM

Soil	SOM			CTC		
	(g/kg)		%	(mmol/dm ³)		%
	Initial	Final		Initial	Final	
RQ	14.1	2.8	80.1	39.0	15.2	61
LVA	27.4	16.1	41.2	51.7	36.5	29

Fonte: Silva et al. (1994).

✓ Decrease in soil microorganisms (Matsuoka et al., 2002).

✓ Increase in soil compaction.



✓ Increase in nematoides and diseases.

Main cropping systems in the region for decades

SOYBEAN

MAIZE 2nd CROP

OR

SOYBEAN

COTTON 2nd CROP



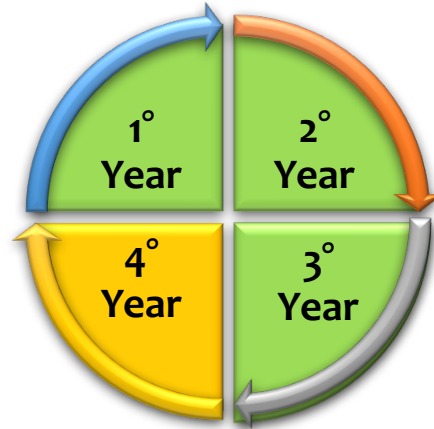
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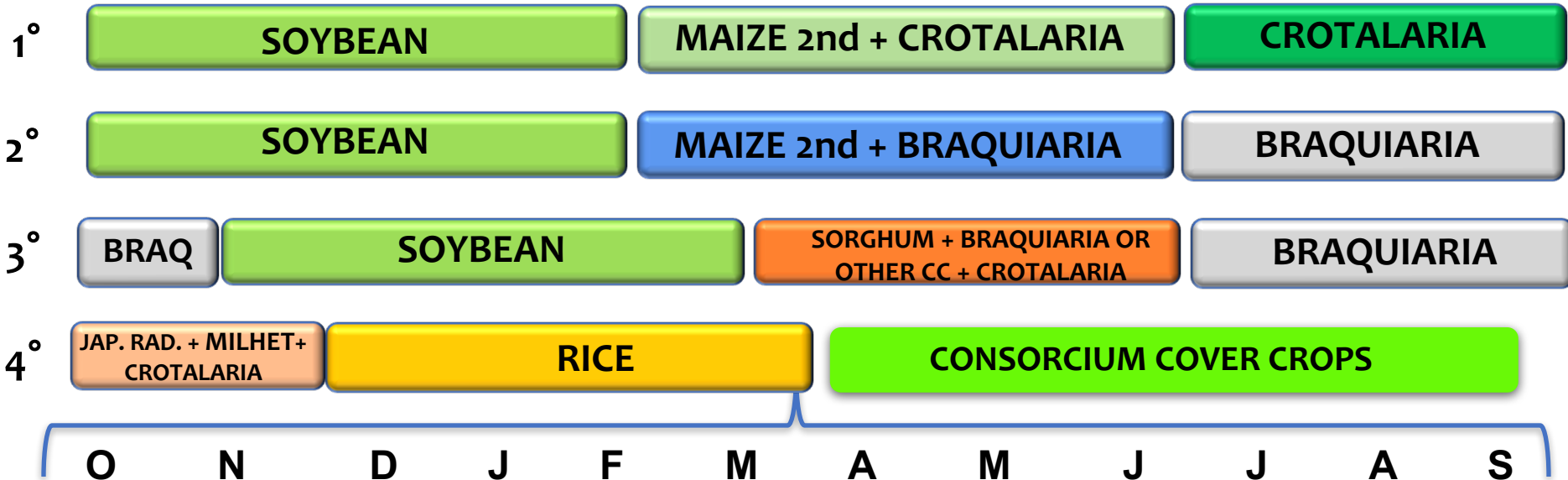
**MONOCROPPING OR DOUBLE
CROP LEAD CAPUABA FARM TO
A VERY DIFFICULT ECONOMIC
SITUATION IN THE 90's**



Sustainable intensification with several crops in rotation



Capuaba Farm



Capuaba Farm: MAIN COMMERCIAL CROPS

Legumes

Soybean
Bean (Irrigated)

Grasses

Rice
Maize (consorciated)
Sorghum (consorciated)

TREND

Consortium of crops and
crop rotation

Capuaba Farm: COVER CROPS

Legumes

**Crotalaria ochroleuca,
Crotalaria spectabilis**

Grasses

**Braquiaria ruziziensis, Sorghum, Millet,
Sudan Grass,
Finger millet (*Eleusine coracana*)**

Crucifers

Japanese Radish (*Raphanus sativus*)

Poligonacea

Mourisco Whate (*Fagopyrum esculentum*)

Asteraceae

**Sunflower (*Helianthus annus*)
Níger (*Guizotia abyssinica*)**

TREND

Consortium of 4, 5 or more crop species



Capuaba Farm

NO-TILL

Capuaba Farm: No-till rice



Capuaba Farm



MAIZE + CROTALARIA SPECTABILIS



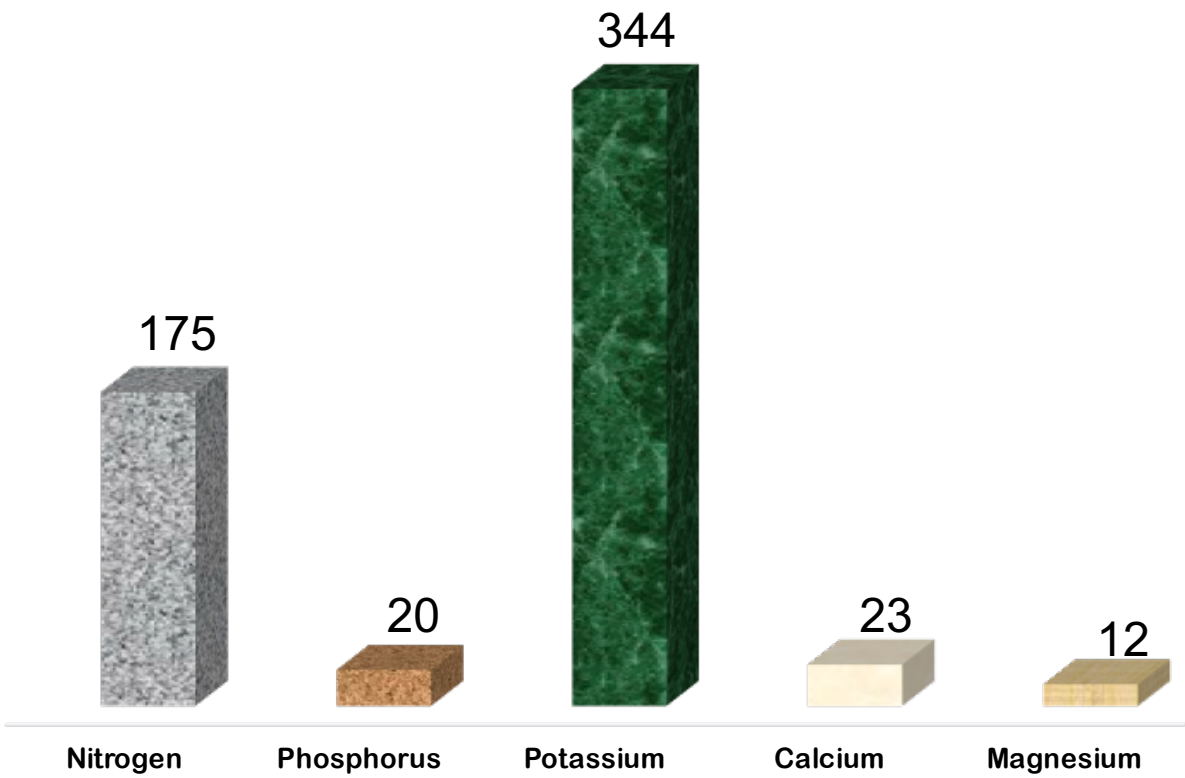
MAIZE + B. RUZIZIENSIS

Capuaba Farm

Japanese Radish (*Raphanus sativus* L.)



Nutrients cycling kg/ha

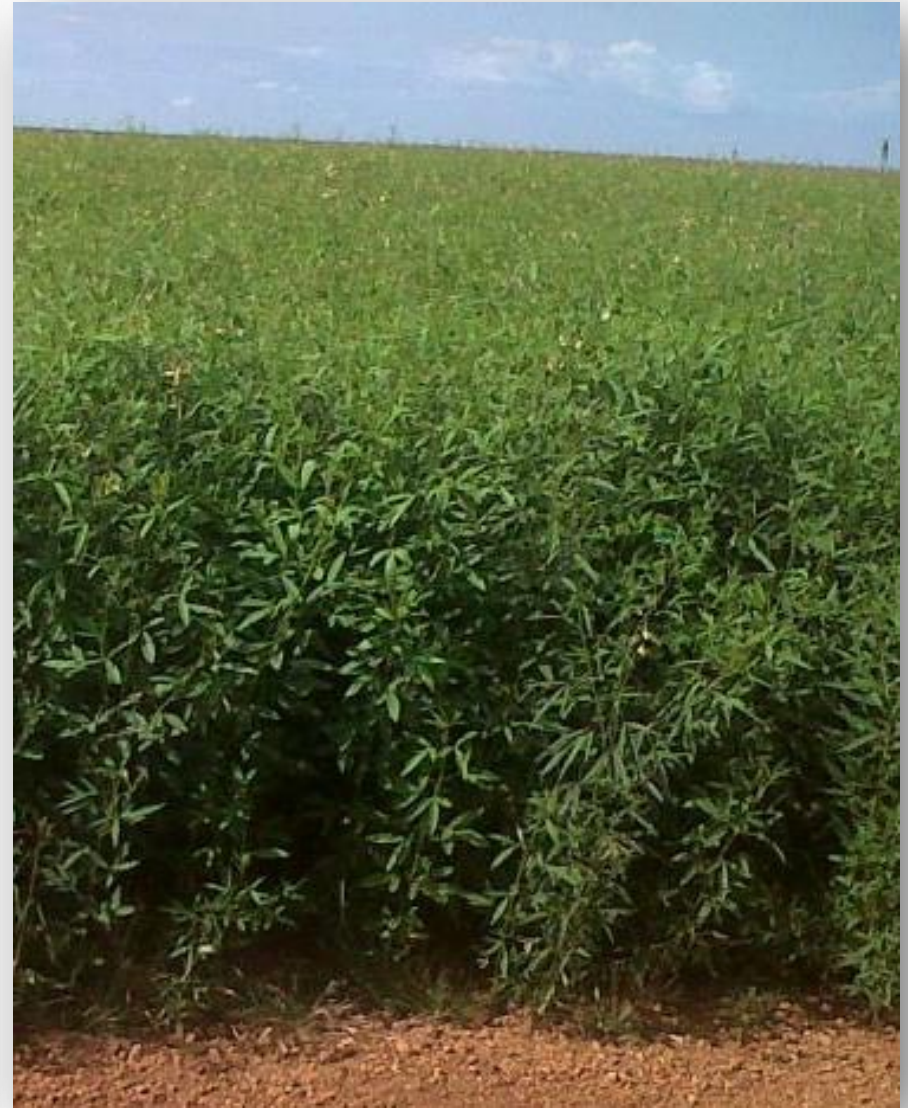


Source: Telmo Amado, UFSM.

Capuaba Farm



SUDAN GRASS
(*Sorghum sudanense*)



CROTALÁRIA
(*Crotalaria ochroleuca*)

Capuaba Farm

Consortium of cover crops

Braquiária + finger millet + sudan grass
+ crotalaria ochroleuca + j. radish



06.10.17



06.12.17



- ✓ **C. Ochroleuca**
- ✓ **C spectabilis**
- ✓ **Sunflower**
- ✓ **Milhet**
- ✓ **Turnip**

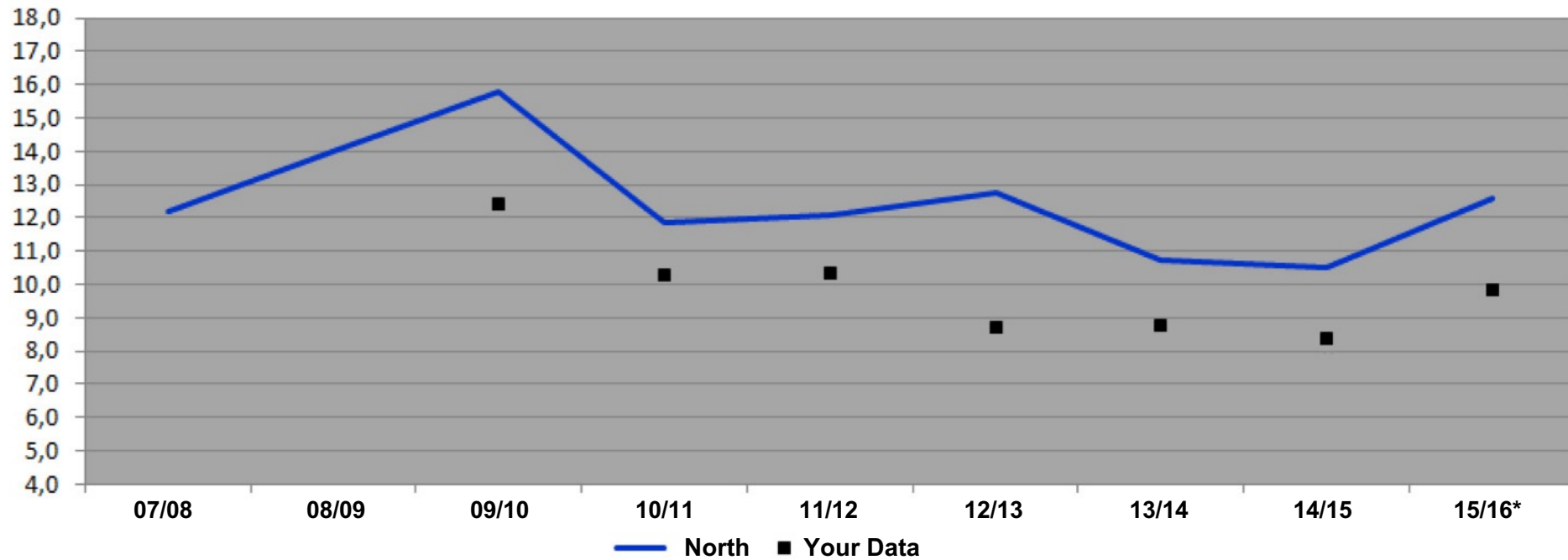
4 Different Families

OXISOL
Before and Now

Capuaba Farm



FERTILIZER COST (Bags/ha)



■ Capuaba Farm

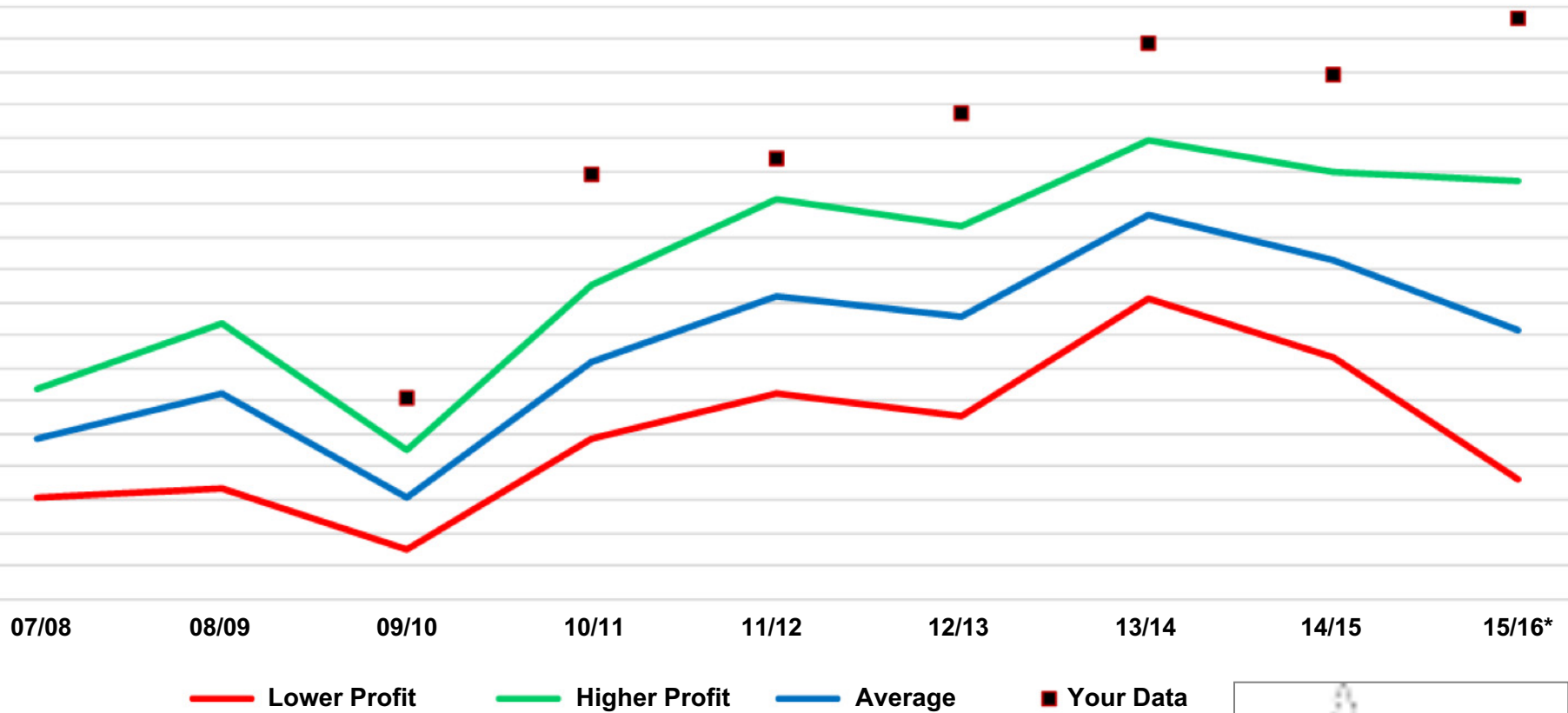
Fertilizing the cropping system

North MT
45 farms



Source: Projeto Referência / Aprosoja MT

PROFIT FOR SOYBEAN (R\$/ha)



■ **Capuaba Farm**

North MT
45 farms



IN SUMMARY:

- ✓ Environment sustainability (lower CO₂ emission).
- ✓ Better conditions for soil microorganisms (biodiversity, biomass).
- ✓ Decrease in nematodes.
- ✓ Higher soil fertility. Higher NUE.
- ✓ Better soil physical conditions.
- ✓ More water, more roots, more stable yields.
- ✓ Higher yields and higher profits.

Lucas do Rio Verde, Mato Grosso, Brazil



Capuaba Farm



**José Eduardo M. Junior
Farmer**

THANK YOU VERY MUCH
FOR YOUR KIND ATTENTION



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