

# “Asian Regional Proficiency Testing for Soil Laboratory Network (SEALNET) 2018”

Ms. Nopmanee Suvannang, LDD, Thailand

Previous SEALNET leader / GLOSOLAN chairperson

Dr. Christian Hartmann, (IRD, France)

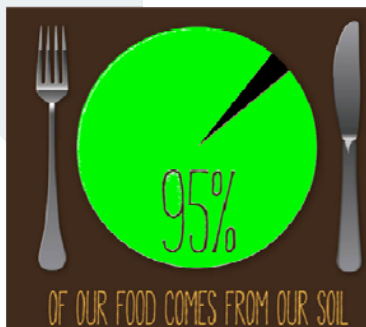
Previous SEALNET co-chairperson



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## Soils are necessary for human life as:



"We need healthy soils to achieve our food security and nutrition goals."




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**International initiatives to increase our knowledge on soil characteristics for better management:**




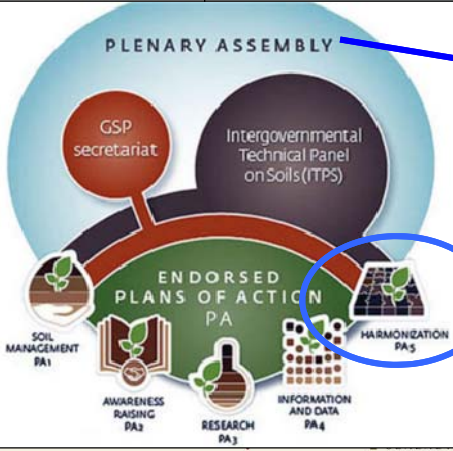

**2015**  
International Year of Soils  
*healthy soils for a healthy life*

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**Pillar 5 of GSP supports Sust. Dev. Goal n° 17, target 18: "Enhance Availability of Reliable Data".**



PLENARY ASSEMBLY

GSP secretariat

Intergovernmental Technical Panel on Soils (ITPS)

ENDORSED PLANS OF ACTION PA

SOIL MANAGEMENT PA1

AWARENESS RAISING PA2

RESEARCH PA3


INFORMATION AND DATA PA4

HARMONIZATION PA5


SUSTAINABLE DEVELOPMENT GOALS

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**The soil is like a black box !**



**soil data mainly come from lab analyses...**



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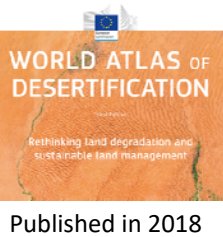
**...but the current situation of soil laboratories is terrible:**

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**...but the current situation of  
soil laboratories is terrible:**

**soil analytical results are  
not comparable & do not know if reliable.**



“(i) some data simply do not exist for all places on Earth  
(ii) while specific data may be widely available, but it is  
**often collected and reported  
using different methods,  
diverse standards,  
and/or using incompatible scales.”**

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**SEALNET  
objective?**

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**1. To organise the first Asian PT for soil lab,  
to assess their performance and comparability**

**2. Take action to improve inter-operability.**



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**1. To organise the first Asian PT for soil lab,  
to assess their performance and comparability,**

## **Materials and methods**

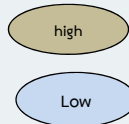
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No available & cheap certified reference material',  
**we had to prepare our own soil samples:**

1. Select soils



2. Collect



3. Prepare



**Dry**  
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**Grind**

**Sieve**

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**Careful homogenisation  
(statist. Checking homogeneity)**



**Weighting**

**Packing**

**Sealing**

**Labeling**

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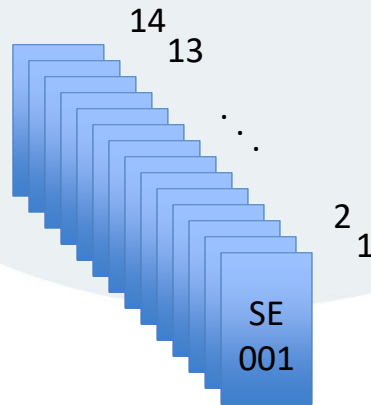
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**APFAN PT-2 Workshop**

Food Analysis Workshop: Proficiency Testing and Reference Materials Development

We sent a set of 14 'blind' soil samples to each lab:



they analysed it without knowing their characteristics.

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The characteristics of the 14 soil samples:



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**APFAN PT-2 Workshop**

Food Analysis Workshop: Proficiency Testing and Reference Materials Development

**4 soil samples**

955	970	KI	LB
SE 001	SE 007	SE 012	SE 008
SE 005	SE 013	SE 009	SE 004
SE 010	SE 002	SE 003	SE 006
			SE 011

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**4 soil types**

955	970	KI	LB
SE 001	SE 007	SE 012	SE 008
SE 005	SE 013	SE 009	SE 004
SE 010	SE 002	SE 003	SE 006
			SE 011

**several replicates**

**x3**   **x3**   **x4**   **x4**

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**Sample codes: randomised differently for each lab,  
thus labs could hardly cross-check their results.**



## Our PT concerned chemical analysis

- **pH**: soil suspension
- **Organic carbon**:
  - oxidation & titration
  - combustion & CN analyzer
- **Available P**: **3 different extractants**
  - Olsen P
  - Bray I P
  - Bray II P
- **Exchangeable K**: Ammonium Acetate & AAS or Flame Photometer.

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**APFAN PT-2 Workshop**

Food Analysis Workshop: Proficiency Testing and Reference Materials Development

**Each lab. received a set of 14 'blind' soil samples:**

**16 laboratories sent their results to GSP secretary, FAO;  
which made them anonymous before sending for statistic analysis**

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**Each lab. received a set of 14 'blind' soil samples:**

**16 laboratories sent their results to FAO;  
which made them anonymous before for statistic analysis**

**We made the statistical analysis,  
and performance estimation.**

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## Details of the statistic analysis:

### Number of results:

Soil '955' & '970' :  $n = 16 \times 3 = 48$

Soil 'Ki' & 'Lb' :  $n = 16 \times 4 = 64$

Table : Number of data analysed for each parameter and each soil type.

Soil name	pH	OC_WB	OC_Comb	P_Olsen	P_Bray 1	P_Bray 2	Exch K
955	48	45	15	33	20	9	48
970	48	45	15	42	15	9	48
Ki	64	60	20	45	28	12	62
LB	64	60	20	56	19	12	64

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### Number of results:

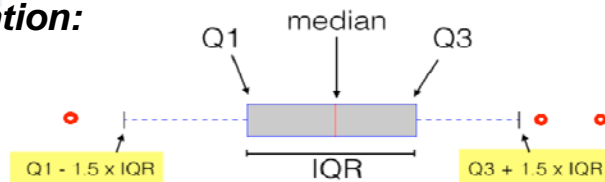
Soil '955' & '970' :  $n = 16 \times 3 = 48$

Soil 'Ki' & 'Lb' :  $n = 16 \times 4 = 64$

### Outliers identification:

$$x_i < Q1 - (1.5 \times IQR)$$

$$x_i > Q3 + (1.5 \times IQR)$$



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**Assigned value: mean value** (excluding outliers)

$$x_{pt} = \frac{(x_1 + x_2 + \dots + x_{ns})}{ns}$$
$$= \frac{\sum x_i}{ns}$$

**QC chart: standard deviation**

$$sd = \sqrt{\sum \frac{(x_i - x_{pt})^2}{ns - 1}}$$

**PERFORMANCE : Z score**

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**Robust statistics: median & MAD** (all datas)

**similar conclusions**  
(data not presented here)

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## Basic estimation of lab precision

**CV % between different replicates** (3 or 4 )

$$cv(\%) = \frac{100 * sd}{x}$$

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## Results

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**1st Inter-laboratory comparison report**  
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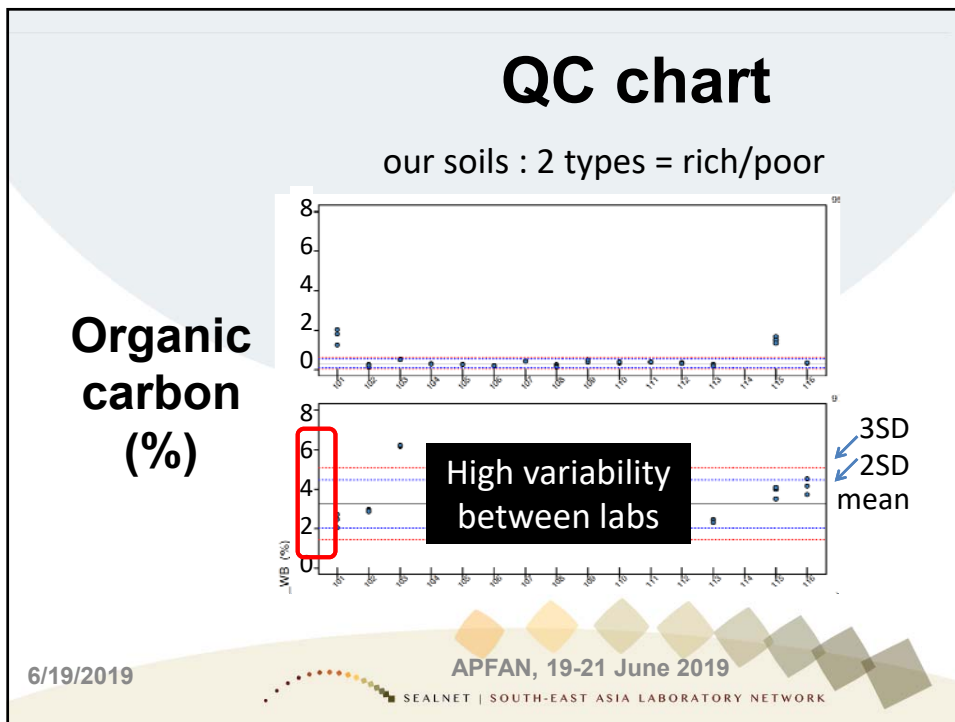
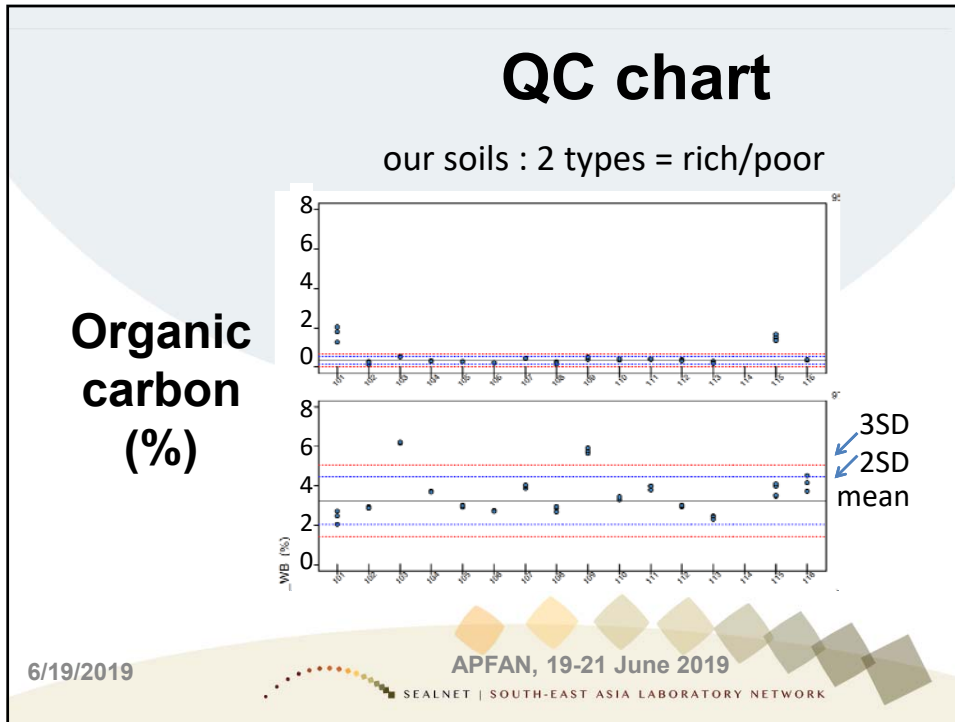
**GSP website**  
GLOBAL SOIL PARTNERSHIP

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**Example of results:**

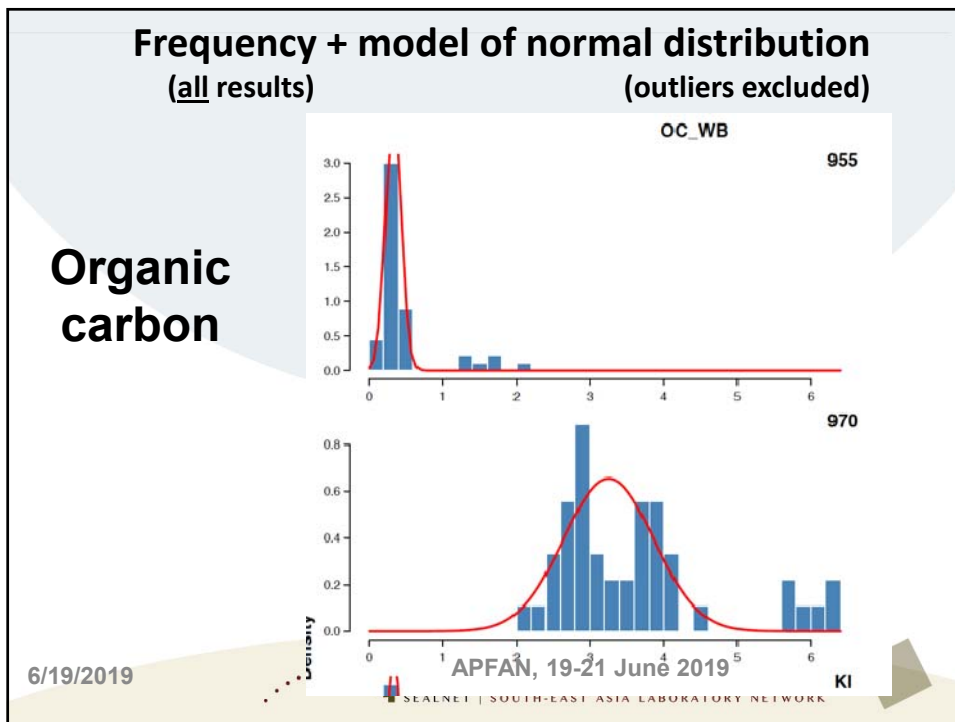
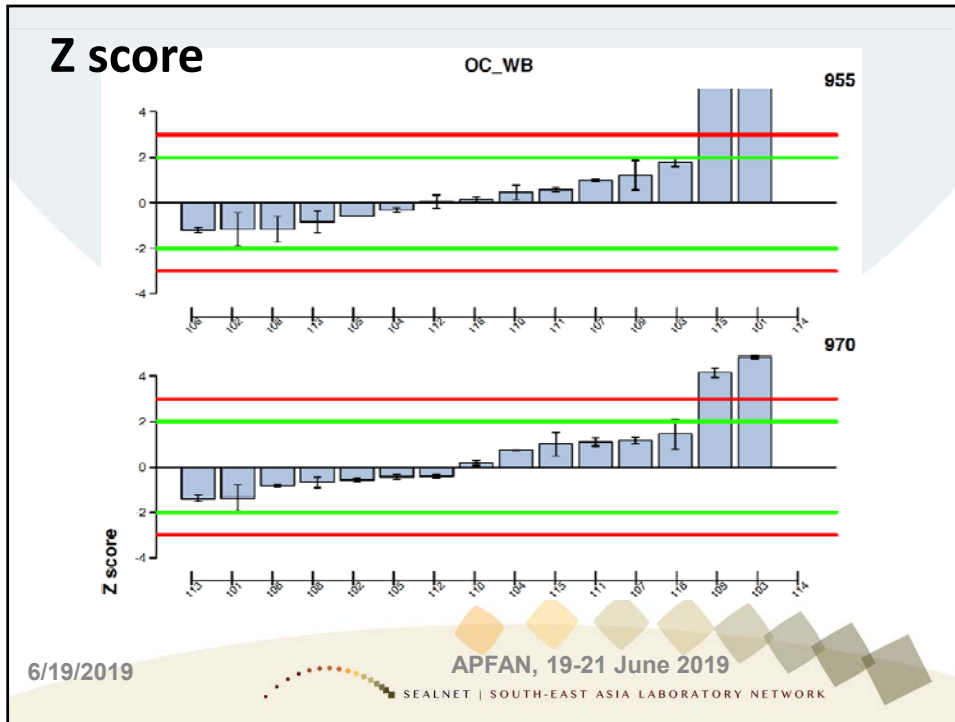
**Organic carbon**  
(oxidation method)  
(%)

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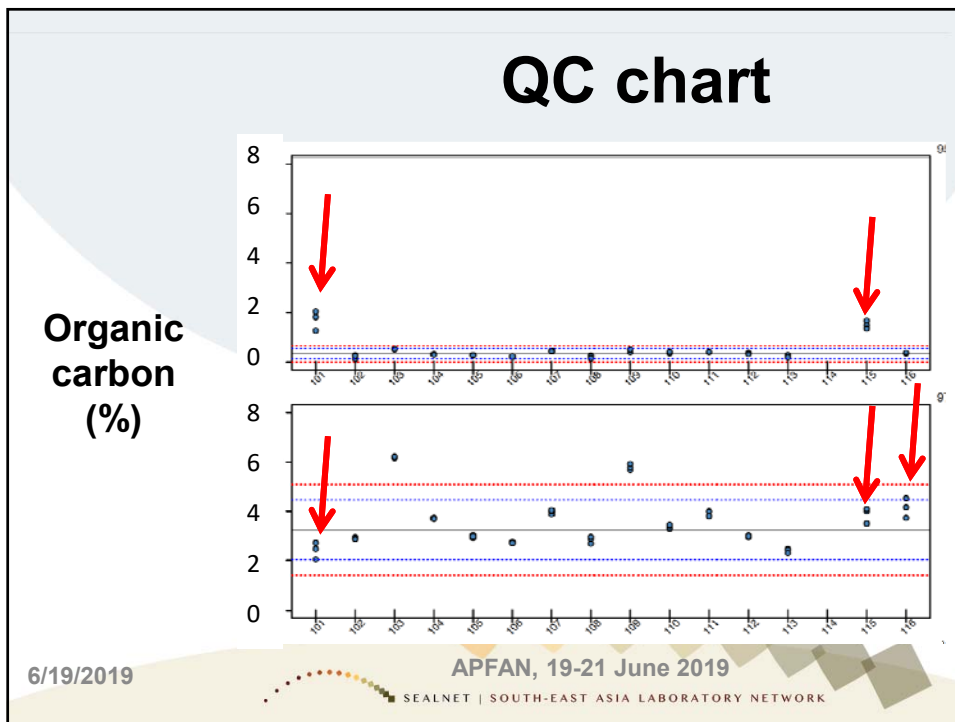
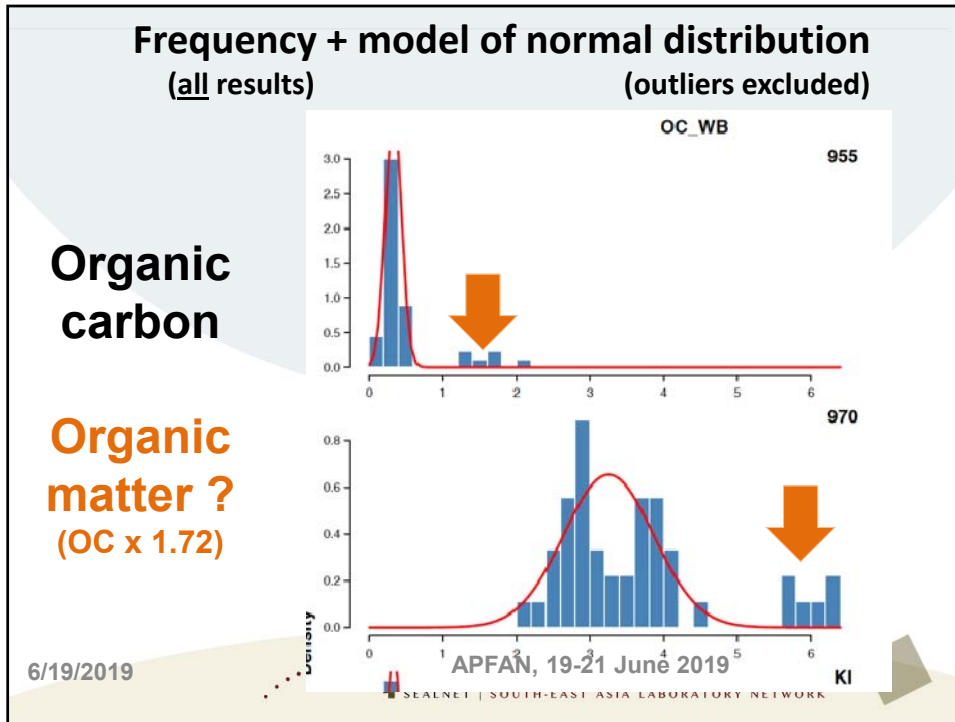


**APFAN PT-2 Workshop**

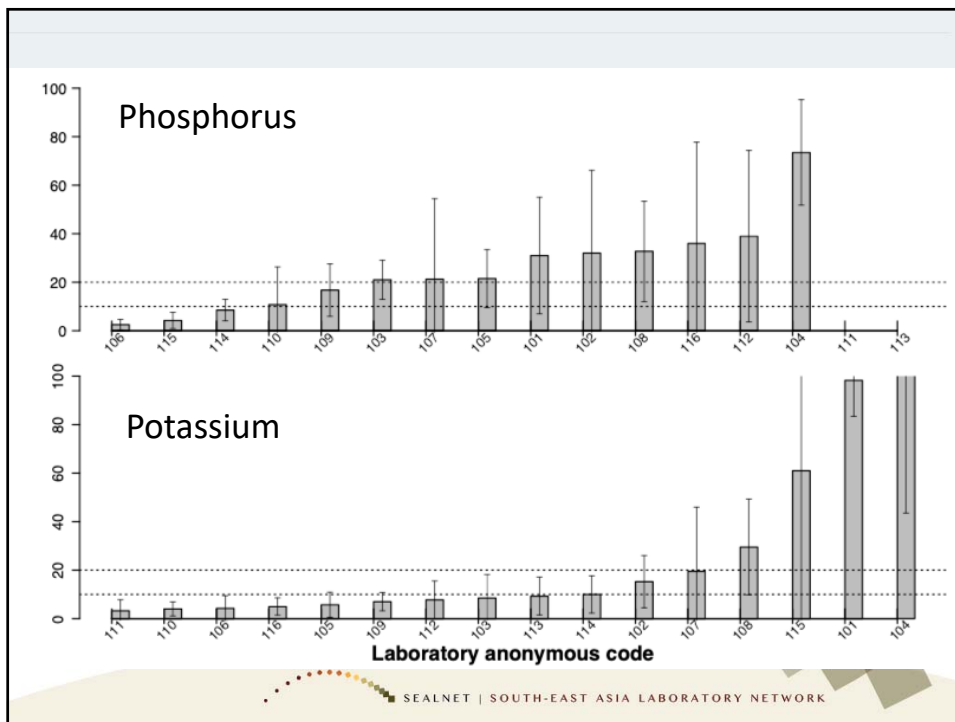
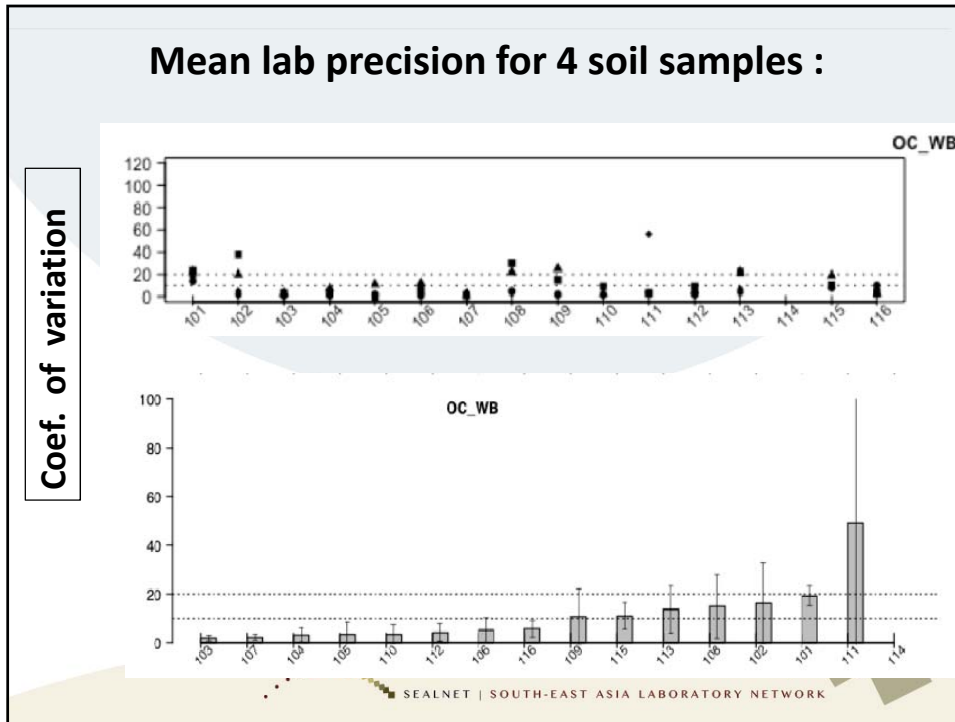
Food Analysis Workshop: Proficiency Testing and Reference Materials Development

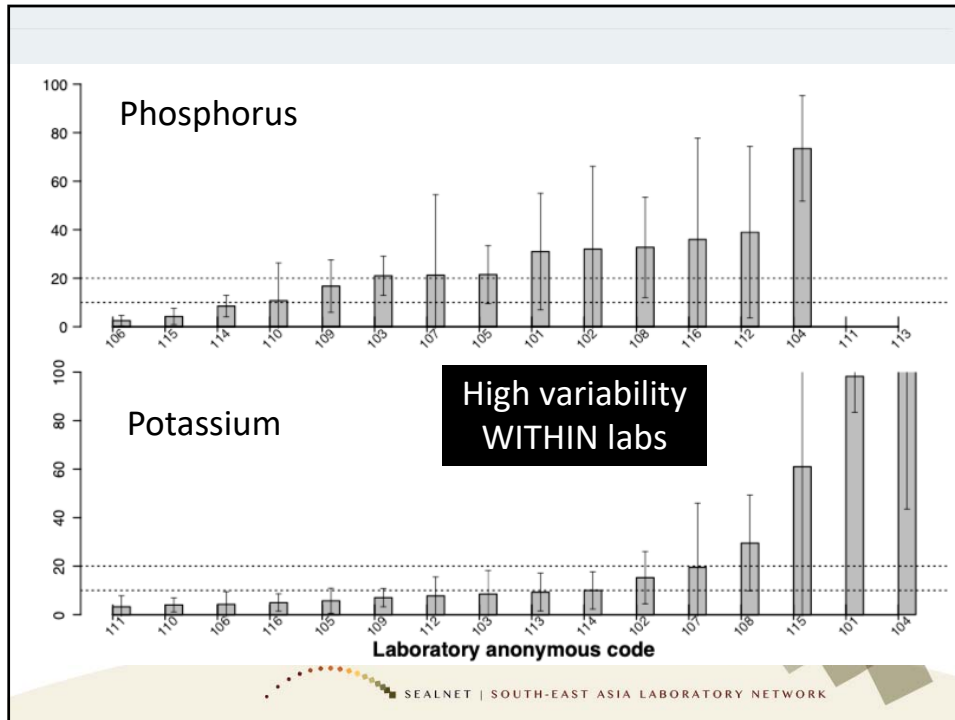






**Mean lab precision for 4 soil samples :**





## ***Main conclusions***

- **Low accuracy:** labs need to follow SOPs
- **Low precision:** lack of quality control (internal and external) and staff training.
- **Terminology issue:**  
organic carbon/organic matter.

## *Perspectives*

- 1. Actions to improve lab performances:**  
staff qualification? Something else?
- 2. SEALNET PT:** Use the best labs to improve the assigned value?
- 3. GLOSOLAN PT: 100 labs on 5 continents**  
How to make the interpretation ?

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## Thanks for your kind attention

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