



Data analysis 2022BCEPR2env-set2

- 202230BCEPR_ciat
- 202238BCEPR_cere

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@BiovIntCIAT_eng

@BiovIntCIAT_esp

#Alliance4Science

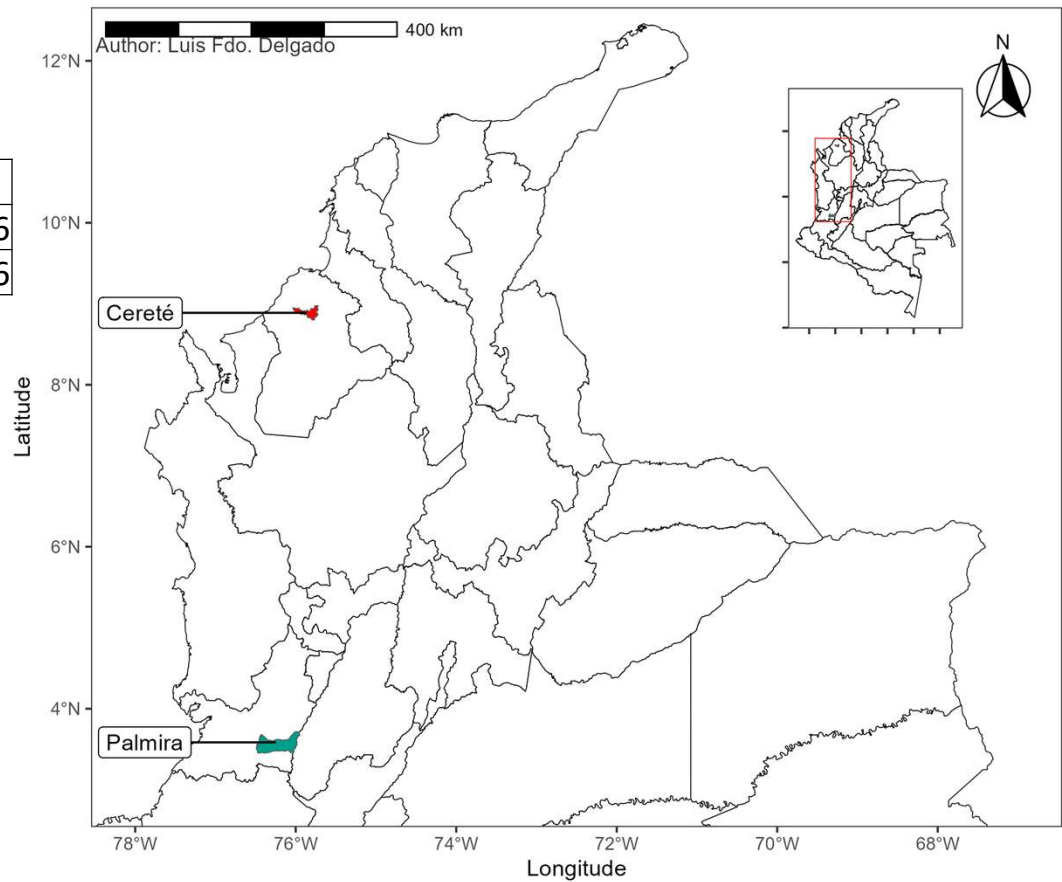
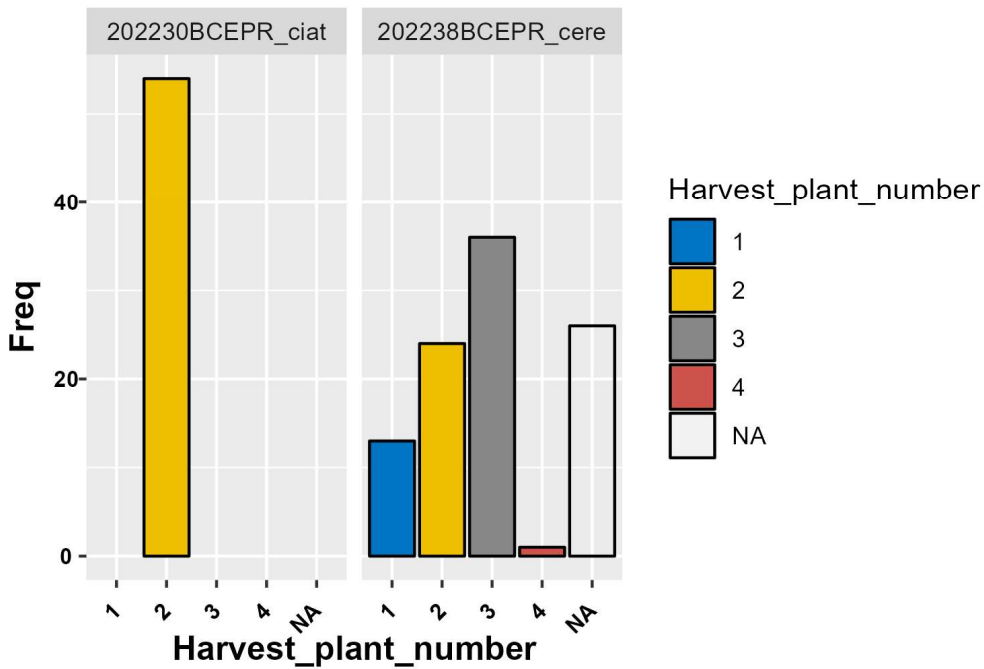
The Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) is part of CGIAR, a global research partnership for a food-secure future

Resolvable row-col with randomized checks

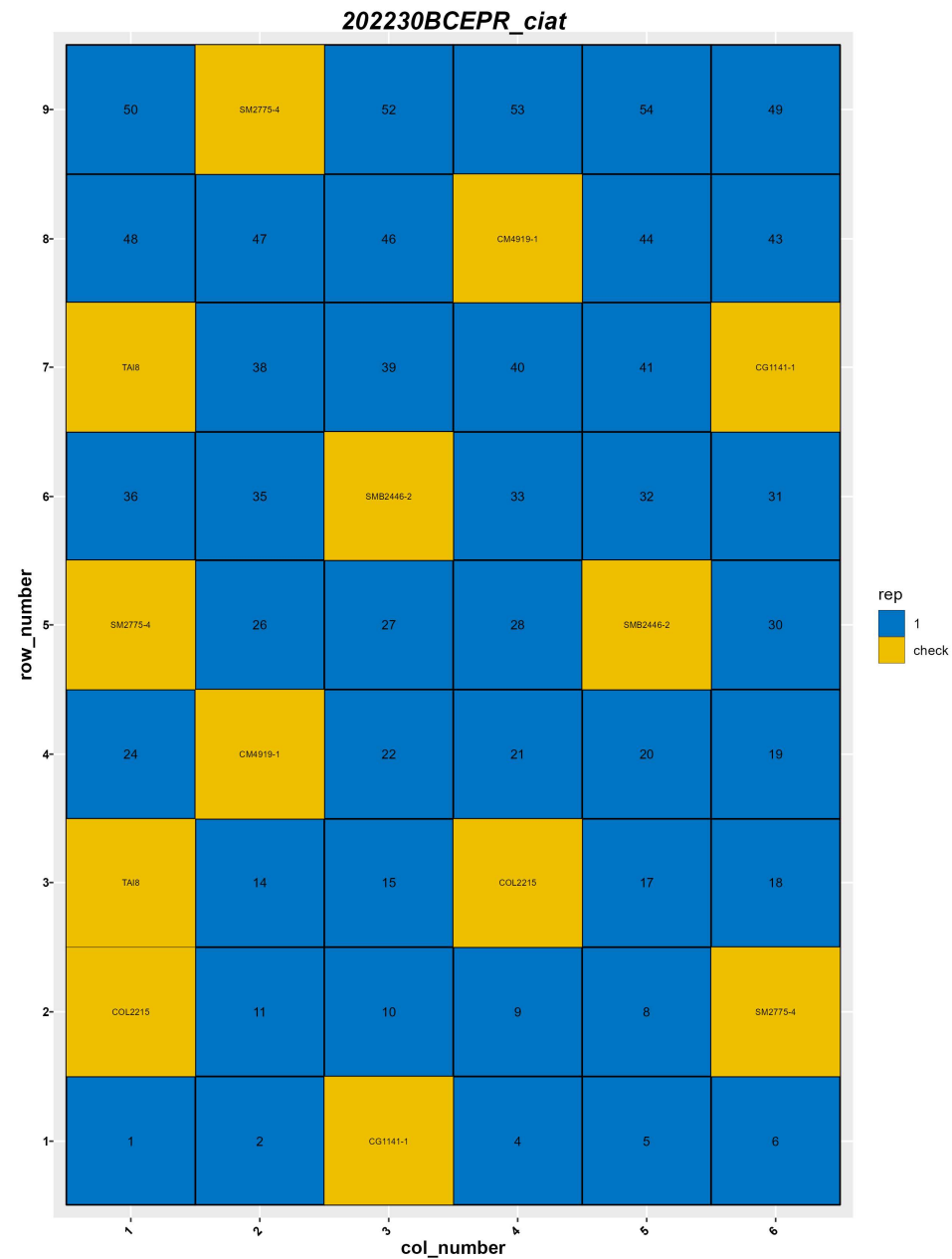
use_trial_name	use_plant_date	use_harvest_date	harvesting_time	use_location	n_gen
202230BCEPR_ciat	2022-July-07	2023-May-09	10month 2day	CIAT. Valle, Colombia	46
202238BCEPR_cere	2022-August-05	2023-May-10	9month 5day	Cerete. Cordoba, Colombia	46

Plot size:

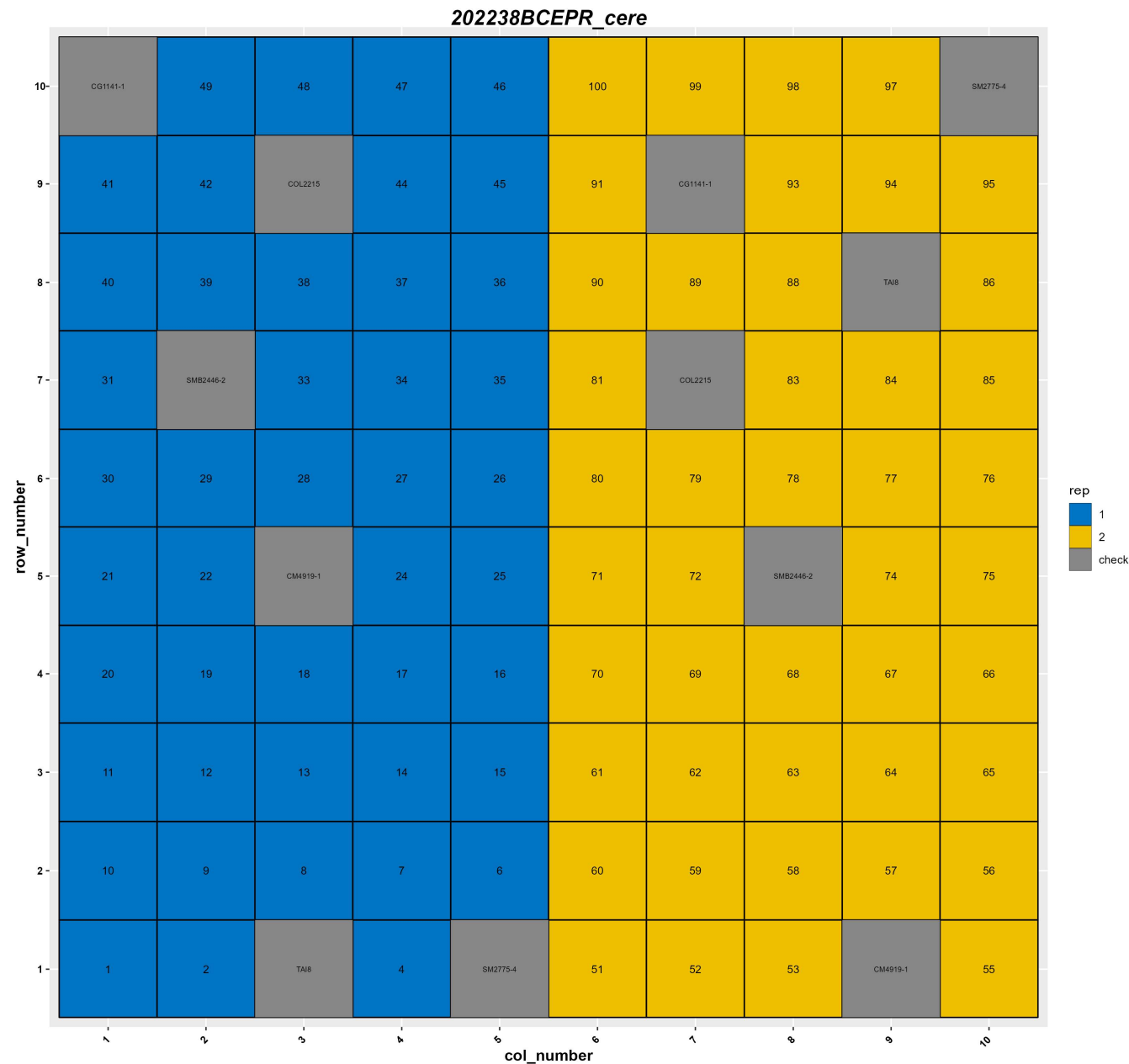
- 202230BCEPR_ciat, 5 plants per plot, harvesting 2 plants for **root_type**
- 202238BCEPR_cere, 5 plants per plot, harvesting 4 plants for **yield**



Trial Design – Row col



Check varieties are completely randomized



Check genotypes

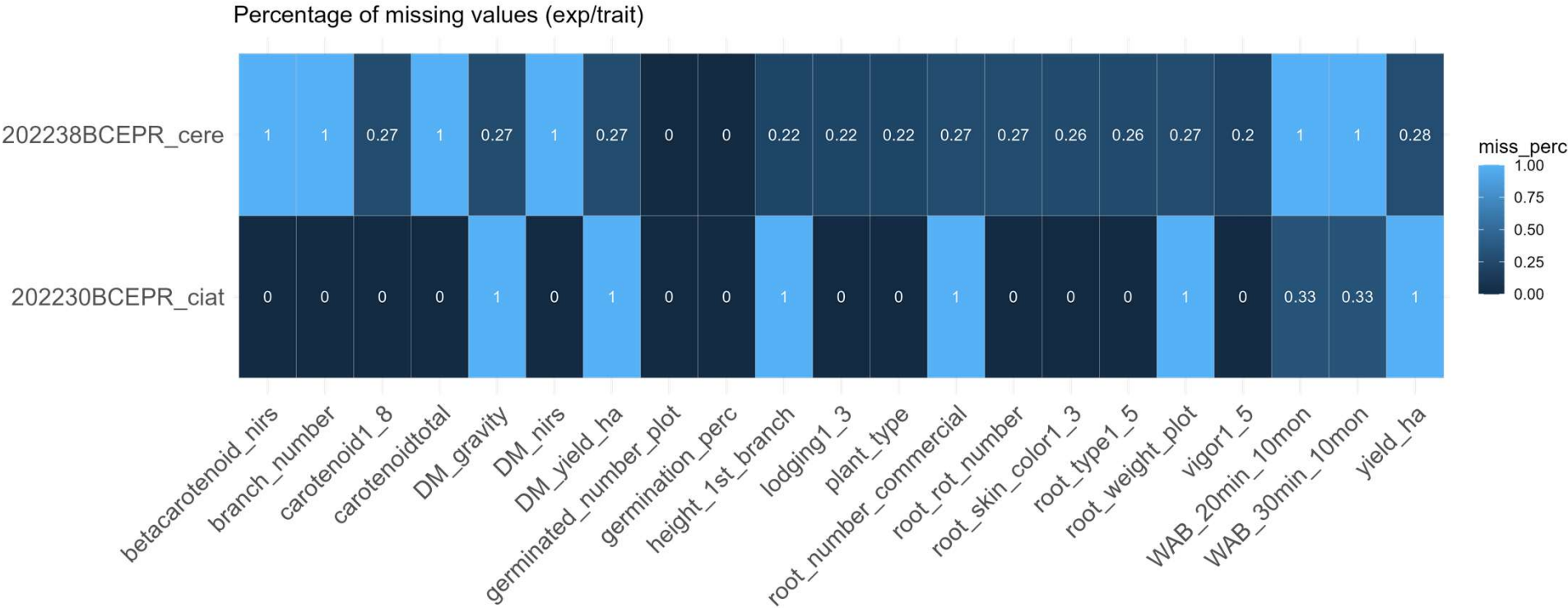
1. CG1141-1_is_Costena
2. CM4919-1_is_Veronica
3. COL2215_is_Venezolana
4. SM2775-4_is_Bellotti
5. SMB2446-2_is_Caiseli
6. TAI8_is_TAI

Exploratory data analysis

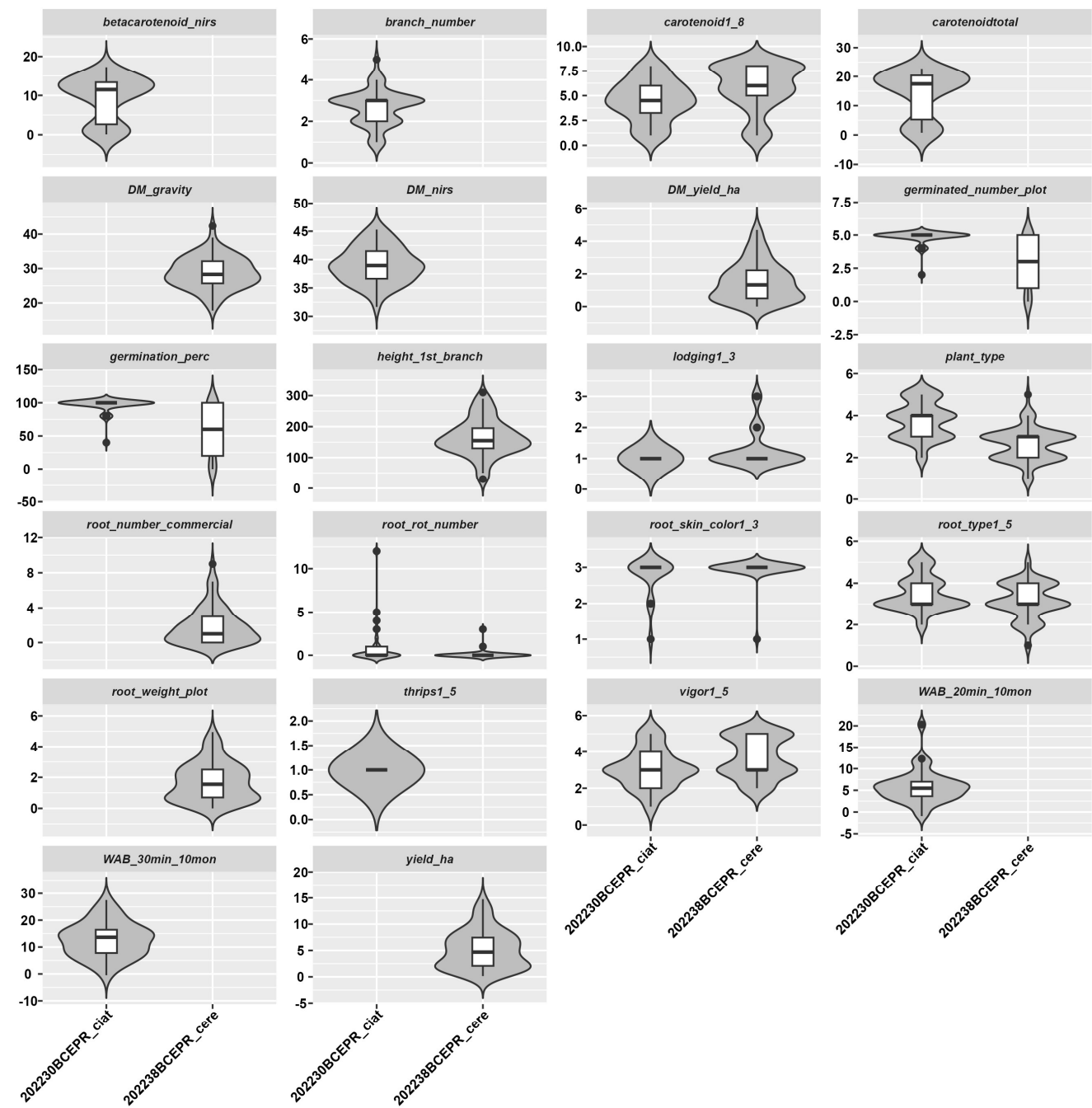
Traits evaluated

betacarotenoid_nirs
branch_number
carotenoid1_8
carotenoidtotal
DM_gravity
DM_nirs
DM_yield_ha
germinated_number_plot
germination_perc
height_1st_branch
lodging1_3
plant_type
root_number_commercial
root_rot_number
root_skin_color1_3
root_type1_5
root_weight_plot
vigor1_5
WAB_20min_10mon
WAB_30min_10mon
yield_ha

Missing values across trials



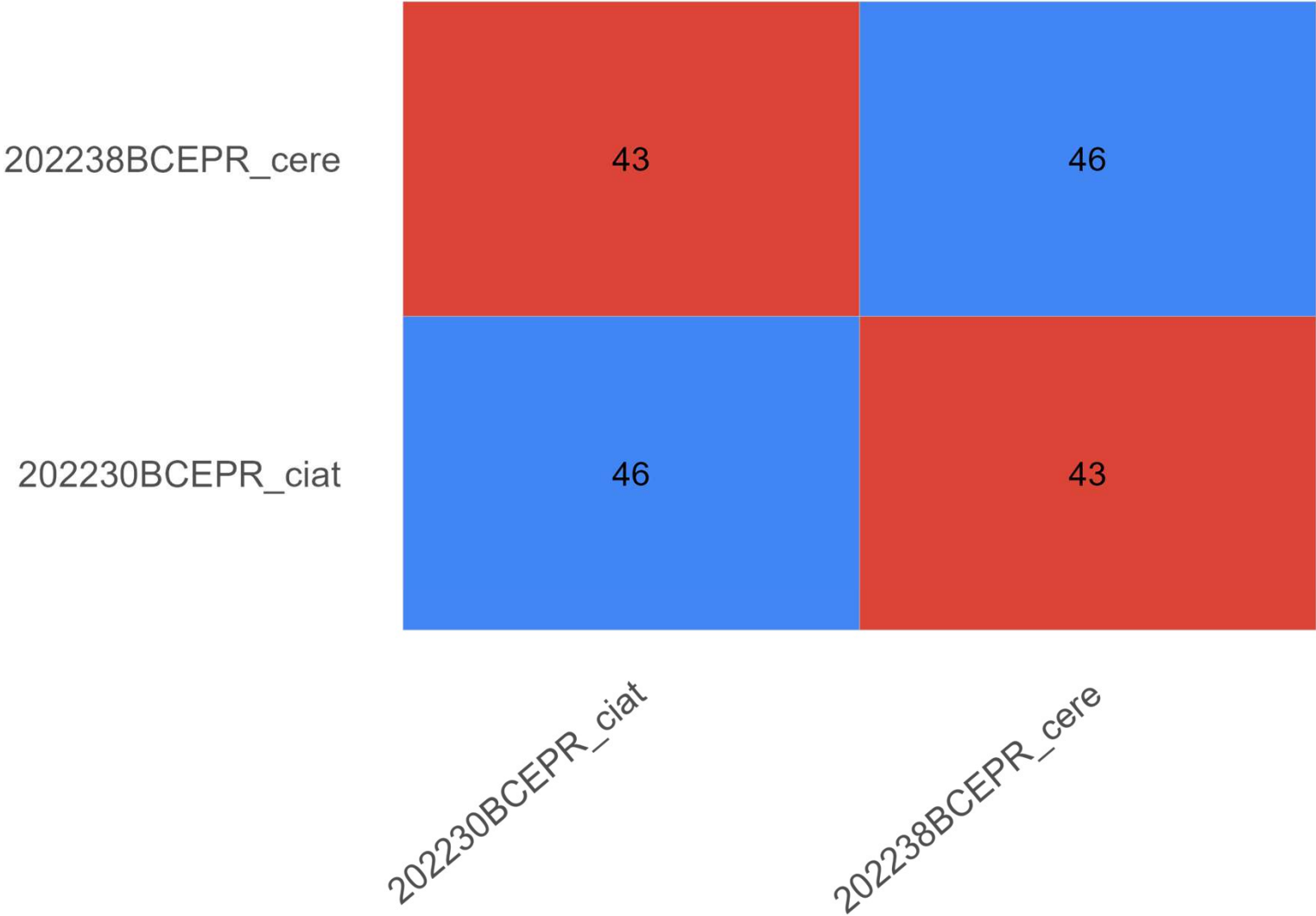
Trait variation across trials (phenotypic value)



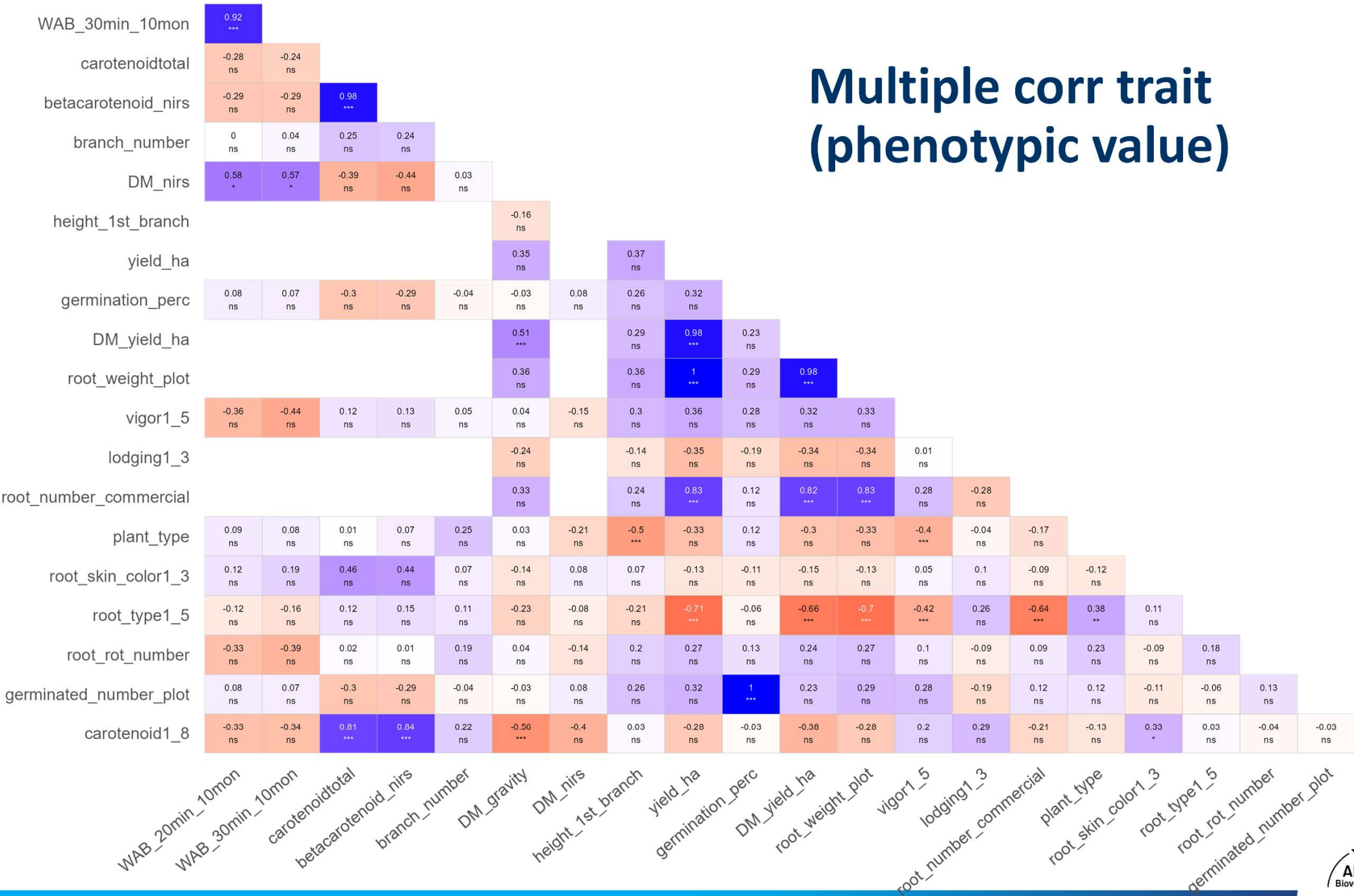
Shared genotypes

Connectivity Matrix

43 -46 shared
genotypes found.



Multiple corr trait (phenotypic value)

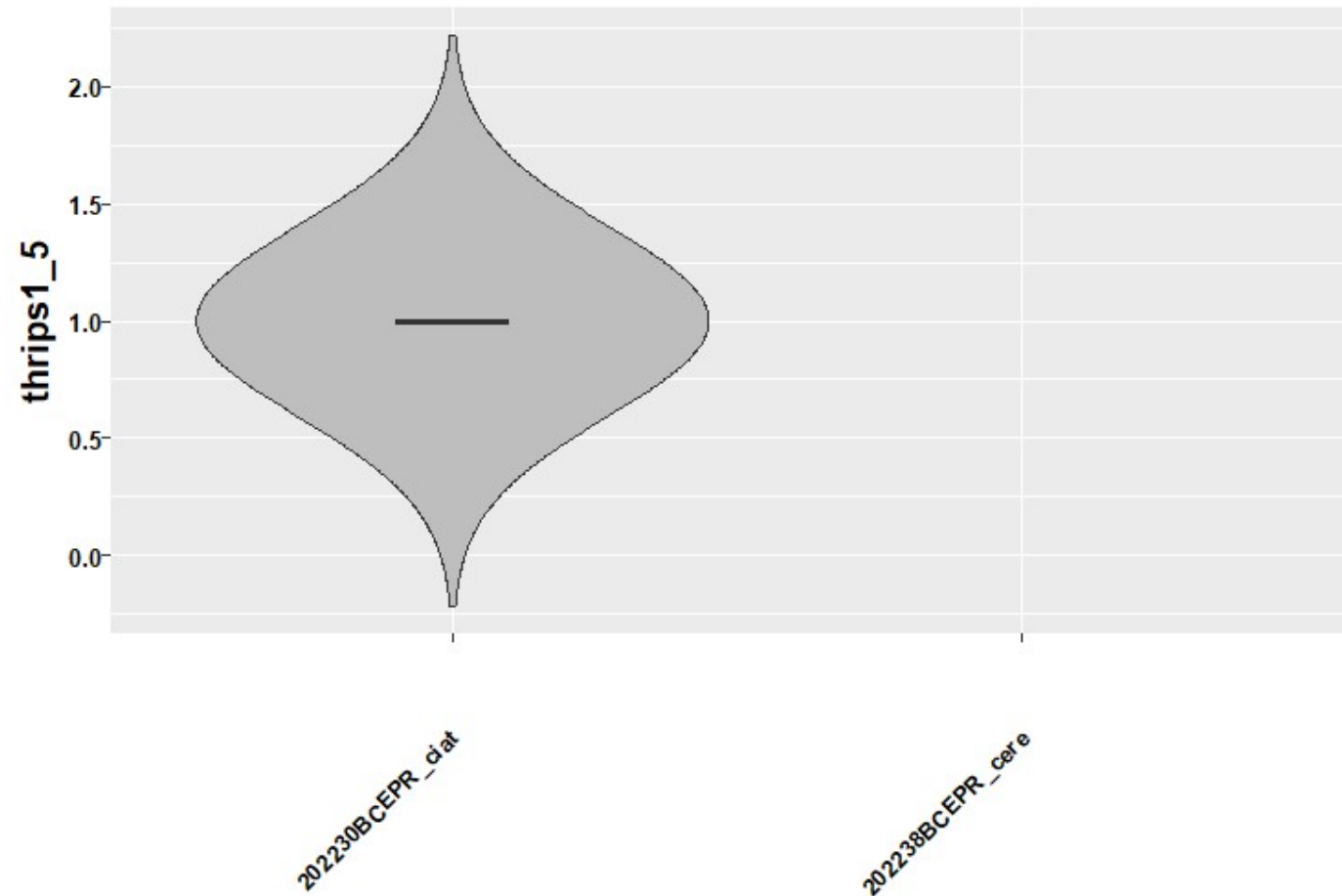


Statistical data analysis

No variation dropped traits

- thrips1_5

thrips1_5 trait
was removed
from the analysis
because its
 $\text{mean_of_sd} = 0$



Single heritability

Moderate to low heritability among two locations.

trial	betacarotenoid_nirs	branch_number	carotenoid1_8	carotenoidtotal	DM_gravity	DM_nirs	DM_yield_ha	germinated_number_plot	germination_perc	height_1st_branch	lodging1_3	plant_type	root_number_commercial	root_rot_number	root_skin_color1_3	root_tuber1_5	root_weight_plot	vigor1_5	WAB_20min_10mon	WAB_30min_10mon	yield_ha
202230BCEPR_ciat	1	0.74	1	1	0.97							0.88		0.99	0.84	0.64		0.88	0.24	0.41	
202238BCEPR_cere			0.89		0.81		0.6	0.81	0.81	0.76	0.43	0.55	0.54	0.36		0.36	0.58	0			0.56

Below single heritability is too high to be true (202230BCEPR_ciat trial)

trait	trial	heritability
carotenoidtotal	202230BCEPR_ciat	1
betacarotenoid_nirs	202230BCEPR_ciat	1
DM_nirs	202230BCEPR_ciat	0.97
root_rot_number	202230BCEPR_ciat	0.99
carotenoid1_8	202230BCEPR_ciat	1

Without the information on random variability and experimental error provided by replication, single heritability may be **overestimated** because these sources of variation are not accounted for. Therefore, it is important to interpret heritability results from trials without **replications** with **caution** and to consider the possibility that replication controls may influence the results.



Thank you!