

Ozone Treatments on Grape Vines

MC-100 Chlorophyll Meter



Introduction:

Chemical pesticides are widely used on grape vines to protect the plants from pests, but many growers are looking for more environmentally friendly alternatives. Ozone (O_3) gas has been suggested as an alternative pest control for the vines, but it could pose a danger in too high of quantities. This study examined the concentration and duration of ozone needed to produce systemic acquired resistance genes in the vines without affecting their health.

Set Up:

The researchers used three-year-old grafted vines in three different trials from 2019 to 2020. Three different combinations of ozone concentration and duration of treatment were tested in each trial: 1) gaseous ozone at 300 ppb for 12 hours, 2) gaseous ozone at 100 ppb for 6 hours, and 3) gaseous ozone at 100 ppb for 3 hours. After the first trial, the plants were tested with just 100 ppb for 3 hours in a second trial. After seven days, the chlorophyll of leaves in different developmental stages was measured 10 times each with an Apogee chlorophyll concentration meter.

Results:

The first two treatments visibly damaged the leaves, causing burn damage and oxidative stipple disease on their surface. The leaves in the third treatment did not have any visible damage and the parameters were used in the next trial. Most vines treated with O_3 showed an increase in damage resistance genes, but photosynthetic activity was not changed. Plants exposed to higher concentrations of O_3 were also changed structurally.

Conclusion:

These results suggest that even low, non-toxic doses of ozone can help stimulate the development of resistance-related genes in grape vines. However, the ozone concentration is directly correlated to oxidization damage to the plants. This study shows that 100 ppb of O_3 for three hours on vines is effective in stimulating SAR-related gene without damaging the plants.

Application Summary

Summary:

An Apogee chlorophyll concentration meter helped measure the effects of ozone gas on the development of grape vines.

Apogee Product Used:

MC-100 Chlorophyll Concentration Meter

Location:

Italy

Authors:

- Margherita Modesti
- Roberto Forniti
- Elena Brunori
- Fabio Mencarelli
- Andrea Bellincontro
- Pietro Tonutti

Reference Article:

Ozone treatments to induce systemic-acquired resistance in leaves of potted vines: molecular responses and NIR evaluation for identifying effective dose and exposition duration