

# APPLICATION OF A FLUORESCENCE-BASED METHOD TO EVALUATE THE RIPENING PROCESS AND QUALITY OF PINOT BLANC GRAPE

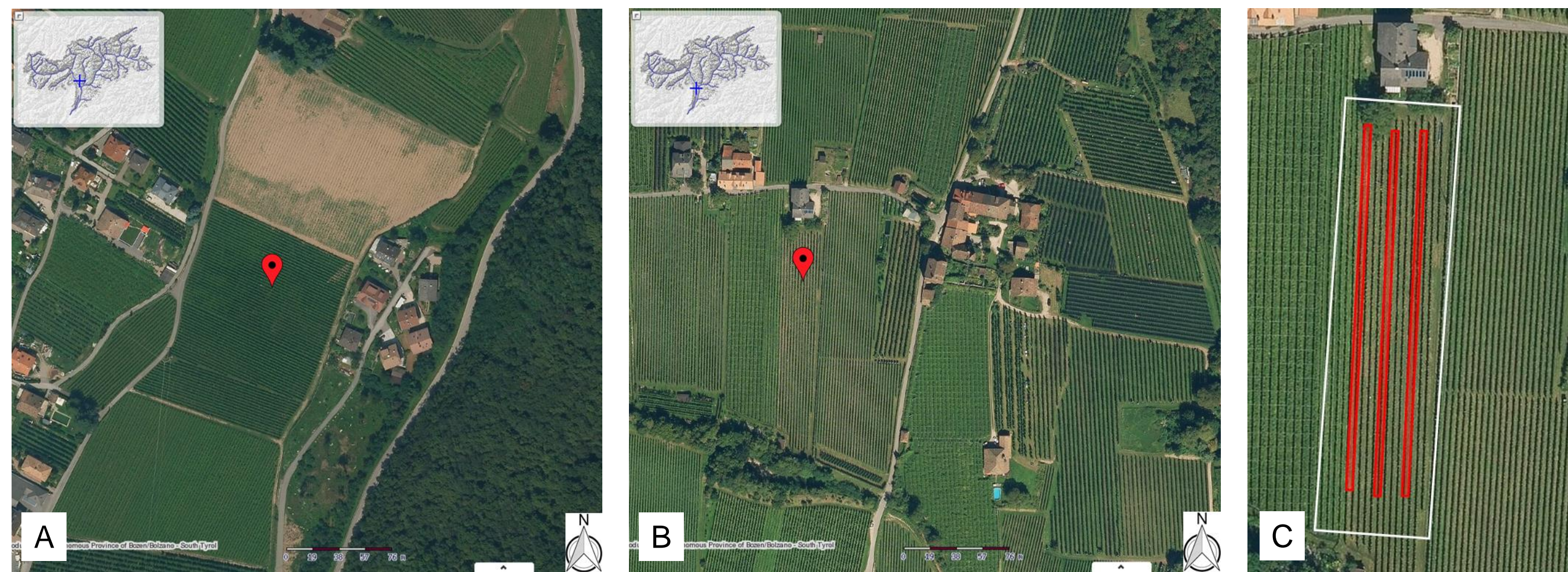
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**Introduction** – The grape berry quality depends on its chemical composition, which is related to the cultivar and vineyard's factors (Mattivi *et al.*, 2006). Among the different chemical classes that characterize the grape juice, flavonoids contribute to the final taste, stability and color of wines (Winkel-Shirly, 2002). Recently, an innovative portable optical sensor based on fluorescence non-destructive measurement has been developed to estimate maturity parameters of red grape varieties through the evaluation of berry skin anthocyanin content (Agati *et al.*, 2003). However, only few studies regarding the application of this method on white grape varieties are reported (Ferrandino *et al.*, 2017).

The aim of the present study was to assess the ripening process and berry quality of Pinot blanc grape by fluorescence-based sensor.



**Figure 1:** Vineyards under study. A) Terlan, rows east-west oriented; B) Eppan, rows north-south oriented. C) example of sampling plan for Multiplex® measurements: three selected rows in the field plot, grape clusters were flashed on both sides of the row.

**Materials and methods** – The study included two vineyards of cv. Pinot blanc located in the Adige valley, Eppan and Terlan respectively (Fig. 1). The two vineyards differ in the grape-row orientation and sun-light exposure of the grape clusters. The trend of grape phenolic maturity was assessed on the skin of intact berries using the commercial optical device Multiplex® 3.6 (Force-A, Orsay, France) (Fig. 2). The spectroscopic indices of flavonols (FLAV\_UV) and chlorophyll (SFR\_R) contents were considered.



**Figure 2:** Fluorescence-based sensor, Multiplex® 3.6, Force-A, Orsay, France.

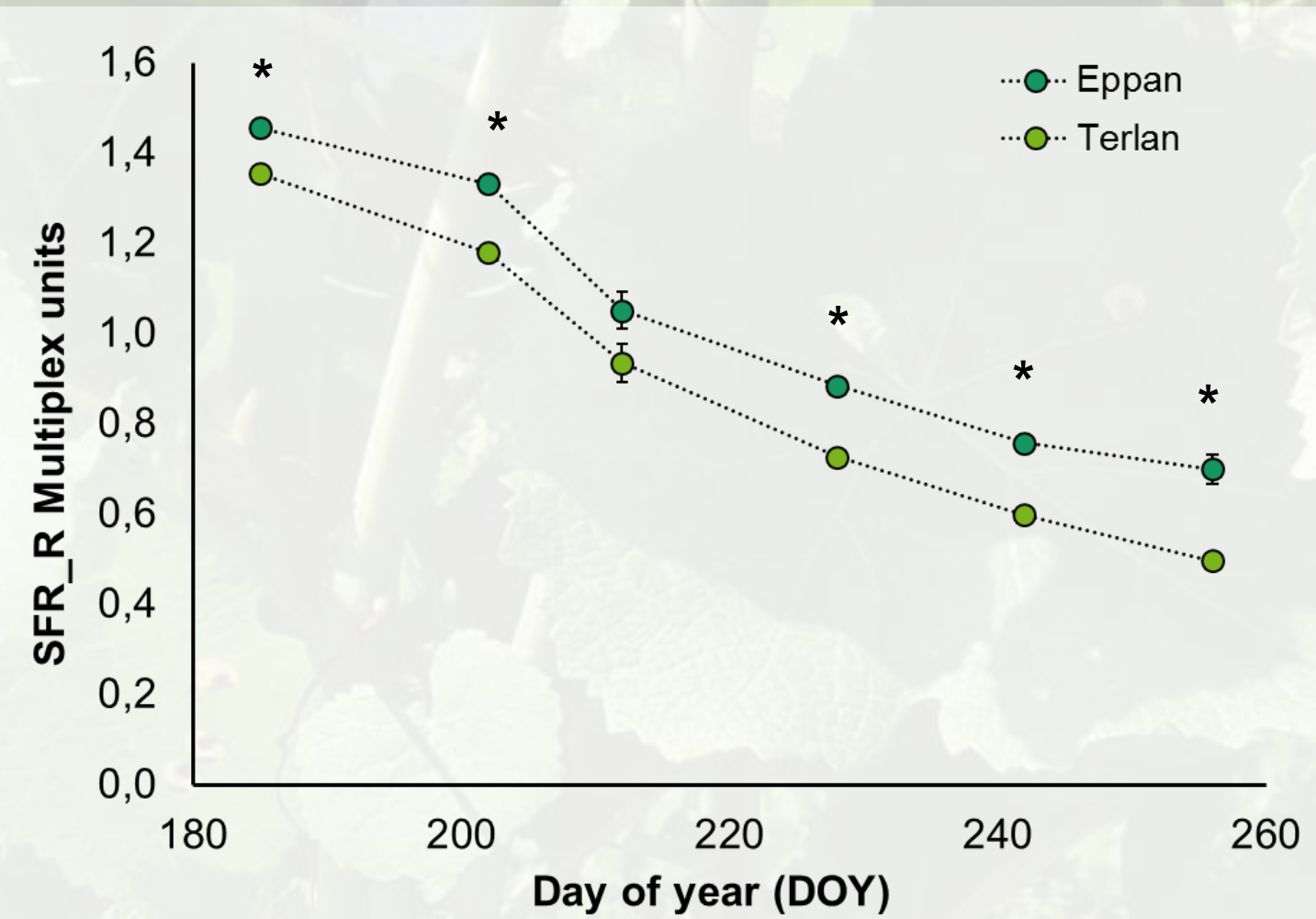
Sampling plan (Fig.1):

- 2 consecutive vintages (2017-2018)
- 6 samplings from clusters-closure to grape maturity
- 3 rows per each vineyards
- 50 grape clusters per each row flashed

Standard grape maturity tests were performed to assess total soluble solids (TSS) and total acidity content of the grape juice by (FT-IR WineScan, FOSS, Denmark). At maturity, the grapes were processed with a standard vinification protocol for white wines. Total polyphenolic content of wines was determined by Hyperlab wine analyzer (Steroglass, Italy).

## Results

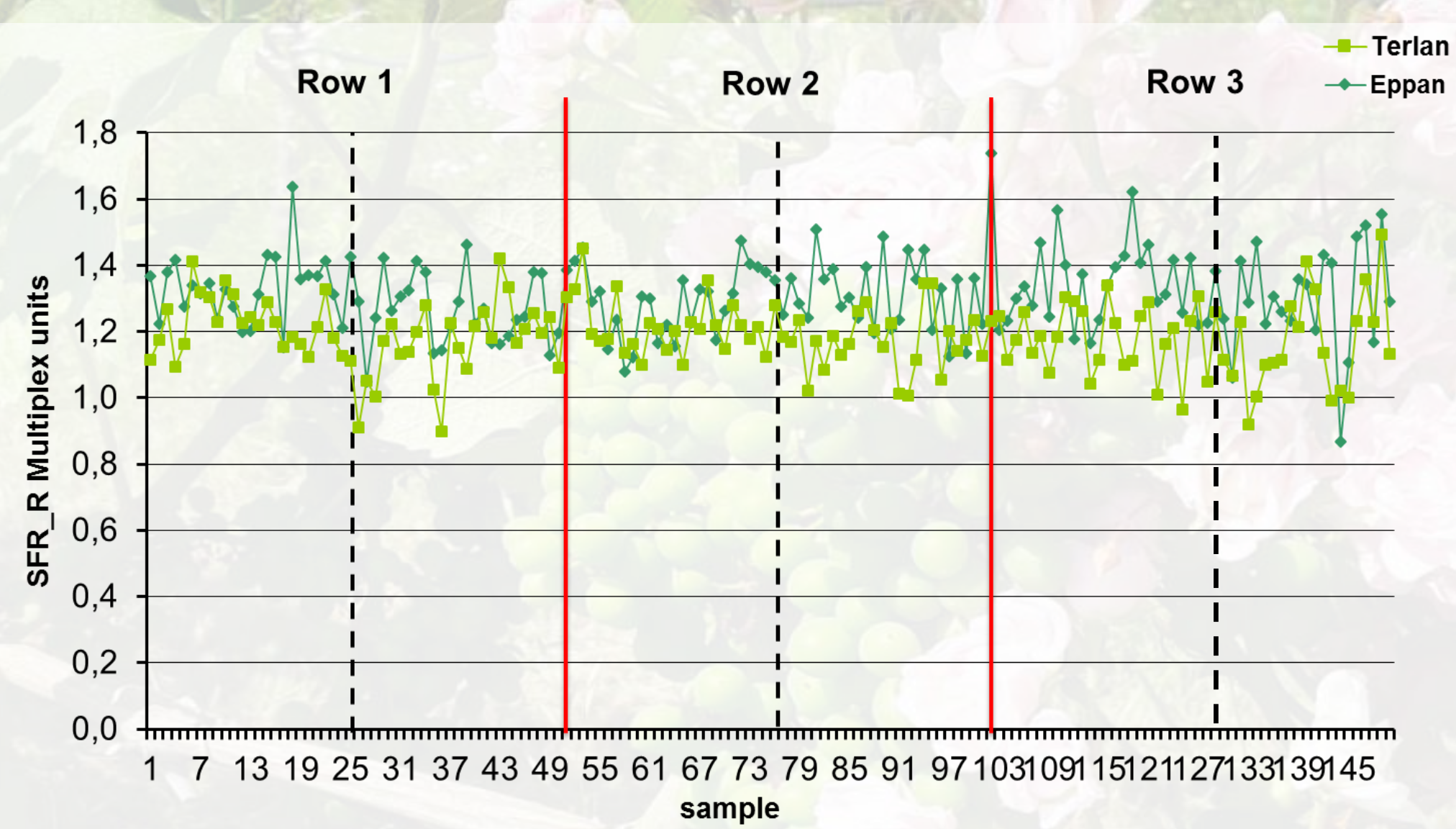
### CHLOROPHYLL index SFR\_R = FRF\_R/RF\_R



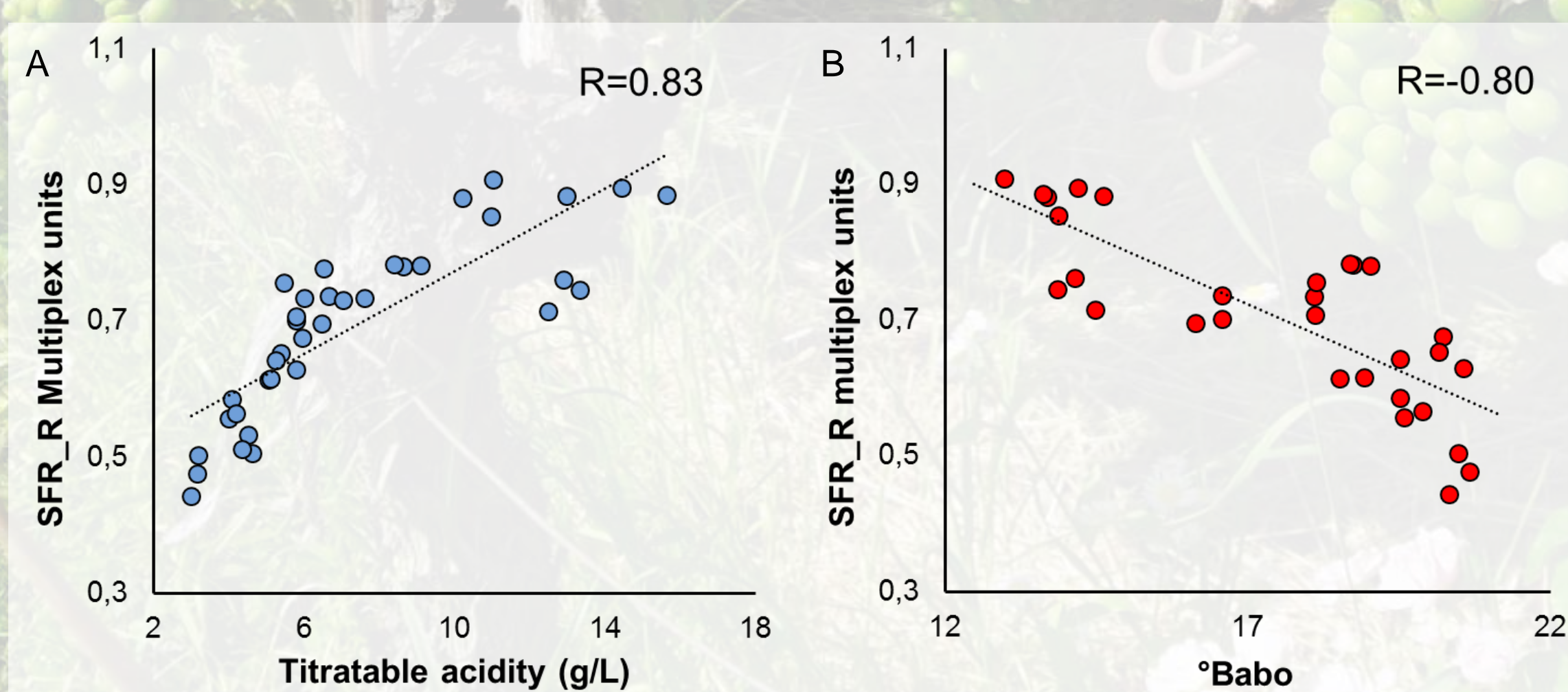
The results showed a decrease of chlorophyll index SFR\_R during the berry ripening process in both the vineyards studied. The two SFR\_R curves showed the same chlorophyll degradation trend (Fig. 3).

**Figure 3:** Chlorophyll index curves. Each point shows the mean  $\pm$  standard error of six samplings done in two consecutive vintages at the same day of the year (DOY). Asterisks indicate values that significantly differed according to Student's *t*-test,  $\alpha=0.05$ .

The berry skin values of SFR\_R index did not differ between the row-side and grape-clusters sun-light exposure (Fig. 4).



**Figure 4:** Example of a complete Multiplex® measurement of SFR\_R index. The graph shows the data of each single grape-cluster measure done in Terlan and Eppan. Red lines divide the three rows and black lines divide the two site of each row (north-south in Terlan and east-west in Eppan).

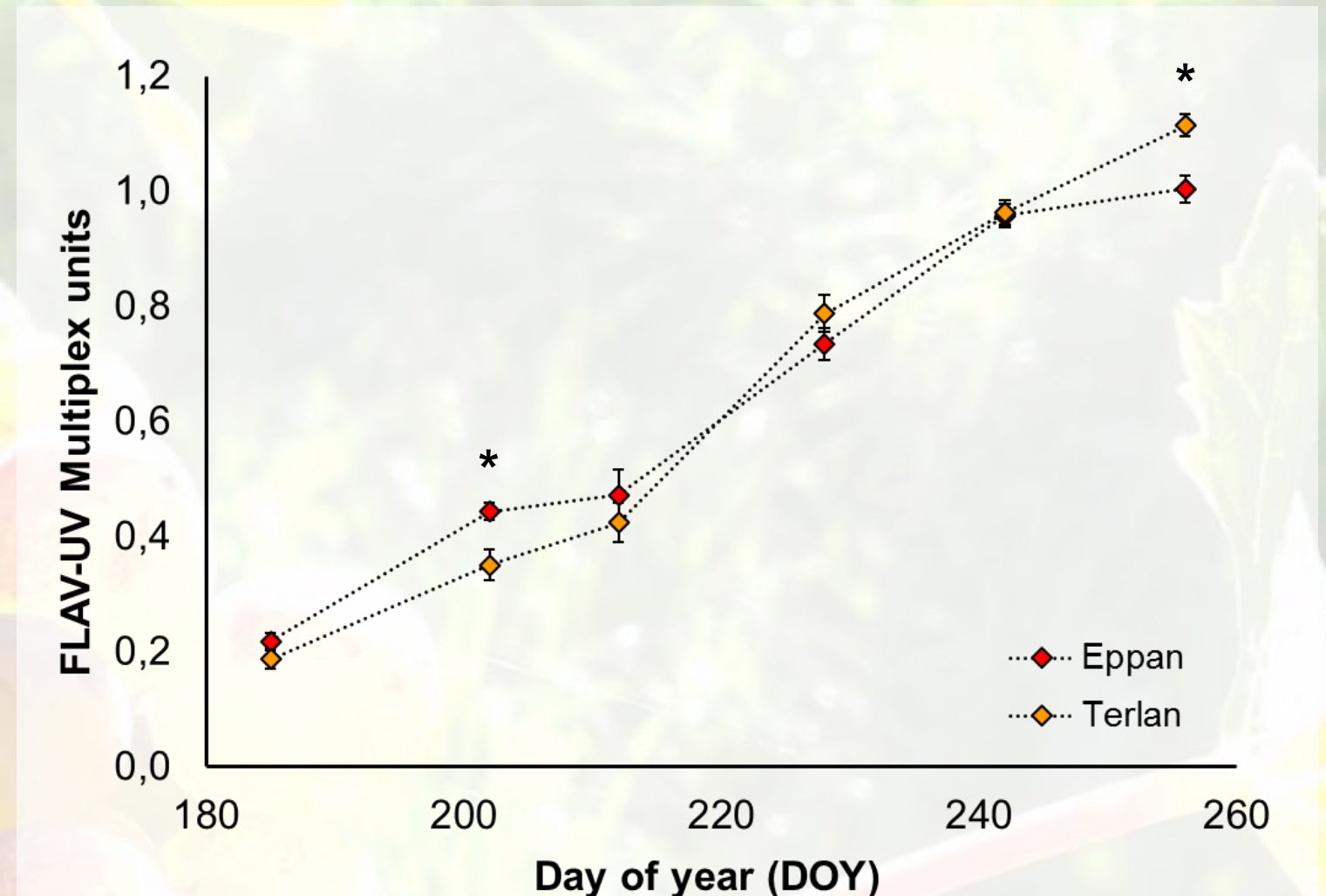


**Figure 5:** Scatter plots between a) Titratable acidity (g/L); b) Total soluble solid (°Babo). Pearson correlation test was applied to the data.

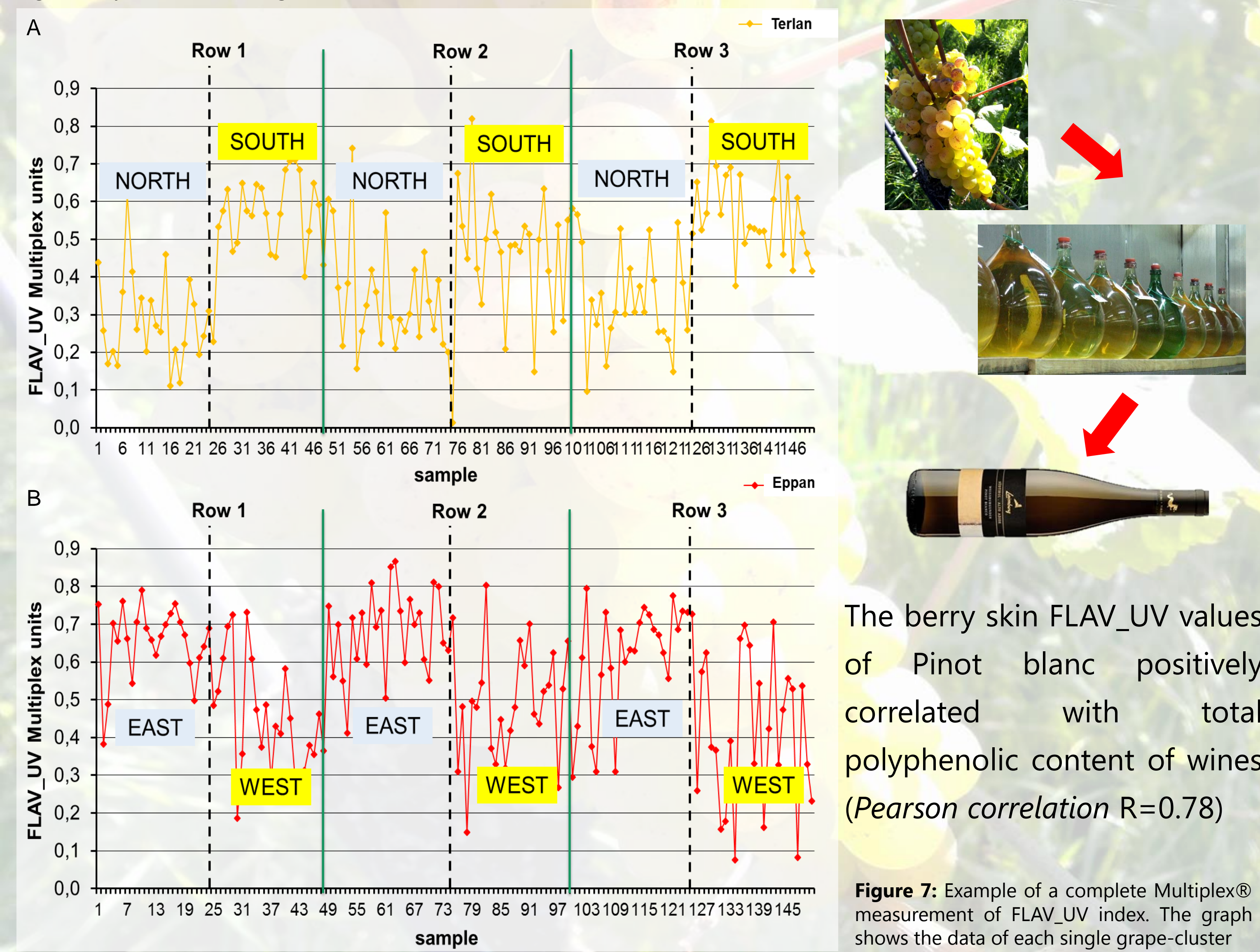
The SFR\_R index positively correlated with titratable acidity and total soluble solid (°Babo) of cv. Pinot blanc berry juice (Fig.5).

### FLAVONOLS index FLAV\_UV = log(1/FRF\_UV)

The results showed an increase in flavonols index FLAV\_UV during the berry ripening process. A significant difference in FLAV\_UV index at harvest is showed (Fig. 6). The FLAV\_UV index significantly differed according to the grape clusters sun-light exposure (Fig. 7).



**Figure 6:** Flavonols index curves. Each point shows the mean  $\pm$  standard error of six samplings done in two consecutive vintages at the same day of the year (DOY). Asterisks indicate values that significantly differed according to Student's *t*-test,  $\alpha=0.05$ .



**Figure 7:** Example of a complete Multiplex® measurement of FLAV\_UV index. The graph shows the data of each single grape-cluster measurement done in Terlan (A) and Eppan (B). Lines divide the three rows and black lines divide the two site of each row (north-south in Terlan and east-west in Eppan).

The berry skin FLAV\_UV values of Pinot blanc positively correlated with total polyphenolic content of wines (Pearson correlation  $R=0.78$ )

**Conclusion** – In conclusion, the Multiplex® indices can improve precision viticulture strategies (implementation of precision harvest practices or canopy management). The SFR\_R index permits an indirect evaluation of ripening process of white grapes in term of grape sugar content and acidity, while FLAV\_UV index can provide useful indications to winemakers about the taste of final product, especially in the case of vinification with maceration process. Future studies will be necessary to better correlate the FLAV\_UV values and the flavours of white wine.

### Acknowledgments

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