

Soil loss reduction and rainwater management in climate smart maize and coffee production systems

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Introduction

Rainwater management at the field level is an important measure to increase the climate resilience of agricultural production systems. The implementation of soil and water conservation practices can significantly reduce erosion, increase water storage in soils, and mitigate the effects of intra-seasonal dry periods. In 2021 ABC together with CRS and Raindrop established an erosion measuring project in maize and coffee in the department of Ahuachapan, El Salvador.

Methods

Measurement of runoff and soil loss on Wishmeier type plots (length: 22m, width: 1.8m, surface: 39.6m²),

Erosion plots San Raymundo (maize): bare fallow, conventional maize, maize with mulch and *Canavalia* ground cover crop.

Erosion plots Apaneca (coffee): bare fallow, shaded coffee, shaded coffee with vegetative barriers of Vetiver and cover crop.

Daily rainfall measurement and monitoring of erosion plots.

Event related sampling and analysis.

Results: Runoff and soil loss, May to October 2021.

San Raymundo Maize	# runoff events	Total runoff mm	Runoff coefficient	Runoff m3/ha	Soil loss t/ha
Rainfall: 1204 mm					
Bare fallow	38	376,8	0,31	3757	310.4
Conventional	28	165,8	0,138	1658	94.6*
Conservation	18	16,8	0,014	168	1.2

*Same conditions at the beginning of vegetation period as bare fallow. 72.6 t/ha of soil loss were caused by just three events in May and June before and after planting.

Apaneca Coffee	# runoff events	Total runoff mm	runoff coefficient	Runoff m3/ha	Soil loss t/ha
Rainfall: 2179 mm					
Bare fallow	56	494*	0,226	4940	212
Shaded	5	0.70	0.005	7	0.1
Shaded +V. barriers	1	0.13	0,001	1,3	0.02

*Approximate value, June 16 rainfall (245 mm) exceeded total runoff storage capacity.



Highlights

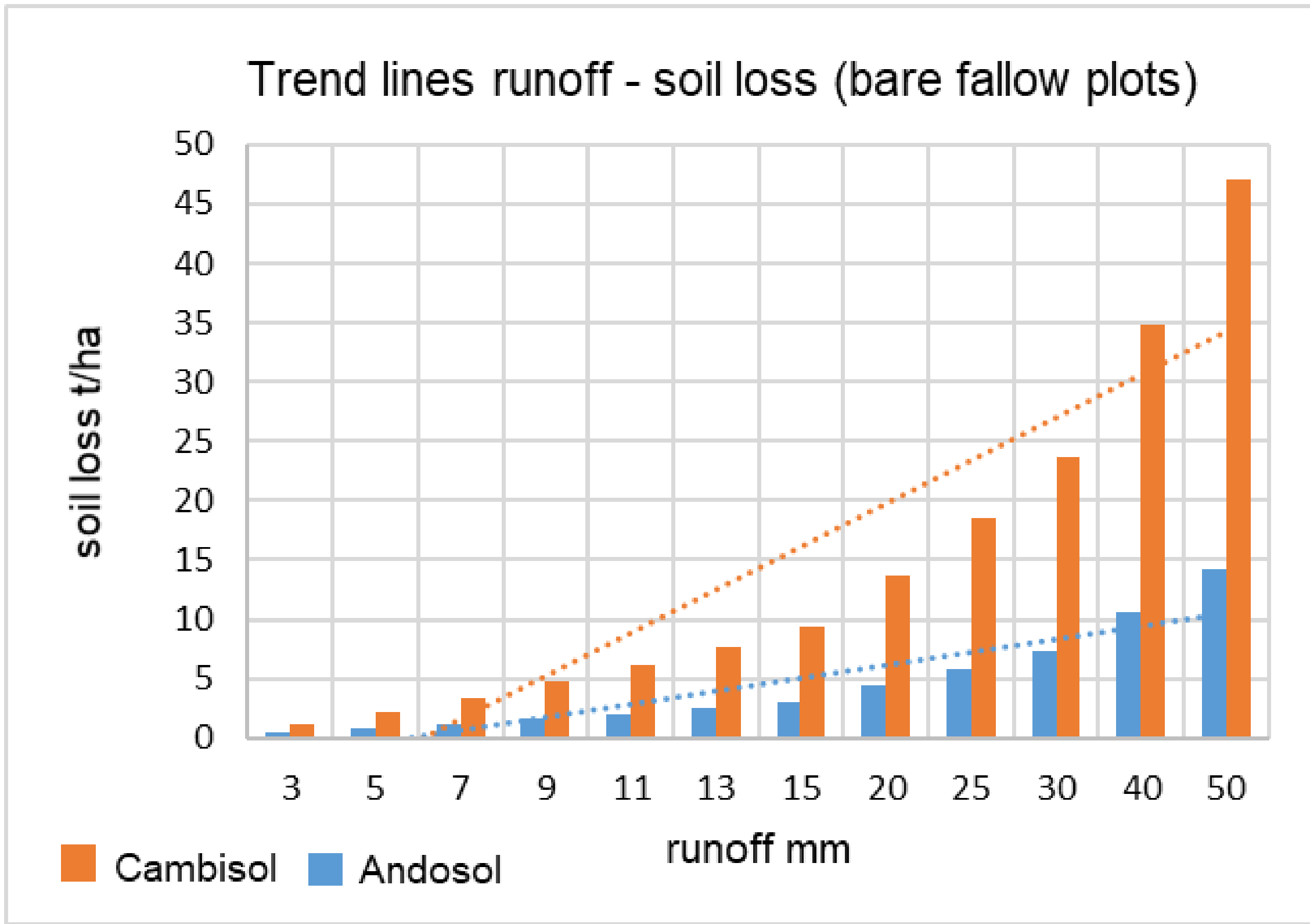
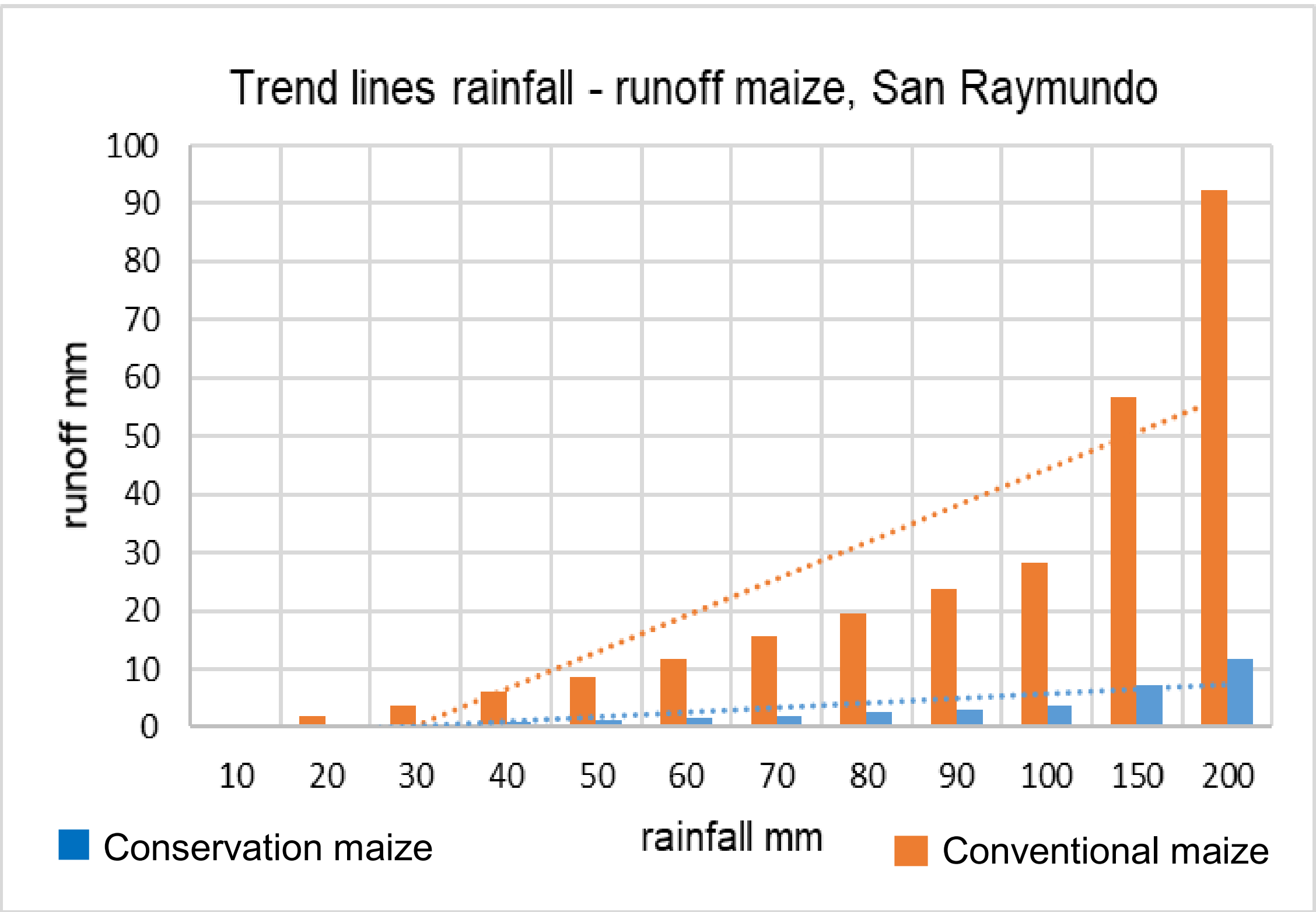
- Mulch in combination with *Canavalia* ground cover crop is an effective measure to reduce soil loss and runoff in maize cultivation.
- The amount of additional water stored in the maize conservation system increases the resilience of the crop to periods of intra-seasonal drought.
- The two soil types have shown a remarkable difference in their resistance to erosive rainfall impact.
- The Andosol soil with dense shaded coffee and ground cover vegetation provides a resilient land management system that buffers the impact of high rainfall, offering important hydrological services.

Site and soil description

San Raymundo: Maize,
UTM: 0196939, 1545937
Altitude: 575 masl
Slope gradient: 16%
Soil type: Cambisol
Texture: silty loam
pH: 4.15 (0-17cm), 6.36 (17-45cm)
O.M. (%): 3,23 (0-17cm)



Apaneca: Coffee
UTM: 0196229, 1532518
Altitude: 1457 masl
Slope gradient: 25%
Soil type: Andosol
Texture: sandy loam
pH: 4.65 (0-14cm)
O.M. (%): 9.83 (0-14cm)
Thixotropy: increasing with soil depth



Left: San Raymundo, 20 september 2021, rainfall event: 44mm

