

Dissecting lentil crop growth in contrasting environments using  
digital imaging and genome-wide association studies  
unpublished

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Derek Wright, Sandesh Neupane, Karsten Neilson, Tania Gioia & Kirstin E Bett. **Dissecting lentil crop growth in contrasting environments using digital imaging and genome-wide association studies.** *unpublished.* (2024) 00: 1-10

which is follow-up to:

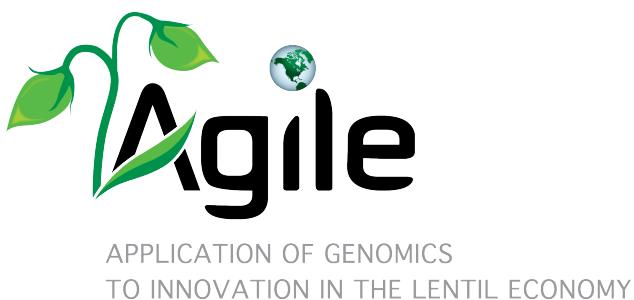
- Sandesh Neupane, Derek Wright, Raul Martinez, Jakob Butler, Jim Weller, Kirstin Bett. **Focusing the GWAS Lens on days to flower using latent variable phenotypes derived from global multi-environment trials.** *The Plant Genome*. (2022) 16(1): e20269. doi.org/10.1002/tpg2.20269
  - [https://github.com/derekmichaelwright/AGILE\\_LDP\\_GWAS\\_Phenology](https://github.com/derekmichaelwright/AGILE_LDP_GWAS_Phenology)
  - Derek M Wright, Sandesh Neupane, Taryn Heidecker, Teketel A Haile, Clarice J Coyne, Rebecca J McGee, Sripada Udupa, Fatima Henkrar, Eleonora Barilli, Diego Rubiales, Tania Gioia, Giuseppina Logozzo, Stefania Marzario, Reena Mehra, Ashutosh Sarker, Rajeev Dhakal, Babul Anwar, Debashish Sarker, Albert Vandenberg, and Kirstin E. Bett. **Understanding photothermal interactions can help expand production range and increase genetic diversity of lentil (*Lens culinaris* Medik.).** *Plants, People, Planet*. (2021) 3(2): 171-181.
  - [https://github.com/derekmichaelwright/AGILE\\_LDP\\_Phenology](https://github.com/derekmichaelwright/AGILE_LDP_Phenology)
- 

- [https://github.com/derekmichaelwright/AGILE\\_LDP\\_GWAS\\_Phenology](https://github.com/derekmichaelwright/AGILE_LDP_GWAS_Phenology)
- View as pdf
- View as HTML
- Source Code Vignette (Growth\_Rates\_Vignette.html)

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- Figures
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## AGILE & P<sup>2</sup>IRC Projects



## Collaborators

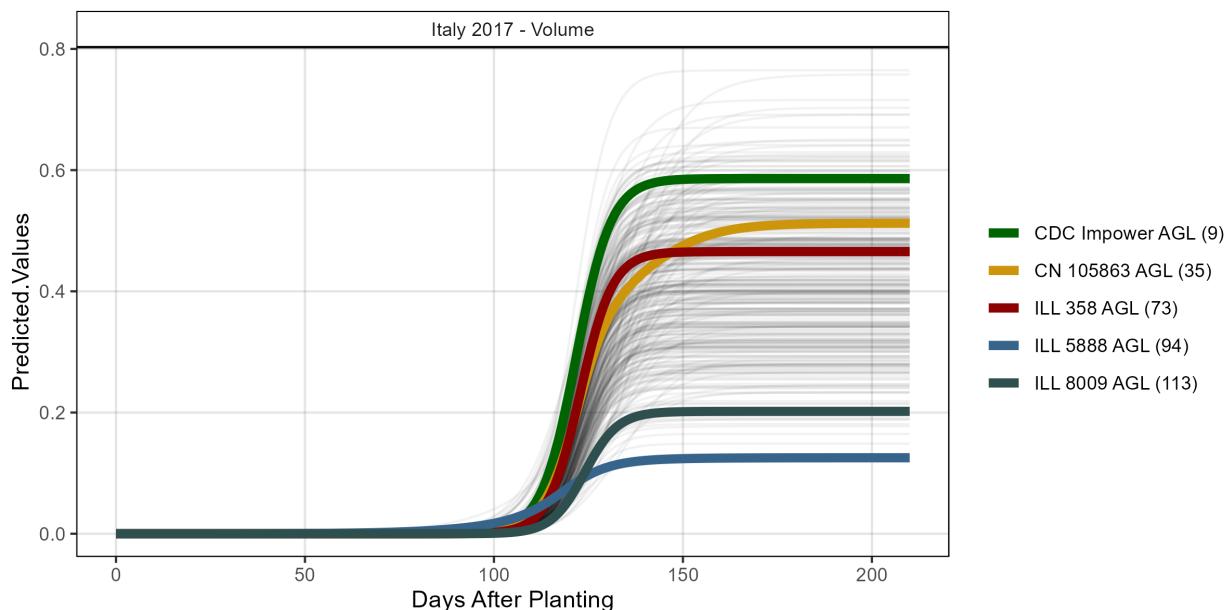
- Department of Plant Sciences and Crop Development Centre, University of Saskatchewan, Saskatoon, Saskatchewan, Canada
  - School of Agriculture, Forestry, Food and Environmental Sciences, University of Basilicata, Potenza, Italy
- 

## Raw Data & Growth Curve Modeling

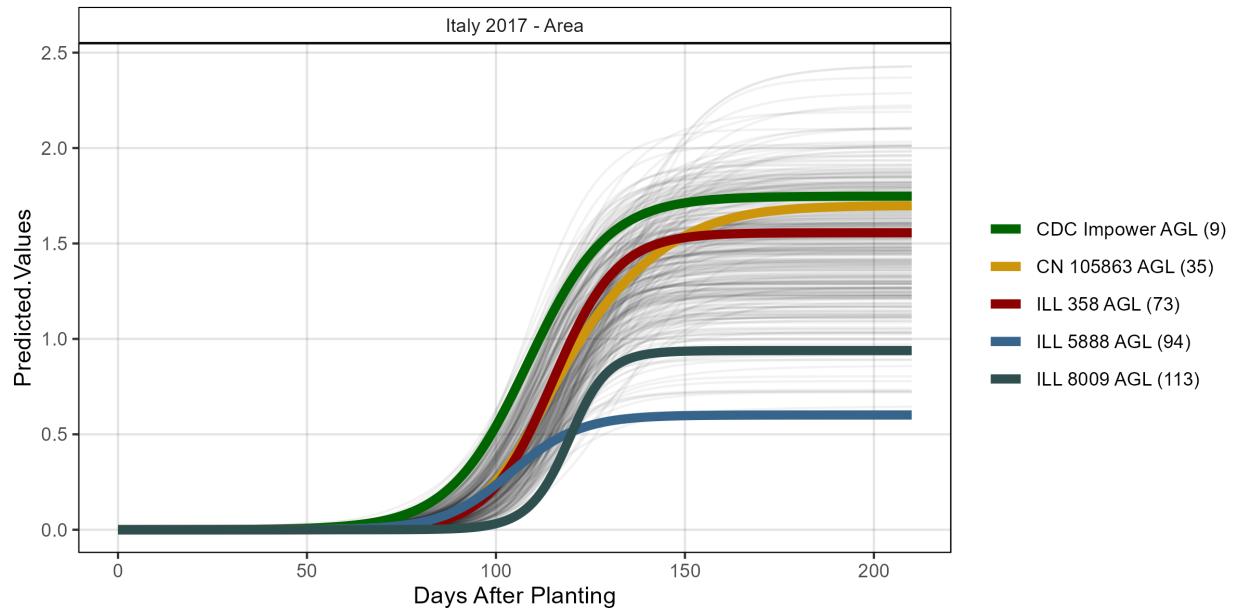
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  - Additional/ggDroneCheck\_Su17.pdf
  - Additional/ggDroneCheck\_Su18.pdf
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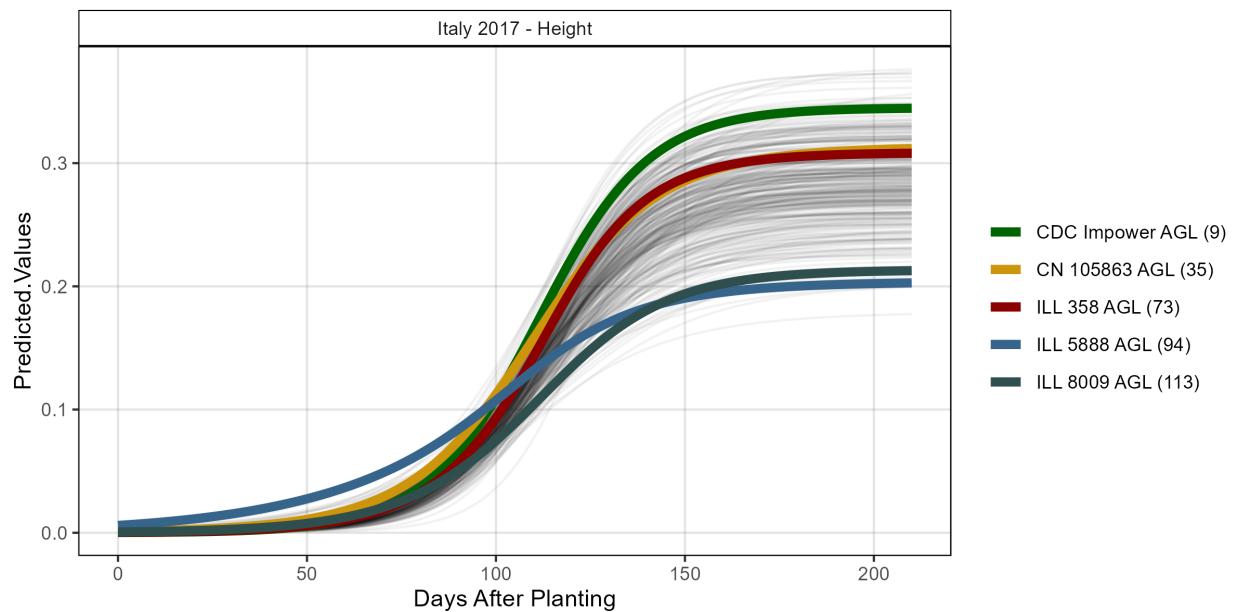
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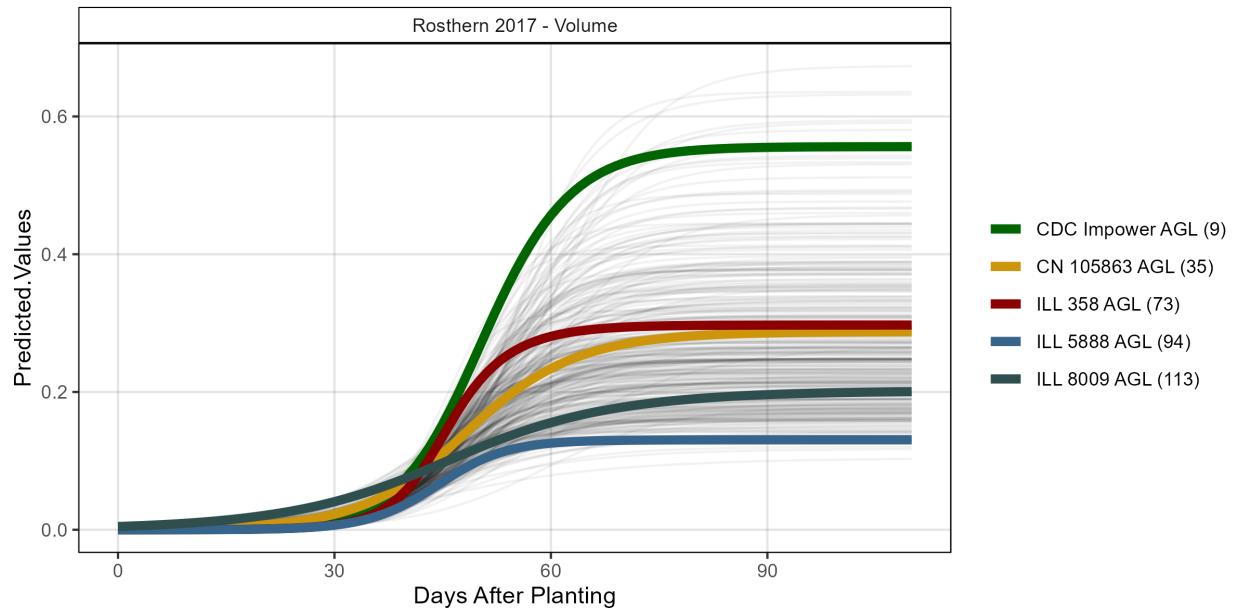


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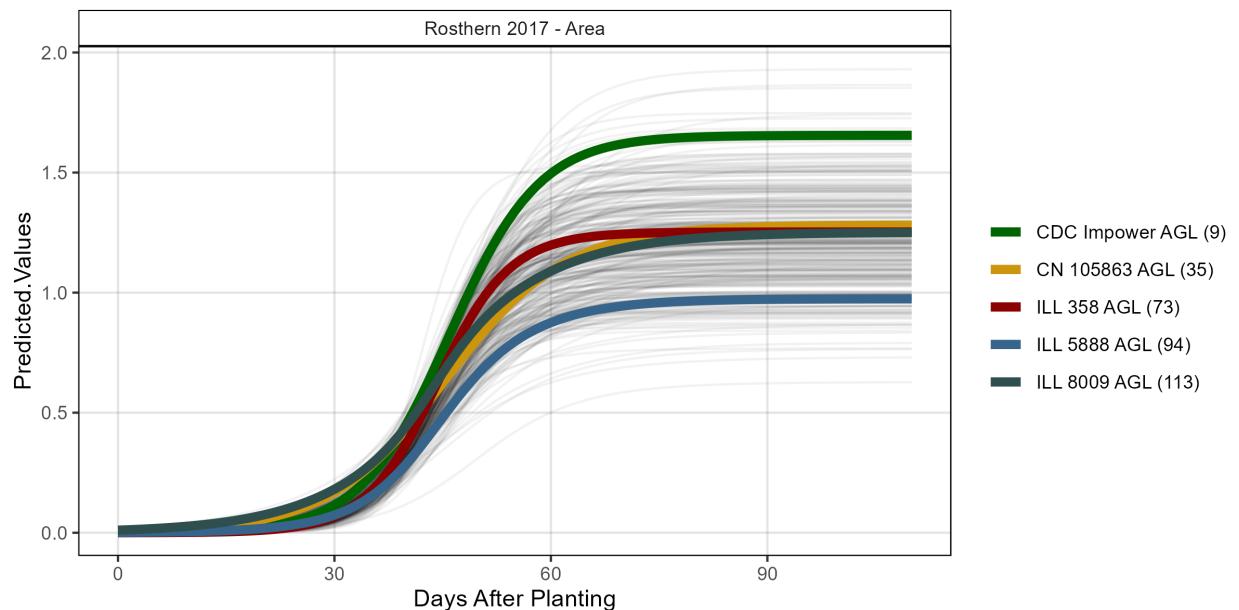


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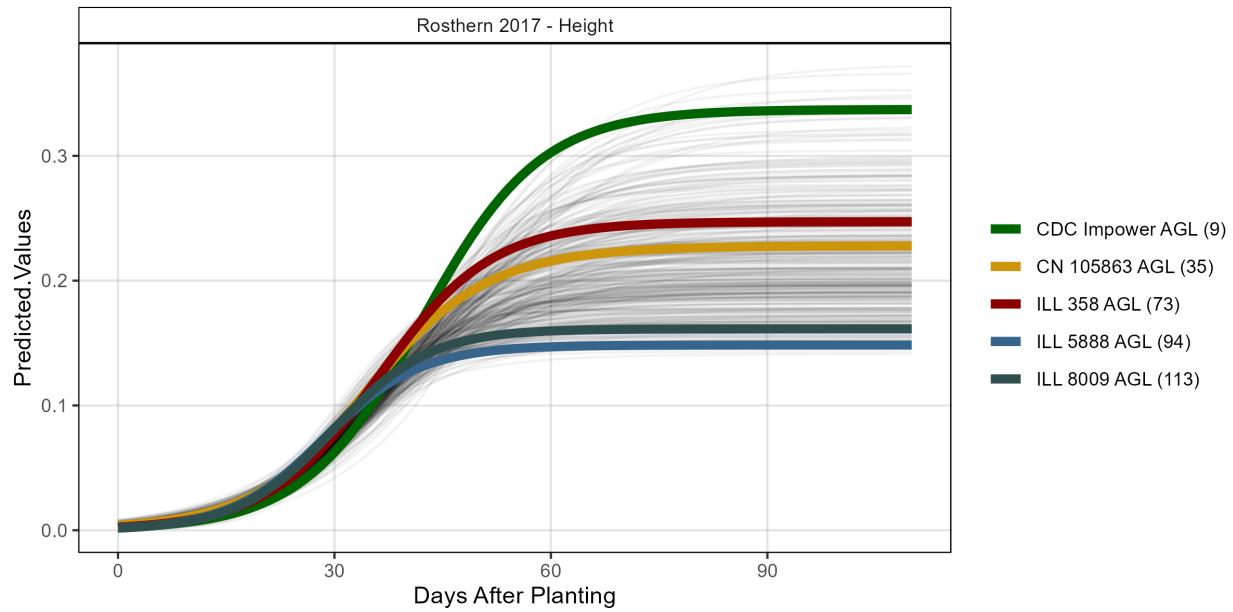
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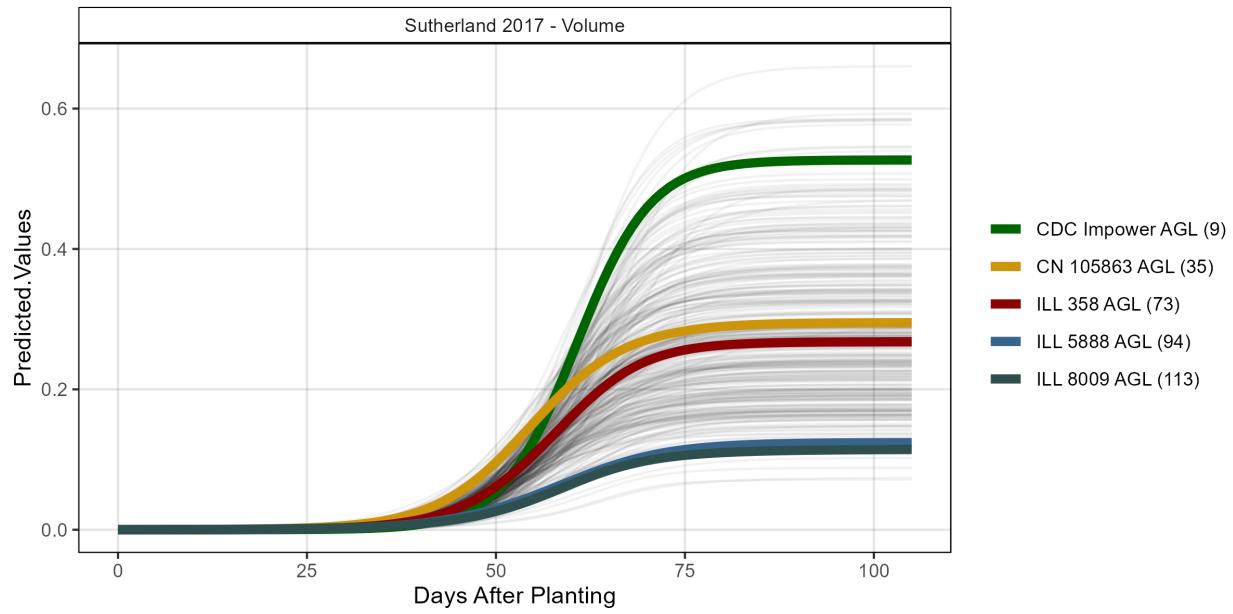


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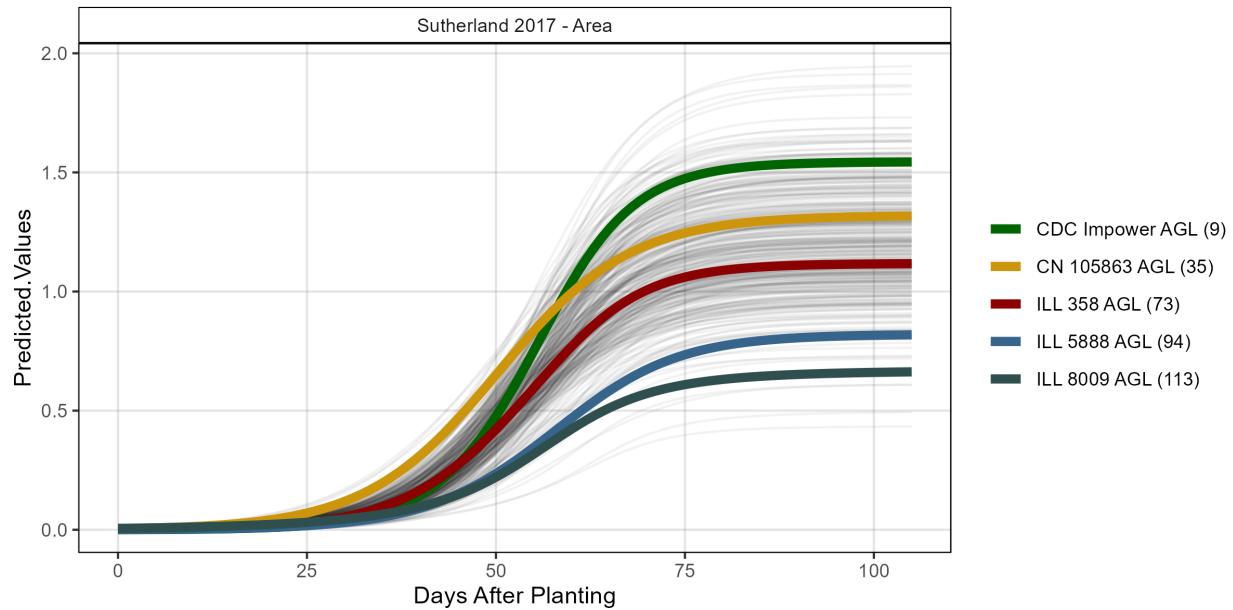


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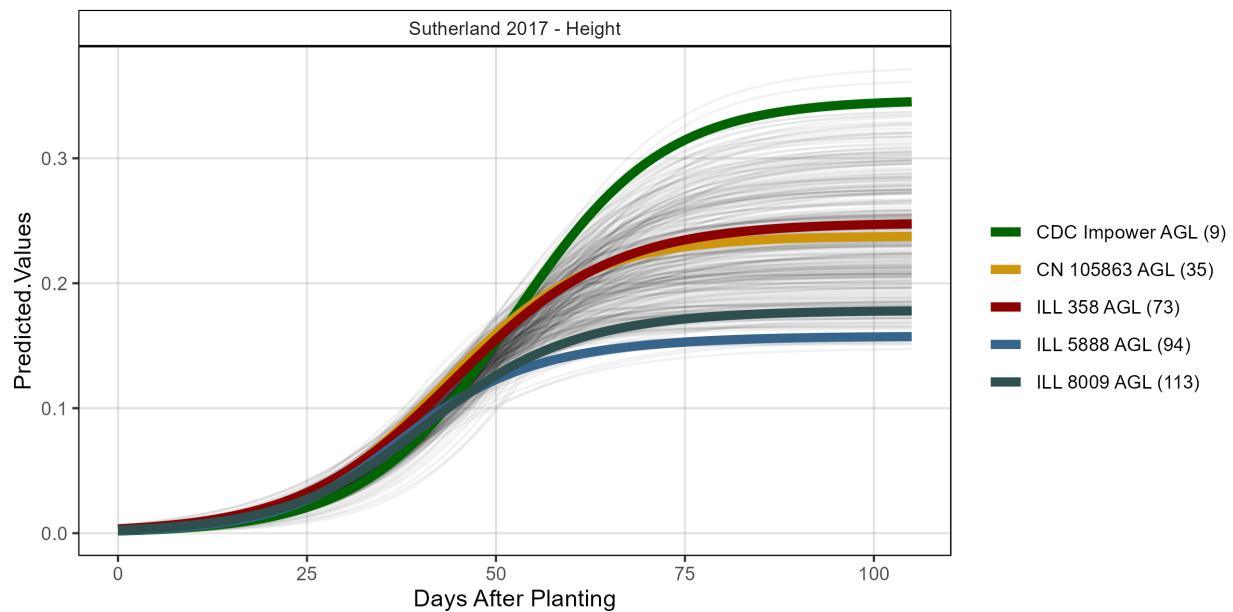
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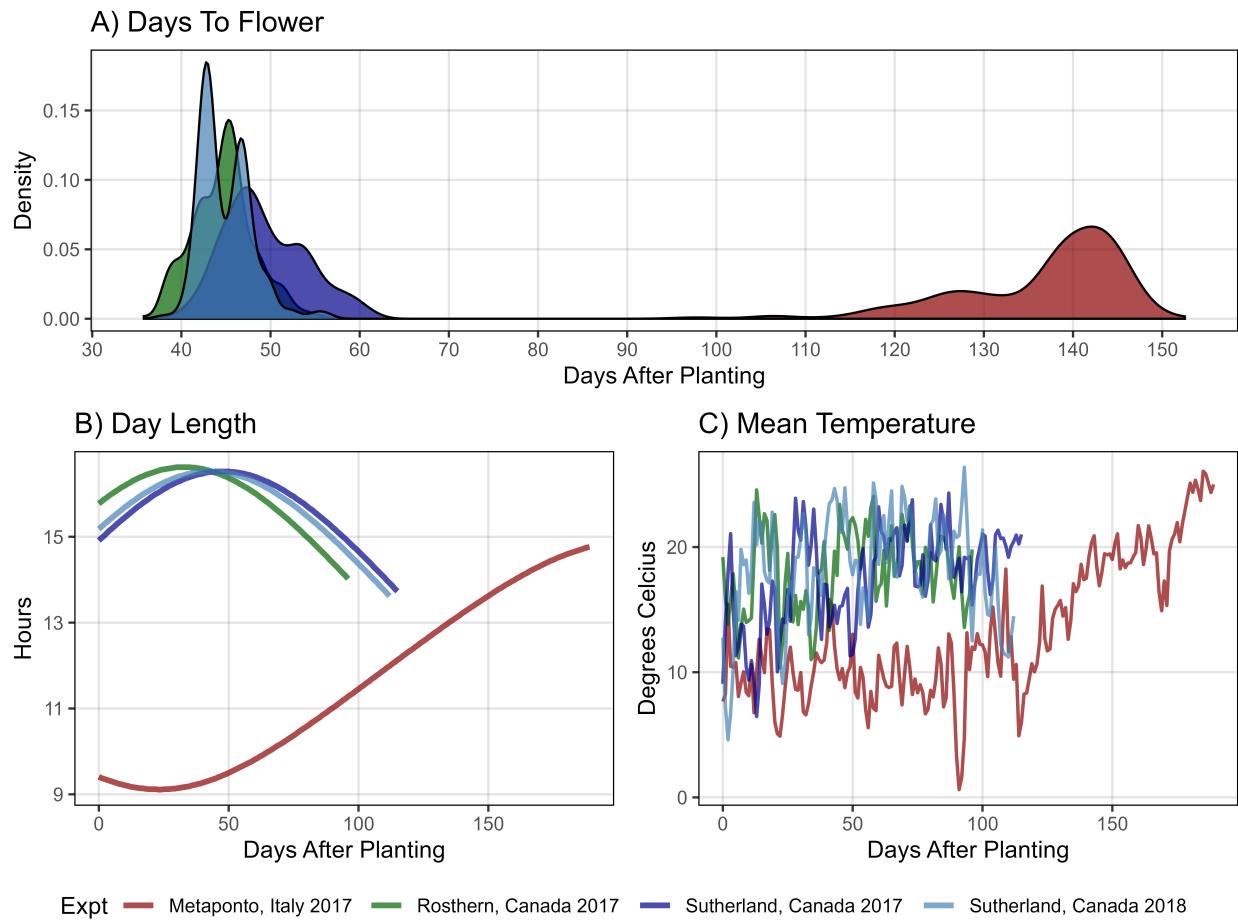
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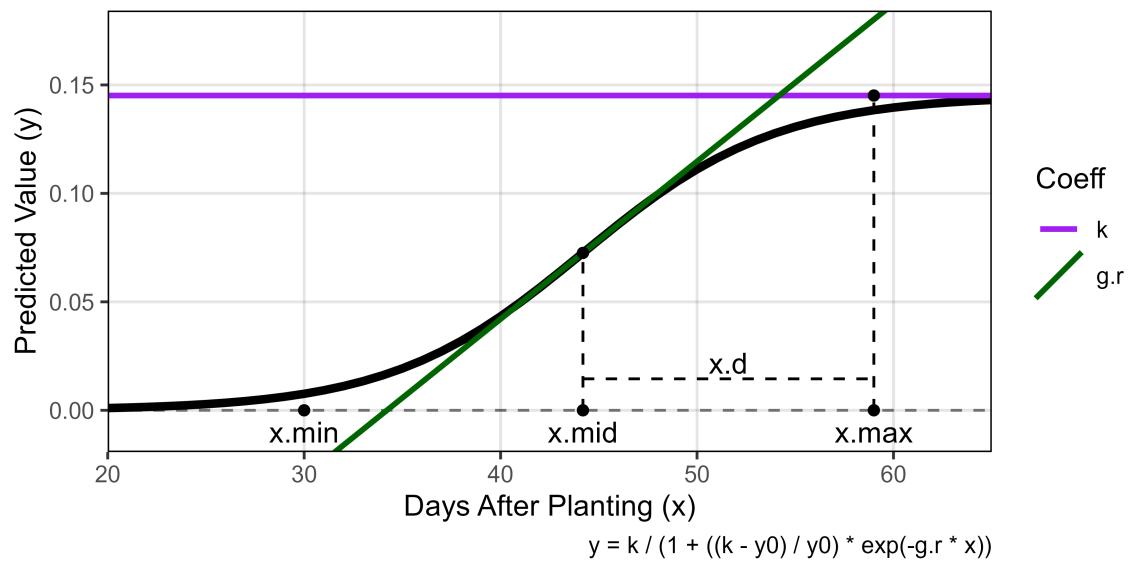
Sutherland, Canada 2018

## Figures

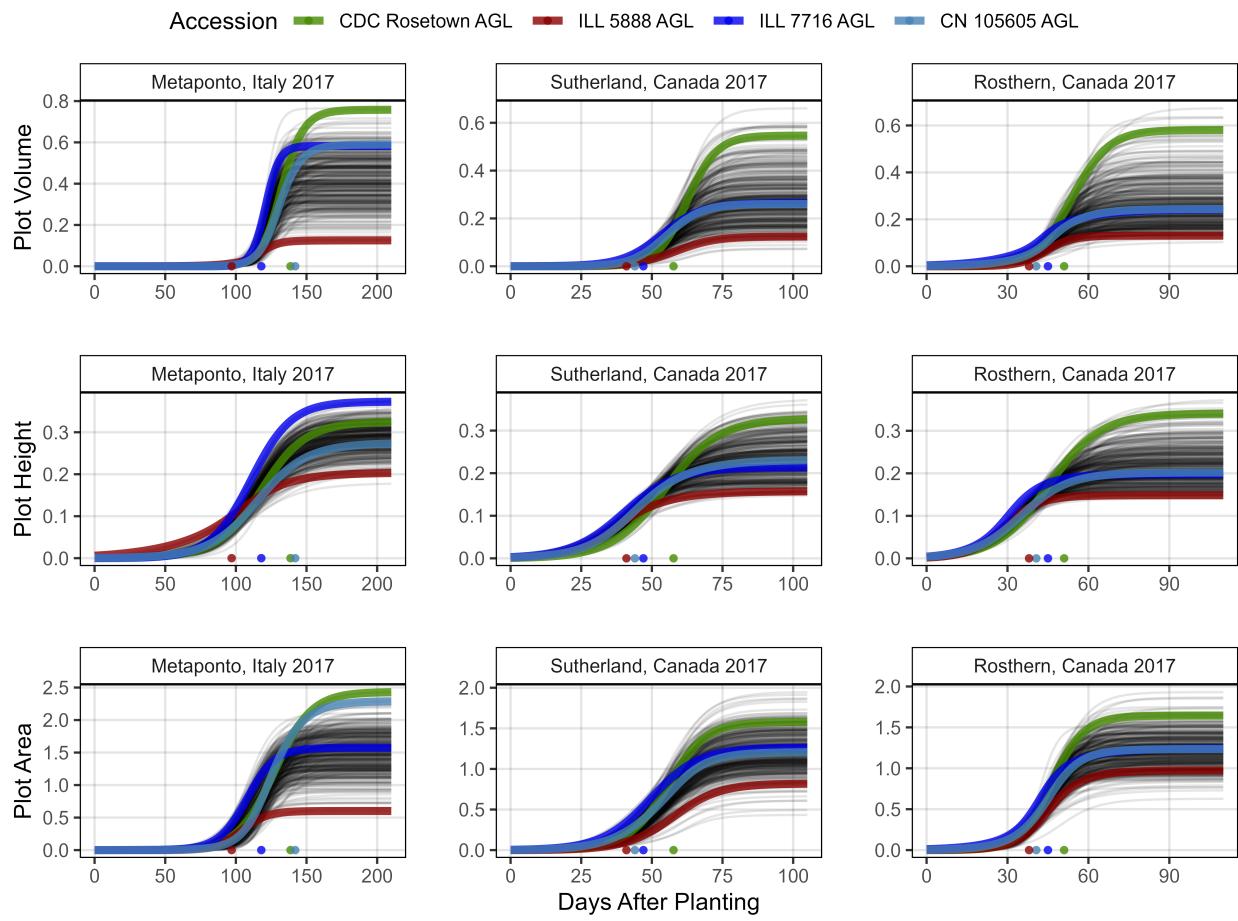
Figure 1



**Figure 2**



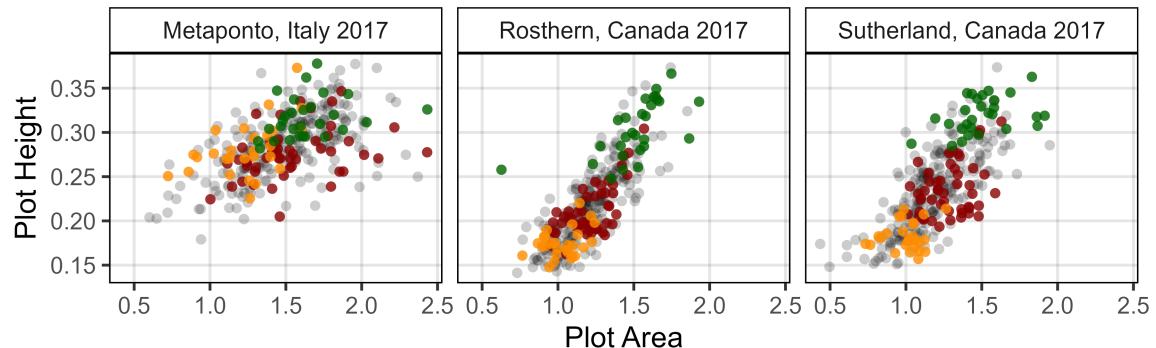
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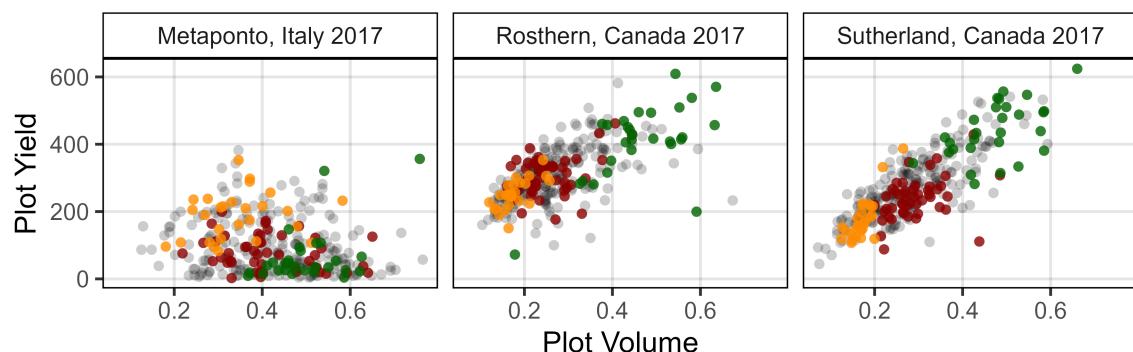
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- Additional/Figure\_04\_B.html
- Additional/Figure\_04\_C.html

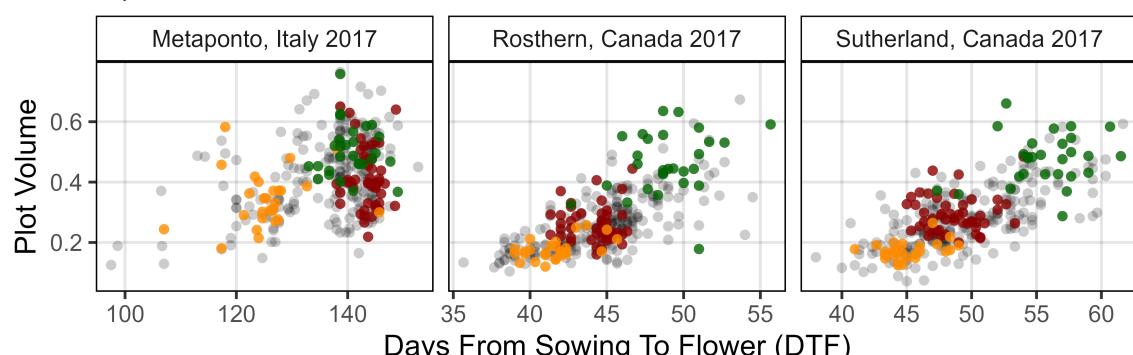
**A) Height x Area**



**B) Yield x Volume**

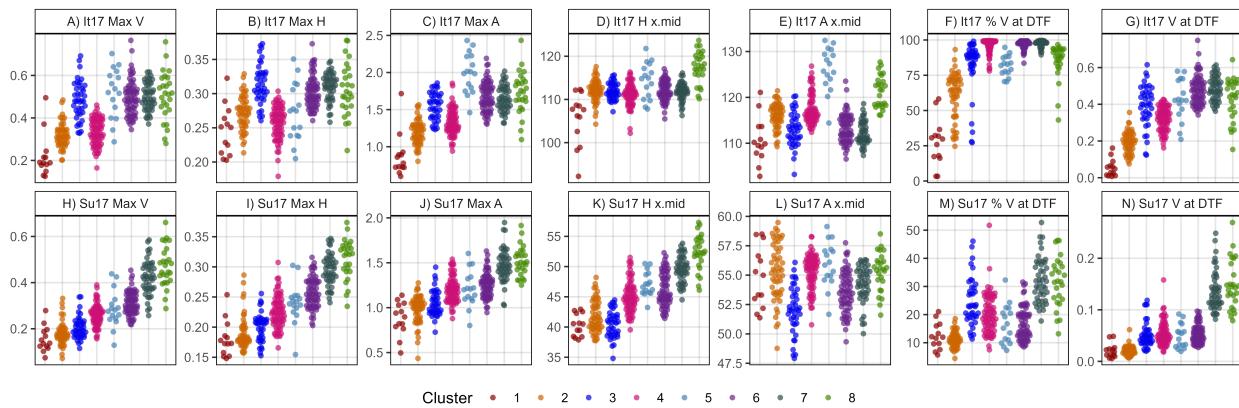


**C) Volume x DTF**

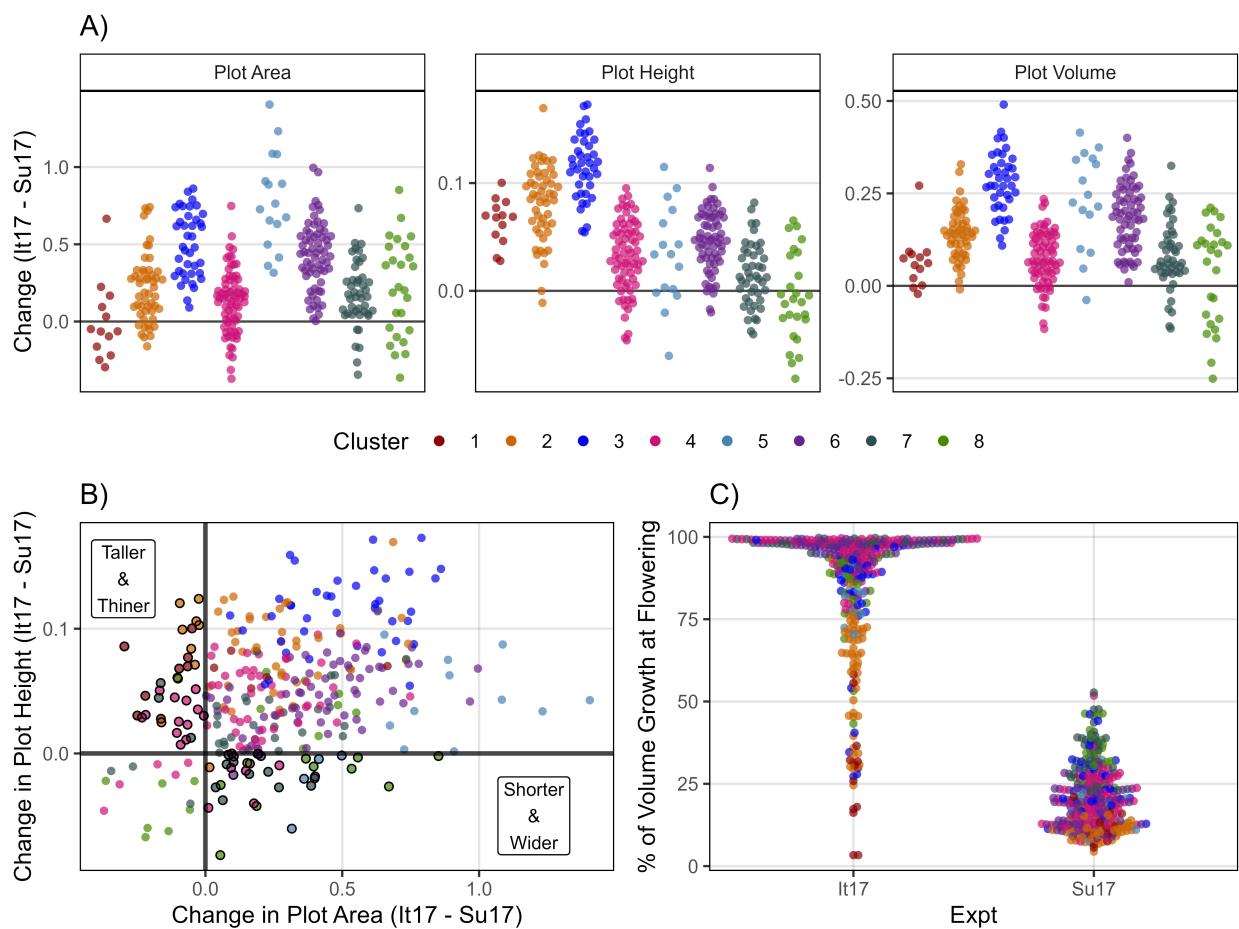


Accession Origin   ●   Canada   ●   India   ●   Iran   ●   Other

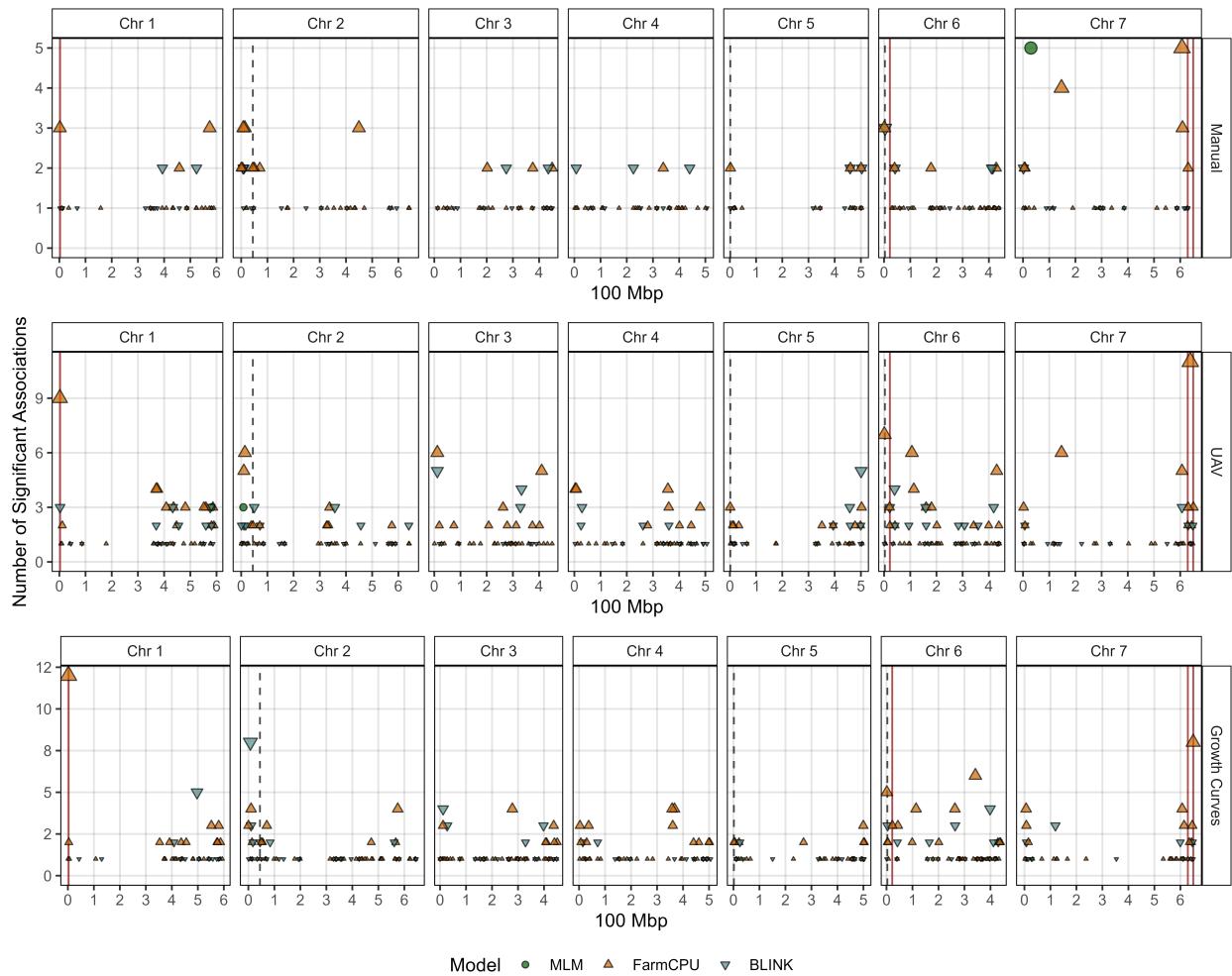
**Figure 5**



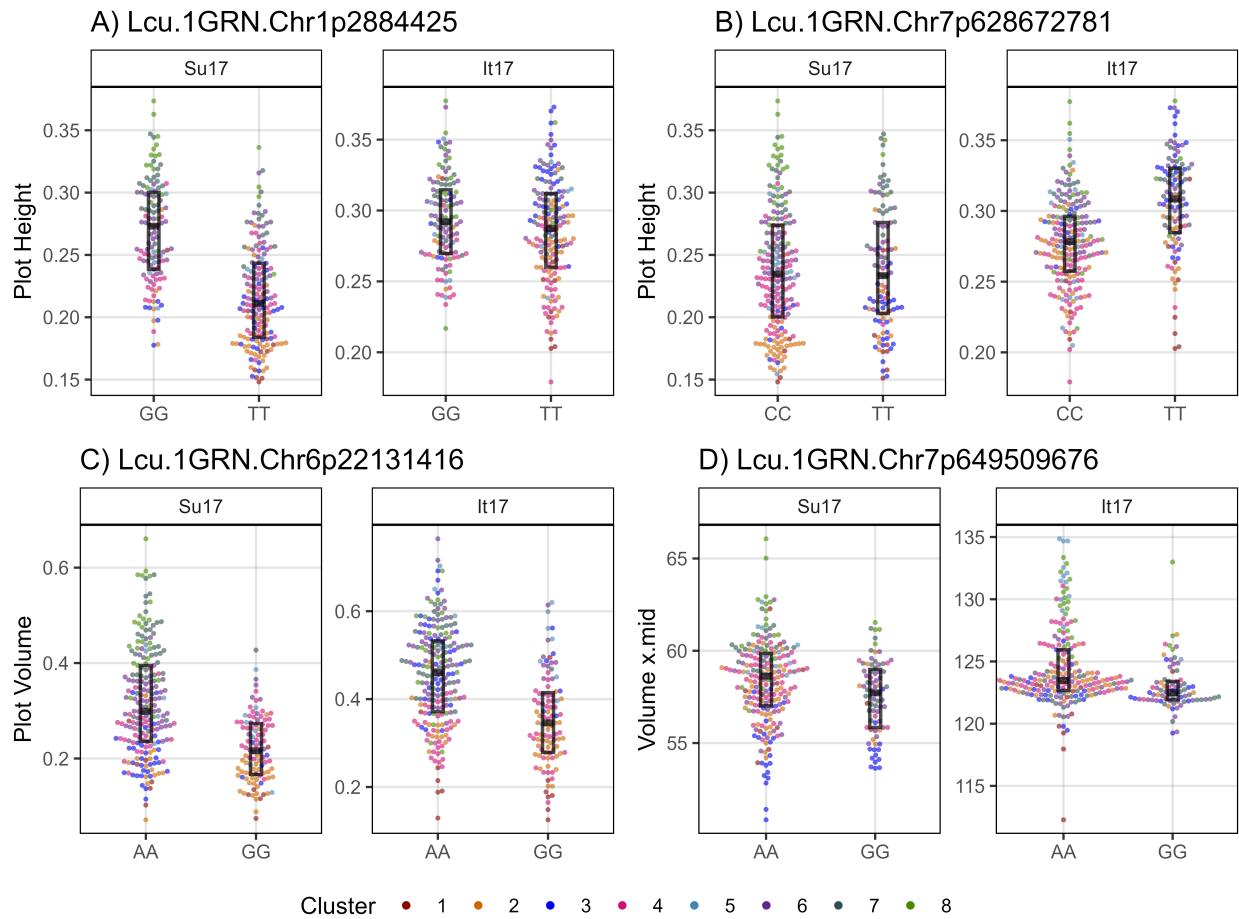
**Figure 6**



**Figure 7**



**Figure 8**



## Supplemental Tables

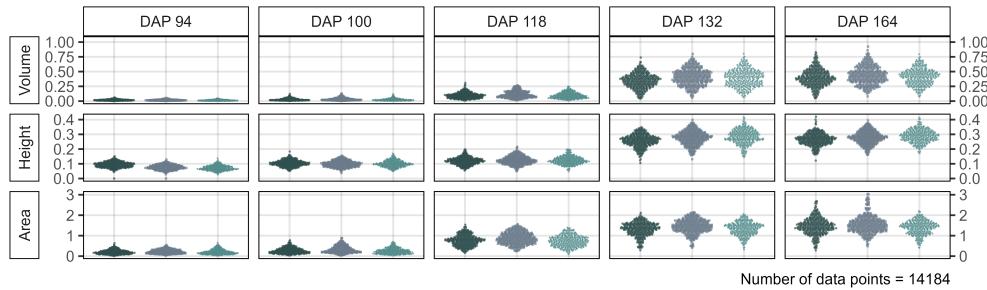
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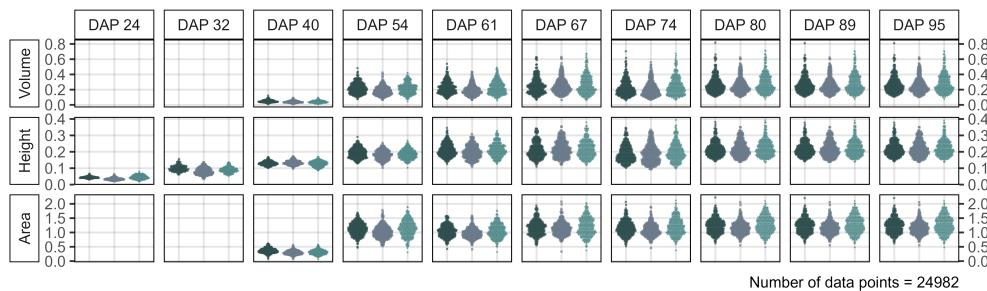
## Supplemental Figures

### Supplemental Figure 1

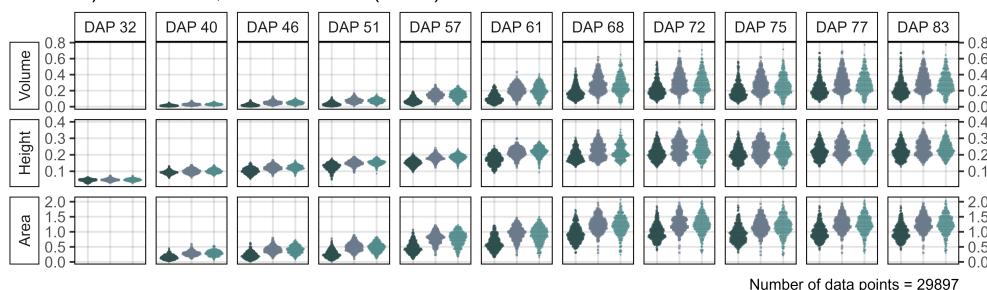
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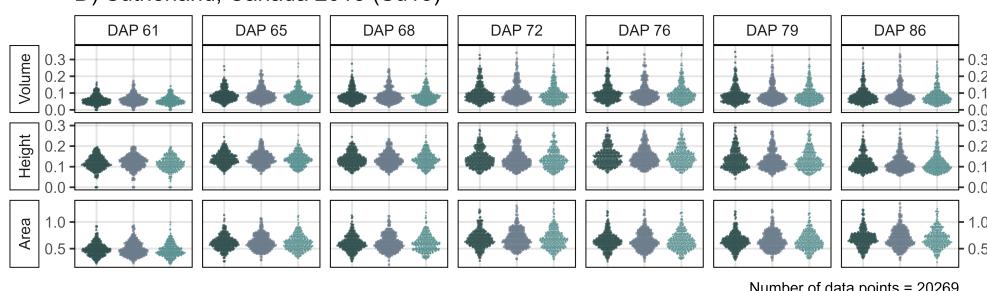
B) Rosthern, Canada 2017 (Ro17)



C) Sutherland, Canada 2017 (Su17)



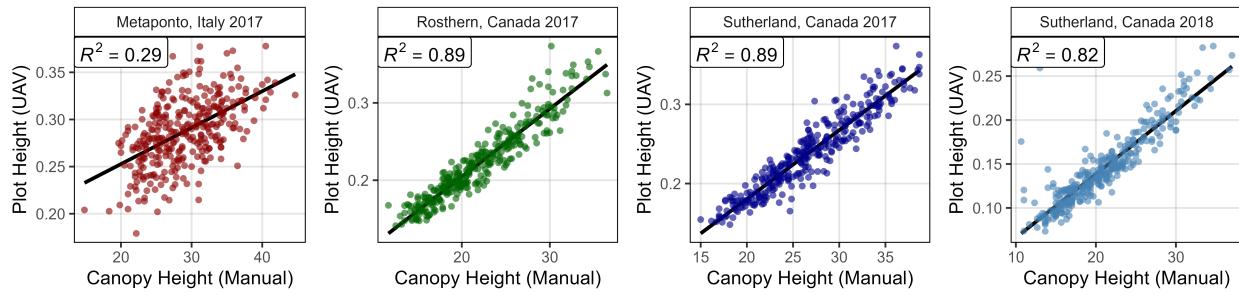
D) Sutherland, Canada 2018 (Su18)



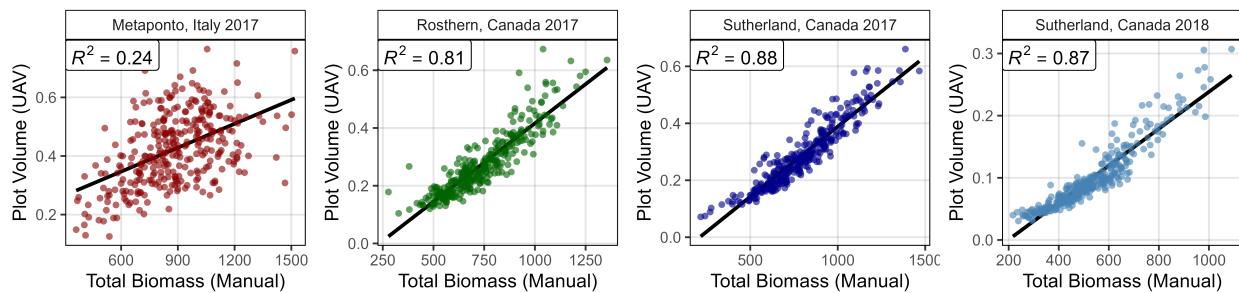
Rep ● 1 ■ 2 ◆ 3

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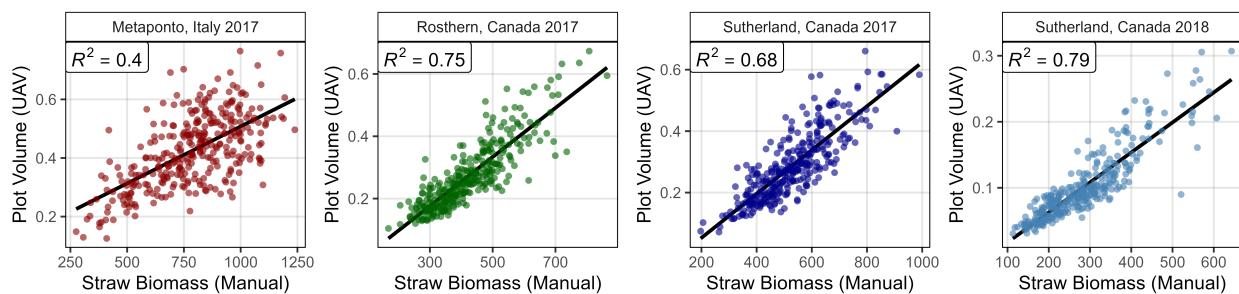
A) Plot Height (UAV) x Canopy Height (Manual)



B) Plot Volume (UAV) x Total Biomass (Manual)

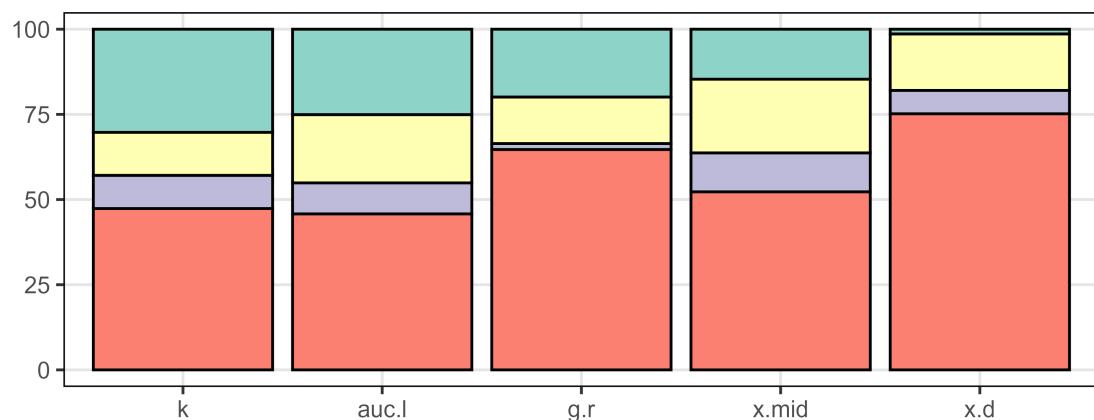


C) Plot Volume (UAV) x Straw Biomass (Manual)

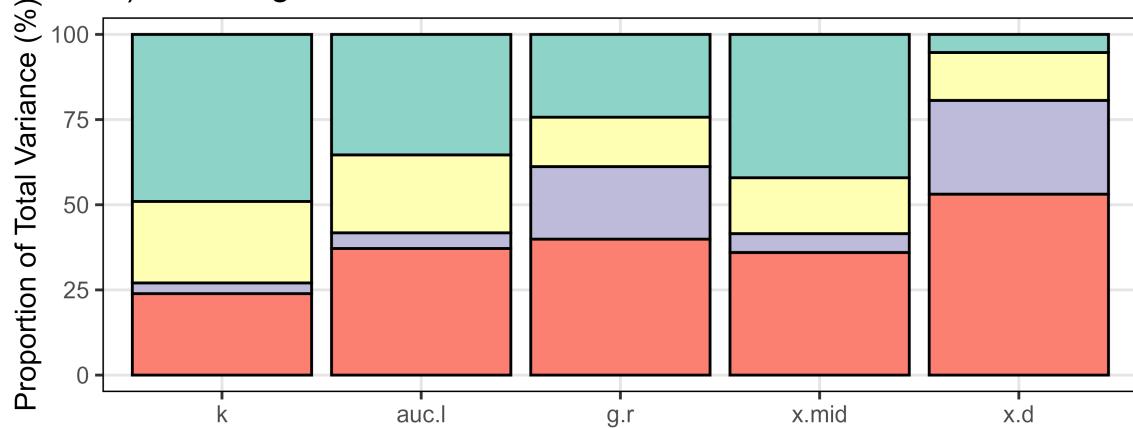


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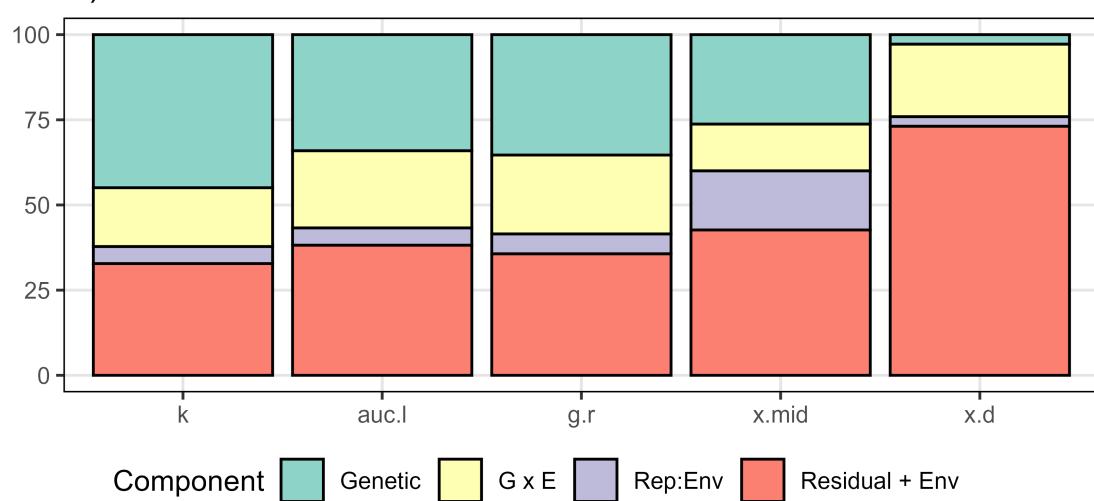
**A) Plot Area Growth Curve Coefficients**



**B) Plot Height Growth Curve Coefficients**

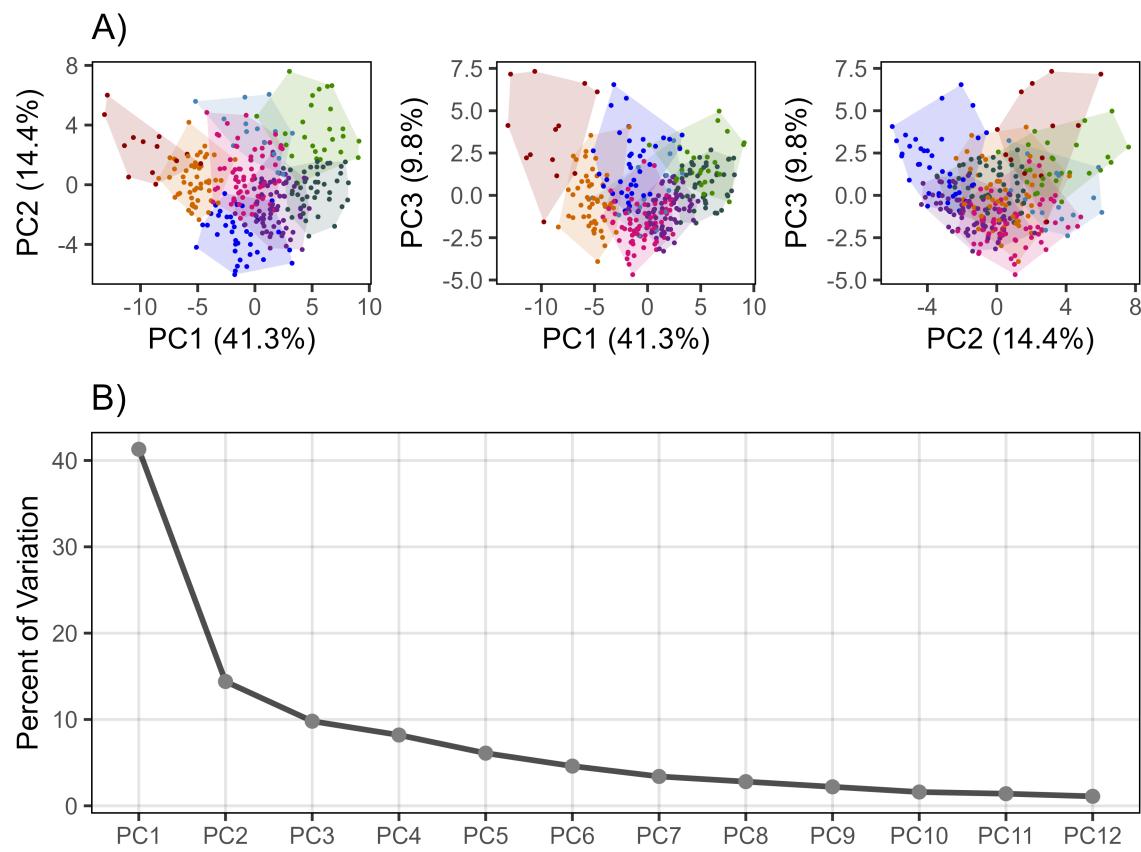


**C) Plot Volume Growth Curve Coefficients**

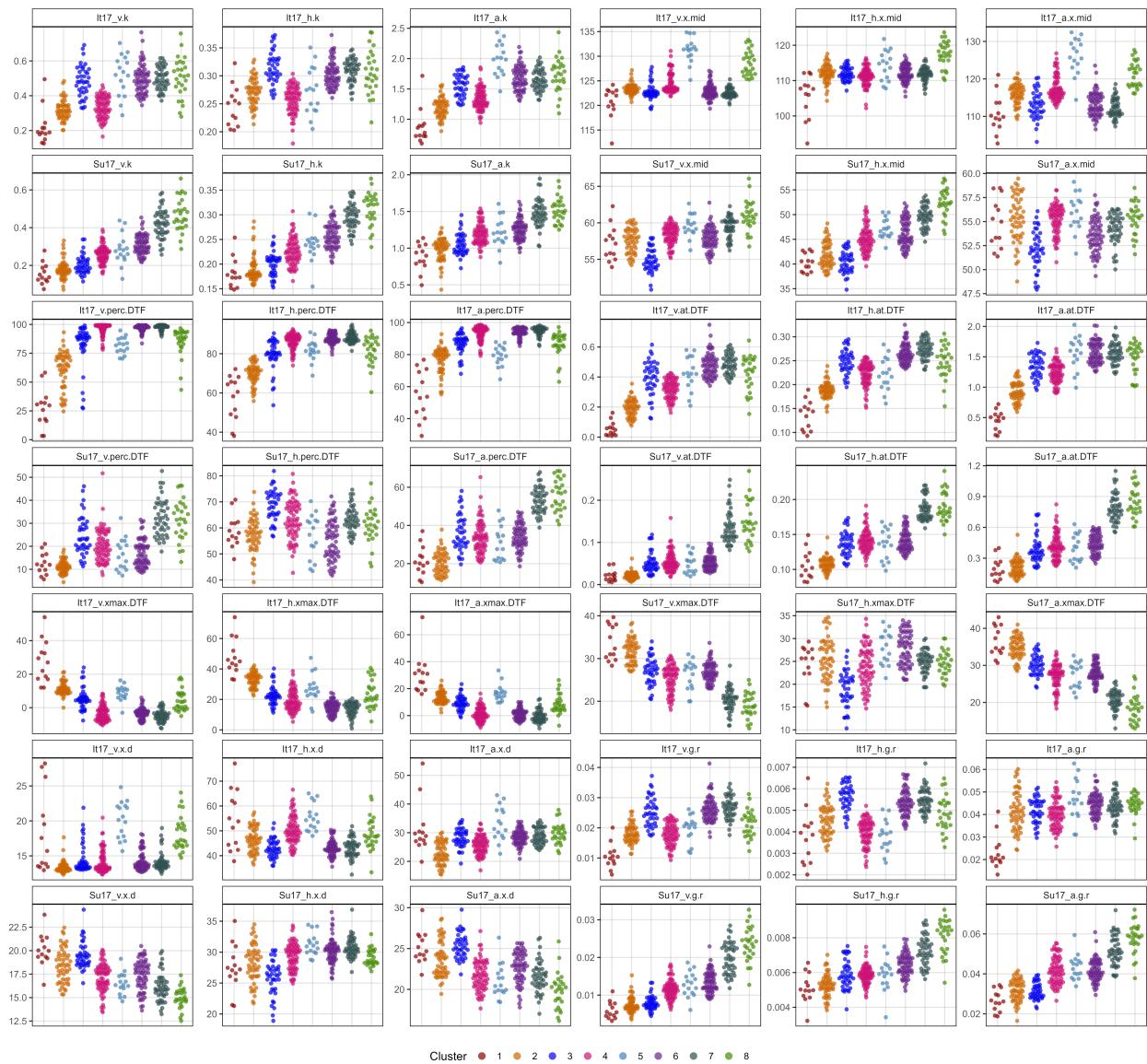


Component    [Color Box] Genetic    [Color Box] G x E    [Color Box] Rep:Env    [Color Box] Residual + Env

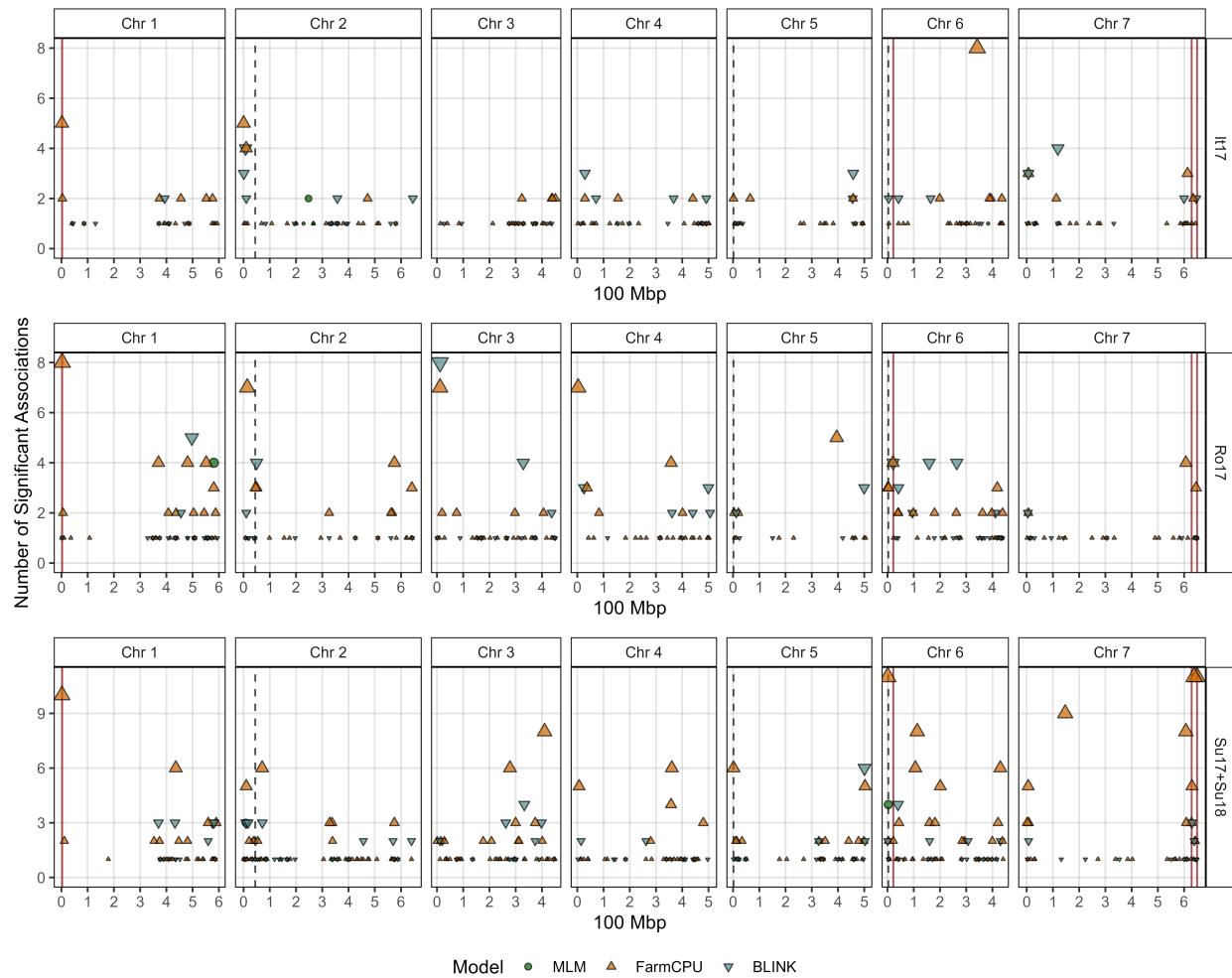
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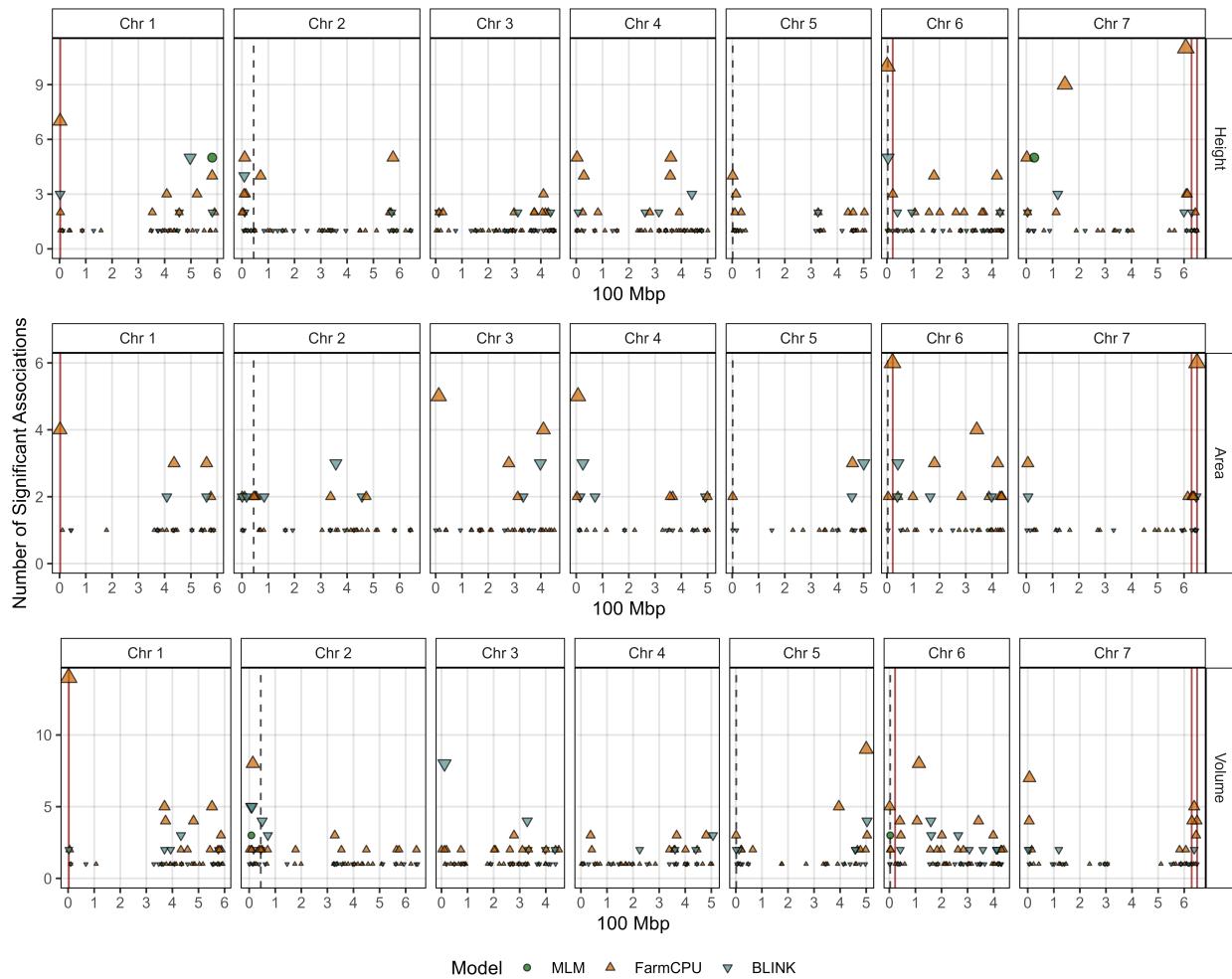
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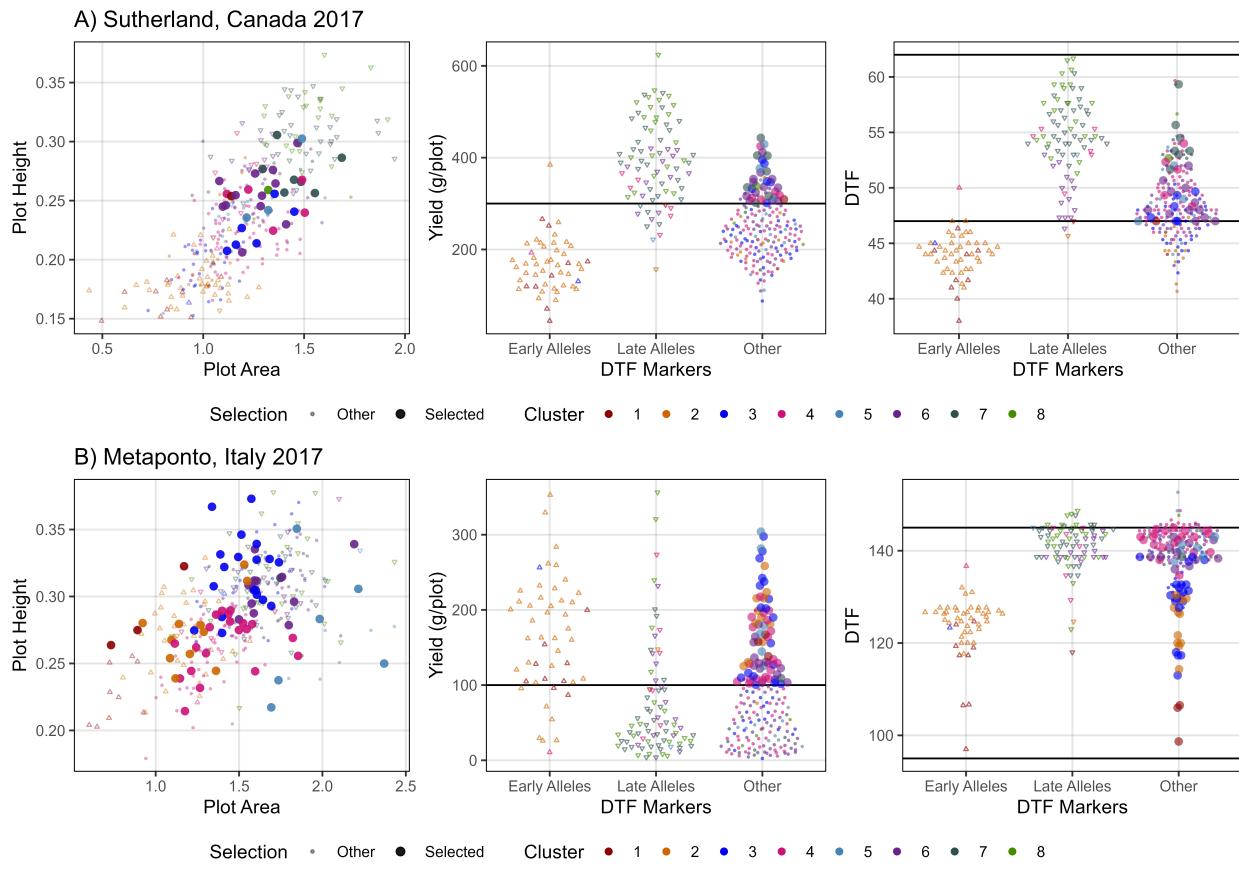
**Supplemental Figure 6**



**Supplemental Figure 7**

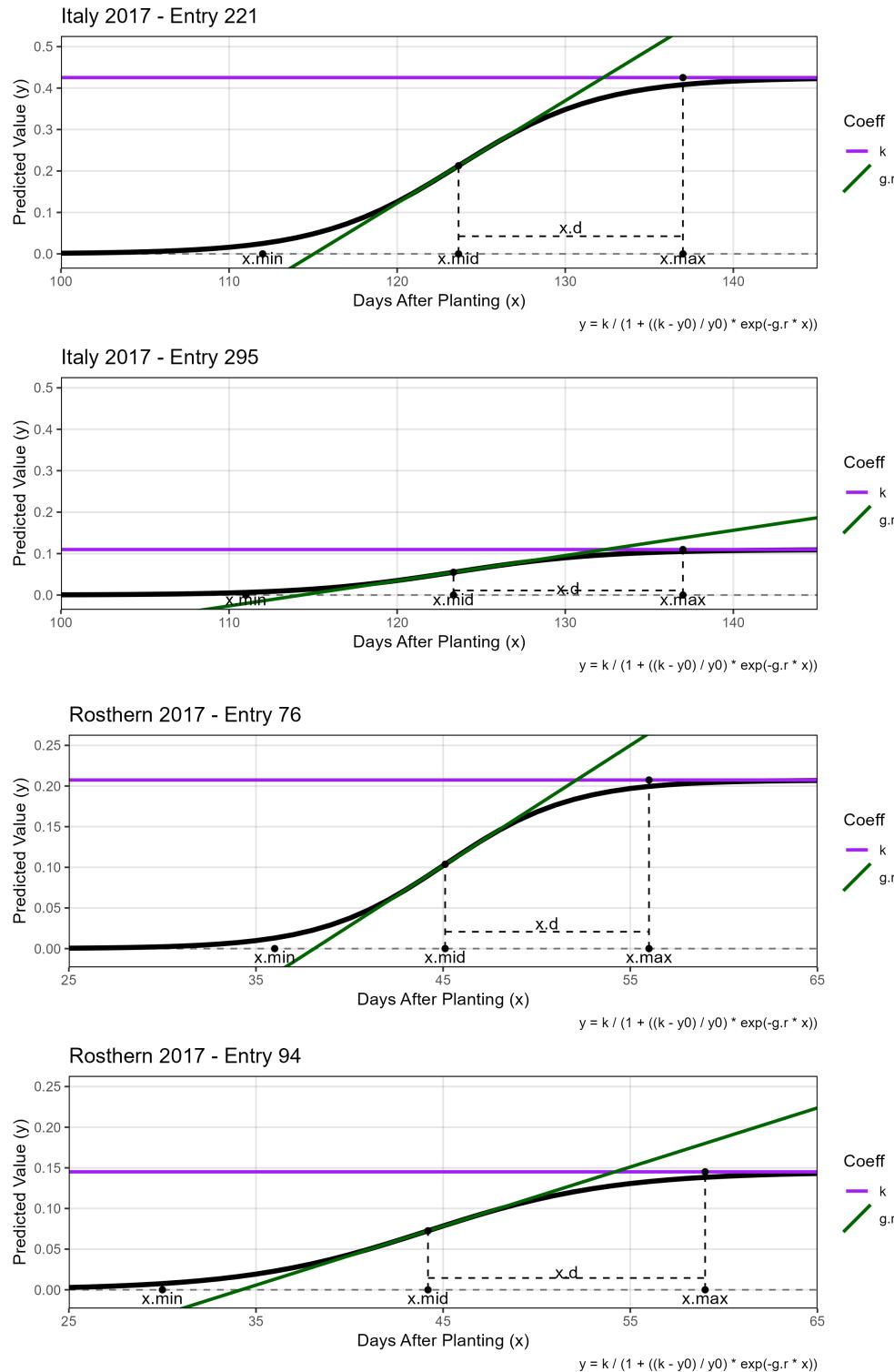


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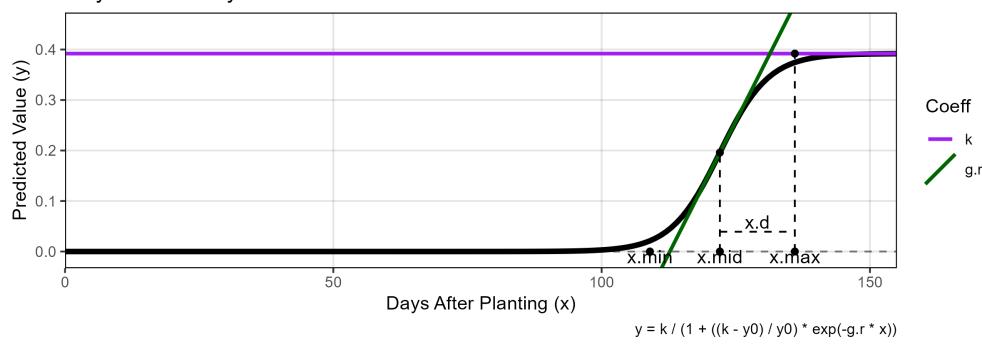


## Additional Figures

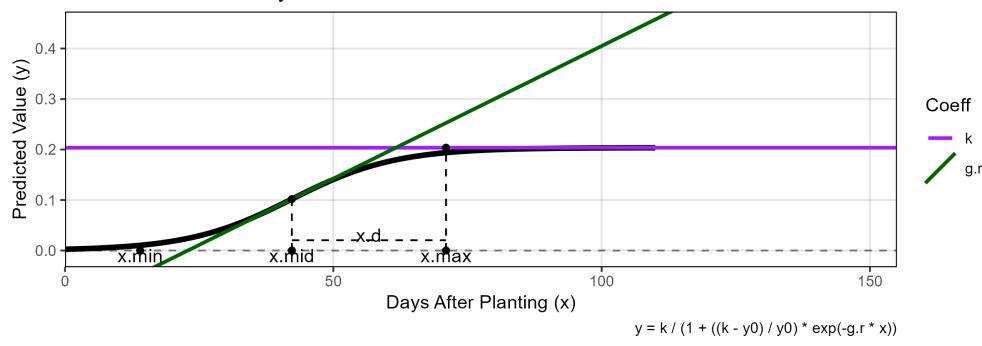
### Additional Figures 1



Italy 2017 - Entry 107

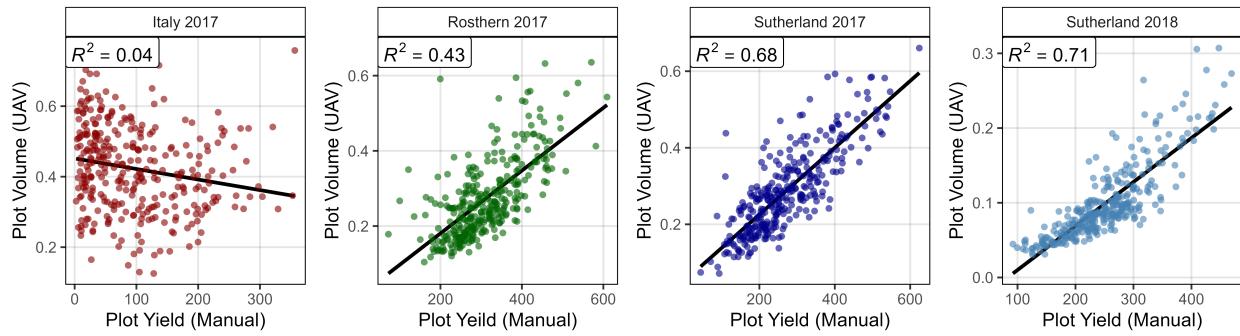


Rosthern 2017 - Entry 107

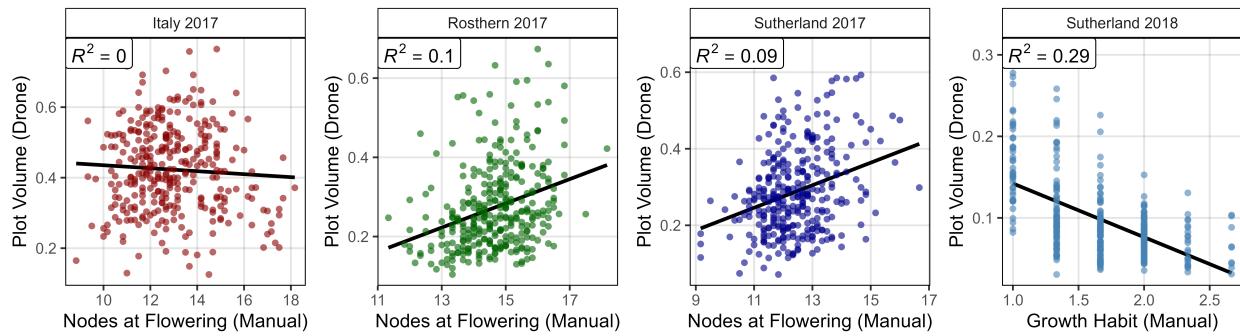


## Additional Figures 2

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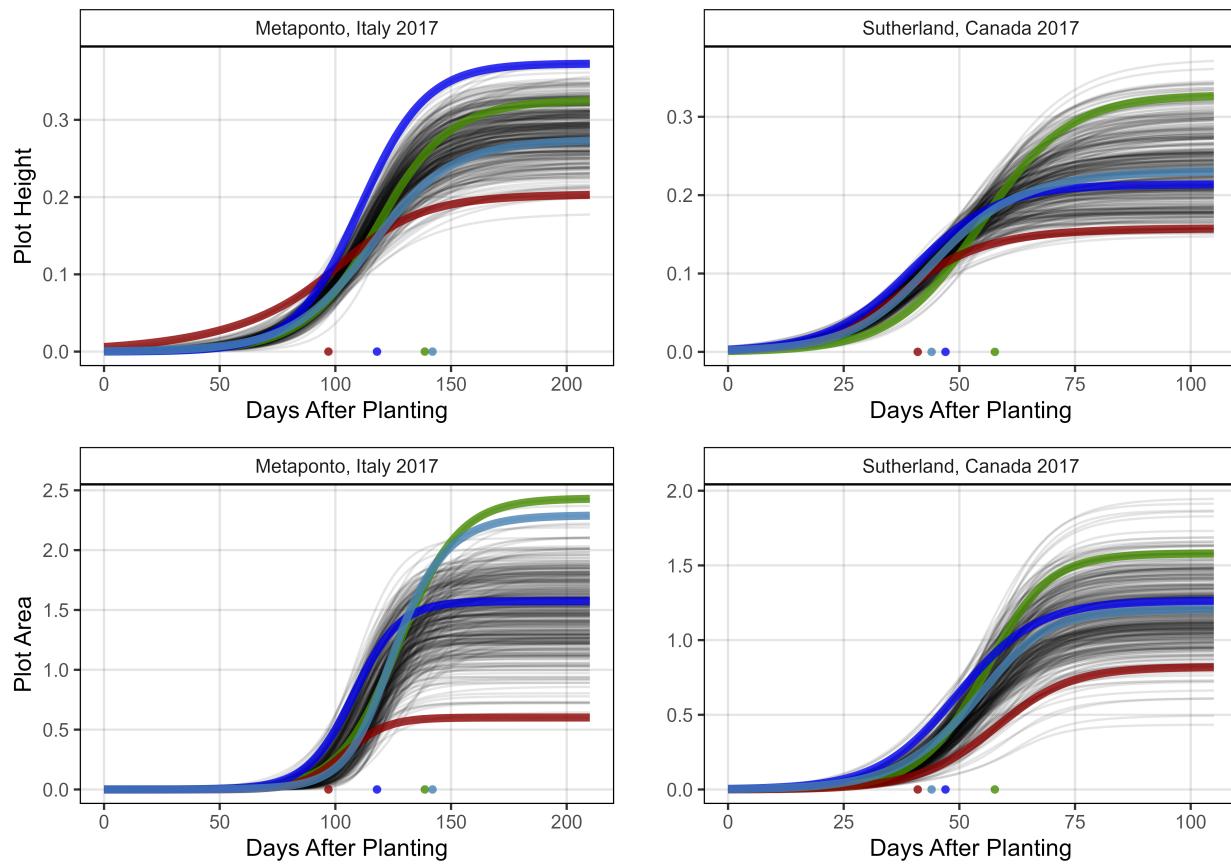
A) Plot Volume (UAV) x Growth Habit (Manual)

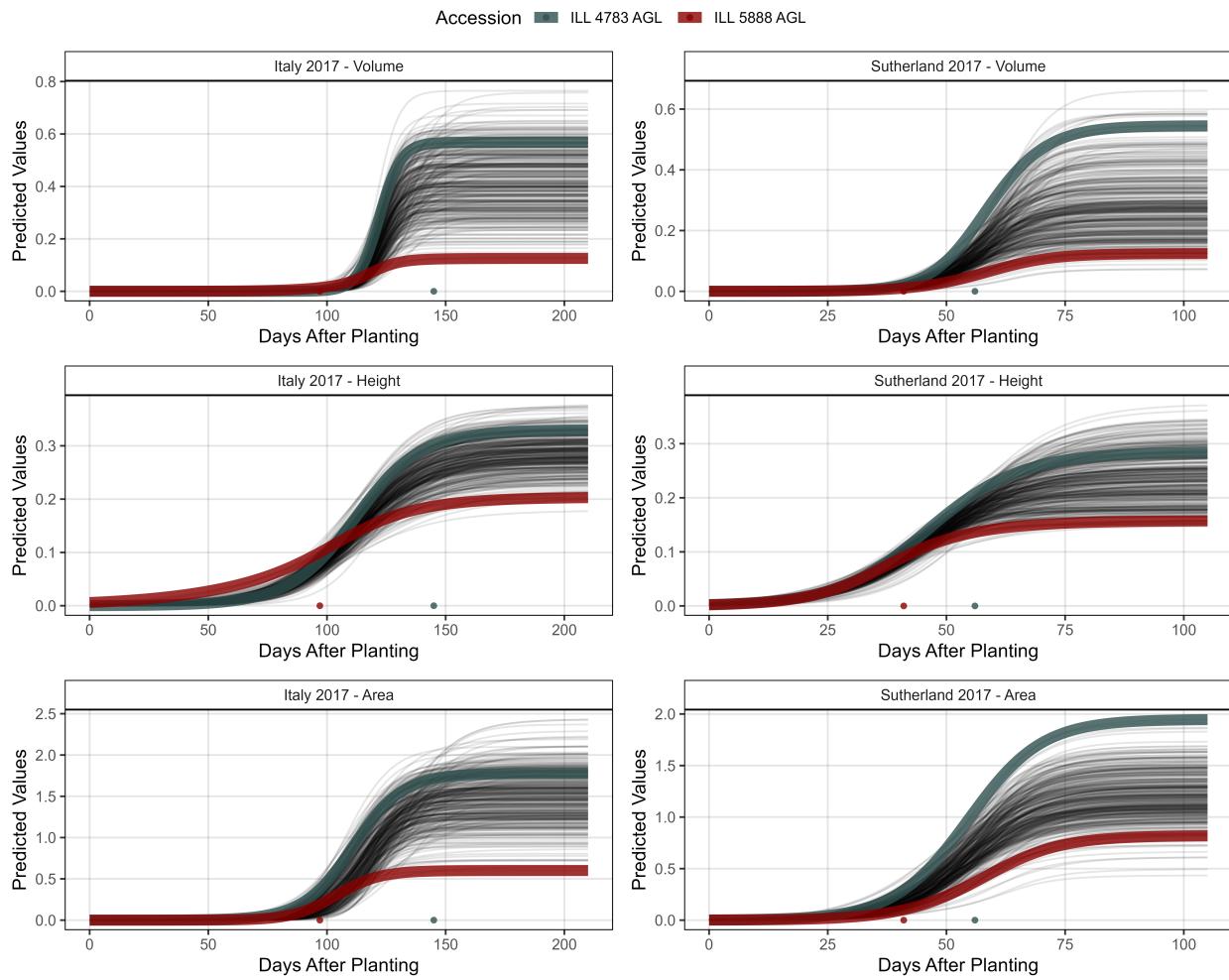


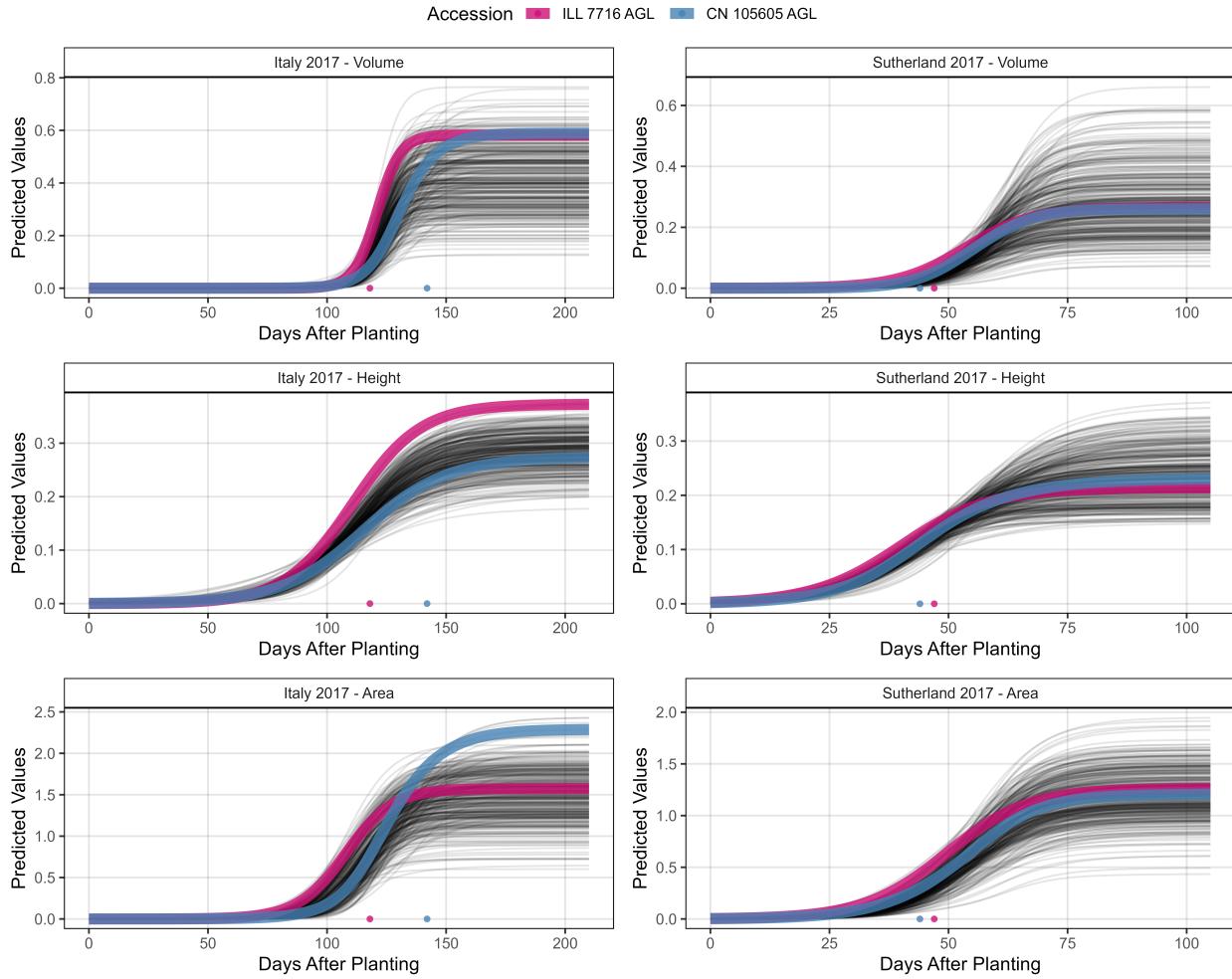
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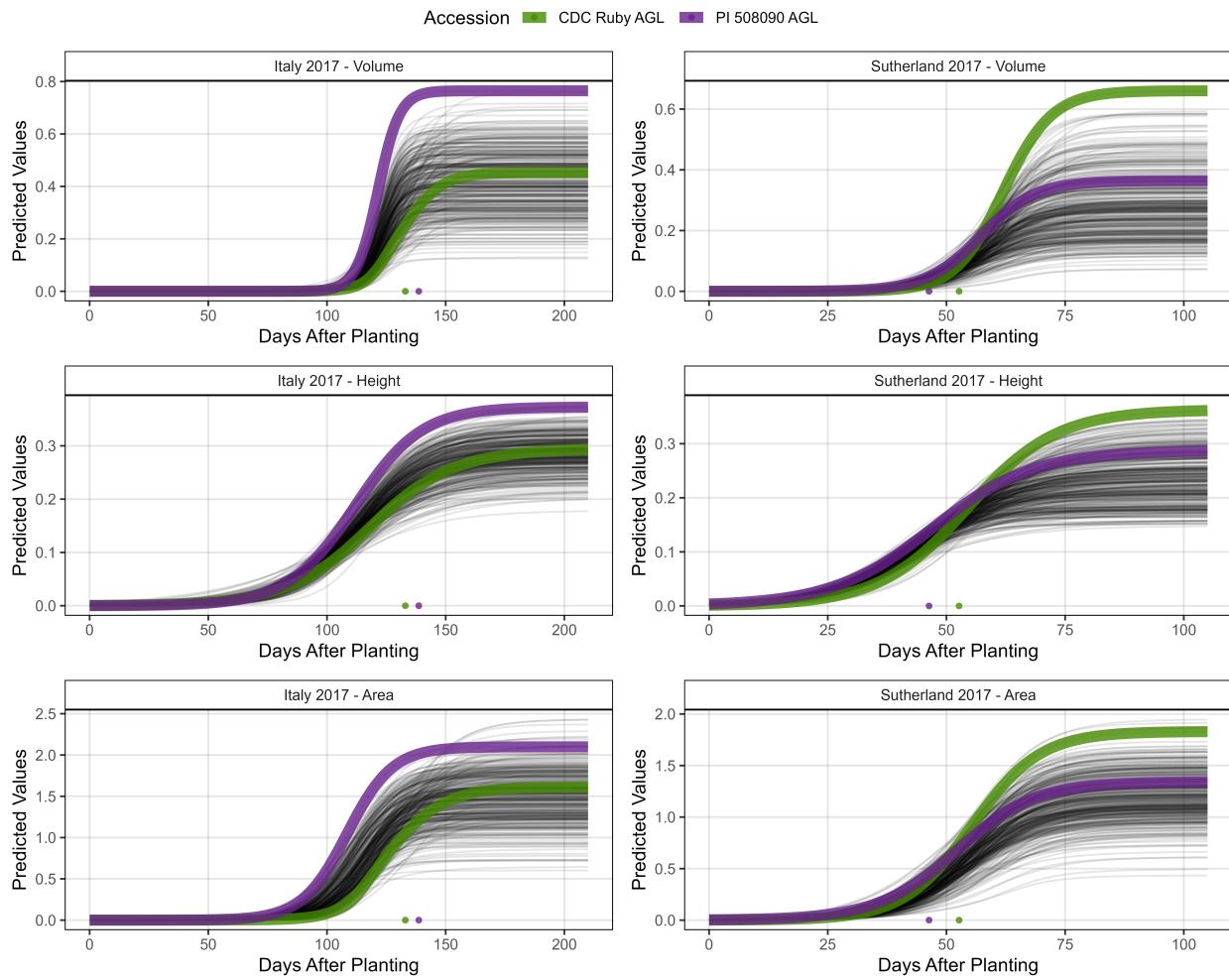
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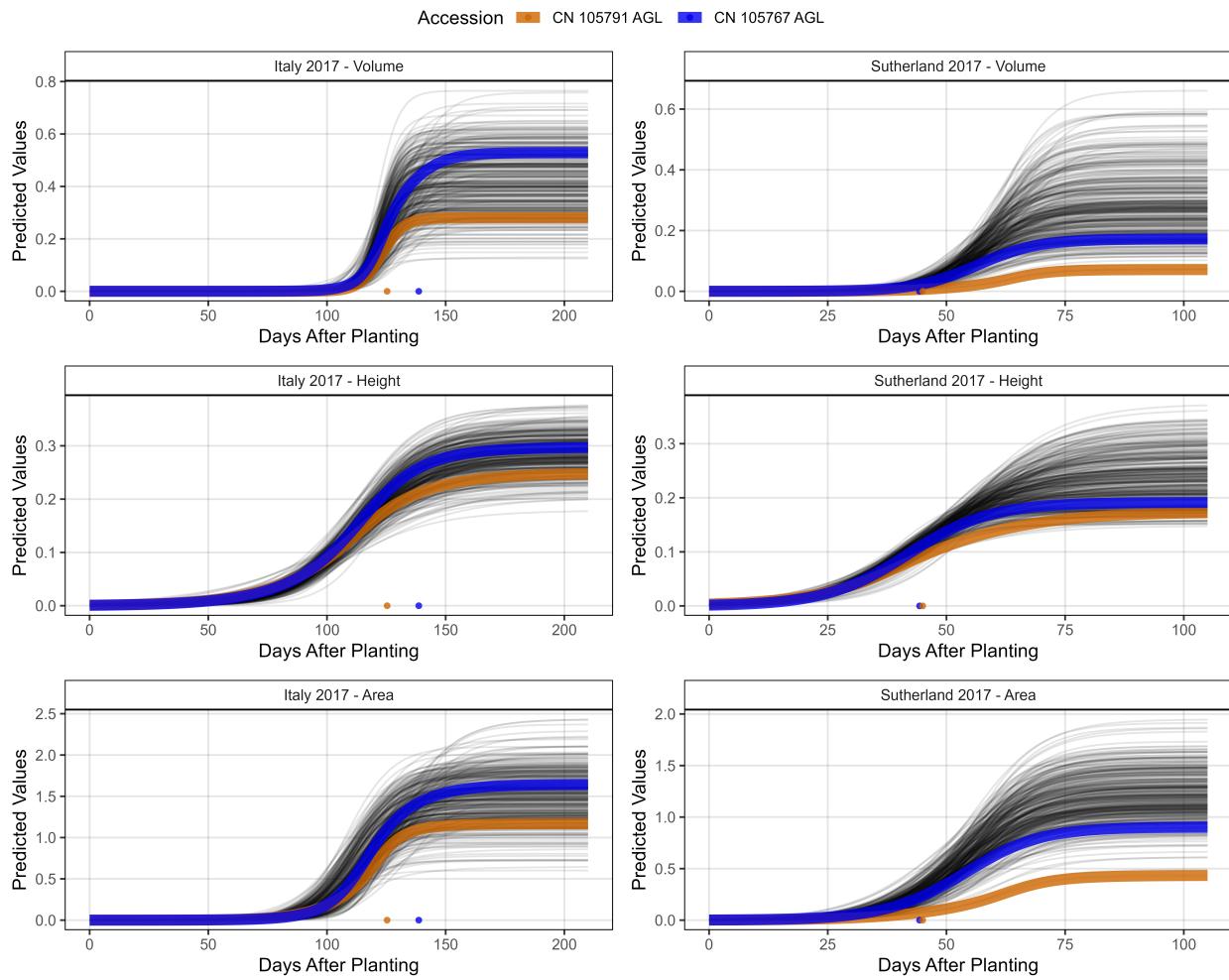
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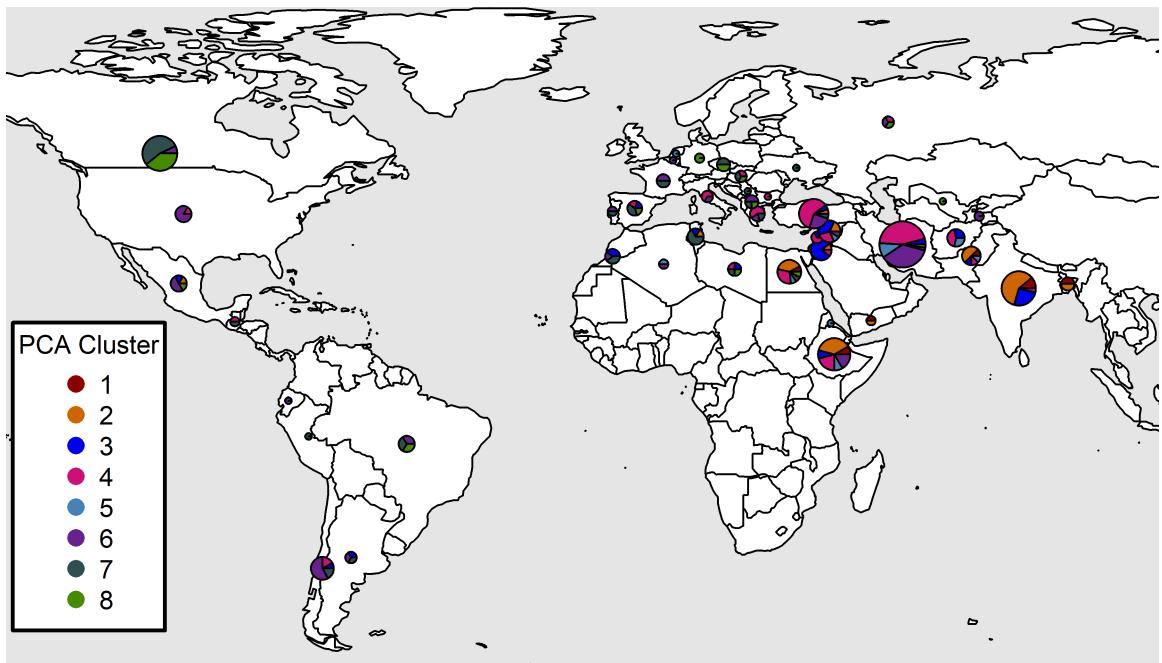




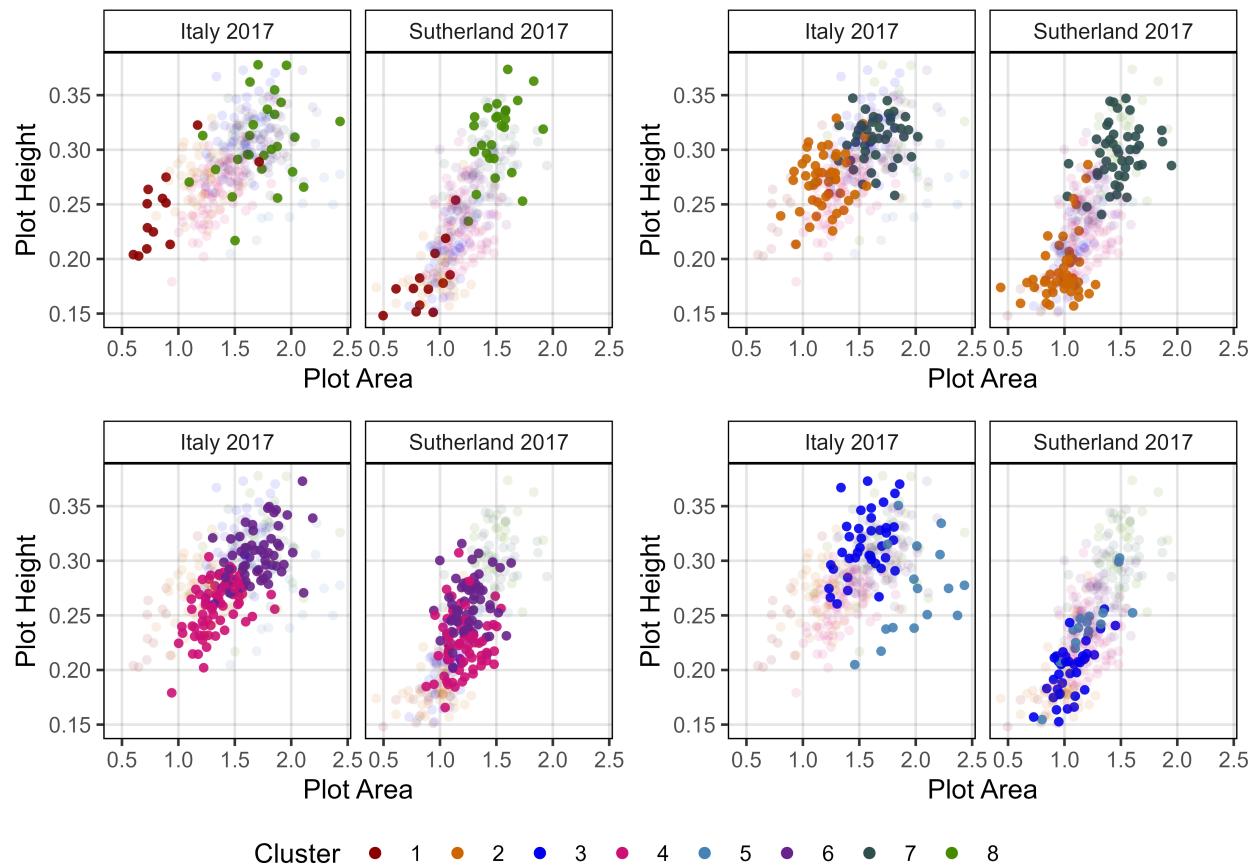




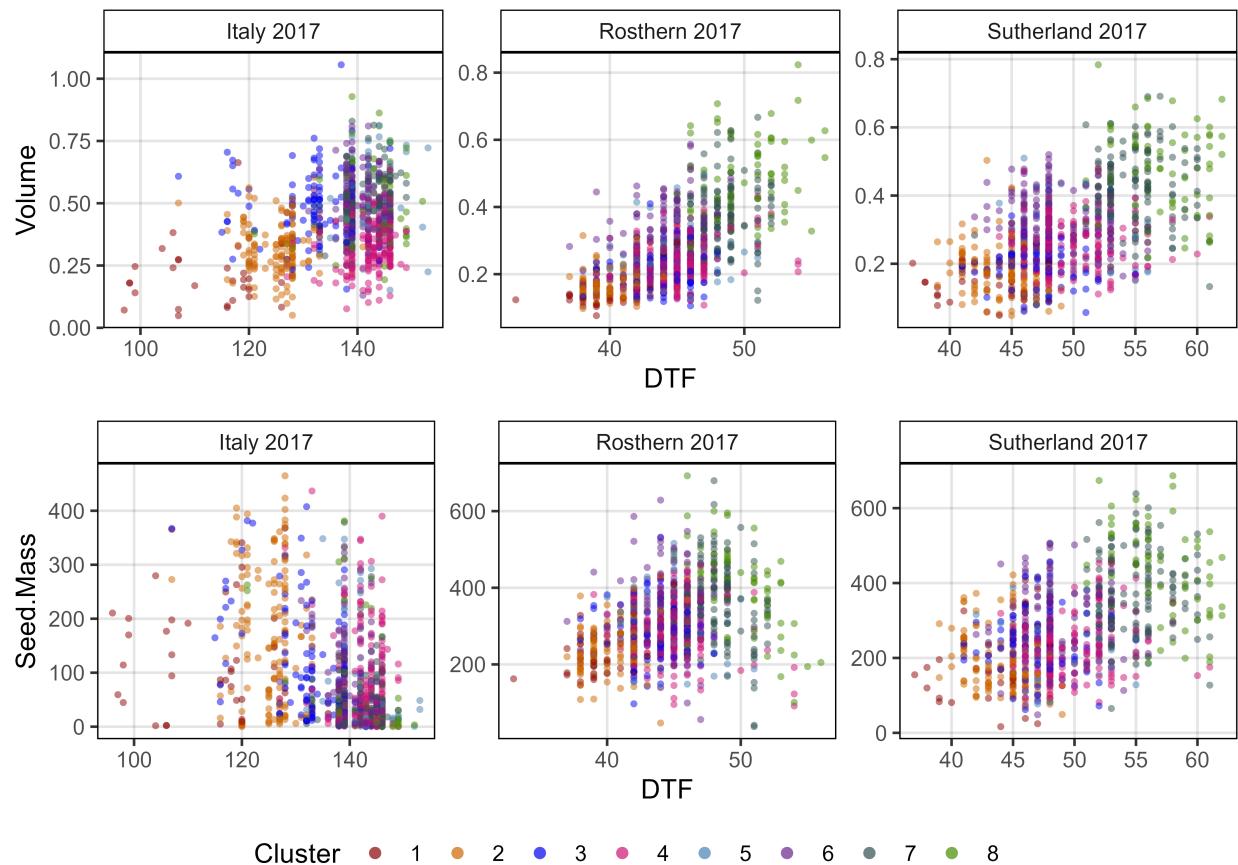
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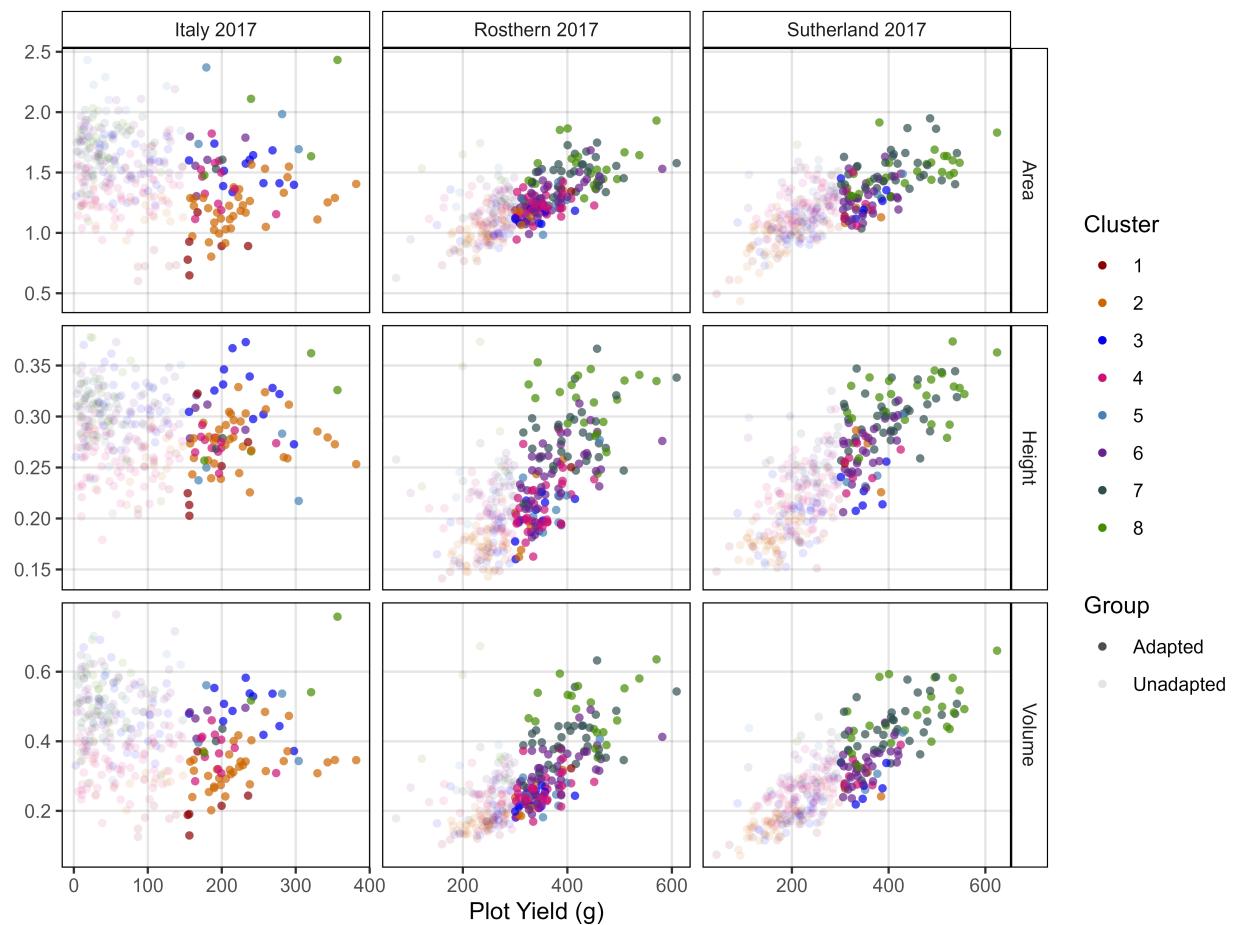
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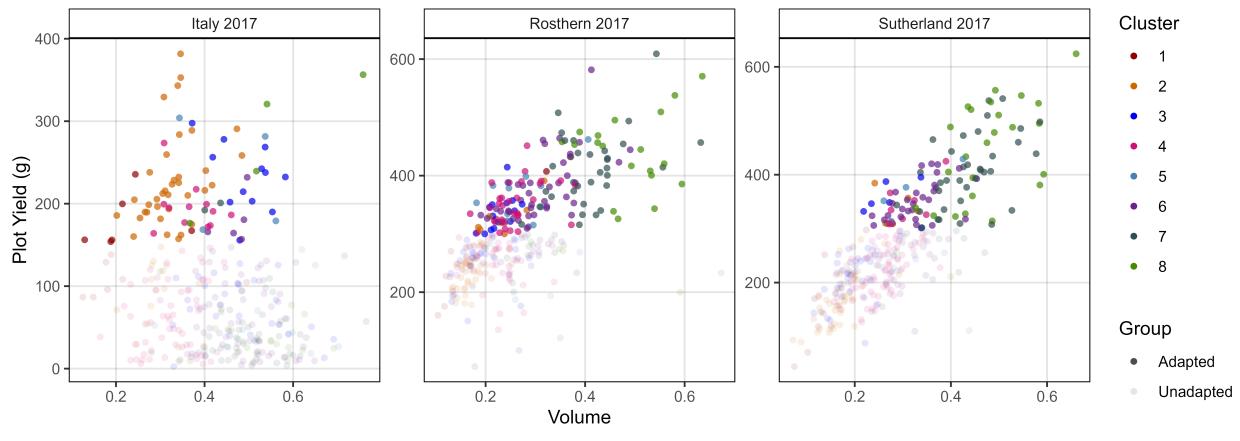


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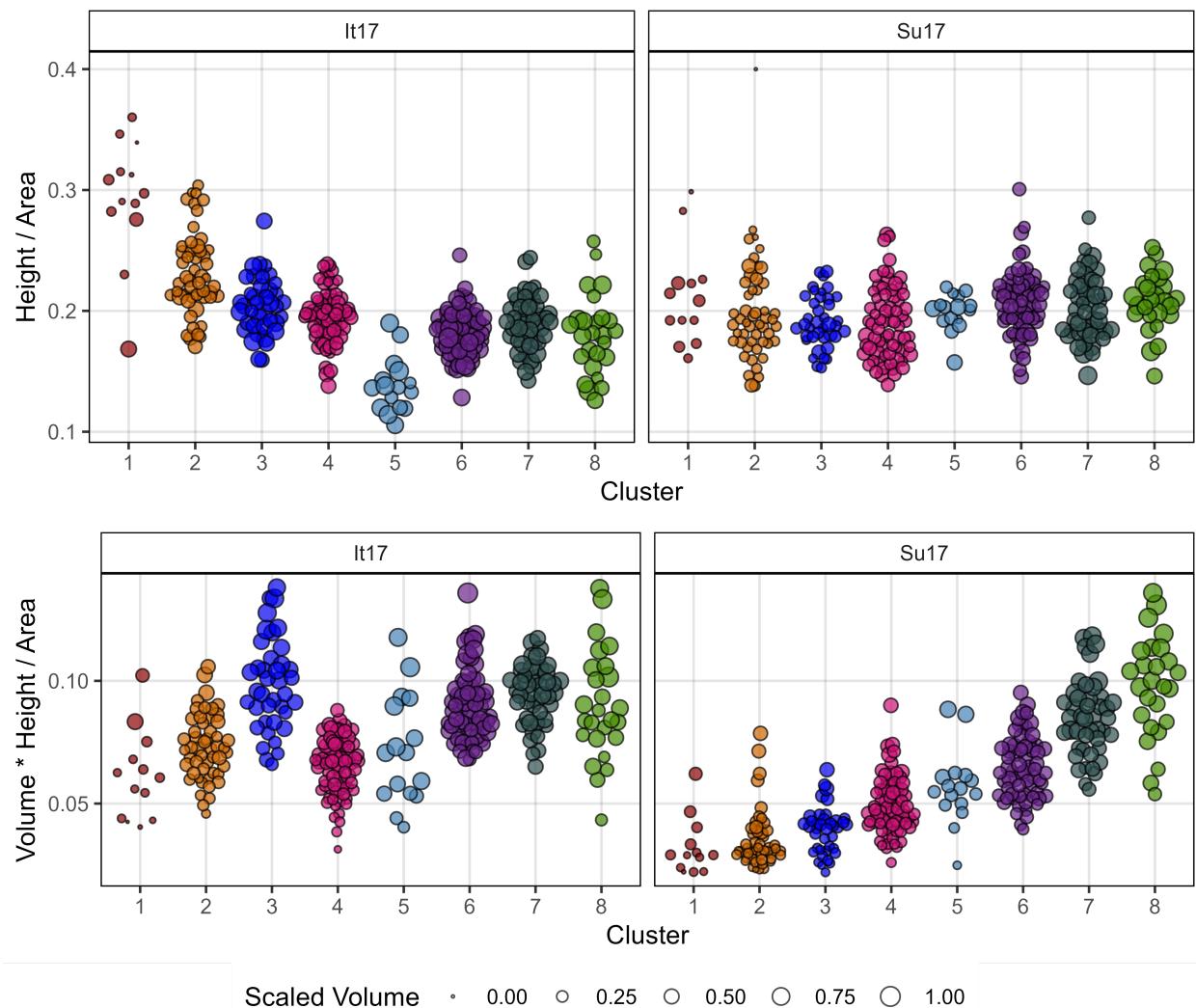


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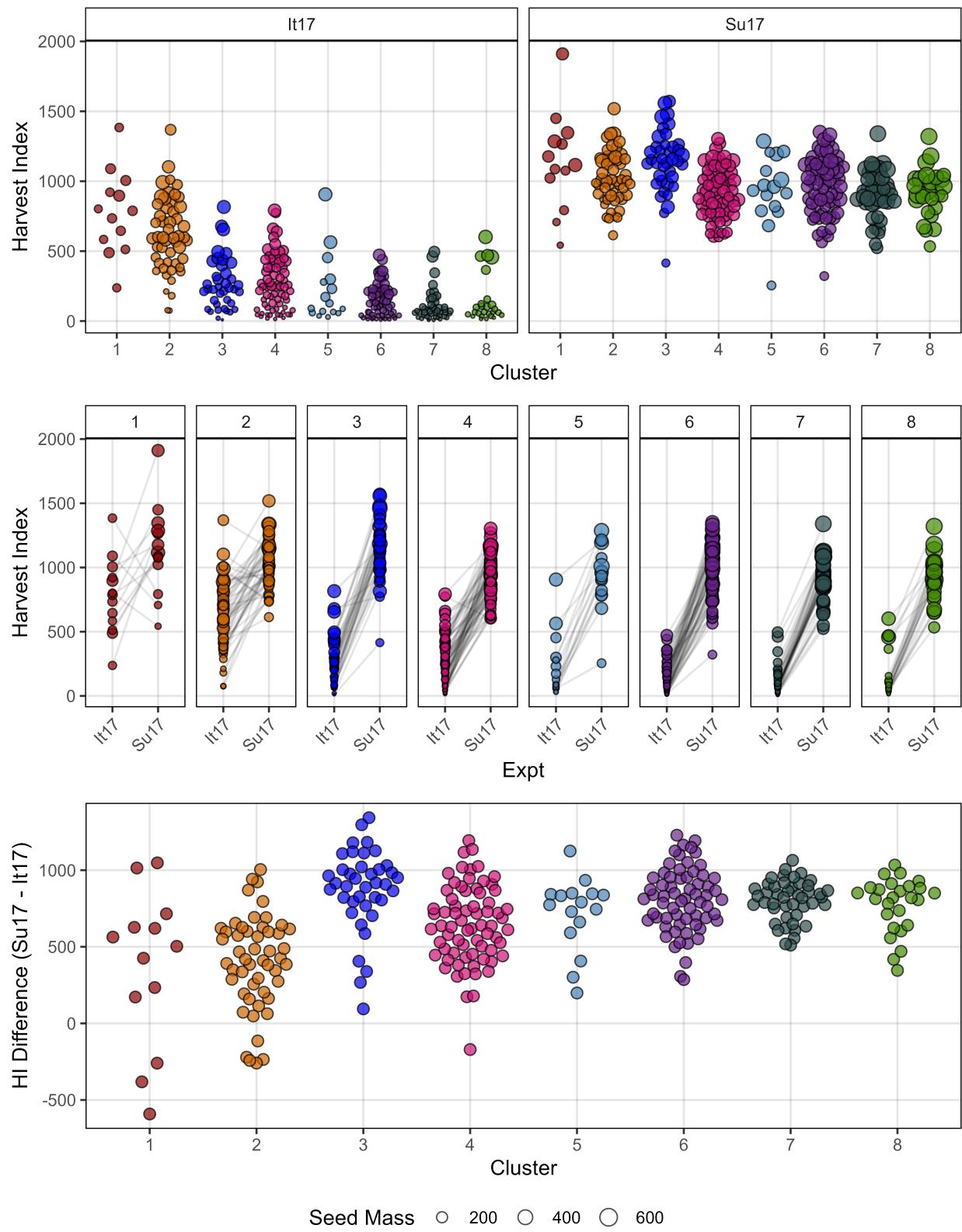


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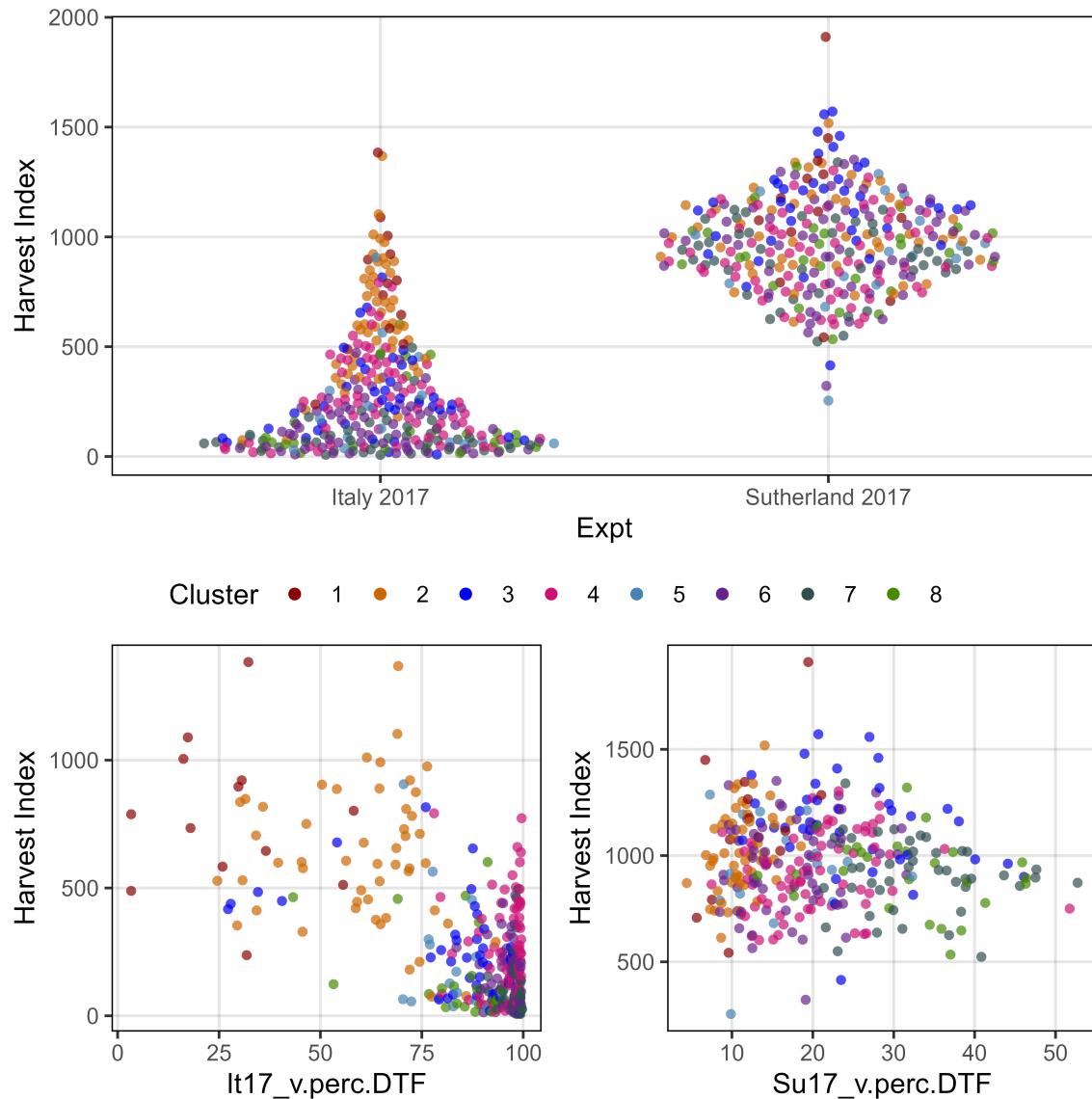


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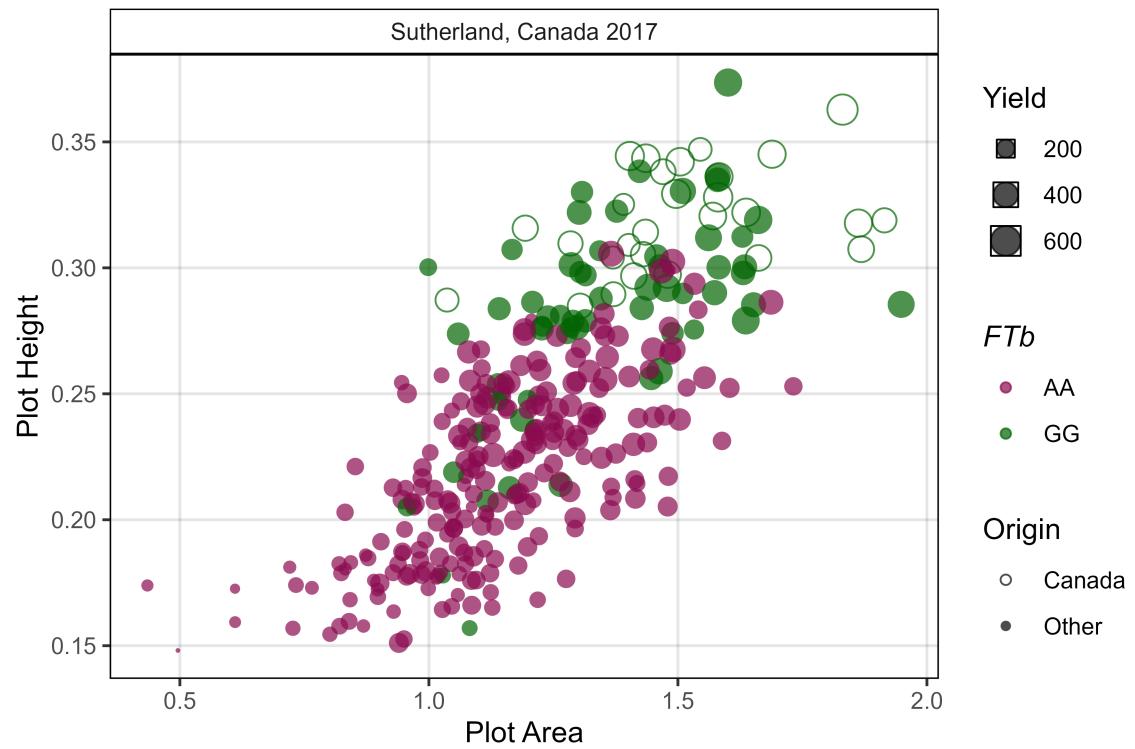


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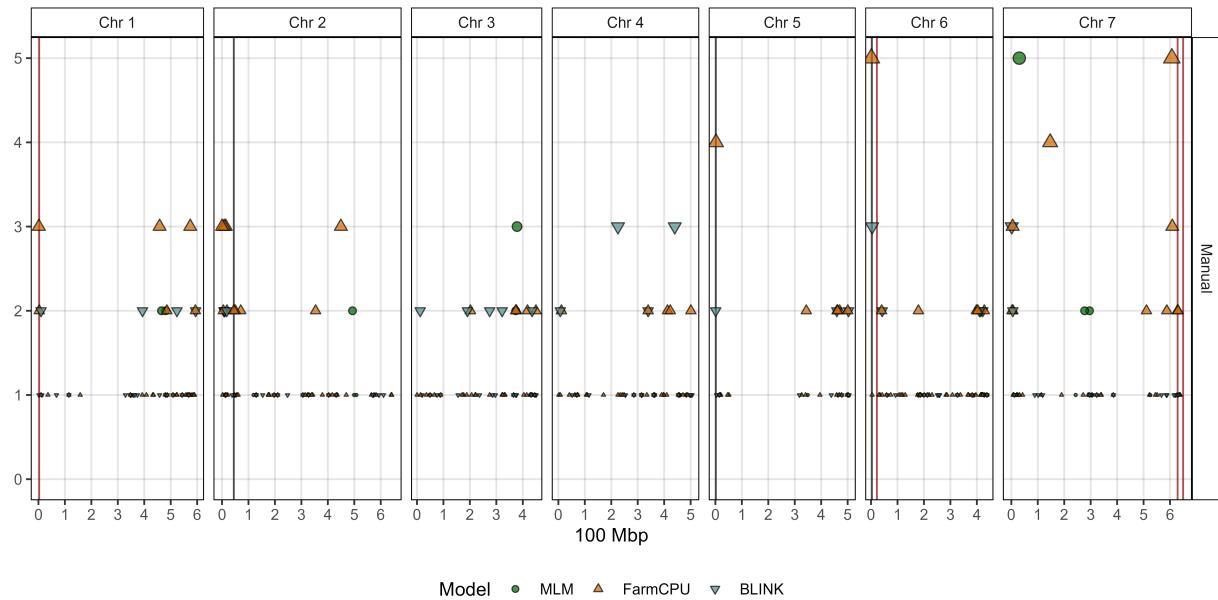


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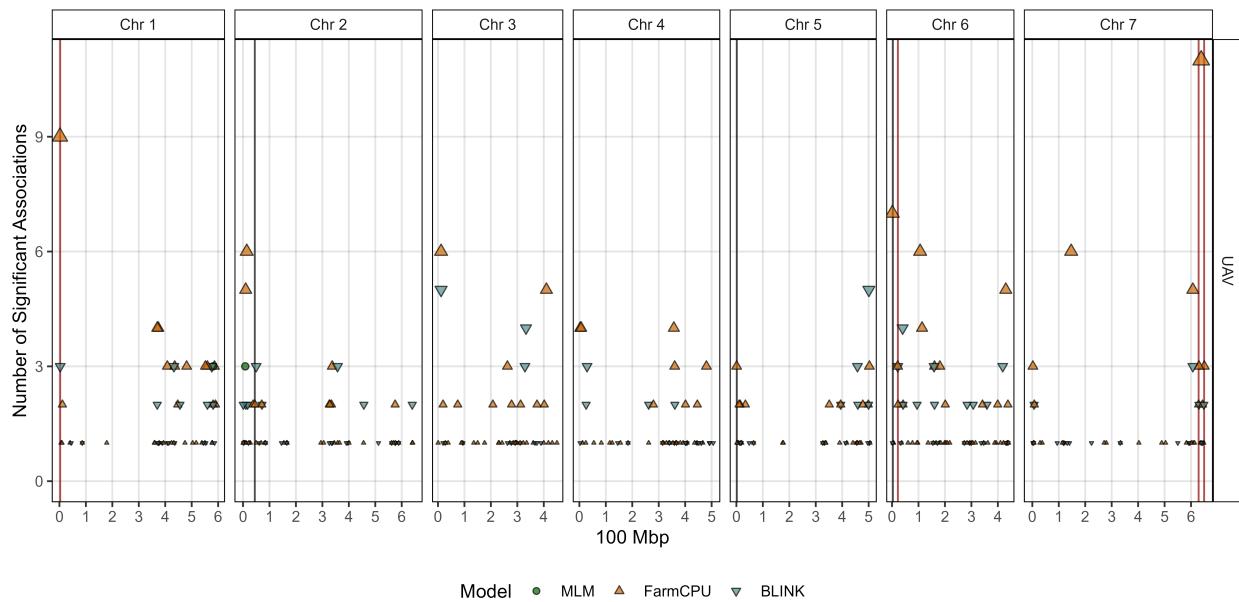


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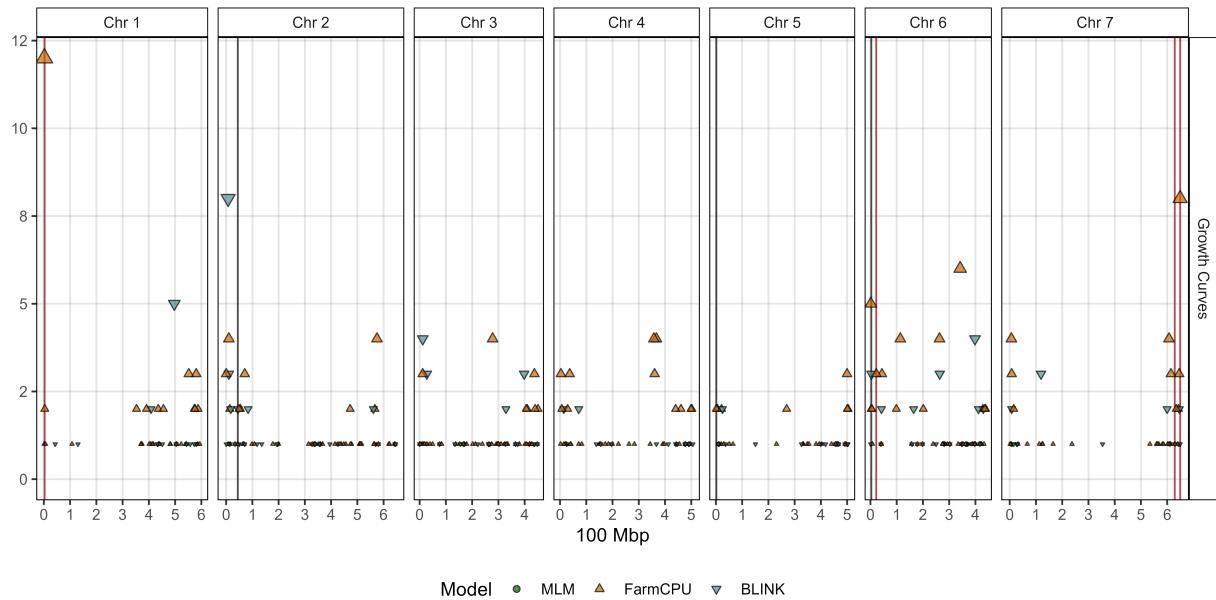
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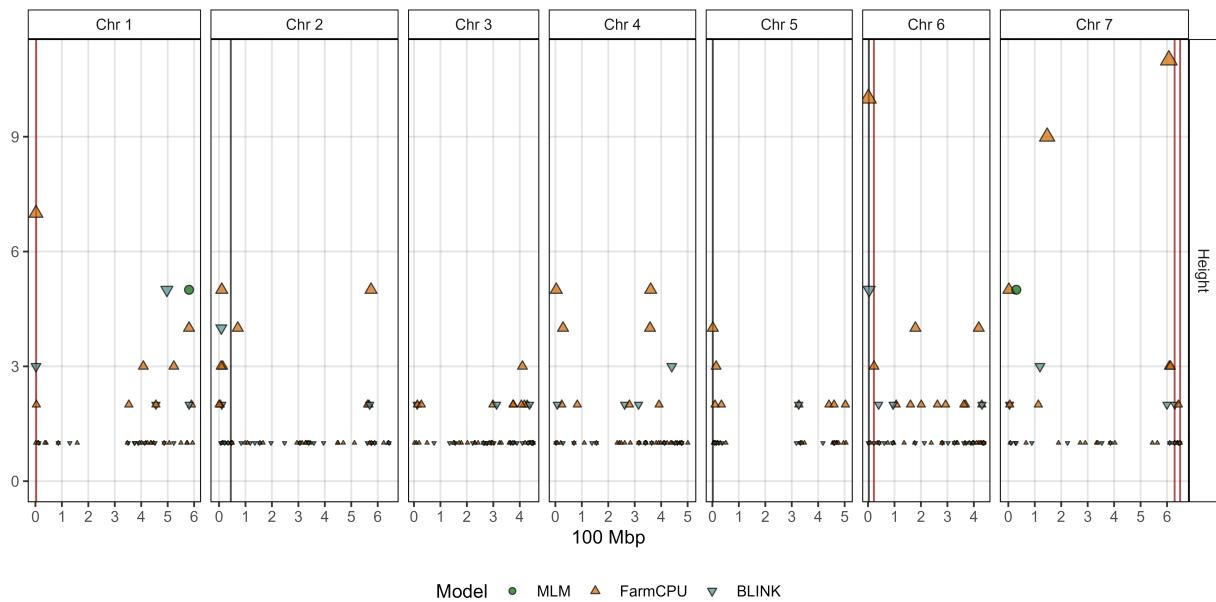
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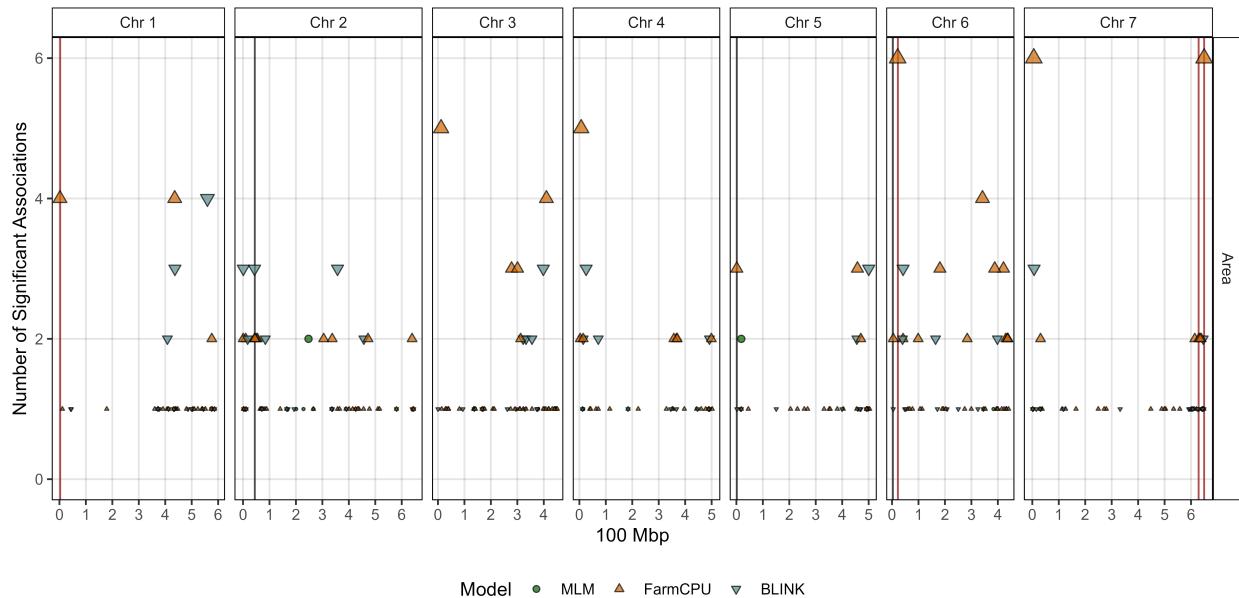
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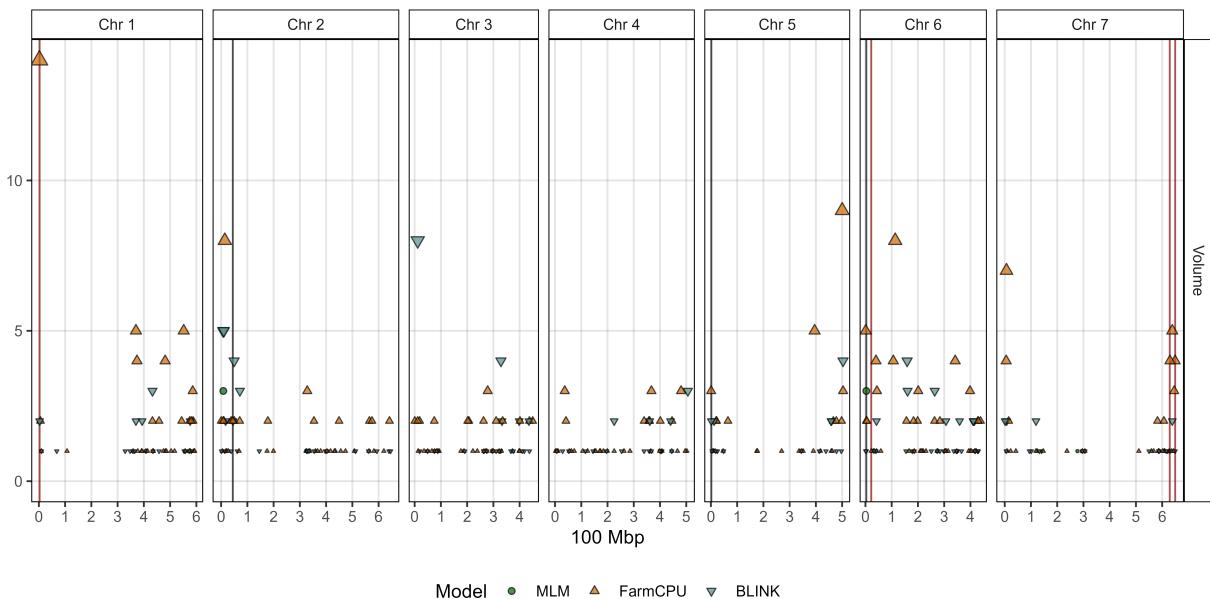
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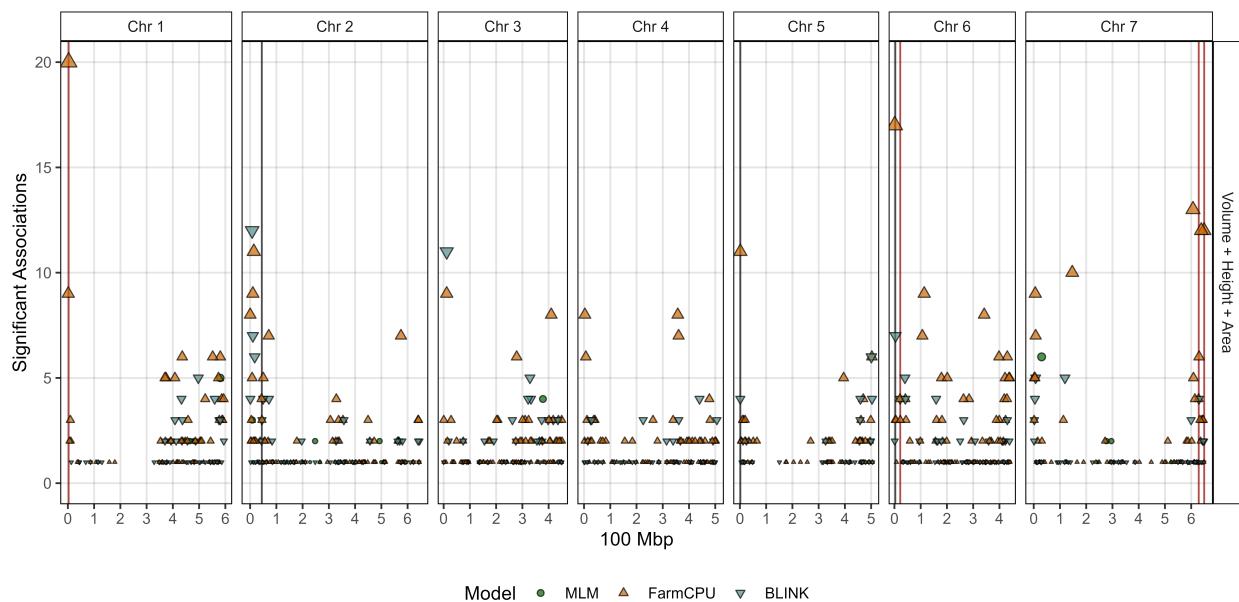
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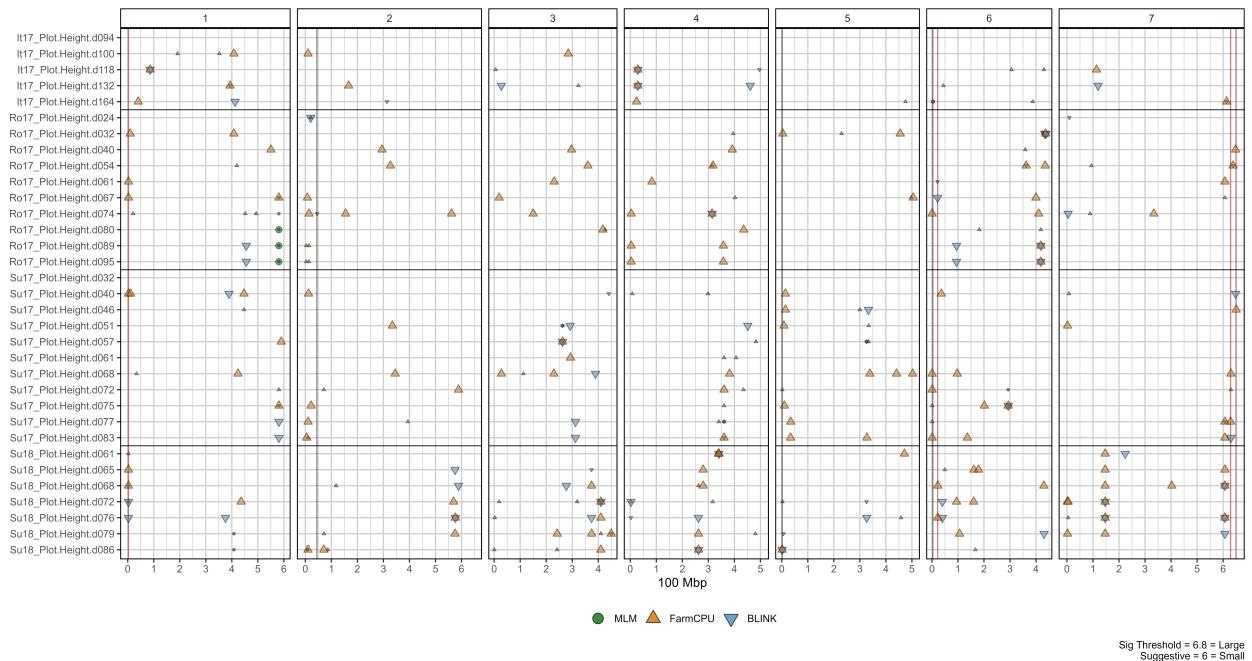


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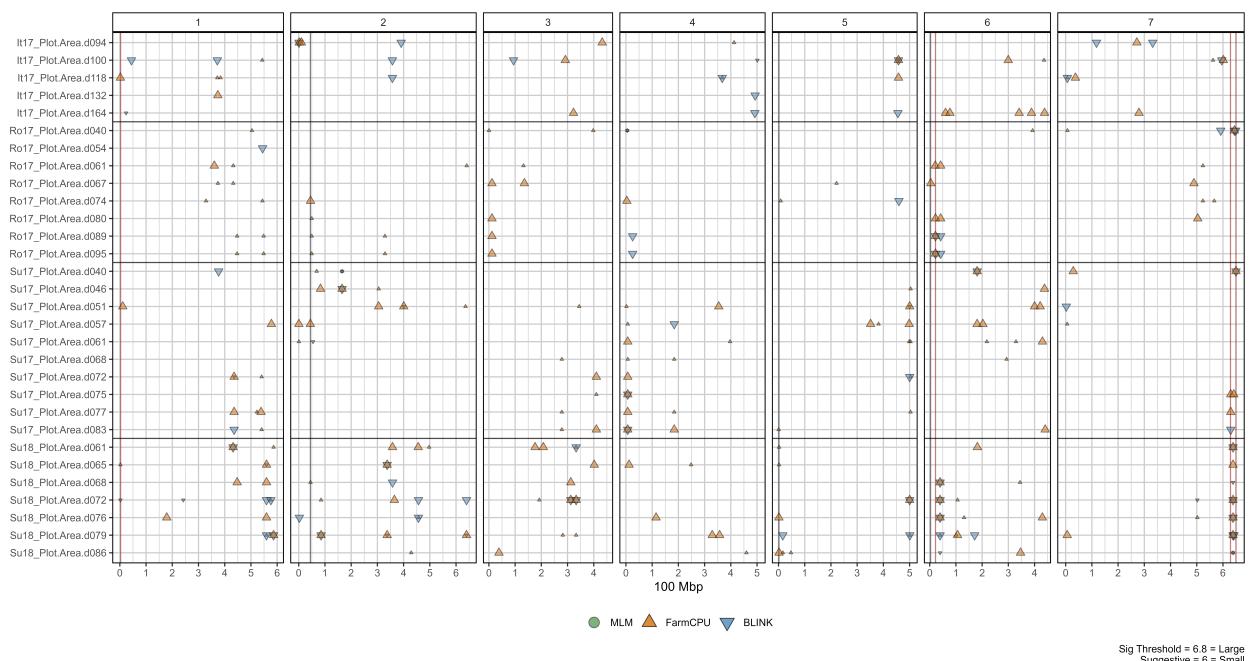


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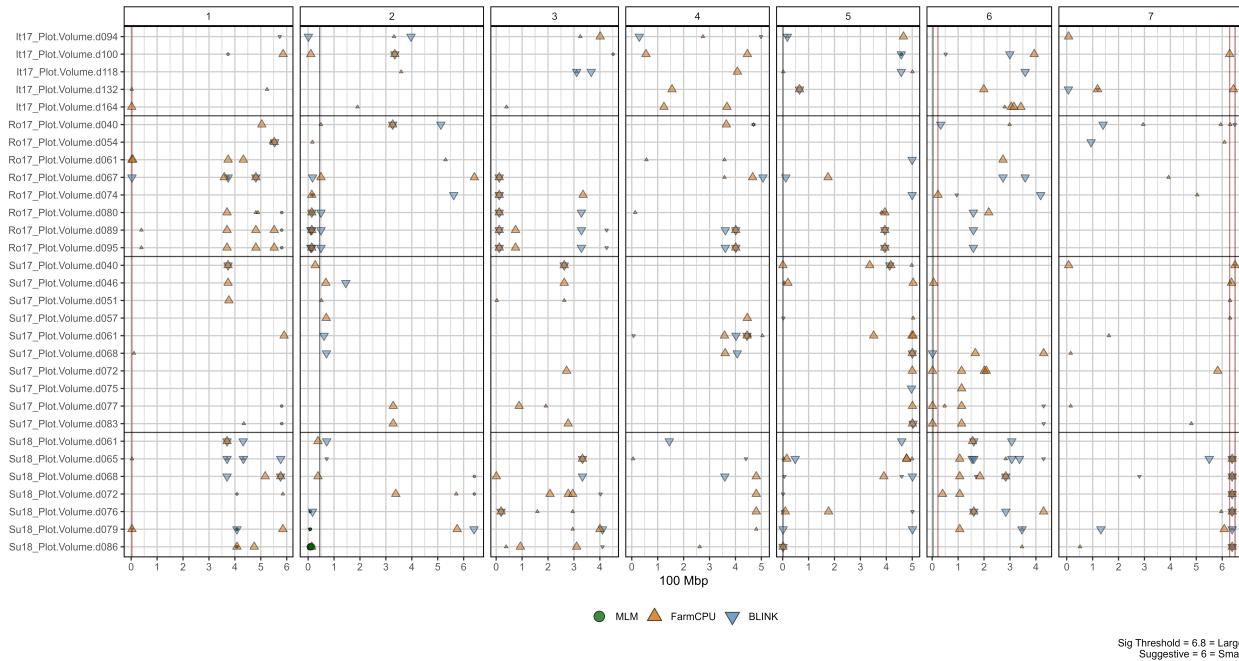
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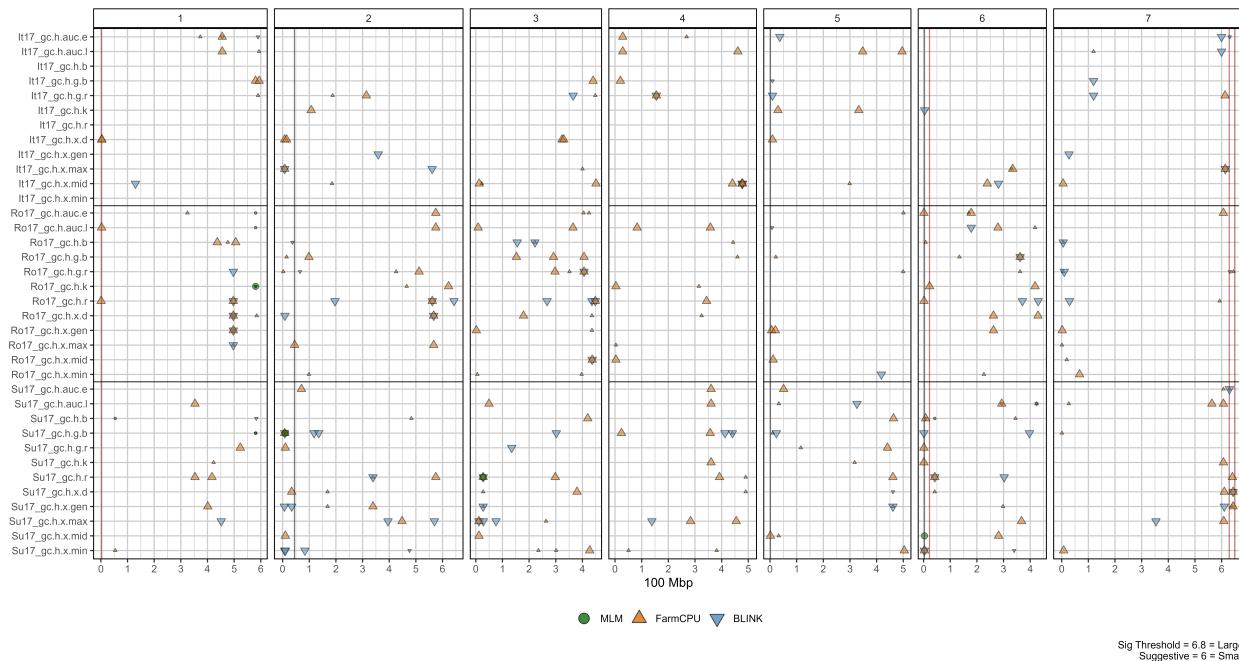
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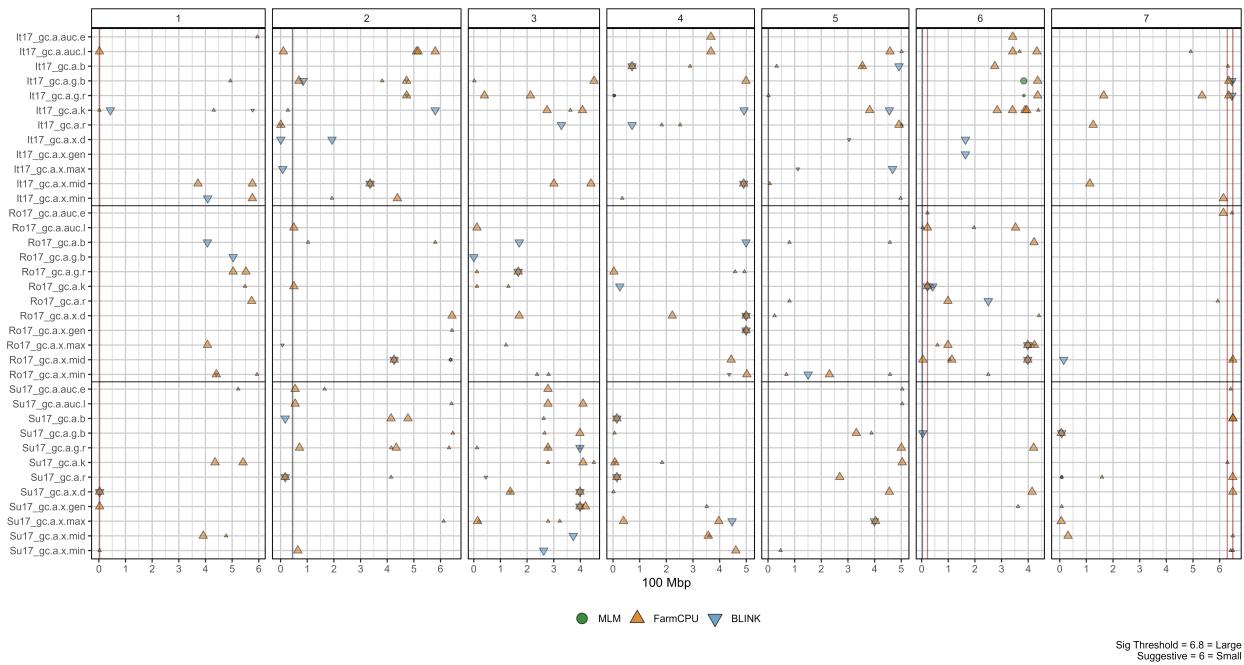
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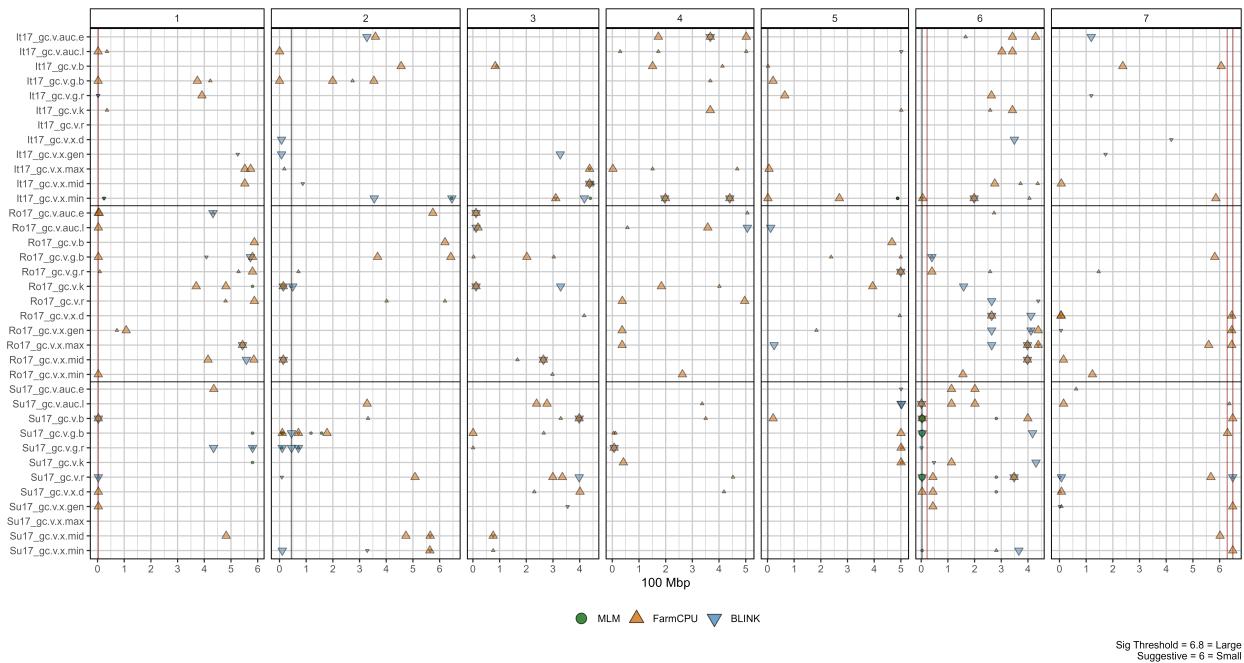
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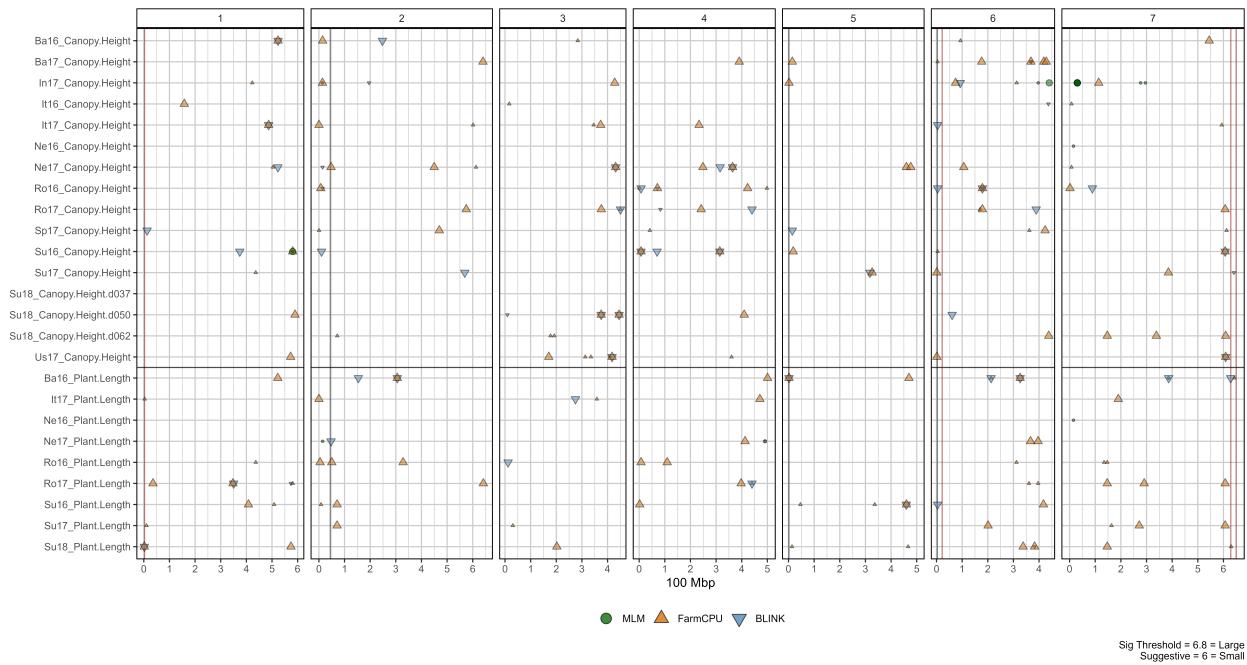
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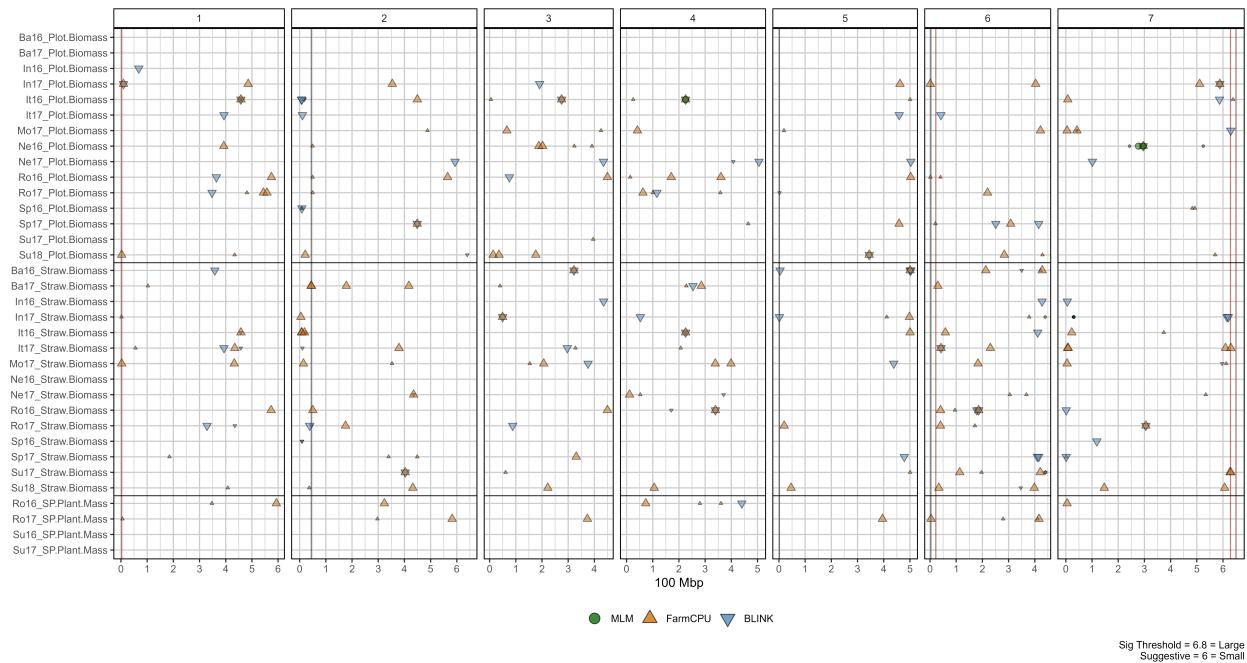
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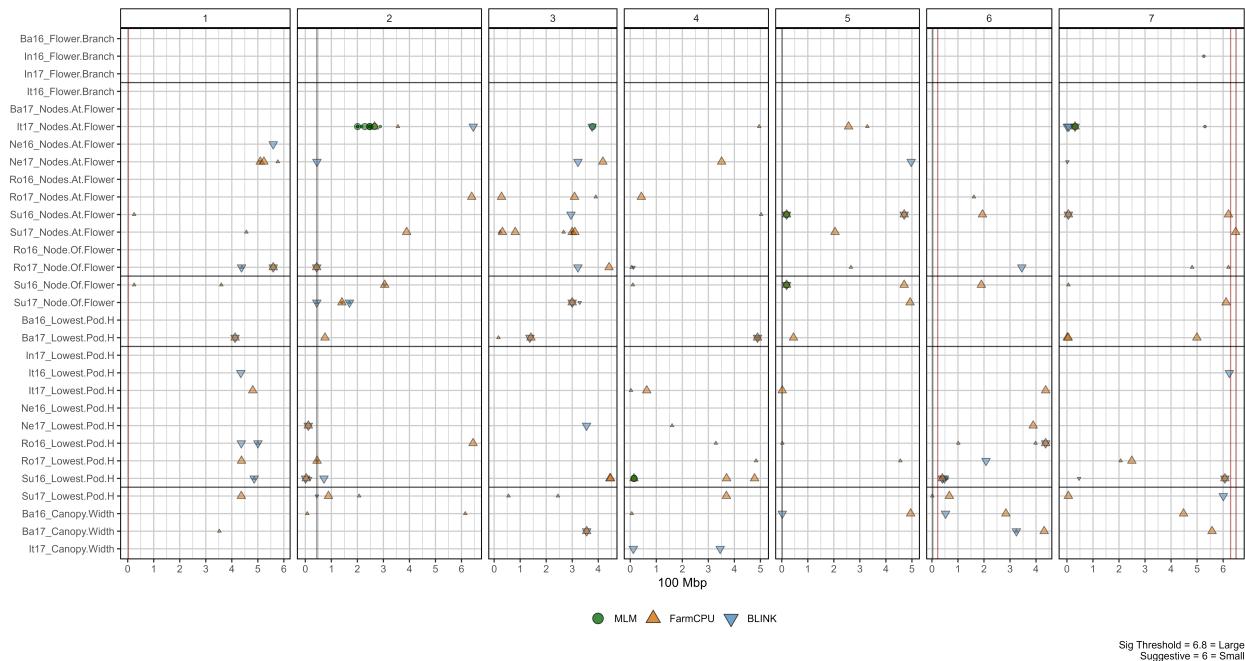
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- Additional/Additional\_Figure\_13\_8.html



- Additional/Additional\_Figure\_13\_9.html



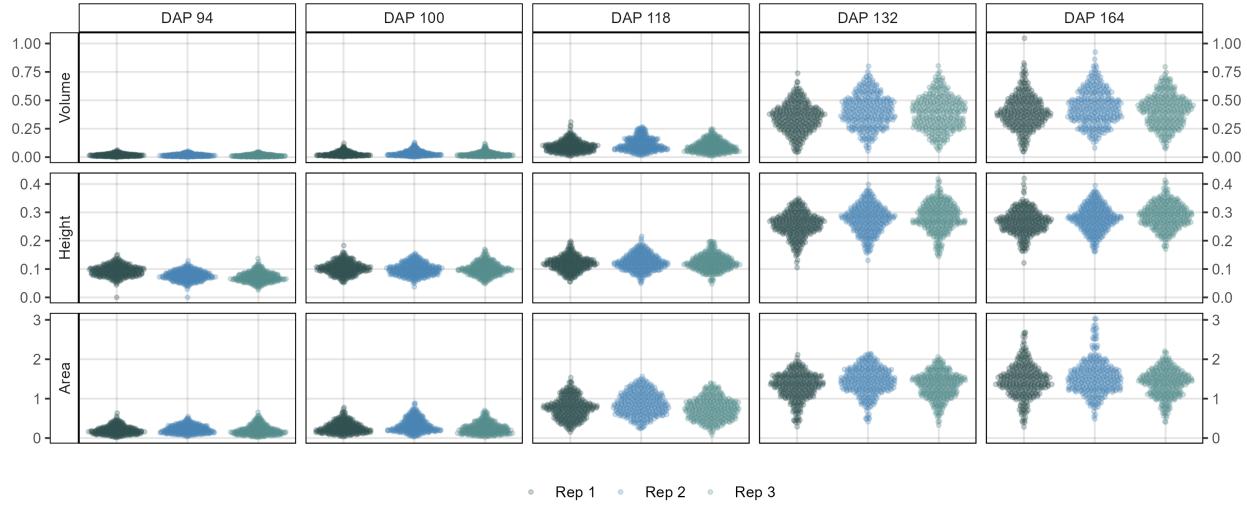

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## ggDroneCheck

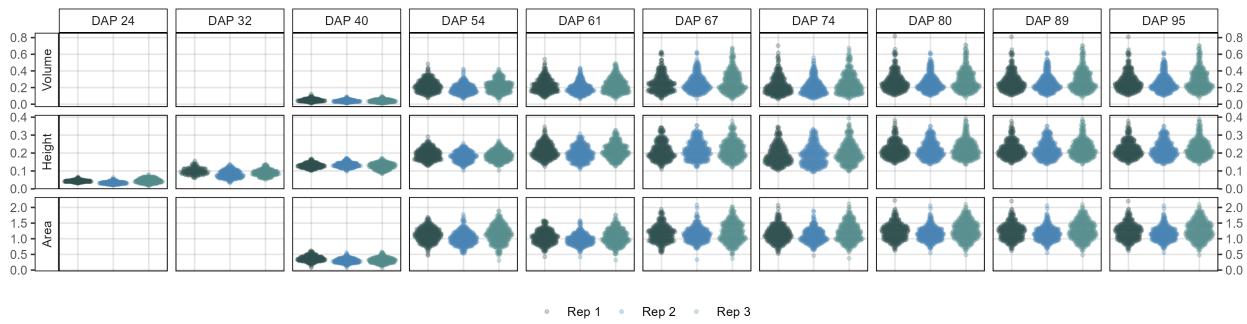
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## ggDroneTrait

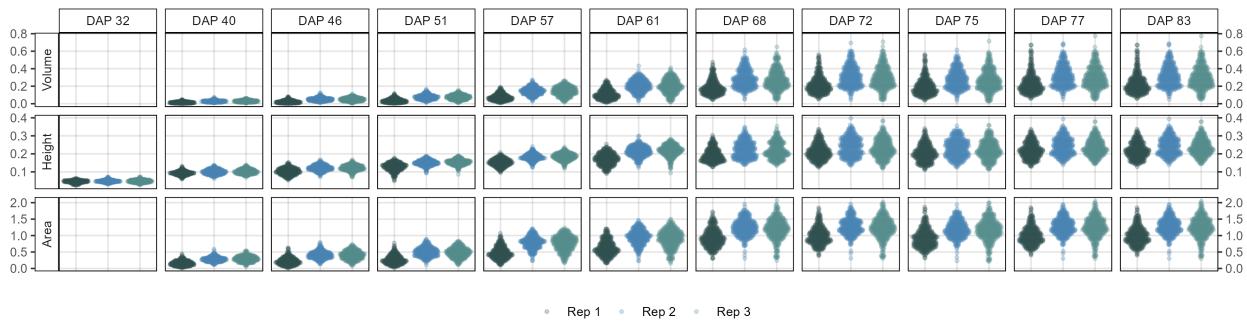
Italy 2017

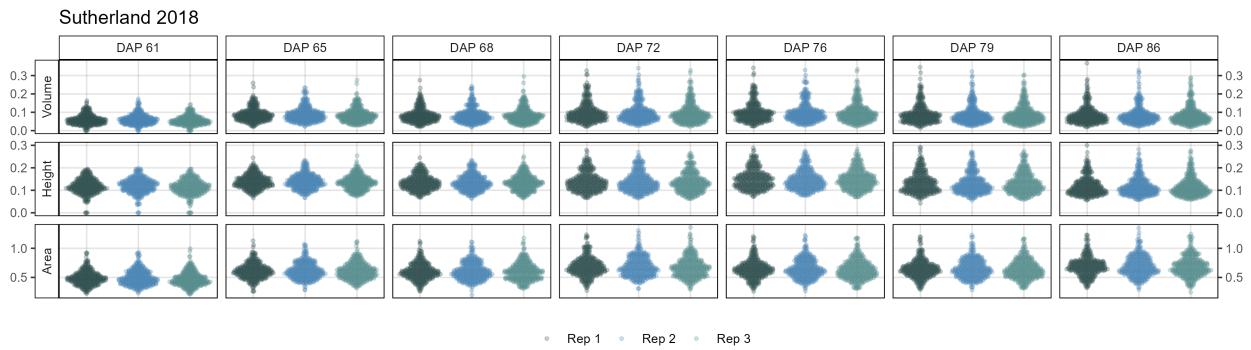


Rosthern 2017



Sutherland 2017

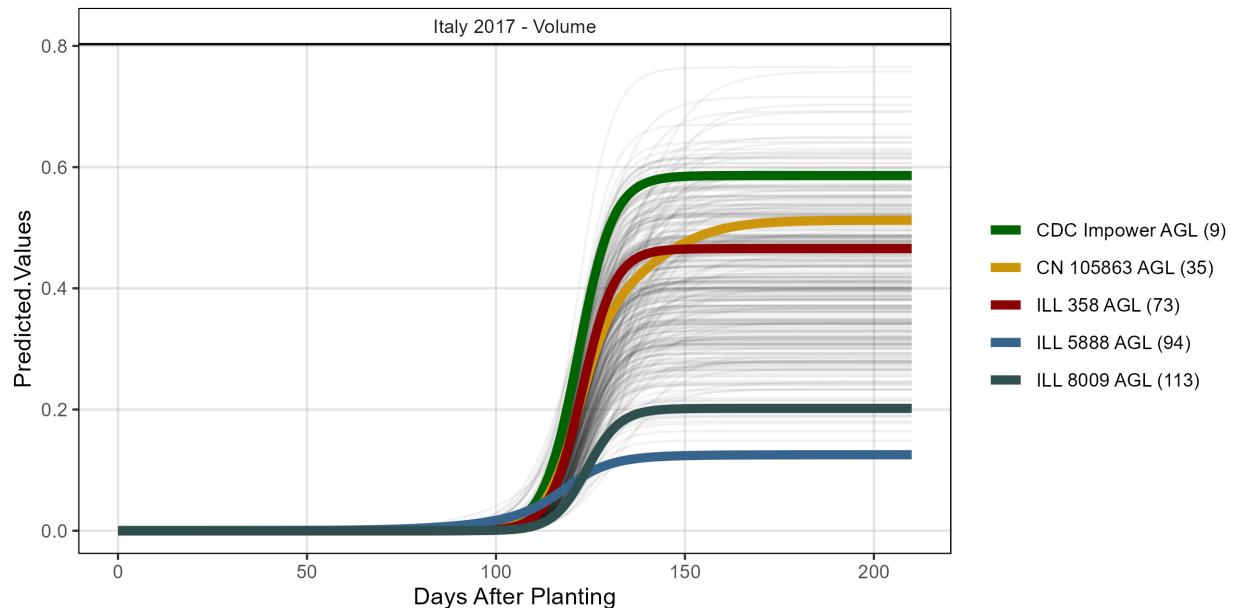




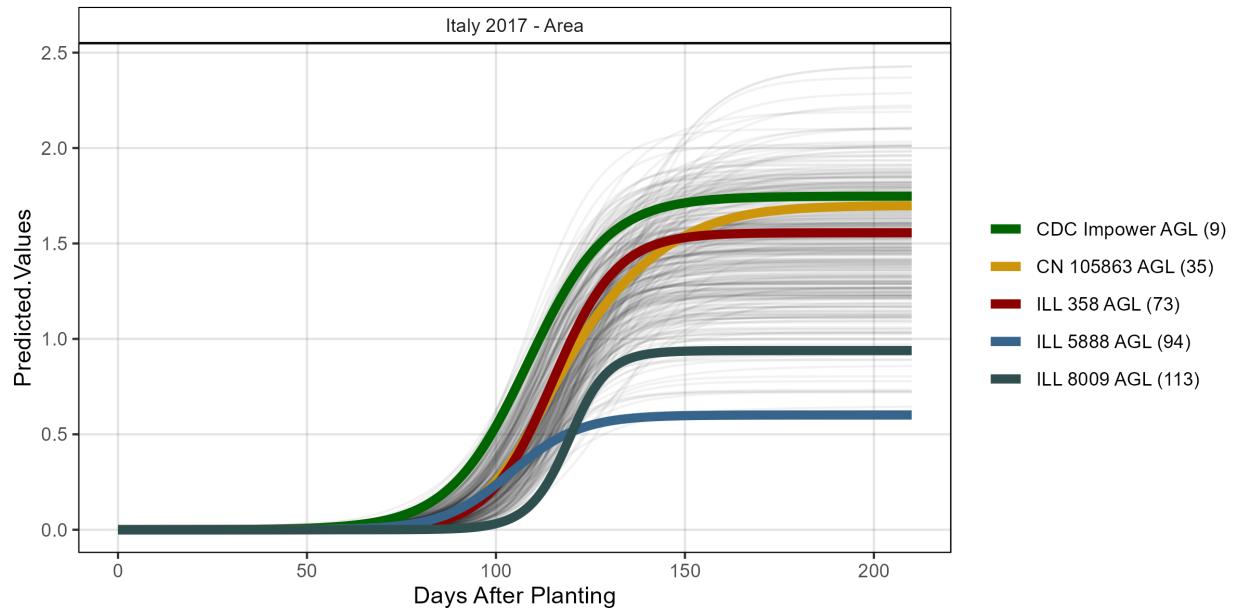
## ggGrowthCurves

### Italy 2017

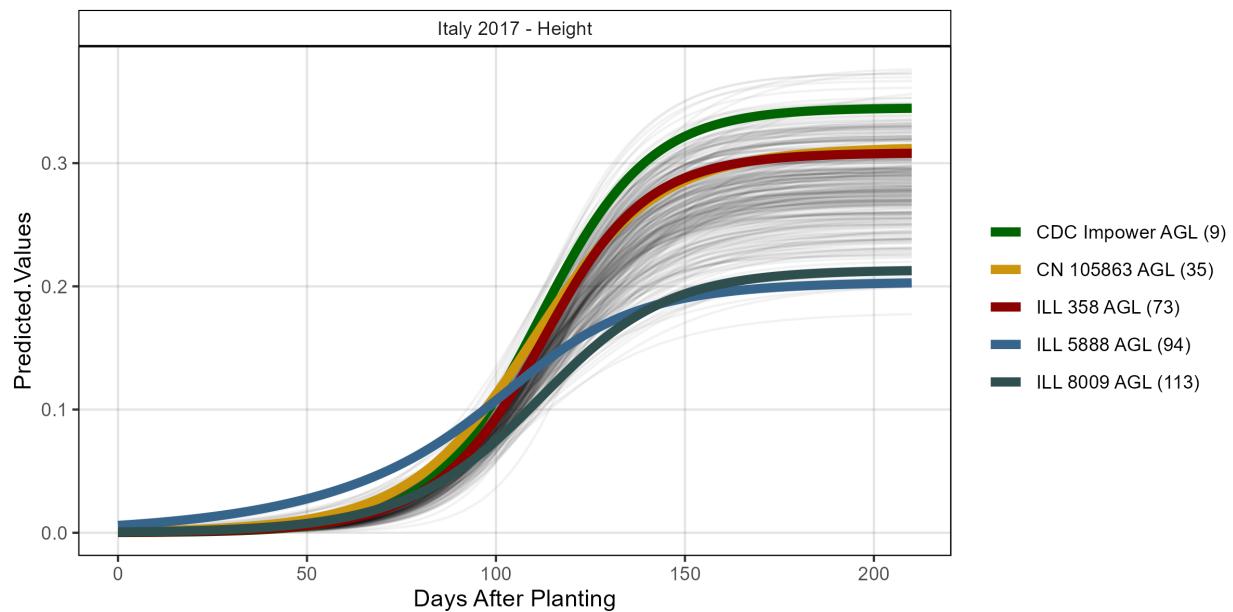
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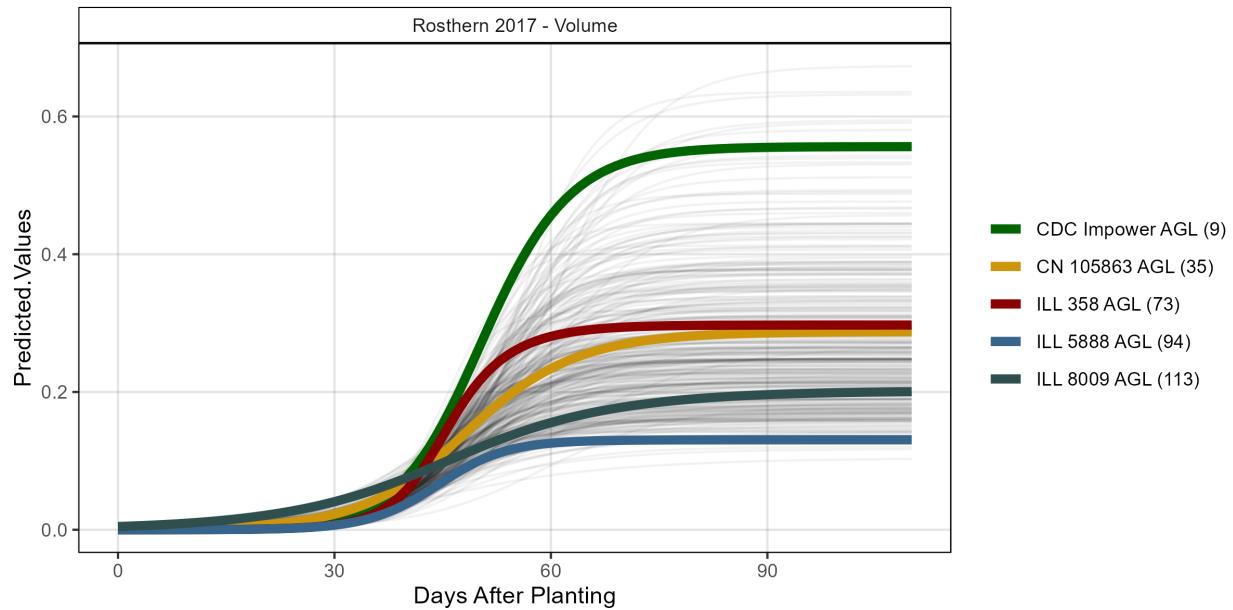


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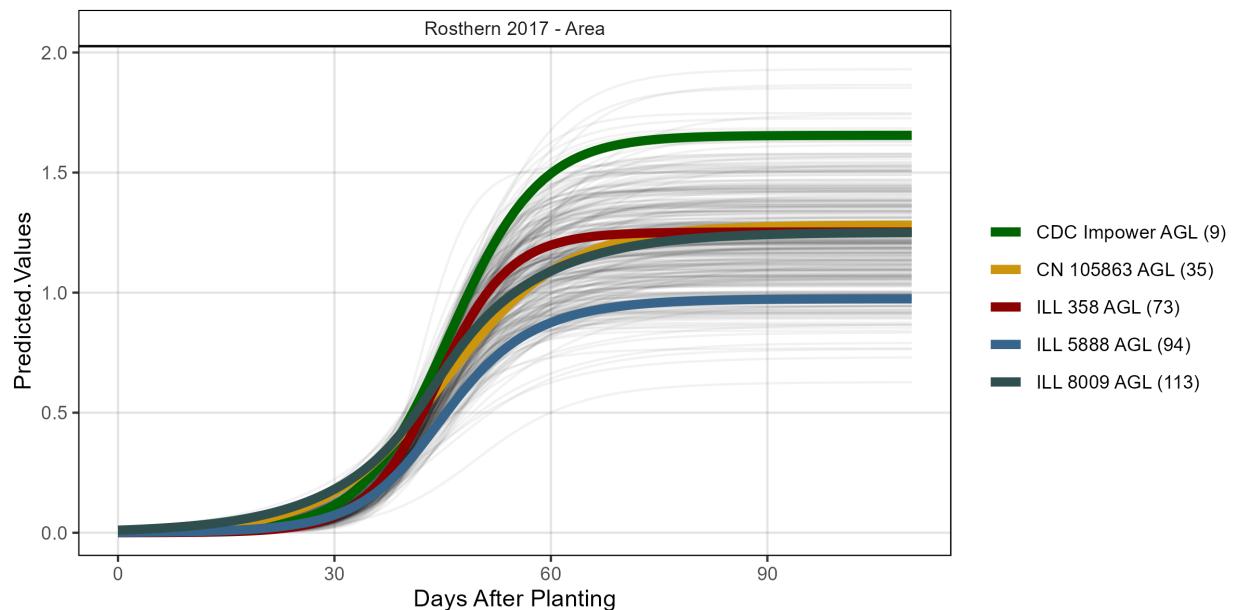


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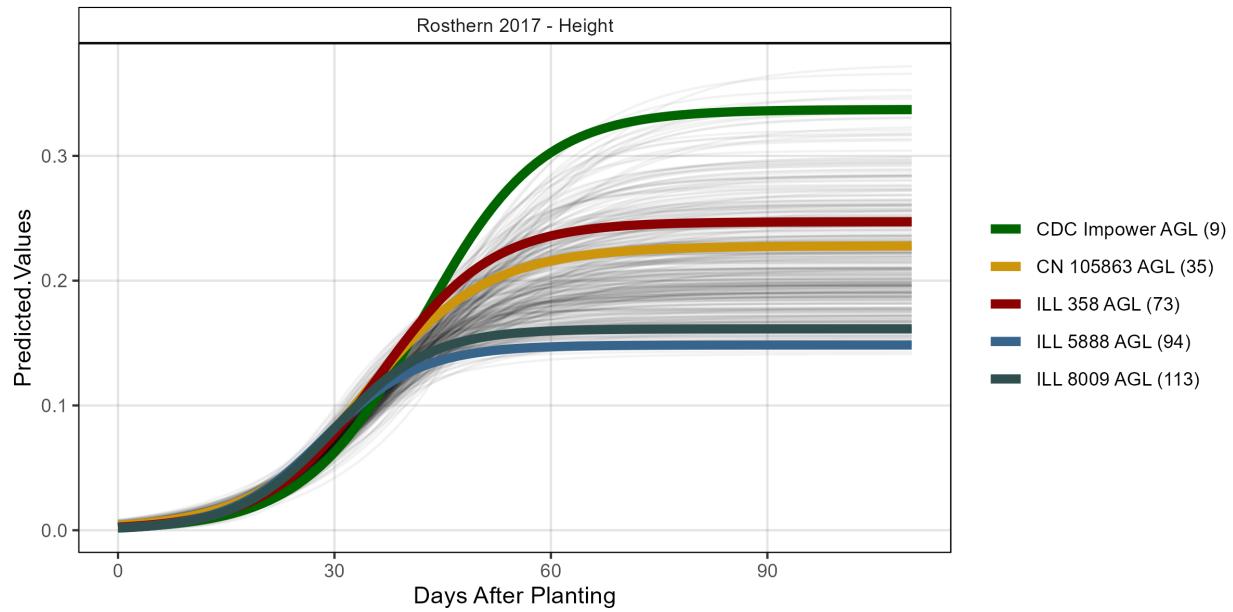
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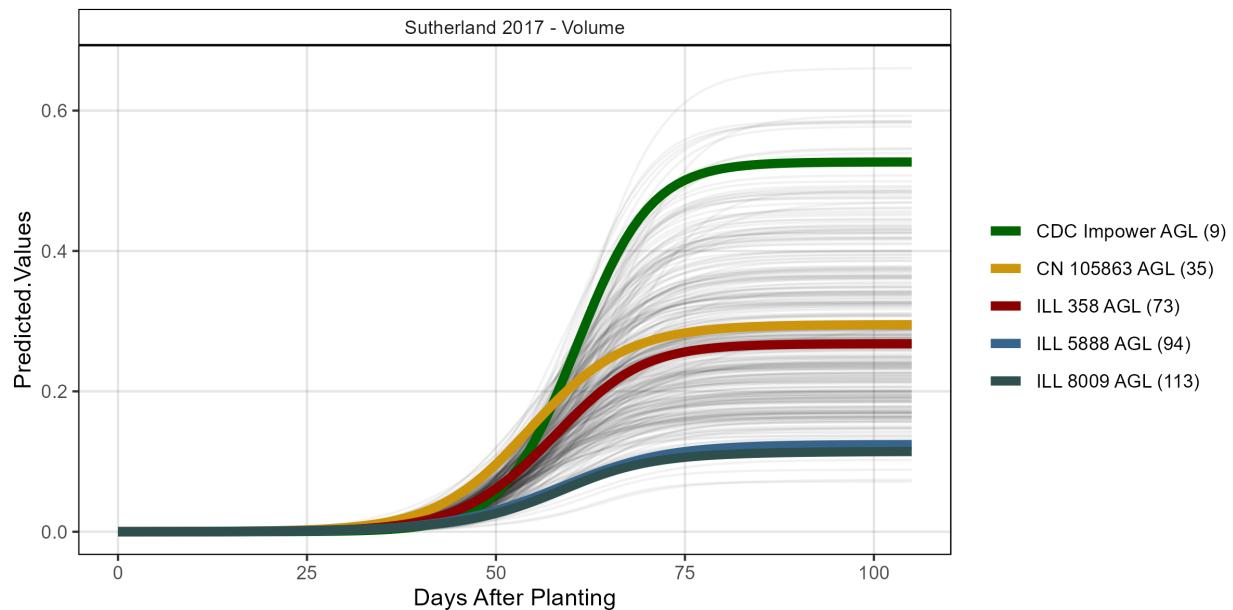


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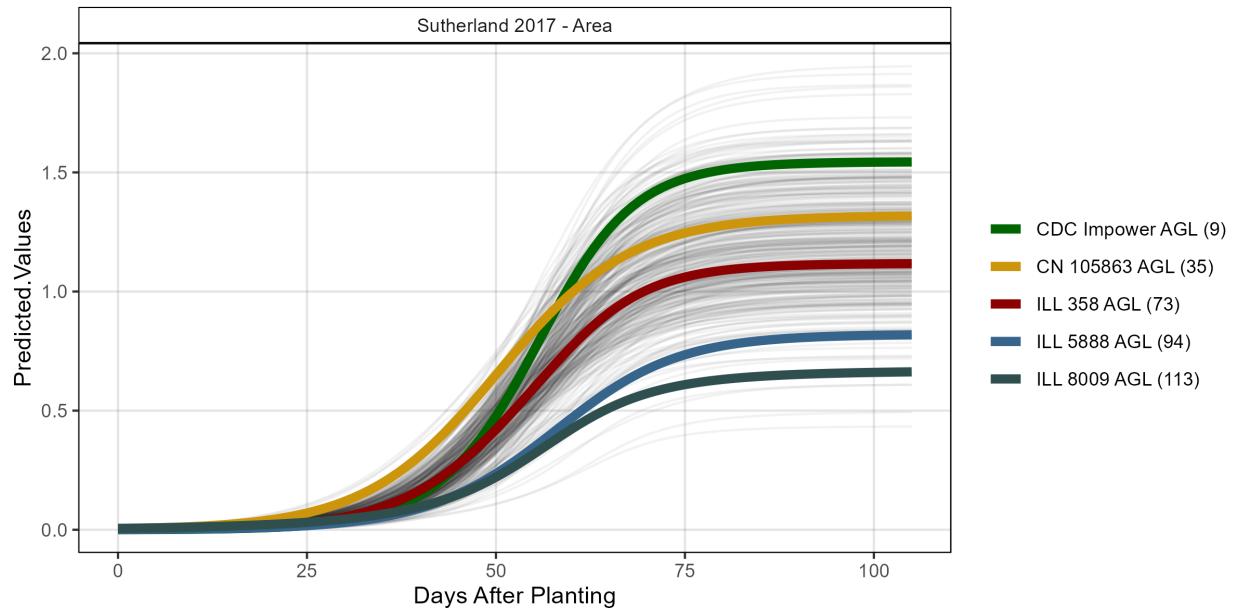


### Sutherland 2017

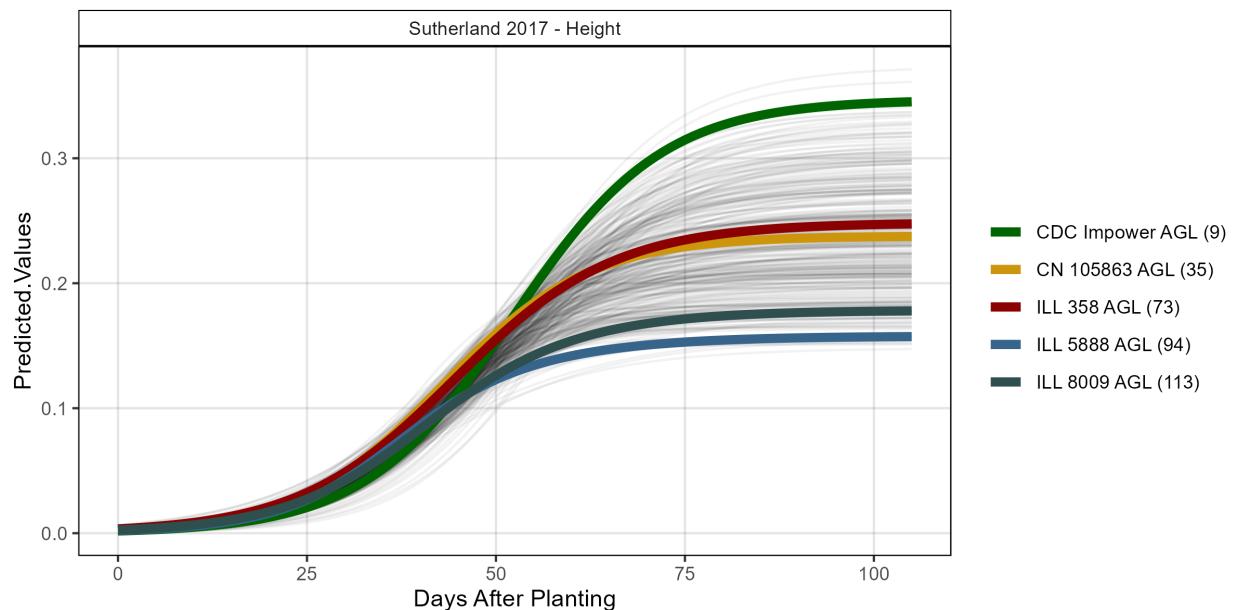
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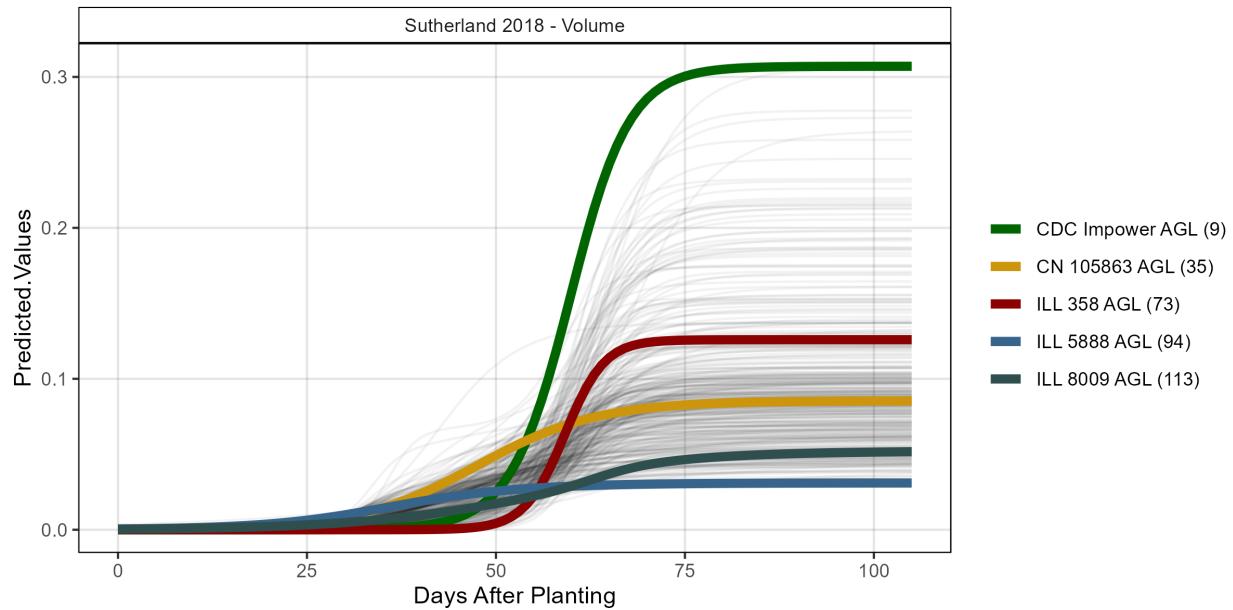


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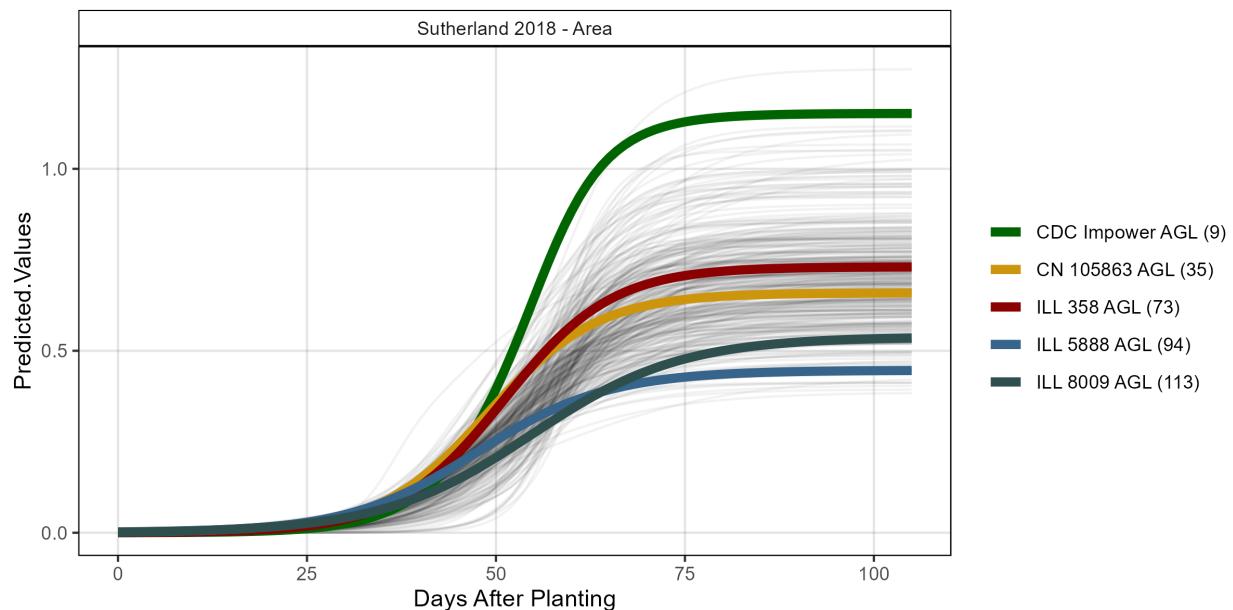


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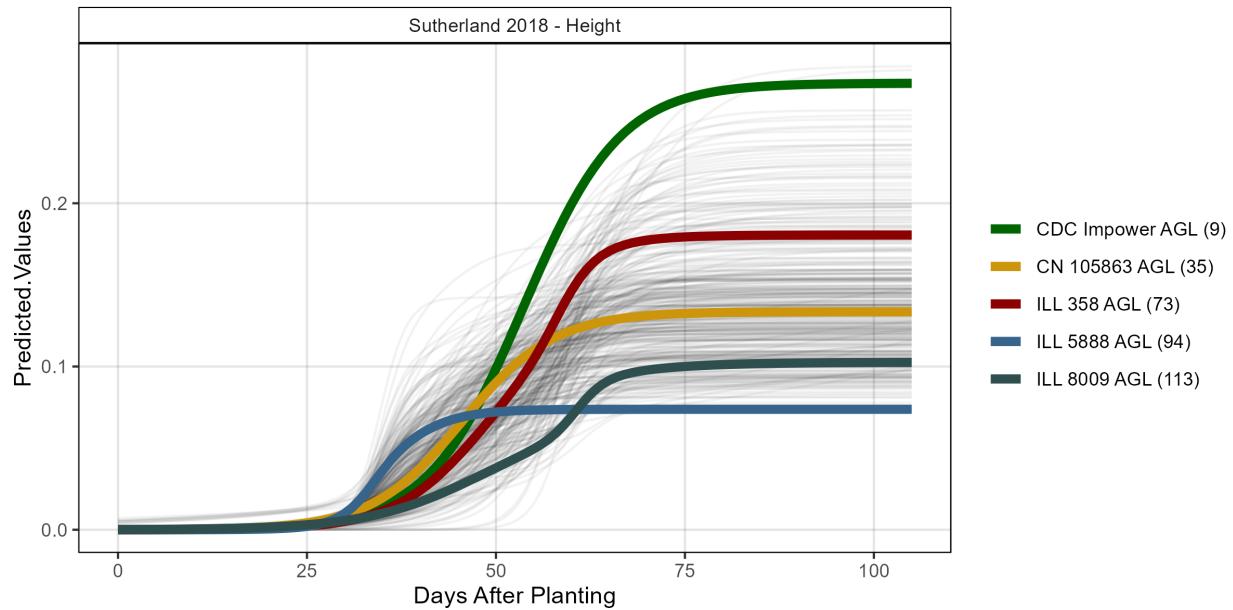
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## Manhattan Plots

- Additional/Manhattan/
- 

## Markers

- Additional/Markers/ ers/Chr7/)
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