



Food and Agriculture
Organization of the
United Nations

3rd Meeting of the Near East and North African Laboratory Network (NENALAB)

12-13 October 2022



GLOSOLAN proficiency test (PT) 2022

Regional outcomes

Dr Christian Hartmann (IRD, France)

NENALAB
NEAR EAST AND NORTH AFRICAN SOIL LABORATORY NETWORK

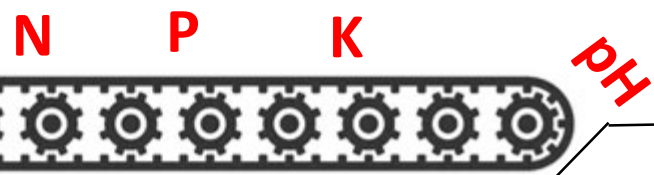




Laboratories:
'factories'
producing data

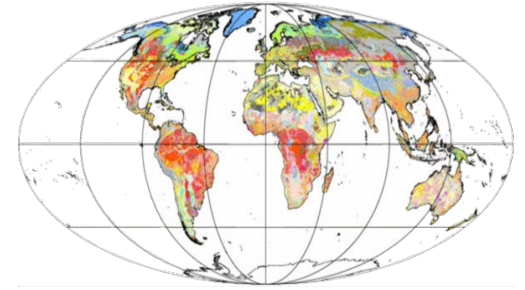
Results = data
C NPK etc

Quantifying
ODD Targets
Ecosystem
services



Traditionally
Nowadays

- Fertilisation
- Mapping
- Scientific conclusions
- Payment for ecosystem services



The laboratories are factories able to change soil samples in analytical results

When the same soil sample is given to different laboratories, the analytical results can be the same only if all laboratories:

- use similar machines, i.e. **use similar methods**,
- run the machines in a similar way, i.e. **use similar procedures**.

The GLOSOLAN has provided many document and trainings to help lab managers and technician from different laboratories around the world to get them working in the same way.

is it now possible we get the same analytical results????
to get the answer to this question...

GLOSOLAN

INTER-LABORATORY COMPARISON (or PT)

2022

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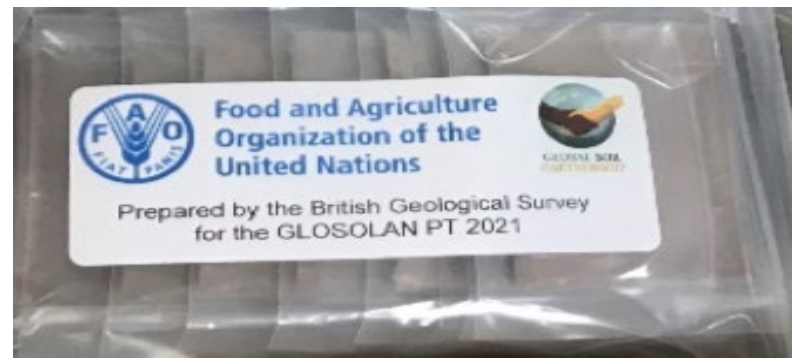


PROCEDURE

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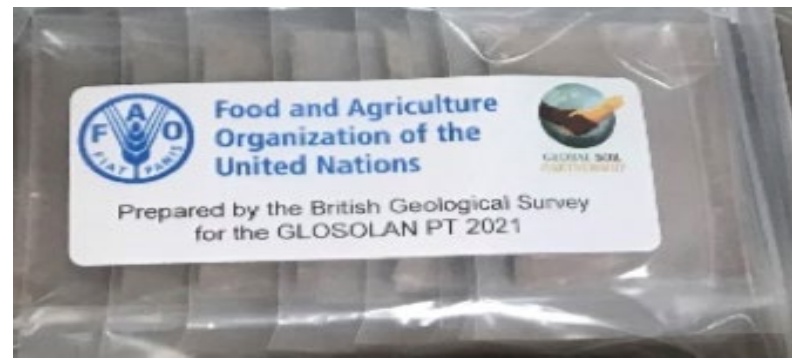
each lab
received 1 set



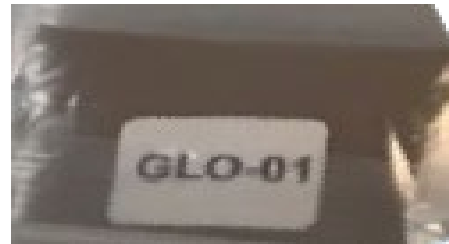
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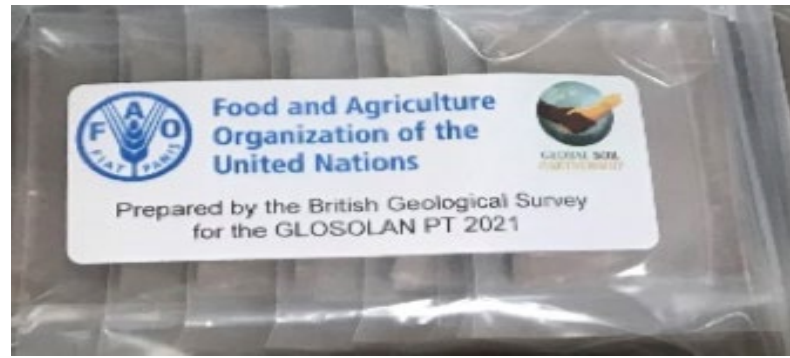
**each lab
received 1 set**



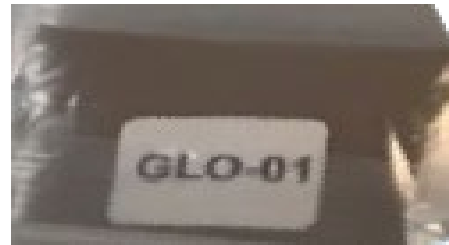
**1 set
= 10 bags**



each lab
received 1 set



1 set
= 10 bags



GLO-01

-02

-03

-04

-05

-06

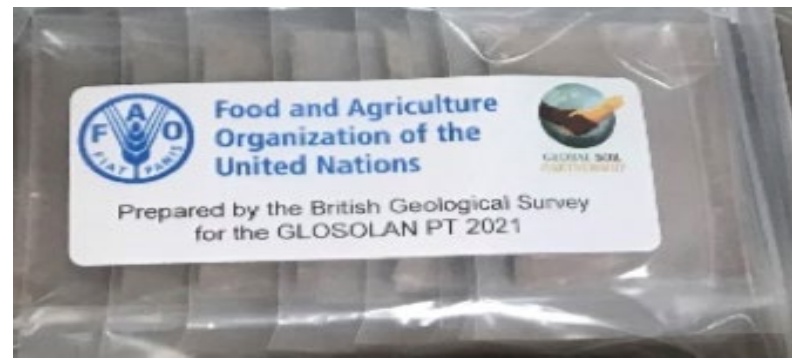
-07

-08

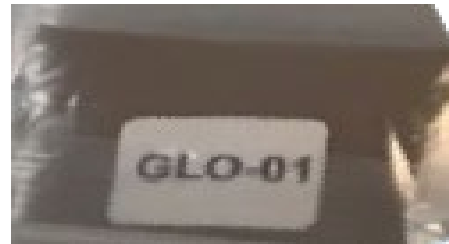
-09

-10

each lab
received 1 set



1 set
= 10 bags

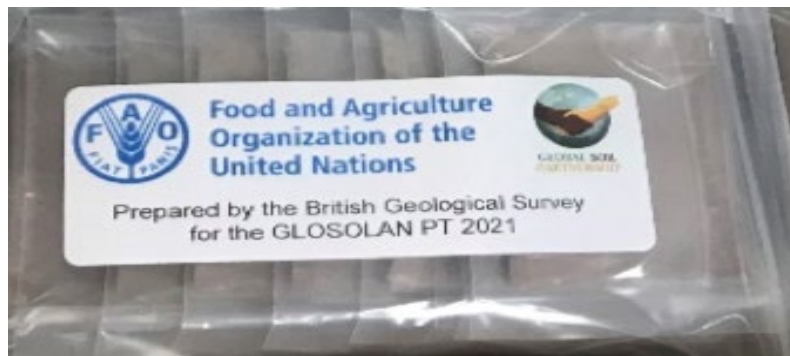


GLO-01 -02 -03 -04 -05 -06 -07 -08 -09 -10

1 set
= 6 soils

A B C D E F

each lab
received 1 set



1 set
= 10 bags



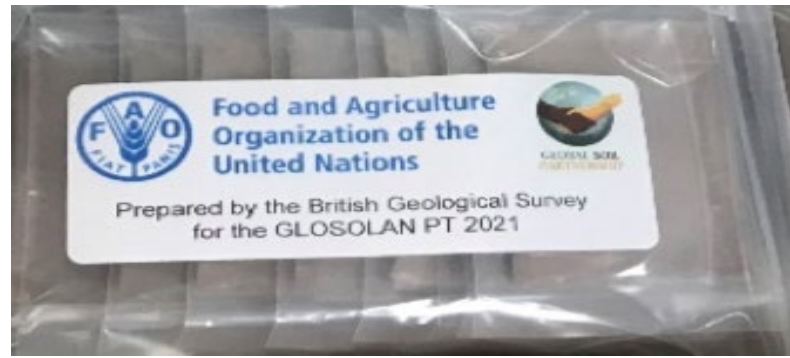
GLO-01 -02 -03 -04 -05 -06 -07 -08 -09 -10

1 set
= 6 soils

1 soil
had 5 replicates

A B C D E F
E1
E2
E3
E4
E5

each lab
received 1 set



1 set
= 10 bags



GLO-01 -02 -03 -04 -05 -06 -07 -08 -09 -10

1 set
= 6 soils

1 soil
had 5 replicates

A B C D E F
E1
E2
E3
E4
E5

testing
LAB. PRECISION

**randomly
distributed**

GLO-01

-02

-03

-04

-05

-06

-07

-08

-09

-10

ordered

A

B

C

D

E

F

randomly
distributed

GLO-01 -02 -03 -04 -05 -06 -07 -08 -09 -10

carbon content

ordered

A B C D E F

lowest

highest



randomly
distributed

GLO-01

-02

-03

-04

-05

-06

-07

-08

-09

-10

ordered

carbon content

A

B

C

D

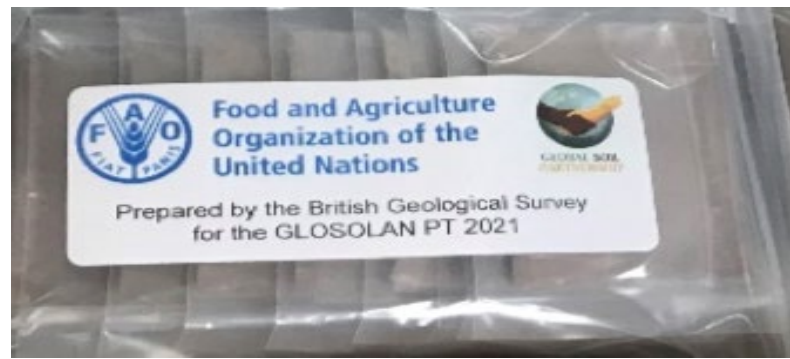
E

F

E1
E2
E3
E4
E5

same content

each lab
received 1 set



randomly
distributed

GLO-01 -02 -03 -04 -05 -06 -07 -08 -09 -10



ordered

A B C D E1 E2 E3 E4 E5 F

F
E3 B E4 E2
A C
D E1 E5



3 ANALYTICAL PARAMETERS: C N P

different methods

Carbon

"Organic carbon by **Walkley and Black**" = "C_WB",
"Total carbon by dry combustion (**Dumas method**)" = "C_Dum",
"Organic matter by **loss of ignition 450 - 550 °C**" = "C_Ig",

Nitrogen

"Total nitrogen by dry combustion (Dumas method) » = "N_Dum",
"Total nitrogen by Kjeldahl" = "N_kje")

Phosphorous

"Available phosphorus by Olsen" = "P_Ols",
"Available phosphorus by Bray I" = "P_B1",
"Available phosphorus by Bray II" = "P_B2",

today we look only at carbon

Carbon

"Organic carbon by **Walkley and Black**" = "C_WB",
"Total carbon by dry combustion (**Dumas method**)" = "C_Dum",
"Organic matter by **loss of ignition 450 - 550 °C**" = "C_Ig",

Nitrogen

"Total nitrogen by dry combustion (Dumas method) » = "N_Dum",
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Phosphorous

"Available phosphorus by Olsen" = "P_Ols",
"Available phosphorus by Bray I" = "P_B1",
"Available phosphorus by Bray II" = "P_B2",

PARTICIPANTS

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Number of results per region

		Africa	America			Asia	Europe		Pacific
	GLOBAL	<i>Af</i>	<i>Al</i>	<i>An</i>	<i>As</i>	<i>Ea</i>	<i>Eu</i>	NENA	<i>Pa</i>
C_WB	160								
C_Dum	54								
C_Ig	42								

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		Africa	America			Asia	Europe		Pacific
	GLOBAL	<i>Af</i>	<i>Al</i>	<i>An</i>	<i>As</i>	<i>Ea</i>	<i>Eu</i>	NENA	<i>Pa</i>
C_WB	160								
C_Dum	54								
C_Ig	42								

GLOBAL: Walkley-Black is the more frequent

Number of results per region

		Africa	America			Asia	Europe			Pacific
	GLOBAL	<i>Af</i>	<i>Al</i>	<i>An</i>	<i>As</i>	<i>Ea</i>	<i>Eu</i>	NENA	<i>Pa</i>	
C_WB	160	41	36	0	38	2	21	20	2	
C_Dum	54	5	14	2	7	0	25	0	1	
C_Ig	42	8	7	2	4	1	12	8	0	

NENA: Walkley&Black was the most frequent.

No participant used C Dumas... why?
(cost of the instruments?)

Number of results per region

		Africa	America	Asia		NENA	Pacific		
	GLOBAL	<i>Af</i>	<i>Al</i>	<i>An</i>	<i>As</i>	EURASIA	EUROPE	<i>Ne</i>	<i>Pa</i>
C_WB	160	41	36	0	38	2	21	20	2
C_Dum	54	5	14	2	7	0	25	0	1
C_Ig	42	8	7	2	4	1	12	8	0

Eurasia: few results

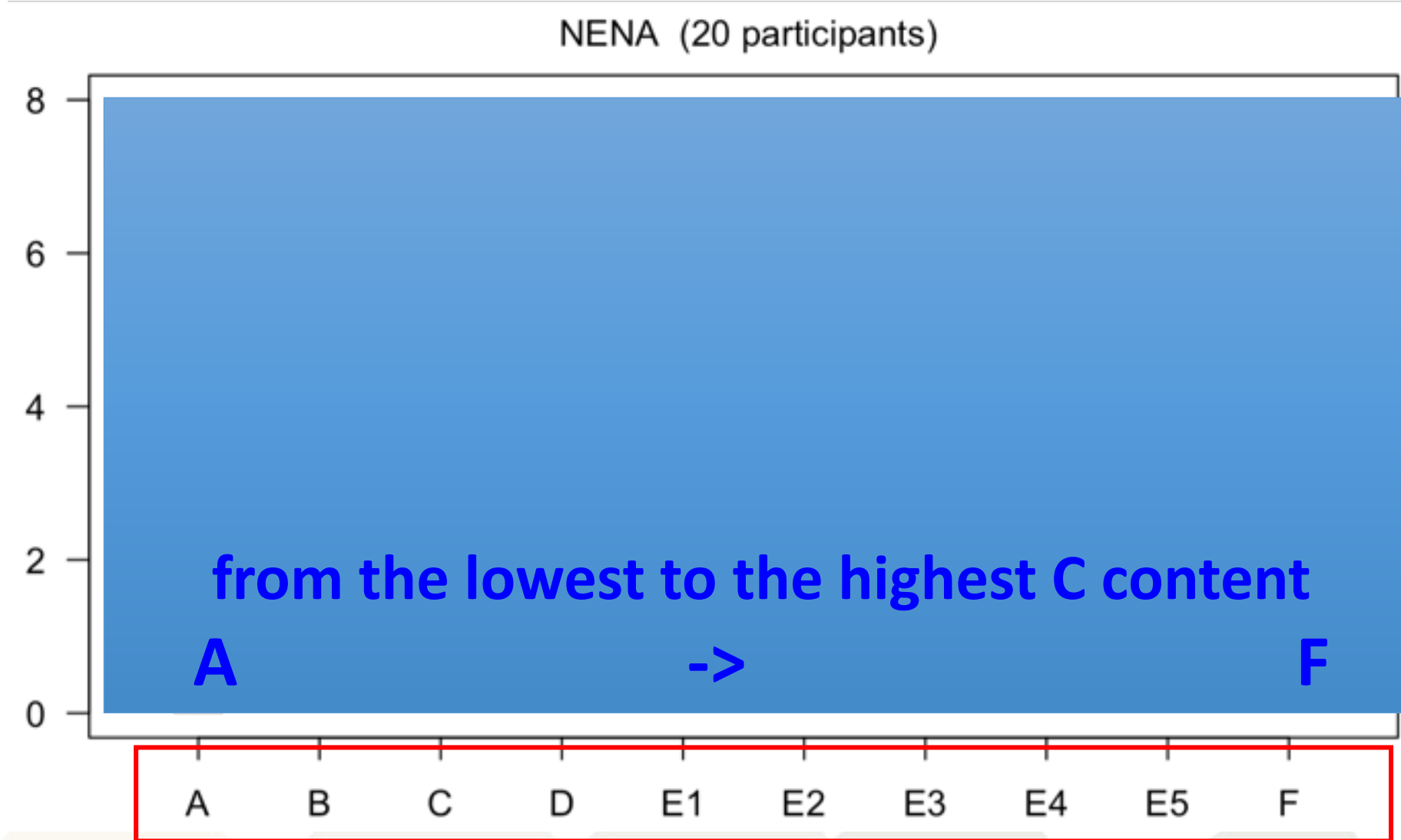
Europe: Dumas is more frequent than Walkley-Black (unlike Global situation)

STATISTICAL ANALYSIS

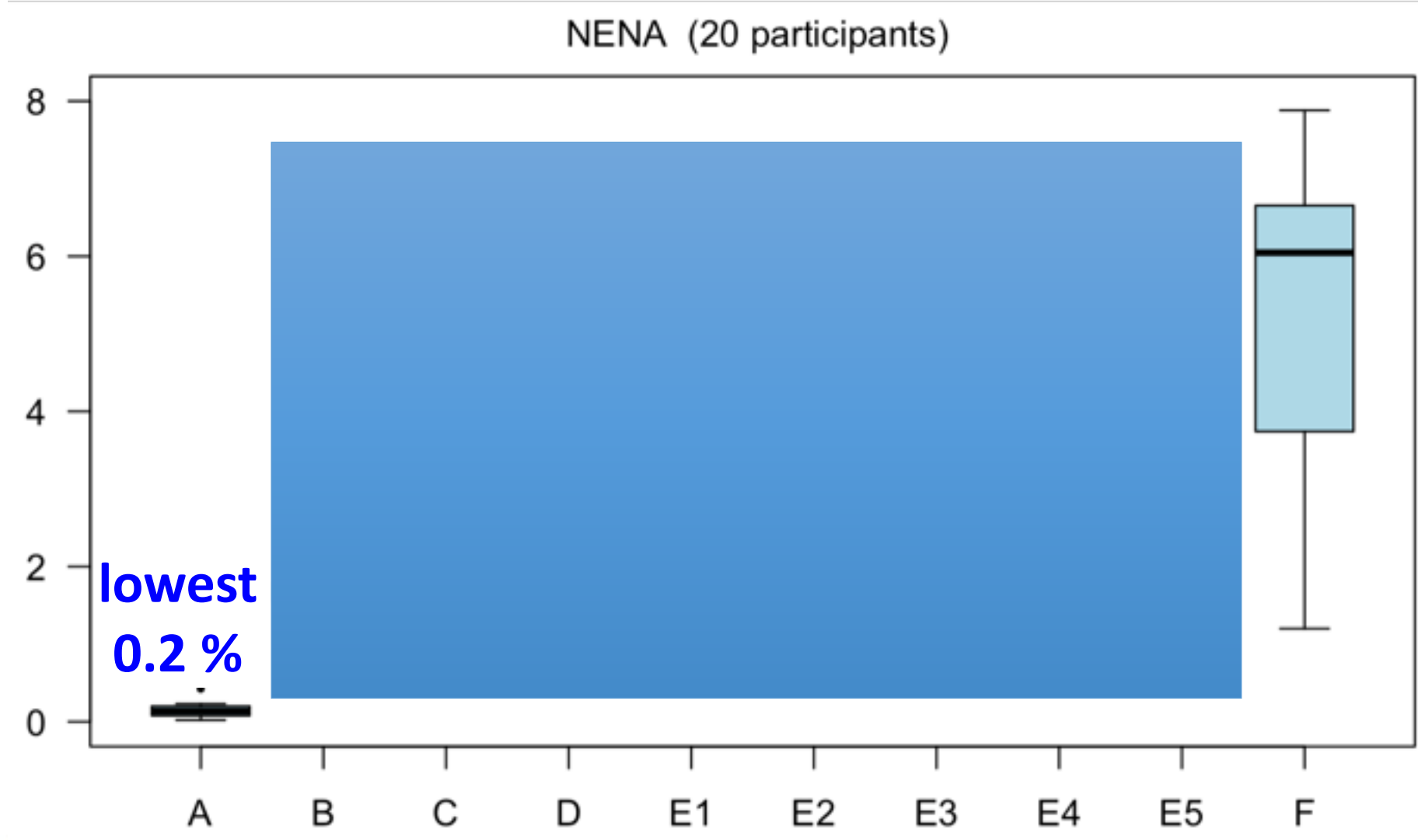
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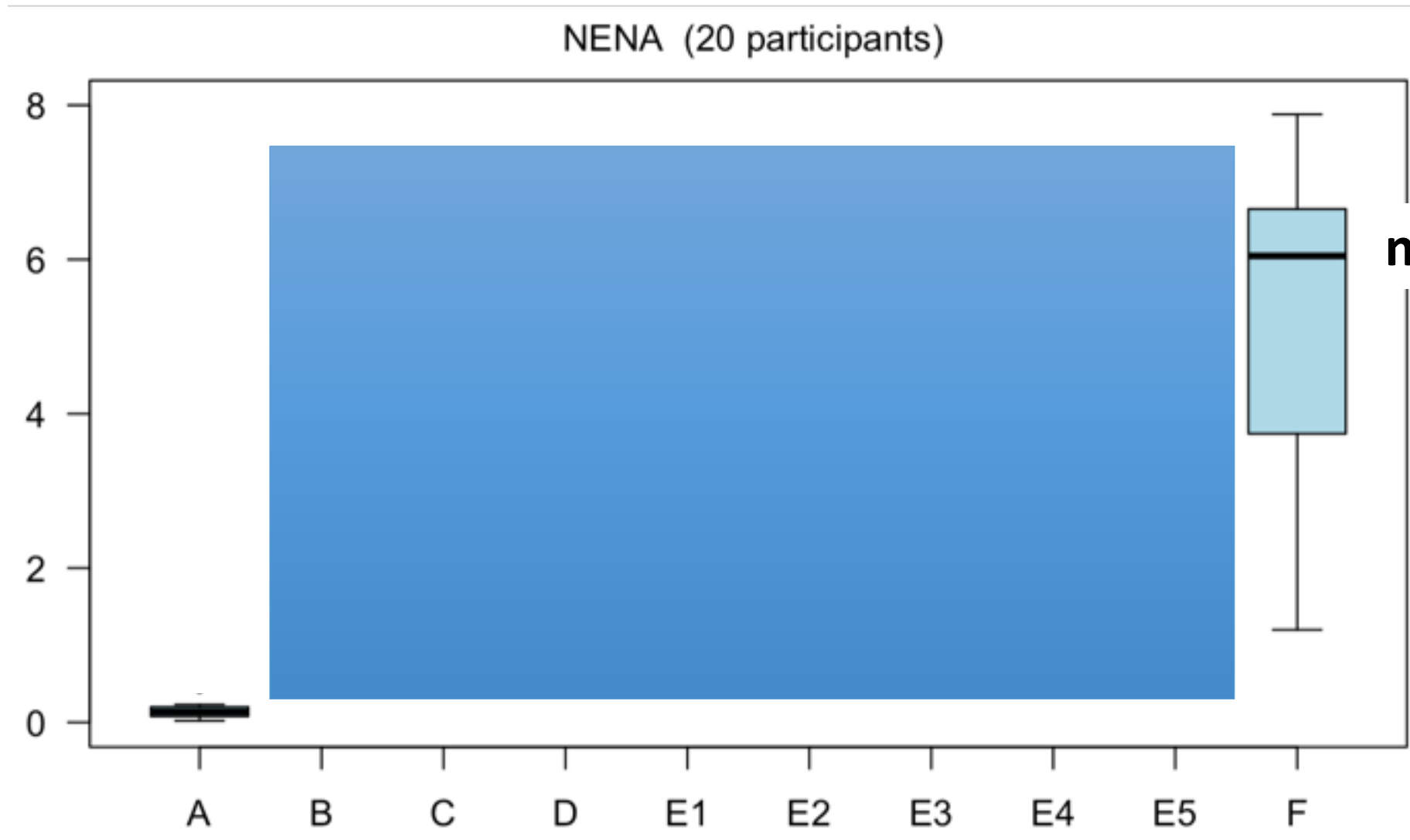
Carbon Walkley & Black (%)



Carbon Walkley & Black (%)



Carbon Walkley & Black (%)

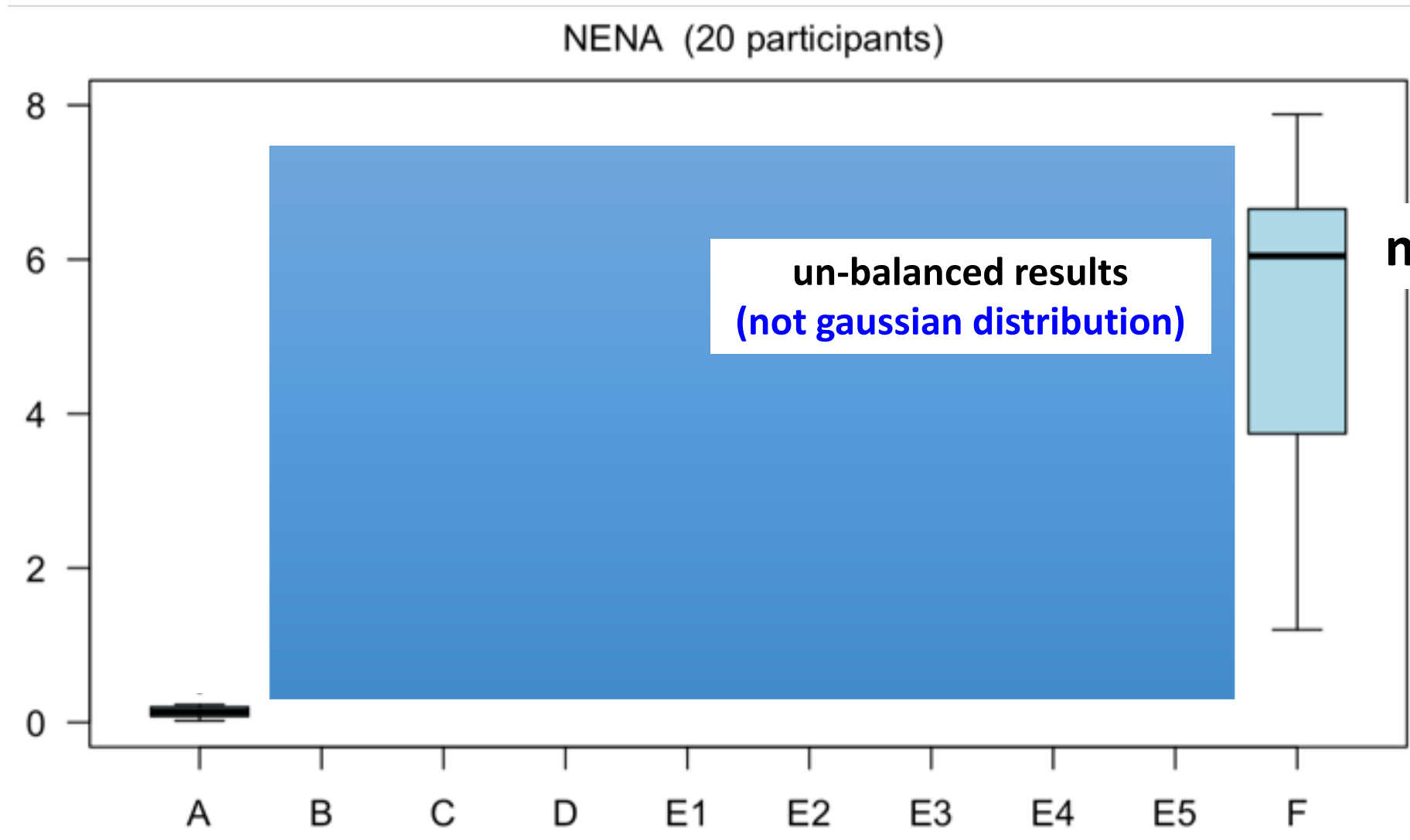


Boxplot

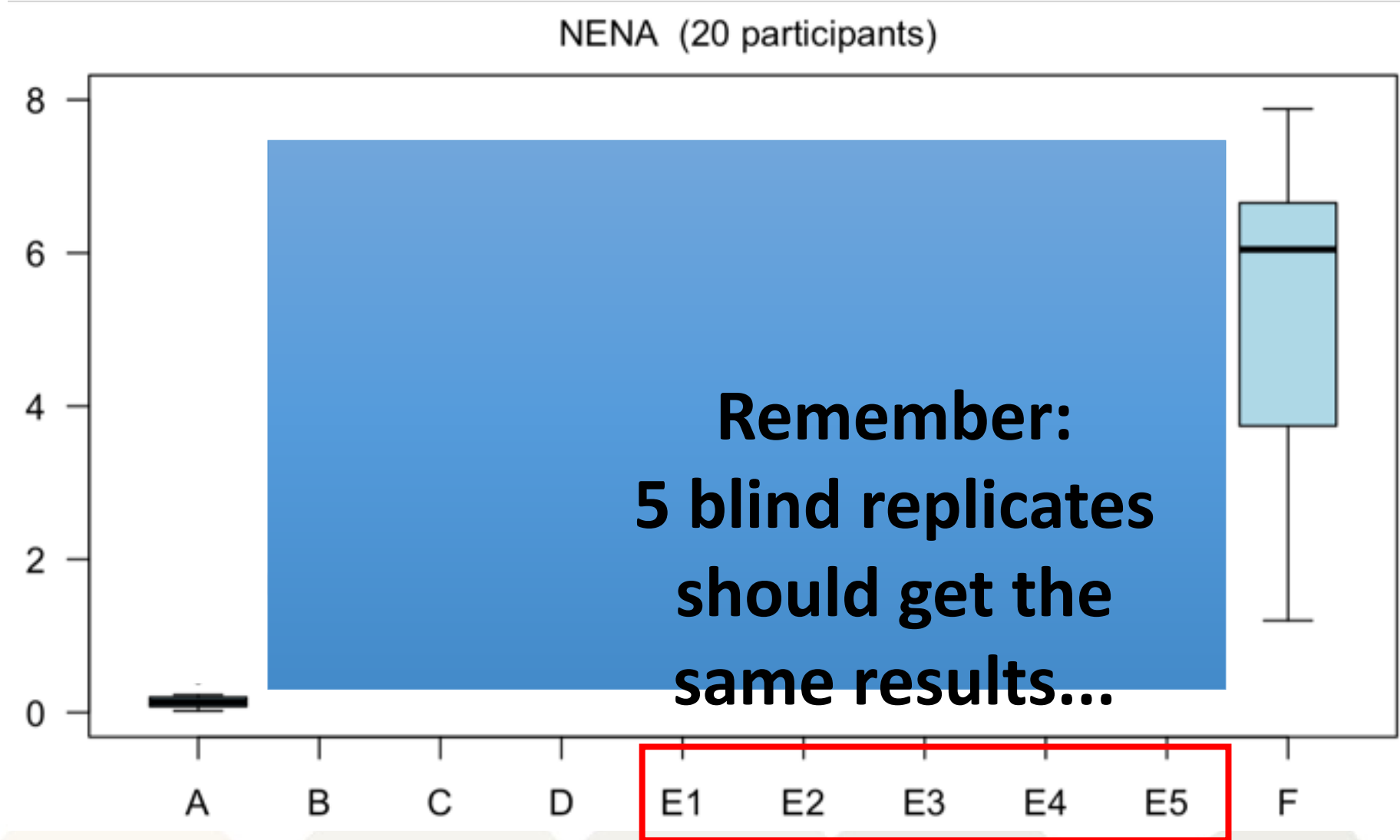
50% of all results
median
50% of all results



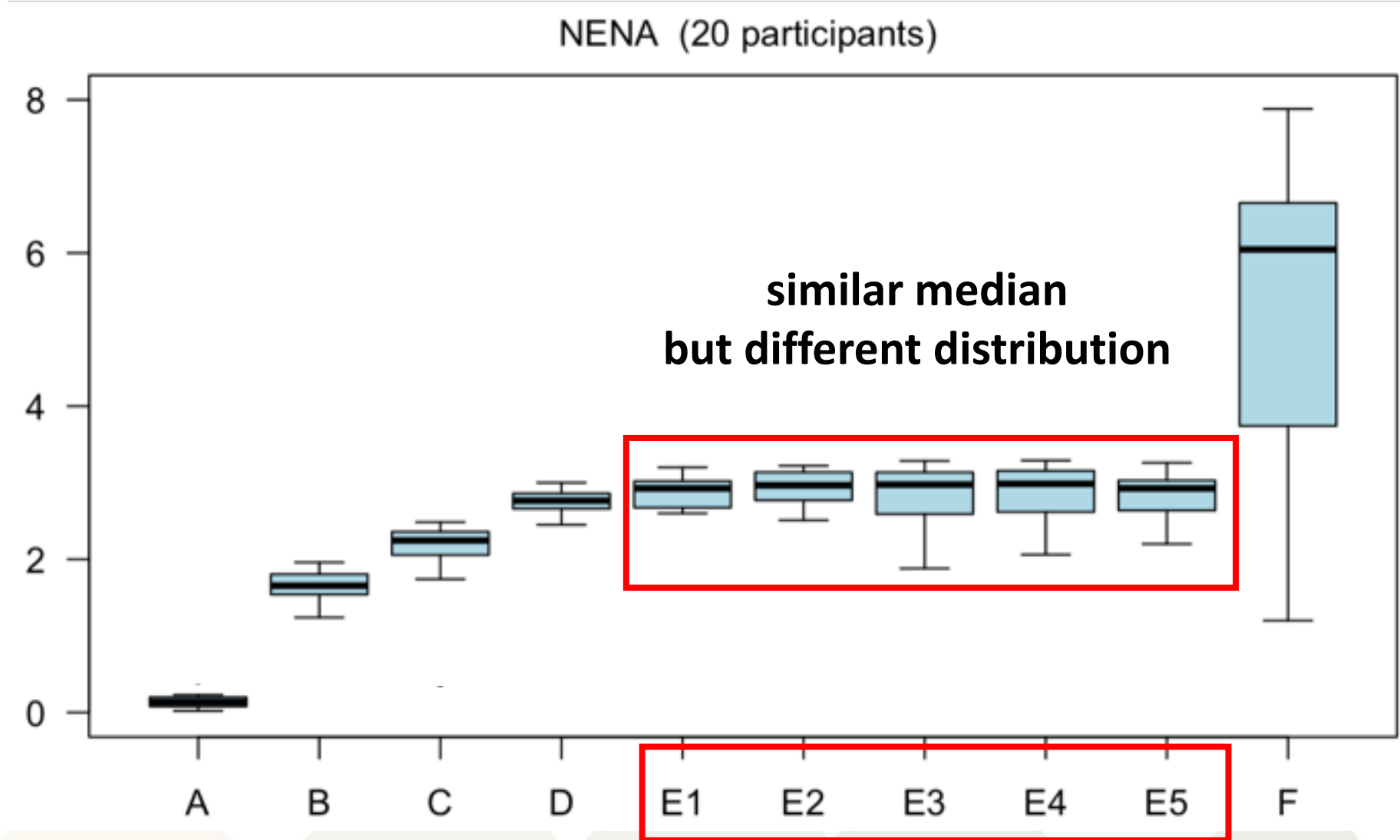
Carbon Walkley & Black (%)



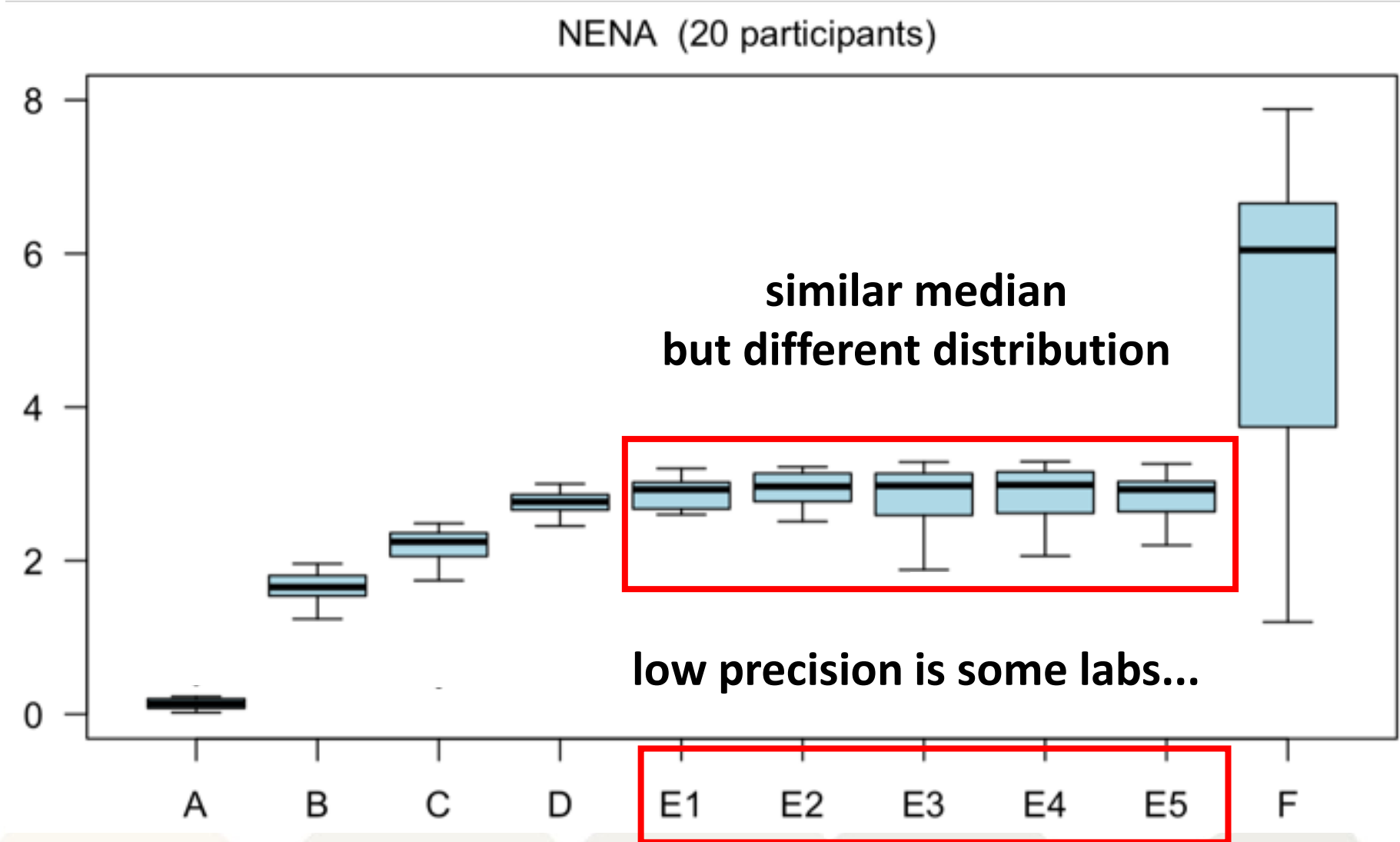
Carbon Walkley & Black (%)



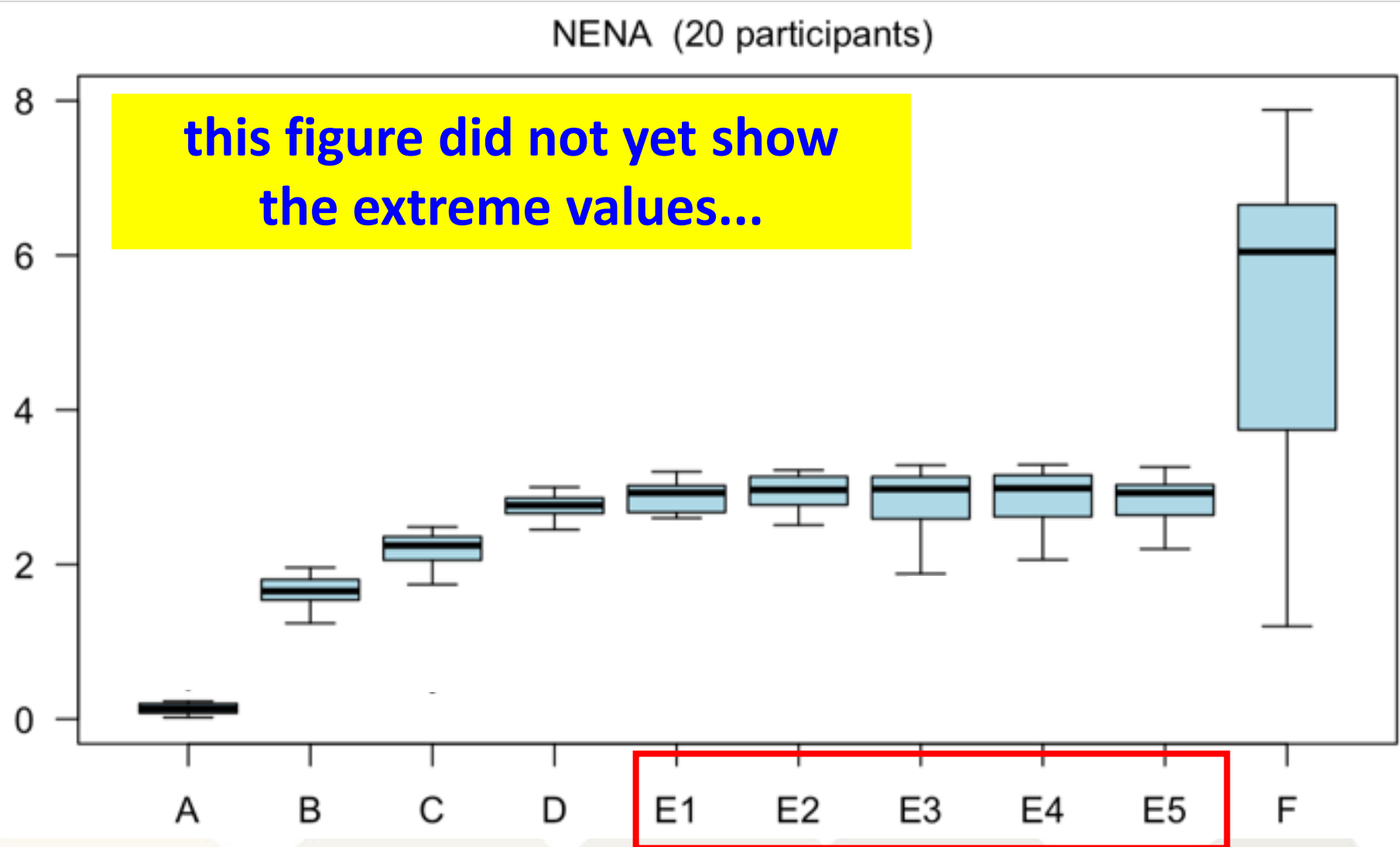
Carbon Walkley & Black (%)



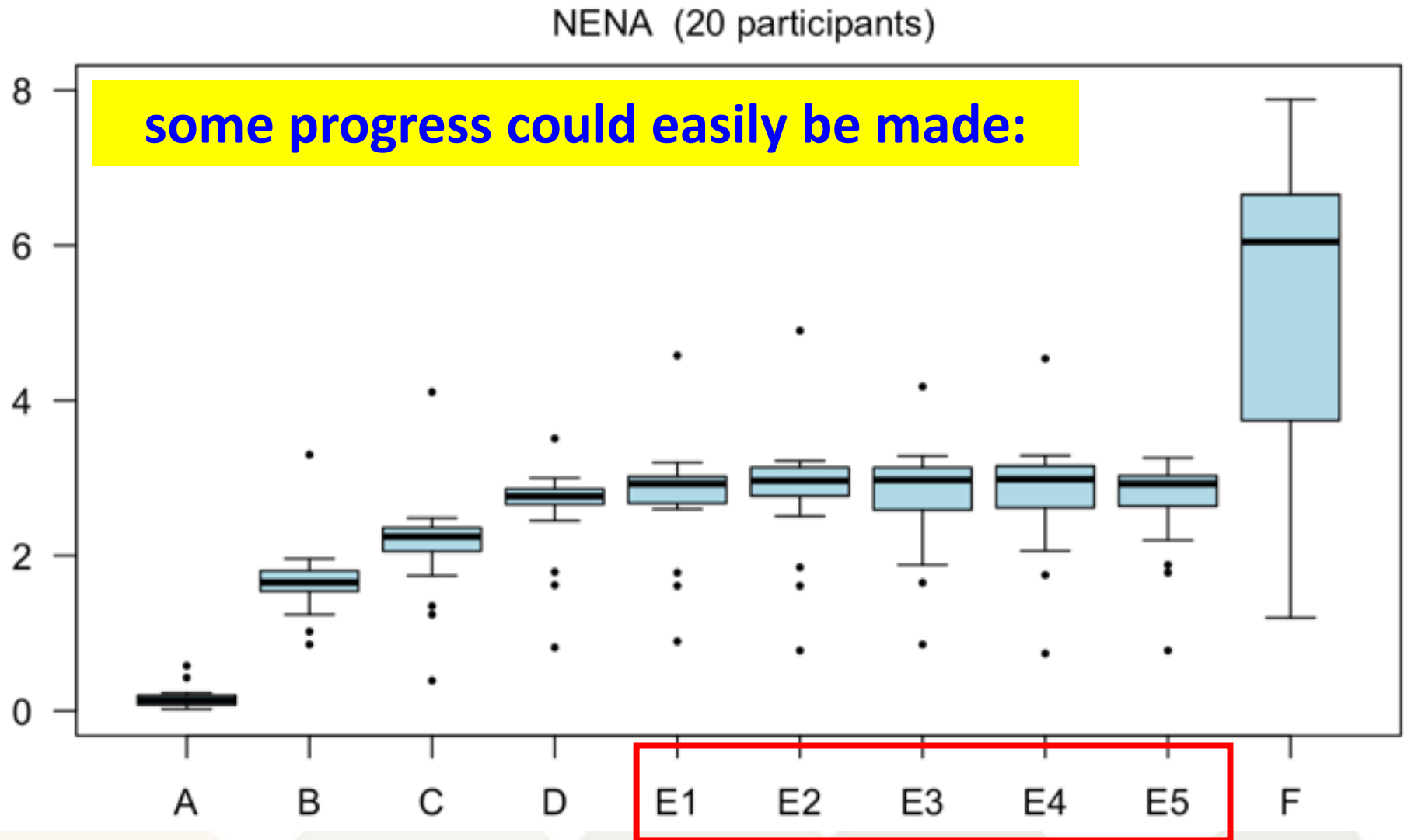
Carbon Walkley & Black (%)



Carbon Walkley & Black (%)



Carbon Walkley & Black (%)

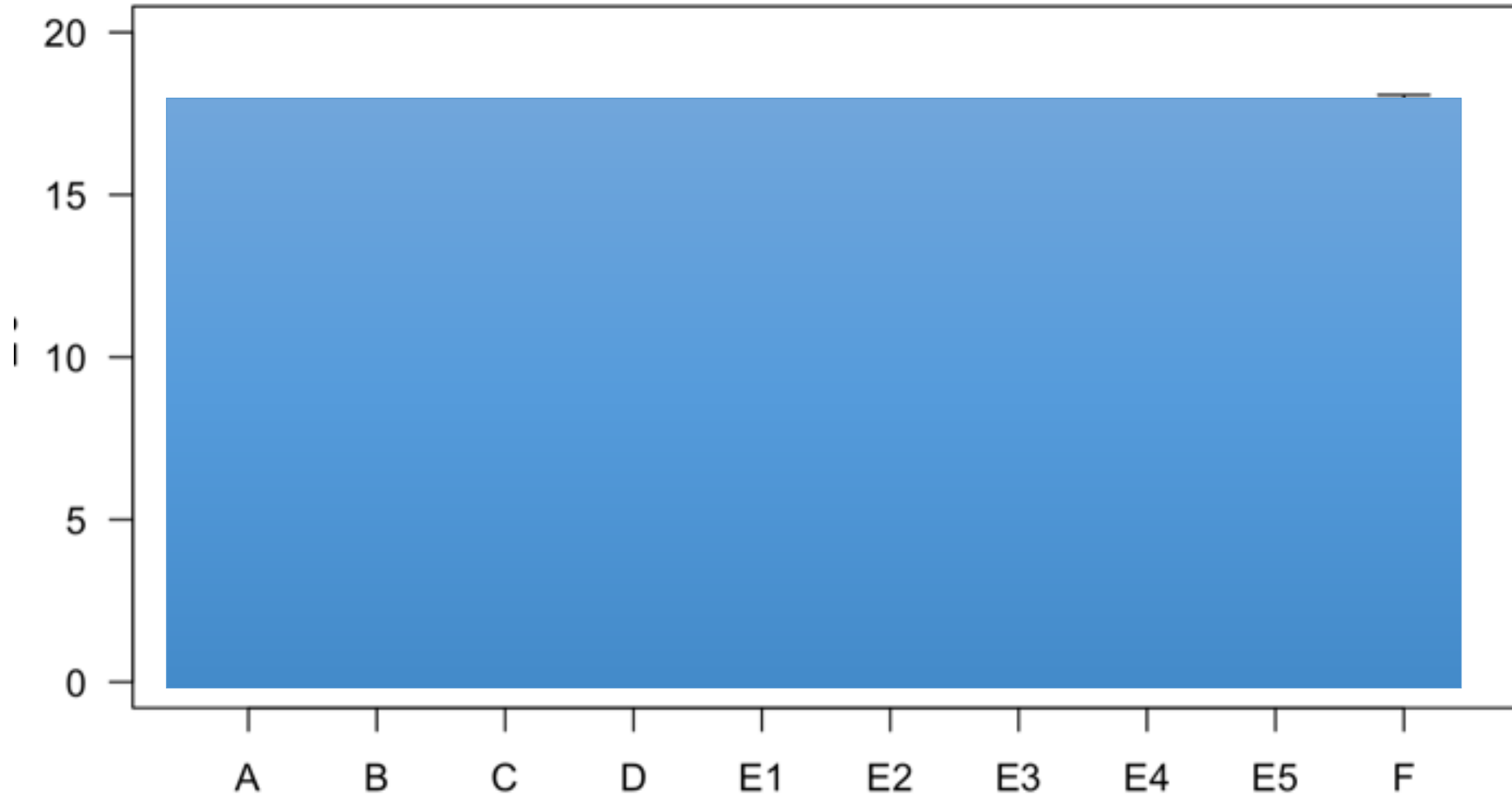


Carbon Dumas (mg/g)

no results....

Carbon by loss of Ignition (%)

NENA (8 participants)

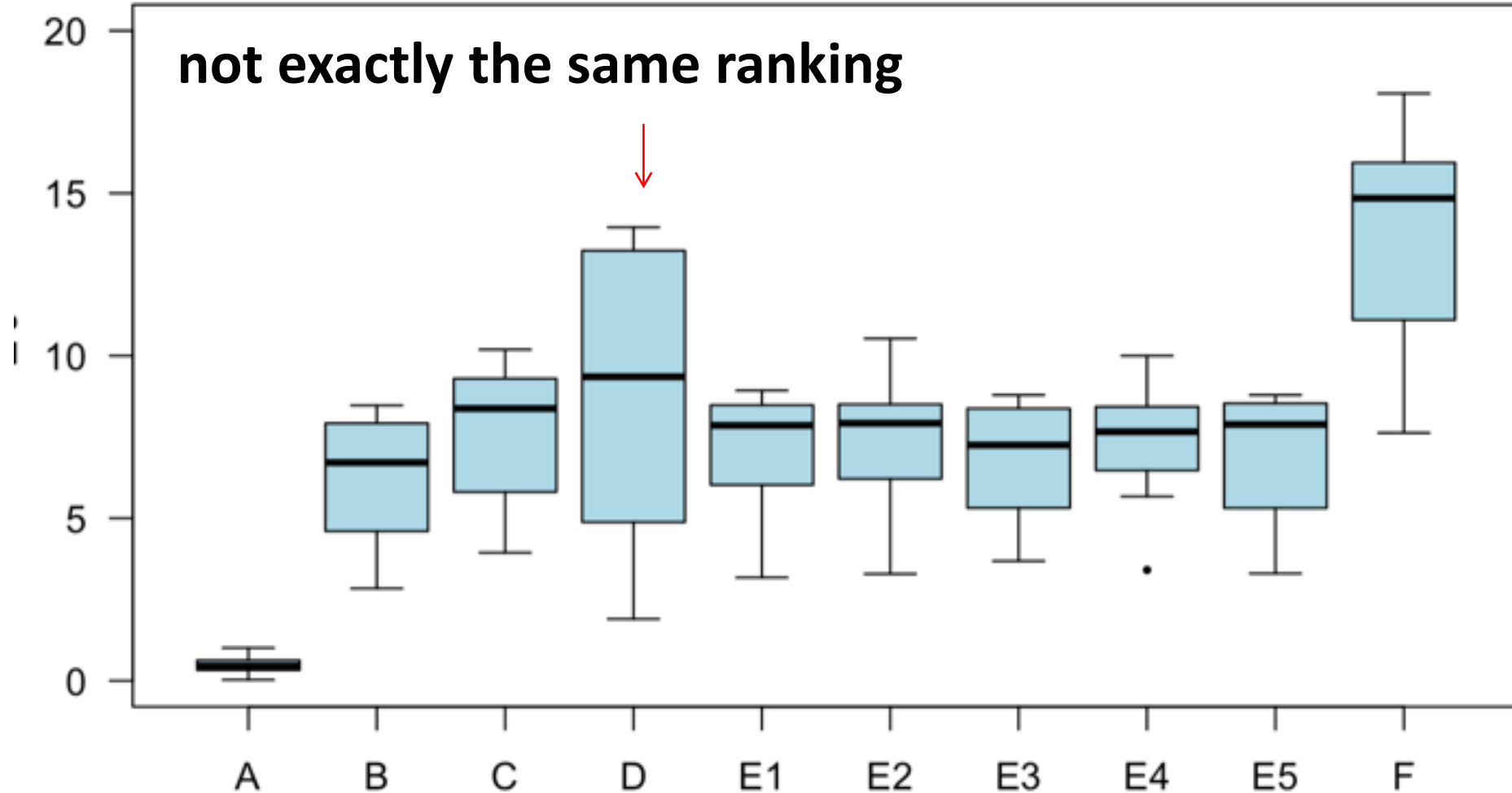


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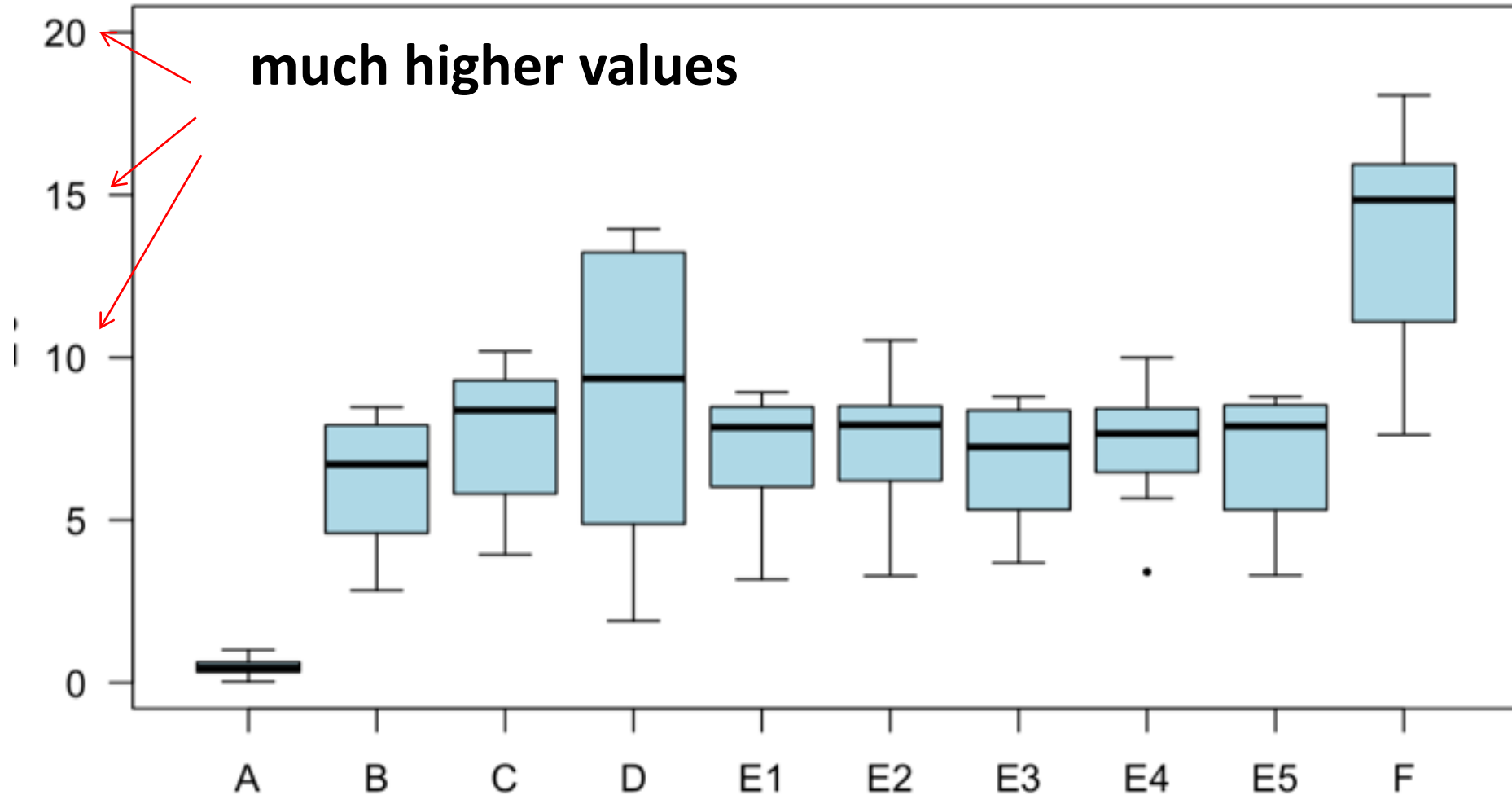
Carbon by loss of Ignition (%)

NENA (8 participants)



Carbon by loss of Ignition (%)

NENA (8 participants)



Conclusions

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1. Carbon content coming from different methods cannot be compared => always clearly indicate which method was used



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- 2. Regional PT should be organised to reduce the dispersion in results between laboratories.**

- 1. Carbon content coming from different methods cannot be compared => always clearly indicate which method was used**
- 2. Regional PT should be organised to reduce the dispersion in results between laboratories.**
- 3. It seems some labs have problems with precision (not the same result when analysing the same sample) => they should use internal control samples for EACH batch!**

'Appendix'

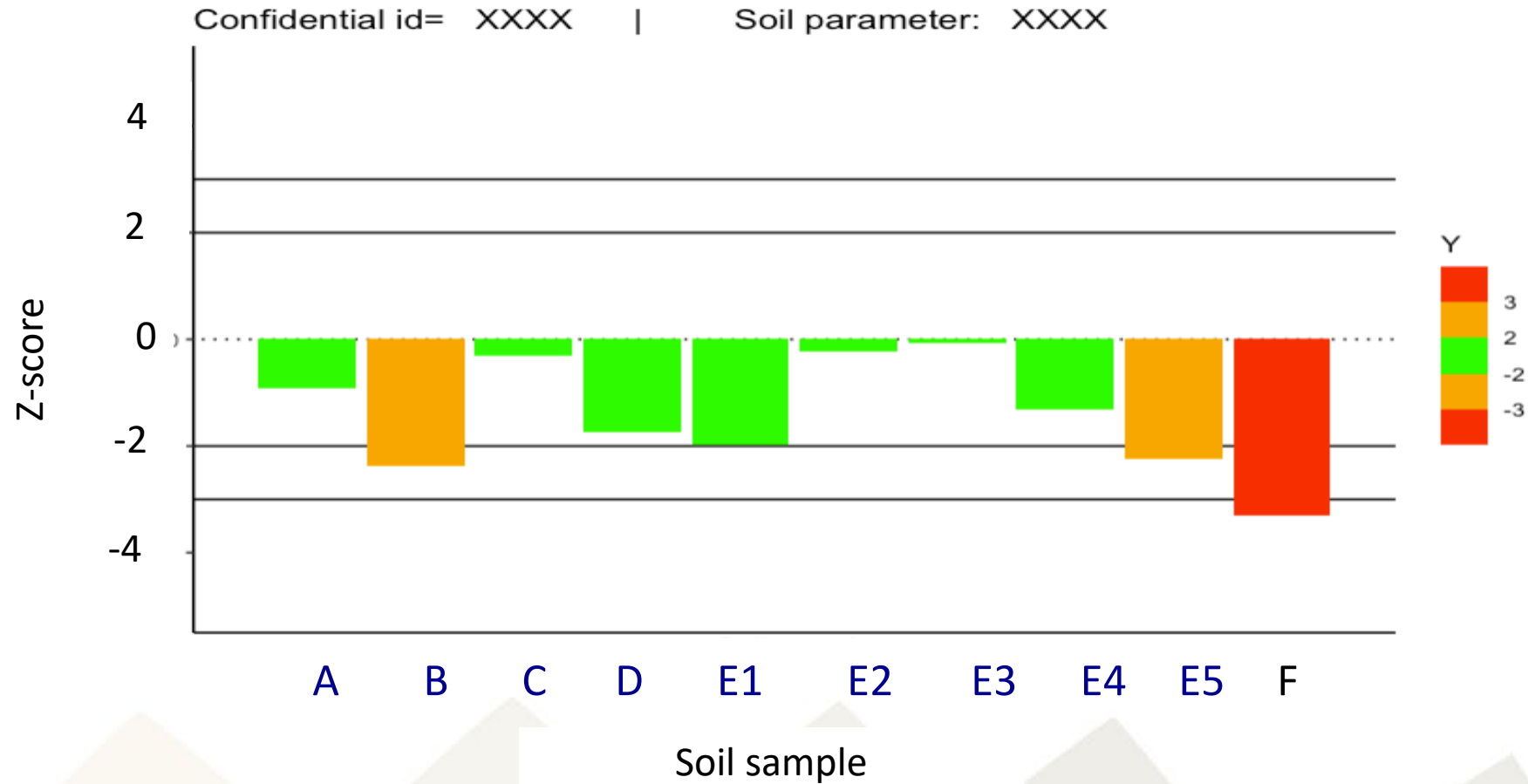
Laboratory performances sheet

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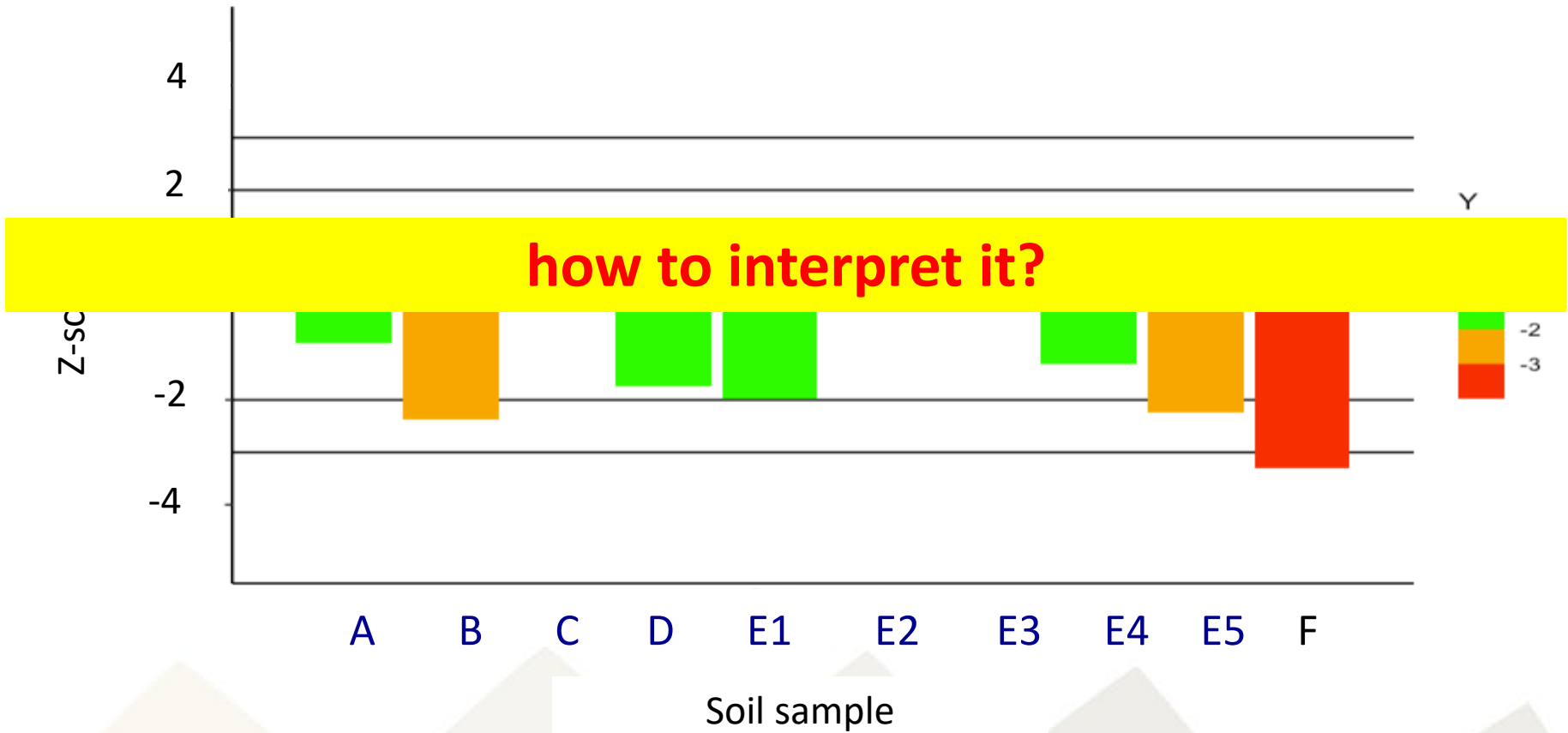


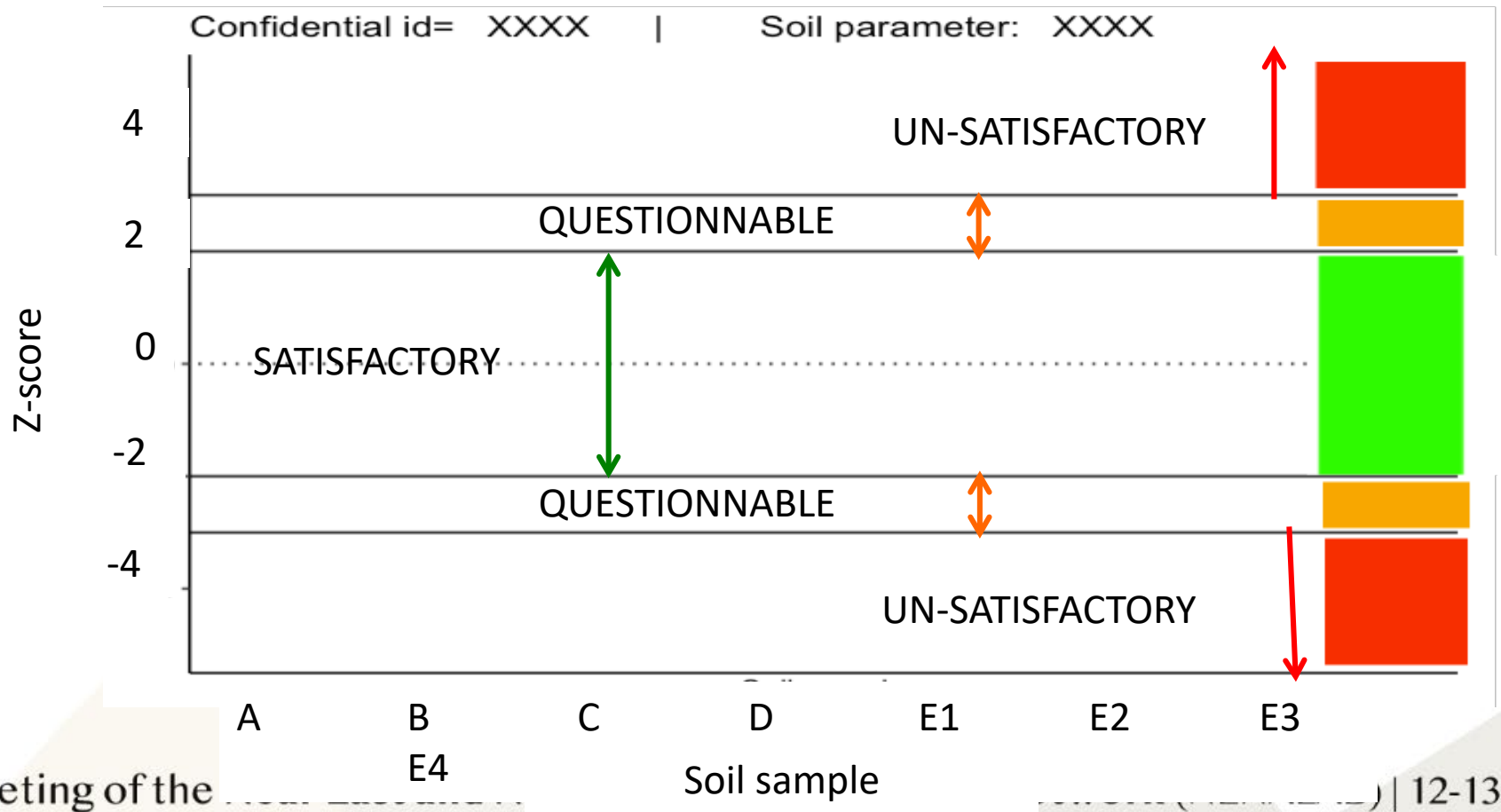
**For each parameter you have analysed,
you will receive a figure that looks like this:**

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you will receive a figure that looks like this:

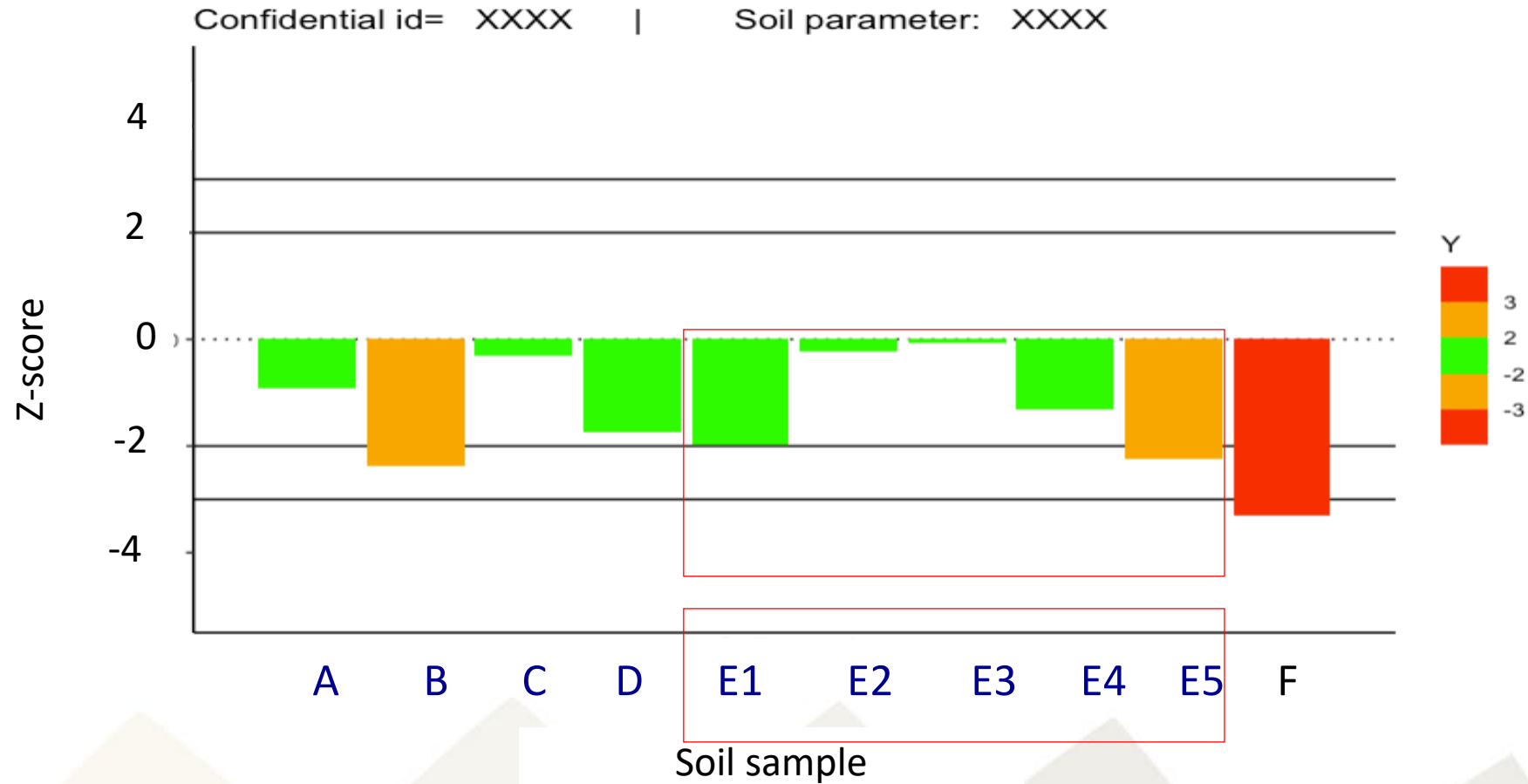


Confidential id= XXXX | Soil parameter: XXXX



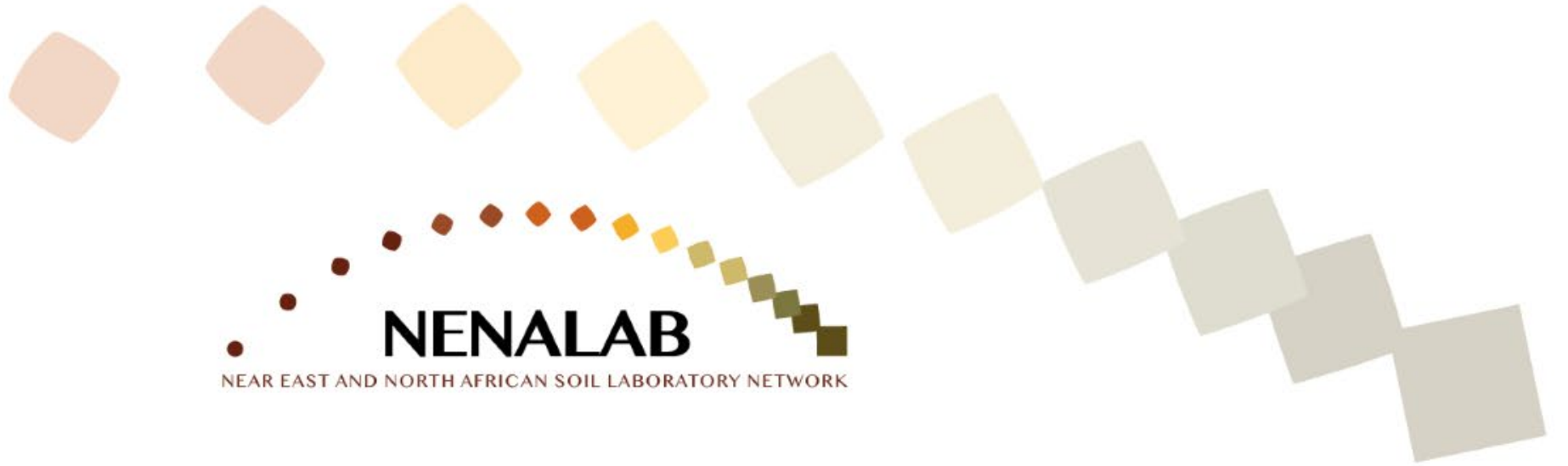


Remember that for the 5 blind replicates,
you should obtain similar Z score (= similar results)





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Thank you for your attention

