Soil and Water Assessment Tool (SWAT)
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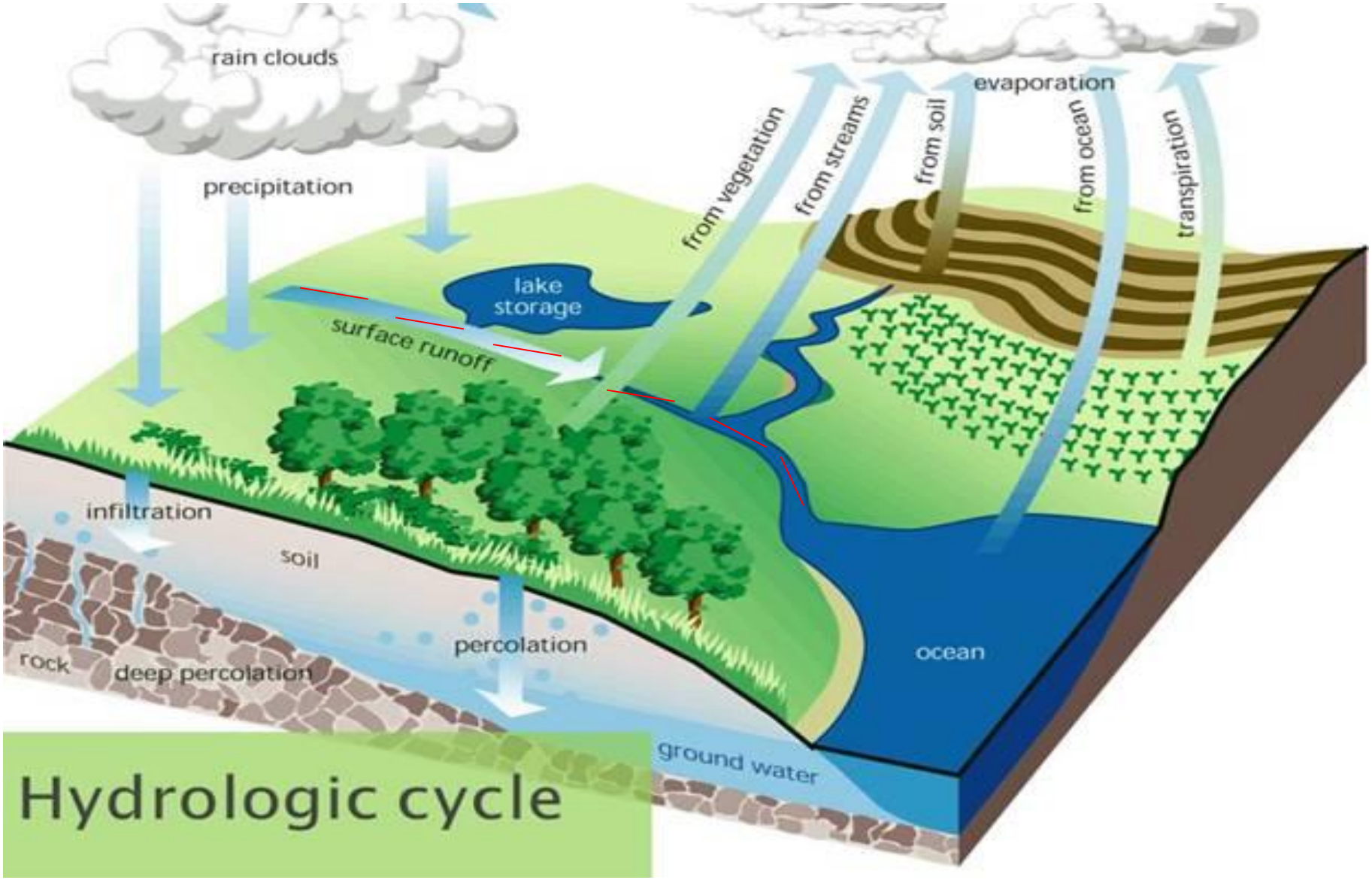
Federal Rural University of Pernambuco

Experimental and Simulated Runoff by the Curve Number Model for Cassava Cropping Under Different Agricultural Practices

Cleene A. Lima, Abelardo A. A. Montenegro , Thais E. M. Santos, Adriano L. N. Monteiro and Elisângela G. Pereira

Recife-PE-July 130 of 2014

Introduction



Introduction

- Hydrological models have become important planning and decision making tools, mainly for assessing the surface runoff and the water storage in a watershed (MUÑOZ-ROBLES et al., 2011).

- Several methods have been used for runoff predictions (Rational Method, Mac-Math Equation, Cook Equation, Curve number (CN), the later being adopted by the Soil and Water Assessment Tool (SWAT).

Objective

- This study aimed to evaluate experimental runoff produced by a rainfall simulator and modeled by the curve number (CN) method in **cassava** cropping under different agricultural practices in a **Yellow Latosol**.

Material and Methods

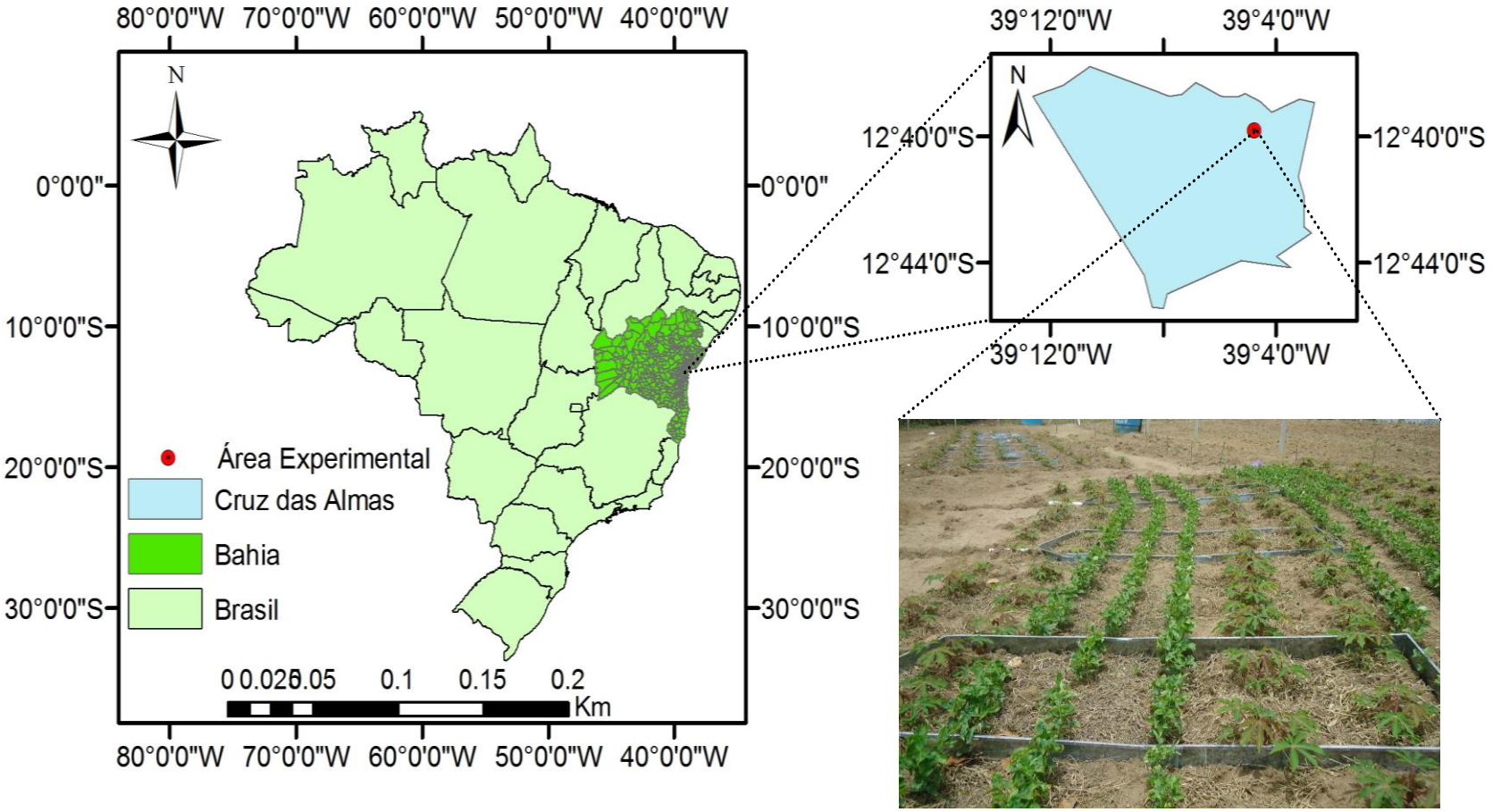


Figure 1. Location of the experimental area in the municipality of Cruz das Almas-Bahia, Brazil

Material and Methods

8 ton/ ha MULCHING

MMA

DOWNHILL CULTIVATION

MMA+CM

DOWNHILL CULTIVATION + **MULCHING**

MN+F+CM

CONTOUR LINE CULTIVATION + **MULCHING**+ BEANS

MN+F

CONTOUR LINE CULTIVATION + **MULCHING**

Figure 2. **Different agricultural managements**

Material and Methods

Soil physical properties

Layers	Sand	Silt	Clay	θ_{fc}	θ_{wp}	Ds	Dp	K_0
cm	g kg^{-1}			$cm^3\ cm^{-3}$		g cm^3		cm h^{-1}
0-20	535	245	220	0.18	0.1	1.46	2.38	0.16
20-40	700	52	248	0.17	0.16	1.49	2.53	5.49

Crusting x **Mulching**

Laboratory experiments with mulching- UFRPE/ U.C. (Portugal)

Experimental measurements

- **Runoff**;
- Sediment transport;
- Nutrient losses (K; Ca; C; P; Mg)

Ref: Lima (2013): “Uso de diferentes práticas agrícolas no cultivo de Cassava”, MSc Dissertation, UFRPE

Material and Methods

Rainfall Simulator:

Runoff Curve Number - CN (SCS, 1972):

$$S = \frac{25400}{CN} - 254 \quad (1)$$

$$Ia = 0.2S \quad (2)$$

$$P > Ia \quad (3)$$

$$Es = \frac{(P - 0.2S)^2}{P + 0.8\,S} \quad (4)$$

Results and Discussion

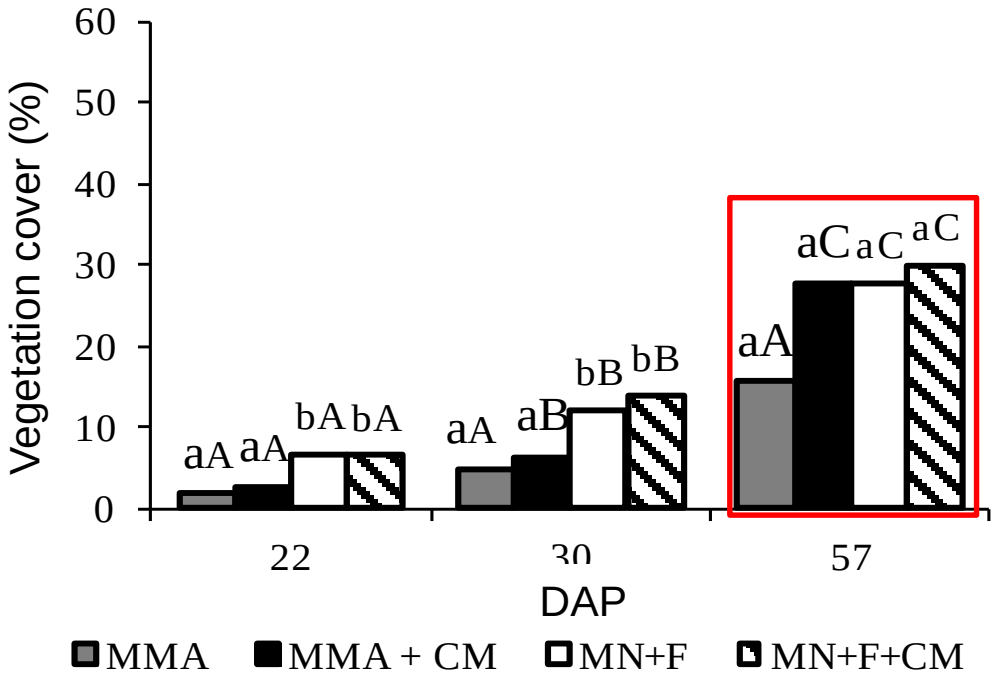


Figure 3. Vegetation growth

Results and Discussion

Table 2. Tabulated values used to determine the flow by SCS (1972)

Management	CN*	P (mm)	S (mm)	Es estimated (mm)	Es measured (mm)
MMA	61	105	162.39	22.39	19.53
MN+F	50	105	254.00	9.53	8.31
MMA+CM	50	105	254.00	0.00	0.00
MN+F+CM	50	105	254.00	0.00	0.00

Tr= 2 hours

"*" - according to SCS Methodology

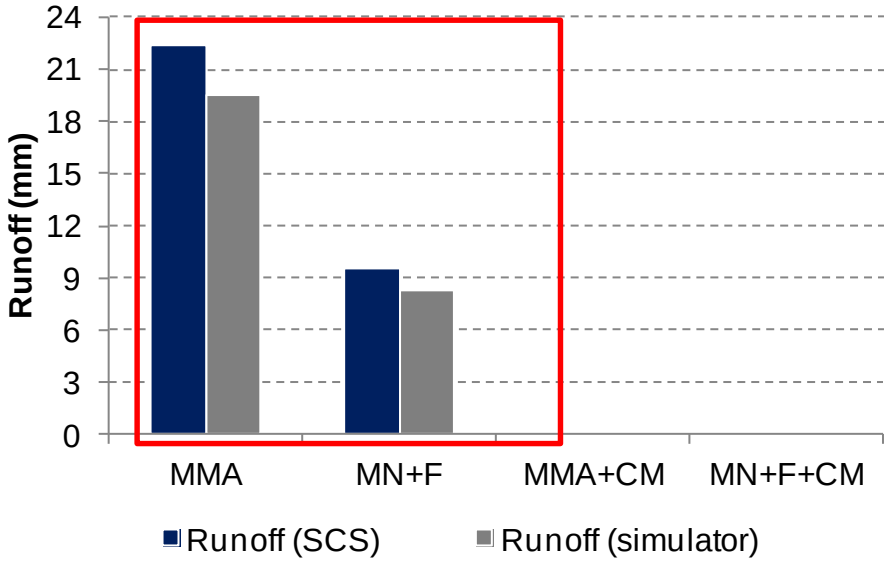


Figure 4. Mean flow generated by a rainfall simulator and simulated by the SCS (1972) for managements

Conclusions

- The conservation practices for cassava in contour lines with cover and without cover, and cassava downhill allowed runoff reduction;
- Mulch cover resulted in no runoff, being a very effective practice;
- Measured runoff values were always lower than those simulated by the SCS model, for different agricultural practices, hence overestimating runoff;
- Those experimental results are expected to improve parameter description in SWAT model, in particular for Cassava.

Acknowledgments

THANK YOU !

Cleene A. de Lima
PhD Student in Agricultural Engineering | UFRPE
Cleene2@homail.com