

## Effect on grapevine cultivars

**Cultivars used for the study-** Malvasia de Banyalbufar and Giro-Ros

**Drought-** was given based on daily stomatal conductance (gs). Control -gs>200 mol.m<sup>-2</sup>.s<sup>-1</sup>; Moderate stress- gs<100 mol.m<sup>-2</sup>.s<sup>-1</sup>.

**Virus-** Inoculum is described in source article.

**Table showing net impact of combined stress over drought stress**

|                        | gs    | A <sub>N</sub> | V <sub>max</sub> | J <sub>max</sub> | gm    | TSP   | Rub/TSP | Chltotal | Cartot | T <sub>L</sub> | M <sub>A</sub> | D <sub>L</sub> | Spongy | Pallisade | f <sub>ias</sub> % |
|------------------------|-------|----------------|------------------|------------------|-------|-------|---------|----------|--------|----------------|----------------|----------------|--------|-----------|--------------------|
| <b>Malvasia</b>        |       |                |                  |                  |       |       |         |          |        |                |                |                |        |           |                    |
| <b>Combined stress</b> | 47.37 | 29.20          | 23.30            | 32.12            | 23.08 | 17.70 | -46.15  | -19.05   | -15.00 | 10.65          | 8.24           | -14.29         | 10.14  | 24.01     | 27.78              |
| <b>Virus stress</b>    | 31.58 | 31.29          | 19.65            | 20.26            | 46.15 | 20.43 | -23.08  | 33.33    | 25.00  | -23.49         | -30.71         | -8.57          | -40.09 | -10.65    | 10.19              |
| <b>Drought stress</b>  | 52.63 | 24.15          | 1.38             | 14.17            | 15.38 | 0.19  | -76.92  | 0.00     | 17.50  | -3.26          | -0.37          | 0.00           | -14.20 | 10.17     | 34.72              |
| <b>Giro-Ros</b>        |       |                |                  |                  |       |       |         |          |        |                |                |                |        |           |                    |
| <b>Combined stress</b> | 65.22 | 49.25          | 27.16            | 27.36            | 44.00 | 7.80  | 16.67   | -75.00   | -65.79 | 6.02           | 39.25          | -12.50         | 27.68  | 23.05     | 49.54              |
| <b>Virus stress</b>    | -4.35 | 11.31          | 27.92            | 14.60            | 32.00 | 13.98 | 5.56    | 12.50    | 7.89   | -4.75          | 4.21           | 8.33           | -5.01  | -2.35     | 22.15              |
| <b>Drought stress</b>  | 60.87 | 37.93          | 13.05            | 22.86            | 48.00 | 2.42  | -5.56   | -50.00   | -42.11 | -6.39          | 24.39          | 29.17          | -9.70  | -17.47    | 26.46              |

**gs-** stomatal conductance; **A<sub>N</sub>-** net photosynthetic rates; **V<sub>max</sub>-** maximum carboxylation rate; **J<sub>max</sub>-** maximum photosynthetic electron transport rate; **gm-** mesophyll conductance; **TSP-** total soluble proteins; **Rub/TSP-** Rubisco concentration/TSP; **Chltotal-** total chlorophyll; **Cartot-** total carotenoid content; **T<sub>L</sub>-** leaf thickness; **M<sub>A</sub>-** leaf mass per area; **D<sub>L</sub>-** leaf density; thickness of mesophyll layers (Spongy and Palisade); **f<sub>ias</sub> %-** mesophyll porosity.

Reference- El Aou-Ouad et al., 2016

**Note:** Values presented in the table were calculated using the formula described below.

$$\text{Reduction over control (\%)} = \frac{(\text{Value Control} - \text{Value Stress})}{\text{Value Control}} \times 100$$

- 1) '0'- indicates plant was not affected by stress as depicted by the parameter.
- 2) '1 or 100 '- indicates plant parameters affected under stress that lead to high susceptibility (higher the value more the damage).
- 3) '-1 to -100'-indicates plant parameters less/not affected under stress leading to improved resistance (higher the value lesser the damage)

**Inference from the study:** Results from Hanan et al. (2016), showed that grapevine cultivars subjected to individual *Grapevine leafroll-associated virus 3* (GLRaV-3) infection changed physiological and anatomical parameters in both cultivars, Malvasia being more affected as compared to Giro-Ros under well-watered conditions. However, no effect of GLRaV-3 infection was seen when subjected to combined stress. This clearly indicates that water potential of leaf tissue influences GLRaV-3 pathogenicity. **Overall, the observed differences between cultivars can be attributed to their genetic variability and GLRaV-3 concentration (in the plant) under both control and drought stressed condition.**