Githublink:

#### **Creating the pedigree matrix for 866 individuals**

🡪 Create\_Pedigree.R

#### **Creating combined A matrix**

🡪 Create\_RelationshipMatrix\_05272021.R

# Input pedigree matrix csv file:

“Ped\_in\_Order\_866\_Individuals\_Fndr\_New\_Order\_0116\_2021.csv”

# Calculate CC matrix and condense the pedigree-based relationship matrix

Source “calcCCmatrixBiphasic.R” & “condenseMixedPloidyRelMat.R

# Input founders A mat

Saved in “CovList\_3\_As\_0116\_2021.Rdata”

# Input GPs A mat

Saved in “Newly\_saved\_3\_As\_for\_CovComb\_0527\_2021.Rdata”

# Combine the marker based A mat and pedigree relationship matrix

CovComb() function

#Output:

“outCovComb4\_Mix\_Conden\_0527\_2021.Rdata”

#### **Formatting Yr2019 and Yr2020 data**

🡪 Step1\_Create\_Matrix.R

I. Phenotypic Data formatting for Yr2019 and Yr2020

II. Import founders genotypic data (“FarmCPU\_GAPIT.Rdata”),

format and **create founders A matrix**

#### **Getting BLUEs for plot level traits**

formatted Yr2019, Yr2020 and Yr2021 data in file:

“3yrs\_data\_plotformated\_indivNot\_12012021.Rdata"

🡪 Getting\_BLUEs\_whitin\_Year.R

#### **Getting BLUEs for individual level traits**

🡪 Getting\_BLUEs\_within\_Year\_Indiv\_traits.R

#### **Heritability, Genetic cor between years, Yr19,Yr20 predicting Yr21 with heterogeneous error variance structure**:

🡪 ASReml\_Predicting\_Yr21\_withASReml.R

# using raw Yr19 and Yr20 data, Fitting both years' data in the model with unstructured year variance and heterogeneous error variance between years.

# This will get the estimated h2 within each year, Genetic cor for the same trait across years, SE for those. Also the BVs of GPs being used in Yr2021

# Results output are in: "/local/workdir/mh865/GCA\_SCA/"

# Input formatted Yr2021 data

“3yrs\_data\_plotformated\_indivNot\_12012021.Rdata”

# Input previously formatted Yr2019 and Yr2020 plot level data

“dataNHpi\_withChk\_3\_sets\_PhotoScore23.rdata”

“dataNHim\_withChk\_3\_sets\_PhotoScore23.rdata”

# Input previously formatted 3 years Individual level data

“dataNHim\_withChk\_3\_sets\_PhotoScore0123\_measurementsInfactor.rdata”

# The combined A matrix is also in the above Rdata, called

“outCovComb4\_MixOrder”

**#### Multi-trait model in ASReml-R. Two trait at a time, Within each year analysis :**

🡪 ASReml\_Multi-trait\_TwoTwocombination\_WithinYr.R

# Input BLUEs within each Year (Yr19,20)

# Input combined A matrix “outCovComb4\_MixOrder” in

“outCovComb4\_Mix\_Conden\_0527\_2021\_866Indiv.Rdata”

(NOTE: the outCovComb matrix that had 955 individuals, included Yr19,Yr20 and Yr21 data is in “outCovComb4\_Mix\_Conden\_0712\_2021.Rdata”)

**#### BGLR, GCA+SCA with pedigree vs with combined A mat; gBLUP with pedigree vs with combined A mat**

# Estimating GCA SCA components function in:

🡪 Estimating\_GCA\_SCA\_fnc.R