Control of downy mildew infection with UV-C light applied via robotic platform in field-grown grapevine for Prosecco production.

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INTRODUCTION

- There is an urgent need to develop alternative or complementary solutions for pesticides; (Pertot *et al.*, 2017)
- In grapevine the control of downy mildew (*Plasmopara viticola* - fig. 01) is critical for producing high quality wine; (Gessler *et al.*, 2011)
- Recently, a pioneering study provided evidence of the effectiveness of UV-C light at reducing the incidence of downy mildew in grapevine; (Aarouf et Urban, 2020)
- We tested the hypothesis in which the application of UV-C light may be suitable as an alternative to agrochemicals under field conditions.

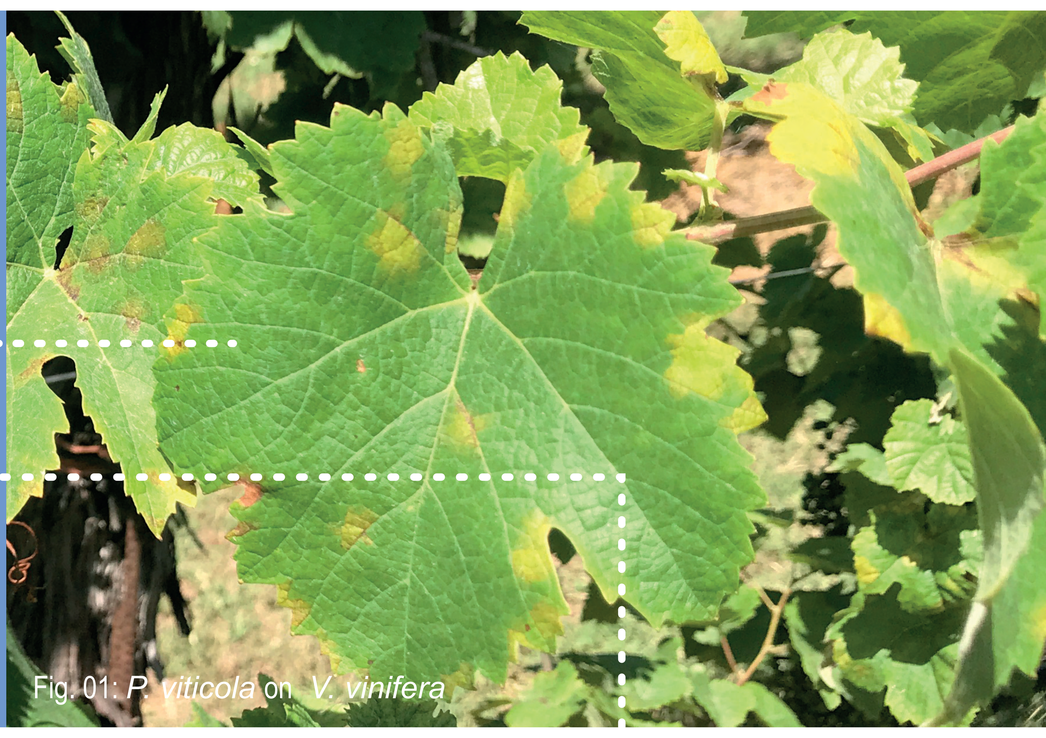

Fig. 01: *P. viticola* on *V. vinifera*

MATERIALS & METHODS

- UV-C light applied via **Thorvald™ platform** from Saga robotics™ (Fig. 02), **every four days** + after each rain ;
- Vineyard cultivar Glera for Prosecco DOC production in northern Italy.
- **Randomised block design** treatment: **UV-C light in 4 specific dosage** (approximately 250; 500; 750; 1000 J/m2*s), **agrochemical strategy** and **untreated control**;
- Agrochemicals followed the farm strategy;
- Weekly **morpho-physiological assessments** from budburst.

Fig.03: Sperimental vineyard

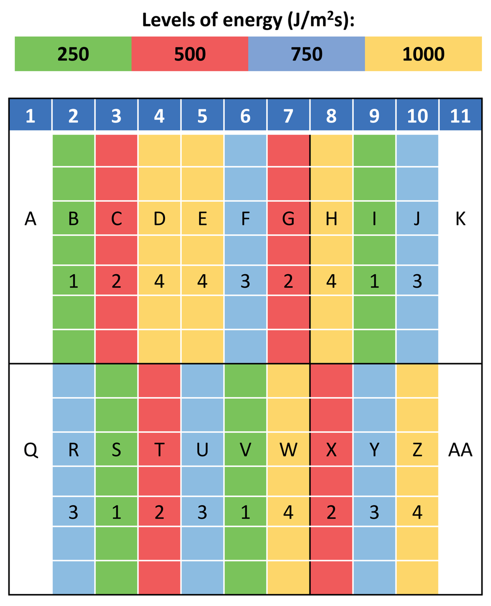

Fig.04: UV-C treatment randomization

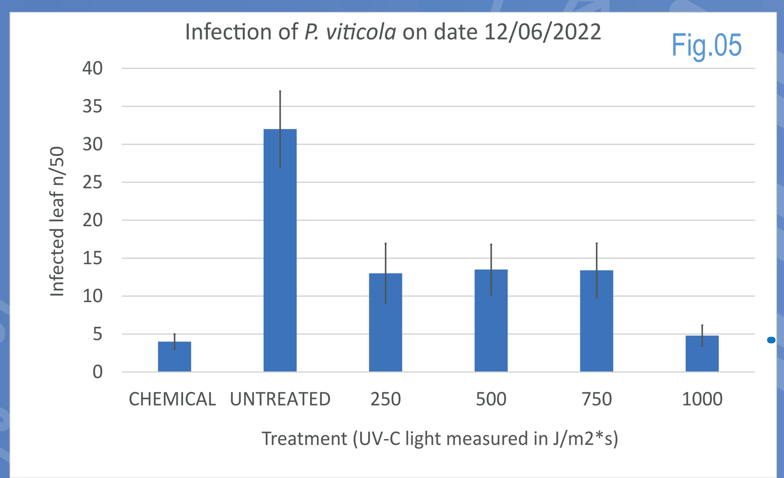

Fig.05

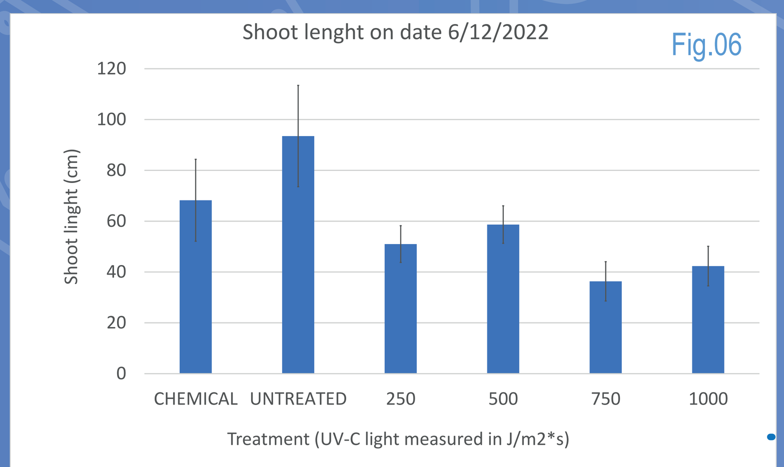

Fig.06

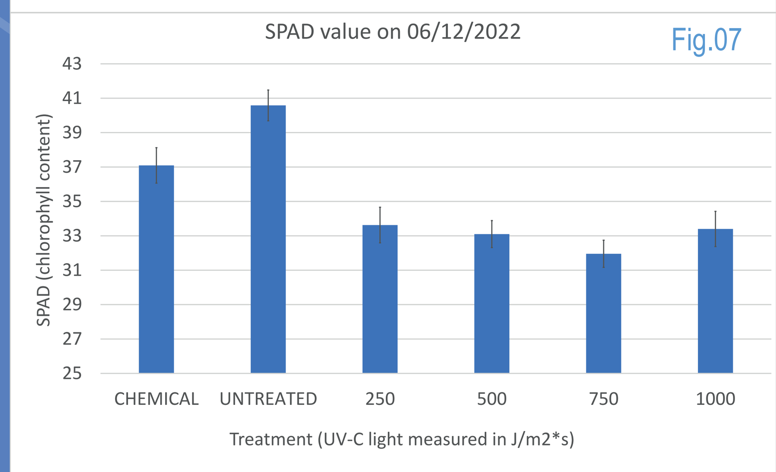

Fig.07

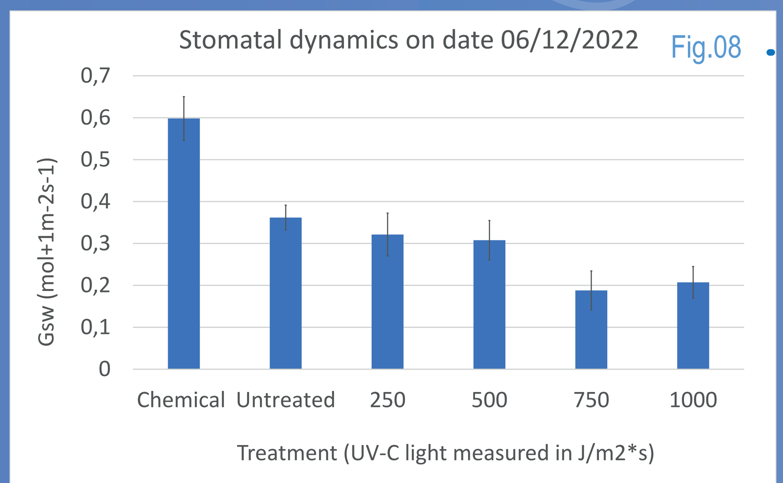

Fig.08

RESULTS

Fig. 02: Thorvald™ platform

We identified specific dosage of UV-C with promising **downy mildew suppression** up to **85%** when compared to the control untreated. (Fig. 5)

However significant effects were observed for **shoots lenght** (Fig. 6) and **SPAD values** (Fig. 7) when UV-C light was applied, suggesting a potential **detrimental role** of UV-C light on **shoot growth** (fig. 9) and **leaf chlorophyll content.**

Although the experimental work should be replicated in further field trials, we observed significant effects of UV-C on **stomatal dynamics** (Fig. 8), suggesting that the reduction in downy mildew intensity may also be associated with UV-C **induced stomatal priming.**

Fig.09: Effect of different intesities of UV-C light (J/m2*s); the intensities are an approximation.

fig.09A 250

fig.09B 500

fig.09C 750

fig.09D 1000

Fig. 10: Thorvald™ platform

CONCLUSIONS

This study provides evidence of the potential effectiveness of UV-C application in controlling downy mildew infection in grapevine.

This strategy may significantly reduce agrochemicals use in vineyard and thereby increase the sustainability of wine production.

In addition the Thorvald™ platform has been shown to be suitable for the application of UV-C treatments in commercial vineyard. Further work will focus on optimizing UV-C intensity to:
- **Better reduce DM infection via synergetic application with standard management approaches;**
- **Avoid adverse effects on shoot growth and thus yield.**

REFERENCES

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