

Supplemental Data for:

Pardini CA, Espínola-Arredondo A and Moyer MM. 2022. Cooperation and compensation to mitigate fungicide resistance. *Am J Enol Vitic* 73:198-203. doi: 10.5344/ajev.2022.21052.

Survey Instrument

Section 1 - Identification of fungicide-use practices.

1. From the list below, please select the various specialty crops you grow.

Grapes

Wine grapes
Raisin grapes
Juice grapes
Table grapes

Small Fruits

Blueberries
Raspberries and/or blackberries
Strawberries
Other berries: Please specify

Tree fruits

Apples
Pears
Sweet cherries
Sour cherries
Plums
Apricots
Nectarines and/or peaches
Other Tree Fruits (avocado, pomegranate, quince) Please specify

Nuts

Hazelnuts
Walnut
Almonds
Other nuts (please specify)

Other Vine crops

Hops
Melon
Other (please specify)

If the crop you grow is not listed above, please specify here:

2. Do you use fungicides? Fungicides are defined as any product applied to a plant for the intention of controlling a fungus-based disease. It can include both synthetic or natural products.

YES
NO

3. For your grape production, select from the list below the brand names of fungicides you have used in the past year.

Abound
Actinovate-AG
Aim
Alion
Aprovia
Botran 75 W
Casoron
Chateau
Devrinol
Dithane, Manzate, Penncozeb
Elevate
Endura
Flint
Fusilade
Gallery
Gramoxone
Goal
Inspire Super
JMS Stylet Oil, Neem Oil, PureSpray Green
Kaligreen
Karmex

Kerb
Luna Experience
M-Pede
Matrix
Mission
Mettle
Orius 20AQ, Tebuzol 45DF
Ph-D
Poast
Princep
Pristine
Procure 480SC
Prolivo 300 SC
Prowl
Quadris Top
Quintec
Rally 40WSP
Regalia
Rely
Roundup
Rovral, Nevado
Scala SC
Select
Serenade Max
Several formulations
Solicam
Sonata
Sovran
Surflan
Switch 62.5 WG
Treflan
Torino
Unicorn
Vanguard WG
Venue
Vivando
Zeus XC
Zeus Prime XC
Ziram

4. If the fungicide you have used in the past year is not listed above, please specify here:

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5. What is the *most* important attribute in your choice of fungicide brand? A fungicide brand is defined as the specific marketing name associated with the product. For example, Venue is the brand for pyraflufen-ethyl.

- PRICE
- QUALITY
- CUSTOMER SERVICE
- OTHER

6. How often do you change fungicide brand?

- NEVER
- SOMETIMES
- ABOUT HALF OF THE TIME
- MOST OF THE TIME
- ALWAYS

7. When designing a fungicide program for your grape production, do you rotate your fungicides between different modes of action (e.g., rotating between different FRAC groups)?

- YES
- NO

8. Do you use any of the following resources to assist in designing your fungicide programs in your grape production?

- Extension Pest Management Guide (e.g., UC-Davis Grape Pest Management Guide, WSU Annual Grape Pest Management Guide, WSU Annual Treefruit Pest Management Guide)
- Local crop consultant
- Extension Specialist or Farm advisor (face-to-face, email, or phone consultations)
- Third party certification recommendations (e.g., Oregon LIVE, Lodi Wine Rules)

9. What management philosophies do you follow in your grape production? Please select all that apply.

- GENERAL/CONVENTIONAL
- CERTIFIED ORGANIC
- CERTIFIED BIODYNAMIC
- CERTIFIED SUSTAINABLE (E.G., LODI RULES, LIVE)
- INTENDED (BUT NOT CERTIFIED) ORGANIC
- INTENDED (BUT NOT CERTIFIED) BIODYNAMIC
- INTENDED (BUT NOT CERTIFIED) SUSTAINABLE
- OTHER: _____

10. Do you typically apply fungicides preventatively (before you notice a disease problem in your crop) or curatively (to treat an existing problem) in your vineyards?

- ONLY PREVENTATIVELY
- BOTH PREVENTATIVELY AND CURATIVELY
- ONLY CURATIVELY

11. How often do you carefully read the instructions and follow the recommended application procedure(s) for the fungicide(s) you use? This is in reference to reading and following the fungicide label.

- NEVER
- SOMETIMES
- ABOUT HALF OF THE TIME
- MOST OF THE TIME
- ALWAYS

12. Do you have at least one neighboring farm?

- YES
- NO

13. If you selected YES in the above question, then what is the approximate distance of the closest neighboring farm from your property?

- Less than 1 mile
- 1-2 miles
- 3-5 miles
- 6-10 miles
- 11 miles and over

14. If you have a neighboring farm, please select the various specialty crops your neighboring farm(s) grow (to the best of your knowledge).

Grapes

- Wine grapes
- Raisin grapes
- Juice grapes
- Table grapes

Small Fruits

- Blueberries
- Raspberries and/or blackberries
- Strawberries
- Other berries: Please specify

Tree fruits

- Apples
- Pears
- Sweet cherries
- Sour cherries
- Plums
- Apricots
- Nectarines and/or peaches
- Other Tree Fruits (avocado, pomegranate, quince) Please specify

Nuts

- Hazelnuts
- Walnut
- Almonds
- Other nuts (please specify)

Other Vine crops

- Hops
- Melon
- Other

15. If the crop your neighboring farm(s) grow is not listed above, please specify here:

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16. How frequently are you aware of when your neighbors apply fungicide?

- NEVER
- SOMETIMES
- ABOUT HALF OF THE TIME
- MOST OF THE TIME
- ALWAYS

17. How often do you know which particular fungicides your neighbors use when they apply?

- NEVER
- SOMETIMES
- ABOUT HALF OF THE TIME
- MOST OF THE TIME
- ALWAYS

18. How often do you know which FRAC groups the fungicides belong to that your neighbors use when they apply?

- NEVER
- SOMETIMES
- ABOUT HALF OF THE TIME
- MOST OF THE TIME
- ALWAYS

19. Have you ever heard of fungicide resistance?

- YES
- NO

20. Are you aware of the causes and consequences of fungicide resistance?

- YES
- NO
- UNSURE

21. To the best of your knowledge, have you ever encountered fungicide resistance on your own farm?

- YES
- NO
- UNSURE

22. How often do you apply fungicide to your grape production? If the frequency that you apply fungicide to your crops varies, please explain (e.g., if you apply fungicide at a certain rate for blueberries and another for grapes, please describe that clearly and label the description with the crop).

23. Do you adjust the timing of your fungicide applications based on the weather (more than is required by the legal restrictions)?

- YES
- NO
- UNSURE

24. If you selected YES in the above question, then please explain your reasoning in the space provided below.

25. Have you ever noticed that neighboring farms' use of fungicide affects you?

- YES
- NO
- UNSURE

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Section 2 - Growers' willingness to cooperate.

26. When you had (If you have) just become aware of the causes and consequences of fungicide resistance, did you (will you) make changes to your fungicide application practices?

- YES
- NO
- UNSURE

27. If you learned that your method of fungicide usage was negatively affecting neighboring farms (e.g., by contributing to fungicide resistance), would you be willing to *stop using fungicide altogether*?

- YES
- NO
- UNSURE

28. If you learned that your method of fungicide usage was found to be negatively affecting neighboring farms (e.g., by contributing to fungicide resistance), would you be willing to *change the frequency* of your applications?

- YES
- NO
- UNSURE

29. If you learned that your method of fungicide usage was found to be negatively affecting neighboring farms (e.g., by contributing to fungicide resistance), would you be willing to *change the timing* of your applications?

- YES
- NO
- UNSURE

30. If you learned that your method of fungicide usage was found to be negatively affecting neighboring farms (e.g., by contributing to fungicide resistance), would you be willing to *alternate the FRAC group of fungicide* used in your applications?

- YES
- NO
- UNSURE

31. If you choose NO or UNSURE in the above question, please explain why in the space provided.

32. Would you adjust your fungicide use if you knew it would help to prevent fungicide resistance, but would otherwise *not affect your profits for the next 5 years or those of other growers*?

- YES
- NO
- UNSURE

33. Would you adjust your fungicide use if you knew it would help to prevent fungicide resistance, would help other growers get better profits, but would otherwise *not affect your profits for the next 5 years*?

- YES
- NO
- UNSURE

34. Would you adjust your fungicide use if you knew it would help to prevent fungicide resistance, would help other growers get better profits, but would otherwise *negatively affect your profits for the next 5 years*?

- YES
- NO
- UNSURE

35. Would you adjust your fungicide use if you knew it would help to prevent fungicide resistance, but would otherwise *negatively affect your profits for the next 5 years and those of other growers*?

- YES
- NO
- UNSURE

36. Would you adjust your fungicide use if you knew it would help to prevent fungicide resistance, would otherwise *negatively affect other growers' profits*, but would otherwise *increase your profits for the next 5 years*?

- YES
- NO
- UNSURE

37. If adjusting the use of fungicide negatively affected your profits for the next 5 years, would you be willing to adjust your fungicide use if you were compensated to do so?

- YES
- NO
- UNSURE

38. If you selected YES in the above question, how much would you need to be compensated in order for you to be willing to adjust your fungicide use?

- Exactly Compensated (**100%** Of Lost Profits Returned)
- Mostly Compensated (**75%** Of Lost Profits Returned)
- Partly Compensated (**25-50%** Of Lost Profits Returned)

39. If the amount you wish to be compensated is not present in the above question, please specify the exact amount.

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Section 3 - Demographics

a. What is your age in years?

- Under 18 years old
- 18-24 years old
- 25-34 years old
- 35-44 years old
- 45-54 years old
- 55-64 years old
- 65-74 years old
- 75 years or older

b. What is your gender?

- Female
- Male
- Prefer not to answer

c. What is your marital status?

- Single, never married
- Married or domestic partnership
- Widowed
- Divorced
- Separated

d. Please specify your ethnicity.

- White
- Hispanic or Latino
- Black or African American
- Native American or Alaska Native
- Asian / Pacific Islander
- Other

e. Which of the following educational attainment categories best describe you currently (please check all that apply)?

- No schooling completed
- Nursery school to 8th grade
- Some high school, no diploma
- High school graduate, diploma or the equivalent (e.g., GED)
- Some college credit, no degree
- Trade/technical/vocational training
- Associate degree (e.g., AA, AS)
- Bachelor's degree (e.g., BA, BS)
- Master's degree (e.g., MA, MS, MEd)
- Professional degree (e.g., MD, DDS, DVM)
- Doctorate degree (e.g., PhD, EdD)

f. How much total combined money did all members of your household earn in 2018?

- \$0 – \$9,999
- \$10,000** – \$19,999
- \$20,000 – \$29,999
- \$30,000 – \$39,999
- \$40,000 – \$49,999
- \$50,000 – \$59,999
- \$60,000 – \$69,999
- \$70,000 – \$79,999
- \$80,000 – \$89,999
- \$90,000 – \$99,999
- \$100,000 or more

g. In which state do you currently reside?

- | | |
|----------------------|----------------|
| Alabama | Montana |
| Alaska | Nebraska |
| Arizona | Nevada |
| Arkansas | New Hampshire |
| California | New Jersey |
| Colorado | New Mexico |
| Connecticut | New York |
| Delaware | North Carolina |
| District of Columbia | North Dakota |
| Florida | Ohio |
| Georgia | Oklahoma |
| Hawaii | Oregon |
| Idaho | Pennsylvania |
| Illinois | Rhode Island |
| Indiana | South Carolina |
| Iowa | South Dakota |
| Kansas | Tennessee |
| Kentucky | Texas |
| Louisiana | Utah |
| Maine | Vermont |
| Maryland | Virginia |
| Massachusetts | Washington |
| Michigan | West Virginia |
| Minnesota | Wisconsin |
| Mississippi | Wyoming |
| Missouri | |

h. In which county do you currently reside? Please specify:

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Supplemental Table 1 Descriptive statistics on respondent demographics.

Age	Count (%)
18-24 years old	0 (0%)
25-34 years old	6 (15.8%)
35-44 years old	4 (10.5%)
45-54 years old	5 (13.2%)
55-64 years old	7 (18.4%)
65-74 years old	13 (34.2%)
75 years or older	3 (7.9%)

Sex	
Male	33 (84.62%)
Female	3 (7.69%)
Prefer not to answer	3 (7.69%)

Highest Degree Earned	
High school graduate,	2 (5.26%)
Some college credit, no degree	7 (18.42%)
Trade/technical/vocational	2 (5.26%)
Professional degree	1 (2.63%)
Bachelor's degree	11 (28.95%)
Master's degree	8 (21.05%)
Doctorate degree	7 (18.42%)

Household Income	
\$30,000 – \$39,999	3 (7.69%)
\$40,000 – \$49,999	2 (5.13%)
\$50,000 – \$59,999	1 (2.56%)
\$60,000 – \$69,999	0 (0.0%)
\$70,000 – \$79,999	6 (15.38%)
\$80,000 – \$89,999	6 (15.38%)
\$90,000 - \$99,000	0 (0%)
\$100,000 or more	16 (41.03%)
Prefer not to answer	5 (12.82%)

Neighbor	
Has a Neighbor	33 (80.49%)
Does Not Have a Neighbor	8 (19.51%)
