Food and Agriculture Organization of the United Nations

3rd Meeting of the
Regional Soil Laboratory Network for Africa
(AFRILAB)

18 October 2021

Item 4
Position of AFRILAB in GLOSOLAN

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AFRILAB
AFRICAN SOIL LABORATORY NETWORK

GLOBAL SOIL PARTNERSHIP

How to decide the GLOSOLAN SOPs to harmonize?

So far priority was given to:

- Soil chemical parameters. In 2020, GLOSOLAN started to work also on soil physical and soil biological parameters
- The most important parameters for soil fertility
- The most used methods in the world

2018	2019	2020 (ongoing)
• Sample pre-treatment • Inorganic carbon (CaCO3 eq.) • OC Walkley and Black • Total carbon (Dumas – dry combustion)	Bray I Bray II Olsen P Mehlich I Mehlich III (postponed to 2020) pH in water pH in KCl pH in CaCl2 EC saturated paste EC in water N Dumas N Kjeldahl Mineral N (still under writing) Tyurin	• particle size-distribution by pipette method and hydrometer • bulk density • moisture content by gravimetric method • Particulate organic carbon by physical fractionation • Quasi-total elements by digestion using aqua regia and EPA. This includes total heavy metals • Exchangeable bases and CEC by ammonium acetate • Available micronutrients (Fe Zn Cu Mn Mo Ni Cd) – extraction using DTPA • Boron by hot water extraction • Mehlich III for macro and micronutrients (including S and B) • Microbial biomass C and N by chloroform fumigation-extraction • Microbial enzyme activities • Soil respiration rate

How to decide the GLOSOLAN SOPs to harmonize?

Five years after the establishment of GLOSOLAN, we might be ready to make a step forward and start working on those methods that are less frequently used but have lower risks for the human health and the environment.

How to decide the GLOSOLAN SOPs to harmonize?

Available phosphorous

Available phosphorous refers to inorganic P dissolved in a water/soil solution that is readily available for plant uptake. Inorganic P forms are primarily mixtures of aluminum (Al-P), iron (Fe-P), and calcium (Ca-P) phosphates; the relative percentages between these three forms are a function of soil pH, with higher percentages of Al-P and Fe-P occurring in acid soils, and a higher percentage as Ca-P in neutral to alkaline soils.

The methods to assess phosphorous in soil already harmonized by GLOSOLAN are the following:

- SOP on soil available P - Bray I method
- SOP on soil available P - Bray II method
- SOP on soil available P - Mehlich I method
- SOP on soil available P - Mehlich III method *(available soon)*
- SOP on soil available P - Olsen method

Soil Available Phosphorous : Sustainability of methods

Method	Risk for human health related to the use of chemicals and the overall implementation of procedure by staff	Environmental risk (waste disposal)	Level of technology required	Average duration of the analysis	Global median price of the analysis (for the customers)
Bray I	Medium	Medium	Medium	> 1 working day	6.3 USD
Bray II	Medium	Medium	Medium	Up to half working day	6.3 USD
Mehlich I	Medium	Medium	Medium	Up to half working day	13 USD
Mehlich III	High	High	Medium	Up to half working day	6.3 USD
Olsen	Medium	Medium	Medium	Up to half working day	6.5 USD

How to decide the GLOSOLAN SOPs to harmonize?

Five years after the establishment of GLOSOLAN, we might be ready to make a step forward and start working on those methods that are less frequently used but have lower risks for the human health and the environment.

This might promote the transition towards the use of more sustainable methods.

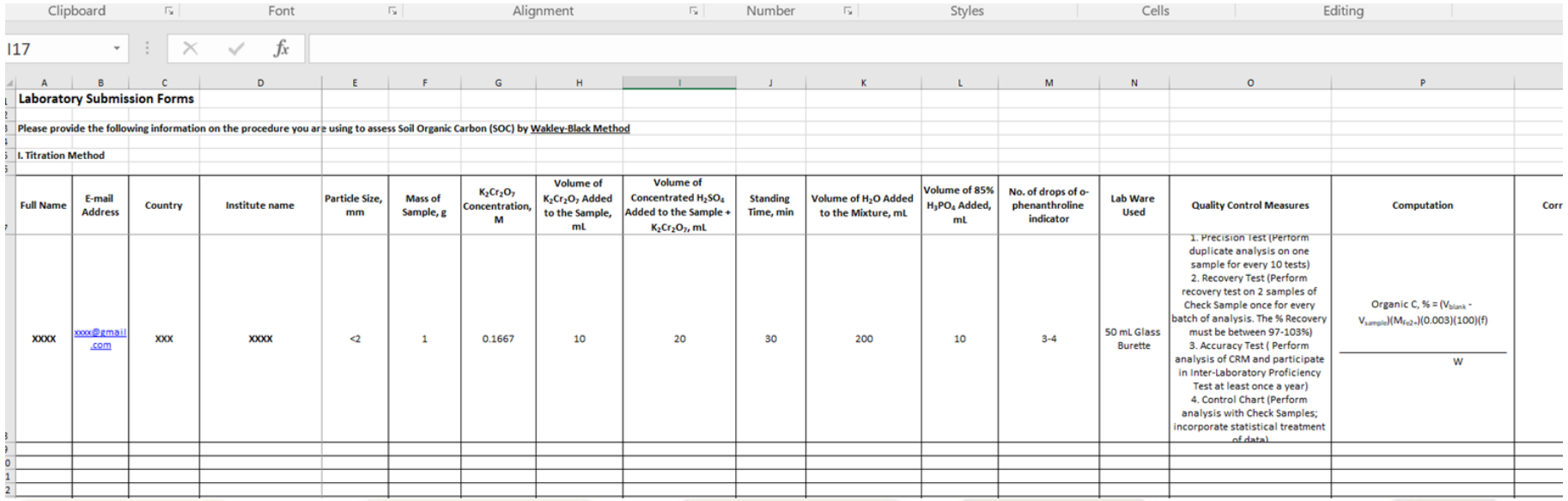
What do you think?

Identification of regional leaders

regional leaders should be confident using the methods they take the leadership for

What shall a regional leader do?

- Contribute to prepare the SOP matrix



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Laboratory Submission Forms

Please provide the following information on the procedure you are using to assess Soil Organic Carbon (SOC) by Wakley-Black Method

I. Titration Method

Full Name	E-mail Address	Country	Institute name	Particle Size, mm	Mass of Sample, g	$K_2Cr_2O_7$ Concentration, M	Volume of $K_2Cr_2O_7$ Added to the Sample, mL	Volume of Concentrated H_2SO_4 Added to the Sample + $K_2Cr_2O_7$, mL	Standing Time, min	Volume of H_2O Added to the Mixture, mL	Volume of 85% H_3PO_4 Added, mL	No. of drops of o-phenanthroline indicator	Lab Ware Used	Quality Control Measures	Computation	Corr
XXXX	xxxx@gmail.com	XXX	XXXX	<2	1	0.1667	10	20	30	200	10	3-4	50 mL Glass Burette	1. Precision Test (Perform duplicate analysis on one sample for every 10 tests) 2. Recovery Test (Perform recovery test on 2 samples of Check Sample once for every batch of analysis. The % Recovery must be between 97-103%) 3. Accuracy Test (Perform analysis of CRM and participate in Inter-Laboratory Proficiency Test at least once a year) 4. Control Chart (Perform analysis with Check Samples; incorporate statistical treatment of data)	Organic C, % = $(V_{blank} - V_{sample})(M_{Fe2+})(0.003)(100)(f)$ / W	

GLOBAL SOIL PARTNERSHIP

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What shall a regional leader do?

- Contribute to prepare the SOP matrix
- Harmonize the information in the matrix from your region

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F109 | 1. Duplicate standard analysis in every 10 samples as Drift,

ASIA

Total number of respondents - 9

Step	Breakdown	No. of Labs	Lab Code	Prevailing Practice	Remarks
Particle size (mm)	≤2mm	9	2, 3, 8, 9, 15, 16, 18, 24, 118	≤2mm	
		9	**Total**		
Sample weight, g	2.0 g	5	15, 16, 18, 24, 118	2.0 g	
	2.5 g	2	2, 9		
	5.0 g	2	3, 8		
		9	**Total**		
Equipment	1. Analytical Balance 2. Reciprocating Shaker 3. Vortex Mixer 4. UV-Vis Spectrophotometer	5	9, 16, 18, 24, 118	1. Analytical Balance 2. Reciprocating Shaker 3. Vortex Mixer 4. UV-Vis Spectrophotometer	Basic equipment for this analysis. One lab uses segmented analyser.
	1. Analytical Balance 2. Reciprocating Shaker 3.. UV-Vis Spectrophotometer	1	2		
	1. Digital Balance: OHAUS Traveler TA302 2.Spectrophotometer APEL PD 303UV UV-Vis	1	15		
	Electronic balance, spatula, tissue, polythen bottles 100 ml, Volumetric flask of 100 ml,filter paper Whatman No.5 or equivalent, funnel, Segmented Flow Analyzer.	1	3		
	Mechanical shaker. Spectrophotometer, weighing balance	1	8		
		9	**Total**		
Volume of Extracting Solution, mL (0.03 M NH4F + 0.025 M HCl)	10.0 mL	1	15		

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What shall a regional leader do?

- Contribute to prepare the SOP matrix
- Harmonize the information in the matrix from your region
- Contribute to the global harmonization of information
- Contribute to draft/review/finalize the GLOSOLAN SOP

Each SOP has a regional leader serving as global leader too. The global leader takes the overall responsibility for the writing of the SOP

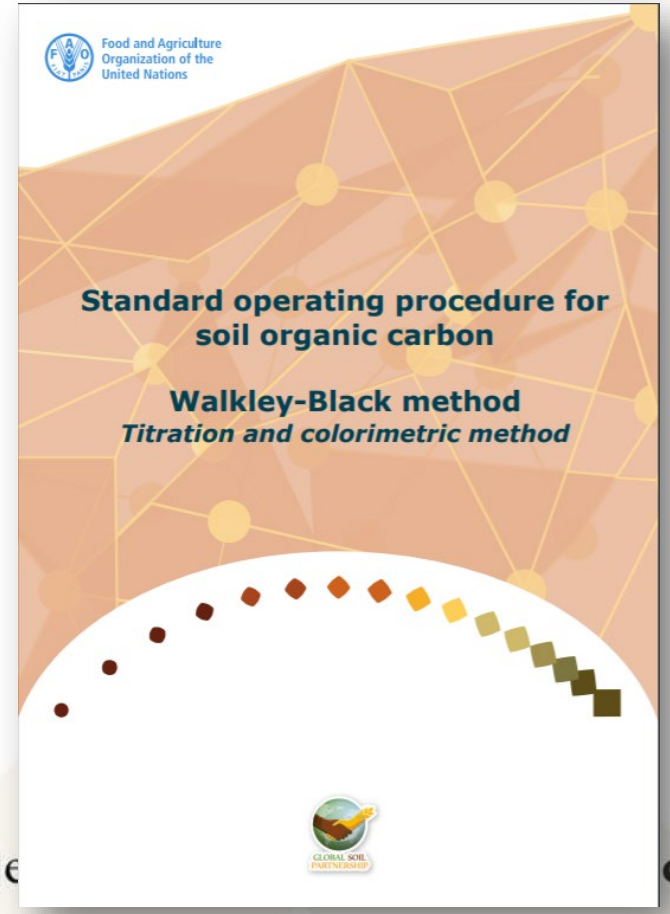
Identification of regional leaders

regional leaders should be confident using the methods they take the leadership for

SOPs 2021-2022 (AFRILAB)	Regional leader
Chemical parameters: ● Exchangeable Acidity by KCl method ● Total carbon by loss of ignition ● soil buffer capacity using KOH ● available phosphorus by KCl Physical parameters: ● Water retention (pF) ● Density by pycnometer Biological parameters: ● Estimate the amount of microbial **population** in the soil….can GLOSOLAN help on this?	Joseph Uponi, Rose Ndango, Rolf Mabicka Obame Alie Kamara, Takesure Tendayi Charles Shey Nying (Cameroon) Lewis Ndirangu, Washington Mutatu Hanane Aroui, Gideon Musukwa Hanane Aroui

GLOSOLAN SOPs

- All laboratories sending information and all authors are acknowledged in the GLOSOLAN SOPs



			received by RESOLANs
02	28 October 2019	Final review of the SOP at the 3rd GLOSOLAN meeting	Revision of steps in the SOP, final discussion and agreement
03			
04			

Modify by	Revision	Approval date	Validated date
GLOSOLAN SOP Tech. W.G. Leader: G. Nilo, Philippines	3rd GLOSOLAN meeting	3rd GLOSOLAN meeting	27 October 2019

GLOSOLAN SOPs

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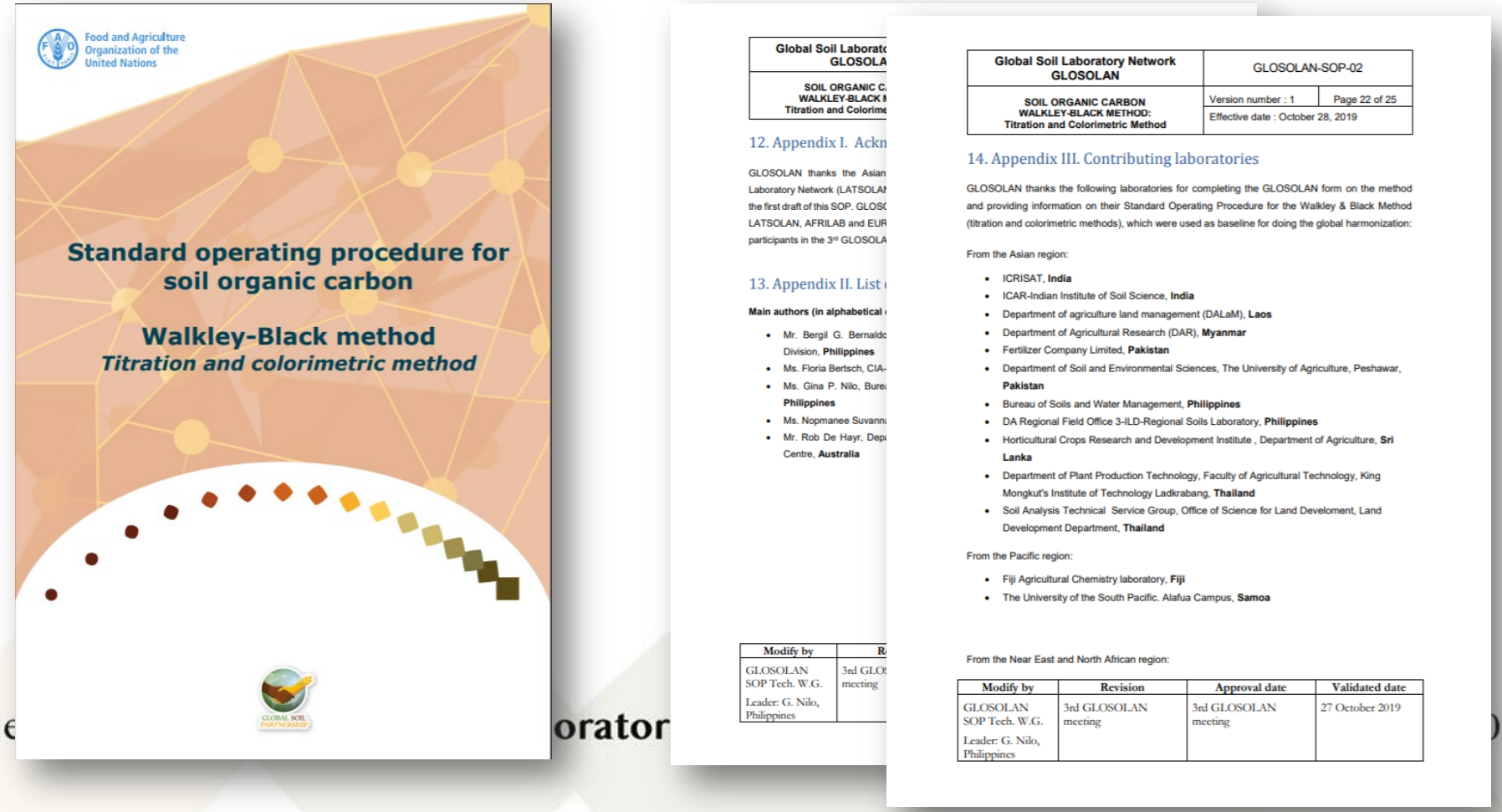

Issues encountered in harmonizing the GLOSOLAN SOPs 2020-2021

- Some methods are used by very few laboratories that completed the harmonization matrixes.
  - Can we still talk about globally harmonized SOPs in this case?
  - Shall we review our way to harmonize this type of SOPs?

Keep the matrixes to retrieve as much info as possible

- The working group for some SOPs (e.g. SOPs on biological parameters) count on the support of very few “experts”. This slow down the whole harmonization process.
  - How to overcome this issue? It is not a problem of willingness to help but a problem of availability of experts.

Ask top experts on the topic to lead the work and produce the SOPs. Invite laboratories that perform these analysis to join the network. Nation Reference Labs to take action on this.

Recap on the training requests by AFRILAB

Training topic	Language	Trainers	Notes
Sample preparation	EN FR	Lesego and Joseph Cheik + Moustapha to coordinate it	
SOPs			
Internal quality control: - Method validation - Measurement uncertainty	EN FR	Patricia Moulin	
Laboratory management			
(common) Equipment use and maintenance			Need to contact the manufacturers
External quality control			
Health and safety			
LAB ANALYSIS CALCULATIONS INCLUDING DILUTIONS			
ISO 17025:2017			It is already planned. A ppt on the topic was given at the 1st AFRILAB meeting

Definition of range and reference values

The Global Soil Partnership asked GLOSOLAN to work on range and reference values to facilitate the provision of recommendations to farmers and other stakeholders.

Range value: indicate the range of validity of the method. E.g. Method X is reliable for SOC content from xx to xx. This information should be included in the GLOSOLAN SOPs.

Poll 1: do you agree on including range values in the GLOSOLAN SOPs?

Yes but a working group should be established to do the literature review on this

Definition of range and reference values

The Global Soil Partnership asked GLOSOLAN to work on range and reference values to facilitate the provision of recommendations to farmers and other stakeholders.

Reference value: provide an indication on the status of soil. For example:

- 0-1 g kg-1 indicate soils poor in phosphorus
- 1-2 g kg-1 indicate soils with a low-medium content of phosphorus
- 2-3 g kg-1 indicate soils with medium content of phosphorus
- 3-4 g kg-1 …

Poll 2: do you agree on defining reference values?

Yes but these values are specific per each method

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Thanks for your attention

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