

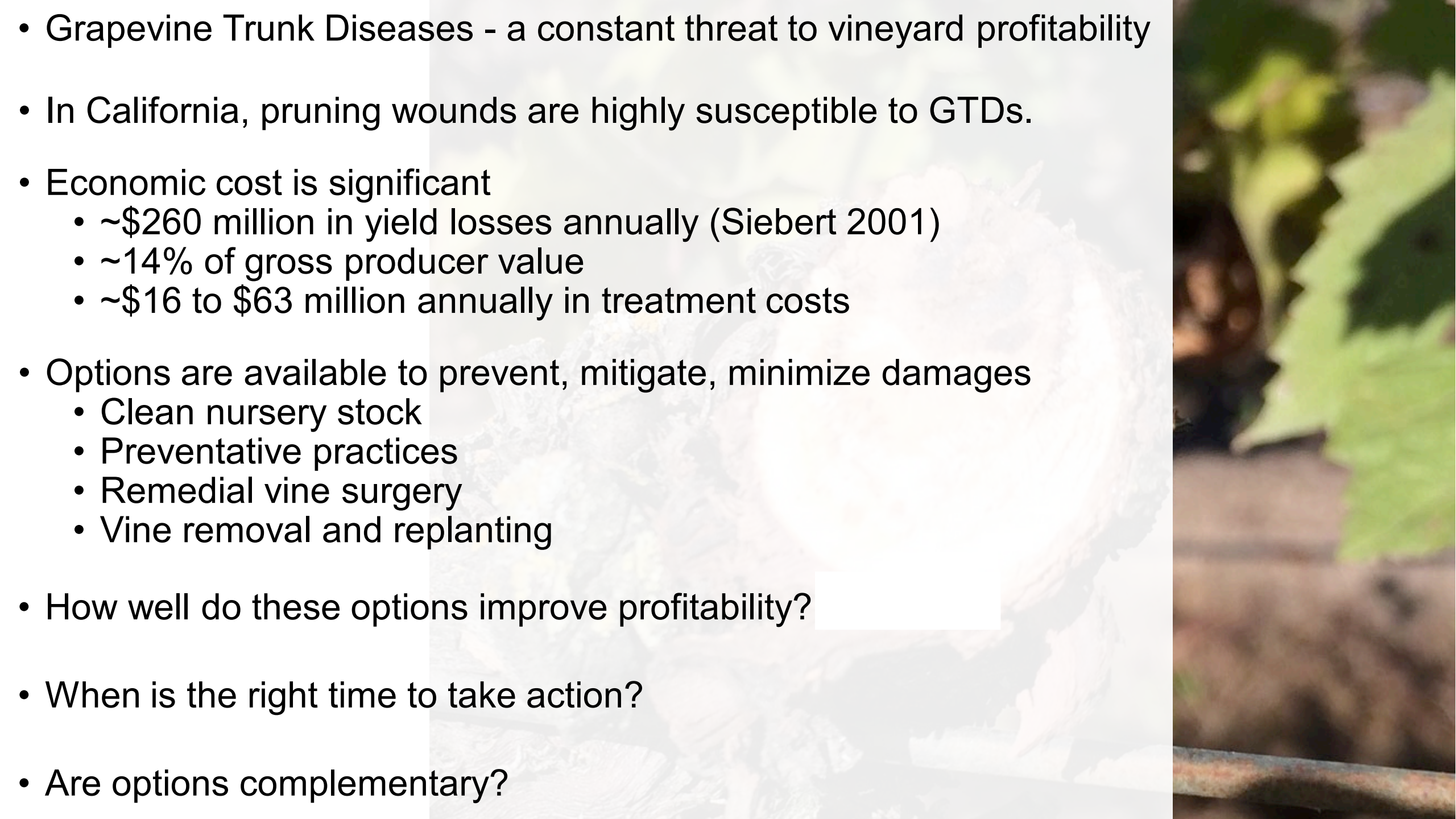
# ***The cost of grapevine trunk diseases and the benefit from adopting preventative and mitigating strategies***

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**CGCN-RCCV Grapevine Trunk Diseases Webinar**

***May 27, 2021***





- Grapevine Trunk Diseases - a constant threat to vineyard profitability
- In California, pruning wounds are highly susceptible to GTDs.
- Economic cost is significant
  - ~\$260 million in yield losses annually (Siebert 2001)
  - ~14% of gross producer value
  - ~\$16 to \$63 million annually in treatment costs
- Options are available to prevent, mitigate, minimize damages
  - Clean nursery stock
  - Preventative practices
  - Remedial vine surgery
  - Vine removal and replanting
- How well do these options improve profitability?
- When is the right time to take action?
- Are options complementary?



# California Grape Production

- 895 K acres of grapevines
  - 844 K acres bearing
  - 51 K acres non-bearing
    - Raisin-type grapes: 145 K acres
    - Table-type grapes: 130 K acres
    - Wine-type grapes: 620 K acres
- Total farm value of California grape production
  - Raisin: \$0.39 billion
  - Table: \$1.2 billion
  - Wine: \$3.8 billion
  - **Total: ~\$5.4 billion**

## Sources:

USDA/NASS, California Grape Acreage Report (2020)

[https://www.nass.usda.gov/Statistics\\_by\\_State/California/Publications/Specialty\\_and\\_Other\\_Releases/Grapes/Acreage/2021/2020%20Grape%20Acreage%20Report.pdf](https://www.nass.usda.gov/Statistics_by_State/California/Publications/Specialty_and_Other_Releases/Grapes/Acreage/2021/2020%20Grape%20Acreage%20Report.pdf)

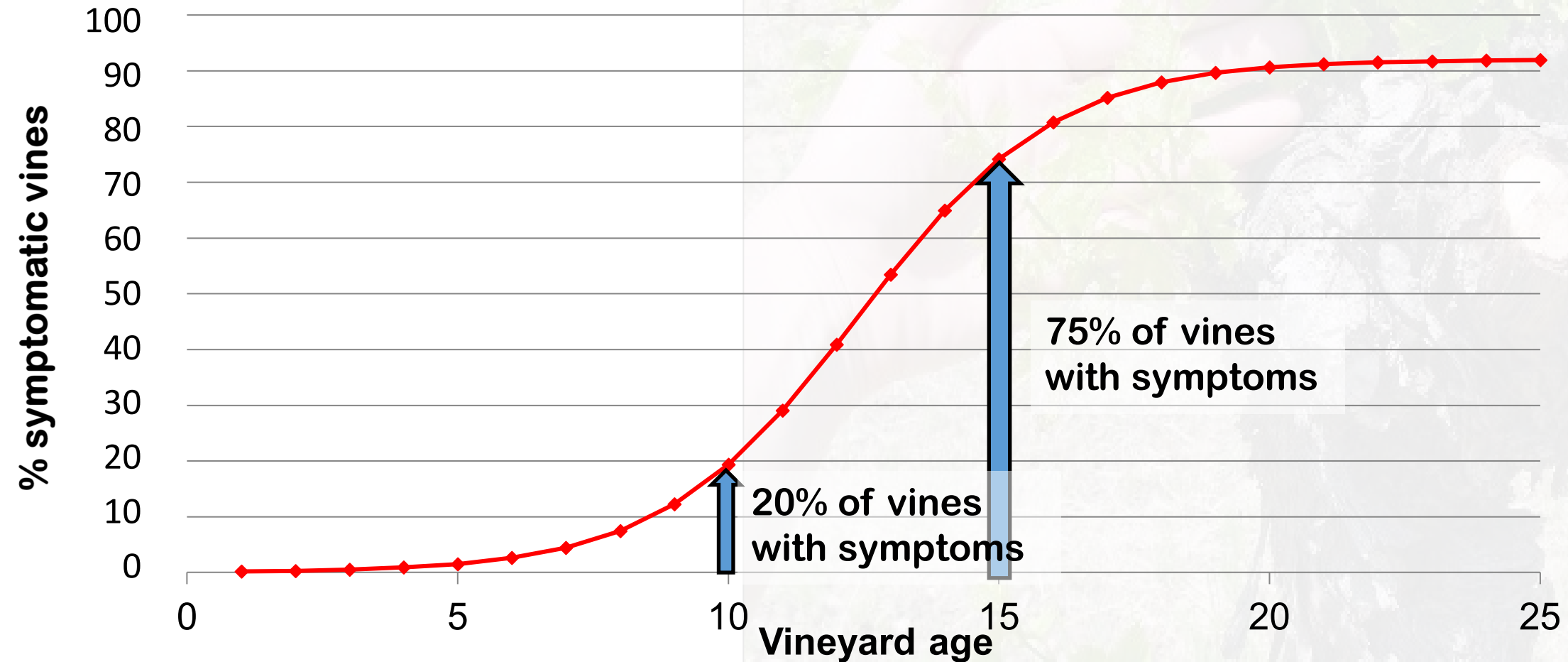
USDA/NASS, Noncitrus Fruits and Nuts 2019 Summary (June 2020)

<https://downloads.usda.library.cornell.edu/usda-esmis/files/zs25x846c/0g3551329/qj72pt50f/ncit0520.pdf>



# Disease incidence with vine age

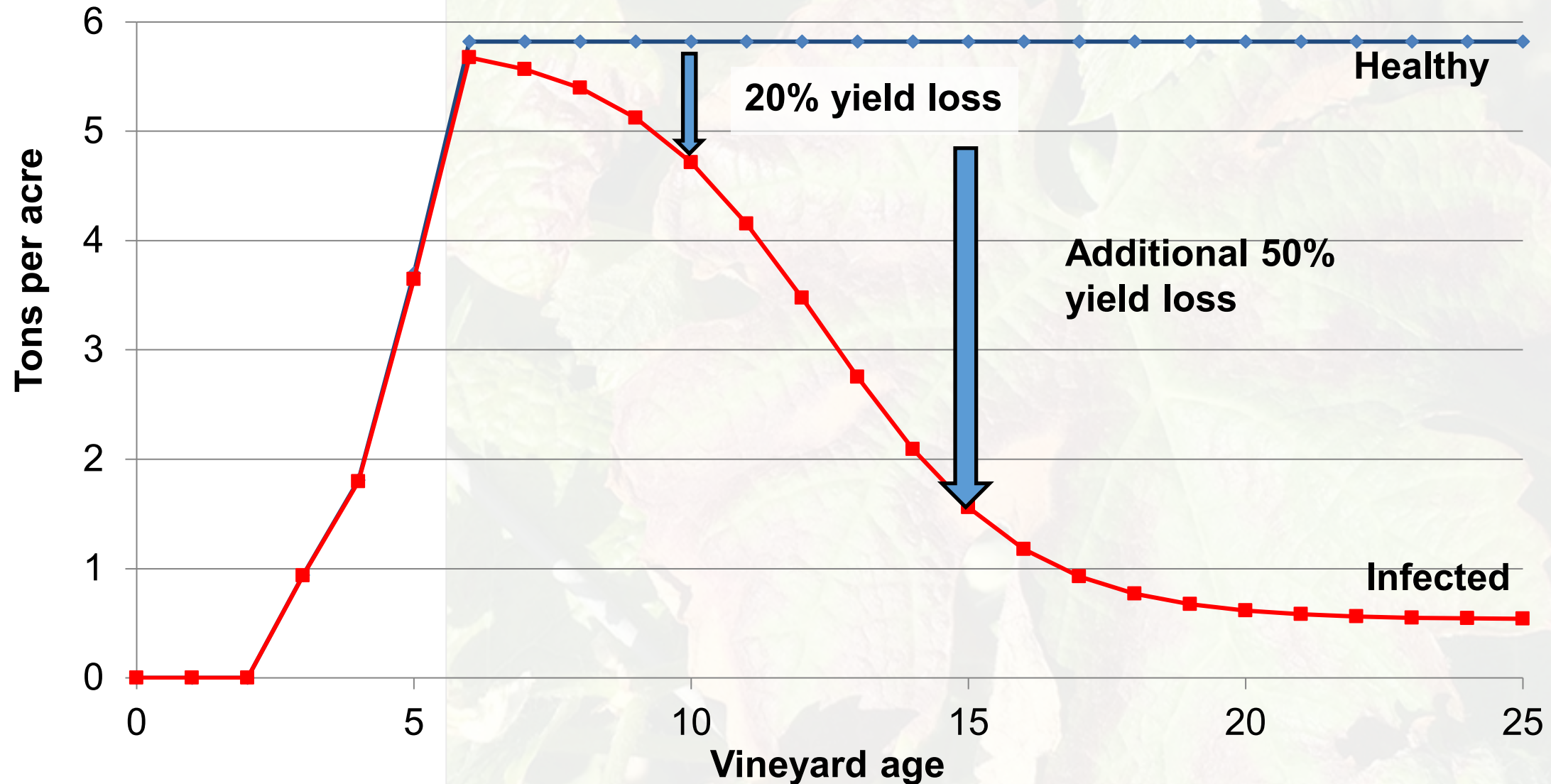
(% vines w/ dead spurs, stunted shoots, symptomatic leaves)



Source: Munkvold, Duthie, and Marios (1994). Reductions in yield and vegetative growth of grapevines due to *Eutypa* dieback. *Phytopathology*, 84(2), 186.

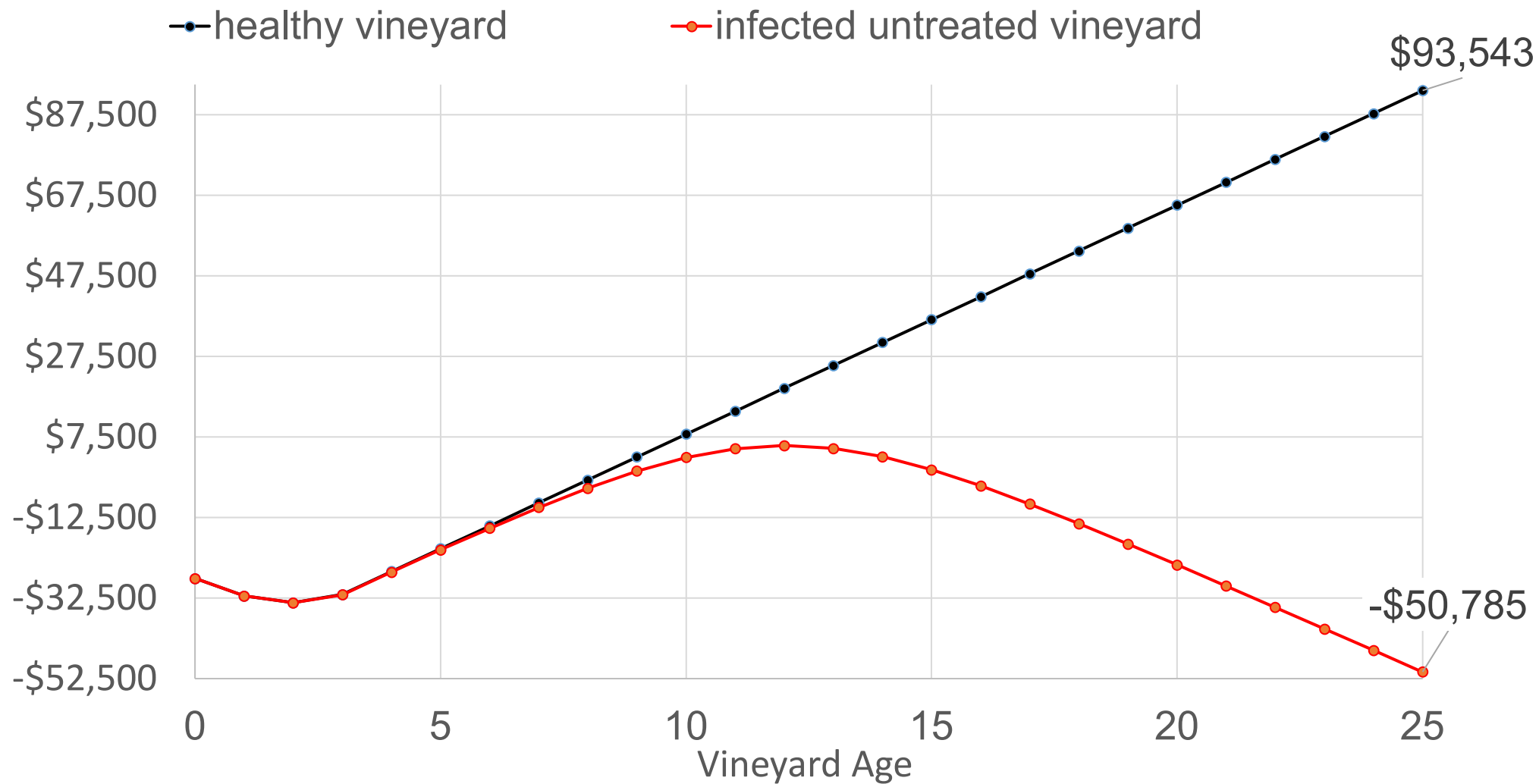


# Yield Impacts of Trunk Diseases



Source: Munkvold, Duthie, and Marios (1994). Reductions in yield and vegetative growth of grapevines due to *Eutypa dieback*. *Phytopathology*, 84(2), 186.

# Discounted Cumulative Net Returns per acre (US\$)



Kaplan J., Travadon R., Cooper C., Hillis V., Lubell M., Baumgartner K. "Identifying economic hurdles to early adoption of preventative practices: The case of trunk diseases in California winegrape vineyards." *Wine Economics and Policy*, 5(2) (2016): 127-141.



# Preventative practices

Delayed Pruning

Pruning-wound Protectants

Double Pruning



December ✖  
January ✖  
February ✔

Topsin, painted on pruning wounds

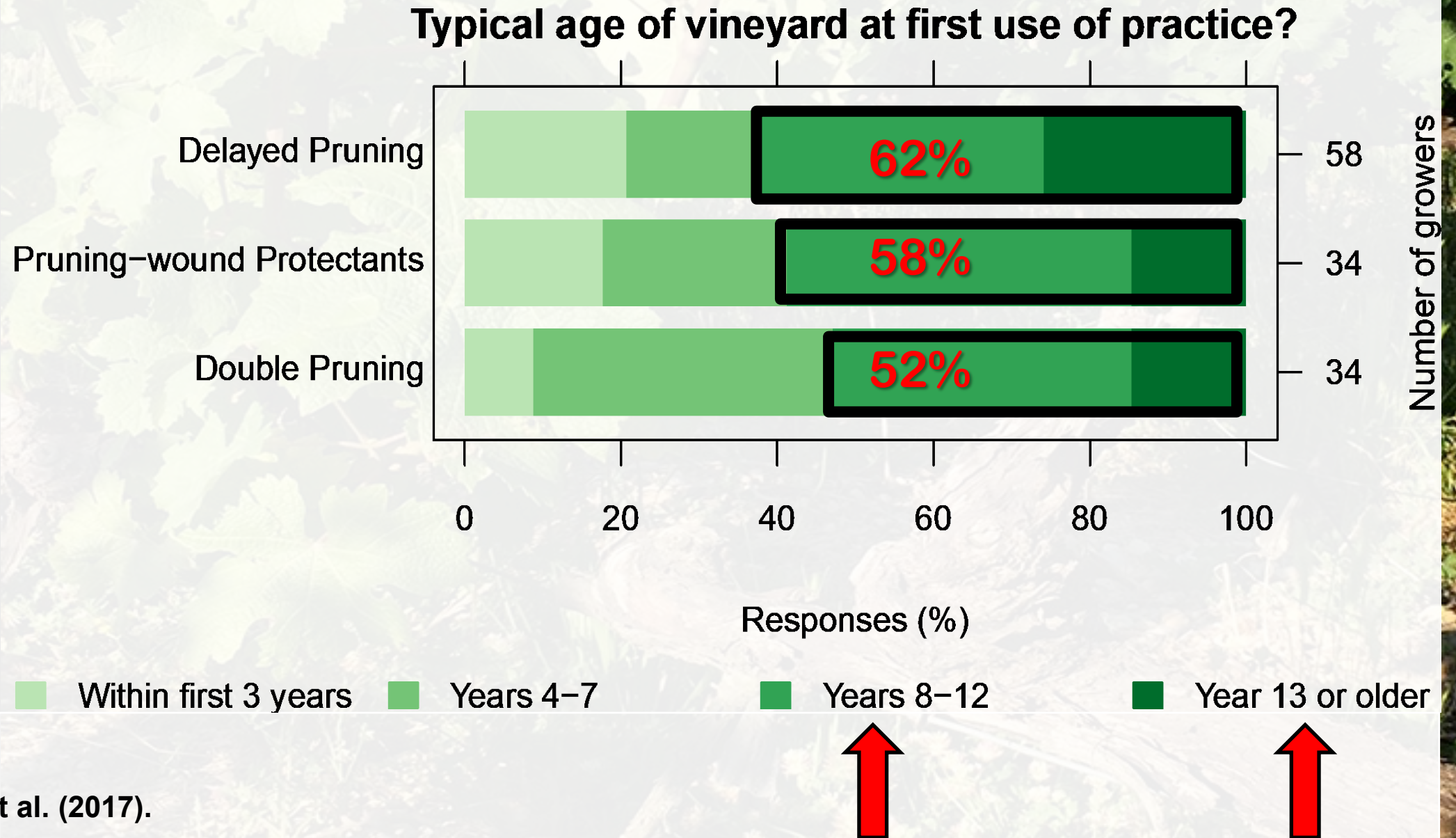
1<sup>st</sup> pass- Dec. (pre-pruning)  
  
2<sup>nd</sup> pass - Feb.

# Disease Control Efficacy

	Pruning-wound Protectant	Delayed Pruning /Double Pruning
Botryosphaeria	60 – 80%	58 – 72%
Esca	52 – 58%	28 – 87%
Eutypa	100%	75 – 97%

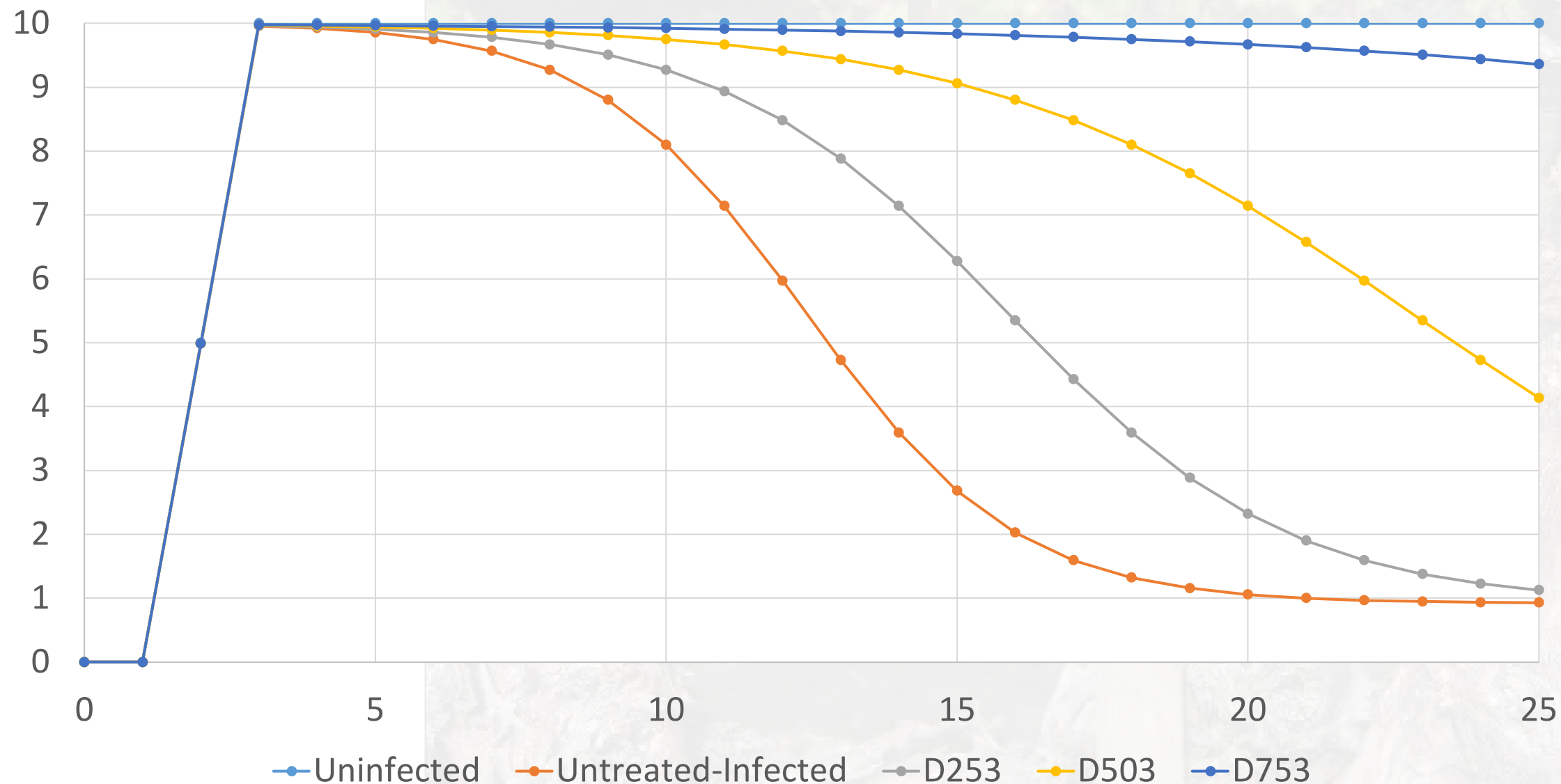
Sources: Amponsah et al. (2012), Larignon & Dubos (2000), Rolshausen et al. (2010), Urbez-Torres & Gubler (2011), Weber et al. (2007).

# Vineyard age when practice adopted



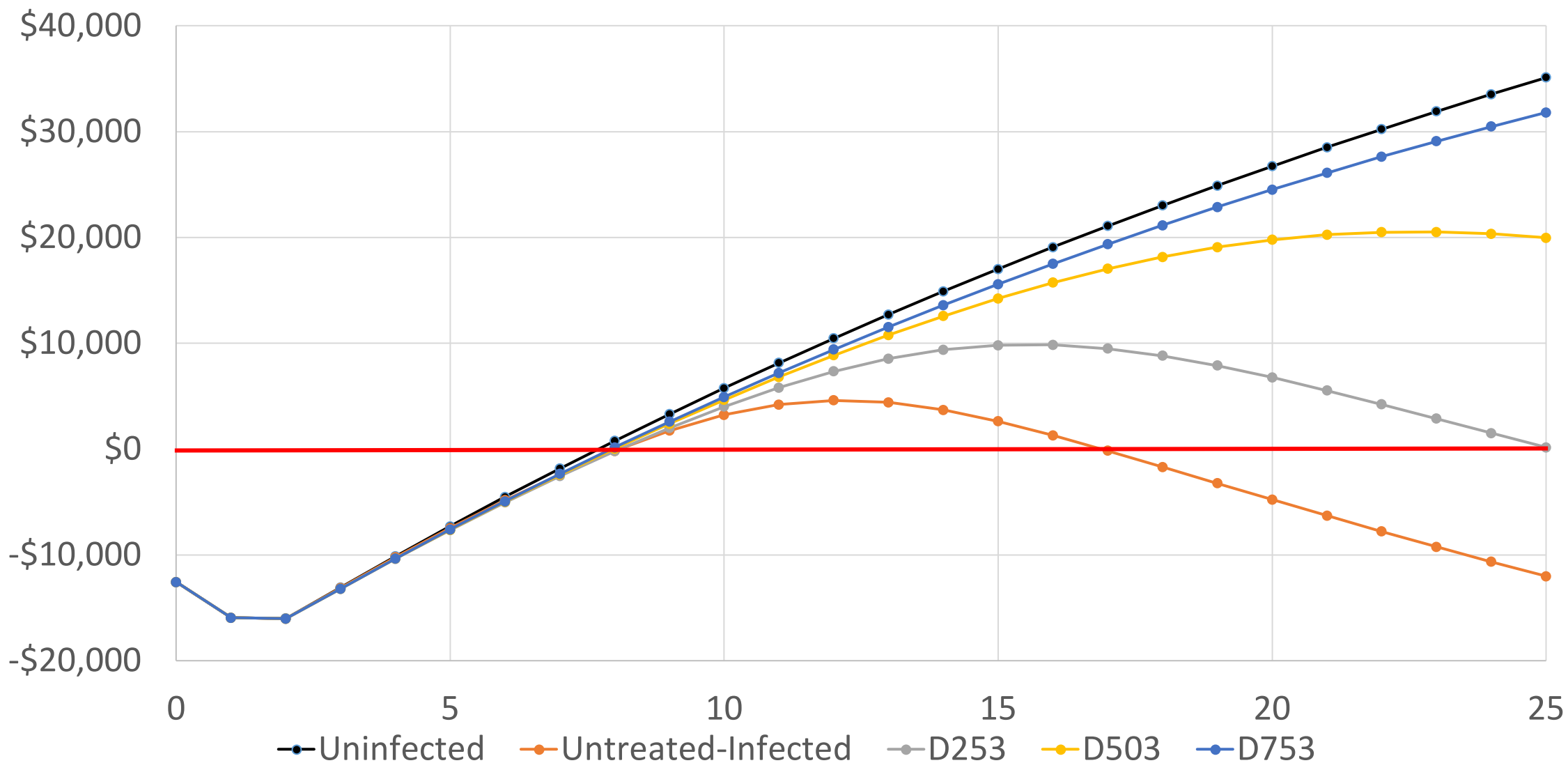


## Annual Yield (tons/acre) when Preventative Practice Adopted in Year 3



Source: Kaplan et al. (2016).

## Cumulative Discounted Net Returns/acre when pruning wound protectant use adopted in year 3.



Source: Kaplan et al. (2016).



Cumulative discounted net benefits/acre from preventative practice adoption (US\$)									
Disease Control Efficacy	Year 3			Year 5			Year 10		
	25%	50%	75%	25%	50%	75%	25%	50%	75%
Napa (4)									
Delayed Pruning	\$46,720	\$114,680	\$155,303	\$37,880	\$96,944	\$147,388	\$16,159	\$44,205	\$89,863
Topsin	\$45,614	\$113,574	\$154,197	\$36,903	\$95,967	\$146,410	\$15,472	\$43,517	\$89,175
Double Pruning	\$39,311	\$107,271	\$147,894	\$31,334	\$90,397	\$140,841	\$11,557	\$39,603	\$85,261
Northern San Joaquin (11)									
Delayed Pruning	\$12,993	\$31,892	\$43,189	\$10,534	\$26,960	\$40,988	\$4,494	\$12,293	\$24,990
Topsin	\$11,621	\$30,520	\$41,817	\$9,322	\$25,747	\$39,776	\$3,642	\$11,441	\$24,138
Double Pruning	\$8,761	\$27,660	\$38,957	\$6,795	\$23,221	\$37,249	\$1,866	\$9,665	\$22,362
Central Coast (8)									
Delayed Pruning	\$18,929	\$46,464	\$62,923	\$15,349	\$39,281	\$59,721	\$6,548	\$17,912	\$36,412
Topsin	\$16,401	\$43,937	\$60,396	\$13,116	\$37,048	\$57,487	\$4,978	\$16,342	\$34,842
Double Pruning	\$13,143	\$40,679	\$57,137	\$10,236	\$34,169	\$54,608	\$2,954	\$14,318	\$32,818
Lake (2)									
Delayed Pruning	\$12,993	\$31,892	\$43,189	\$10,534	\$26,960	\$40,988	\$4,494	\$12,293	\$24,990
Topsin	\$11,621	\$30,520	\$41,817	\$9,322	\$25,747	\$39,776	\$3,642	\$11,441	\$24,138
Double Pruning	\$8,761	\$27,660	\$38,957	\$6,795	\$23,221	\$37,249	\$1,866	\$9,665	\$22,362
Sonoma (3)									
Delayed Pruning	\$23,539	\$57,781	\$78,248	\$19,087	\$48,848	\$74,265	\$8,142	\$22,274	\$45,280
Hand painted Topsin	\$22,388	\$56,630	\$77,097	\$18,070	\$47,831	\$73,248	\$7,427	\$21,559	\$44,565
Double Pruning	\$18,347	\$52,588	\$73,056	\$14,499	\$44,260	\$69,677	\$4,917	\$19,049	\$42,055

**Last profitable year for mature vineyard**

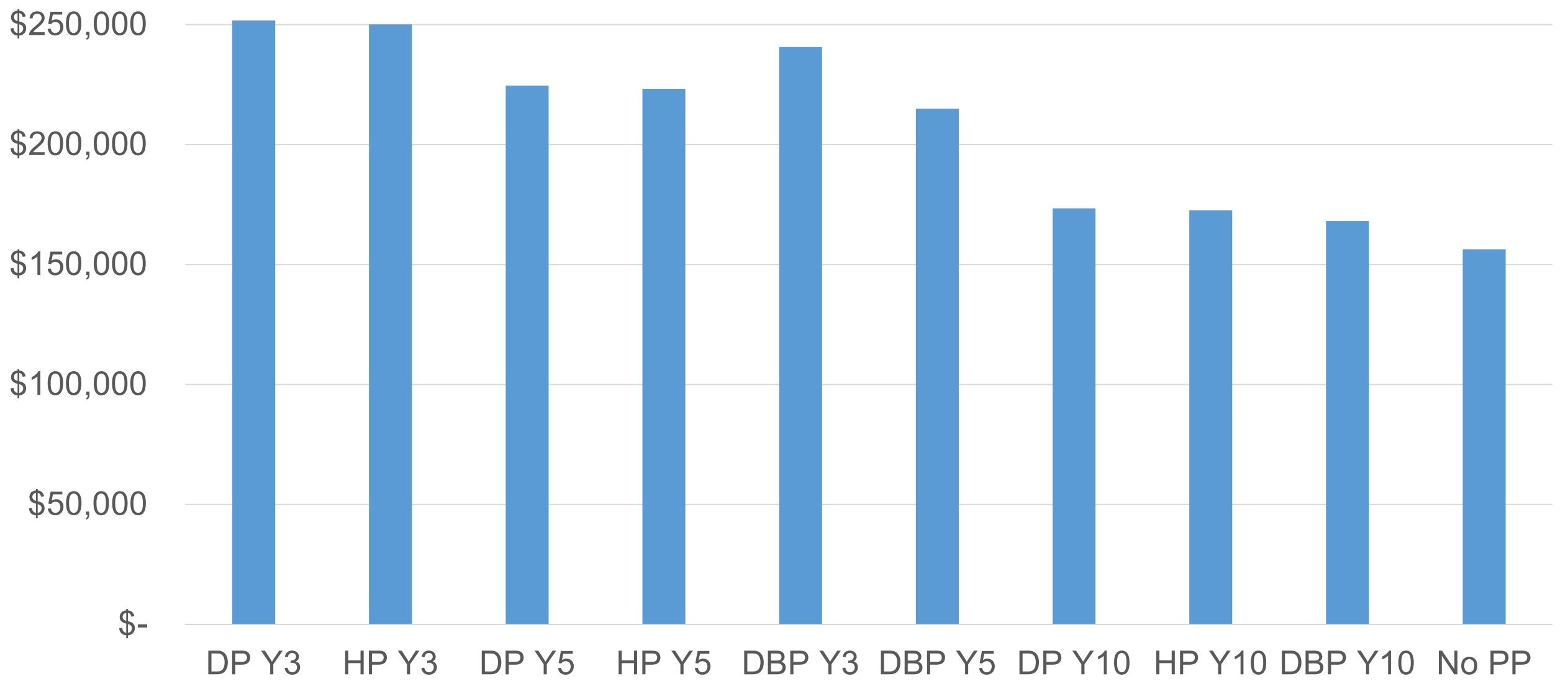
Disease Control Efficacy	Year 3			Year 5			Year 10		
	25%	50%	75%	25%	50%	75%	25%	50%	75%
Napa (4)									
Delayed Pruning	18	25	25	17	24	25	16	19	25
Topsin	18	25	25	17	24	25	15	19	25
Double Pruning	18	25	25	17	24	25	15	19	25
Northern San Joaquin (11)									
Delayed Pruning	15	22	25	15	20	25	13	15	22
Topsin	15	22	25	15	20	25	13	15	22
Double Pruning	15	22	25	14	20	25	13	15	21
Central Coast (8)									
Delayed Pruning	16	23	25	15	21	25	14	16	24
Topsin	16	23	25	15	21	25	13	16	23
Double Pruning	16	23	25	15	21	25	13	16	23
Lake (2)									
Delayed Pruning	17	24	25	16	22	25	14	17	25
Topsin	17	24	25	16	22	25	14	17	25
Double Pruning	16	24	25	16	22	25	14	17	25
Sonoma (3)									
Delayed Pruning	16	22	25	15	21	25	13	16	23
Topsin	15	22	25	15	20	25	13	15	22
Double Pruning	15	22	25	15	20	25	13	15	22



Cumulative Discounted Net Benefits/acre for Vine Surgery in Select Years for Napa with 50% DCE over 25 years (US\$)

Age	Practice	PP Only	10	11	12	13	14	15
3	DP	121,875	156,241	159,568	161,686	162,746	162,890	162,226
3	TP	120,744	155,113	158,440	160,560	161,621	161,766	161,104
3	DBP	114,249	148,637	151,969	154,095	155,164	155,319	154,669
5	DP	103,026	154,720	157,559	159,077	159,405	158,665	156,950
5	TP	102,027	153,726	156,566	158,086	158,416	157,678	155,967
5	DBP	96,288	148,018	150,867	152,397	152,739	152,017	150,324
10	DP	46,978	146,537	146,566	144,872	141,599	136,908	130,966
10	TP	46,275	145,854	145,887	144,198	140,930	136,246	130,311
10	DBP	42,241	141,932	141,990	140,330	137,095	132,446	126,549
	No PP	-	122,513	126,127	126,021	121,944	114,333	104,188

**Discounted Cumulative Net Returns/acre over 75 years for a Napa Vineyard with Complete Vine Removal two years after last profitable year and replanted with Cabernet Sauvignon (2016 US dollars and 50% DCE)**





# Conclusions

- Under all scenarios net benefits improved when preventative pruning practice or vine surgery are performed
- Although, optimal vine surgery alone may outperform the best preventative practice, preventative pruning practices and vine surgery are complementary.
- The earlier preventative pruning practices are adopted, the later vine surgery is optimal and the lower is its cost.
- A clean nursery stock is a necessary first step toward combatting GTDs.
- However, preventative practices early and vine surgery later are very much needed to allow vines to remain highly productive.