

# Protective effect of kaolin in preventing grape sunburn on Petit rouge: first results

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## Background

- ▶ Petit rouge, a native grape variety grown in the Aosta Valley (northwestern Italy), is particularly sensitive to grape sunburn, which causes partial or complete desiccation of exposed bunches.
- ▶ While grape sunburn usually occurs after the veraison in hot climates, the Petit rouge shows an almost unique sensitivity starting from the "pea-size" phenological stage until veraison.
- ▶ A well-developed canopy can protect the vine bunches from direct exposure to sunlight, avoiding or limiting grape sunburn.



- ▶ Kaolin, sprayed over the whole canopy, is often used to protect vines from damage caused by hot weather, both water stress and grape sunburn.

## Aims

- ▶ This experiment aims to assess the direct effect of kaolin on Petit rouge bunches, excluding indirect effects from whole-canopy treatments: the fruit-zone leaves were removed, to maximise the exposure of the bunches and possibly their sunburn damage.

## Methods

- ▶ The trial was carried out in four experimental vineyards at high sunburn risk.
- ▶ The experimental design was a Randomized Complete Block Design (RCBD) consisting of 3 replicates and 2 treatments: "Untreated control" and "Kaolin". The two plots of each replicate were placed on the same row, alternating treatments across replicates.
- ▶ Fruit-zone leaves were removed at "pea-size" stage, to increase bunches exposure to solar radiation and high temperatures.

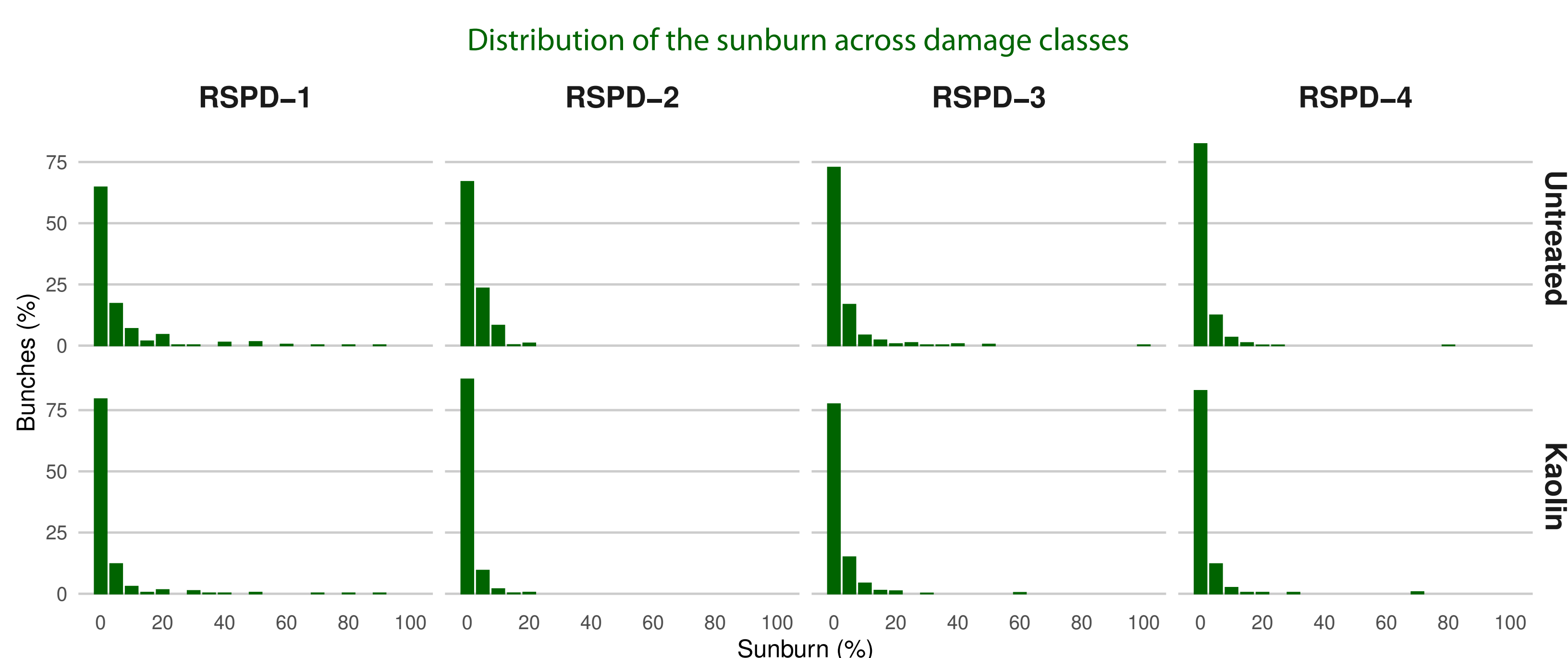
## Results and conclusions

- ▶ Despite the defoliation, the sunburn damage in 2025 was very limited, ranging from 1.6% to 4.9% for untreated plants (mean: 2.8%).
- ▶ The kaolin effect varied, with estimated burnt surfaces ranging from 0.9% to 3.8% (mean: 1.9%).
- ▶ Logistic regression analysis revealed that the kaolin effect was statistically significant ( $P < 0.001$ ) in three of the four sites. The model incorporated a covariate for plot position within experimental block (e.g. upper/lower, eastern/western). The replicate effects alone failed to account for the majority of field variability; significant positional differences persisted across all sites.
- ▶ This positional effect was particularly pronounced in RSPD-4, the only location where kaolin showed no positive impact. In this site, the berries of the lower slope exhibited a >2.5-fold increased probability of sunburn compared to those on the upper slope.
- ▶ The overall odds ratio (OR) for kaolin was 0.57 (95% confidence intervals: 0.54-0.61), indicating a 43% reduction in the chance of being burnt for the treated plants compared to the untreated ones.
- ▶ The distribution of the sunburn across damage classes, from 0% to 100% of the bunch surface, varied more among sites



- ▶ Immediately after leaf removal, the bunches of the "Kaolin" plots were sprayed with a 5% kaolin solution until fully covered.
  - ▶ The bunches were kept covered until veraison, with reapplications after significant rainfall.
  - ▶ Upon completion of veraison, the percentage of burnt surface was assessed for each bunch in the experimental unit. Data were then analysed using a GLM logistic model.
- than between treatments within locations (see histograms below): for instance, in site RSPD-2 no bunches exceeded 20% in either treatments. Conversely, in site RSPD-1, both untreated control and kaolin plots contained a few severely affected bunches.
- ▶ Data suggest that direct kaolin application on bunches may be most effective at preventing minor sunburn damage (5%-10%).
  - ▶ Extending treatments to the whole canopy alongside appropriate canopy management practices would likely result in a marked reduction of sunburn incidence, especially in years/locations with high sunburn incidence.
  - ▶ In the first-year trial, kaolin's protective effect was confirmed, albeit partially; further testing under more severe conditions is still ongoing.

Location	Sunburn damage	
	Untreated (%) Mean ± SD	Kaolin (%) Mean ± SD
RSPD-1	4.9 ± 2.3	3.8 ± 2.1
RSPD-2	2.3 ± 1.3	0.9 ± 0.6
RSPD-3	2.8 ± 2.0	2.0 ± 0.3
RSPD-4	1.6 ± 0.6	1.2 ± 0.6
OVERALL	2.8 ± 3.2	1.9 ± 2.5



Effect of Kaolin treatments: odds-ratio table				
Location	OR	CI (low)	CI (high)	P
RSPD-1	0.38	0.34	0.43	<0.001
RSPD-2	0.35	0.29	0.41	<0.001
RSPD-3	0.65	0.59	0.73	<0.001
RSPD-4	1.14	0.98	1.32	0.090
OVERALL	0.57	0.54	0.61	<0.001

Positional effects within the replicate: odds-ratio table				
Location	OR	CI (low)	CI (high)	P
RSPD-1	0.52	0.46	0.58	<0.001
RSPD-2	0.75	0.63	0.88	<0.001
RSPD-3	0.82	0.73	0.91	<0.001
RSPD-4	2.43	2.09	2.83	<0.001

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