

Smart Lab SCRI-Alternaria-Broccoli

Objective 1: survey, speciation, host-pathogenicity



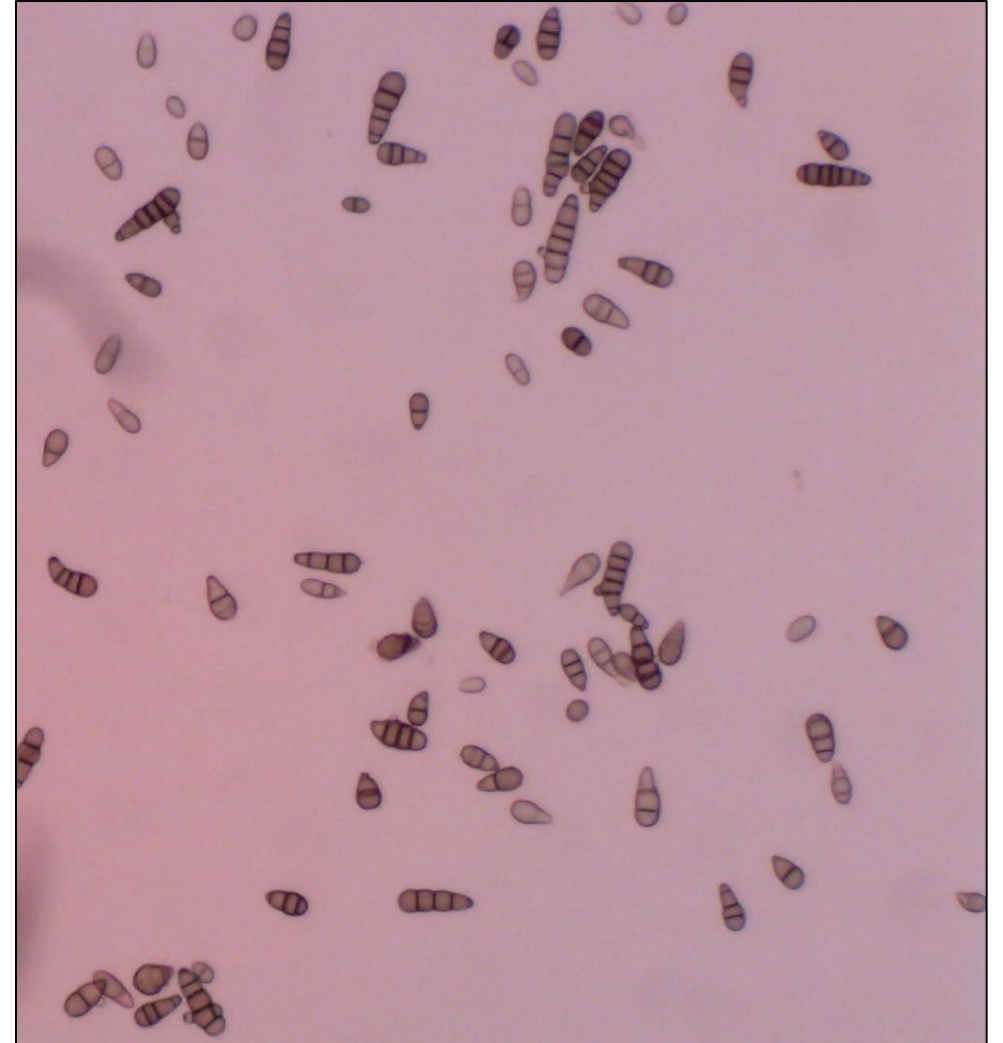
Field surveys and pathogen isolation

- Collected diseased broccoli samples
 - 10 weed samples, *Alternaria* from two
- 121 isolates in pure culture



Single conidial isolations

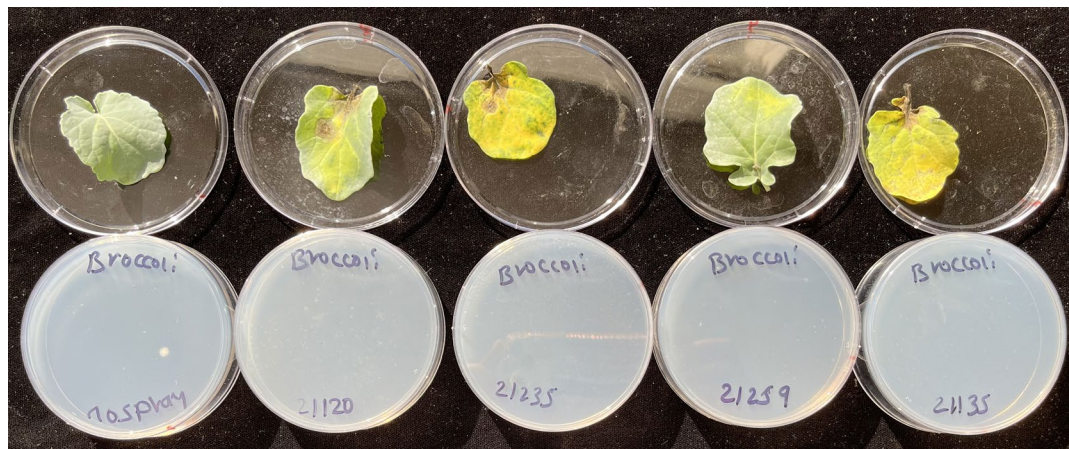
- Single conidial isolations from all 121 isolates
- *Alternaria brassicicola* specific PCR performed on all 121 isolates, and 119 are *A. brassicicola* the other two appear to be *A. alternata*
- All 119 isolates sent to Sydney Everhart and her team for population studies and fungicide sensitivity



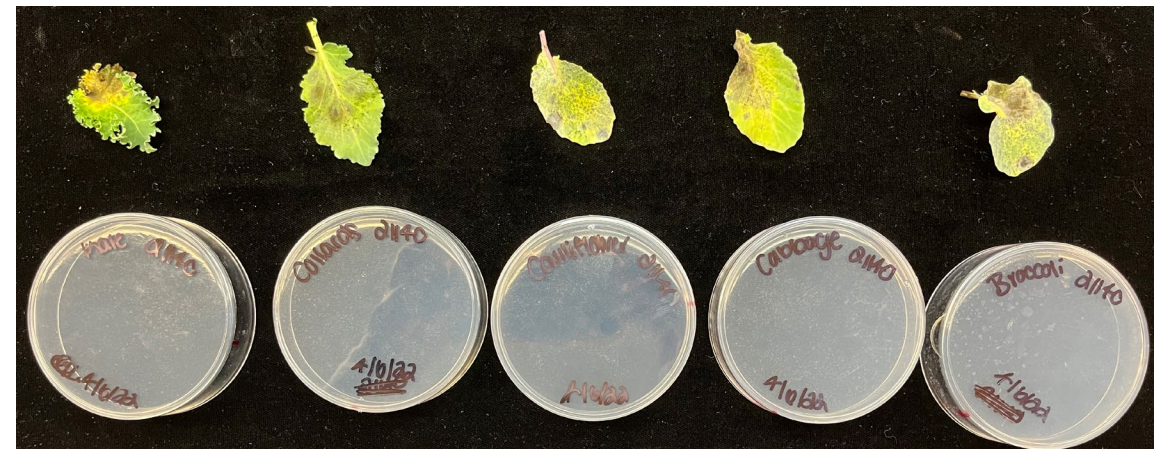
Detached leaf pathogenicity assay

- 121 single conidial isolates collected from 4 counties in New York state were used for this experiment
- 5-week-old detached leaves of broccoli, cabbage, cauliflower, kale, and collard crops inoculated with each of the 121 isolates (three replicates).
- Disease severity assessed on 3rd and 5th day after inoculation

Five different isolates on broccoli



One isolate on each host



Kale

Collard

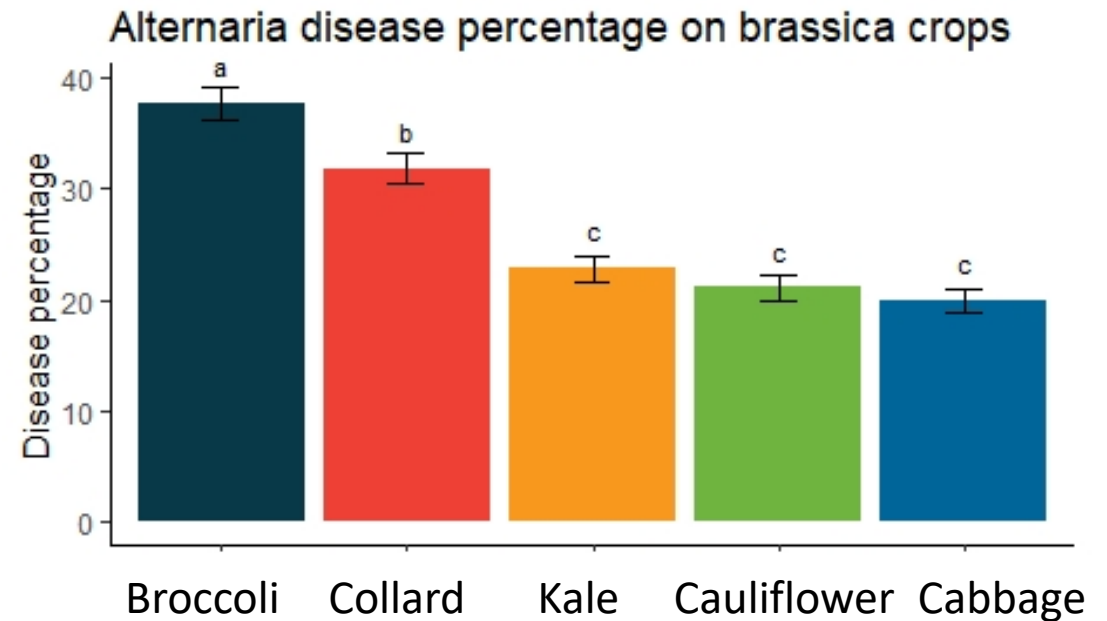
Cauliflower

Cabbage

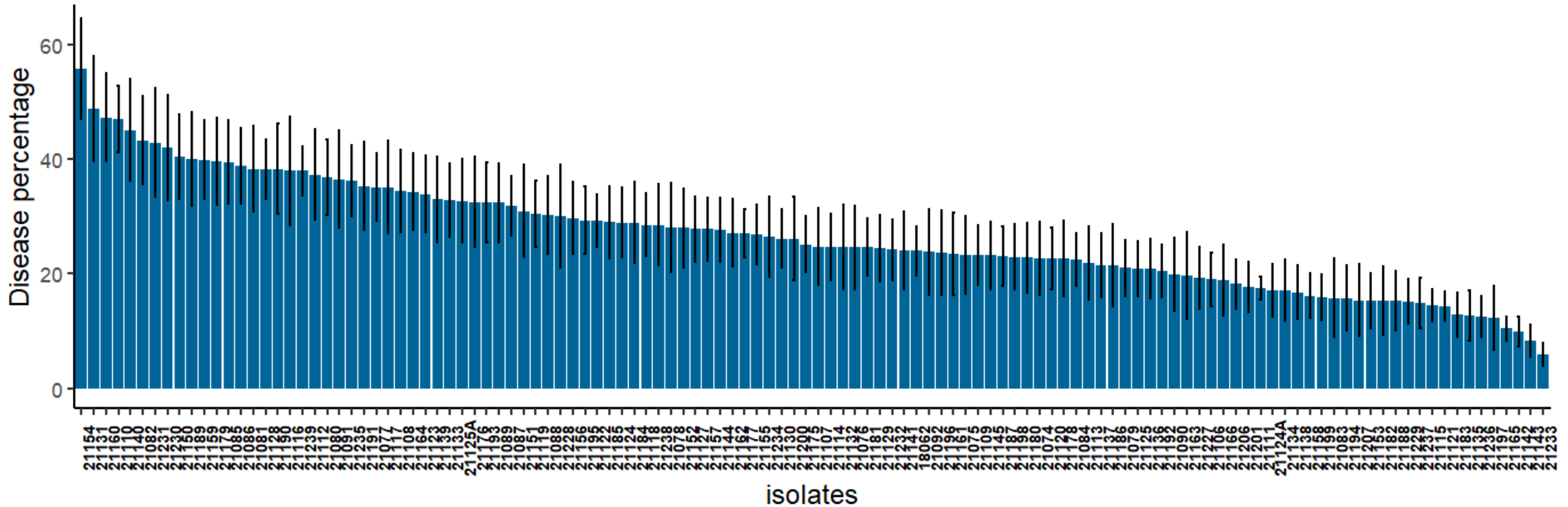
Broccoli

Detached leaf pathogenicity assay

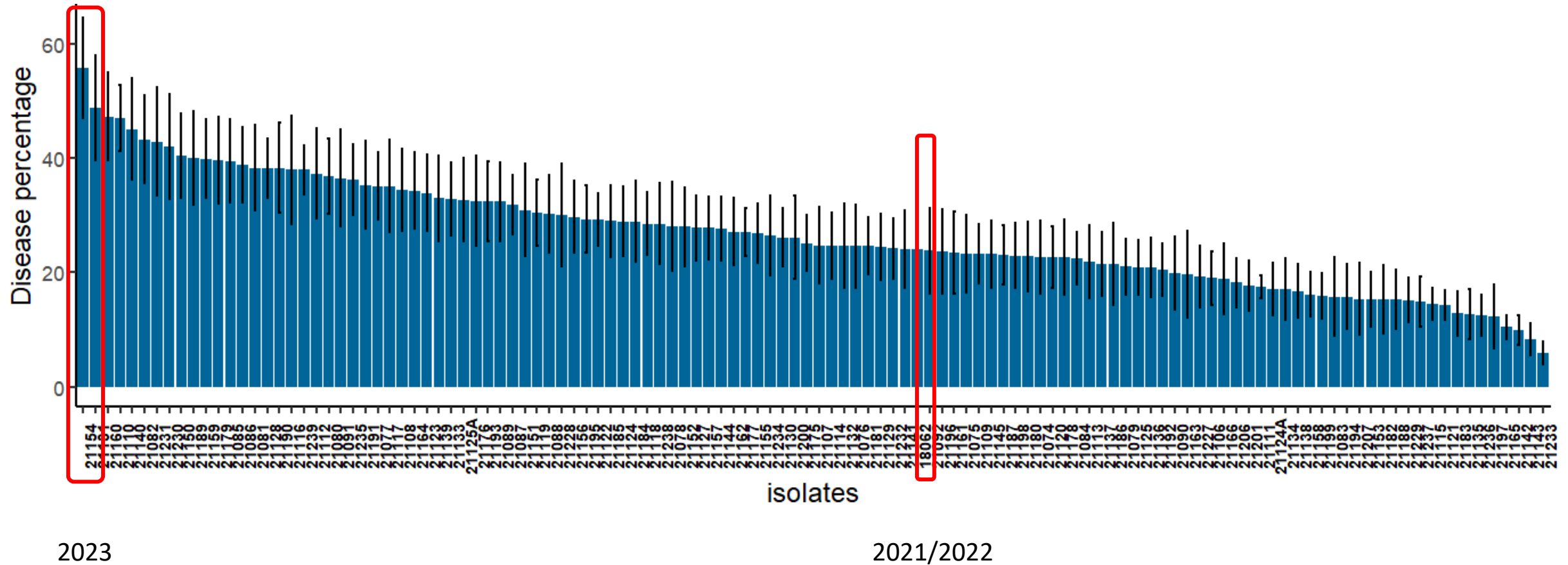
- Broccoli was the most susceptible of the 5 crops tested
- All 119 *A. brassicicola* isolates were pathogenic on broccoli
- The two isolates that were not *A. brassicicola* were not pathogenic on any of the five crops and were probably secondary invaders



Aggressiveness of *A. brassicicola* isolates



Aggressiveness of *A. brassicicola* isolates



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Objective 2: variety trials, irrigation trials, N-fertility trials





Varietal screening

- **2021**

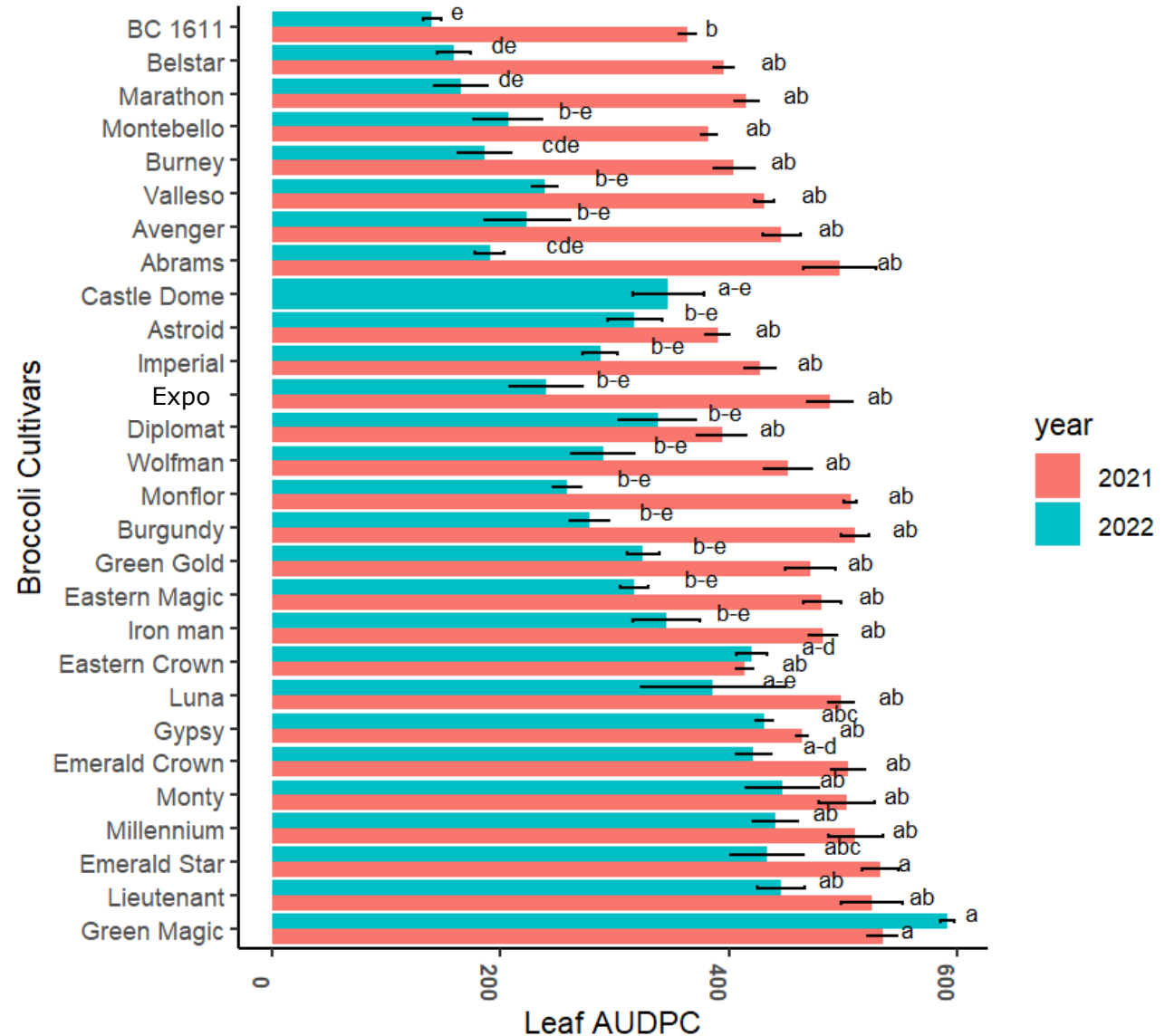
- 27 broccoli cultivars
- Rated for % leaf disease 10 times

- **2022**

- 27 broccoli cultivars (same as 2021) plus 1 additional (Castle Dome)
- Inoculated twice
- Rated for % leaf disease 5 times and % head disease 4 times
- Heading date determined when 50% of plants head from each plot reached maturity

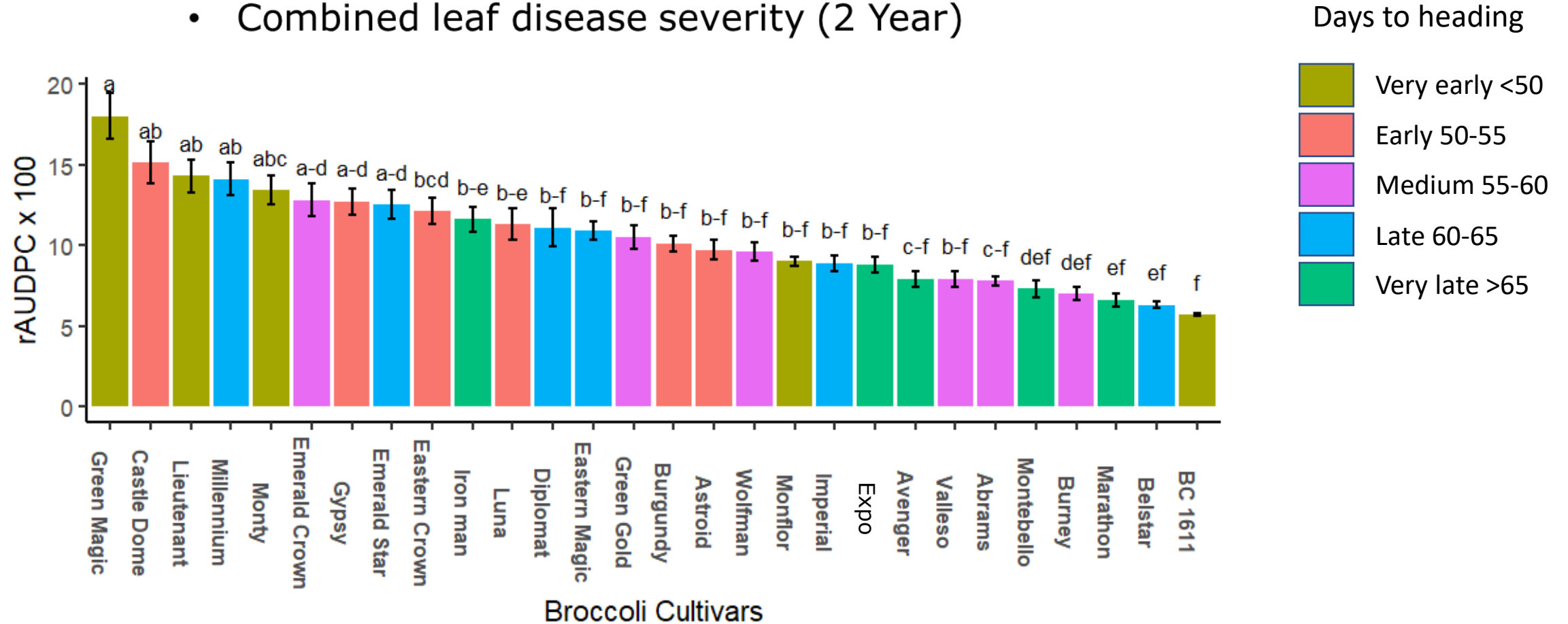
Variety trial

- Significant difference in susceptibility both years
- Disease severity higher in 2021



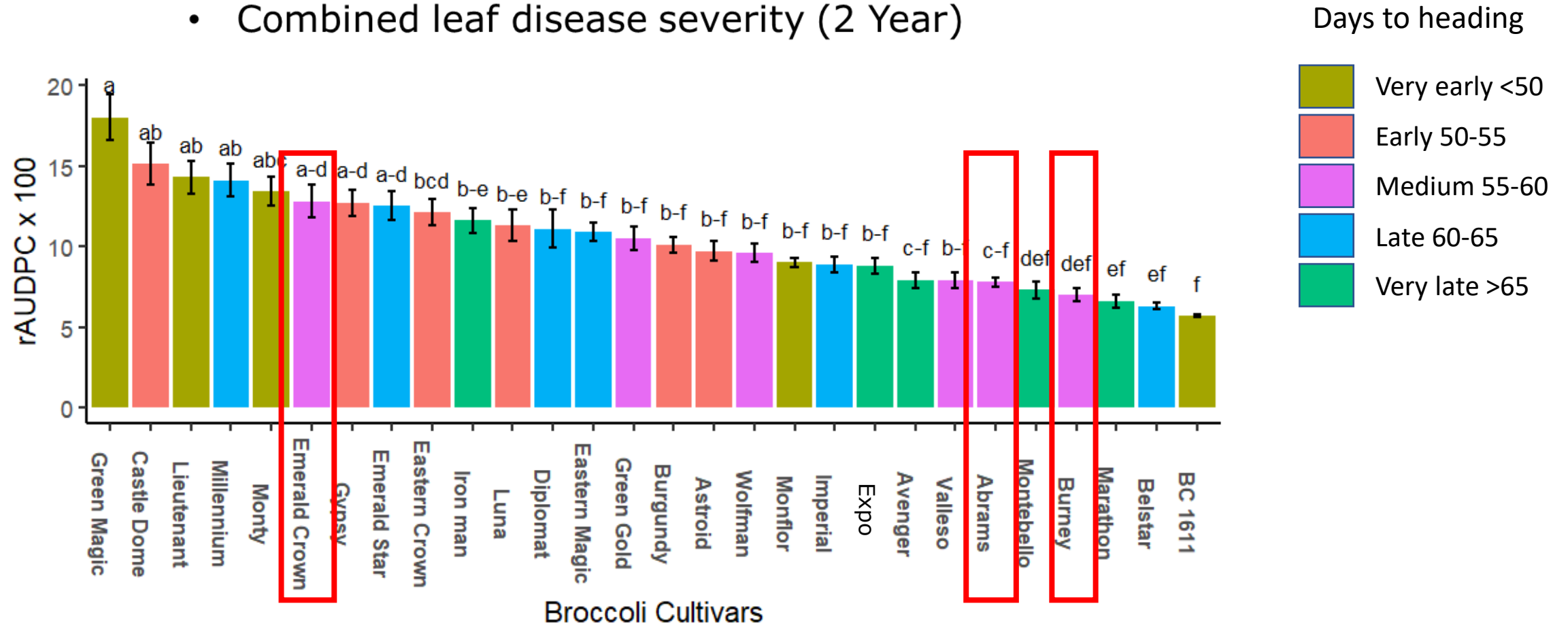
Variety trial

- Combined leaf disease severity (2 Year)



Variety trial

- Combined leaf disease severity (2 Year)

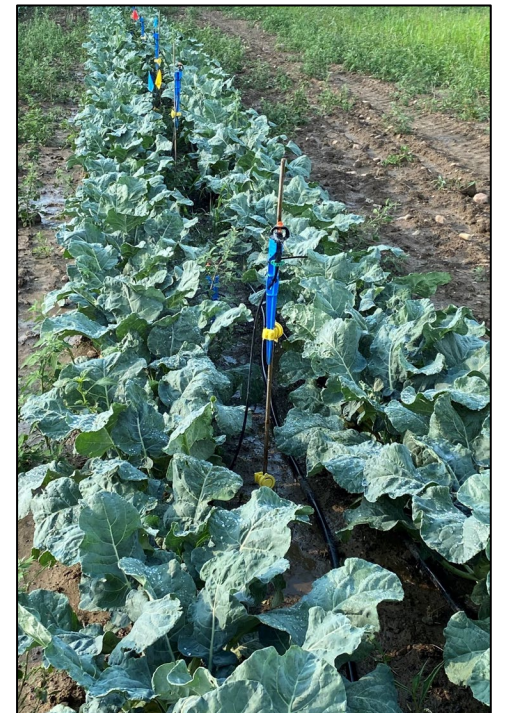


Three cultivars we are considering for 2023

Irrigation time of day – Emerald Crown

- Disease severity for leaf blight and head rot for treatments overhead irrigated at different times of day in 2021 and 2022
- Control plots were not overhead irrigated

Irrigation time	Leaf AUDPC		Head AUDPC	
	2021	2022	2021	2022
morning	91.7 a	128.5a	63.3 a	137.5a
midday	104.5 a	131.9a	104.5 a	177.5a
evening	99.6 a	156.4a	107.1 a	202.8a
Control drip-irrigated	111.6 a	154.8a	77.1 a	169.6a



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evening	99.6 a	156.4a	107.1 a	202.8a
Control non-irrigated	111.6 a	154.8a	77.1 a	169.6a

- Because there were no statistically significant differences between the control and overhead irrigated plots we do not plan to use overhead irrigation in 2023.

Nitrogen fertility trial – Emerald Crown

- Disease severity for leaf blight and head rot for treatments with 50-150% recommended N in 2021 and 2022
- Percentage unmarketable heads for 2022

% N from recommended	Leaf AUDPC		Head AUDPC		unmarketable head (%)
	2021	2022	2021	2022	2022
50%	99a	288a	37 b	168a	67a
75%	85a	266a	21 a	140a	58a
100%	66a	276a	20 a	136a	57a
125%	71a	204a	16 a	75a	56a
150%	76a	272a	11 a	147a	77a

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125%	71a	204a	16 a	75a	56a
150%	76a	272a	11 a	147a	77a

- Because there were no statistically significant differences between the control (100% of recommended N) and other levels of N, we plan to use 100% of recommended in 2023.

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Fungicide trials



Screening conventional and OMRI listed fungicides Emerald Crown

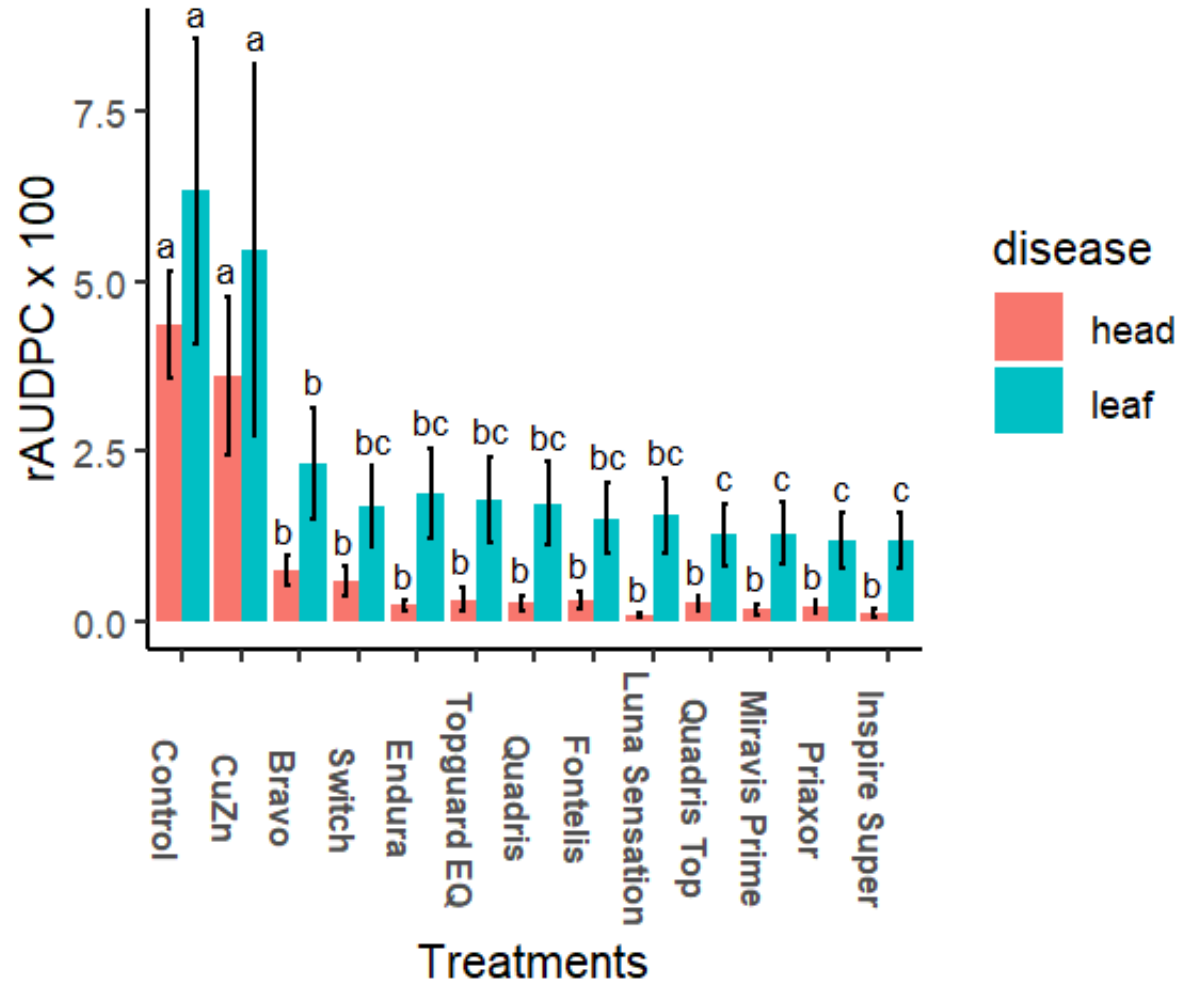
	2021	2022
Treatment used		
Conventional	11 + untreated	12+ untreated
Organic	8 + untreated	9 + untreated
Inoculation	Once (40 *DAT)	Twice (45 & 52 DAT)
Treatment started	35 DAT	44 DAT
Treatment sprayed	5 times (weekly)	4 times (weekly)
Disease rating	7 times leaf, 5 times head	5 times leaf, 4 times head

*DAT= days after transplanting

Conventional fungicide trial results – 2021+2022 combined

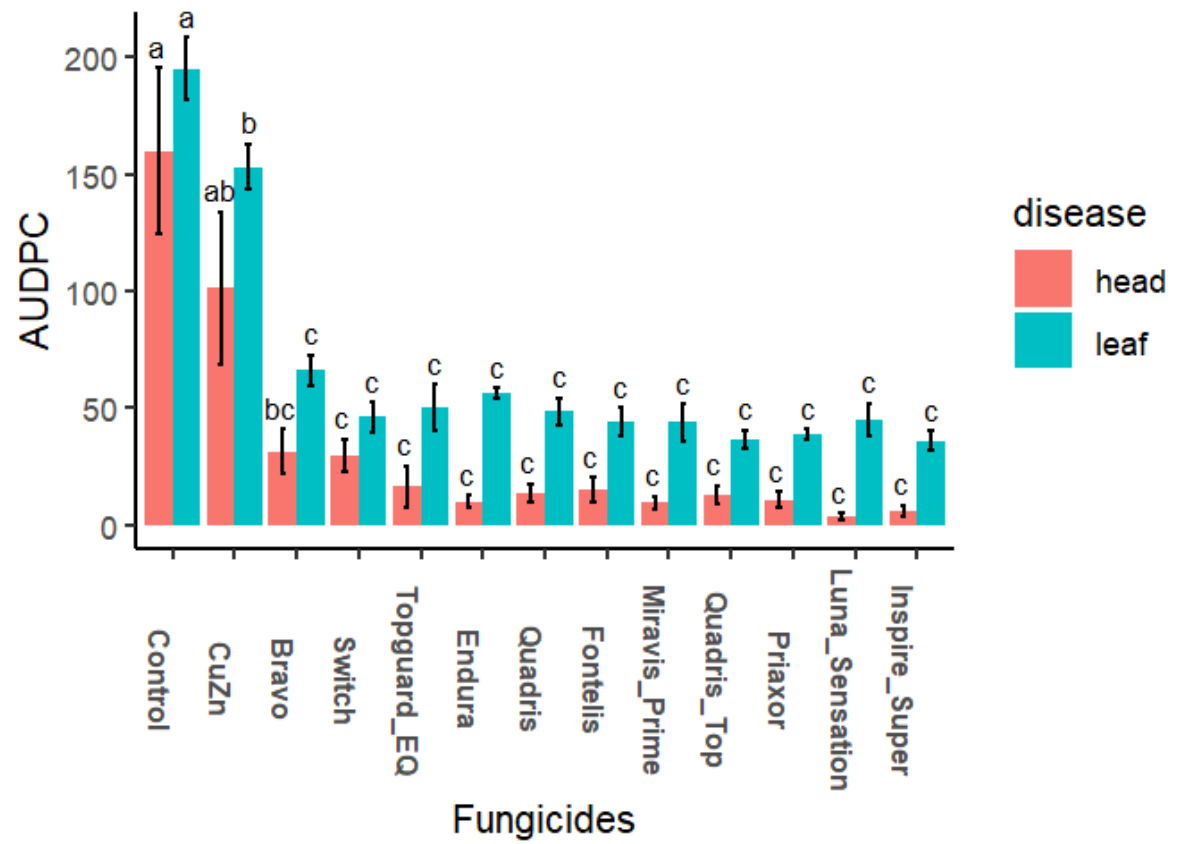
Leaf and head disease severity combining two years

Strong correlation between head and leaf disease severity
 $r=0.88^{**}$

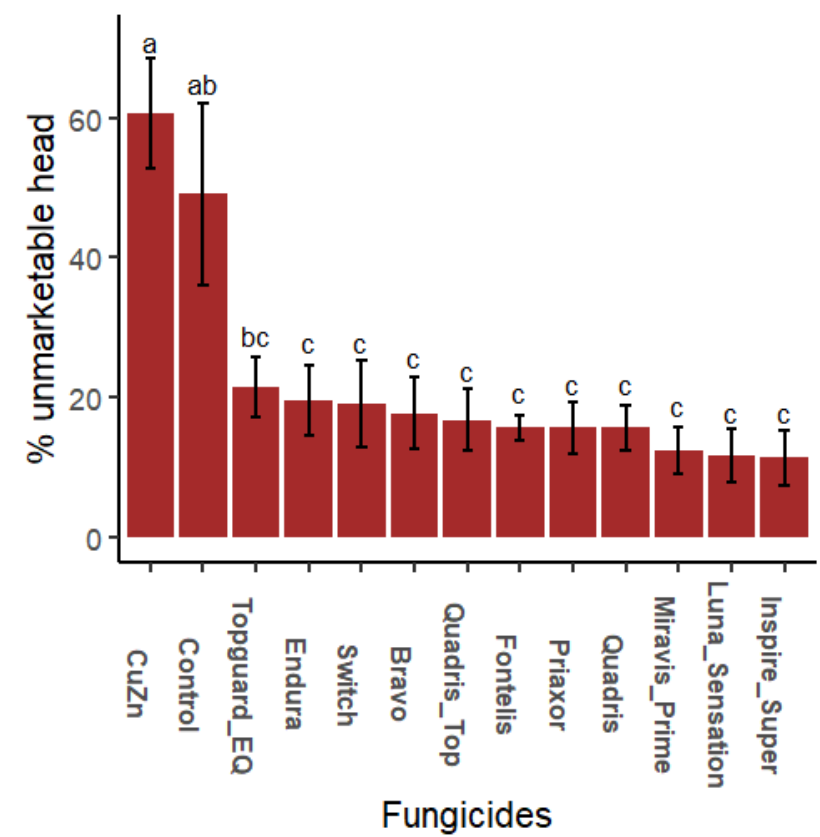


Conventional fungicide trial results –2022

Leaf and head disease severity

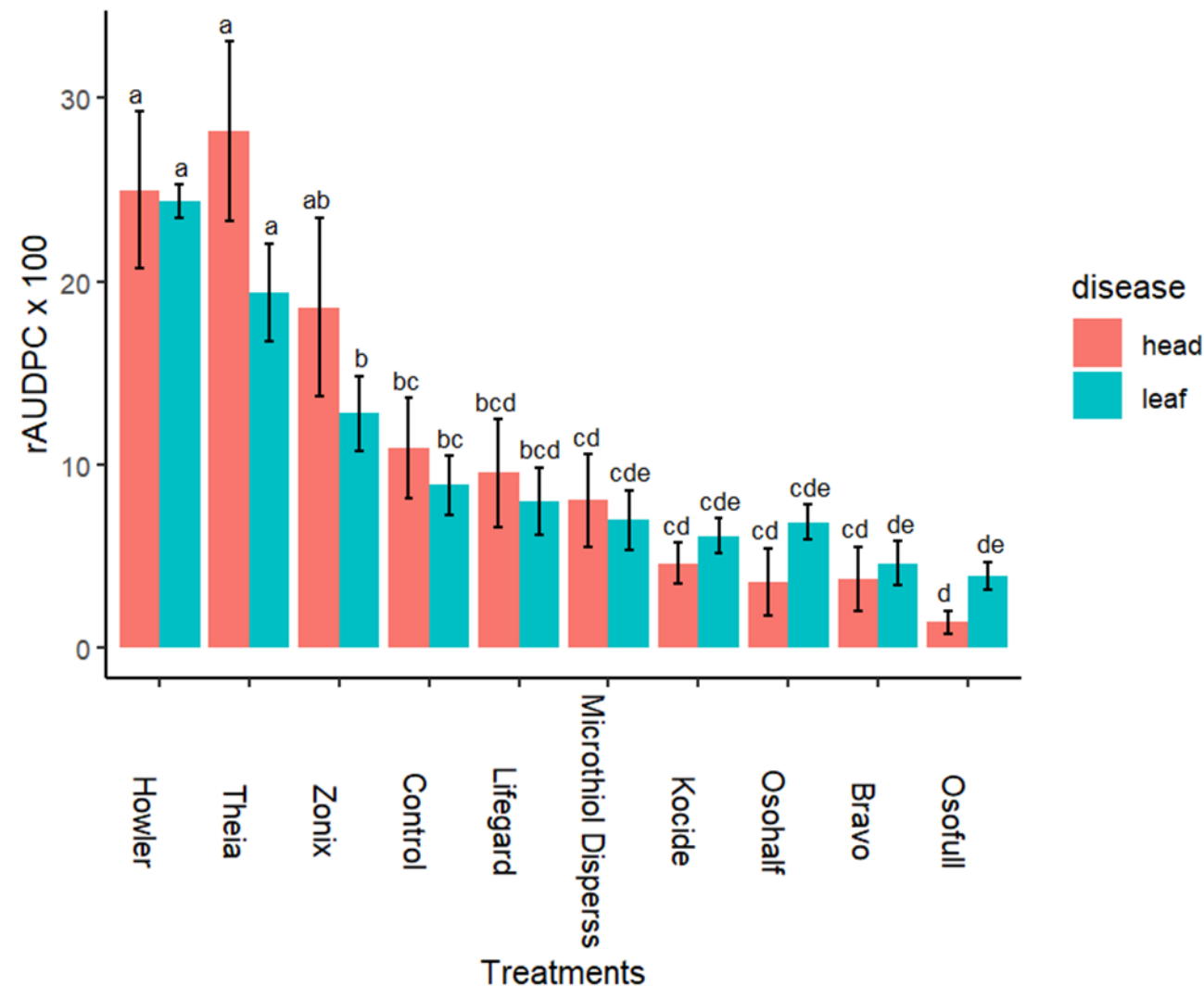


Percentage of unmarketable heads



Organic fungicide trial results – 2021+2022 combined

Efficacy of organic fungicides on leaf and head disease in two years



Oso

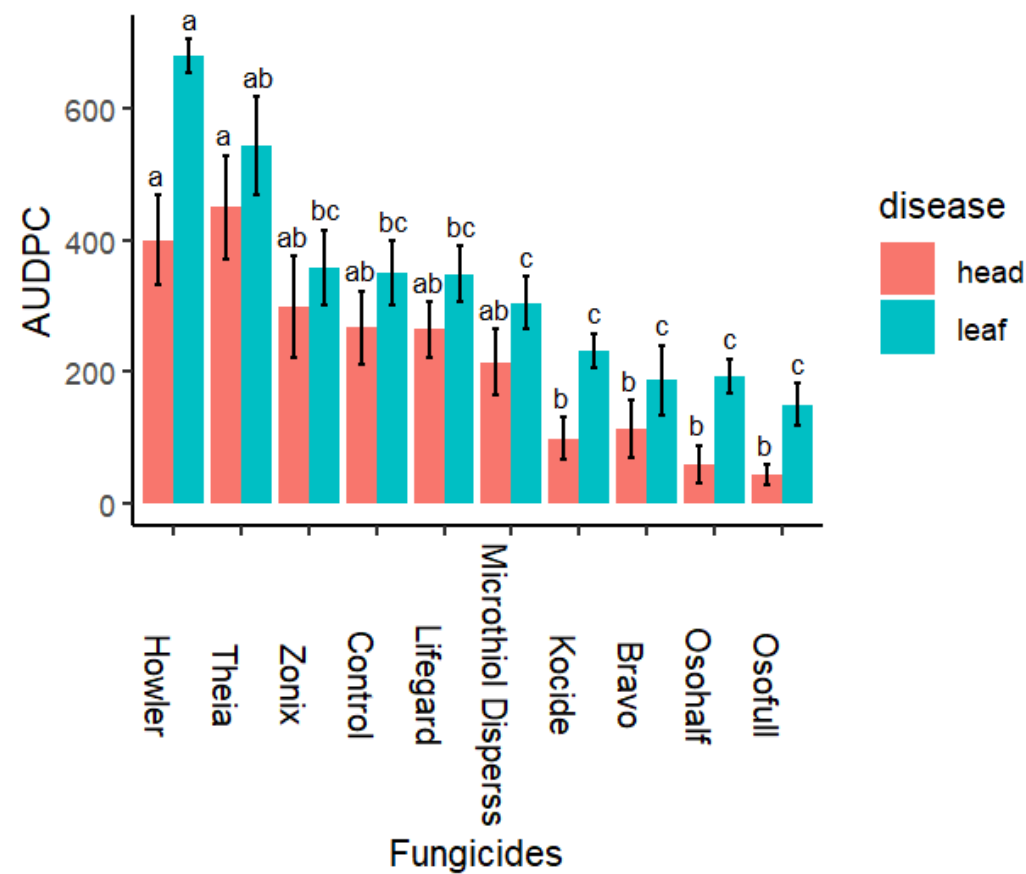


Howler

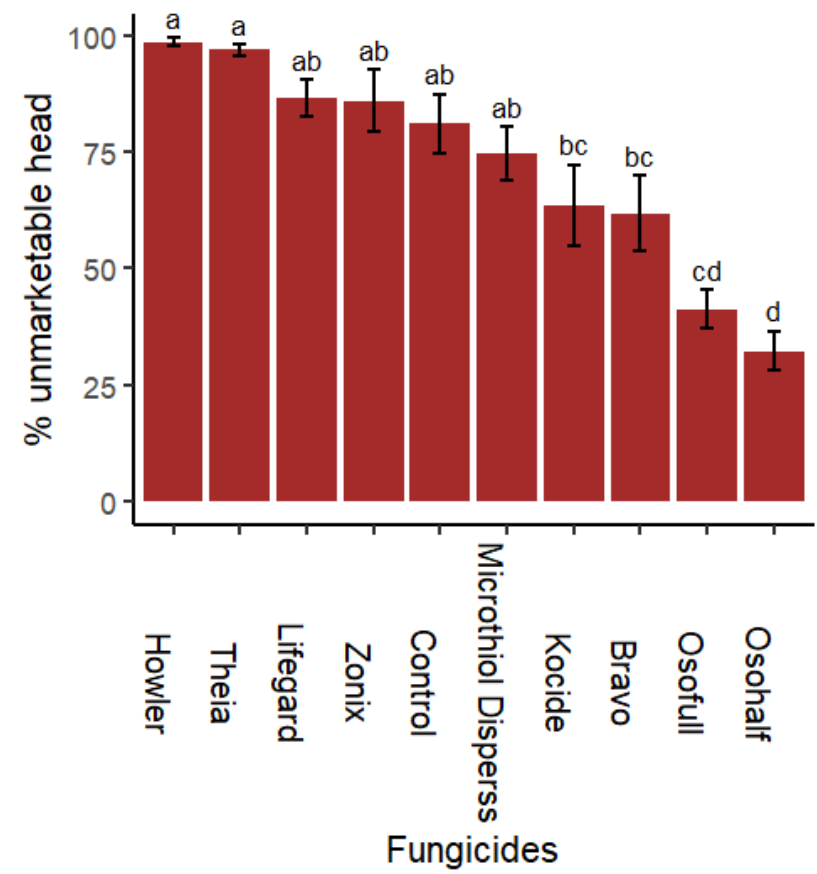


Organic fungicide trial results –2022

Leaf and head disease severity



Percentage of unmarketable heads



Plans for 2023 – we are open to changes

- Cultural practices
 - 100% N-fertility
 - No overhead irrigation – we will have drip irrigation
- Cultivars; Emerald Crown, Burney, Abrams?
- Three conventional programs ensuring rotation of chemistries and mindful of PHI and cost
 - Bravo, Miravis Prime, Quadris Top, Luna Sensation
 - Bravo, Priaxor, Inspire Super, Luna Sensation
 - Bravo, Quadris Top, Bravo, Quadris Top
- Two organic programs
 - Kocide, Oso (half rate), Kocide, Oso (half rate)
 - Kocide (or some other copper?) only