



Data analysis DVGN6

**202101DVGN6_ciat
202109DVGN6_momi
202206DVGN6_ciat
202232DVGN6_momi**

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@BiovIntCIAT_eng
@BiovIntCIAT_esp

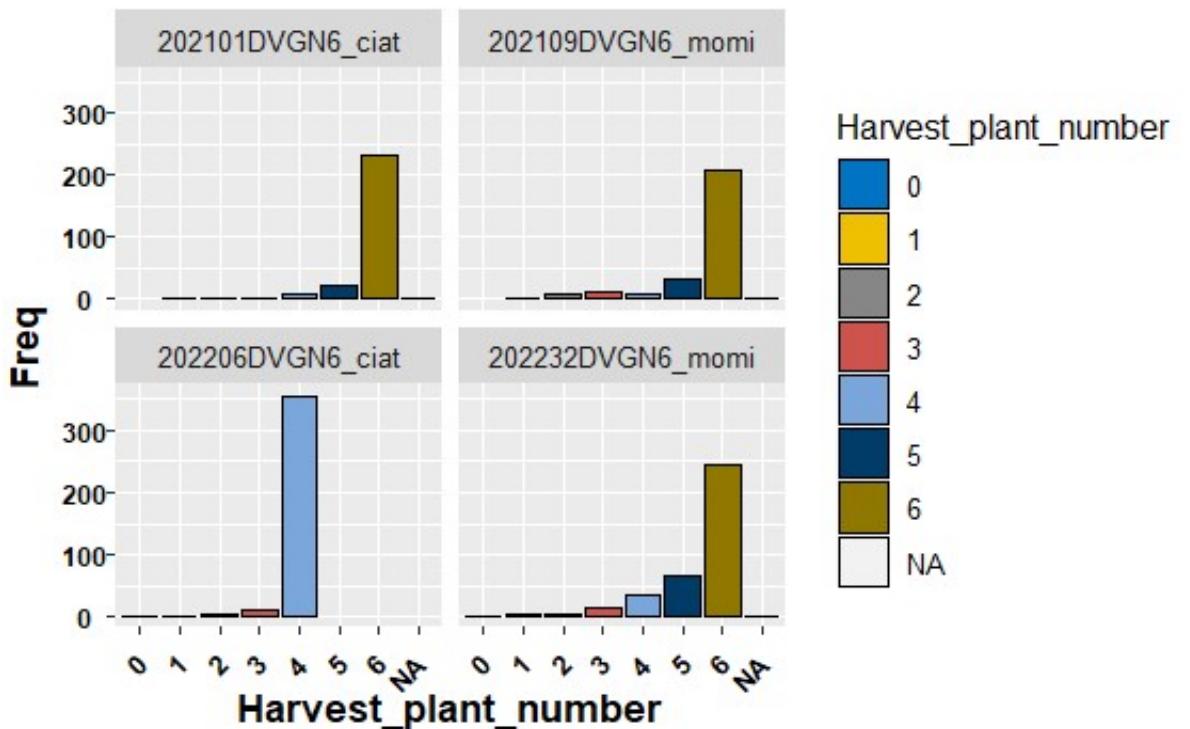
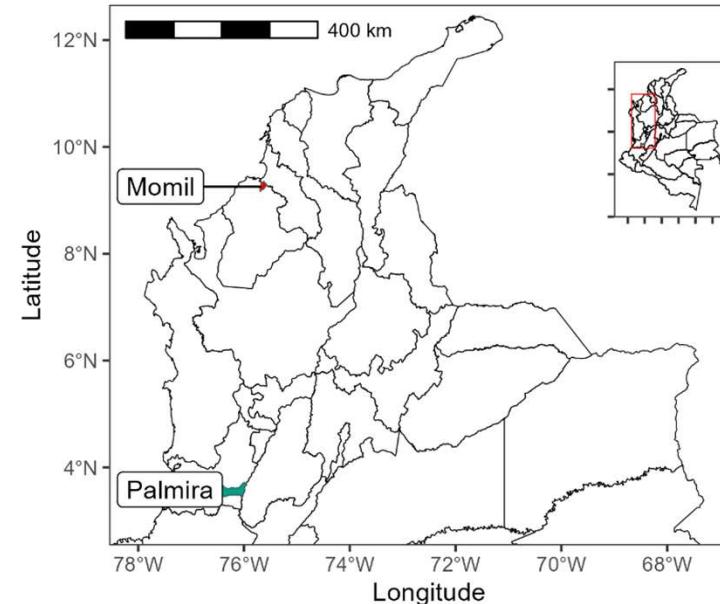
#Alliance4Science

Resolvable row-col with randomized checks

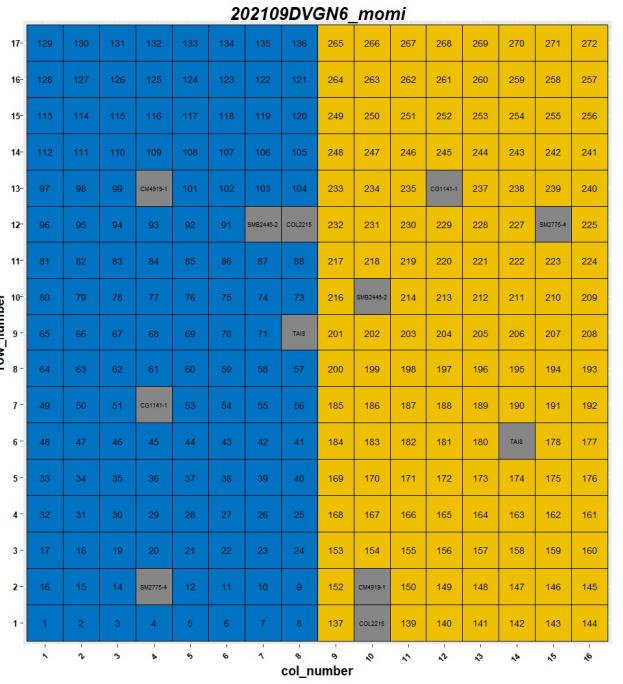
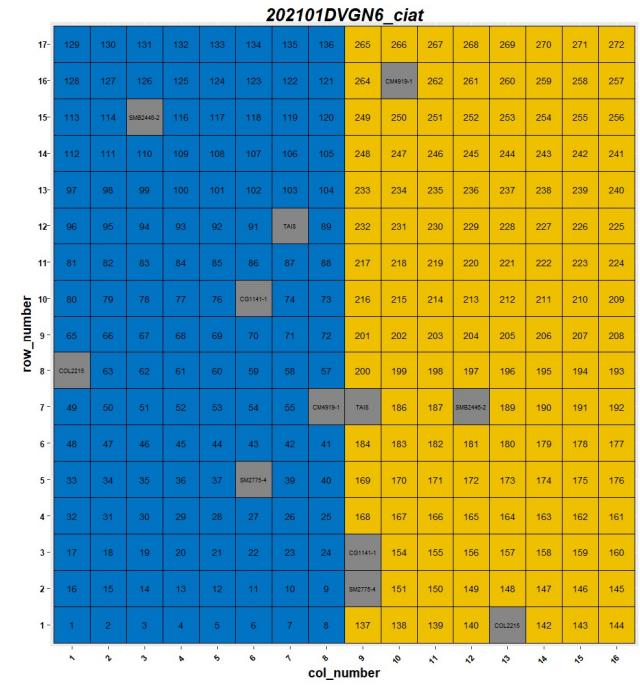
Trial_name	Plant_date	Harvest_date	Harvesting_time	Location	n_gen
202101DVGN6_ciat	2021-March-03	2022-February-04	11month 1day	CIAT. Valle, Colombia	136
202109DVGN6_momi	2021-April-21	2022-March-02	10month 9day	Momil. Cordoba, Colombia	136
202206DVGN6_ciat	2022-March-31	2023-March-03	11month 3day	CIAT. Valle, Colombia	184
202232DVGN6_momi	2022-May-18	2023-February-25	9month 7day	Momil. Cordoba, Colombia	183

Plot size:

- 202101DVGN6_ciat: **20** plants per plot, harvesting **6** plants for yield
- 202109DVGN6_momi: **20** plants per plot, harvesting **6** plants for yield
- 202206DVGN6_ciat: **10** plants per plot, harvesting **4** plants for yield
- 202232DVGN6_momi: **10** plants per plot, harvesting **6** plants for yield



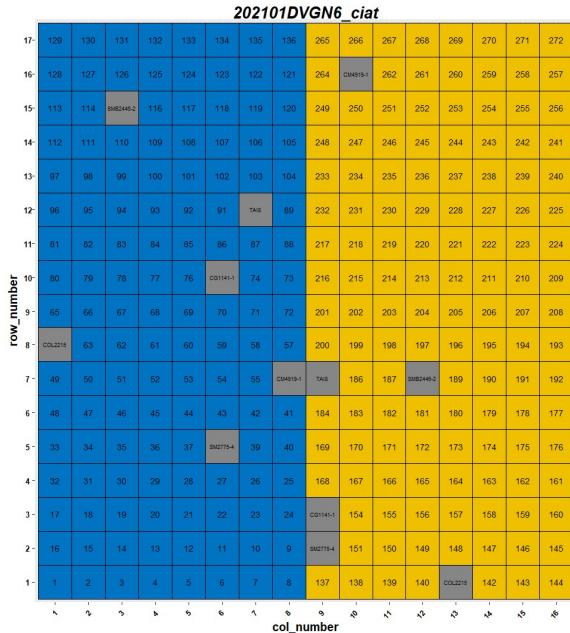
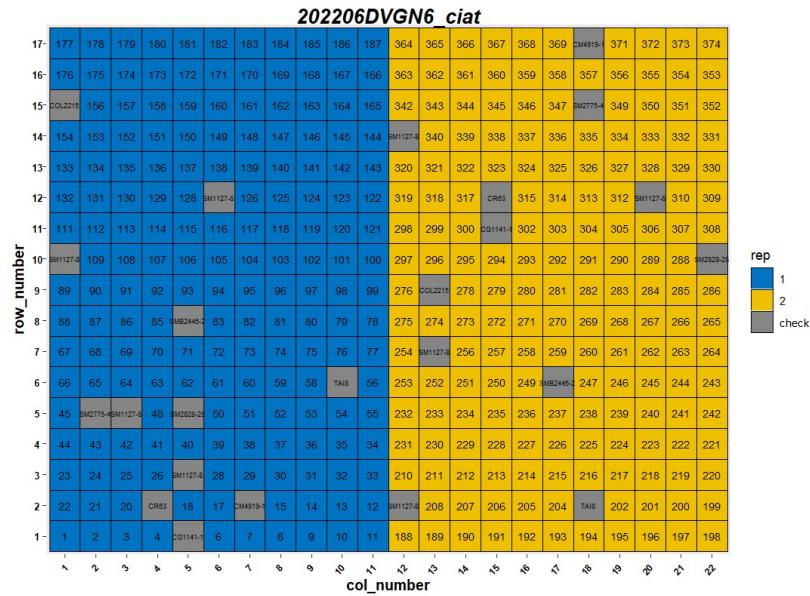
Trial Design – Resolvable row-col



Check varieties are completely randomized

Checks:

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
7. SM1127-8_is_Cubana



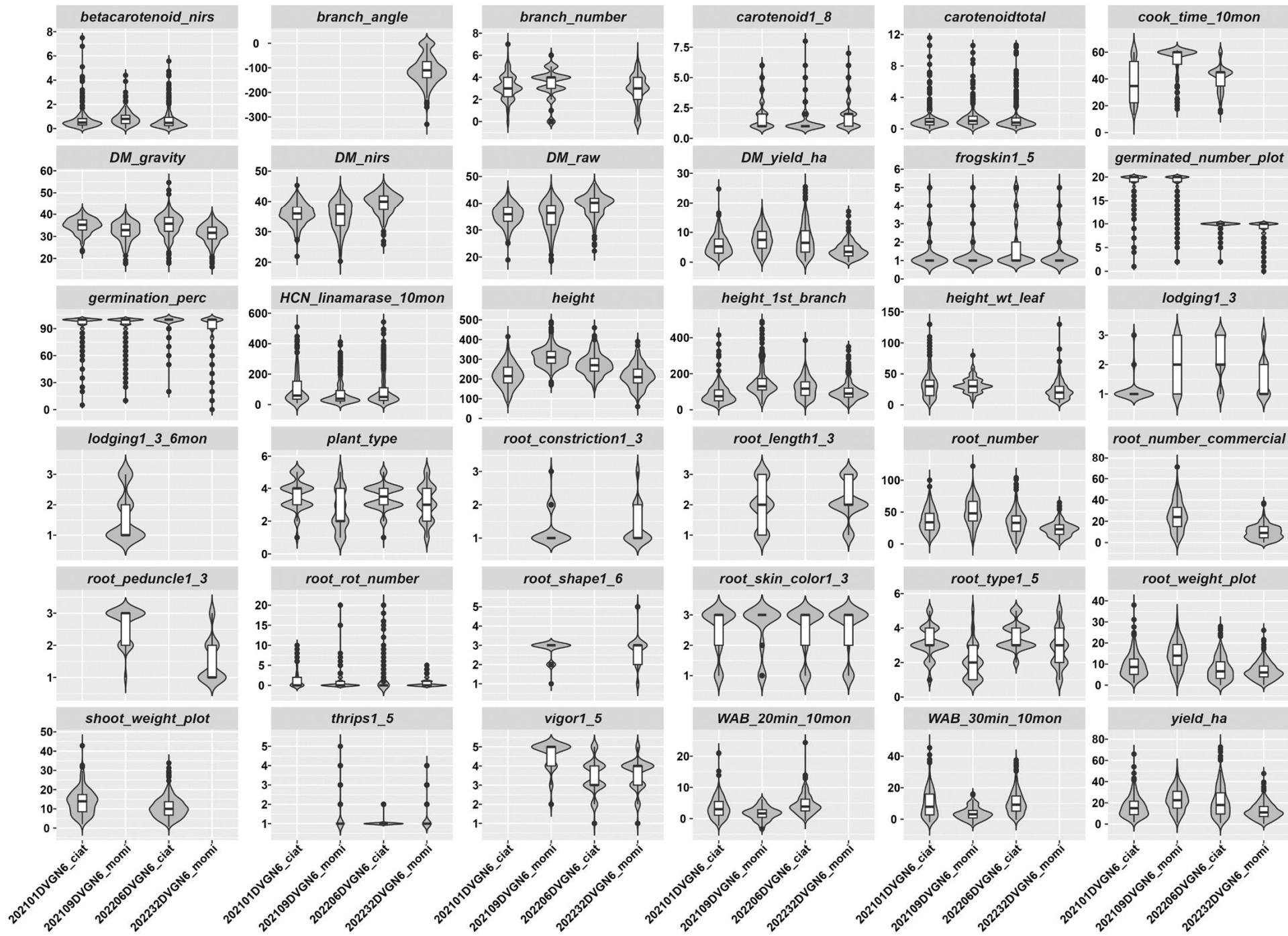
A close-up photograph of green cassava leaves with prominent veins, set against a blurred background of more plants under a clear sky.

Exploratory data analysis

Traits evaluated

Traits evaluated	
betacarotenoid_nirs	plant_type
branch_angle	root_constriction1_3
branch_number	root_length1_3
carotenoid1_8	root_number
carotenoidtotal	root_number_commercial
cook_time_10mon	root_peduncle1_3
DM_gravity	root_rot_number
DM_nirs	root_shape1_6
DM_raw	root_skin_color1_3
DM_yield_ha	root_type1_5
frogskin1_5	root_weight_plot
germinated_number_plot	shoot_weight_plot
germination_perc	thrips1_5
harvest_number	vigor1_5
HCN_linamarase_10mon	WAB_20min_10mon
height	WAB_30min_10mon
height_1st_branch	yield_ha
height_wt_leaf	
lodging1_3	
lodging1_3_6mon	

Trait variation across trials (phenotypic value)

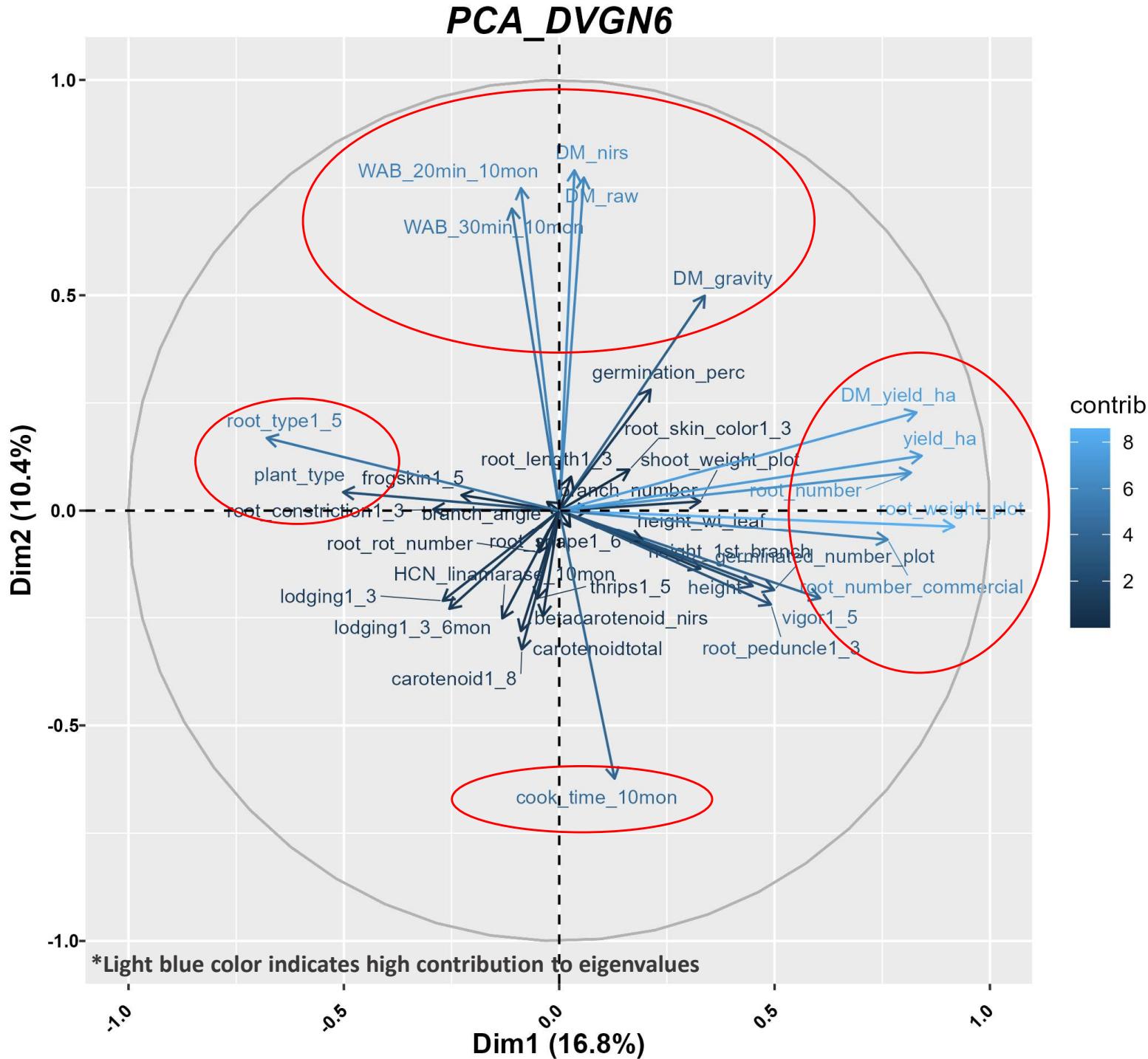


Multiple trait correlation (phenotypic value)

Principal component analysis (phenotypic value)

Two big groups of variable were found.

- ✓ 1: **strong** correlation between WAB and DM.
- ✓ 2: **strong** correlation between yield, commercial_roots and DM_yield
- ✓ **Cooking_time** had strong inverse correlation with WAB and DM.
- ✓ **Strong** correlation between root_type and plant_type.

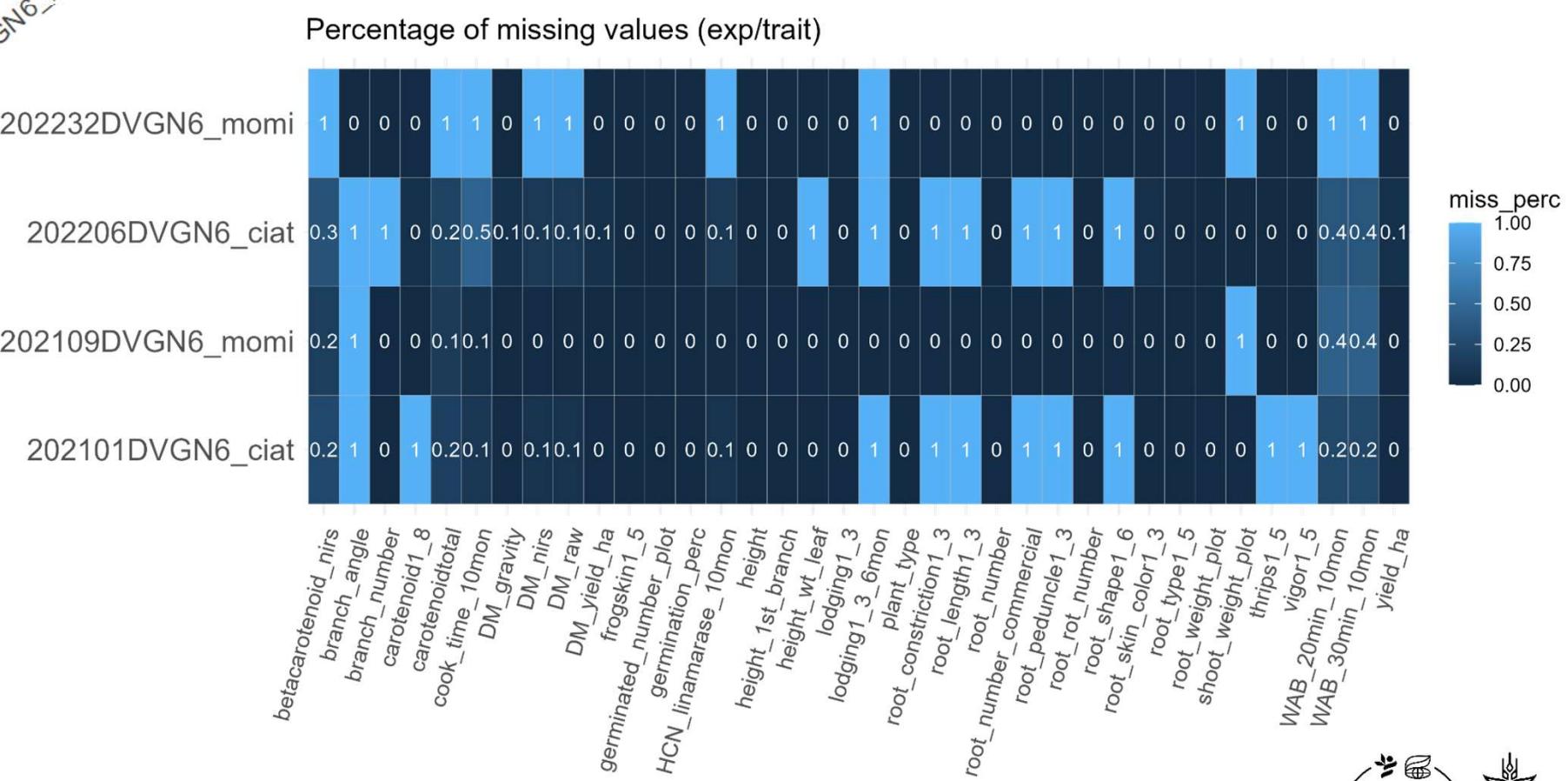


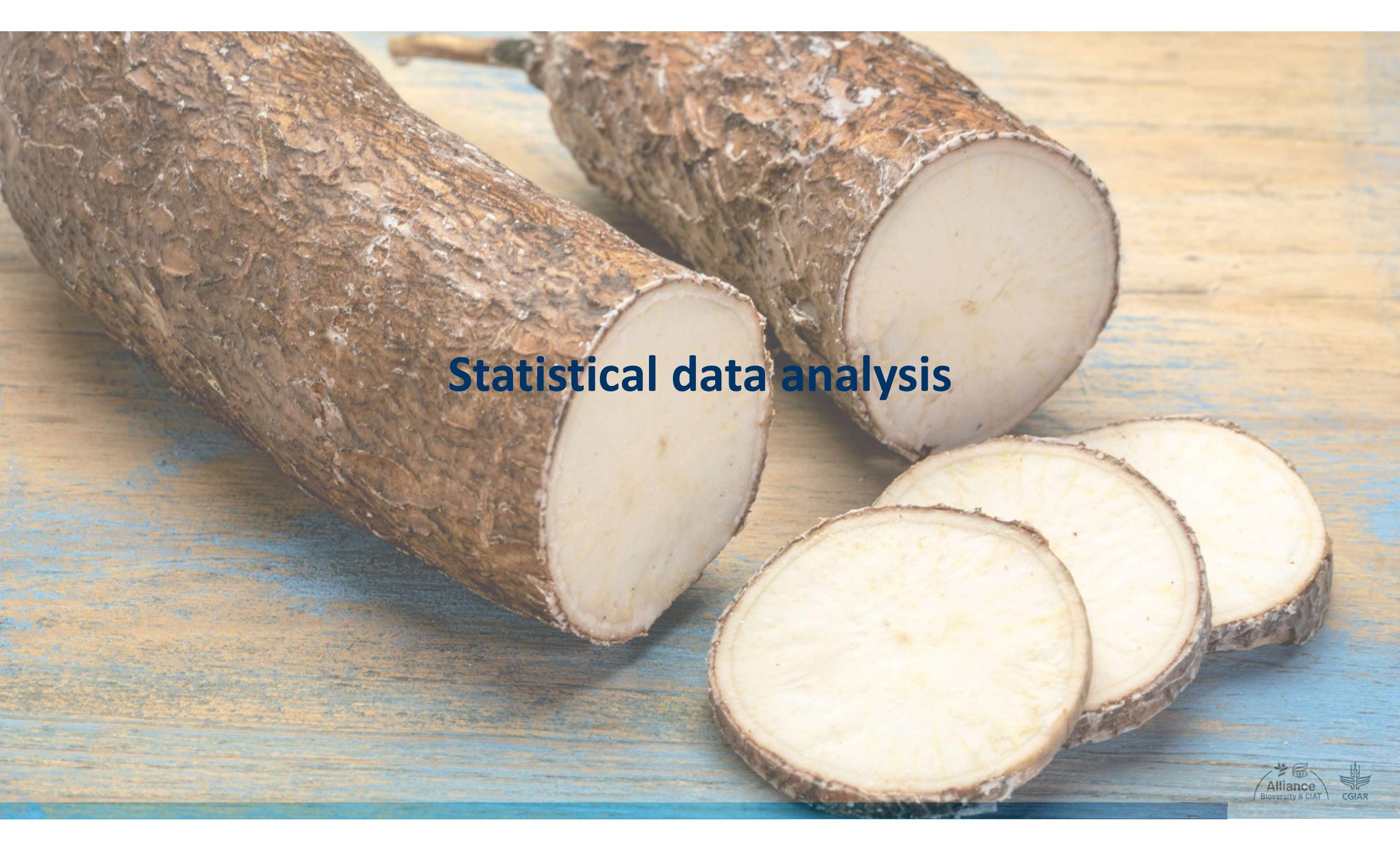
Connectivity Matrix

202232DVGN6_momi	131	131	183	183
202206DVGN6_ciat	131	131	184	183
202109DVGN6_momi	136	136	131	131
202101DVGN6_ciat	136	136	131	131

202101DVGN6_ciat
202109DVGN6_momi
202206DVGN6_ciat
202232DVGN6_momi

Percentage of missing values (exp/trait)



A large cassava root with its brown, textured skin and several thin, round slices of cassava root are arranged on a light-colored wooden surface with a blue stain.

Statistical data analysis

Single Heritability

trial	betacarote noid_nirs	branch_an gle	branch_number	carotenoid1 8	carotenoidto tal	cook_time_10mon	DM_gravity	DM_nirs	DM_raw	DM_yield_ha	frogskin1_5	germited_number_pl ot	germination_perc	HCN_limarase_10m	height	height_1st Bran ch	height_wt_leaf	lodging1_3
202101DVGN6_ciat	0.96		0.68		0.98	0.8	0.86	0.87	0.89	0.71	0.7	0.82	0.82	0.88	0.82	0.87	0.35	0.36
202109DVGN6_momi	0.91		0.8	0.86	0.97	0.7	0.89	0.91	0.91	0.86	0.66	0.86	0.86	0.96	0.71	0.86	0.48	0.8
202206DVGN6_ciat	0.97			0.81	0.99	0.64	0.72	0.84	0.86	0.74	0.79	0.4	0.4	0.93	0.76	0.88		0.51
202232DVGN6_momi		0.73	0.85	0.86			0.84			0.81	0.85	0.72	0.72		0.71	0.85	0.49	0.61

trial	lodging1_3 6mon	plant_type 1_3	root_constriction 1_3	root_length 1_3	root_numbe r	root_number_com mercial	root_peduncle 1_3	root_rot_num ber	root_shape 1_6	root_skin_color 1_3	root_type1 5	root_weight_plot	shoot_weight_ plot	thrips1_5	vigor1 5	WAB_20min_10 mon	WAB_30min_10 mon	yield_ha
202101DVGN6_ciat		0.84			0.63			0.34		0.93	0.6	0.7	0.69			0.72	0.81	0.7
202109DVGN6_momi	0.64	0.84	0.31	0.62	0.79	0.73	0.52	0.31	0.44	0.96	0.81	0.85		0.57	0.69	0.92	0.93	0.85
202206DVGN6_ciat		0.64			0.69			0		0.96	0.63	0.78	0.82	0.09	0.76	0.69	0.8	0.74
202232DVGN6_momi		0.71	0.47	0.3	0.76	0.71	0.55	0.34	0.41	0.98	0.73	0.79		0.8	0.68			0.79

Moderate to high heritability showing the good trial management at 7 locations.

Blue color boxes indicate low heritability

Heritability GxE

trait	h2
root_skin_color1_3	0.98
carotenoidtotal	0.98
HCN_linamarase_10mon	0.95
betacarotenoid_nirs	0.95
carotenoid1_8	0.93
height_1st_branch	0.9
DM_gravity	0.9
DM_raw	0.88
DM_nirs	0.88
height	0.87
frogskin1_5	0.86
branch_number	0.85
WAB_30min_10mon	0.84
plant_type	0.83
root_number	0.81
root_weight_plot	0.8
WAB_20min_10mon	0.79
DM_yield_ha	0.79
vigor1_5	0.79
germination_perc	0.78
yield_ha	0.78
lodging1_3	0.78
shoot_weight_plot	0.77
root_type1_5	0.75
germinated_number_plot	0.74
root_number_commercial	0.71
cook_time_10mon	0.66
height_wt_leaf	0.61
root_constriction1_3	0.48
root_shape1_6	0.43
root_rot_number	0.03
thrips1_5	-0.09
root_length1_3	-0.18
root_peduncle1_3	-0.24

Traits removed from the MET analysis:

- ✓ Branch_angle: **only one trial to fit an MET model**
- ✓ lodging1_3_6mon: **only one trial to fit an MET model**

Traits with non quality:

- ✓ root_rot_number
- ✓ thrips1_5
- ✓ root_length1_3
- ✓ Root_peduncle1_3

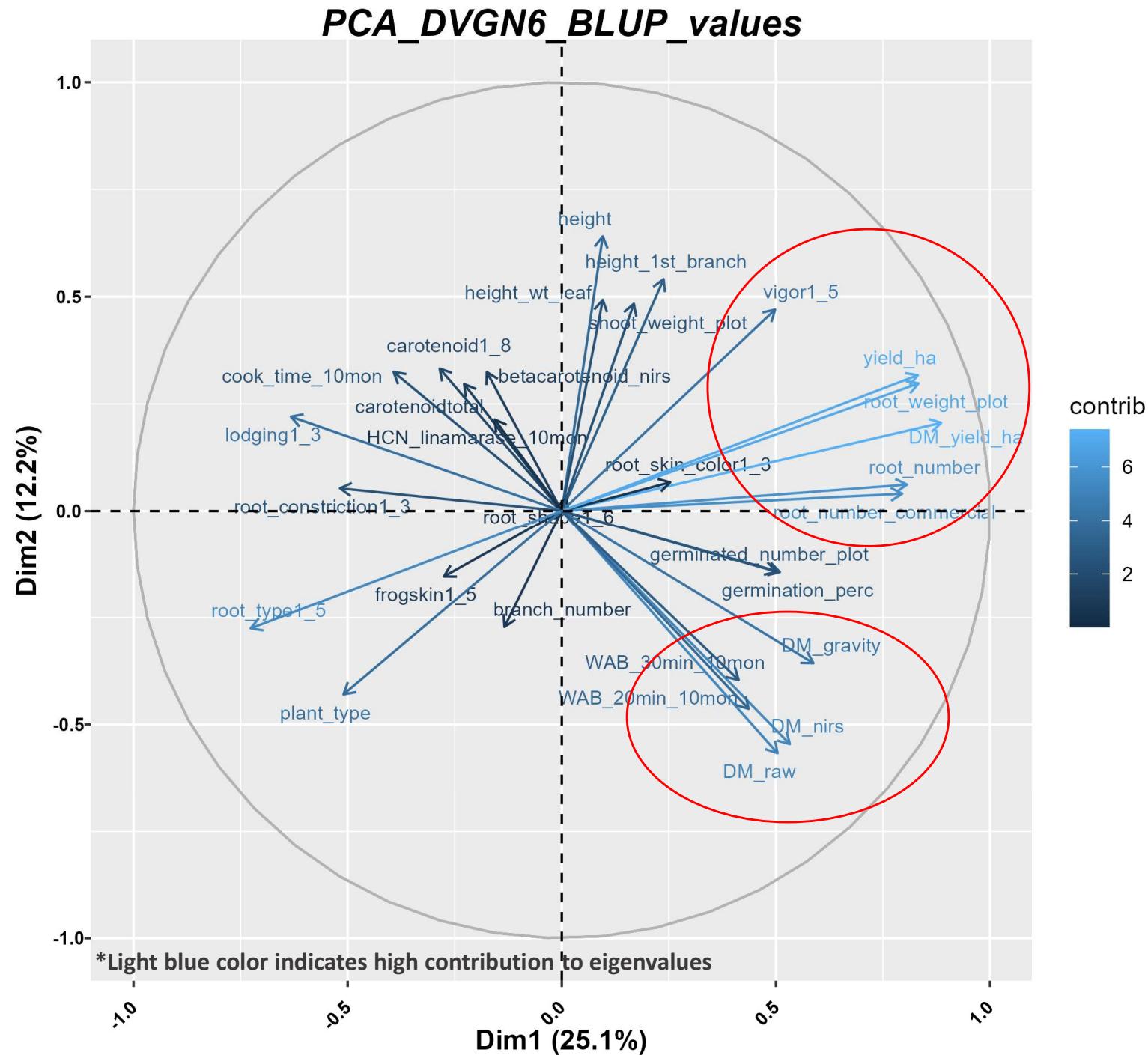
Very low GxE h2. Overall BLUP values not trusted

Genotypic correlation (BLUP value)

Principal component analysis (BLUP values)

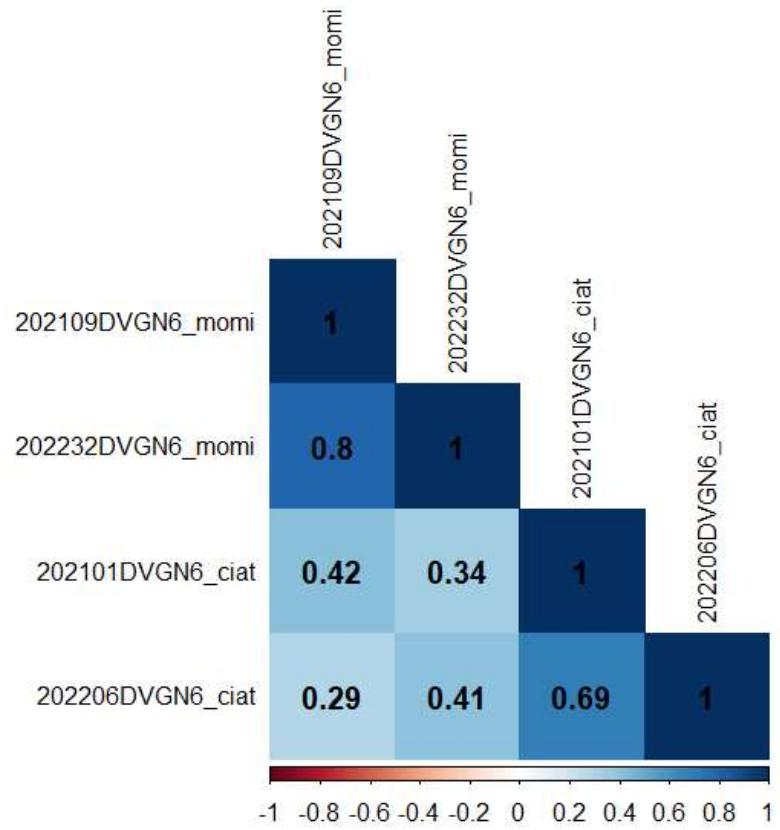
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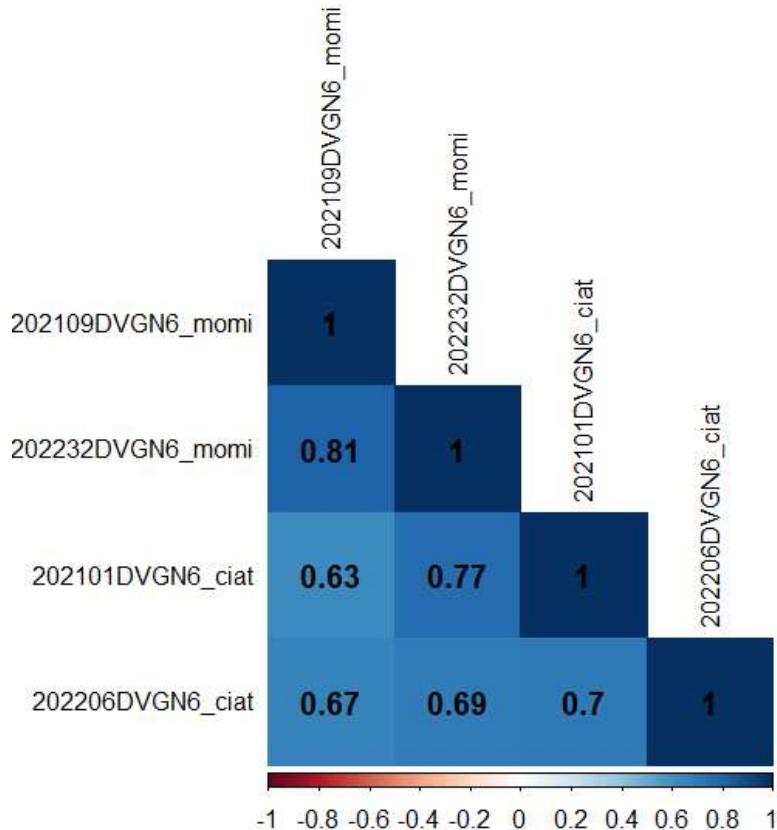


Genotypic Correlation agronomic traits:

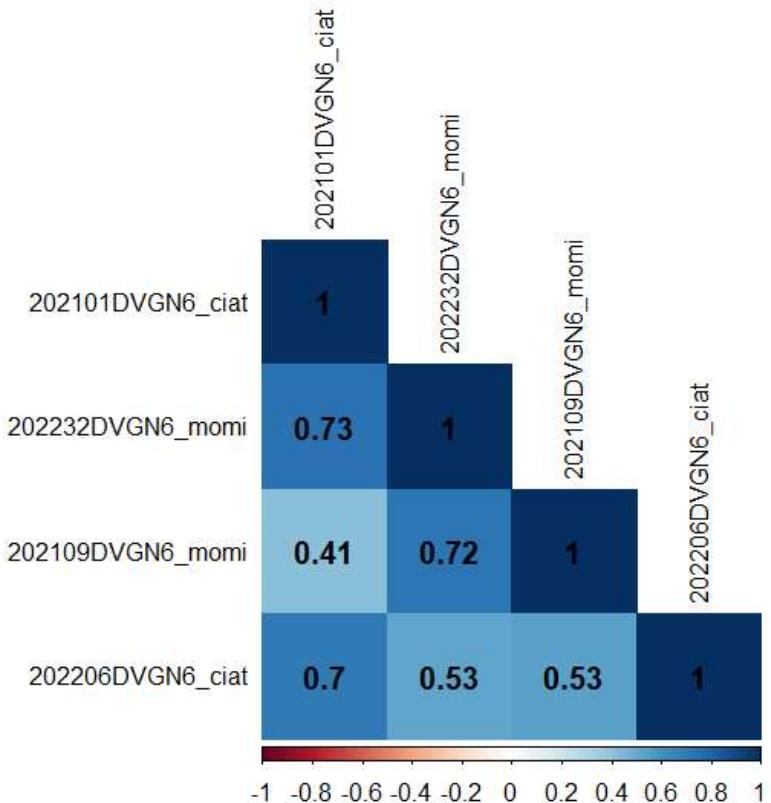
Yield



Dry Matter gravity

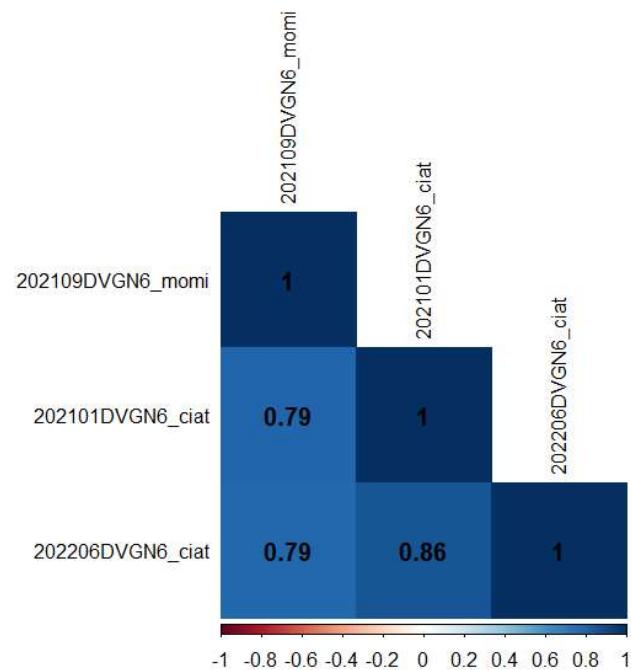


Plant type

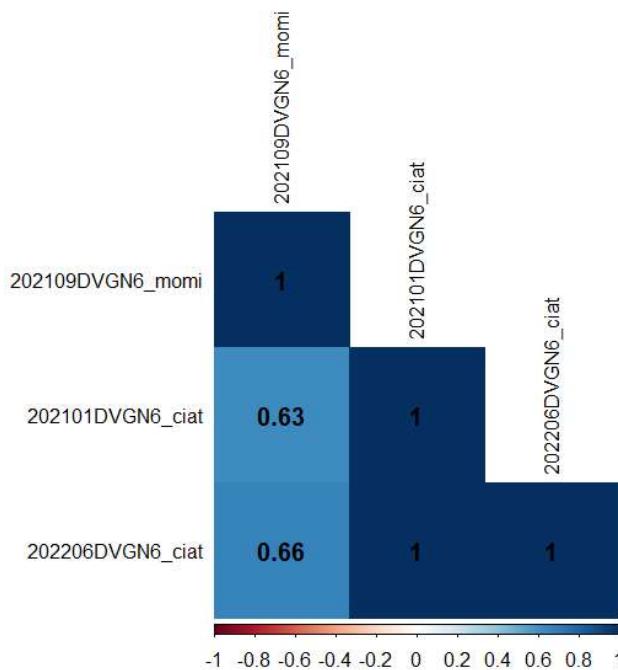


Genotypic Correlation quality traits:

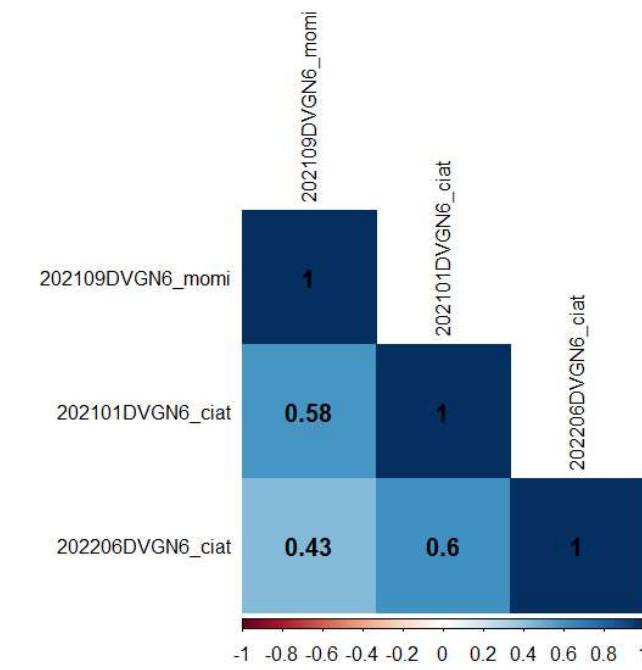
Dry Matter by oven



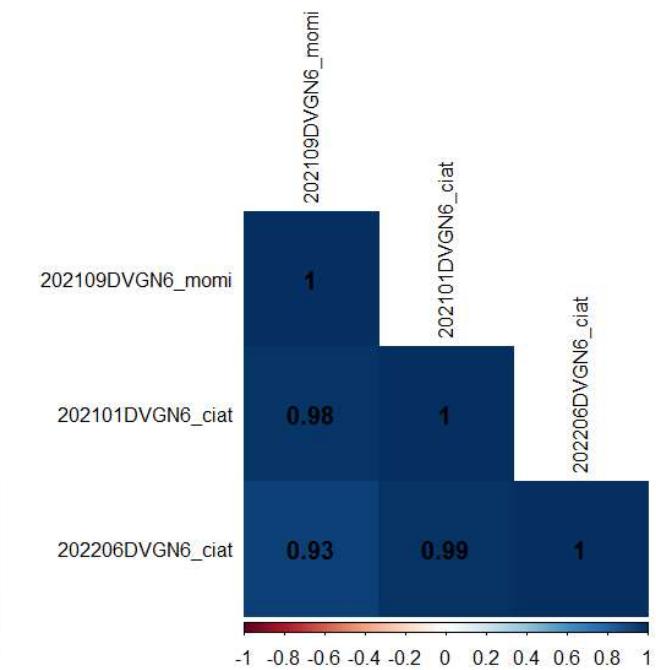
WAB 30 min



Cooking time

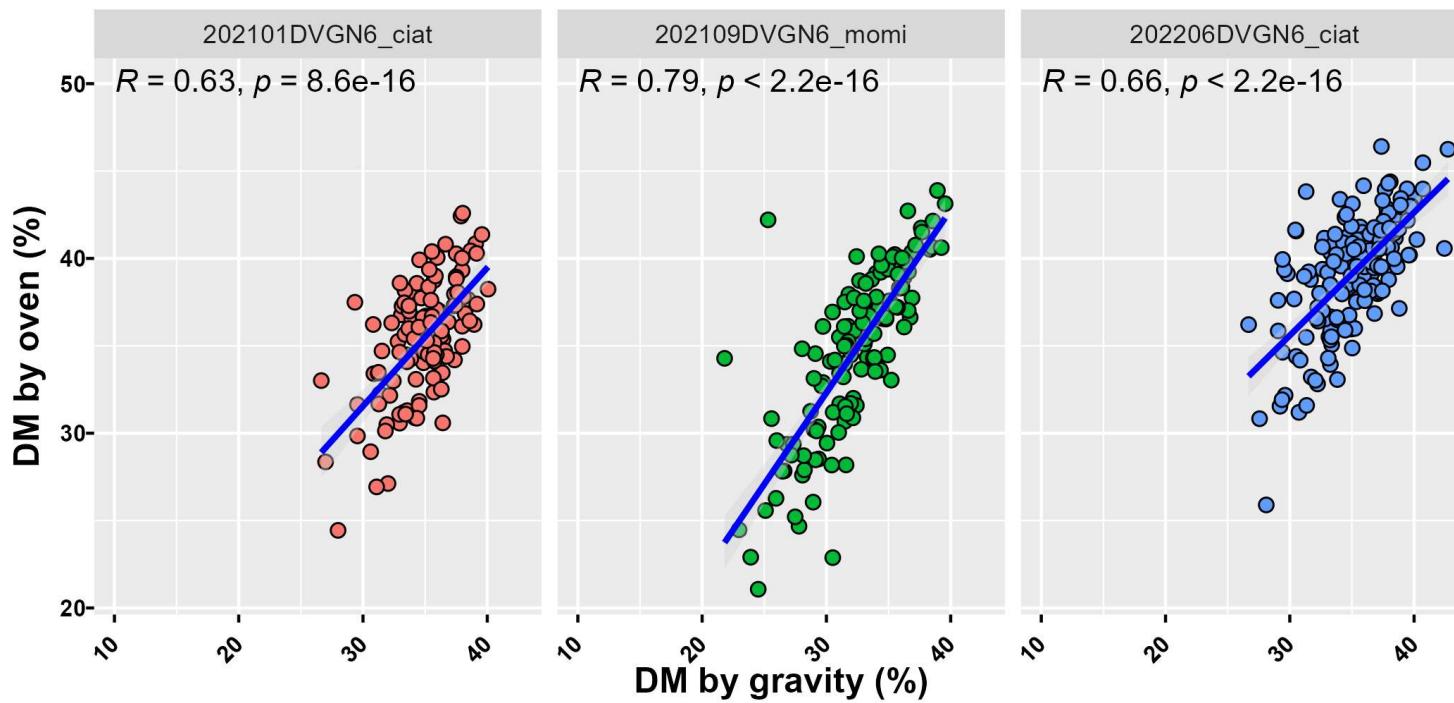


Cyanide content



Genetic correlation between DM_gravity and DM_oven

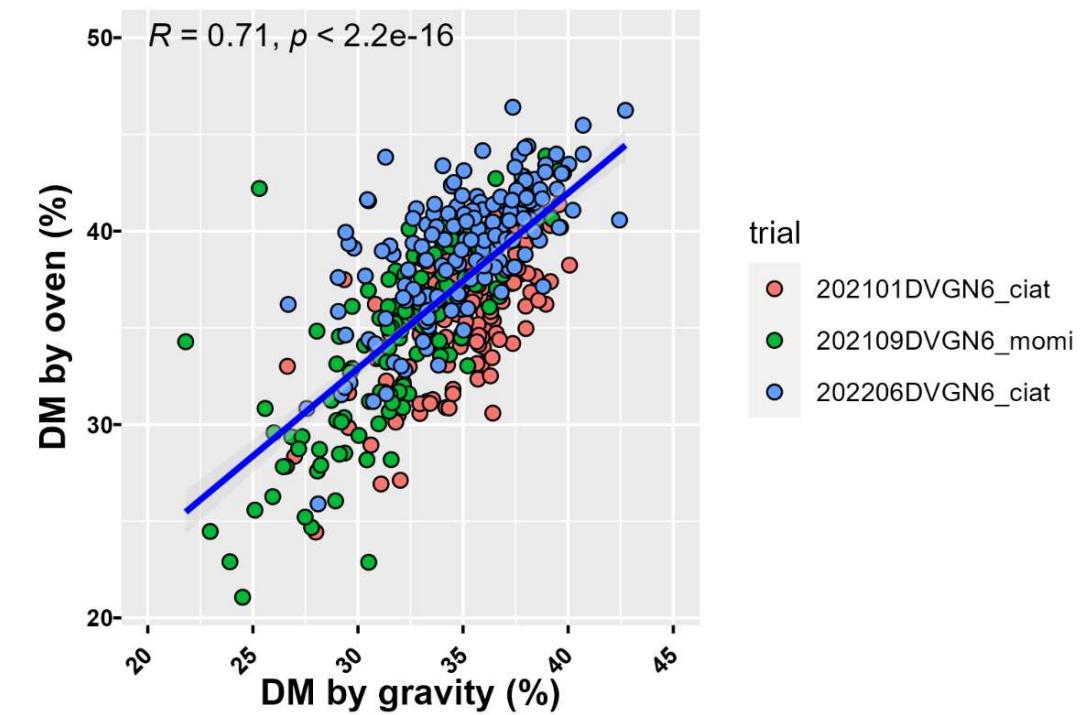
Cor with BLUP values from each trial



BLUP value

Correlation between two methodologies was **moderate**.

Binding of both trials





Thank you!