

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unpublished

Derek Michael Wright derek.wright@usask.ca

01-08-2024

## Contents

<b>Contents</b>	<b>2</b>
<b>AGILE &amp; P<sup>2</sup>IRC Projects</b>	<b>3</b>
Collaborators . . . . .	3
<b>Raw Data &amp; Growth Curve Modeling</b>	<b>3</b>
Metaponto, Italy 2017 . . . . .	3
Rosthern, Canada 2017 . . . . .	5
Sutherland, Canada 2017 . . . . .	6
Sutherland, Canada 2018 . . . . .	8
<b>Figures</b>	<b>9</b>
Figure 1 . . . . .	9
Figure 2 . . . . .	10
Figure 3 . . . . .	11
Figure 4 . . . . .	12
Figure 5 . . . . .	13
Figure 6 . . . . .	13
Figure 7 . . . . .	14
Figure 8 . . . . .	15
<b>Supplemental Tables</b>	<b>15</b>
Supplemental Table 1 . . . . .	15

<b>Supplemental Figures</b>	<b>16</b>
Supplemental Figure 1 . . . . .	16
Supplemental Figure 2 . . . . .	17
Supplemental Figure 3 . . . . .	18
Supplemental Figure 4 . . . . .	19
Supplemental Figure 5 . . . . .	20
Supplemental Figure 6 . . . . .	21
Supplemental Figure 7 . . . . .	22
Supplemental Figure 8 . . . . .	23

---

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lentil crop growth in contrasting environments using digital imaging and genome-wide association studies.** *unpublished.* (2024) 00: 1-10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)

## Contents

- Raw Data & Growth Curve Modeling
- Figures
- Supplemental Tables
- Supplemental Figures
- Additional Figures

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



APPLICATION OF GENOMICS  
TO INNOVATION IN THE LENTIL ECONOMY



### Collaborators

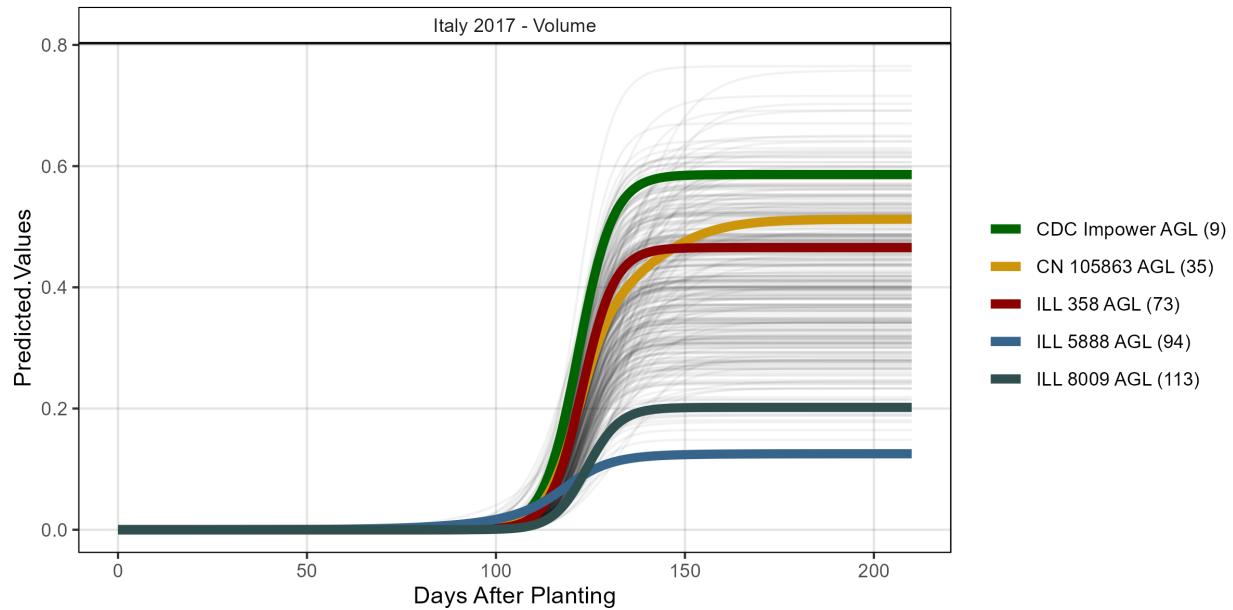
- Department of Plant Sciences and Crop Development Centre, University of Saskatchewan, Saskatoon, Saskatchewan, Canada
  - School of Agriculture, Forestry, Food and Environmental Sciences, University of Basilicata, Potenza, Italy
- 

### Raw Data & Growth Curve Modeling

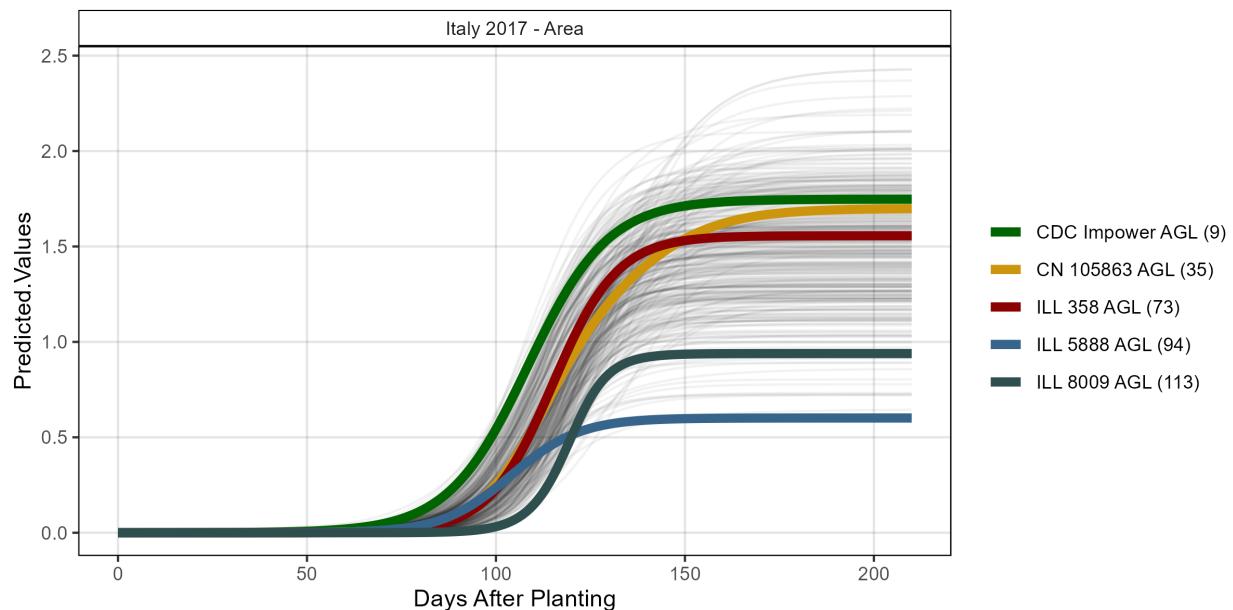
- Additional/ggDroneCheck\_It17.pdf
  - Additional/ggDroneCheck\_Ro17.pdf
  - Additional/ggDroneCheck\_Su17.pdf
  - Additional/ggDroneCheck\_Su18.pdf
- 

### Metaponto, Italy 2017

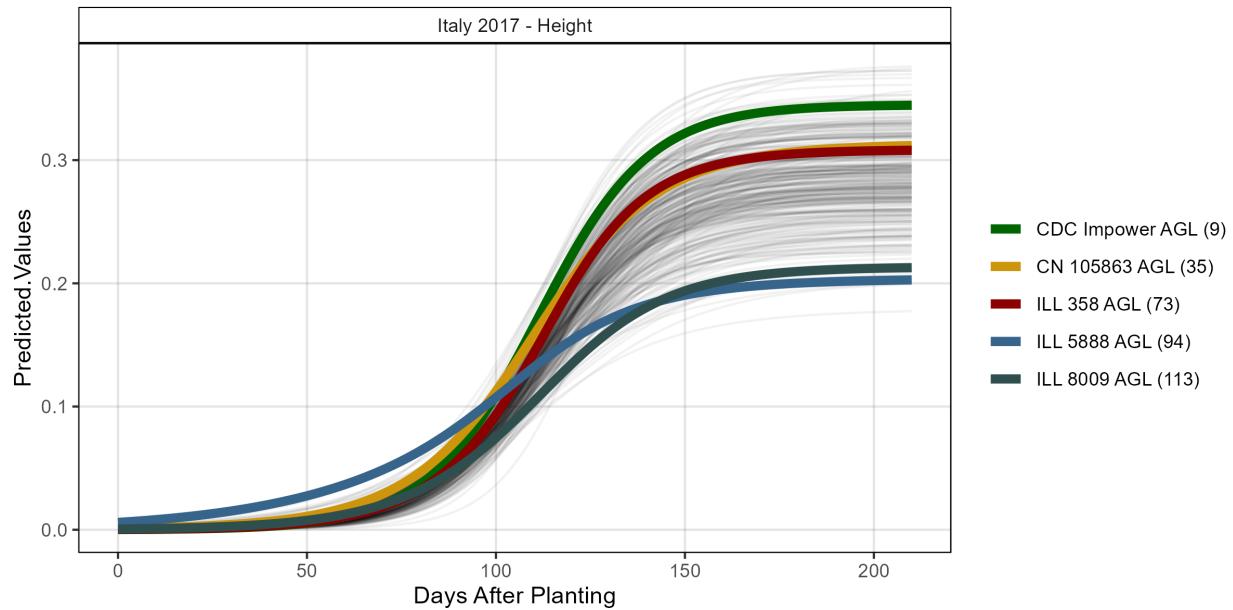
- Additional/ggpGrowthCurves\_It17\_volume.html



- Additional/ggpGrowthCurves\_It17\_area.html

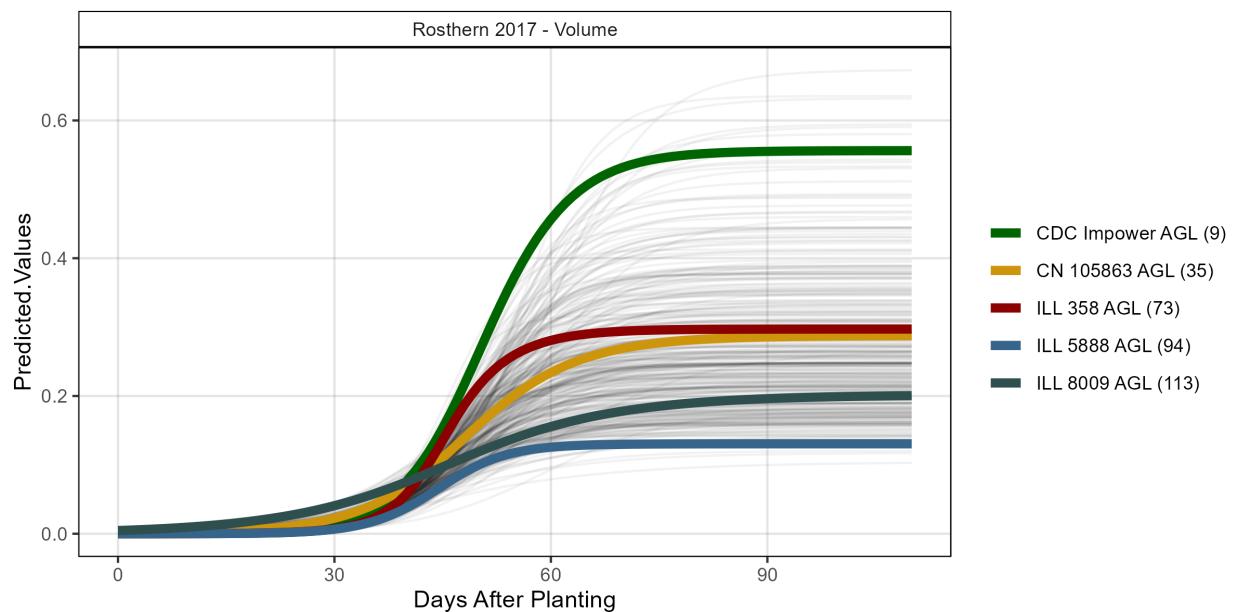


- Additional/ggpGrowthCurves\_It17\_height.html

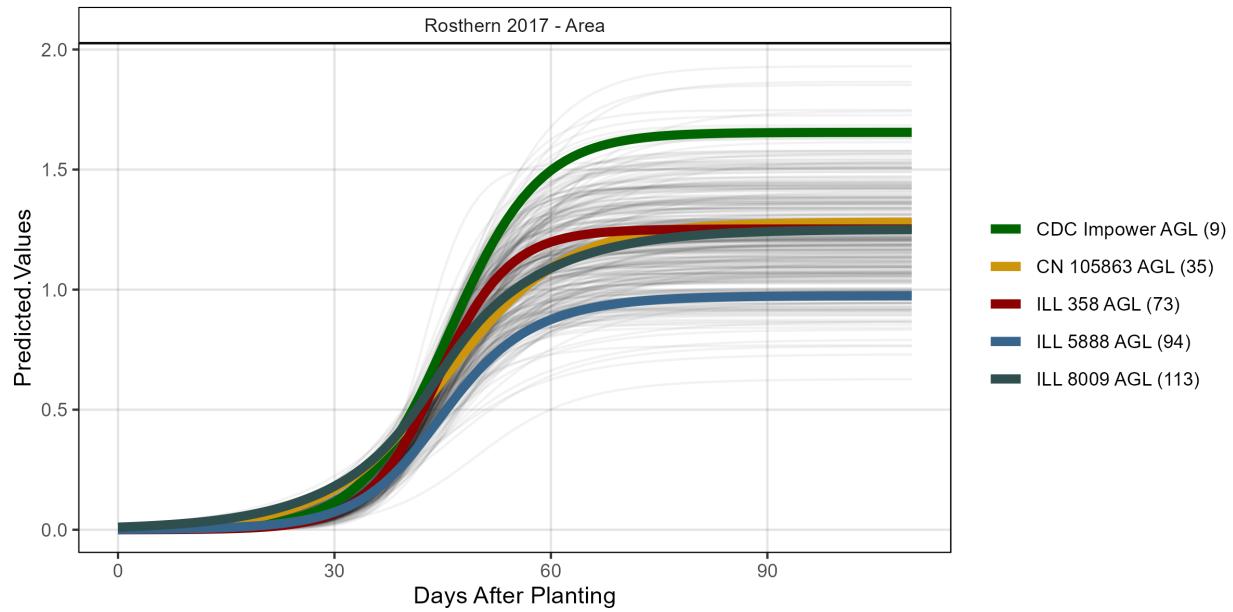


## Rosthern, Canada 2017

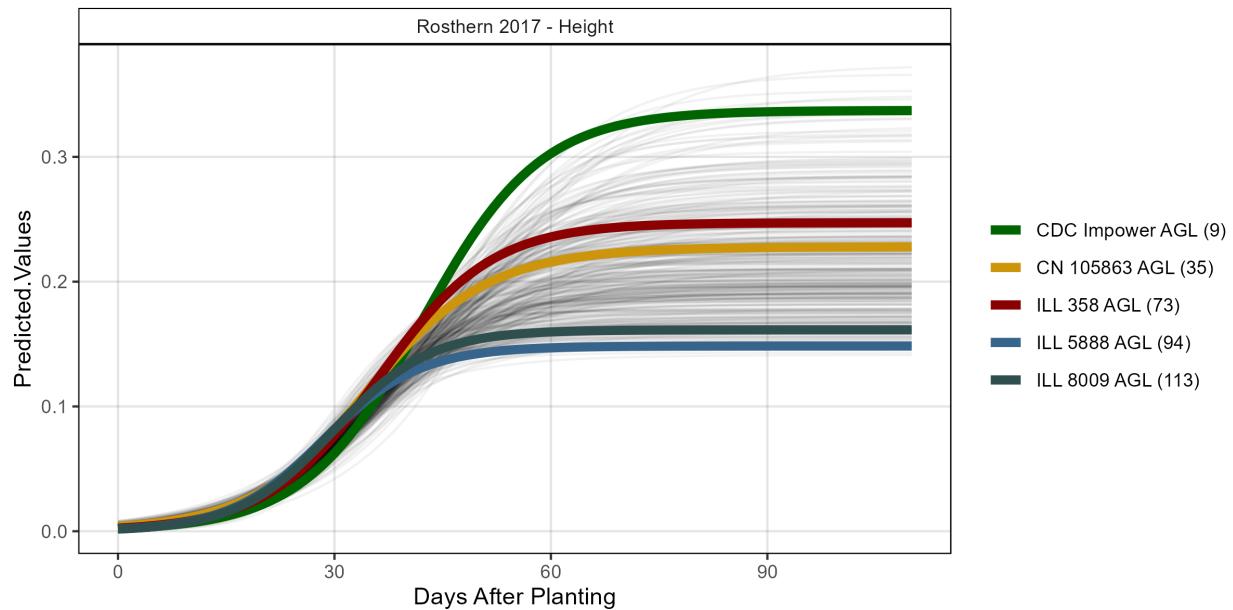
- Additional/ggpGrowthCurves\_Ro17\_volume.html



- Additional/ggpGrowthCurves\_Ro17\_area.html

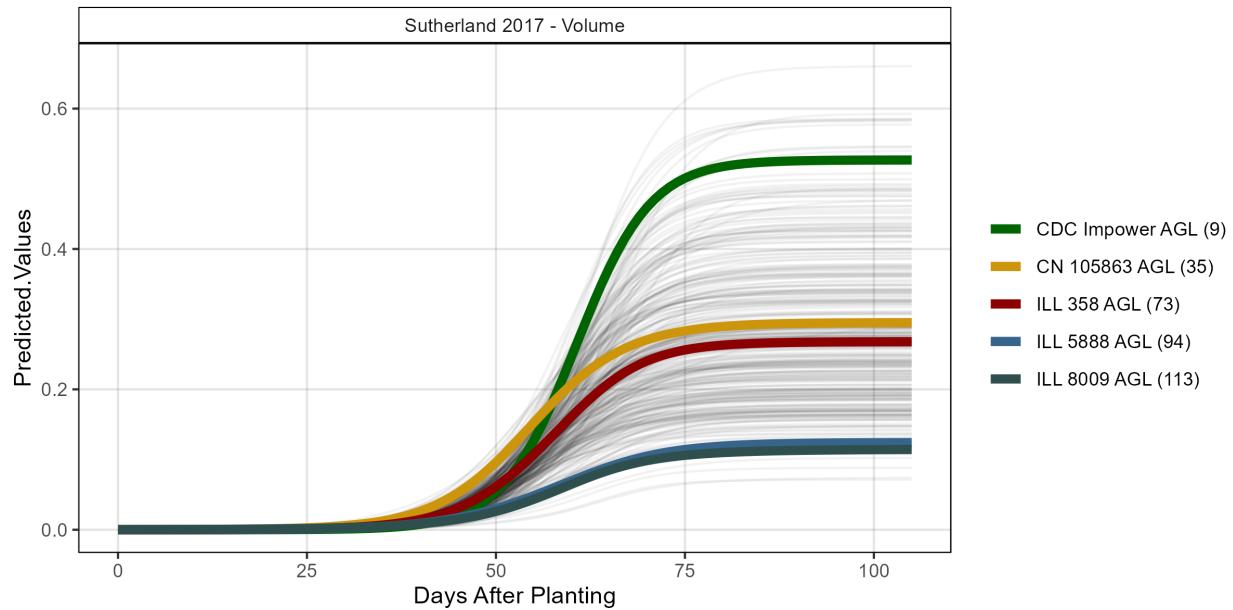


- Additional/ggpGrowthCurves\_Ro17\_height.html

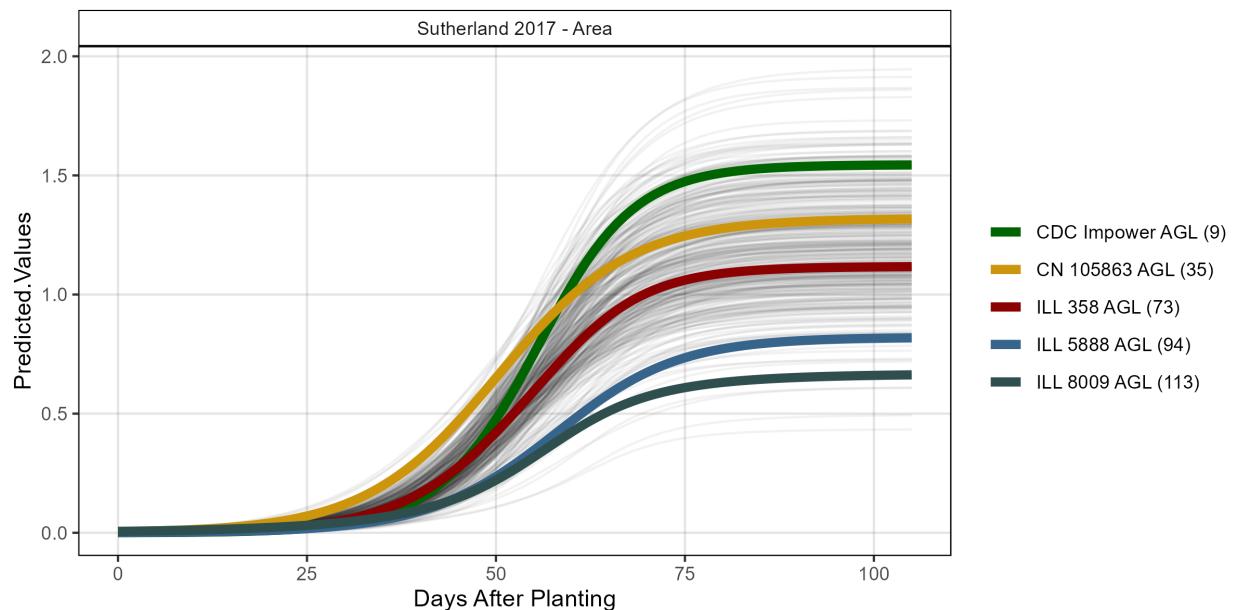


## Sutherland, Canada 2017

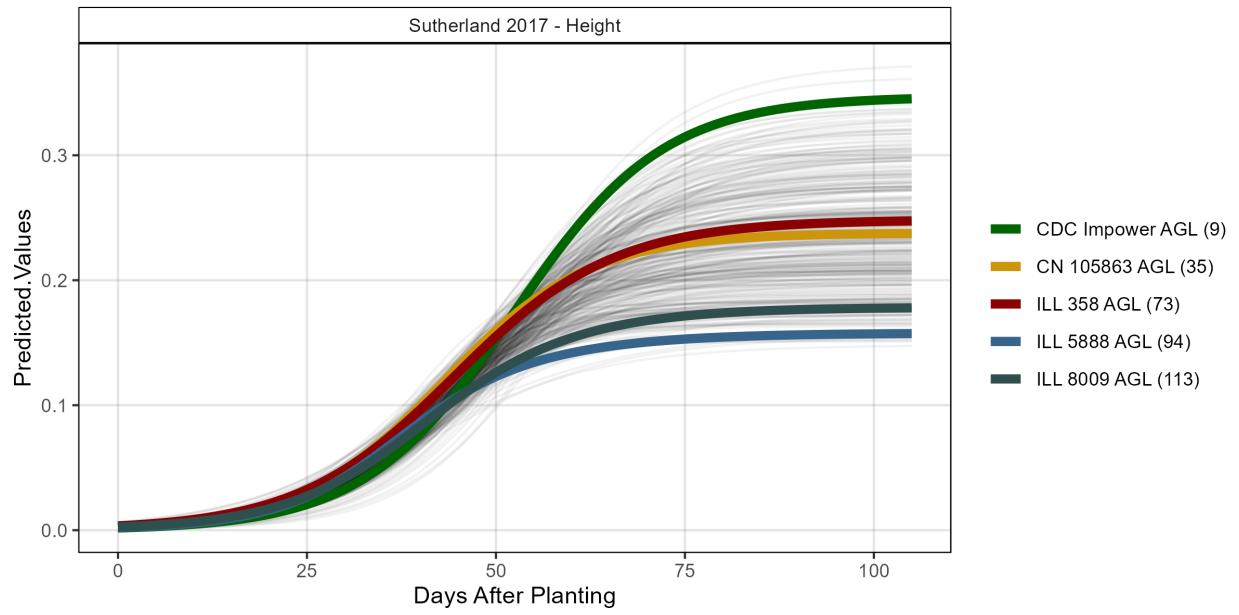
[Additional/ggpGrowthCurves\\_Su17\\_volume.html](#)



[Additional/ggpGrowthCurves\\_Su17\\_area.html](#)



[Additional/ggpGrowthCurves\\_Su17\\_height.html](#)

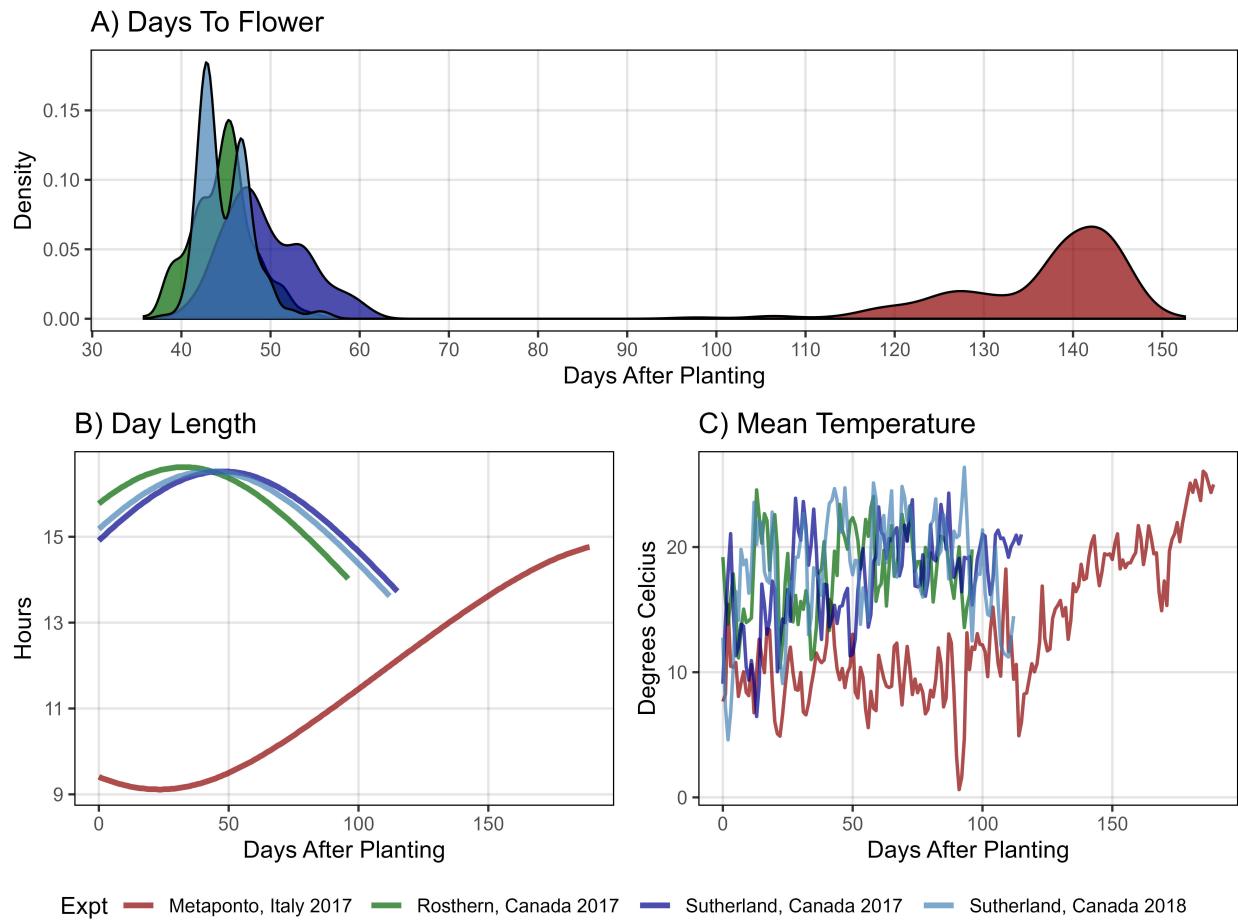


Sutherland, Canada 2018

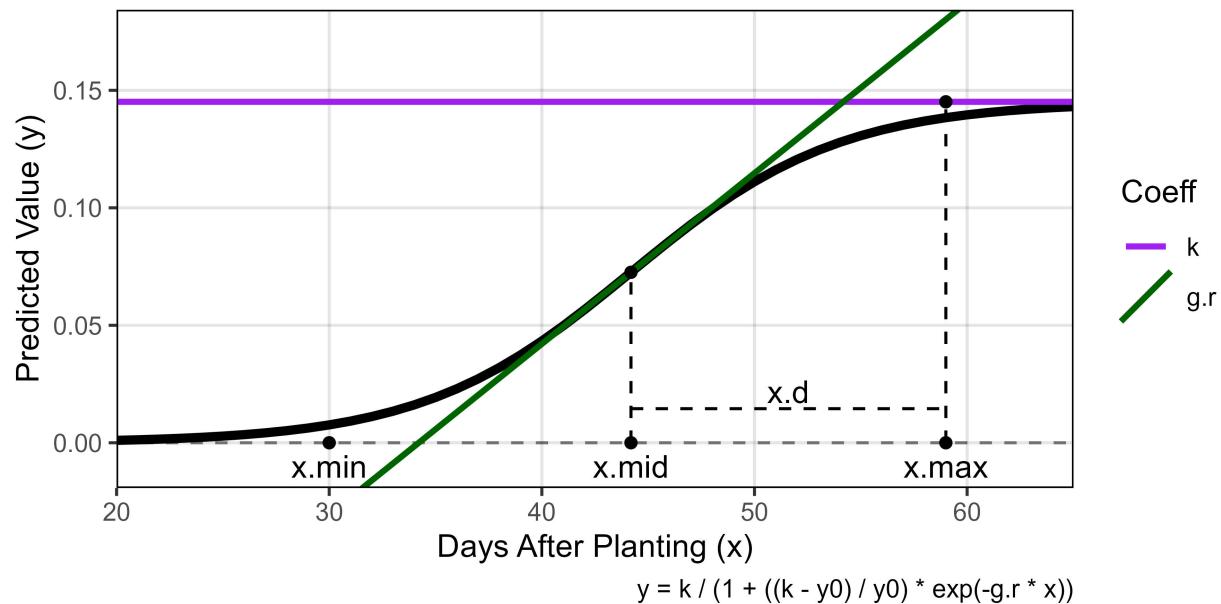
---

## Figures

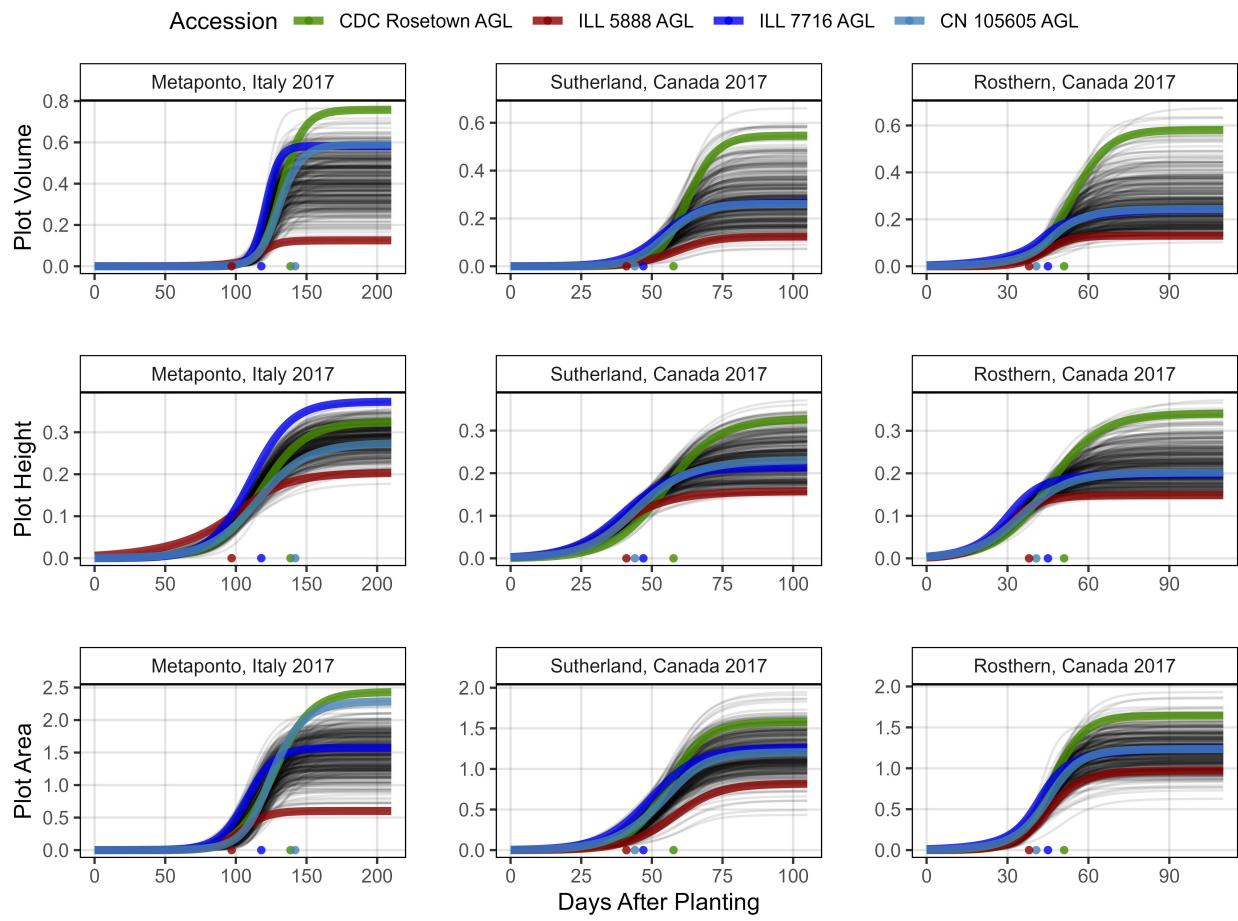
Figure 1



**Figure 2**



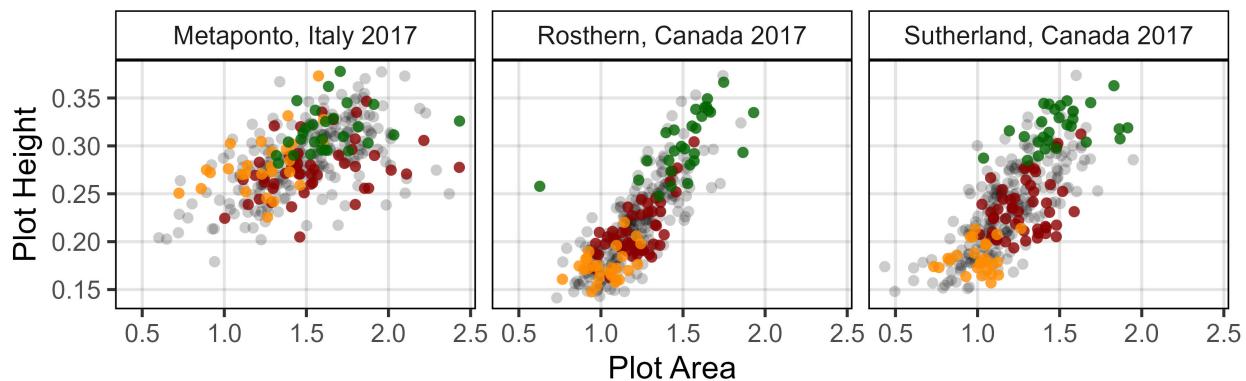
**Figure 3**



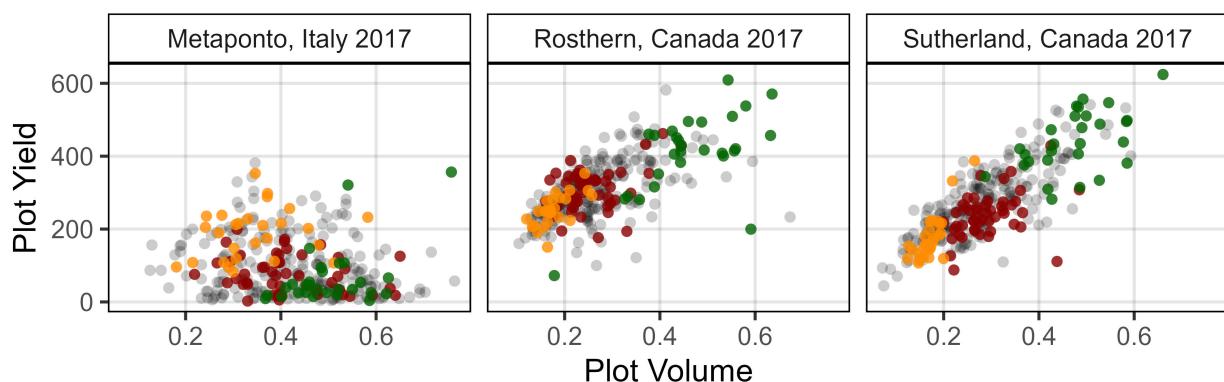
**Figure 4**

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

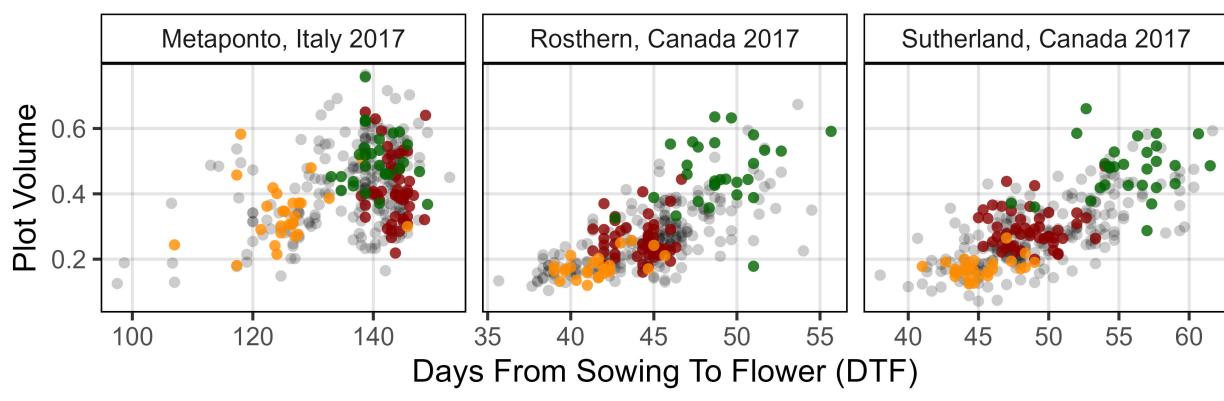
### A) Height x Area



### B) Yield x Volume

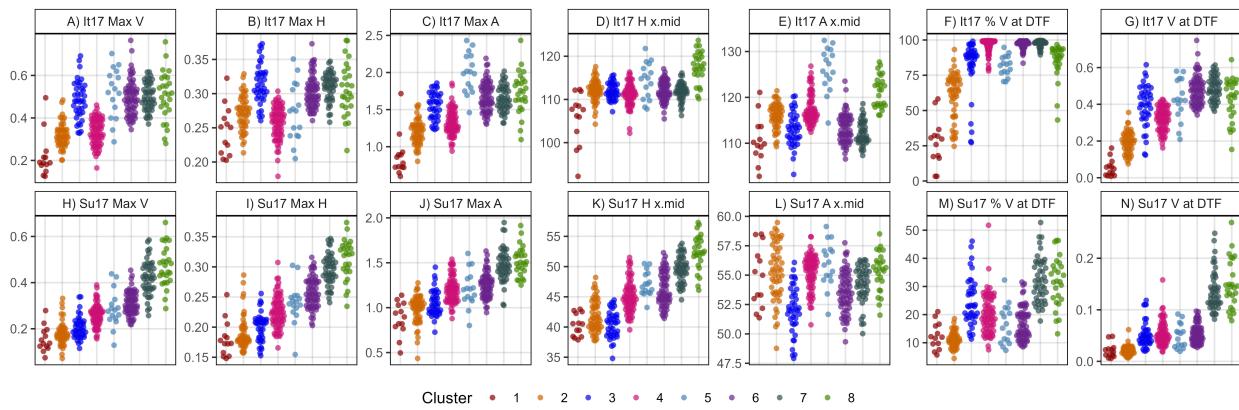


### C) Volume x DTF

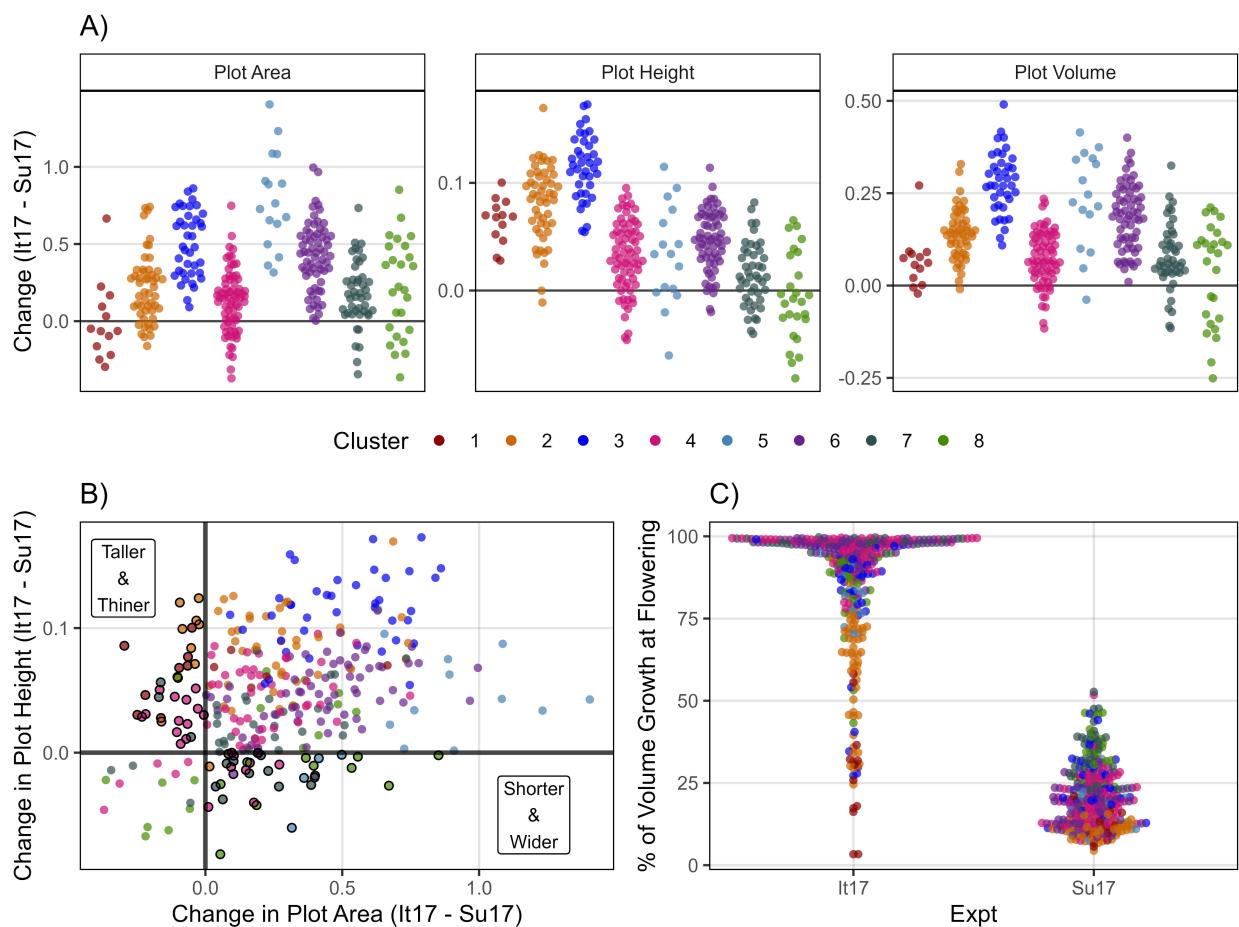


Accession Origin      ● Canada      ● India      ● Iran      ● Other

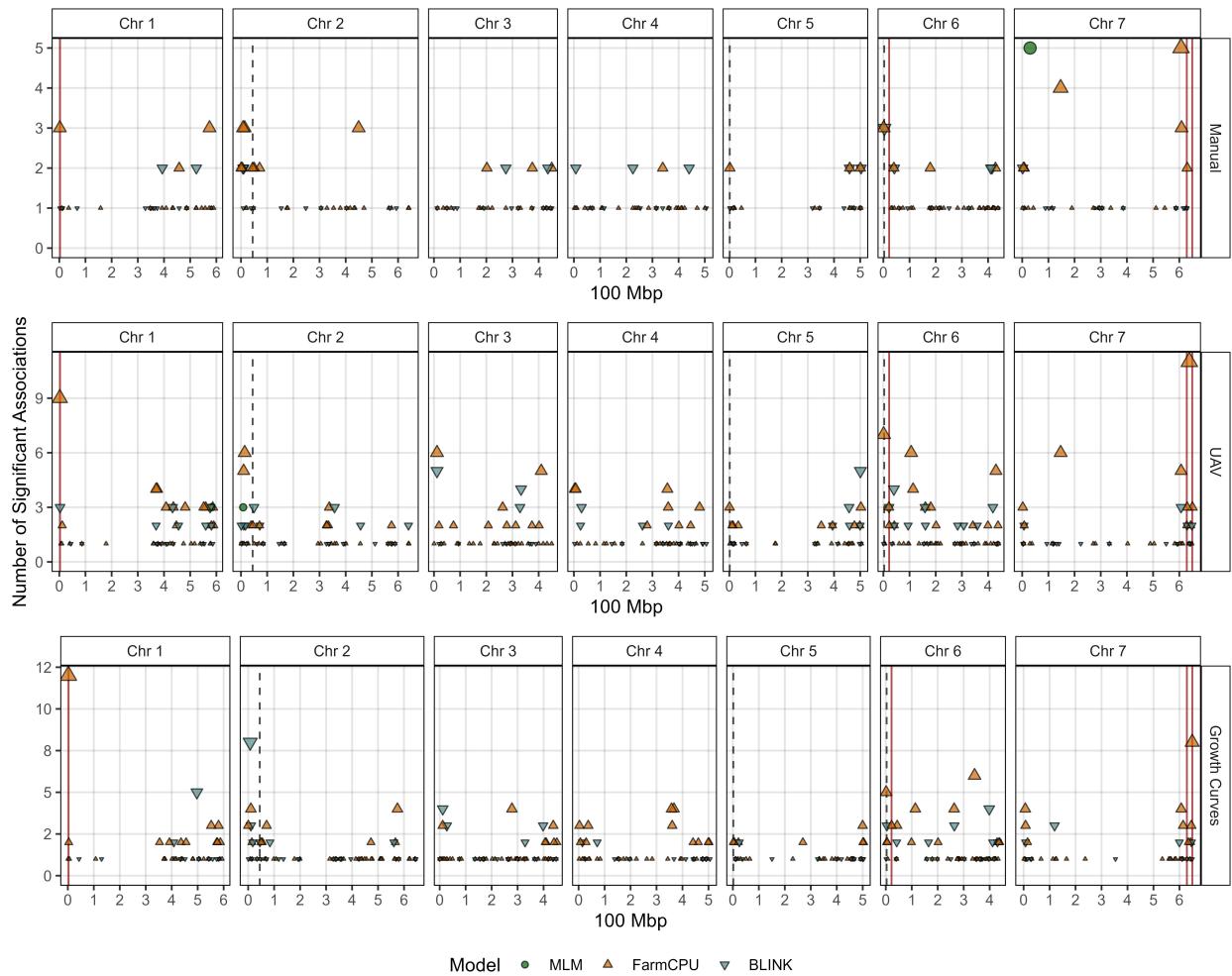
**Figure 5**



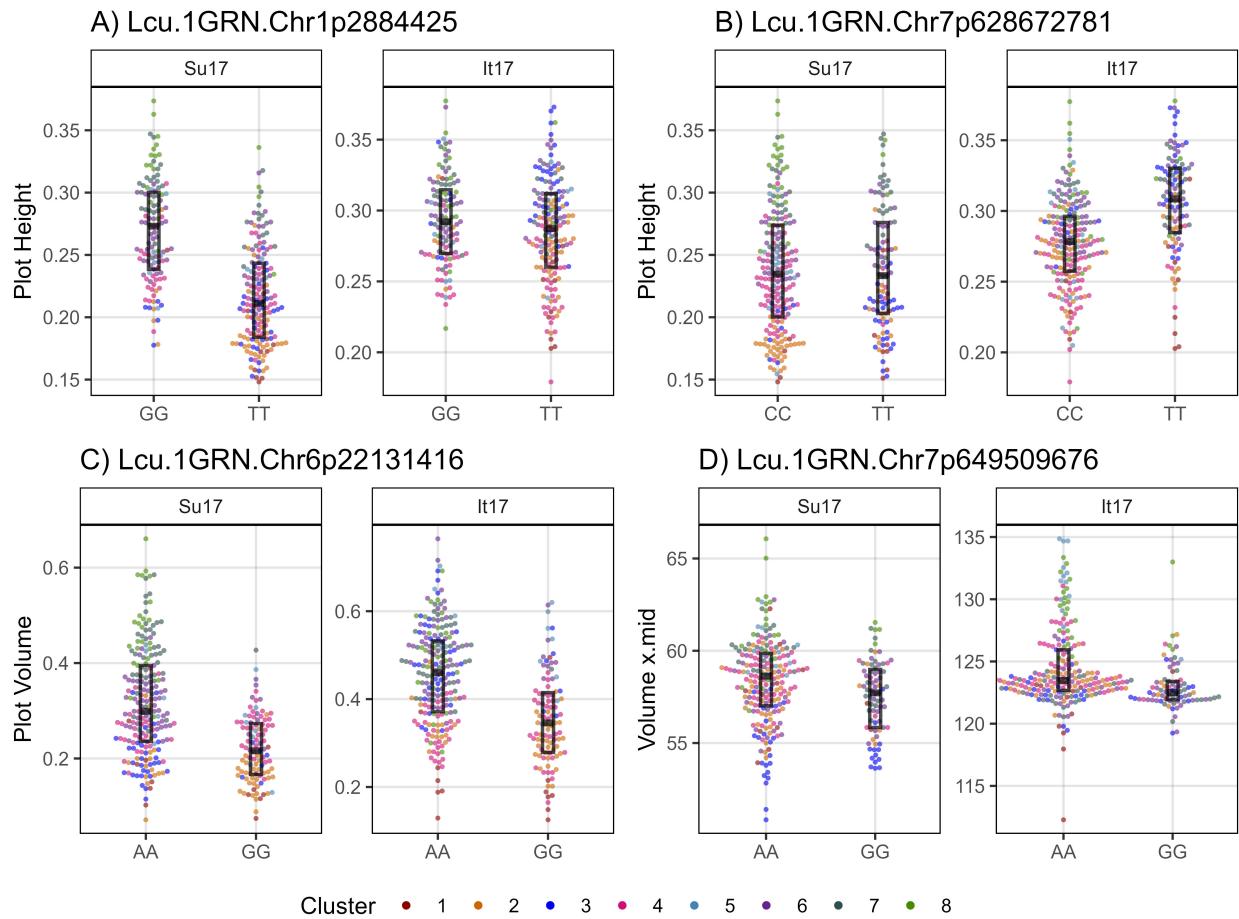
**Figure 6**



**Figure 7**



**Figure 8**



## Supplemental Tables

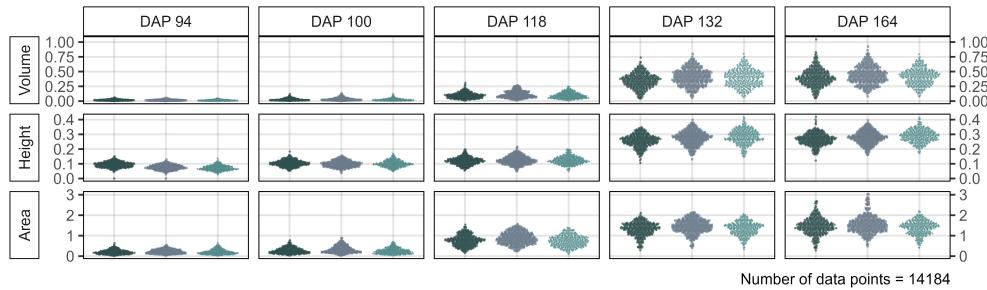
### Supplemental Table 1

- Supplemental\_Table\_01.csv

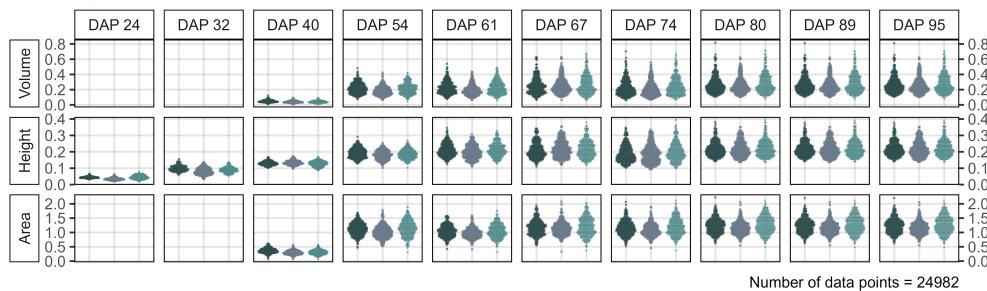
## Supplemental Figures

### Supplemental Figure 1

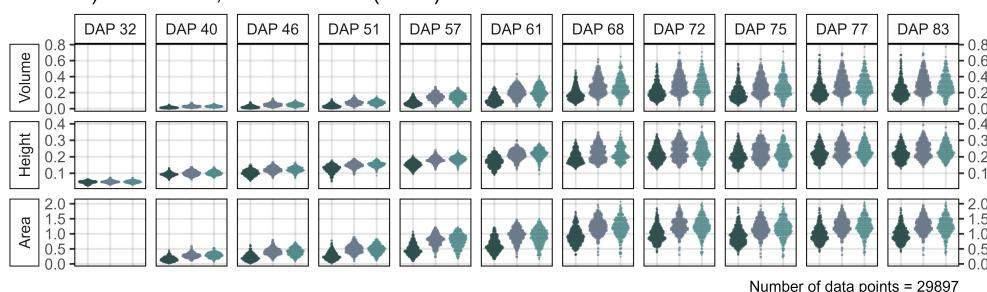
A) Metaponto, Italy 2017 (It17)



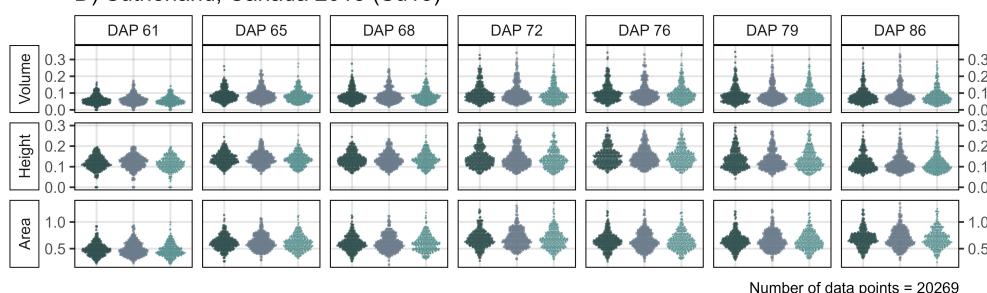
B) Rosthern, Canada 2017 (Ro17)



C) Sutherland, Canada 2017 (Su17)



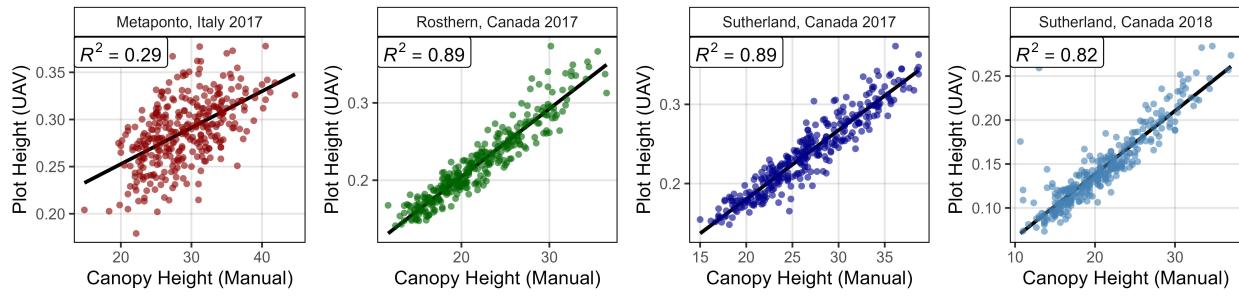
D) Sutherland, Canada 2018 (Su18)



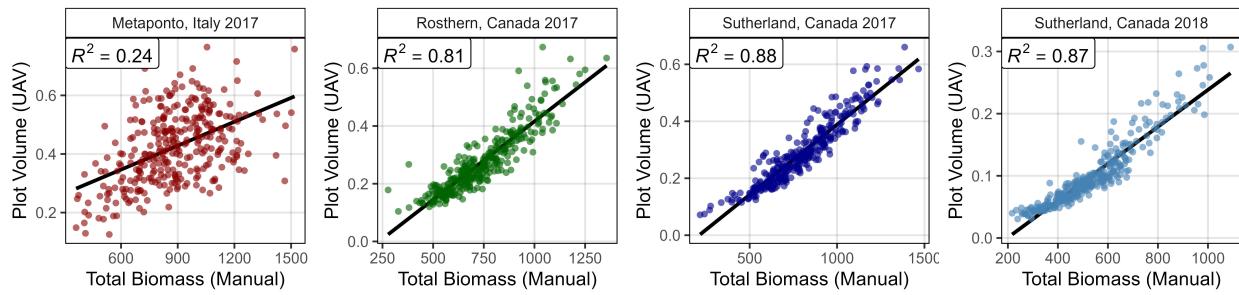
Rep ● 1 ■ 2 ♦ 3

## Supplemental Figure 2

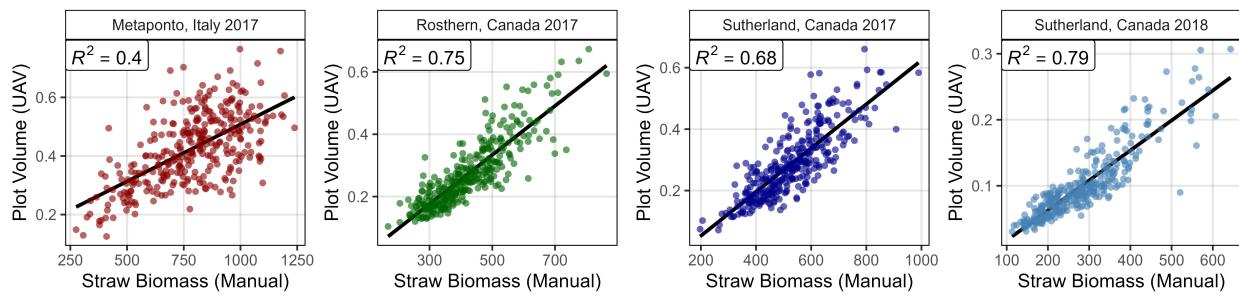
A) Plot Height (UAV) x Canopy Height (Manual)



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

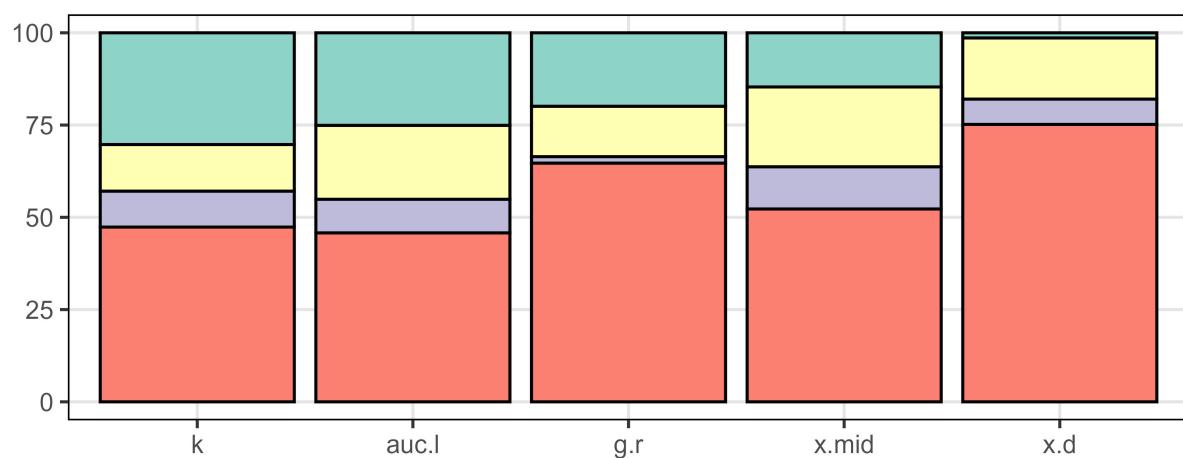


C) Plot Volume (UAV) x Straw Biomass (Manual)

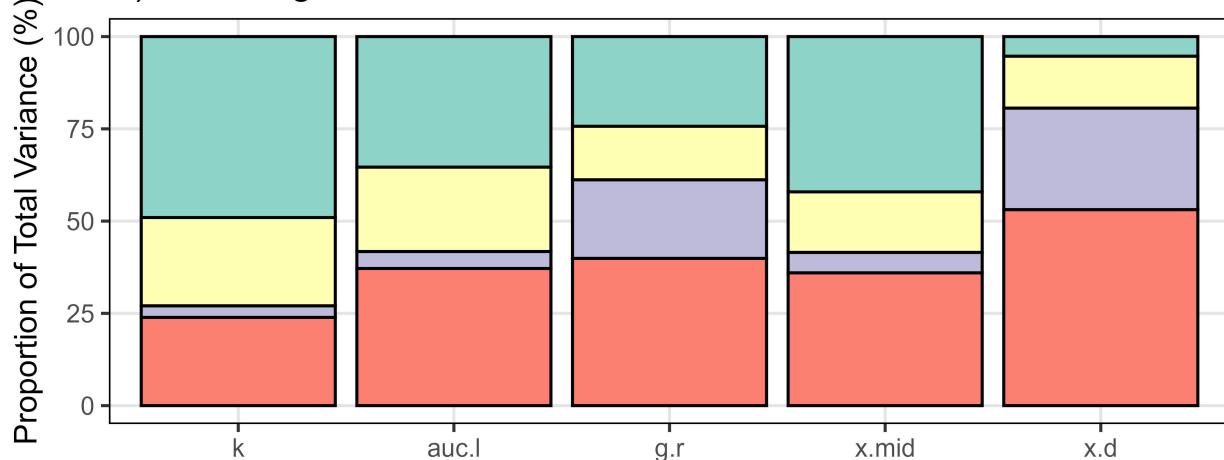


Supplemental Figure 3

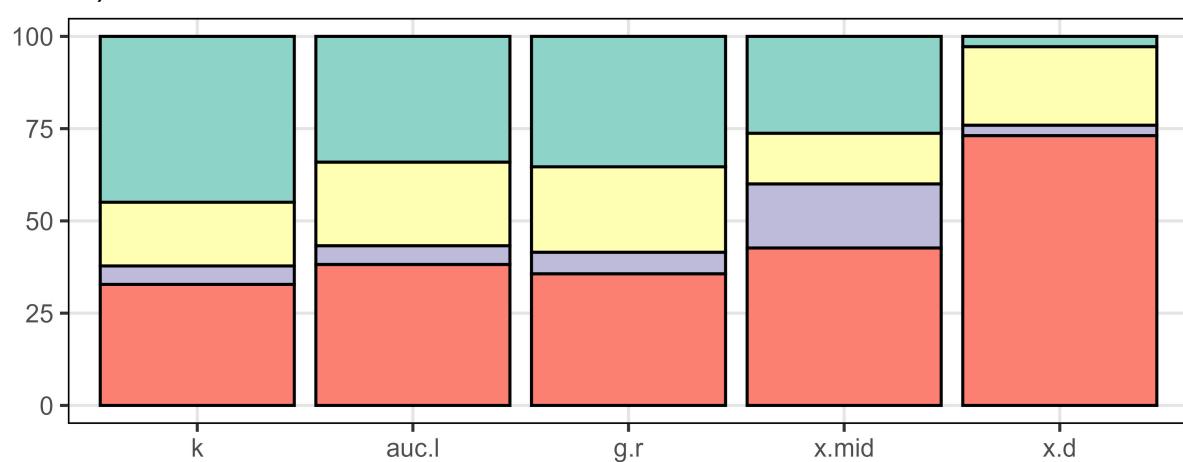
A) Plot Area Growth Curve Coefficients



B) Plot Height Growth Curve Coefficients

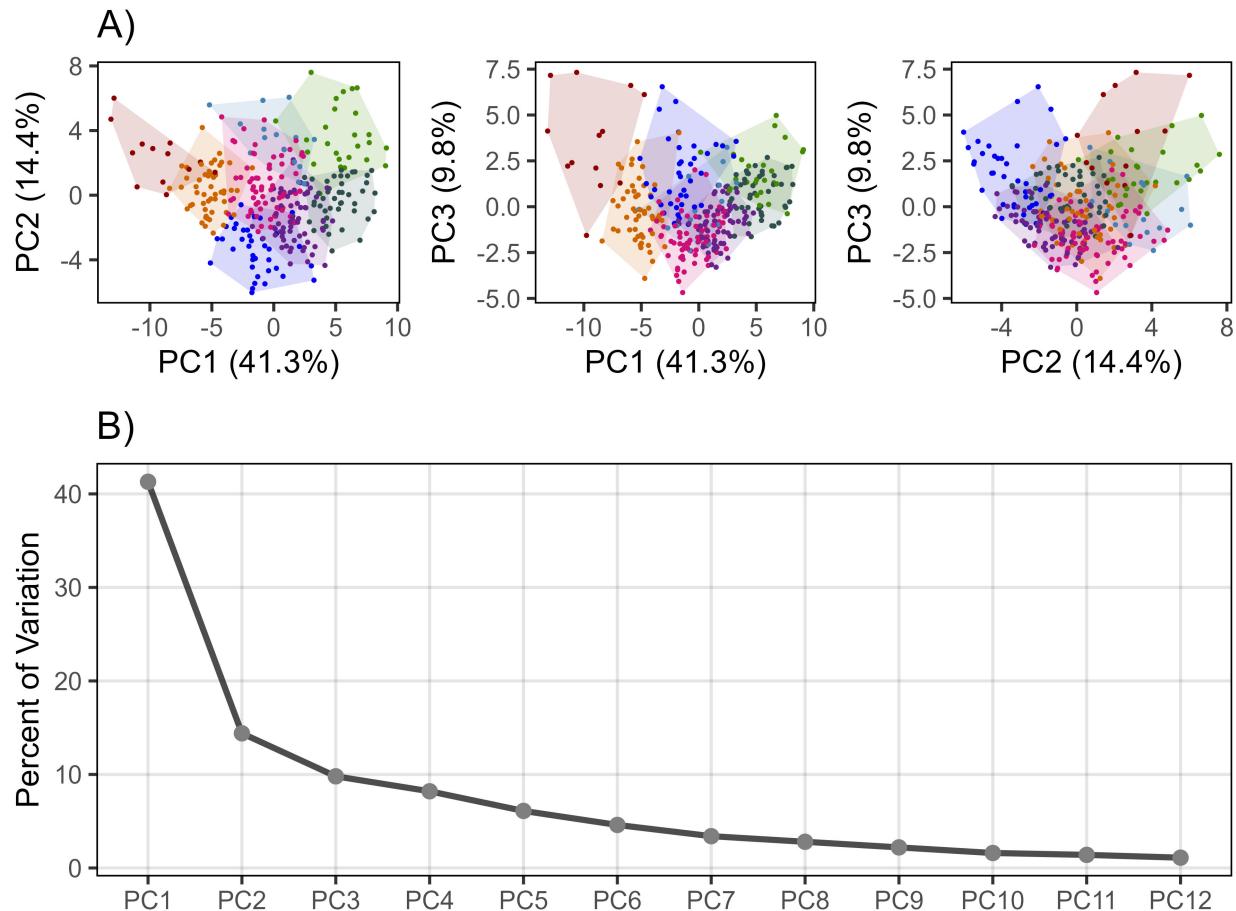


C) Plot Volume Growth Curve Coefficients

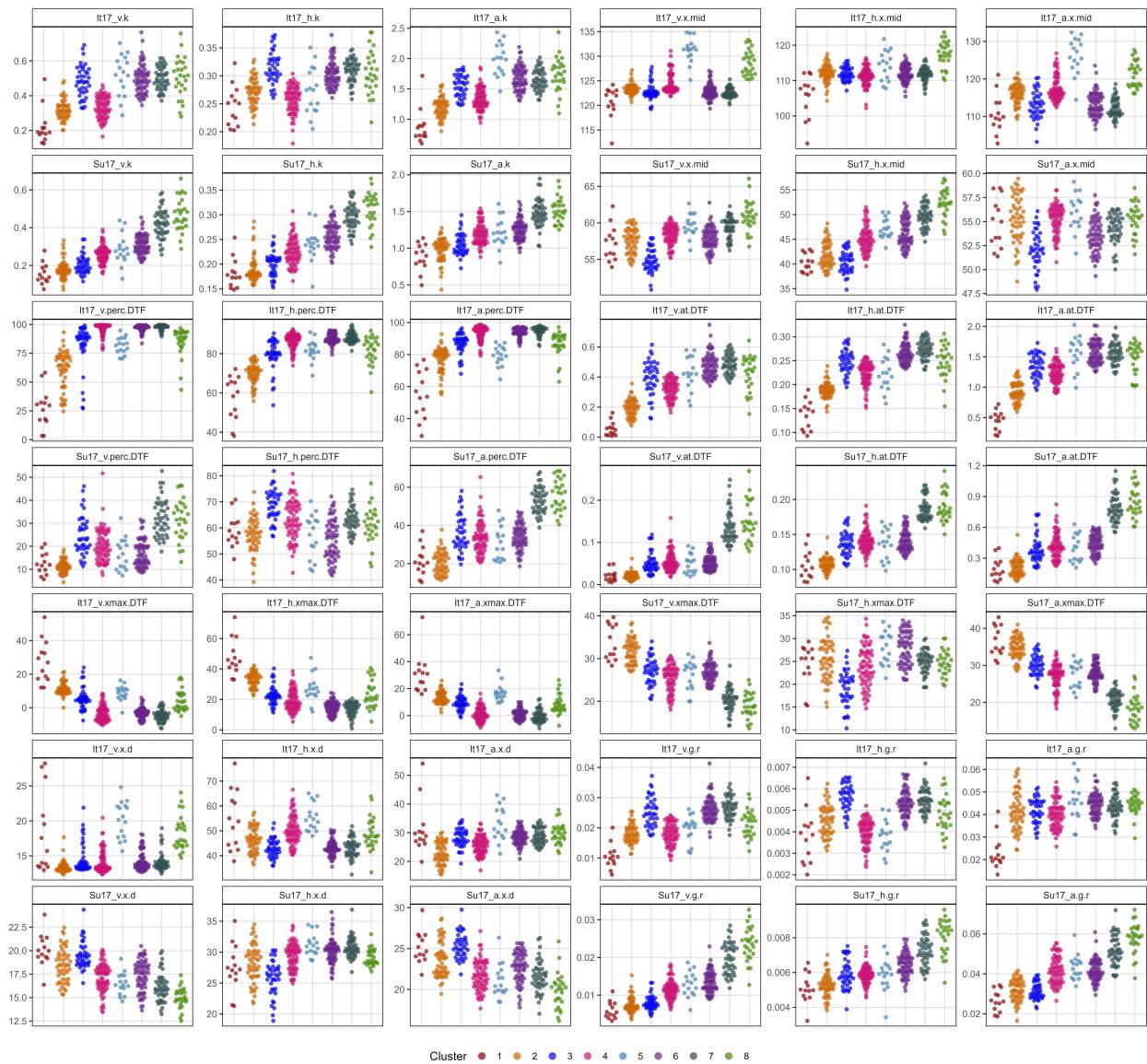


Component    Genetic    G x E    Rep:Env    Residual + Env

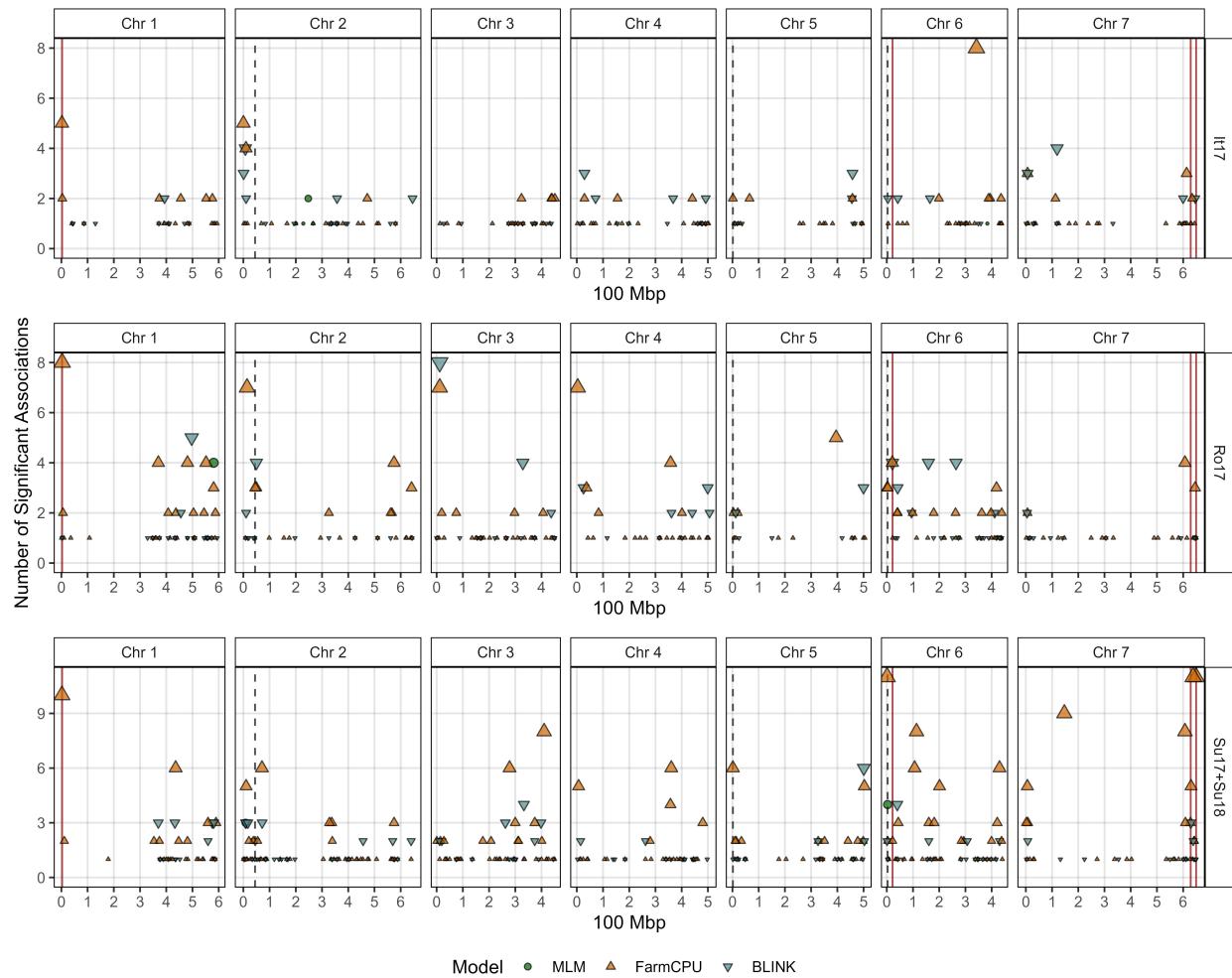
Supplemental Figure 4



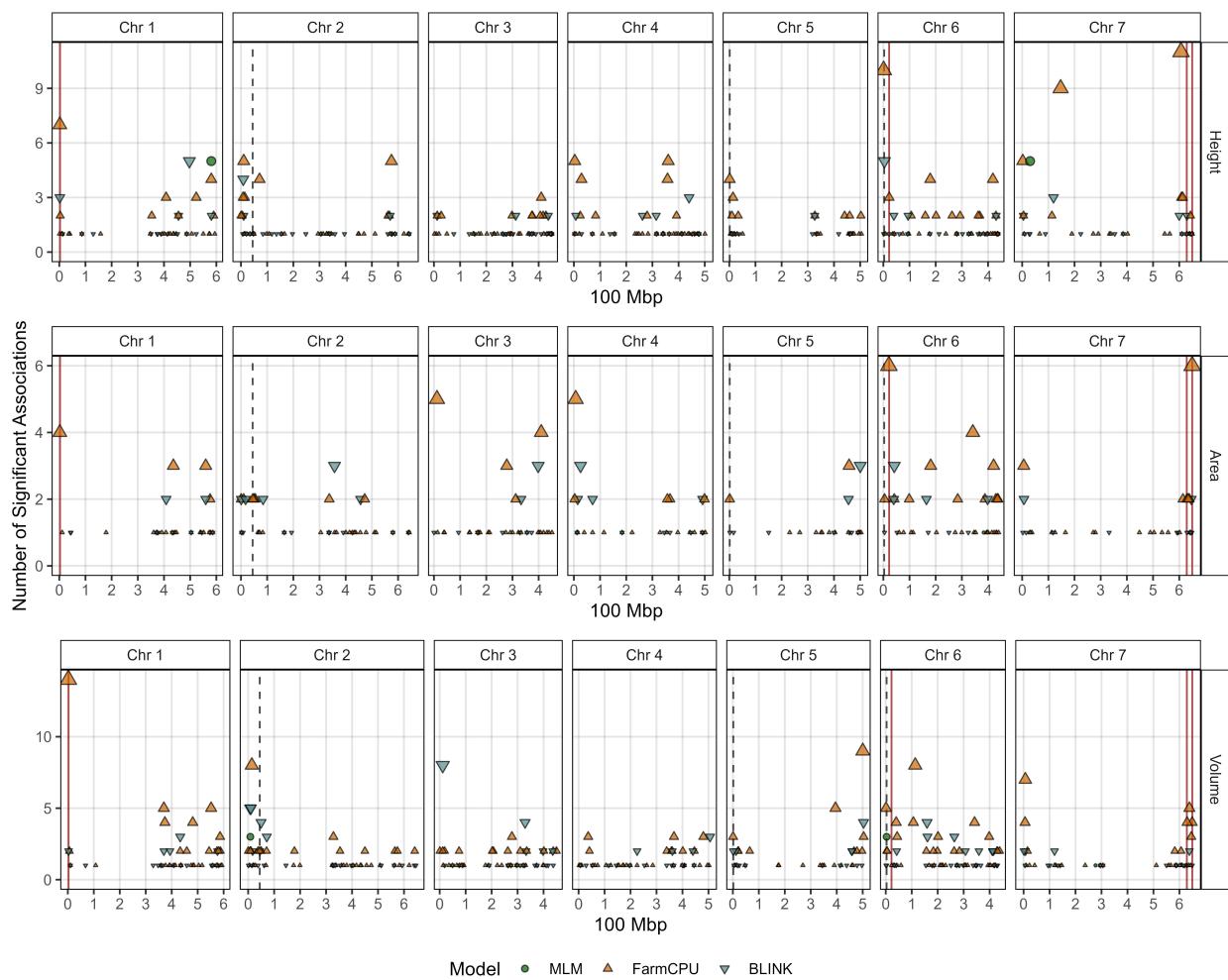
**Supplemental Figure 5**



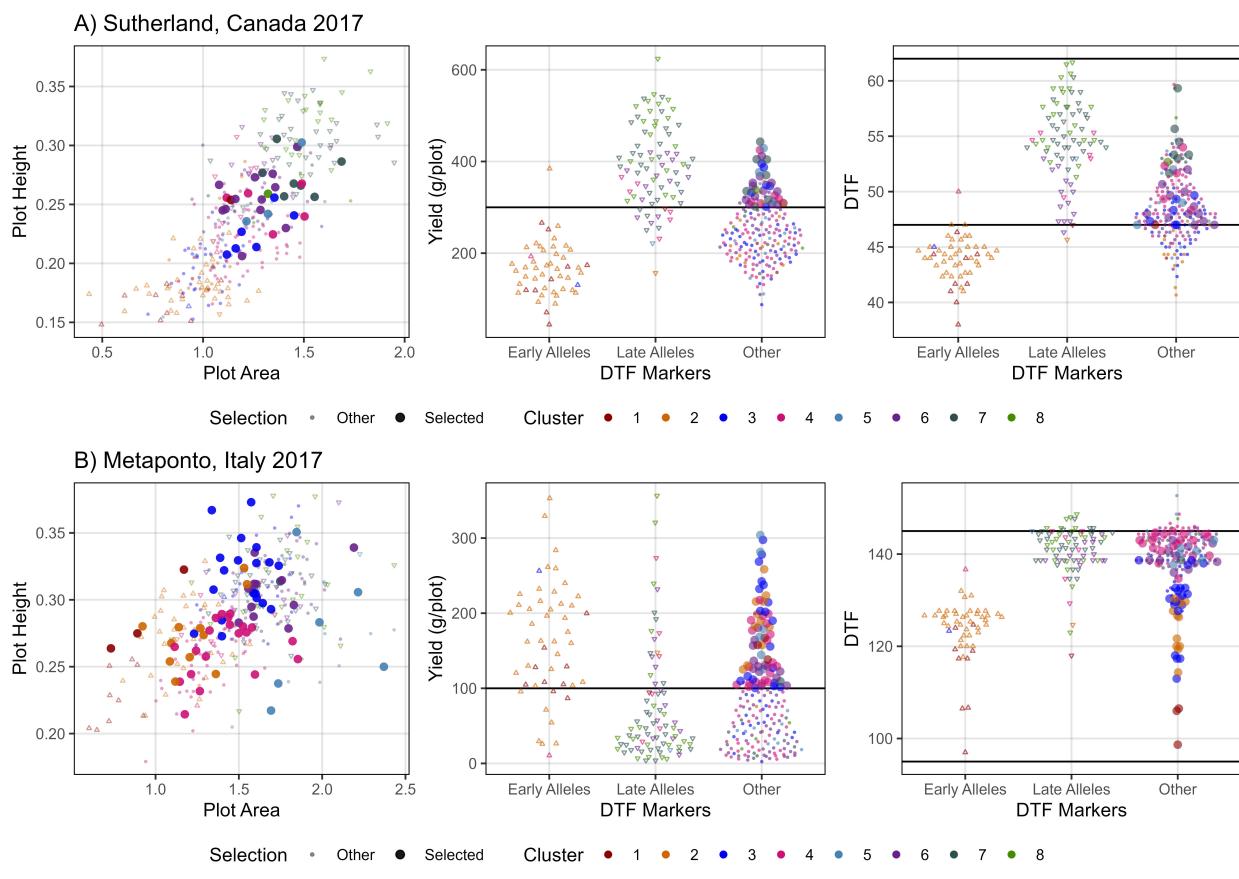
**Supplemental Figure 6**



**Supplemental Figure 7**



## Supplemental Figure 8



© Derek Michael Wright