



Data analysis DVPRC, DMPRC & CQPRC - 11 environments

Year 2022

- 2022102DVPRC_stom
- 2022105DVPRC_cere

Year 2021

- 202183DVPRC_momi
- 202167DMPRC_polo
- 202171DVPRC_repe

Year 2020

- 202051DMPRC_pivi
- 202052DMPRC_momi
- 202053DMPRC_cere
- 202054CQPRC_pivi
- 202055CQPRC_momi
- 202056CQPRC_cere

Luis Fernando Delgado Munoz
luis.delgado@cgiar.org
Palmira, August 2022



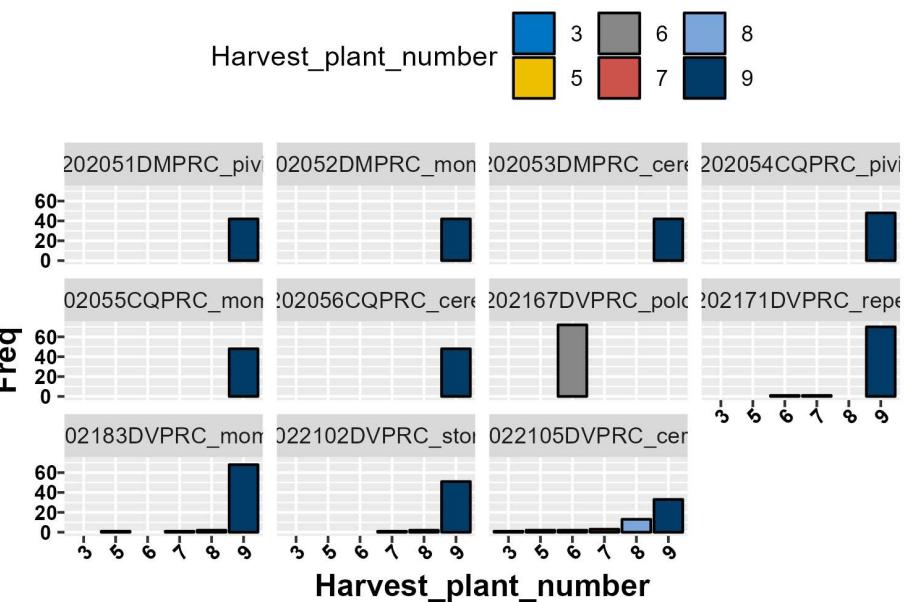
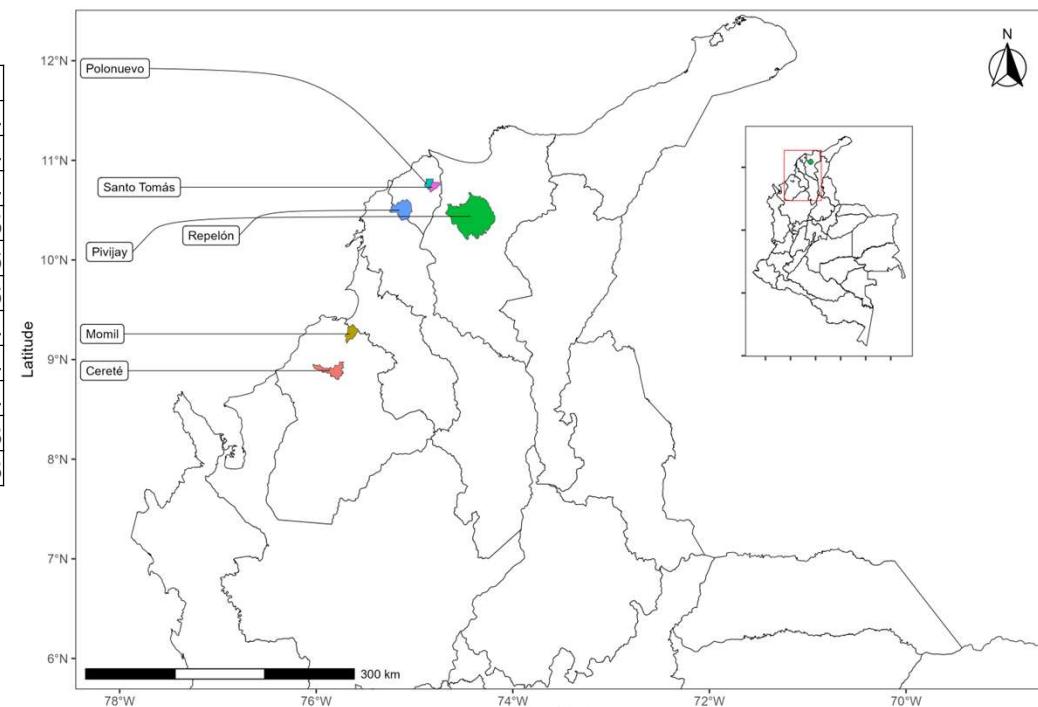
@BiovIntCIAT_eng
@BiovIntCIAT_esp

#Alliance4Science

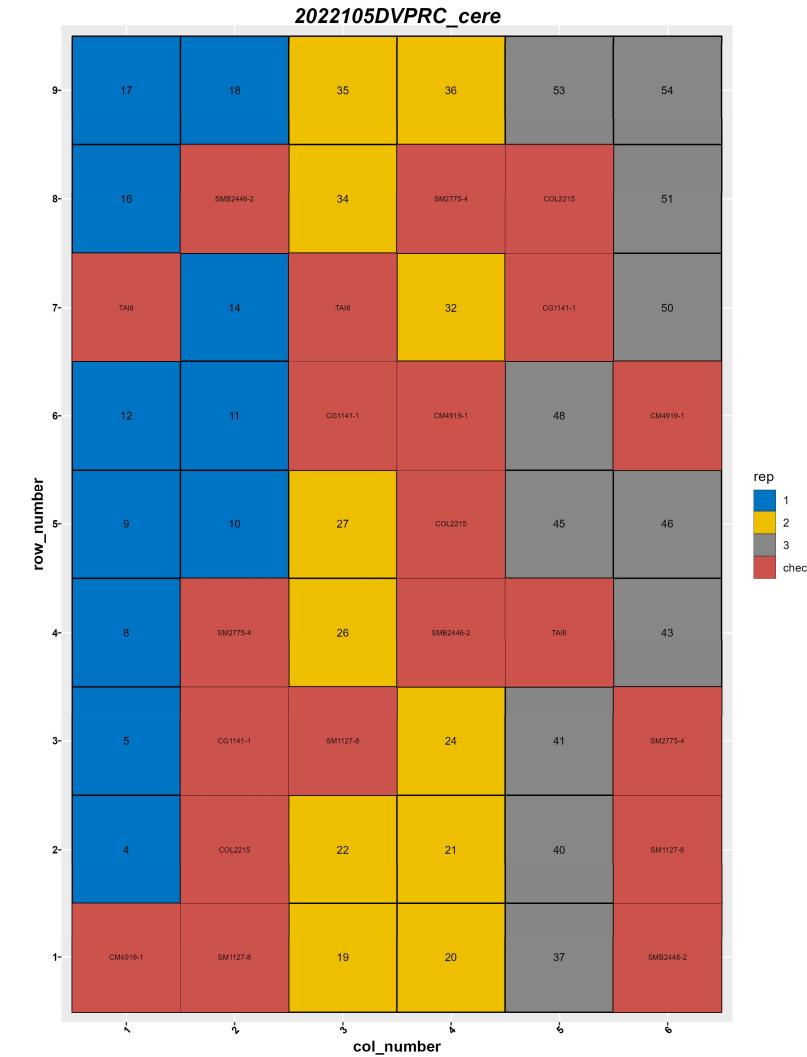
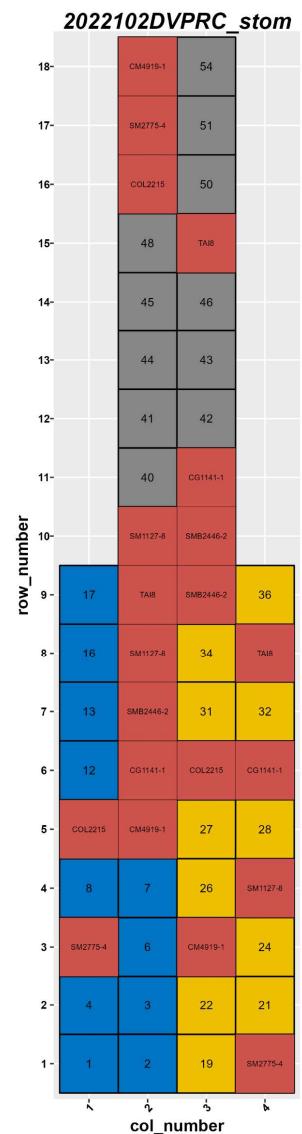
Resolvable row-col with randomized checks

use_trial_name	use_plant_date	use_harvest_date	harvesting_time	use_location	n_gen
202051DMPRC_pivi	2020-September-02	2021-July-21	10month 19day	Pivijay. Magdalena, Colombia	14
202052DMPRC_momi	2020-September-04	2021-August-12	11month 8day	Momil. Cordoba, Colombia	14
202053DMPRC_cere	2020-September-07	2021-July-02	9month 25day	Cerete. Cordoba, Colombia	14
202054CQPRC_pivi	2020-September-09	2021-July-22	10month 13day	Pivijay. Magdalena, Colombia	15
202055CQPRC_momi	2020-September-04	2021-August-12	11month 8day	Momil. Cordoba, Colombia	16
202056CQPRC_cere	2020-July-28	2021-March-01	7month 1day	Cerete. Cordoba, Colombia	16
202167DVPRC_polo	2021-August-26	2022-September-02	12month 7day	Polonuevo. Atlantico, Colombia	24
202171DVPRC_repe	2021-August-27	2022-August-24	11month 28day	Repelon. Atlantico, Colombia	24
202183DVPRC_momi	2021-September-13	2022-June-17	9month 4day	Momil. Cordoba, Colombia	24
2022102DVPRC_stom	2022-September-26	2023-July-24	9month 28day	Santo Tomas. Atlantico, Colombia	18
2022105DVPRC_cere	2022-September-29	2023-July-26	9month 27day	Cerete. Cordoba, Colombia	18

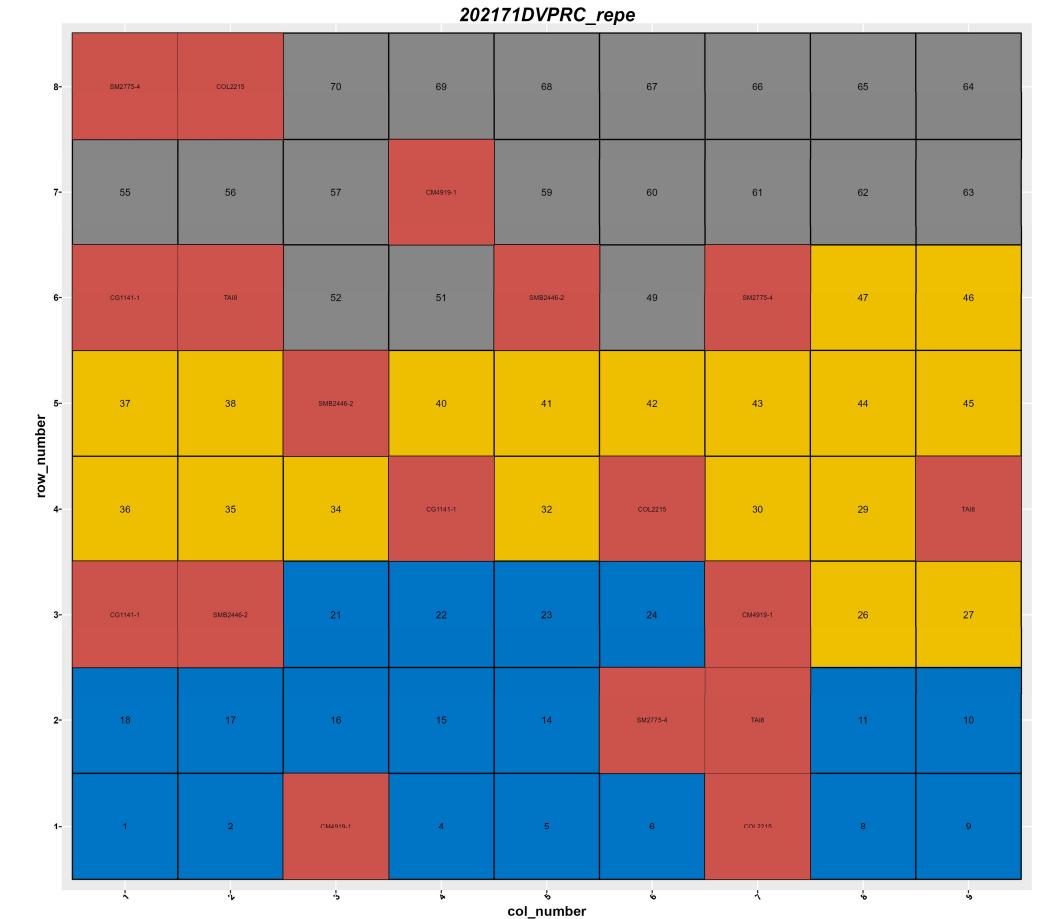
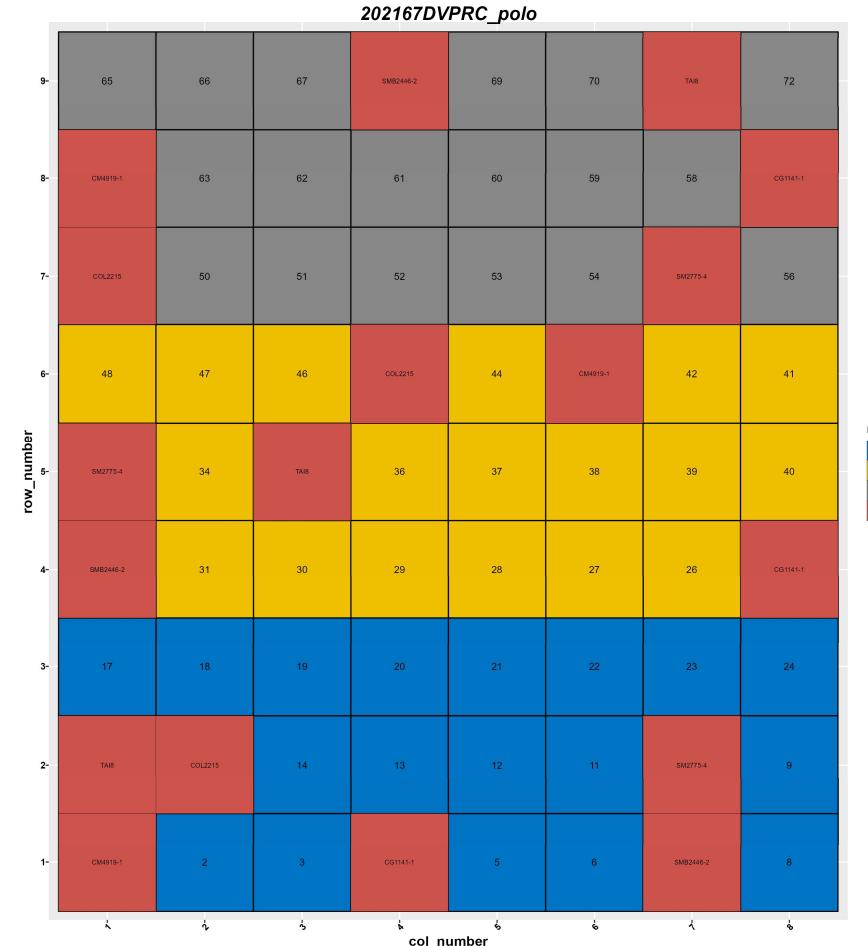
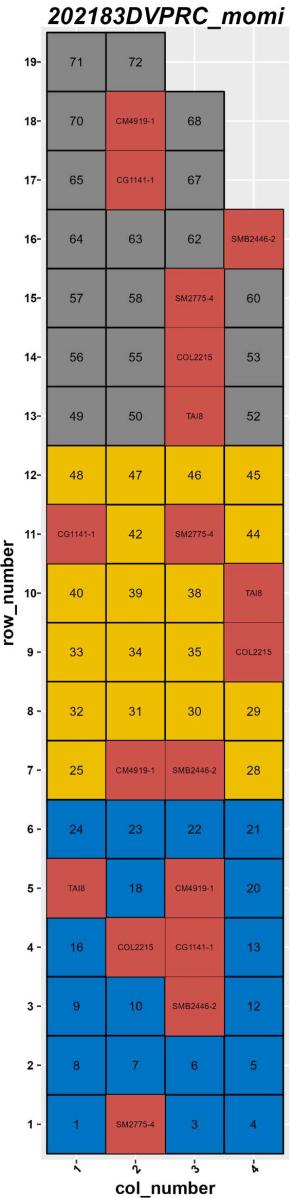
use_trial_name	planted_plants	Harvested_plants
202051DMPRC_pivi	25	9
202052DMPRC_momi	25	9
202053DMPRC_cere	25	9
202054CQPRC_pivi	25	9
202055CQPRC_momi	25	9
202056CQPRC_cere	25	9
202167DVPRC_polo	25	6
202171DVPRC_repe	25	9
202183DVPRC_momi	25	9
2022102DVPRC_stom	25	9
2022105DVPRC_cere	25	9



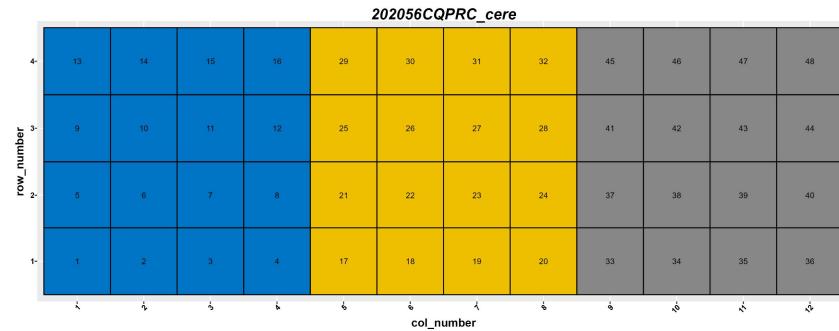
Year 2022: Trial Design – Row col



Year 2021: Trial Design – Row col

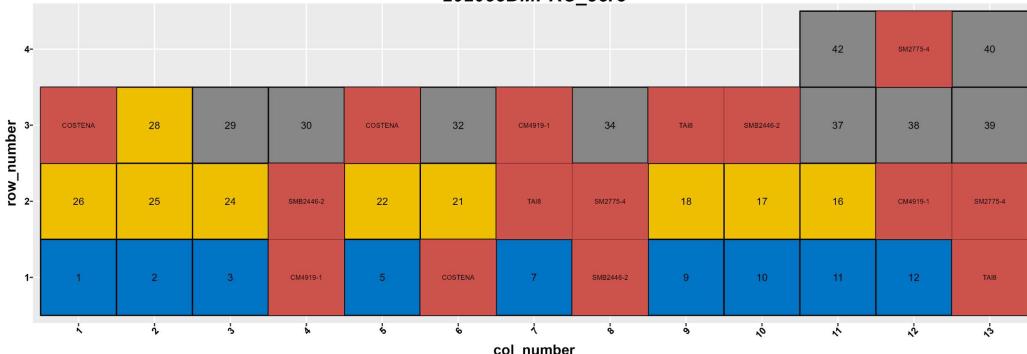


Year 2020: Trial Design – Row col



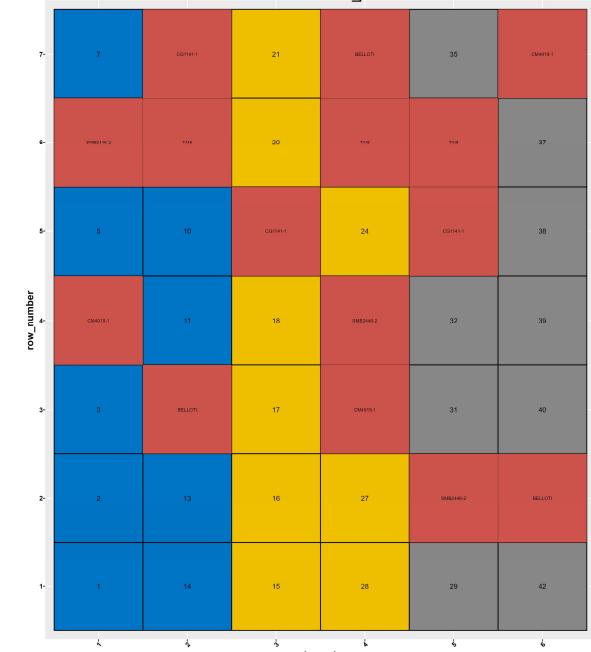
rep
1
2
3

202053DMPRC_cere

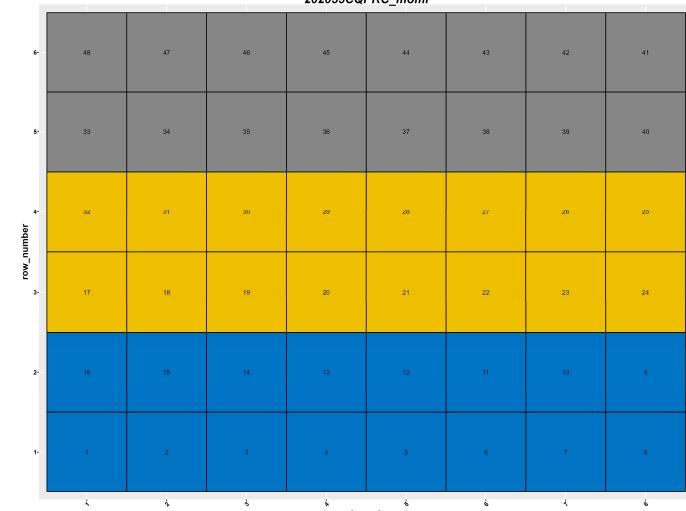


rep
1
2
3
check

202051DMPRC_pivi

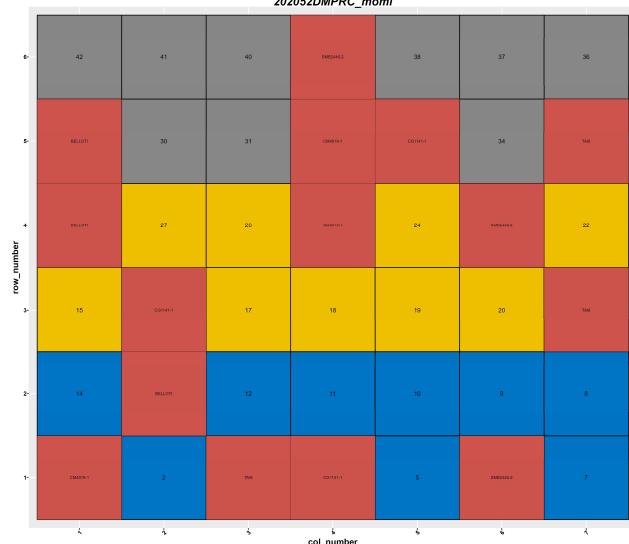


202055CQPRC_momi



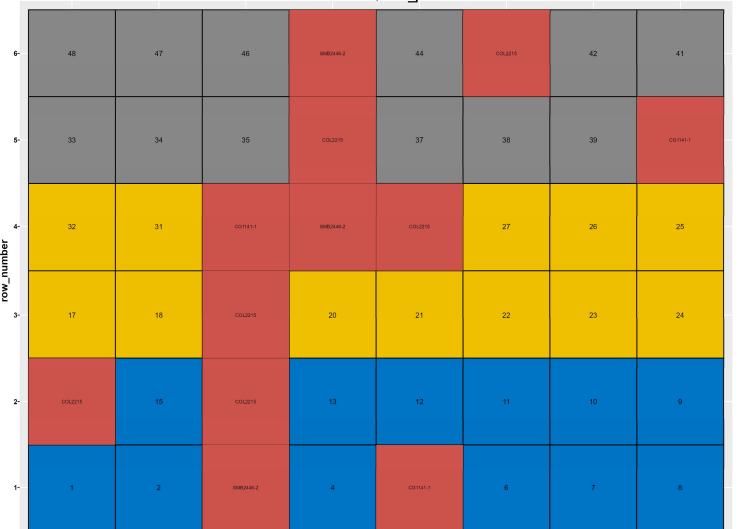
rep
1
2
3

202052DMPRC_momi



rep
1
2
3
check

202054CQPRC_pivi



Check genotypes

1. CG1141-1_is_Costena
2. COL2215_is_Venezolana
3. SM1127-8_is_Cubana
4. SM2775-4_is_Bellotti
5. SMB2446-2_is_Caiseli
6. TAI8_is_TAI
7. CM4919-1_is_Veronica

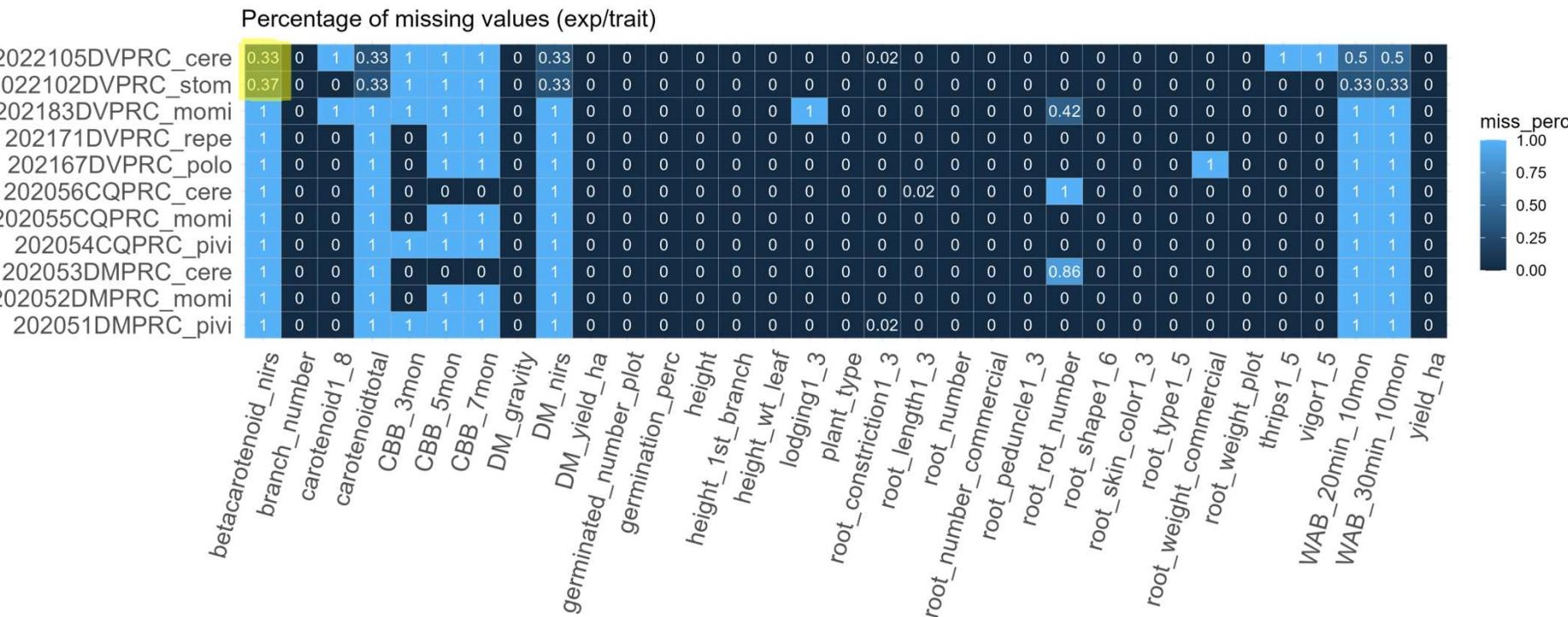


3 - Unloading cassava. Women processors, Korogho Côte d'Ivoire. Patricio Mendez del Villar / 3 - Déchargement de manioc Femmes transformatrices, Korogho Cote d'Ivoire. Patricio Mendez del Villar

Exploratory data analysis

Traits evaluated

Assessed agronomic traits
CBB_5mon
CBB_7mon
WAB_20min_10mon
WAB_30min_10mon
carotenoidtotal
betacarotenoid_nirs
branch_number
CBB_3mon
DM_gravity
DM_nirs
height_1st_branch
yield_ha
germination_perc
DM_yield_ha
root_weight_plot
vigor1_5
lodging1_3
root_number_commercial
root_weight_commercial
plant_type
height
height_wt_leaf
root_skin_color1_3
root_constriction1_3
root_type1_5
root_length1_3
root_number
root_rot_number
germinated_number_plot



Trait variation across trials (phenotypic value)

Traits in red were removed from the analysis.
They had no variation.



Shared genotypes

Connectivity Matrix

2022105DVPRC_cere	8	8	8	12	12	12	18	18	18	18	18
2022102DVPRC_stom	8	8	8	12	12	12	18	18	18	18	18
202171DVPRC_repe	12	12	12	14	14	14	24	24	24	18	18
202167DVPRC_polo	12	12	12	14	14	14	24	24	24	18	18
202183DVPRC_momi	12	12	12	14	14	14	24	24	24	18	18
202056CQPRC_cere	3	3	3	15	16	16	14	14	14	12	12
202055CQPRC_momi	3	3	3	15	16	16	14	14	14	12	12
202054CQPRC_pivi	2	2	2	15	15	15	14	14	14	12	12
202052DMPRC_momi	14	14	14	2	3	3	12	12	12	8	8
202051DMPRC_pivi	14	14	14	2	3	3	12	12	12	8	8
202053DMPRC_cere	14	14	14	2	3	3	12	12	12	8	8

202053DMPRC_cere
 202051DMPRC_pivi
 202052DMPRC_momi
 202054CQPRC_pivi
 202055CQPRC_momi
 202056CQPRC_cere
 202183DVPRC_momi
 202167DVPRC_polo
 202171DVPRC_repe
 2022102DVPRC_stom
 2022105DVPRC_cere

Multiple corr trait (phenotypic value)

	1 ***	CBB_7mon	WAB_30min_10mon	carotenoidtotal	betacarotenoid_nirs	branch_number	CBB_3mon	DM_gravity	height_1st_branch	yield_ha	germination_perc	DM_yield_ha	root_weight_plot	vigor1_5	lodging1_3	root_number_commercial	root_weight_commercial	plant_type	height	height_wt_leaf	root_skin_color1_3	root_constriction1_3	root_type1_5	root_length1_3	root_number	root_rot_number	germinated_number_plot	root_peduncle1_3	root_shape1_6	thrips1_5	carotenoid1_8		
CBB_7mon	1 ***																																
WAB_30min_10mon		0.91 ***																															
carotenoidtotal		0.13 ns	0.14 ns																														
betacarotenoid_nirs		0.13 ns	0.14 ns	0.83 ***																													
branch_number		-0.1 ns	-0.1 ns	-0.12 ns	-0.12 ns	0.14 ns	0.09 ns																										
CBB_3mon		-0.05 ns	-0.05 ns						-0.07 ns																								
DM_gravity		-0.19 ns	-0.19 ns	0.39 ns	0.27 ns	0.19 ns	0.27 ns	-0.01 ns	-0.07 ns																								
DM_nirs				0.41 ns	0.25 ns	0.27 ns	0.31 ns	0.18 ns		0.69 ***																							
height_1st_branch		0.08 ns	0.08 ns	0.44 ns	0.47 *	-0.06 ns	0.01 ns	-0.64 ***	0.03 ns	0 ns	-0.15 ns																						
yield_ha		-0.02 ns	-0.02 ns	-0.34 ns	-0.33 ns	-0.12 ns	-0.2 ns	-0.03 ns	-0.06 ns	0.28 ***	-0.15 ns	0.29 ***																					
germination_perc		-0.17 ns	-0.17 ns	-0.08 ns	-0.07 ns	0.09 ns	-0.01 ns	0.01 ns	-0.08 ns	0.18 **	-0.1 ns	-0.06 ns	0.01 ns																				
DM_yield_ha		-0.05 ns	-0.05 ns	-0.23 ns	-0.26 ns	-0.06 ns	-0.12 ns	-0.03 ns	-0.07 ns	0.4 ***	0.05 ns	0.28 ***	0.99 ***	0.03 ns																			
root_weight_plot		-0.02 ns	-0.02 ns	-0.28 ns	-0.26 ns	-0.11 ns	-0.19 ns	-0.12 ns	-0.06 ns	0.29 ***	-0.14 ns	0.37 ***	0.93 ***	0.02 ns	0.92 ***																		
vigor1_5		0.07 ns	0.07 ns	-0.13 ns	-0.27 ns	-0.23 ns	-0.08 ns	-0.13 ns	-0.08 ns	0.29 ***	-0.27 ns	0.17 ***	0.33 ***	0.15 ns	0.36 ***	0.33 ***																	
lodging1_3		-0.1 ns	-0.1 ns	0.32 ns	0.41 ns	0.03 ns	-0.01 ns	-0.05 ns	0.03 ns	-0.04 ns	-0.1 ns	0.21 ***	0.06 ns	-0.1 ns	0.06 ns	0.08 ns	0.08 ns																
root_number_commercial		0 ns	0 ns	-0.41 ns	-0.5 *	-0.07 ns	-0.2 ns	0.1 ns	-0.11 ns	0.08 ns	-0.01 ns	0.11 ns	0.73 ***	0.02 ns	0.7 ***	0.72 ***	0.16 ns	-0.11 ns															
root_weight_commercial		-0.01 ns	-0.01 ns	-0.52 ns	-0.56 ns	-0.08 ns	-0.17 ns	-0.03 ns	-0.1 ns	0.23 ***	-0.14 ns	0.3 ***	0.93 ***	0.01 ns	0.91 ***	0.96 ***	0.25 ns	0.03 ns	0.83 ***														
plant_type		-0.02 ns	-0.02 ns	-0.24 ns	-0.22 ns	-0.18 ns	-0.11 ns	0.35 ***	0.01 ns	-0.02 ns	-0.04 ns	-0.34 ***	-0.13 ns	-0.02 ns	-0.12 ns	-0.2 ns	-0.13 ns	0.17 ns	-0.09 ns	-0.12 ns													
height		-0.03 ns	-0.03 ns	0.54 **	0.56 ***	-0.03 ns	0.08 ns	-0.2 ns	-0.06 ns	0.17 ns	0.02 ns	0.66 ***	0.6 ***	-0.05 ns	0.6 ***	0.68 ***	0.29 ***	0.25 ***	0.42 ***	0.63 ***	-0.34 ***												
height_wt_leaf		-0.11 ns	-0.11 ns	0.58 ***	0.65 ***	0.14 ns	0.16 ns	-0.43 ns	0.14 ns	0 ns	-0.1 ns	0.34 ***	-0.19 ns	-0.04 ns	-0.19 ns	-0.12 ns	0.13 ns	0.16 ns	-0.42 ns	-0.26 ns	-0.32 ns	0.18 **											
root_skin_color1_3		0.09 ns	0.09 ns	-0.18 ns	-0.18 ns	-0.05 ns	0.2 ns	-0.03 ns	-0.04 ns	0.2 ns	0.11 ns	0.05 ns	0.04 ns	-0.03 ns	0.07 ns	0.03 ns	-0.12 ns	0.13 ns	-0.01 ns	0.03 ns	0.08 ns	0.02 ns	-0.06 ns										
root_constriction1_3		0.18 ns	0.18 ns	0.15 ns	0.18 ns	-0.13 ns	-0.18 ns	-0.04 ns	0.06 ns	0.04 ns	-0.15 ns	0 ns	-0.04 ns	-0.02 ns	-0.03 ns	-0.03 ns	-0.07 ns	-0.12 ns	-0.06 ns	0.03 ns	-0.03 ns	0.09 ns	-0.03 ns										
root_type1_5		0.11 ns	0.11 ns	0.27 ns	0.29 ns	-0.01 ns	0 ns	0.02 ns	-0.1 ns	0.02 ns	-0.04 ns	-0.06 ns	-0.38 ***	0.04 ns	-0.35 ***	-0.37 ***	-0.11 ns	0.07 ns	-0.42 ns	-0.39 ns	0.22 ***	-0.15 ns	0.05 ns	0.08 ns	0.11 ns								
root_length1_3		0.15 ns	0.15 ns	-0.35 ns	-0.41 ns	-0.06 ns	-0.06 ns	0.05 ns	0.07 ns	-0.25 ns	0.19 ns	-0.07 ns	0.05 ns	-0.09 ns	0.01 ns	-0.02 ns	-0.15 ns	-0.12 ns	0.2 ns	0.08 ns	0 ns	-0.1 ns	-0.22 ns	-0.04 ns	-0.01 ns	-0.31 ns							
root_number		-0.05 ns	-0.05 ns	-0.5 ns	-0.6 ns	-0.18 ns	-0.32 ns	0 ns	-0.05 ns	0.13 ns	0.03 ns	0.22 ***	0.69 ***	0.06 ns	0.68 ***	0.76 ***	0.22 ns	-0.04 ns	0.81 ***	0.71 ***	-0.14 ns	0.52 ***	-0.31 ns	-0.01 ns	-0.07 ns	-0.32 ns	0.09 ns						
root_rot_number				0.2 ns	0.28 ns	0.43 ns	0.48 ns	0.03 ns	-0.08 ns	0.06 ns	0.09 ns	0.06 ns	0 ns	0.05 ns	-0.05 ns	-0.01 ns	0.08 ns	-0.07 ns	-0.03 ns	-0.07 ns	0.08 ns	0 ns	-0.05 ns	0.03 ns	-0.03 ns	-0.14 ns							
germinated_number_plot		-0.17 ns	-0.17 ns	-0.08 ns	-0.07 ns	0.09 ns	-0.01 ns	0.01 ns	-0.08 ns	0.18 ns	-0.1 ns	-0.06 ns	0.01 ns	1 ***	0.03 ns	0.02 ns	0.15 ns	-0.1 ns	0.02 ns	0.01 ns	-0.05 ns	-0.04 ns	-0.03 ns	-0.02 ns	0.04 ns	-0.09 ns	0.06 ns	0 ns					
root_peduncle1_3		0.25 ns	0.25 ns	0.24 ns	0.27 ns	0.02 ns	0.11 ns	0 ns	-0.05 ns	0.25 ns	0.18 ns	0.01 ns	0.11 ns	0.04 ns	0.15 ns	0.11 ns	0.15 ns	0 ns	-0.03 ns	0.05 ns	-0.02 ns	0.16 ns	0.1 ns	0.01 ns	0.04 ns	0.04 ns	0.04 ns						
root_shape1_6		0.08 ns	0.08 ns	0.34 ns	0.34 ns	-0.21 ns	-0.06 ns	0.06 ns	0.13 ns	0 ns	0.2 ns	-0.21 ns	-0.3 ns	0.06 ns	-0.29 ns	-0.32 ns	-0.15 ns	-0.1 ns	-0.17 ns	-0.3 ns	0.03 ns	-0.27 ns	0.08 ns	-0.03 ns	0.04 ns	0.01 ns	0.19 ns	-0.24 ns	-0.07 ns	0.06 ns			
thrips1_5		-0.03 ns	-0.03 ns																														
carotenoid1_8		-0.07 ns	-0.07 ns	-0.34 ns	-0.34 ns	0.31 ns	0.02 ns	0 ns	-0.01 ns	-0.34 ns	-0.24 ns	-0.1 ns	-0.09 ns	0.04 ns	-0.14 ns	-0.08 ns	-0.02 ns	-0.14 ns	-0.04 ns	-0.05 ns	-0.02 ns	-0.17 ns	0 ns	-0.36 ns	-0.04 ns	-0.01 ns	0.07 ns	-0.09 ns	-0.02 ns	0.04 ns	-0.08 ns	-0.04 ns	-0.05 ns

A large pile of harvested cassava roots, which are thick, tuberous, and brownish-pink. They are piled high, filling the frame. Some smaller roots and green stems are visible among the larger ones.

Statistical data analysis

Moderate to high heritability among all locations.

Single heritability

	betacarot enoid_nir s	branch_n umber	carotenoi d1_8	carotenoi dtotal	CBB_3mo n	DM_gravi ty	DM_nirs	DM_yield ha	germinat er_numb er_plot	germinati on_perc	height	height_1s t_branch	height_wt leaf	lodging1_3	plant_typ e	root_con striction1 3	root_leng th1_3	root_num ber_com ber	root_num ber_com mercial	root_ped uncle1_3	root_rot number	root_sha pe1_6	root_skin color1_31_5	root_type ight_com mercial	root_wei ght_plot	thrips1_5	vigor1_5	WAB_20 min_10m on	WAB_30 min_10m on				
202051DMPRC_p ivi		0.89	0.94			0.97		0.57	0.81	0.81	0.82	0.87	0.68		0.67	0.25	0.24	0.32	0.17	0.09	0.62	0.83	0.96	0.74	0.39	0.49	0.85	0.76			0.49		
202052DMPRC_momi		0.68	0.96		0.05	0.92		0.63	0.01	0.01	0.82	0.87	0.83	0.61	0.87		0.53	0.68	0.6	0.01	0.1	0.78	0.99	0.88	0.83	0.79	0.03	0.87			0.79		
202053DMPRC_cere		0.65				0.9		0.32	0.73	0.73	0.69	0.52	0.56	0.04	0.44		0.66	0.78	0.44	0.69		0.07		0.58	0.67	0.43		0.81			0.43		
202054CQPRC_pi		0.94	0.81			0.85		0.73	0.85	0.85	0.72	0.93	0.81	0.85	0.83	0.29	0.39	0.77	0.67		0	0.65	0.9	0.73	0.78	0.74	0.22	0.56			0.74		
202055CQPRC_momi		0.9	0.36		0.93	0.92		0.8	0.33	0.33	0.9	0.89	0.67	0.79	0.89	0	0.66	0.67	0.68	0	0.27	0.81	0.79	0.79	0.77	0.79	0.81	0.04		0.79			
202056CQPRC_ce re		0.9	0		0	0.67		0.27	0.44	0.44	0.89	0.89	0.92	0.82	0.73	0.55	0.48	0.81	0.78	0.66		0.2	0.94	0.01	0.56	0.24		0.71			0.24		
202167DVPRC_p olo		0.91	0.95		0.02	0.81		0.04	0.97	0.97	0.36	0.89	0.68	0.13	0.6	0.03	0.71	0.57	0.27	0.04	0.5	0.66	0.9	0.03		0.15				0.38			0.15
202171DVPRC_re pe		0.88	0.93			0.94		0.8	0.94	0.94	0.85	0.87	0.8	0.44	0.88	0.31	0.43	0.69	0.68	0.33	0.69	0.59	0.96	0.48	0.72	0.8	0.85	0.86			0.8		
202183DVPRC_m omi		0.67				0.78		0.67	0.57	0.57	0.67	0.5	0.59		0.8	0	0.21	0.48	0.62	0	0	0.7	0.98	0.28	0.66	0.66	0.04	0.73			0.66		
2022102DVPRC_s tom		0.84	0.86	0.98	0.94		0.96	0.95	0.77	0.45	0.45	0.85	0.76	0.73		0.68	0.3	0.64	0.79	0.33	0.55	0.19	0.6	0.96	0.66	0.74	0.77		0.78	0.91	0.93	0.77	
2022105DVPRC_c ere		0.94	0.78		0.97		0.57	0.87	0.78	0.86	0.86	0.3	0.63	0.79	0.77	0.8	0.16	0.62	0.71	0.09	0.02	0.68	0.64	0.99	0.58	0.27	0.76			0.51	0.6	0.76	

Traits with heritability
< 0.1 were removed
them from the GxE
analysis.

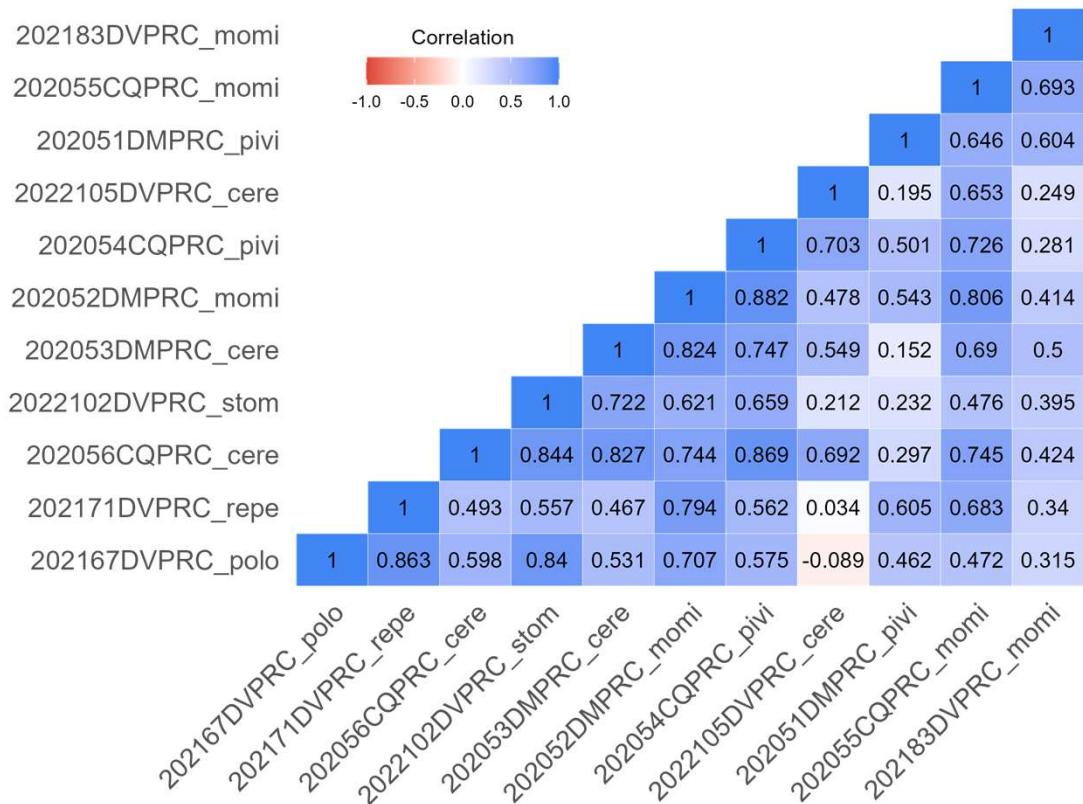
Heritability gxe all trials

trait	h2
root_skin_color1_3	0.99
carotenoidtotal	0.97
branch_number	0.95
carotenoid1_8	0.94
height_1st_branch	0.94
DM_gravity	0.94
height	0.94
betacarotenoid_nirs	0.93
plant_type	0.92
DM_nirs	0.92
height_wt_leaf	0.89
yield_ha	0.87
root_weight_plot	0.87
root_weight_commercial	0.87
root_number	0.87
root_shape1_6	0.87
vigor1_5	0.83
DM_yield_ha	0.83
lodging1_3	0.82
root_number_commercial	0.77
WAB_20min_10mon	0.72
germination_perc	0.69
germinated_number_plot	0.69
root_peduncle1_3	0.69
root_type1_5	0.68
root_length1_3	0.66
thrips1_5	0.65
WAB_30min_10mon	0.35
root_constriction1_3	0.27
root_rot_number	0.25

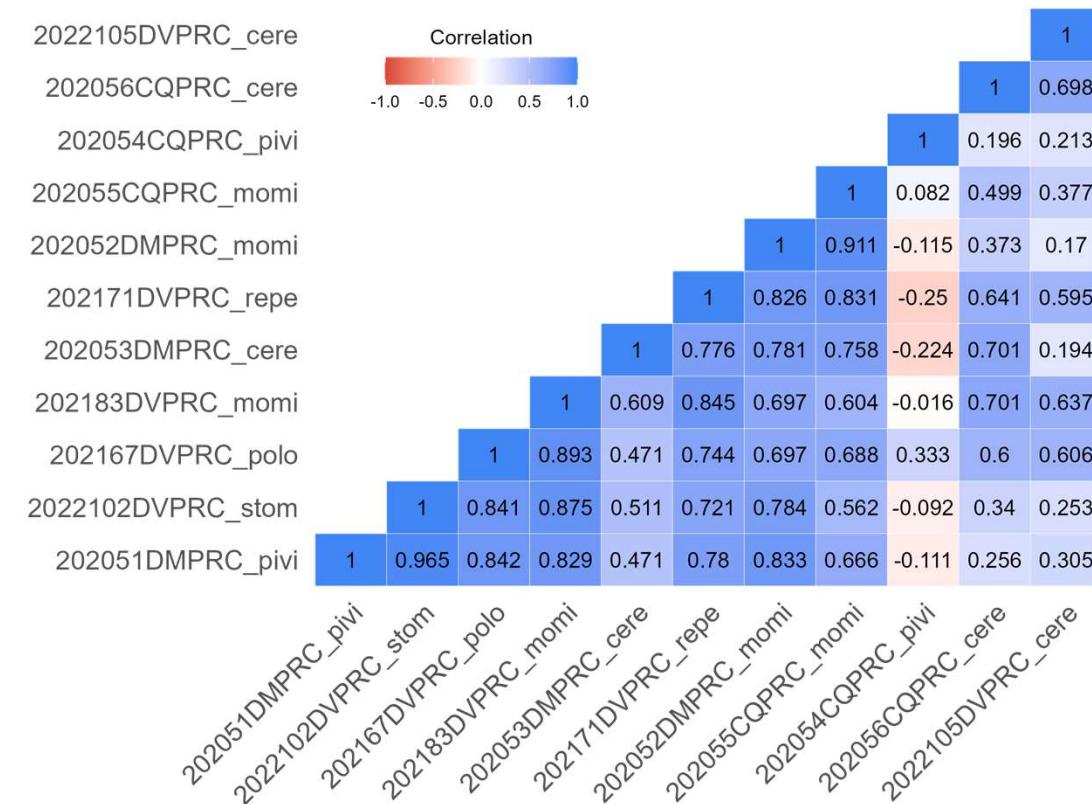
For traits with low heritability, please be **careful.** (blue square)

Genotypic Correlation: Locations

Yield

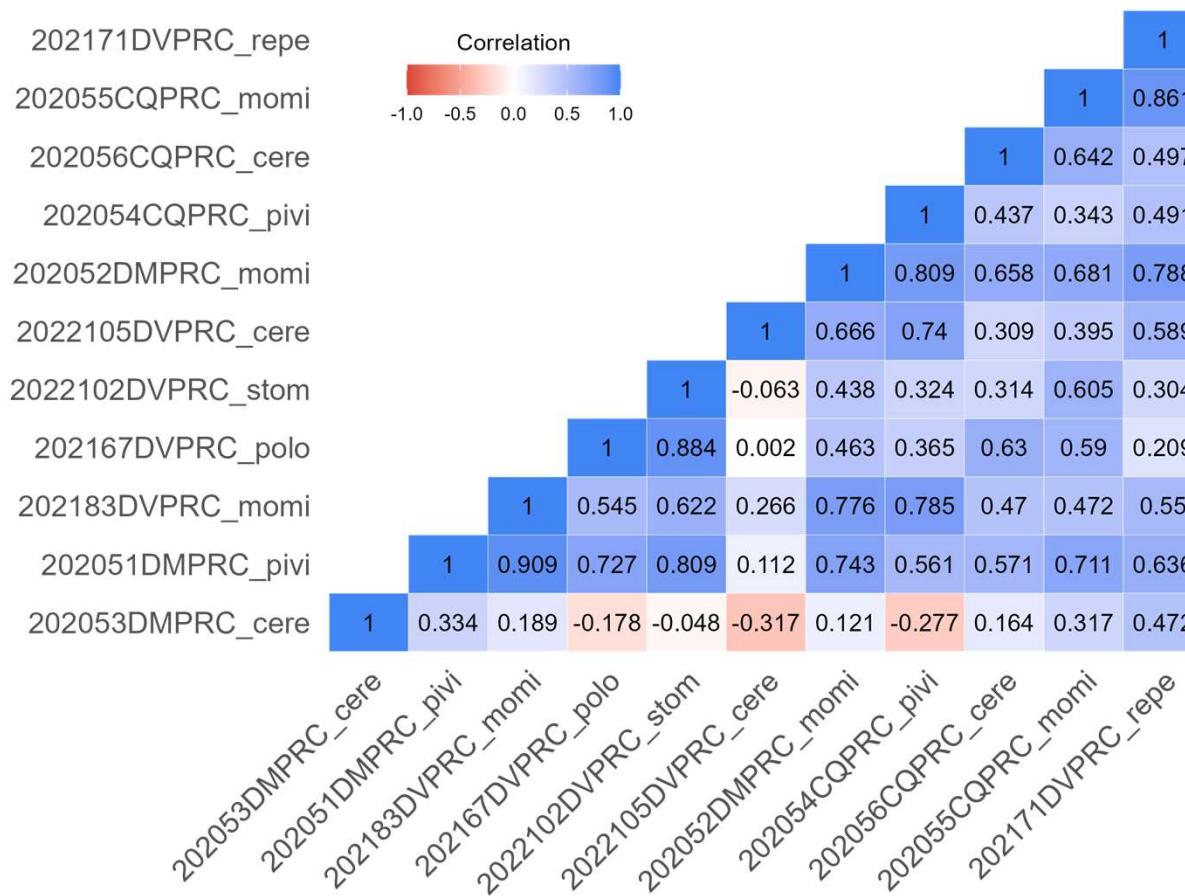


Dry Matter

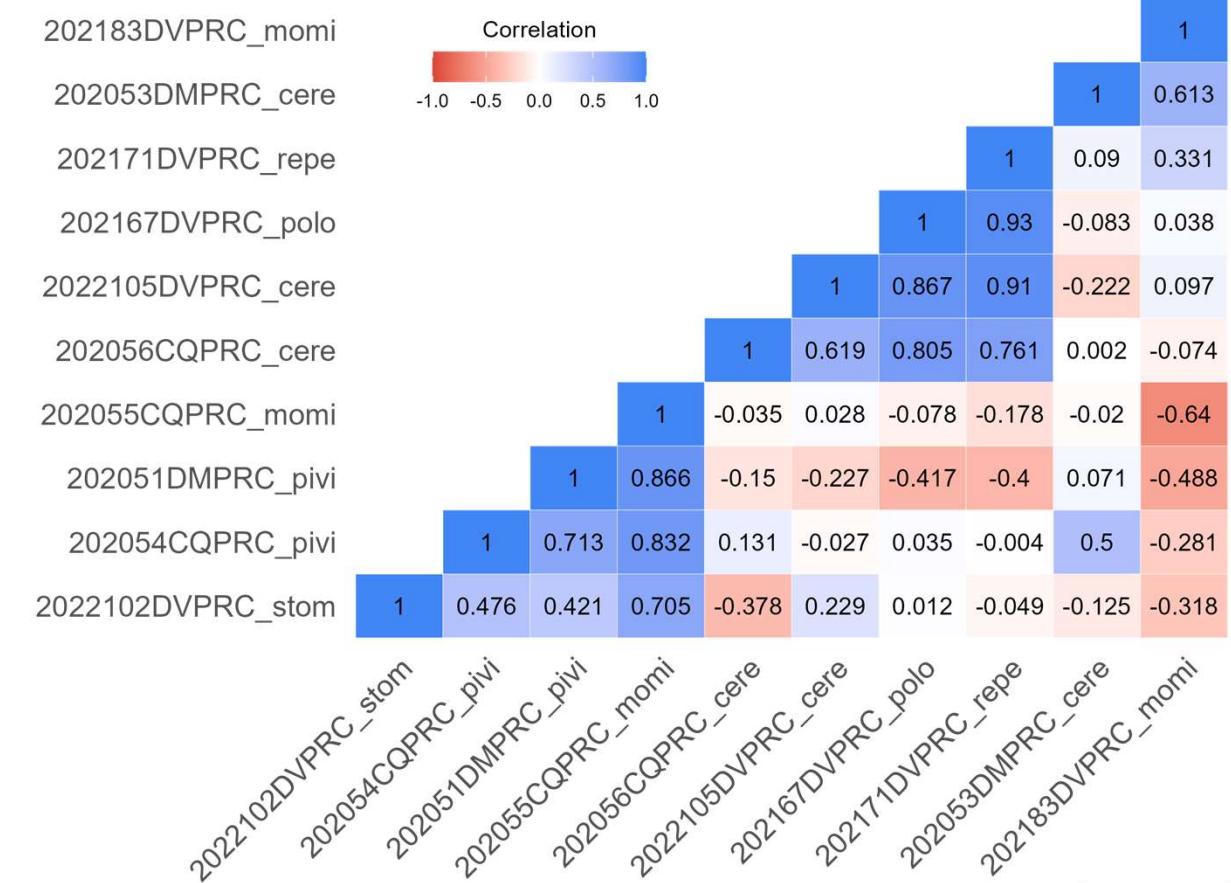


Genotypic Correlation: Locations

Plant type

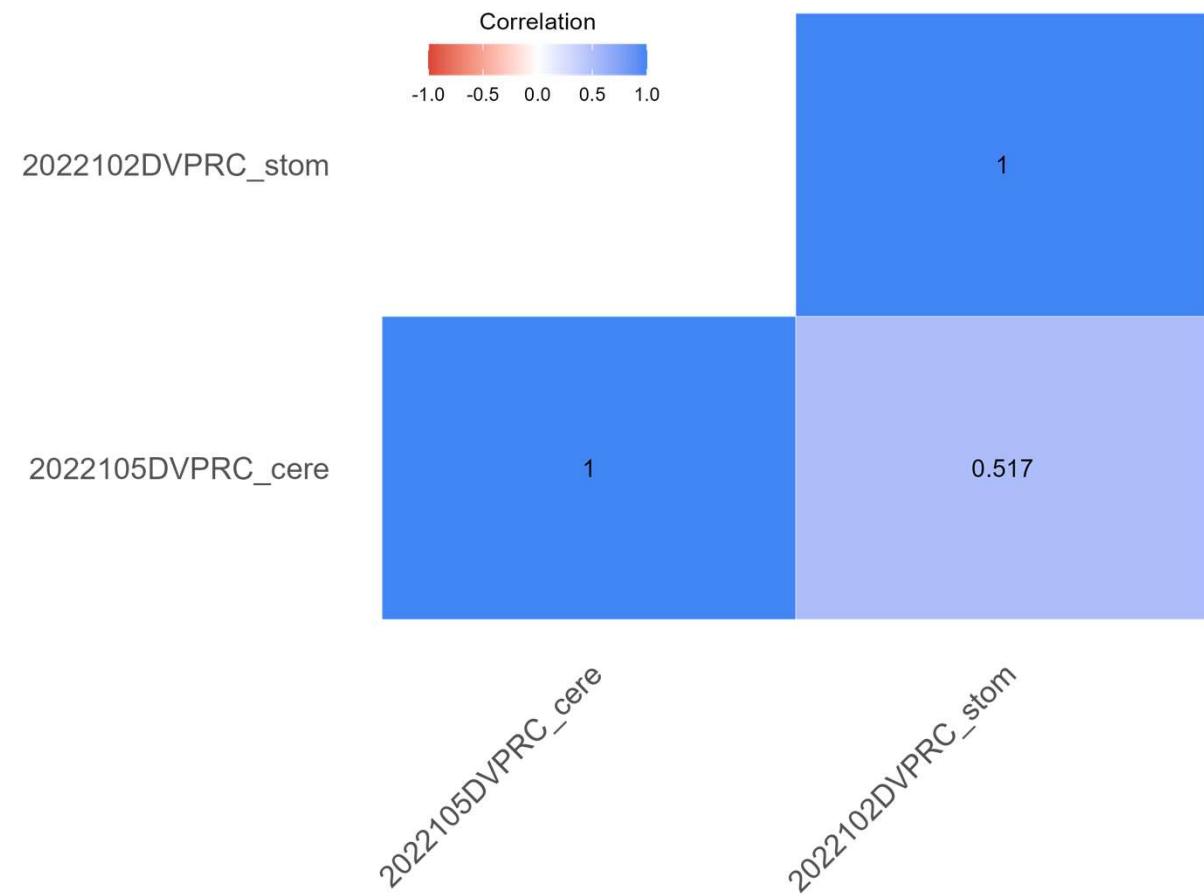


Germination

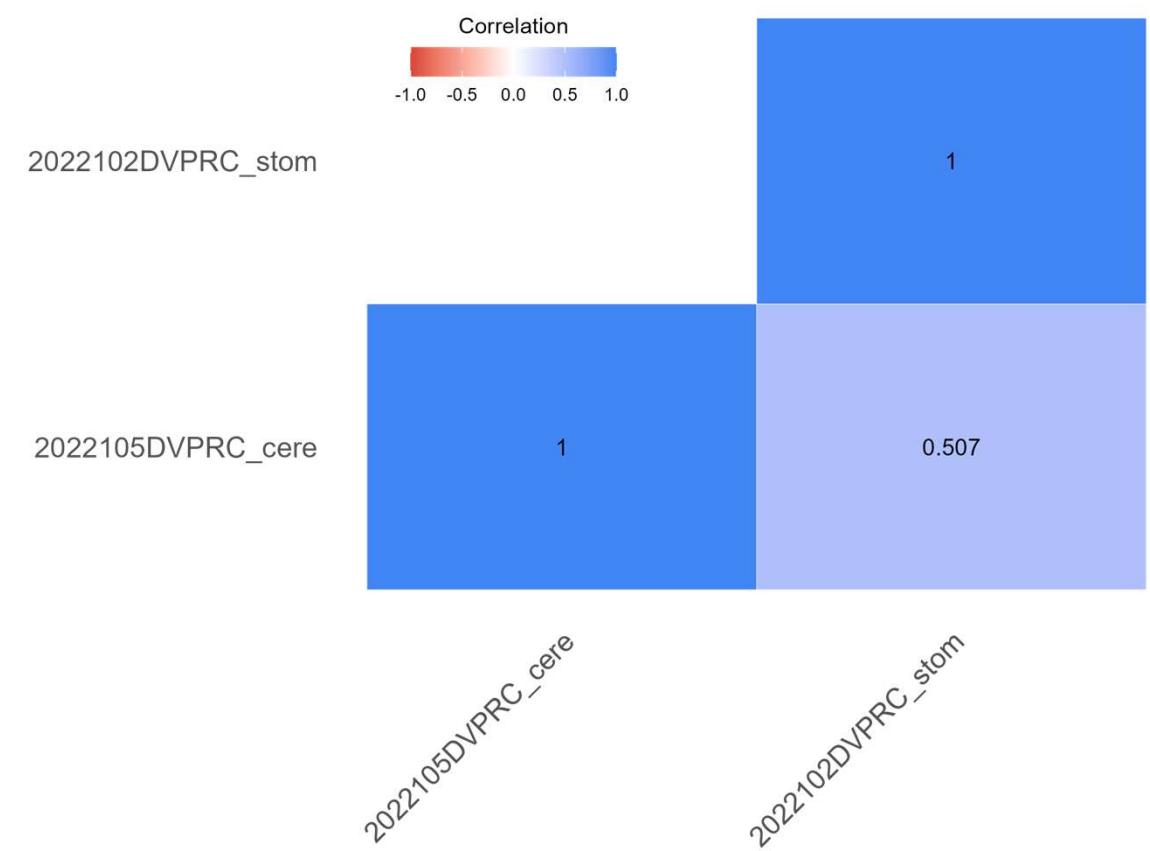


Genotypic Correlation: Locations

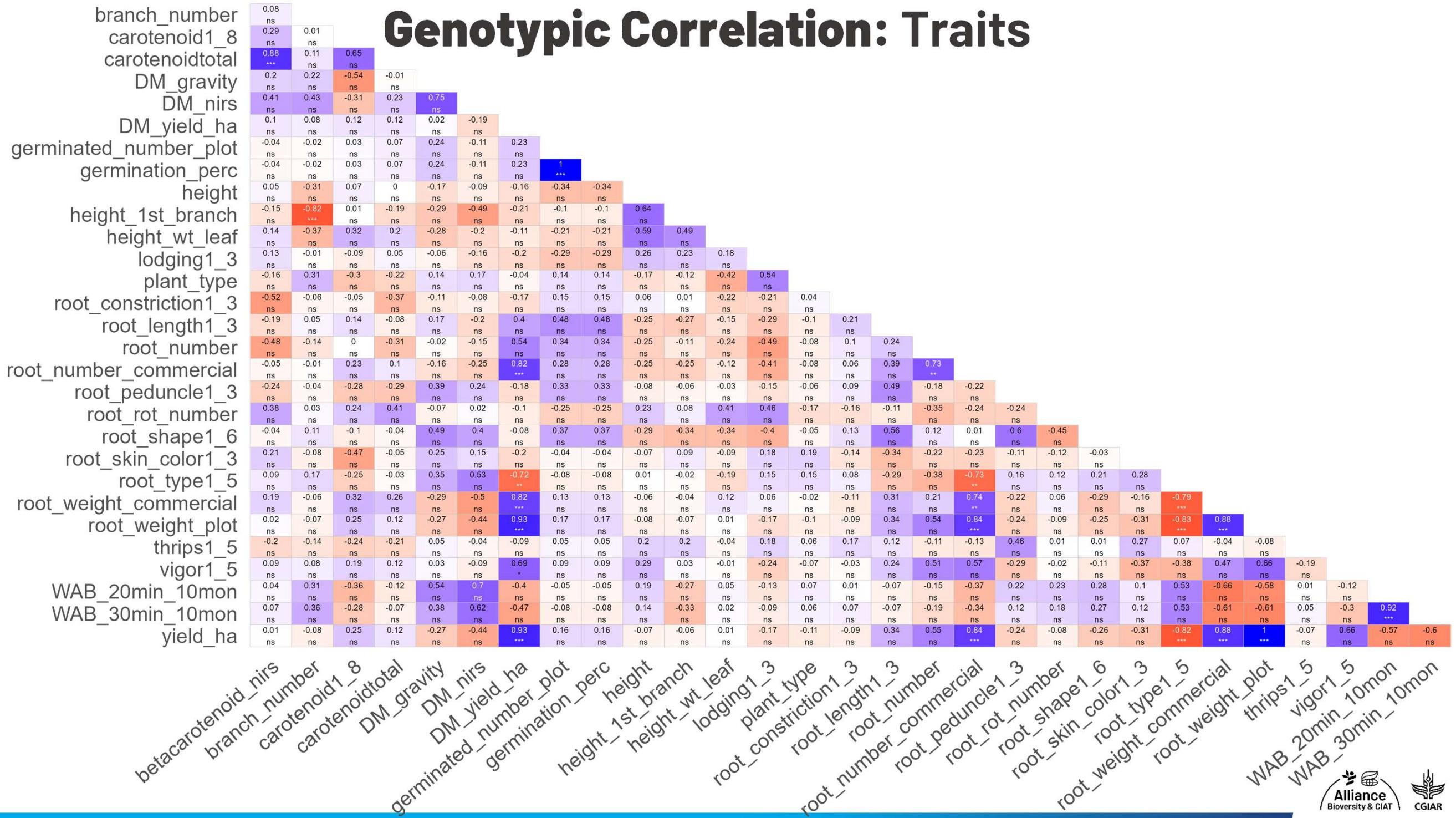
WAB 30 min



Dry matter by NIR



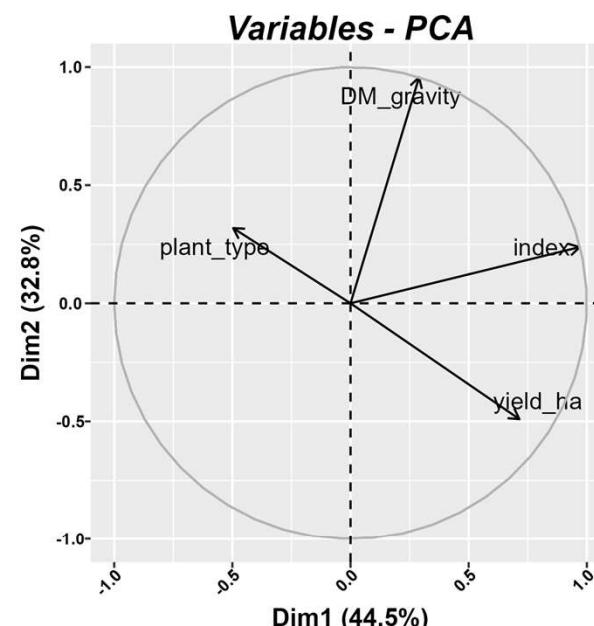
Genotypic Correlation: Traits



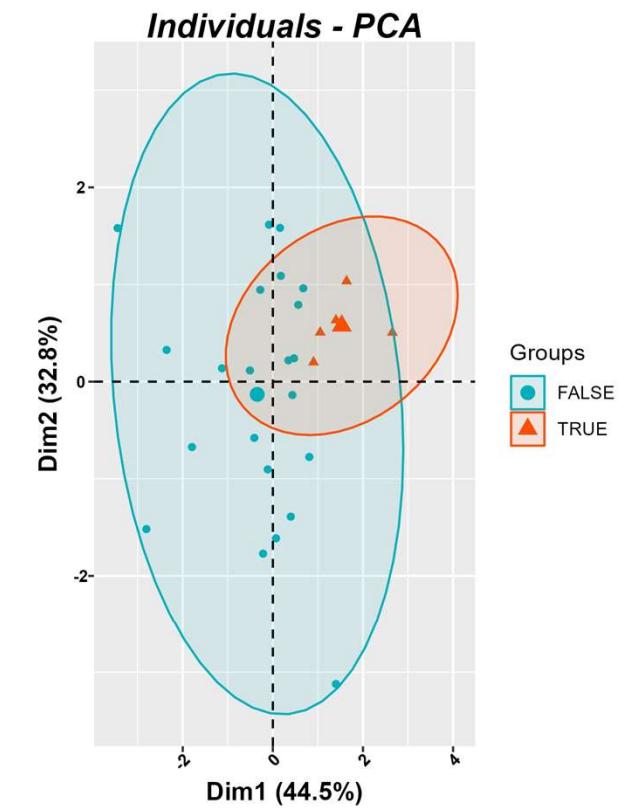
Selection comments

- 1) DM_gravity, plant_type & yield_ha were used to calculate index selection.
- 2) Scores given were:
 - DM_gravity = 10
 - plant_type = -5
 - yield_ha = 10
- 3) Percentage to be selected: 20%

A



B





Thank you!