Fungicide resistance of key almond pathogens

Bacterial spot, Anthracnose and Hull rot

Tonya Wiechel and Simone Kreidl

Almond trees have many enemies

Foliar
- Rust
- Shot hole
- Bacterial spot
- Anthracnose

Fruit
- Anthracnose
- Hull rot
- Bacterial spot
- Scab

Trunk
- Phytophthora
- Cankers

Soil
- Verticillium

Key almond diseases

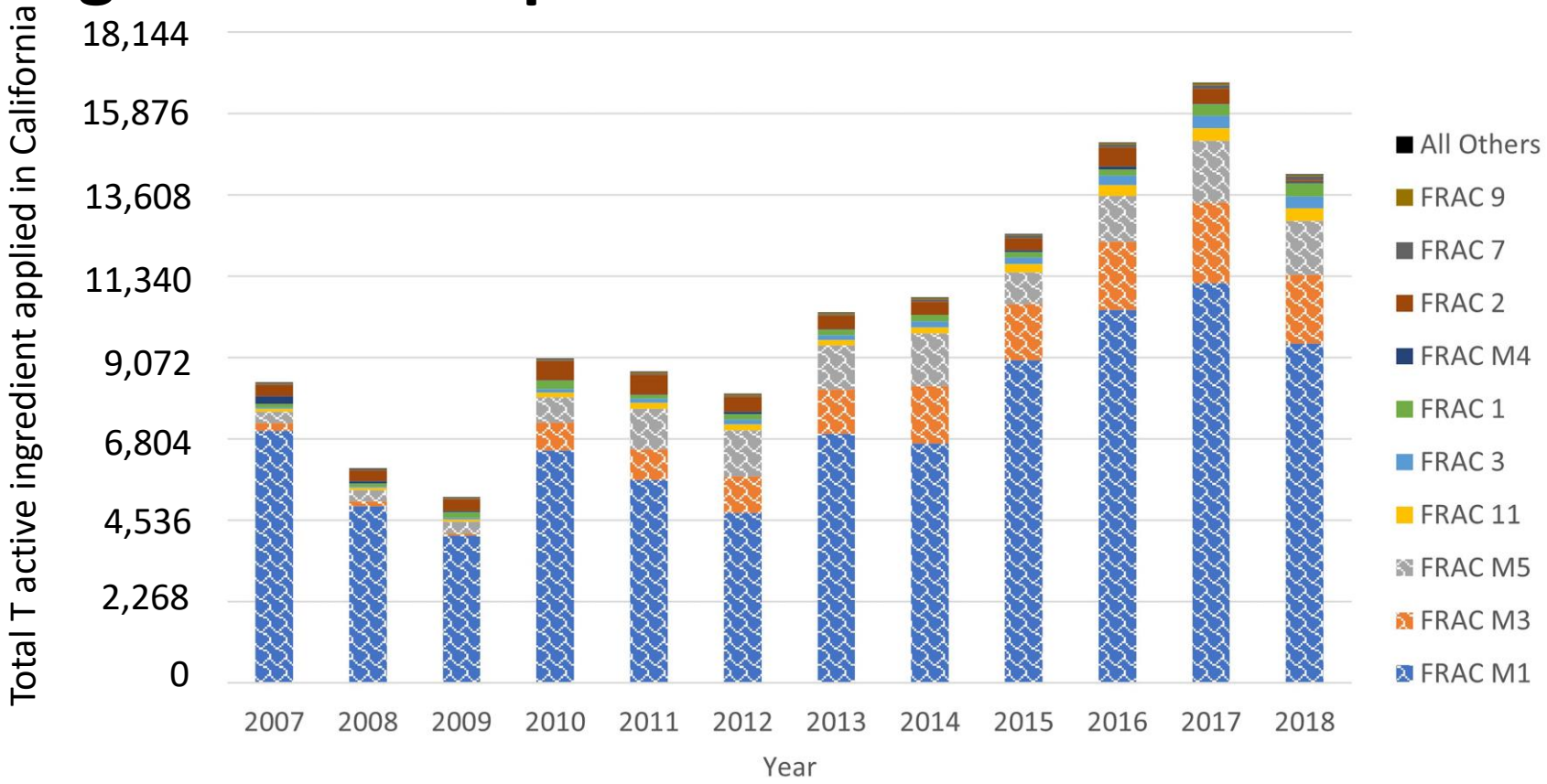
Bacterial spot

Anthracnose

Hull rot

TJW

Fungicides are important tools to combat enemies



TJW

J. Beckerman; C. Palmer; E. Tedford; H. Ypema; *Phytopathology*® 2023, 113, 694-706.
DOI: 10.1094/PHYTO-10-22-0399-IA

Many reasons for lack of management

Poor spray distribution or inadequate canopy penetration

Using doses different than the label rate.

Reliance on curative sprays, rather than preventative or early intervention strategies.

Lower doses applied more frequently.

TJW

Lack of information on fungicide resistance

Fungicide resistance

- Occurs in other regions of the world
- Same pathogens on other crops

Lack of information on fungicide resistance in Australia

TJW

Bacterial spot – copper sensitivity testing

1. Copper sulphate – laboratory standard
2. 500 g/kg Cu - copper hydroxide
3. 190 g/L Cu – tribasic copper sulphate
4. 500g/kg Cu - copper oxychloride

56 isolates tested

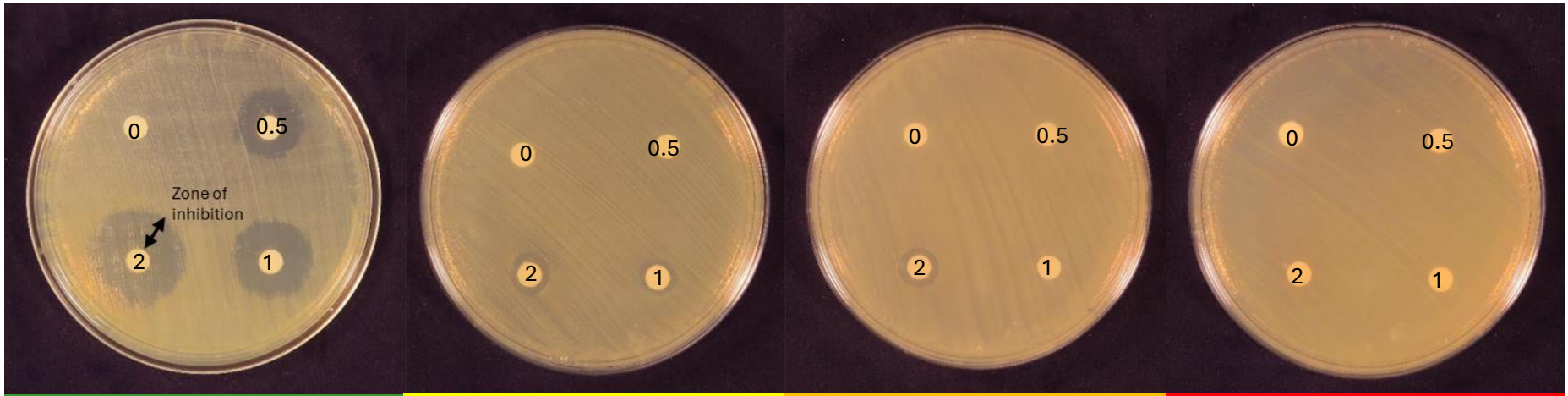
- 20 historical
- 36 last few seasons

Region	1996	2018	2019	2020	2023	2024	2025	Total
Riverina					18			18
Riverland	1	6			1		6	14
Sunraysia		3	4	6	7	4		24
Total	1	9	4	6	26	4	6	56

Shona Armstong

TJW

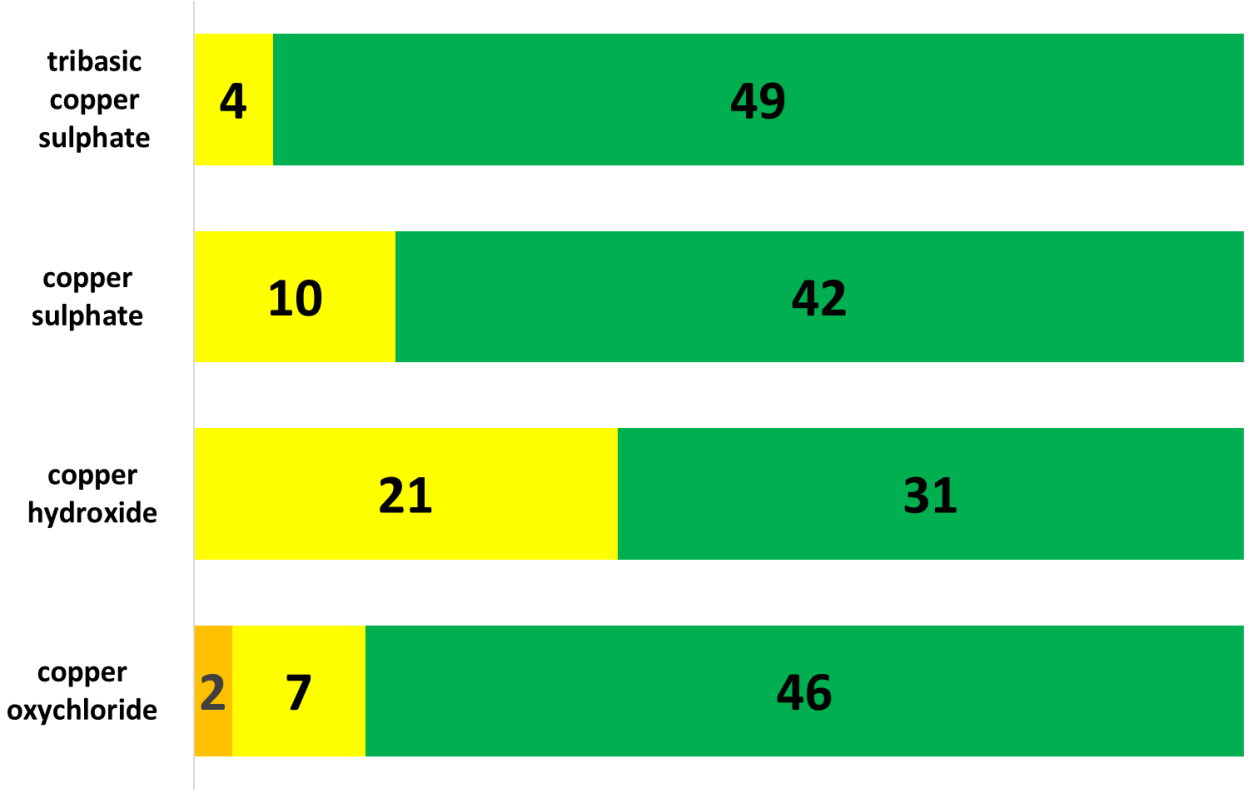
Bacterial spot copper categories



Sensitive	Decreased sensitivity	Insensitive	Resistant

TJW

Bacterial spot



Sensitive
Decreased sensitivity
Insensitive
Resistant

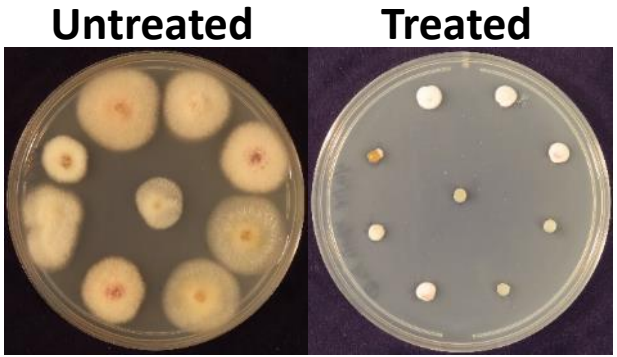
TJW

Anthracnose

Azoxystrobin (FRAC 11)

Isopyrazam (FRAC 7)

Propiconazole (FRAC 3)

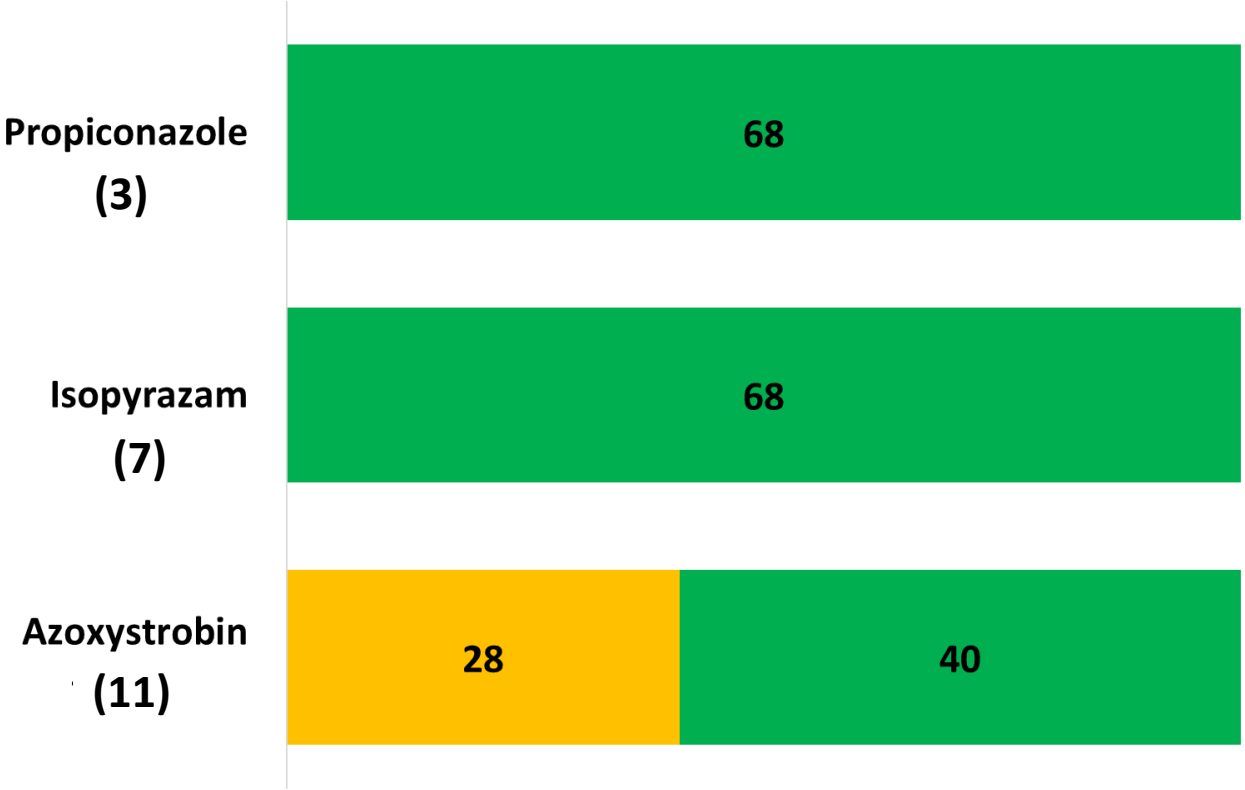


- 68 isolates tested
  - 54 historical
  - 14 last season

Region	1969	1997	1998	2000	2001	2002	2008	2016	2017	2019	2021	2022	2023	2024	Total
Adelaide plains		1		3	6	1									11
SA		1	1												2
Riverland									3	1			1		5
Riverina								1				25	10		36
Sunraysia							2			2		2	1	2	9
WA										3	1				4
Qld	1														1
Total	1	2	1	3	6	1	2	1	3	6	1	27	12	2	68

Amy Cao

Anthracnose



Sensitive >75
Decreased sensitivity 50-75
Resistant <50

$$RGI = \frac{(Untreated\text{-}treated)}{Untreated} \times 100$$

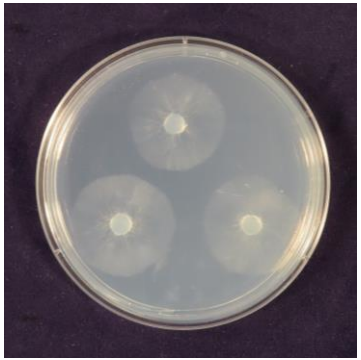
TJW

Hull rot – fungicide sensitivity testing

1. Fluopyram + Tebuconazole (7+3)
2. Fluopyram + Trifloxystrobin (7+11)
3. Mefentrifluconazole (3)
4. Isopyrazam (7)
5. Tebuconazole + Azoxystrobin (3+11)

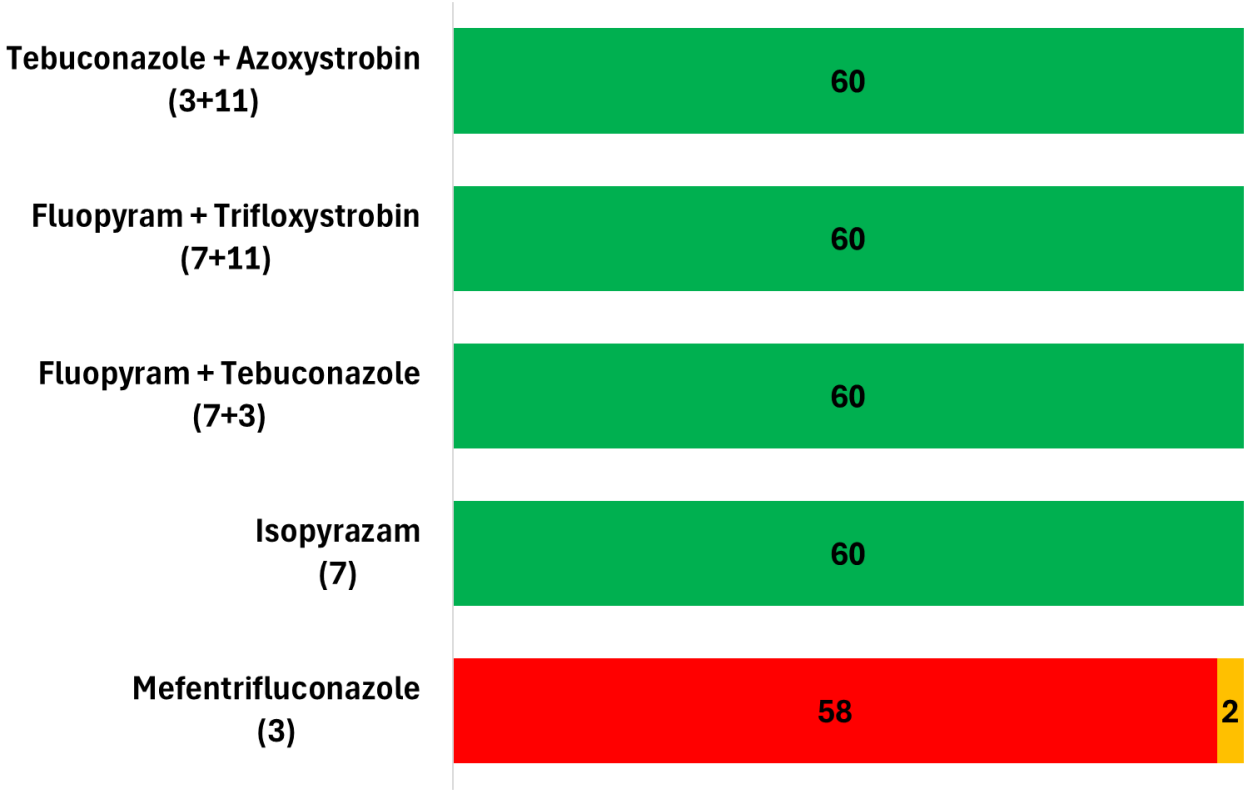
60 isolates tested

- 41 historical
- 19 current season



Region	2018	2019	2023	2025	Total
Sunraysia	9	9		4	22
Riverina		6	6	10	22
Riverland	10			5	15
WA		1			1
Total	19	16	6	19	60

Hull rot



Sensitive >75

Decreased sensitivity 50-75

Resistant <50

$$RGI = \frac{(\text{Untreated-treated})}{\text{Untreated}} \times 100$$

TJW

Impact for industry

Be Alert not Alarmed

Remember to do the right thing

Use fungicides responsibly → **Rotate fungicide groups** → **Integrate other practices**

TJW

Hort Innovation
Strategic levy investment

ALMOND FUND