

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

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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.** *The Plant Phenome Journal.* (2025) 8(1): e70040. doi.org/10.1002/ppj2.70040

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
 - 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
-

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- 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
- Supplemental Tables
- Supplemental Figures
- Additional Figures



APPLICATION OF GENOMICS
TO INNOVATION IN THE LENTIL ECONOMY



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Collaborators

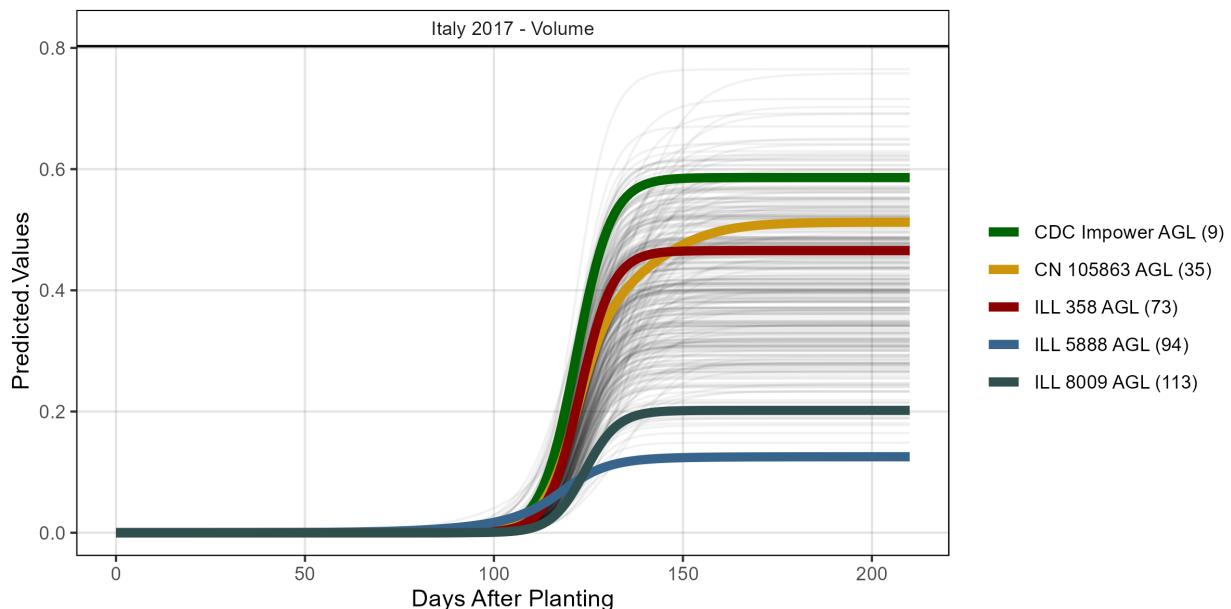
- Department of Plant Sciences and Crop Development Centre, University of Saskatchewan, Saskatoon, Saskatchewan, Canada
- School of Agriculture, Forestry, Food and Environmental Sciences, University of Basilicata, Potenza, Italy

Raw Data & Growth Curve Modeling

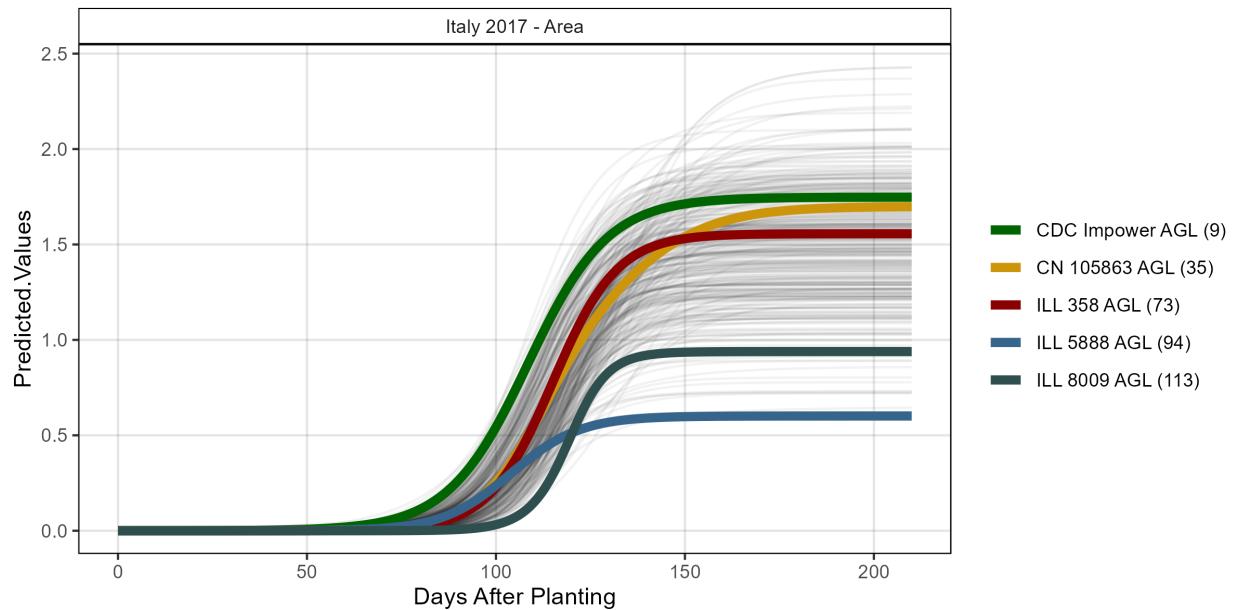
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- Additional/ggDroneCheck_Ro17.pdf
- Additional/ggDroneCheck_Su17.pdf
- Additional/ggDroneCheck_Su18.pdf

Metaponto, Italy 2017

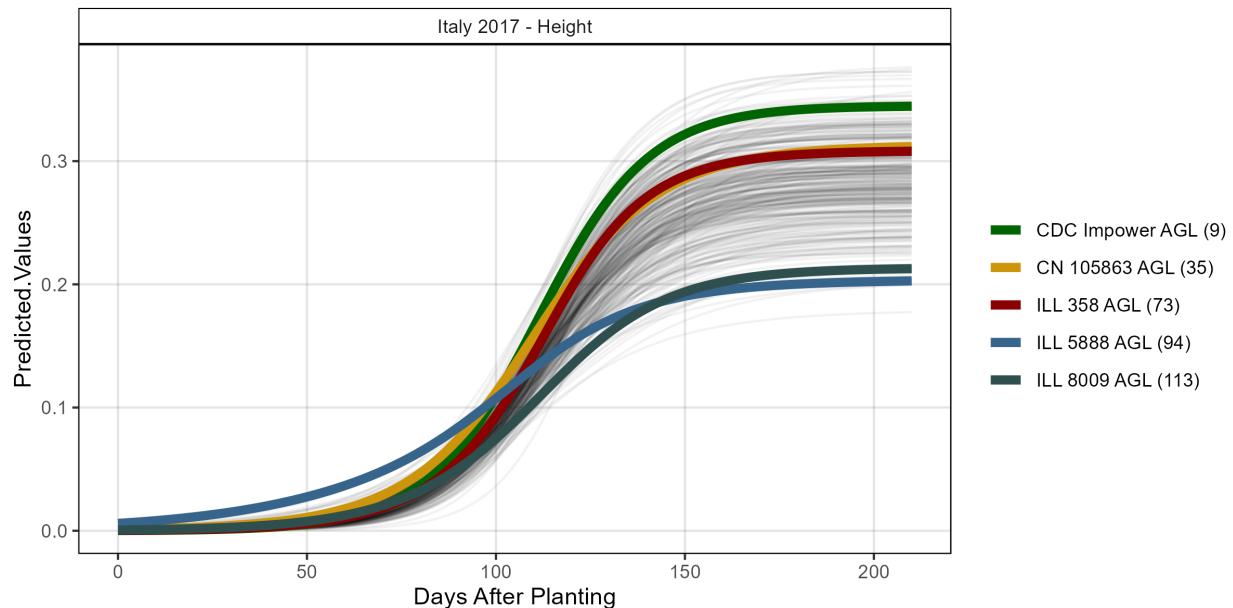
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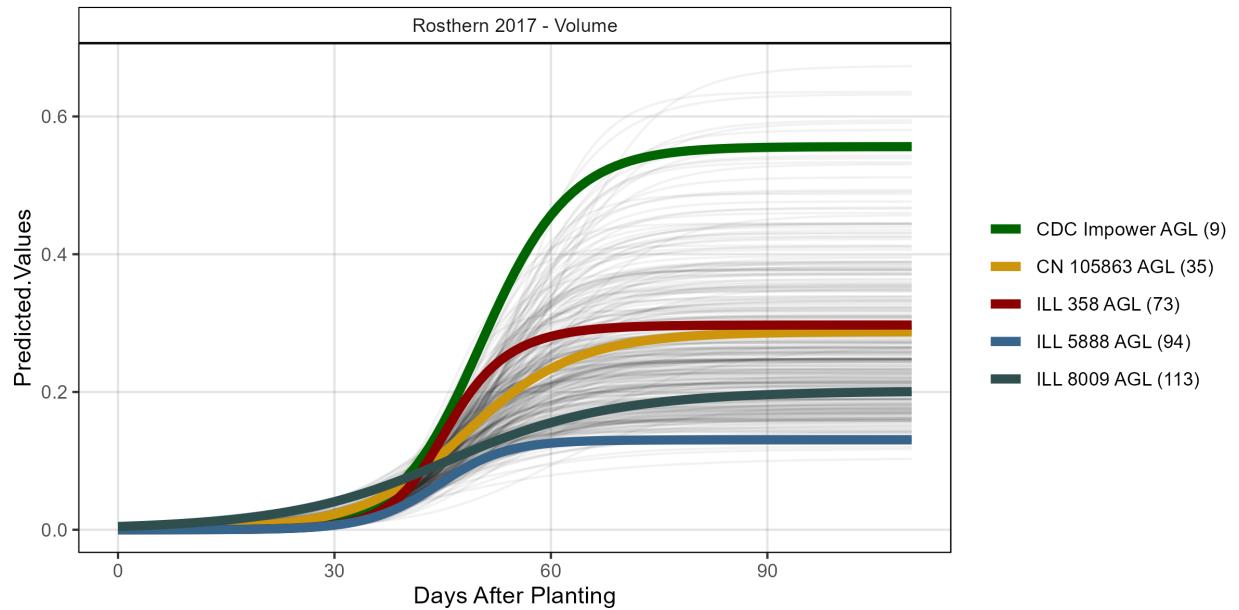


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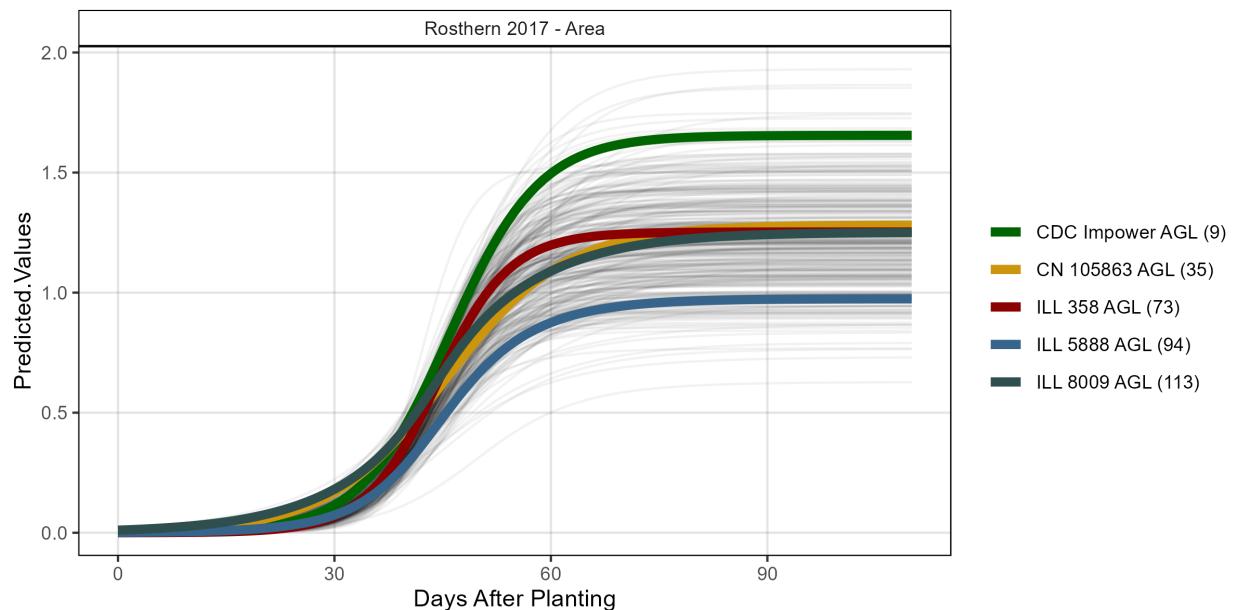


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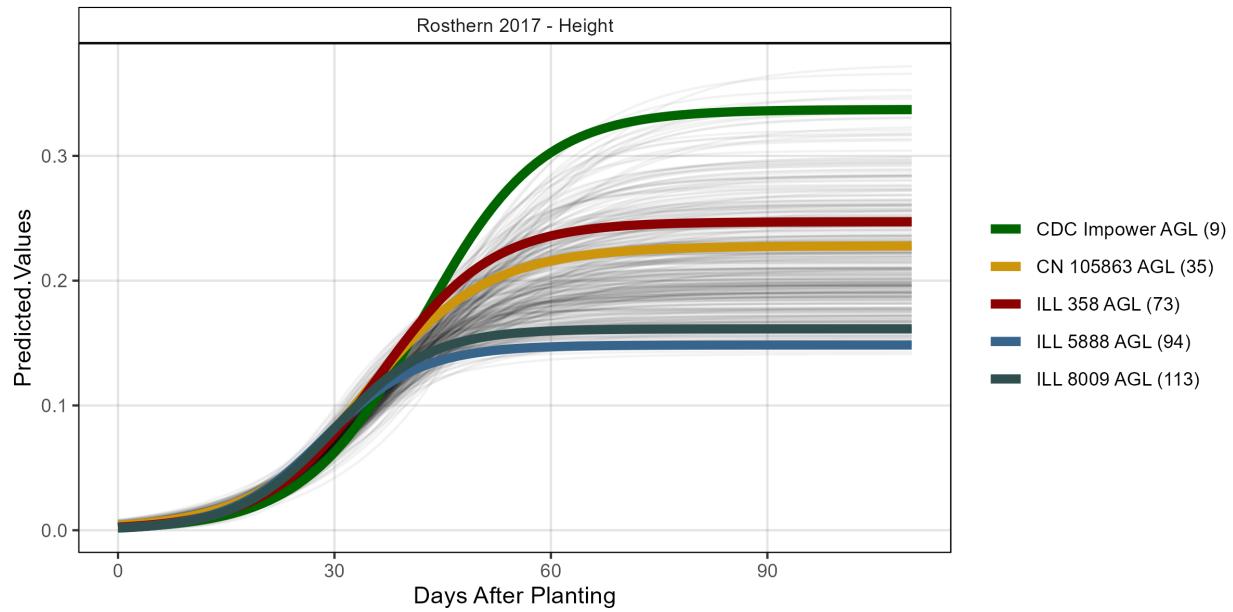
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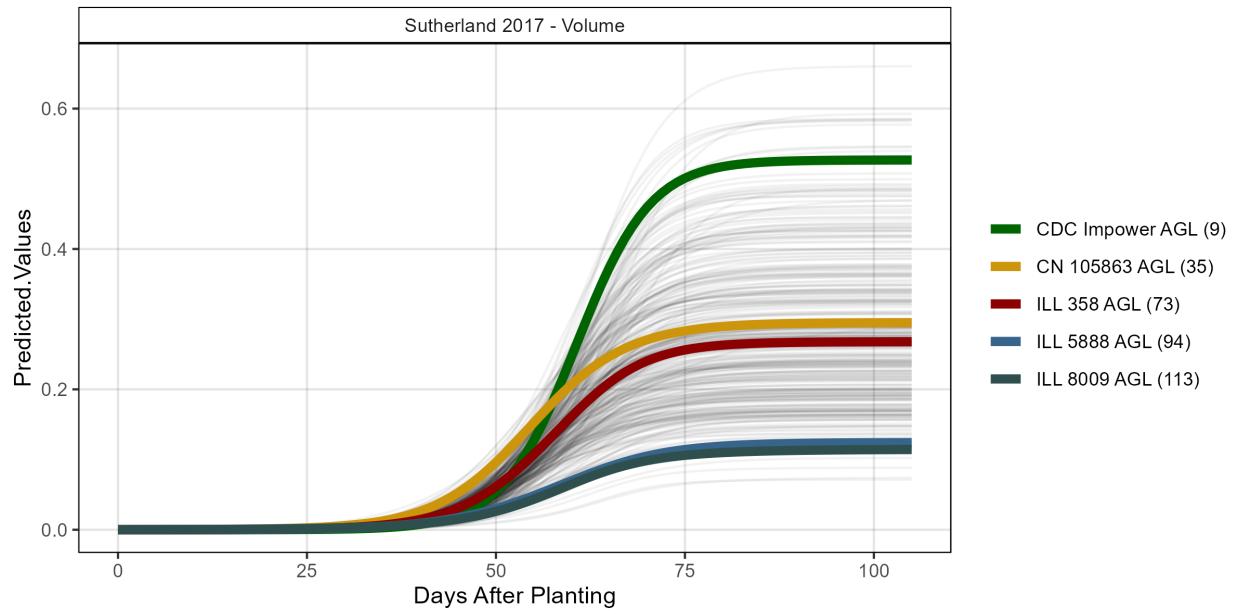


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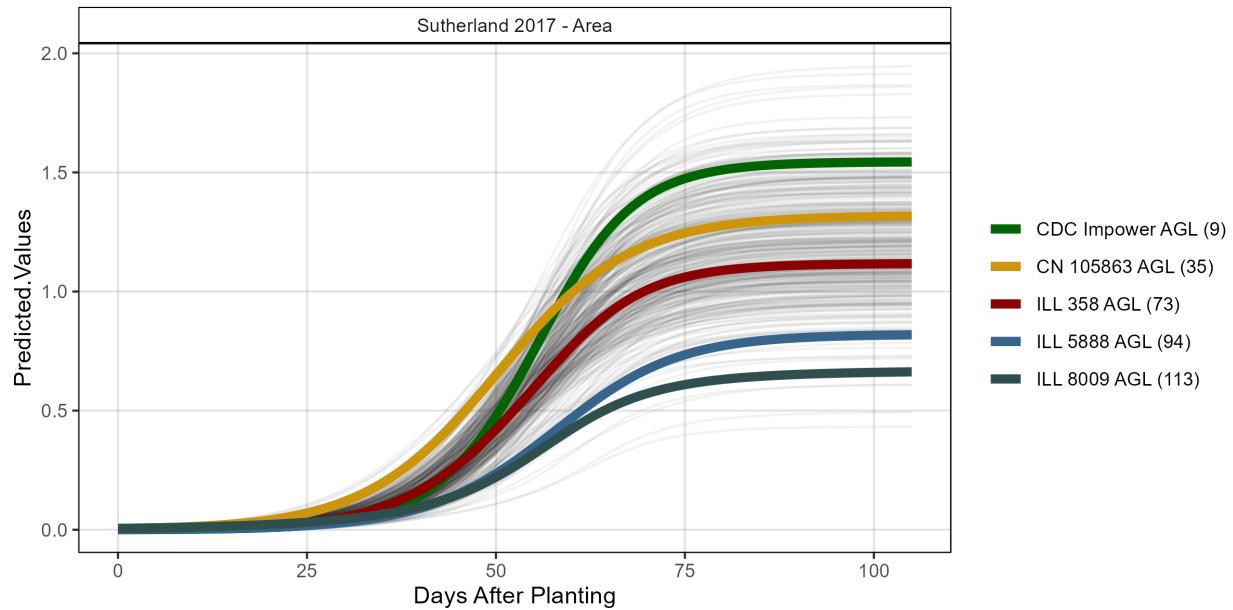


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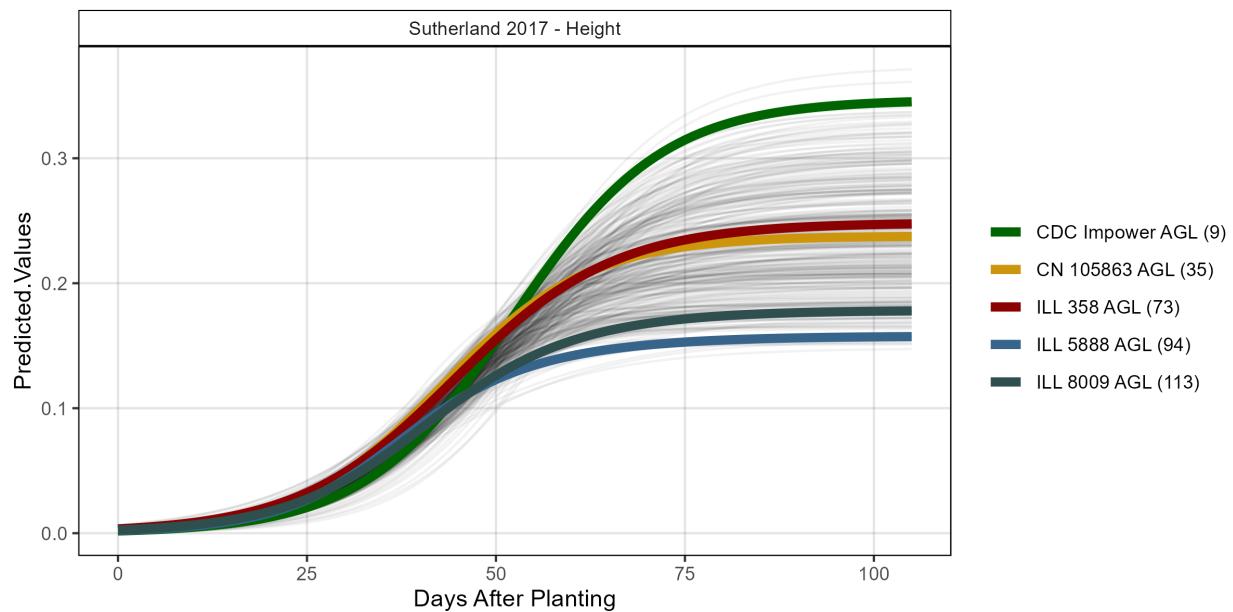
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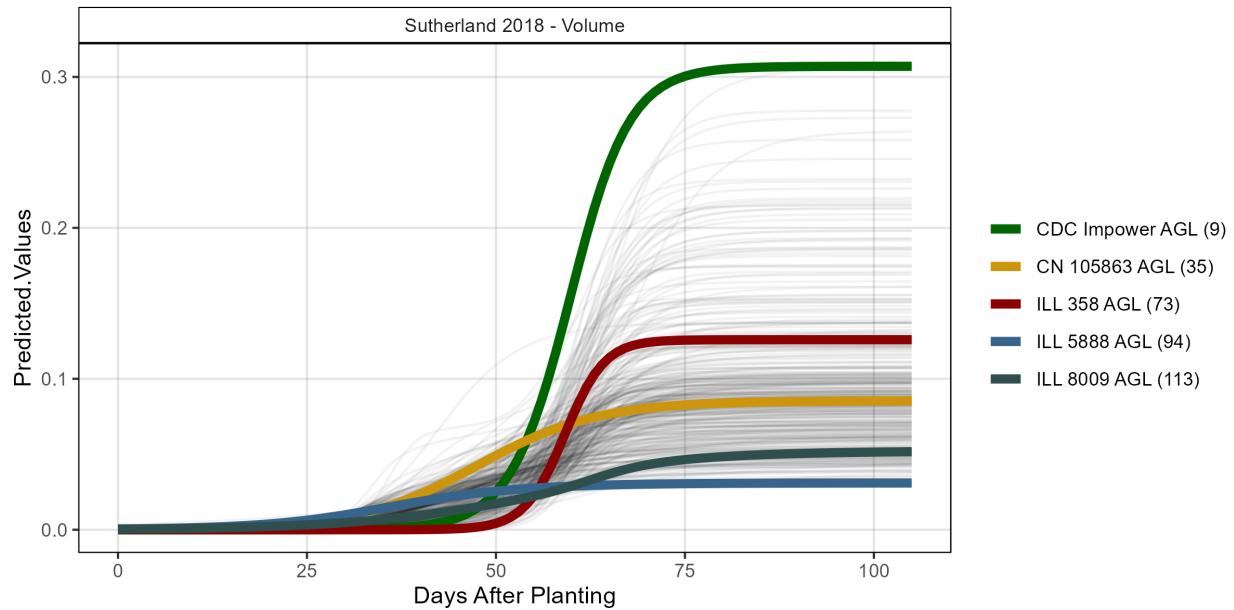


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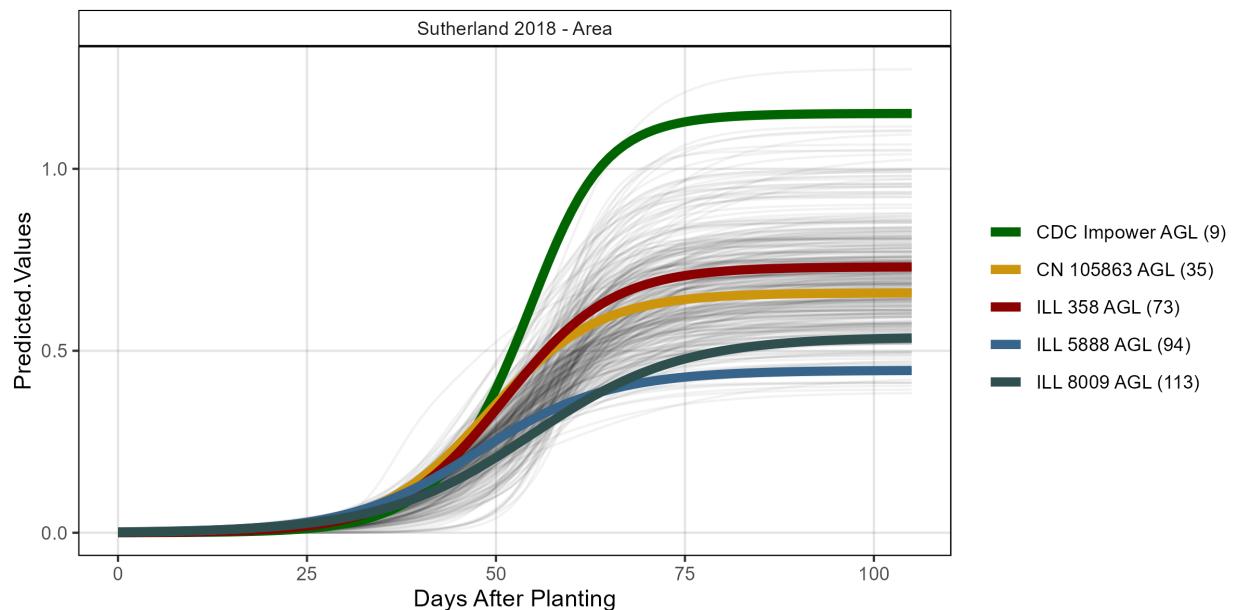


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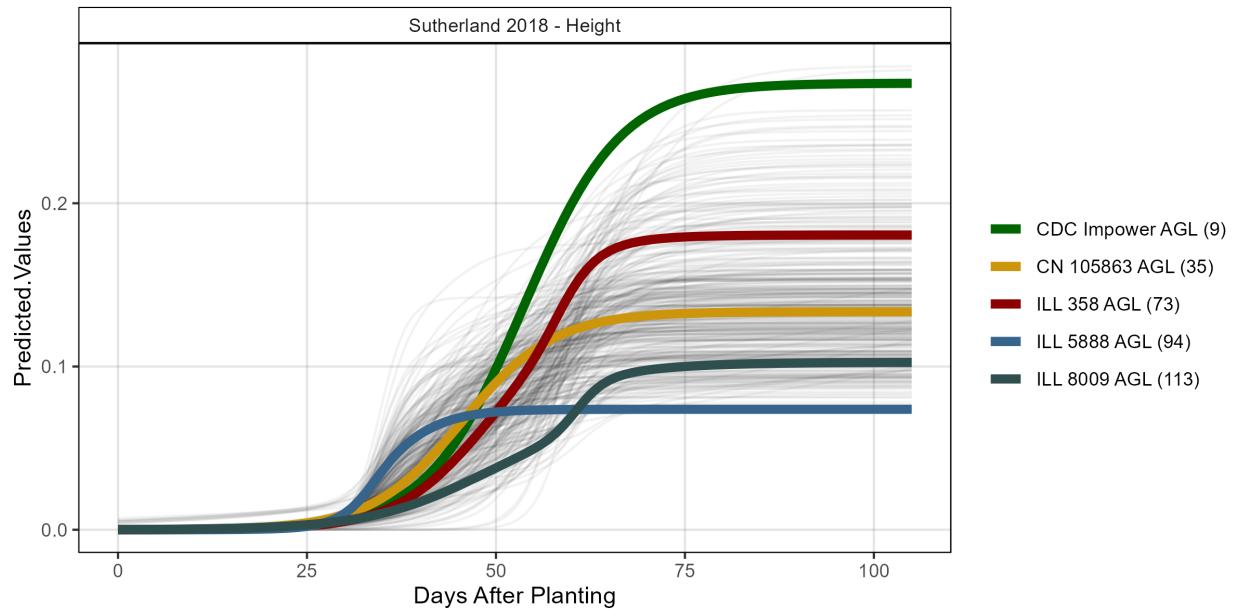
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Figures

Figure 1

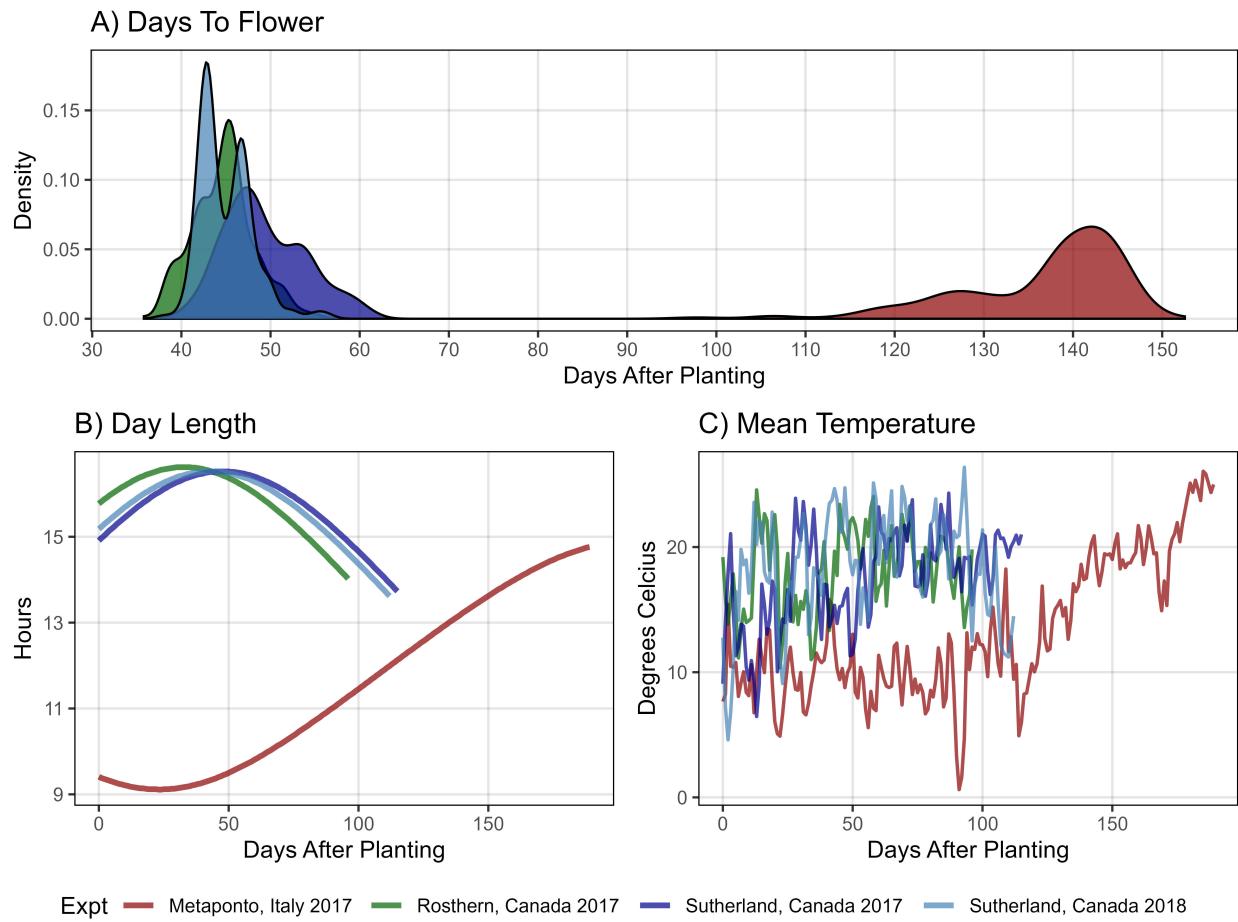


Figure 2

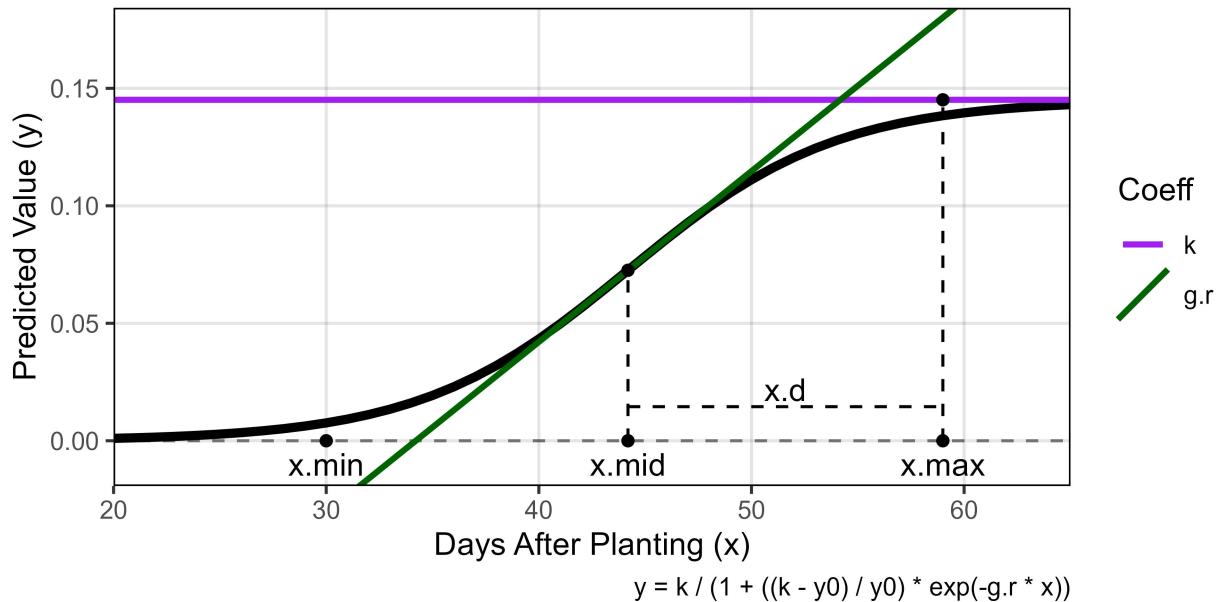


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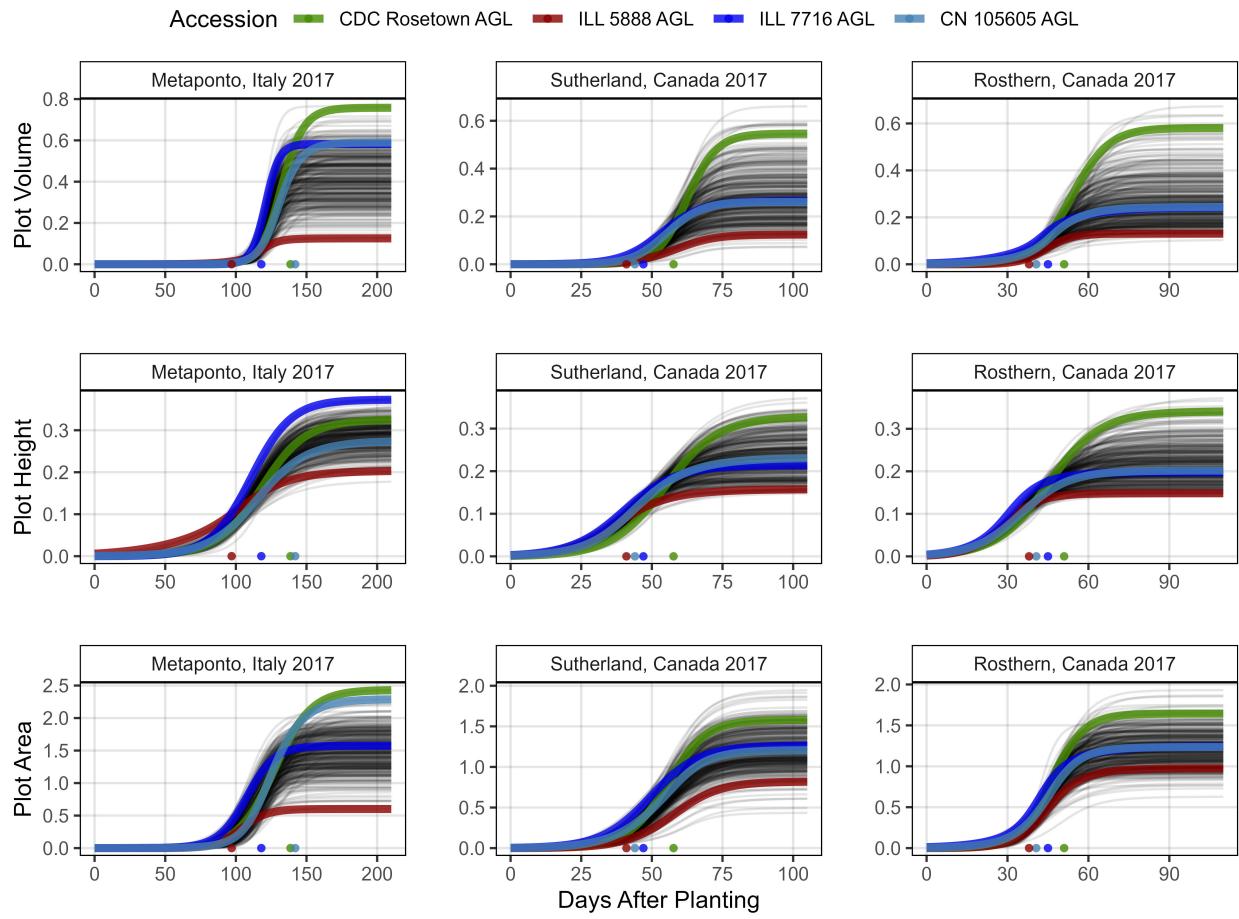
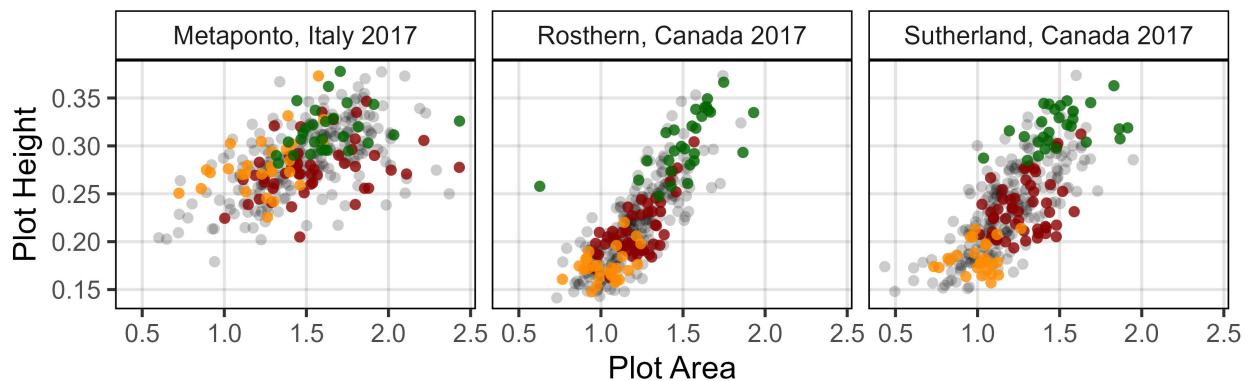


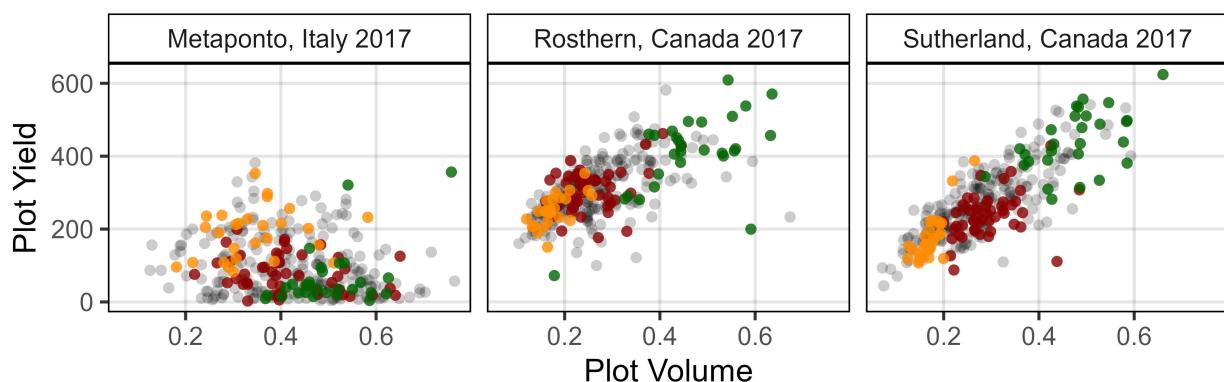
Figure 4

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- Additional/Figure_04_B.html
- Additional/Figure_04_C.html

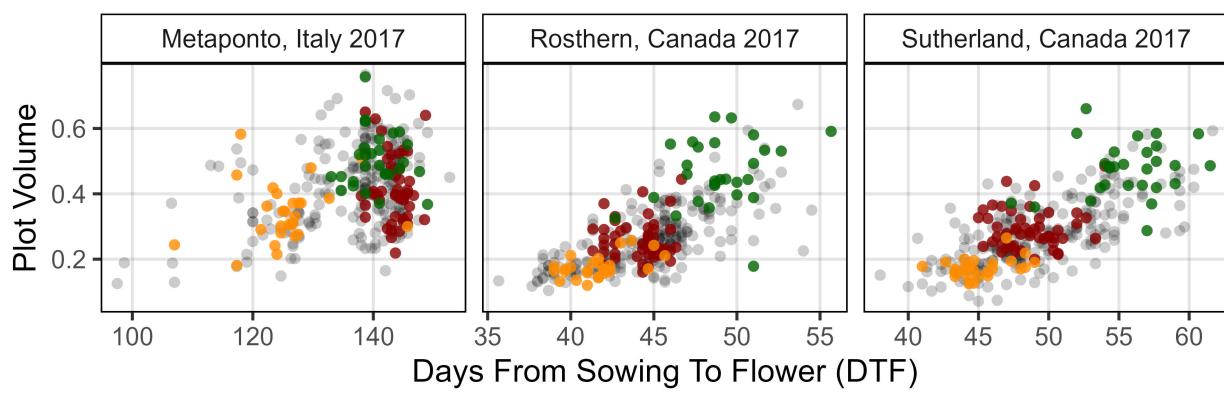
A) Height x Area



B) Yield x Volume



C) Volume x DTF



Accession Origin ● Canada ● India ● Iran ● Other

Figure 5

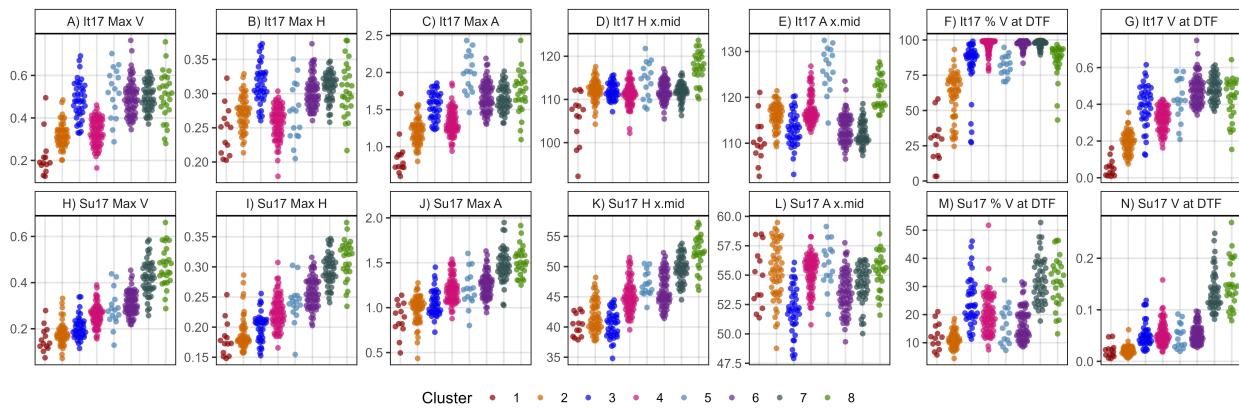


Figure 6

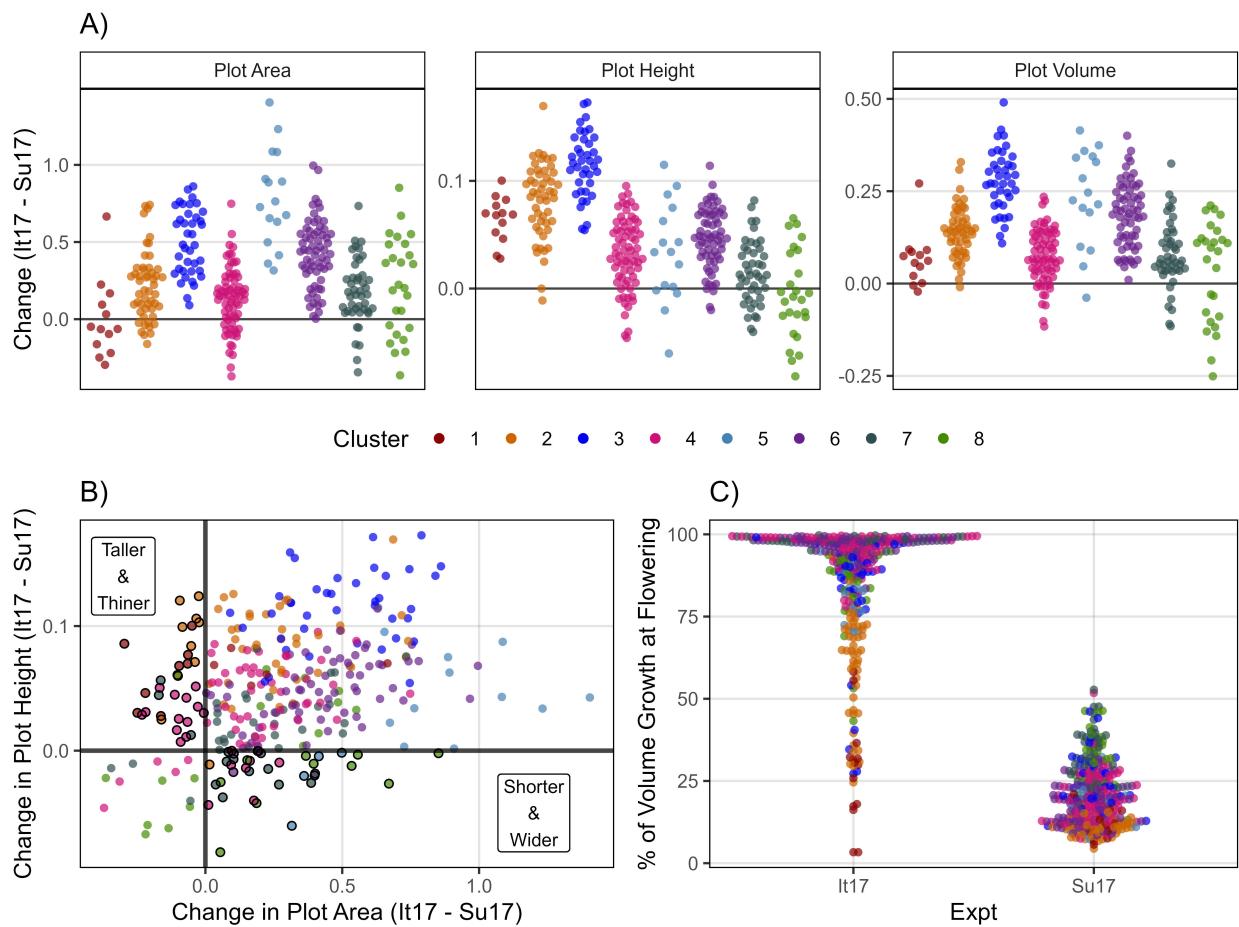


Figure 7

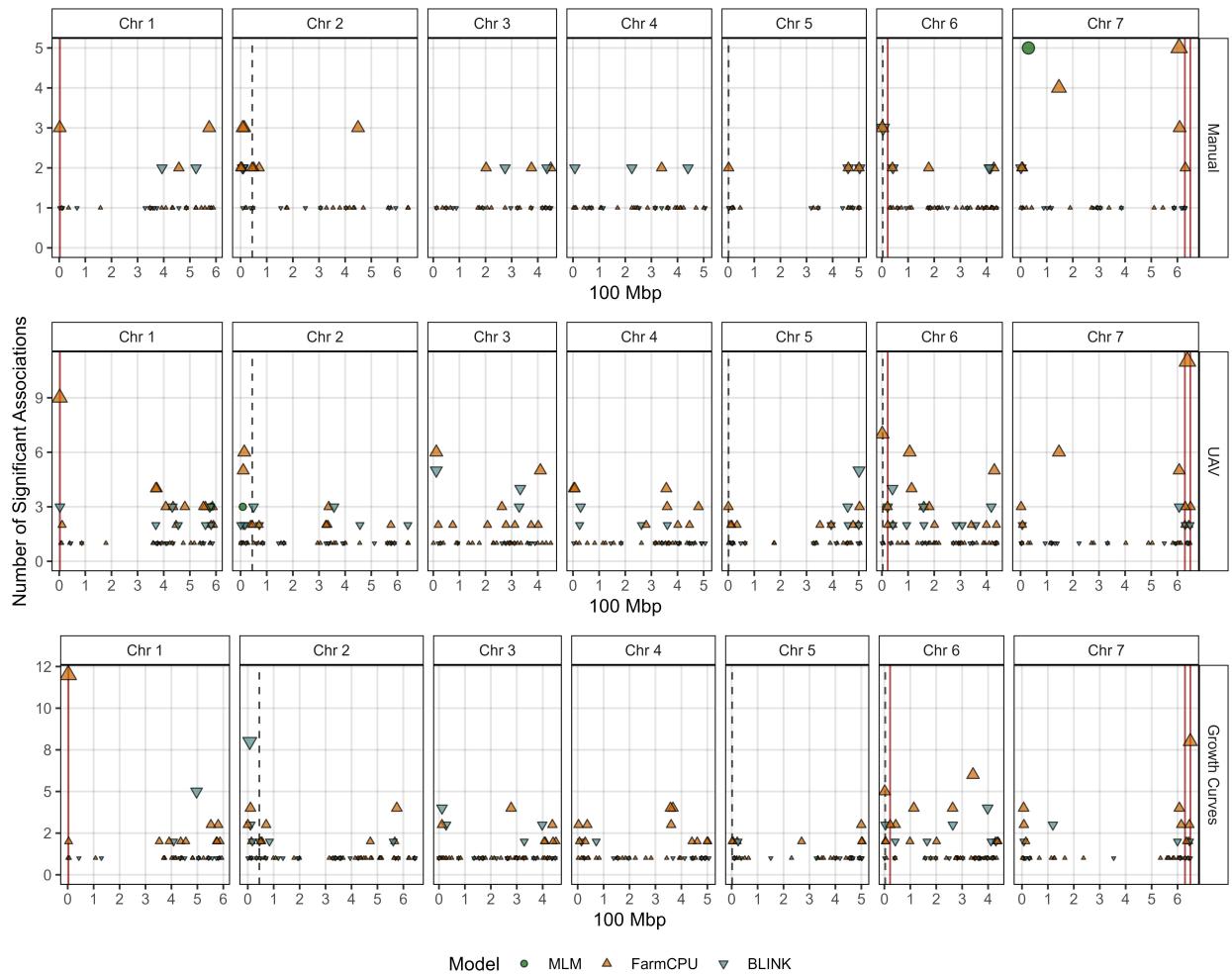
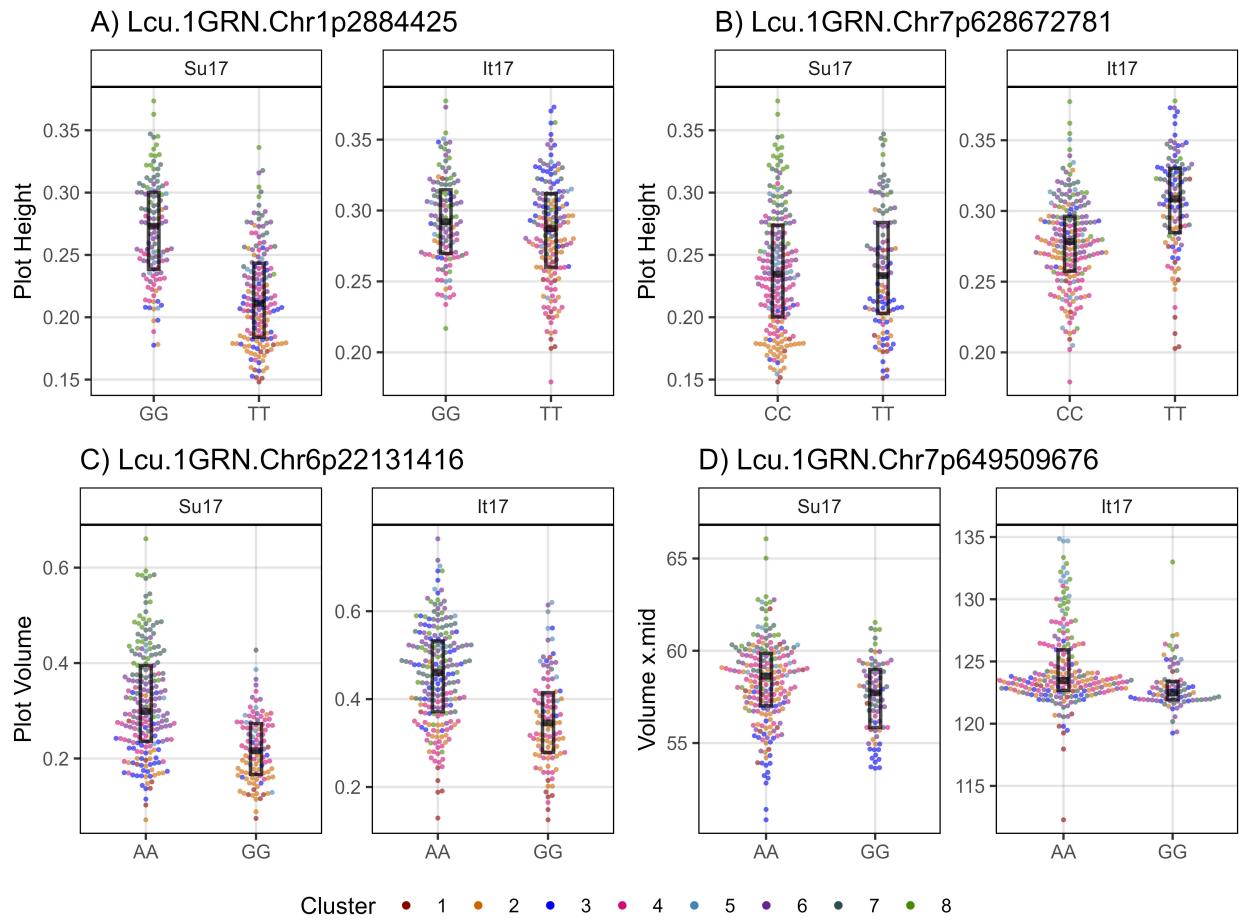


Figure 8



Supplemental Tables

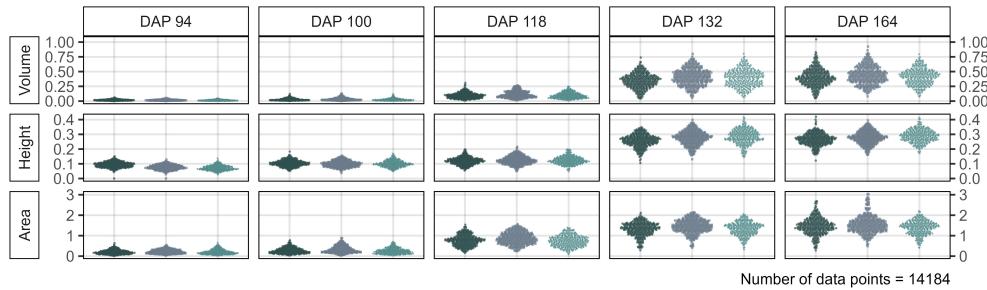
Supplemental Table 1

- Supplemental_Table_01.csv

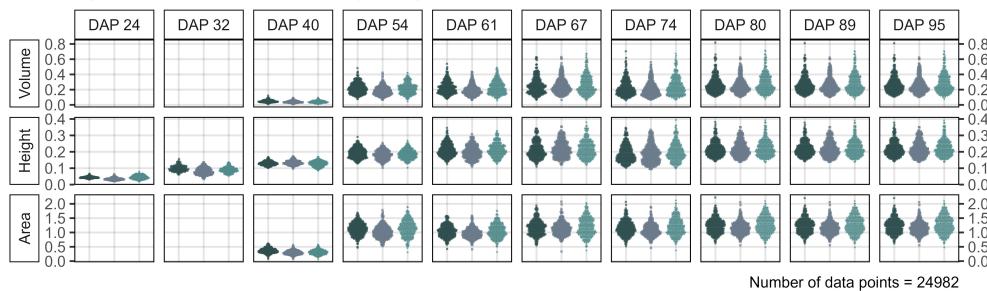
Supplemental Figures

Supplemental Figure 1

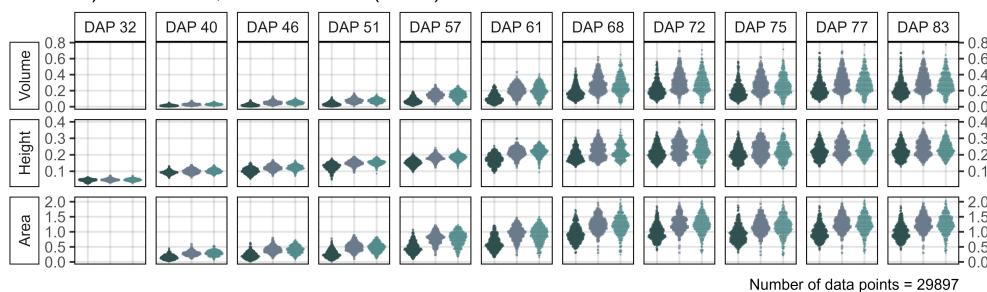
A) Metaponto, Italy 2017 (It17)



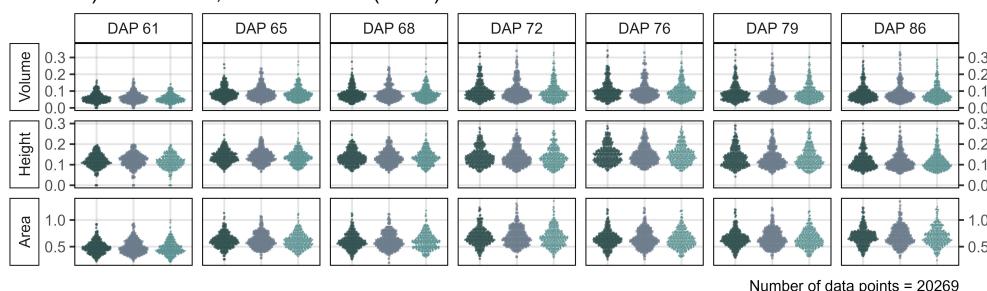
B) Rosthern, Canada 2017 (Ro17)



C) Sutherland, Canada 2017 (Su17)



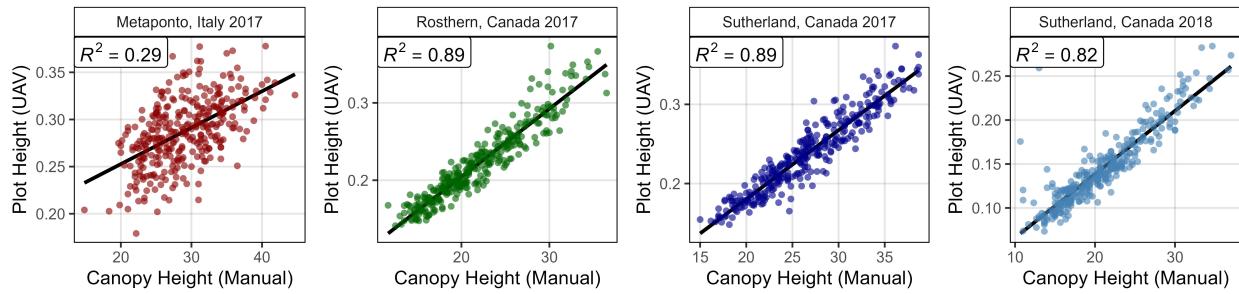
D) Sutherland, Canada 2018 (Su18)



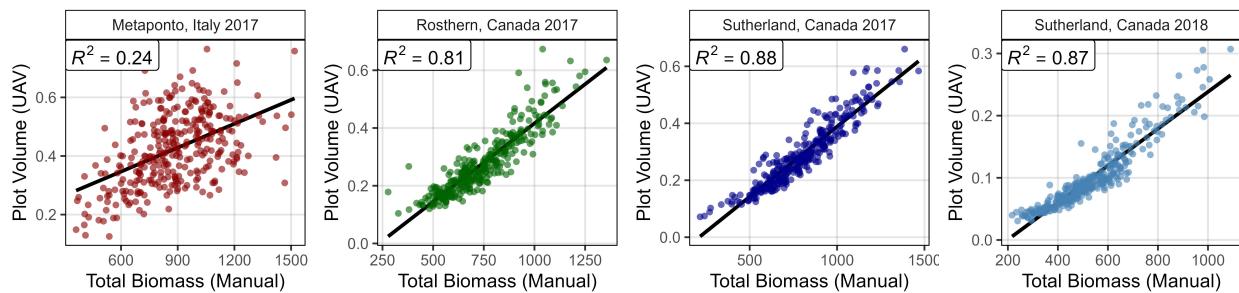
Rep ● 1 ■ 2 ◆ 3

Supplemental Figure 2

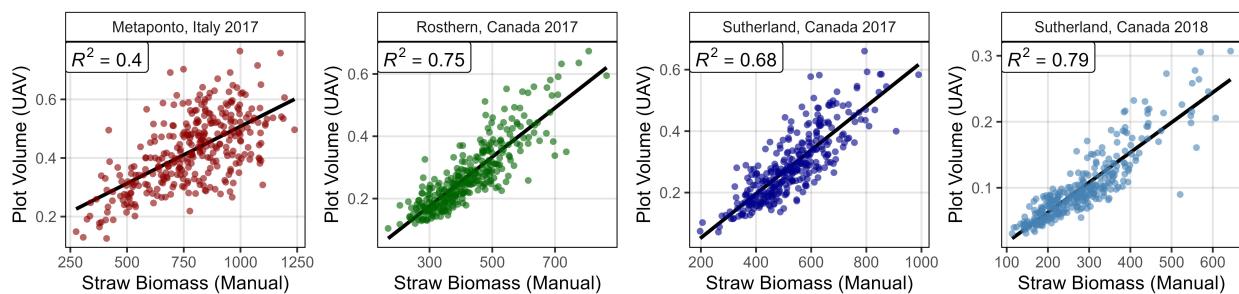
A) Plot Height (UAV) x Canopy Height (Manual)



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

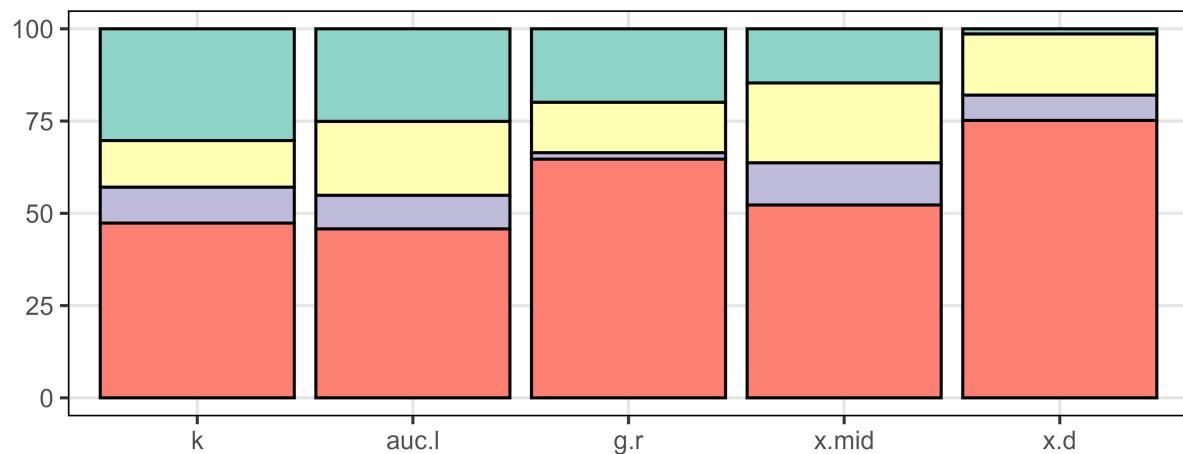


C) Plot Volume (UAV) x Straw Biomass (Manual)

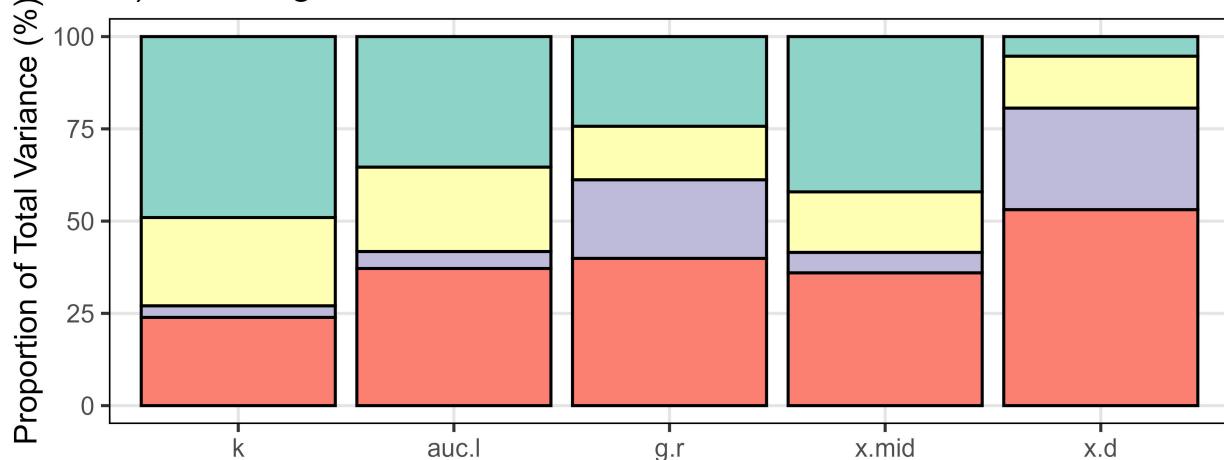


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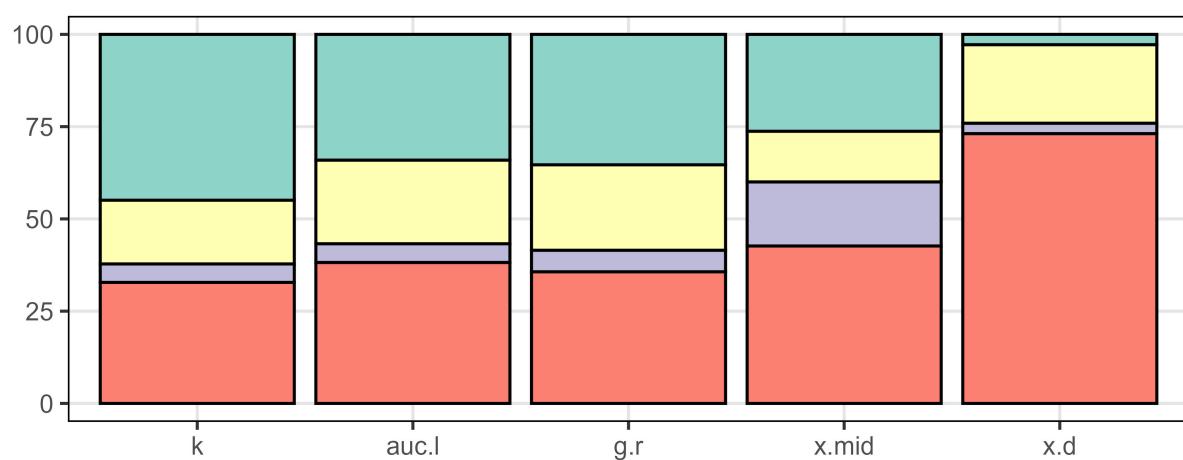
A) Plot Area Growth Curve Coefficients



B) Plot Height Growth Curve Coefficients

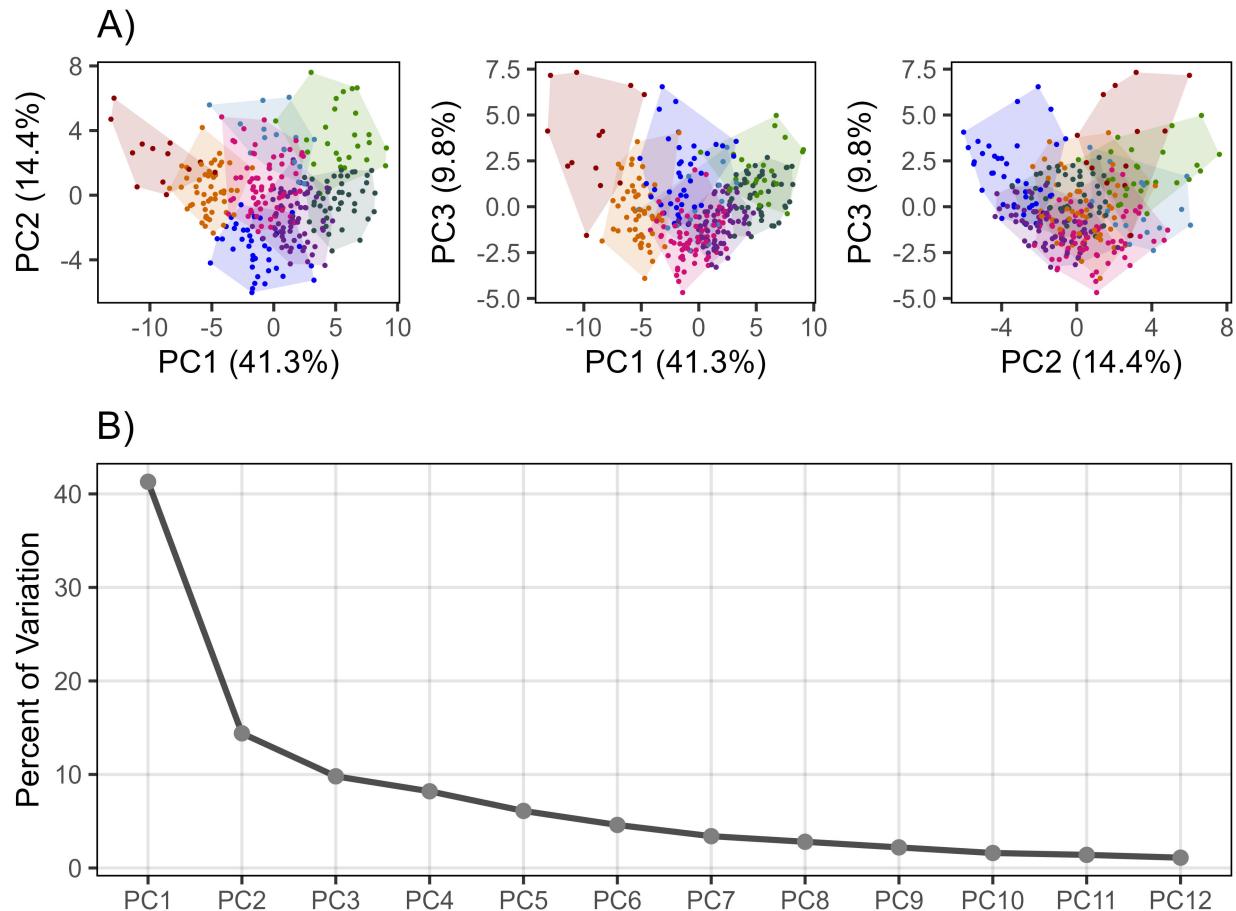


C) Plot Volume Growth Curve Coefficients

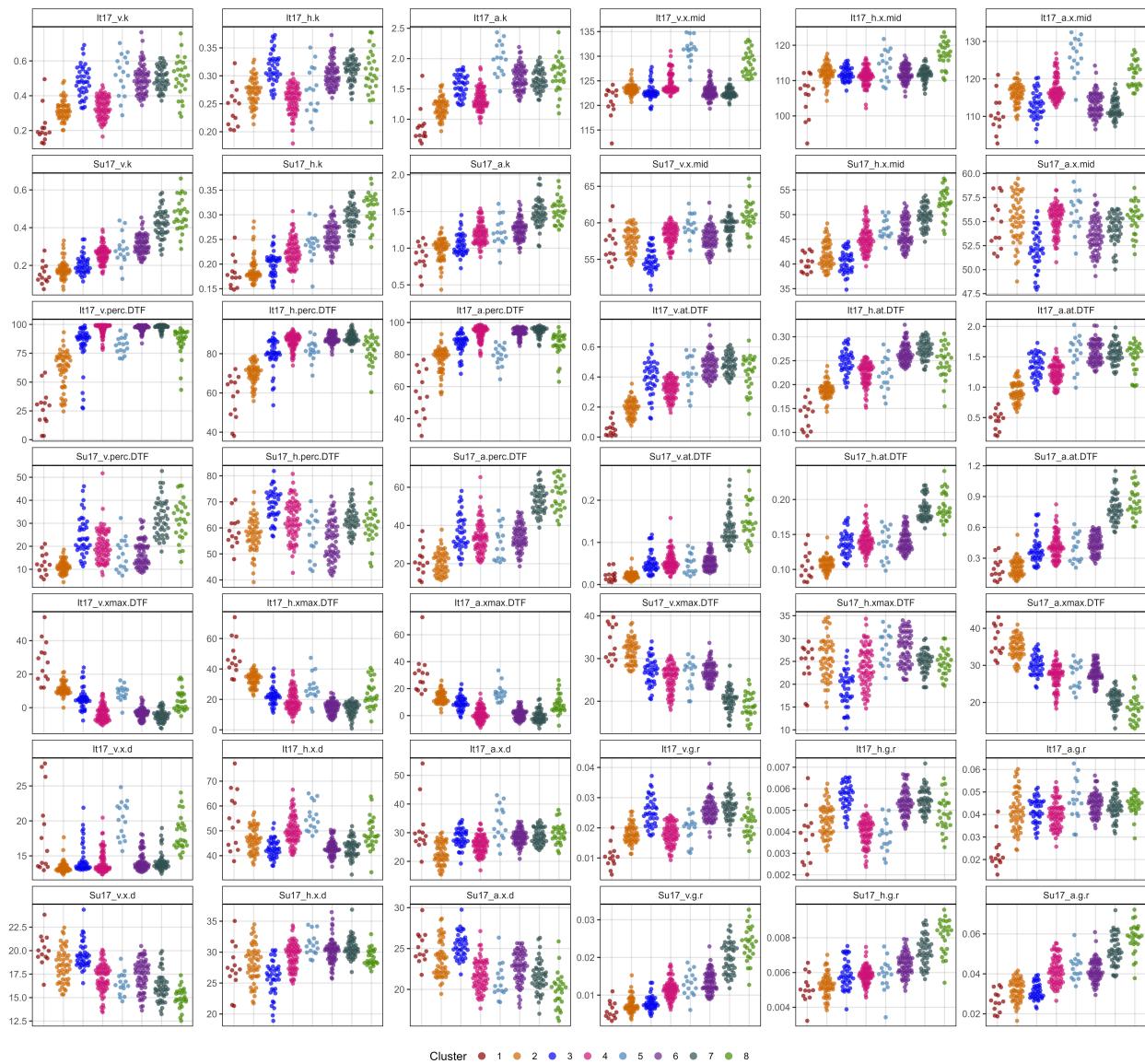


Component Genetic G x E Rep:Env Residual + Env

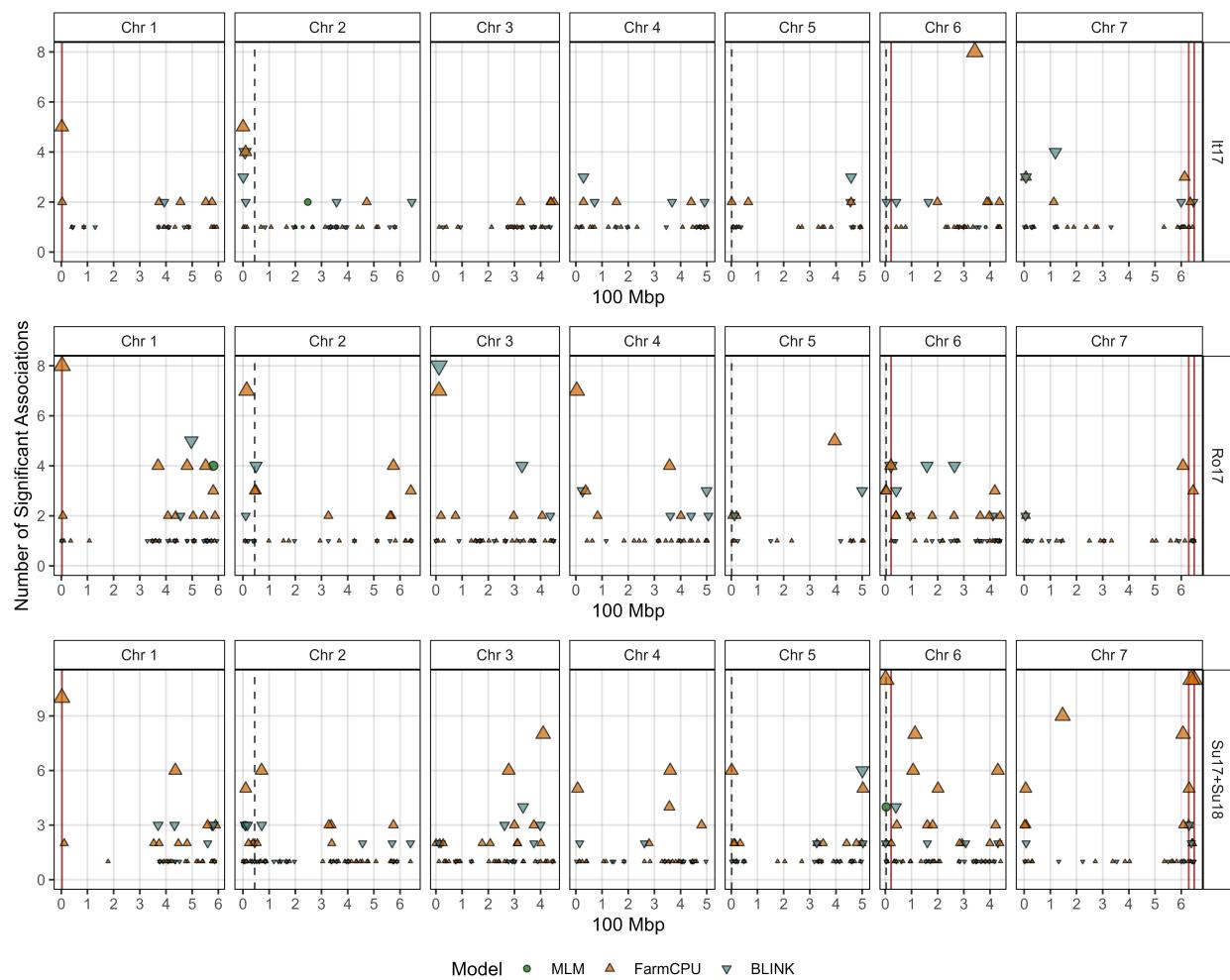
Supplemental Figure 4



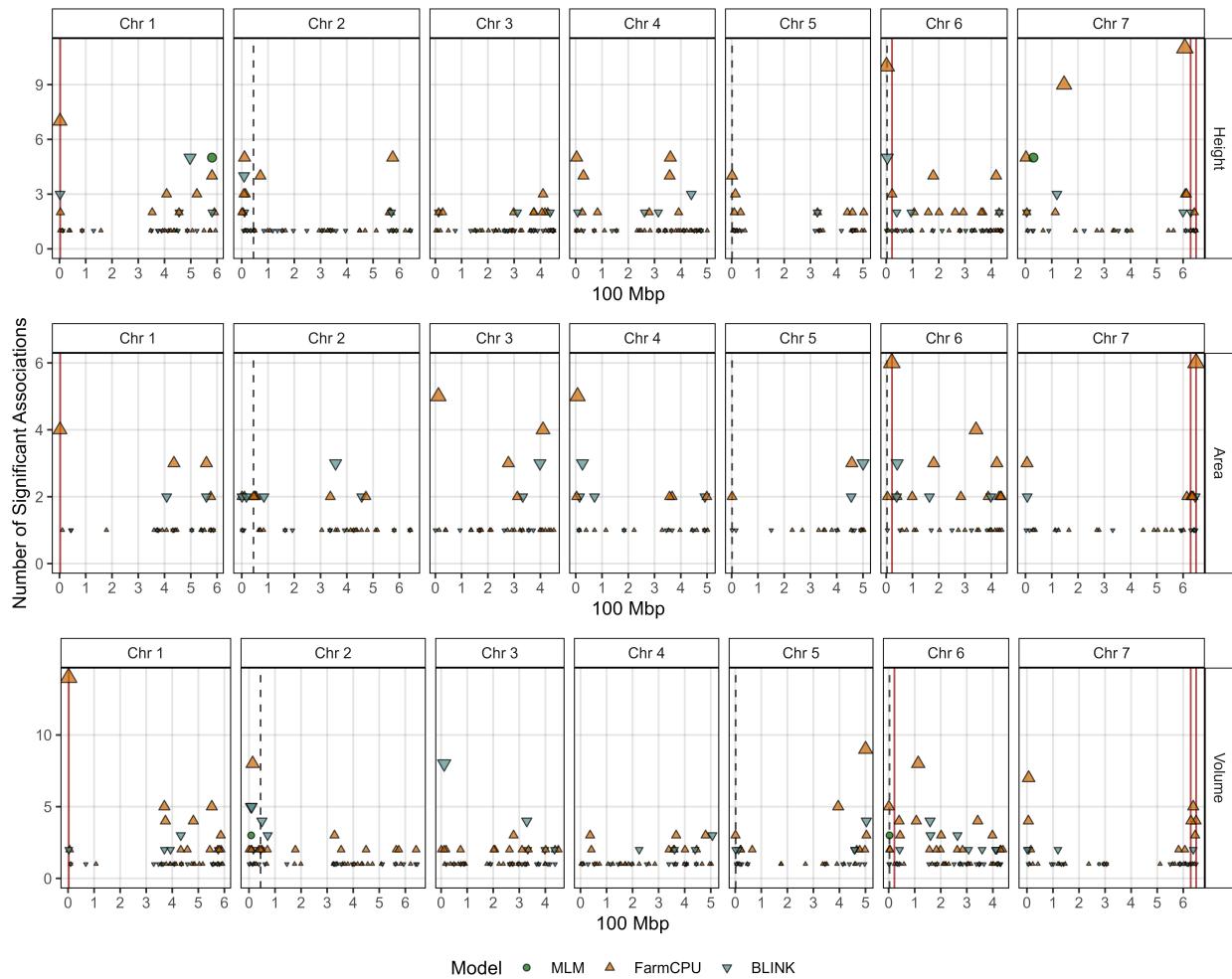
Supplemental Figure 5



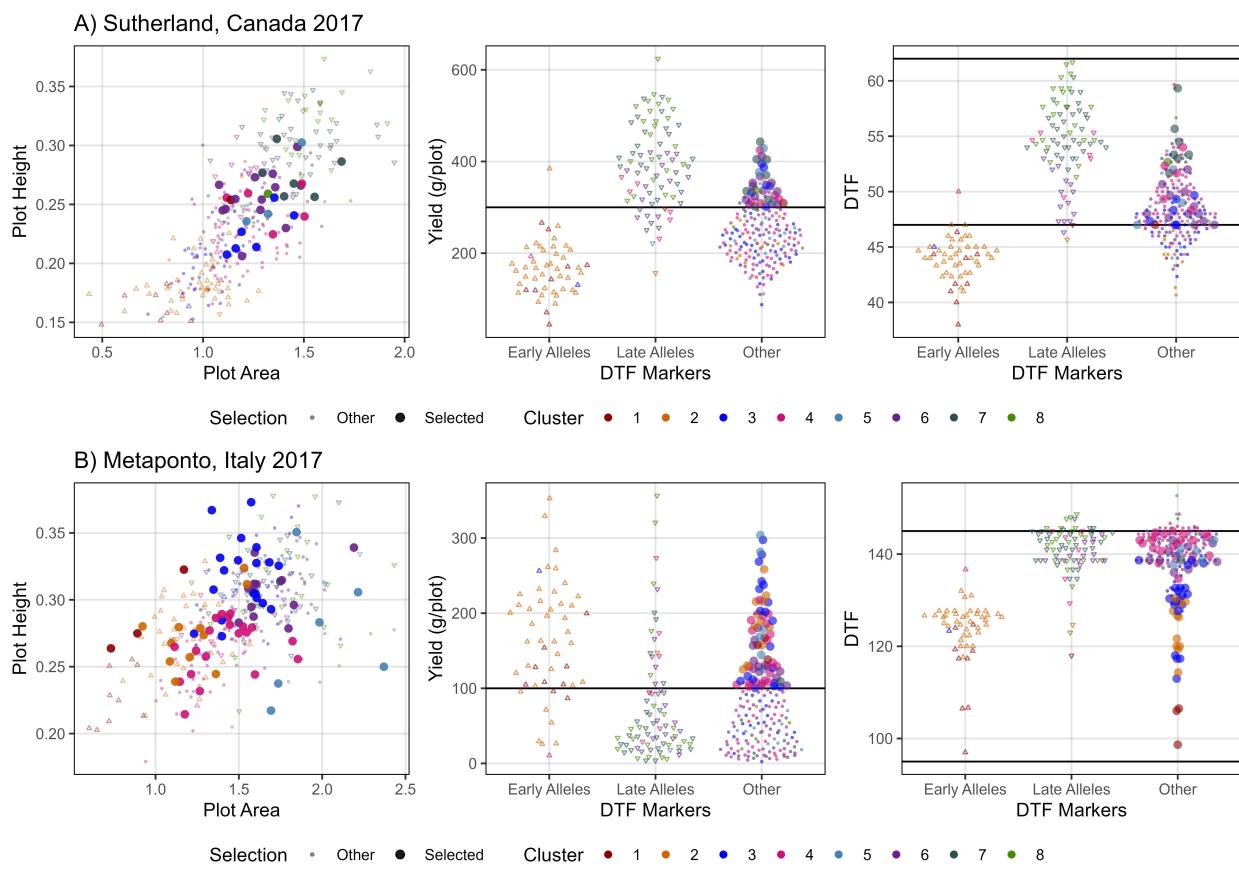
Supplemental Figure 6



Supplemental Figure 7



Supplemental Figure 8



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