

Response of grape leaf resveratrol levels to the application of biostimulant Foliacin

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Key words

Resveratrol, Foliacin, UV, grapes

Background

Stilbenes are a group of secondary metabolites produced by grapevines in response to various types of stresses. Attack by fungal pathogens or exposure to ultra-violet radiation are examples of such stresses which are known to lead to the production of stilbenes such as resveratrol.

Objectives

The following set of trials was designed to determine the efficacy of the product Foliacin™ in eliciting resveratrol production in grapevine leaves (cv. Pinot noir). These investigations were the:

- validation of UV radiation (254 nm) as a control treatment for eliciting resveratrol production in grapevine leaves.
- effects of Foliacin™ concentrations as leaf treatments on resveratrol production ,
- effects of different incubation times after treatment on resveratrol production,

Experimental methods

In the following trials detached leaves were treated with Foliacin™ and extracted for resveratrol. Resveratrol production was analysed by high performance liquid chromatography (HPLC), which showed ug pure resveratrol per mL sample.

Dose response trial

The following treatments were applied to grapevine leaves:

1. Foliacin™ (0.05%)
2. Foliacin™ (0.1%)
3. Foliacin™ (0.25%)
4. Foliacin™ (0.5%)
5. Foliacin™ (2%)
6. Foliacin™ (5%)
7. UV light (254 nm – positive control)

There were four replicates per treatment. Leaves were incubated in the dark at 20°C for 24 h, after which resveratrol was extracted.

Results

Dose response trial

There was a positive correlation between the concentration of Foliacin™ applied and resveratrol levels detected in leaves, as illustrated in Fig 1. Significant ($P < 0.05$) increases in resveratrol were found when increasing the concentration of Foliacin™ from 0.5% to 2% and from 2% to 5%. In comparison to leaves treated with 0.5% Foliacin™, resveratrol production was significantly higher in leaves treated with 2% Foliacin™ and the effect was more pronounced when 5% Foliacin™ was applied. Furthermore, as shown in Fig 2, 5% Foliacin™ elicited levels of resveratrol higher than did UV (2.3 ug and 1.6 ug resveratrol, respectively).

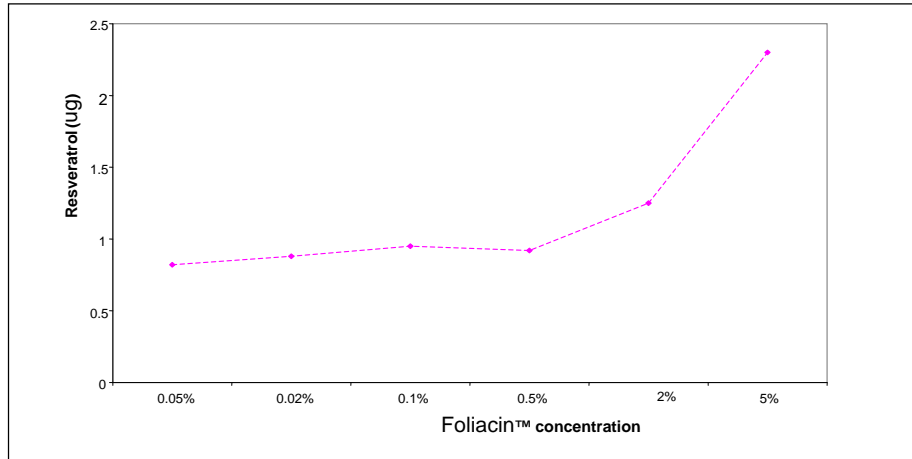


Figure 1 Dose response curve showing average resveratrol production in leaves treated with Foliacin™

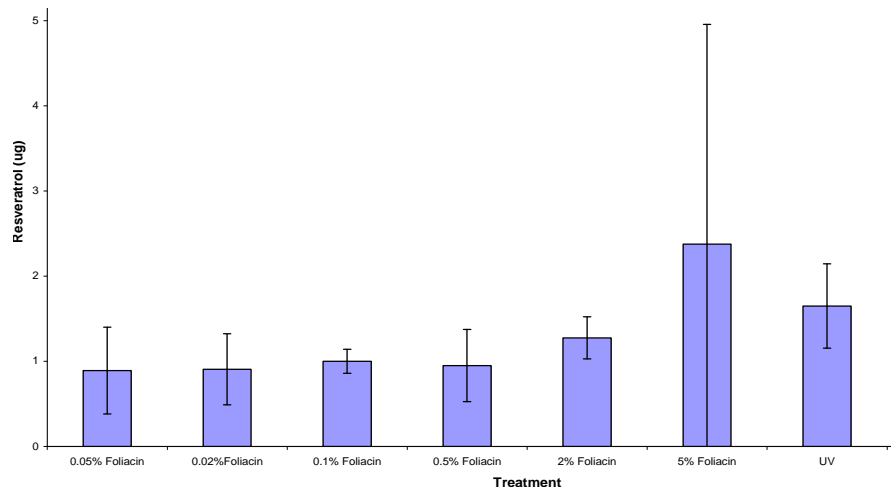


Figure 2 Effects of UV light and different concentrations of Foliacin™ on average resveratrol levels produced by leaves.

Conclusions

The following conclusions were drawn:

- The 0.5% Foliacin™ concentration was too low to elicit any significant levels of resveratrol in grapevine leaves.
- The 5% Foliacin™ concentration elicited resveratrol to the same magnitude as UV.
- The 2% Foliacin™ concentration elicited moderate quantities of resveratrol.
- The optimum time for resveratrol elicitation by UV was 4 days and by Foliacin™ was 48 h. Since Foliacin™ activity was the primary focus of the project, the incubation time for grapevine leaves in future, similar trials was set for 48 h.