

INTRODUCTION

- Strip trials may be used to compare different management practices in adjacent vineyard rows.
- The moving window *t*-test can reveal spatial variation in the difference between two practices along a strip [1], as influenced by topography and/or soil type.
- The question remains about where to locate the strip(s) so that the trial provides the most useful information.
- We examined elevation and plant cell density (PCD) to guide trial positioning using powdery mildew data from a published whole-of-block, spatially-distributed study [2].
- The original study compared one sulfur spray (S1) with two (S2) within an organic fungicide program.

SIMULATIONS

- CSIRO's Precision Agriculture Tools (PAT) [3] were used to extract data from maps of elevation, PCD and disease severity at 2 m intervals along each of 90 N-S vine rows in a 4.5 ha block of Pinot Noir (Fig. 1).
- S1 and S2 were compared using a two-tailed moving window *t*-test applied sequentially to every 10 paired points (i.e. 20 m) along each strip.

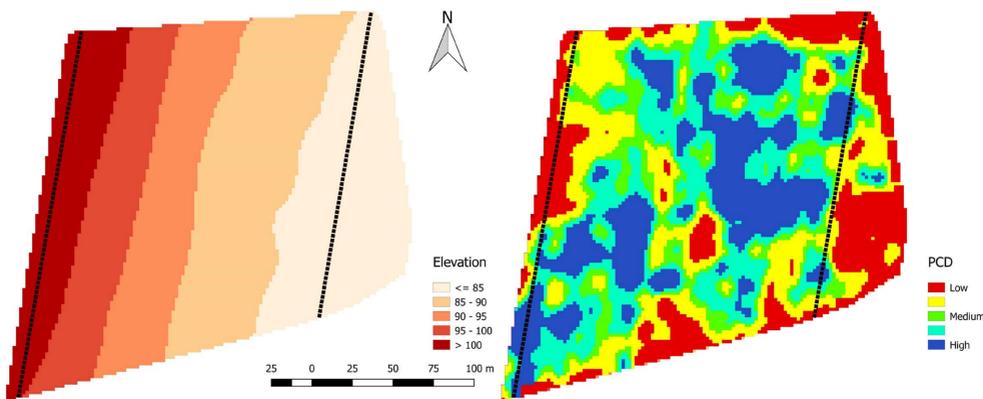


Figure 1. Variation in elevation and PCD at veriason for the 4.5 ha site. The two black lines per map indicate the two strips presented in Figure 2.

RESULTS

- S2 spray program resulted in lower disease severity than S1 for *t*-tests in all strips ($P < 0.01$).
- There was no association between disease severity and PCD (data not shown).
- Disease severity was greater at higher elevation (Fig. 2), with elevation also accounting for 84 % of the variance in the difference in disease severity between S1 and S2 (Fig. 3).

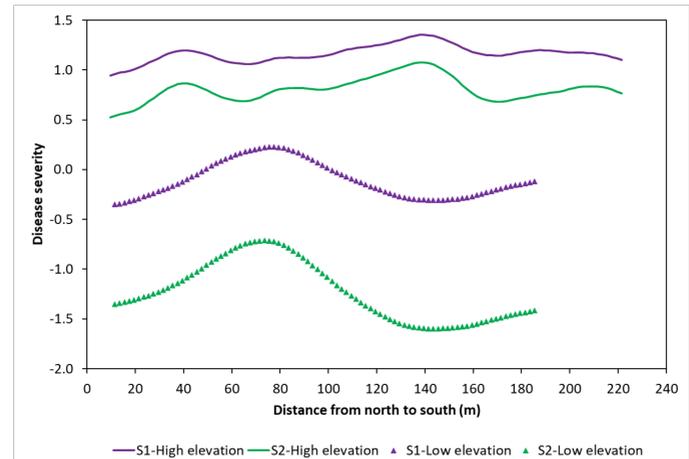


Figure 2. Spatial variation in disease severity (transformed data) along single vine rows (strips): one at higher elevation and one at lower elevation as indicated in Figure 1. The two spray programs, S1 and S2, resulted in mean whole-of-block disease severities of $3.0\% \pm 4.9$ (SD) and $1.5\% \pm 3.9$ (SD).

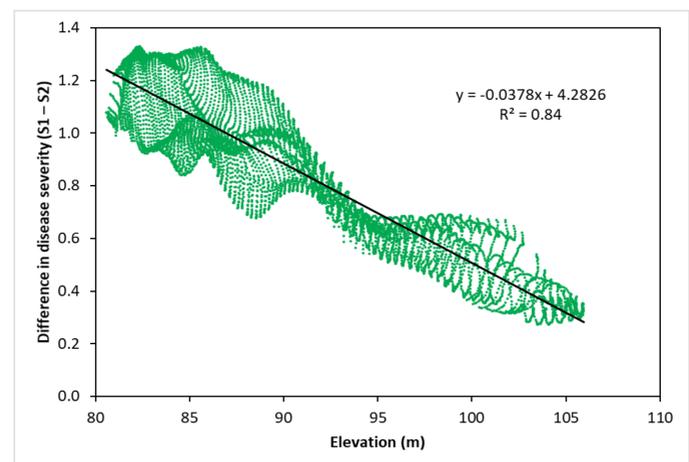


Figure 3. The association between elevation and the difference in disease severity (S1-S2) for each sample point ($n = 7,820$) within 90 vineyard rows.

CONCLUSIONS

- At this site, two strips indicated how the tested spray programs are likely to perform relative to other across the whole block.
- Elevation was a useful covariate that could assist in choosing strip locations. However, because of the row orientation at this site, more than one strip was needed to cover the elevation range and hence powdery mildew severity.
- Testing this approach for other types of viticultural trials will reveal the broader value (convenience, efficiency) relative to other designs.

FUTURE WORK

- This work forms the first part of a PhD project which will examine how diverse wine businesses do on-farm trials, and how new approaches might be valued and then enabled.
- Please contact us if you are interested in participating in this research.

References:

1. Lawes, R.A. and Bramley, R.G.V., 2012. A simple method for the analysis of on-farm strip trials. *Agronomy Journal*, 104(2), pp.371-377.
2. Bramley, R.G.V., Evans, K.J., Dunne, K.J. and Gobbett, D.L., 2011. Spatial variation in response to 'reduced input' spray programs for powdery mildew and botrytis identified through whole-of-block experimentation. *Australian Journal of Grape and Wine Research*, 17(3), pp.341-350.
3. Ratcliff, C., Gobbett, D., Bramley, R.G.V., 2019. PAT- Precision Agriculture Tools. v1. CSIRO. *Software Collection*. <https://doi.org/10.25919/5c731a813b91a>.