"PIWI" GRAPE VARIETIES AUTHORIZED IN TRENTINO: 3 YEARS OF OBSERVATIONS (2023-2025)

Dall'Agnol N., Zuanazzi M., Gelmetti A.

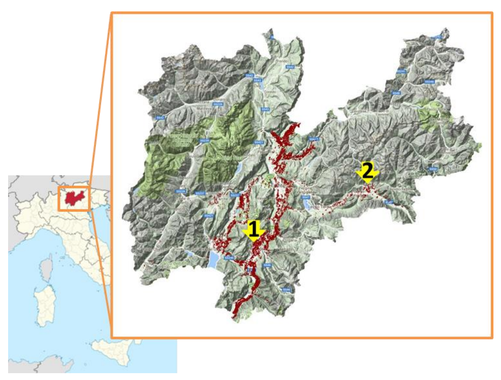
FONDAZIONE E. MACH, Via Mach 1, 38010, S. Michele all'Adige, Italia

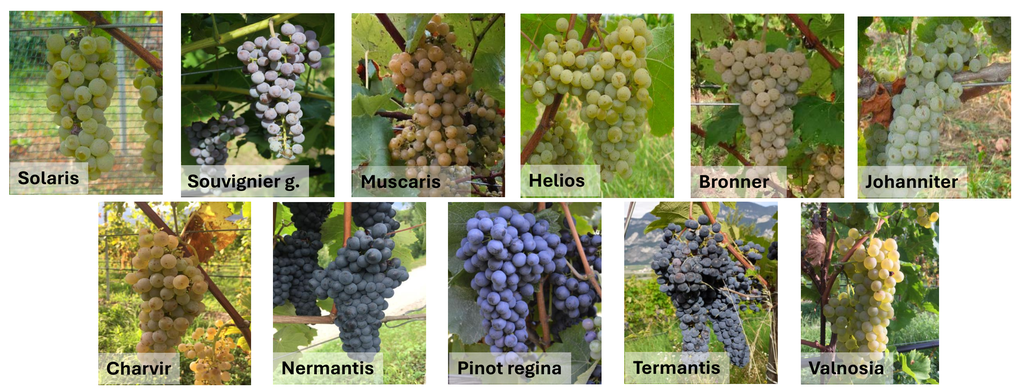
Introduction and objectives

In recent years, in Trentino, the vineyard area dedicated to resistant varieties resulting from interspecific crosses (called PIWI) has increased significantly. Specifically, an analysis of the provincial vineyard register shows that 123 hectares were officially registered in 2025, an increase of over 50% compared to 2019. The most widely planted varieties are Solaris (51.4 ha), Souvignier Gris (20 ha), and Johanniter (18.1 ha). In the last wine year, PIWI grape production from wineries belonging to the Consorzio Vini del Trentino amounted to 4000 quintals. Currently, 11 resistant varieties are permitted in Trentino, registered as "varieties under observation": Bronner, Helios, Johanniter, Muscaris, Solaris, Souvignier Gris (from the State Wine Institute of Freiburg, Germany), Pinot Regina (University of Pécs, Hungary), and Charvir, Valnosia, Nermantis, and Termantis (E. Mach Foundation, Italy).

Materials and methods

- Plant material: 11 resistant varieties (PIWI).
- Experimental sites: 2 vineyards in Trentino with different elevations:
  1. Rovereto – Navicello (170 m a.s.l.);
  2. Telve – Pasquaro (470 m a.s.l.).
- Study period: 3-year observation (2023–2025).
- Data collection:
  1. phenology;
  2. agronomic parameters;
  3. phytosanitary assessment;
  4. grape composition.





Results

1. **Phenology** (2023-2025): a general delay of approximately 7 days was observed in the mid-hill site (Telve) compared to the valley floor site (Rovereto). The resistant varieties generally exhibited a shorter cycle (from bud break to technological ripeness) compared to the reference variety, Chardonnay. On average, PIWIs showed a 4-day delay in bud break but reached the target sugar content (18 °Brix) 11 days earlier than Chardonnay. Solaris recorded the shortest cycle (115 days) while Charvir had the longest (133 days) (Fig. 1).
2. **Agronomic parameters** (Rovereto vineyard 2023-2025): the average budbreak rate for resistant varieties was 81.5%, slightly lower than Chardonnay 85.5% (Fig. 2). Similarly, the average actual fertility was 1.53 (bunches/shoot) compared to 1.67 for the reference. Notably, Solaris (1.84) and Bronner (1.71) showed the highest cluster counts, while Valnosia (1.14) and Nermantis (1.29) were significantly lower (Fig. 3).

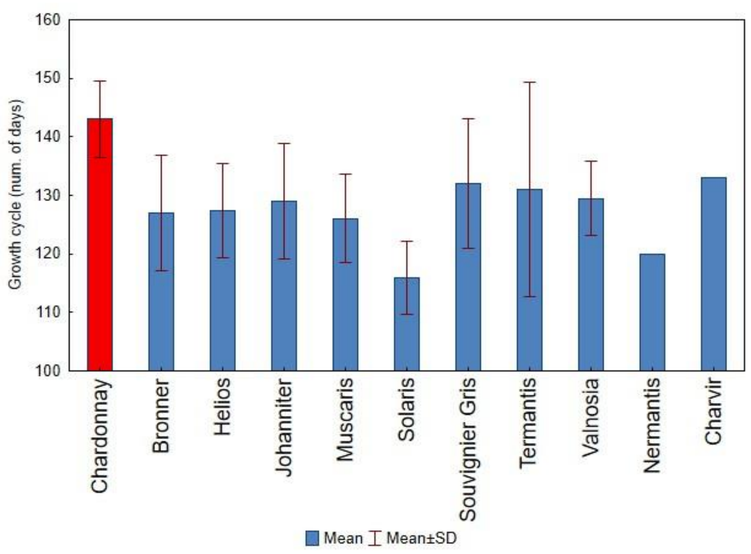


Fig. 1: Growth cycle of Piwi grapevines varieties compared to Chardonnay

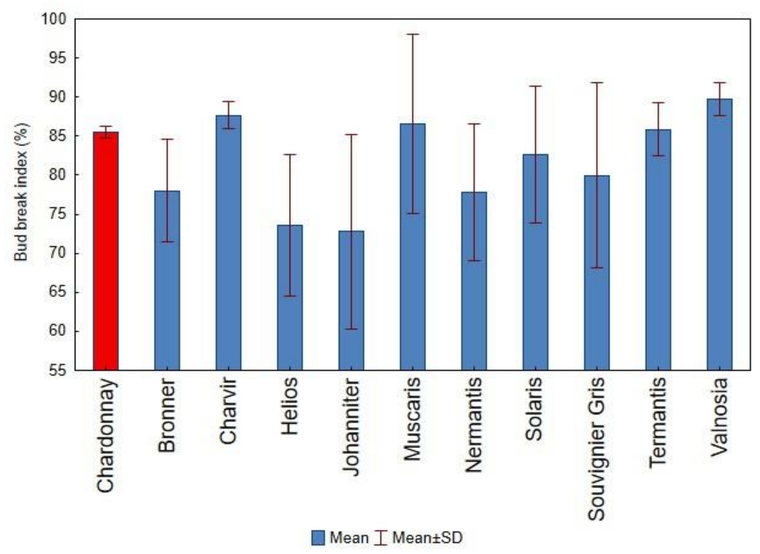


Fig. 2: Grapevine bud break index compared to Chardonnay

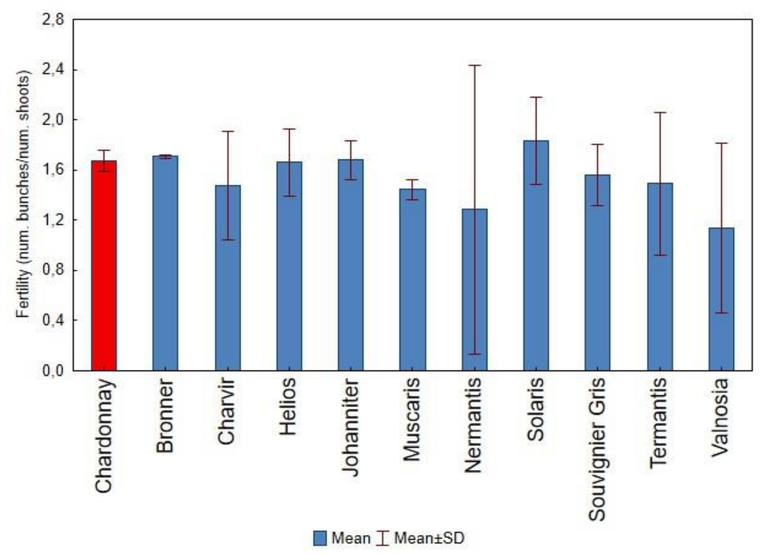


Fig. 3: Grapevine fertility index compared to Chardonnay

3. **Phytosanitary assessment:** untreated control plots confirmed high disease pressure; downy mildew frequency reached 100% in 2025 at both sites, while powdery mildew prevalence was medium-high only in Rovereto during 2023 and 2024 (tab. 1). Despite this pressure, the resistant varieties – managed with only 2/3 seasonal treatments – demonstrated high field resistance to both pathogens on leaves and clusters. Only Johanniter and Pinot Regina showed susceptibility to secondary diseases, such as black rot and anthracnose, at the Telve site (tab. 2).

Tab. 1: Frequency (F) and intensity (I) of downy mildew (DM) and powdery mildew (PM) on untreated control plants.

Year	Rovereto Navicello				Telve Pasquaro			
	DM		PM		DM		PM	
	F (%)	I (%)	F (%)	I (%)	F (%)	I (%)	F (%)	I (%)
2023	82	40,9	80	24,7	32	19,4	0	0
2024	97	70,5	12	5,5	78	7,5	0	0
2025	100	86,7	2	0,1	100	75,2	0	0

Tab. 2: OIV indices of PIWI varieties; average of 3 years of observation in Telve.

Variety	Downy mildew		Powdery mildew		Black rot		Anthracnose	
	Leaves	Clusters	Leaves	Clusters	Leaves	Clusters	Leaves	Clusters
Bronner	9	9	9	9	9	9	9	9
Charvir	9	9	9	9	9	9	9	9
Helios	9	9	9	9	9	9	9	9
Johanniter	9	9	9	9	9	8.3	5.7	7
Muscaris	9	9	9	9	9	9	9	9
Pinot Regina	9	9	9	9	5	3	7	7
Solaris	9	9	9	9	9	9	9	9
Souvignier g.	9	9	9	9	9	9	9	9
Termantis	9	9	9	9	9	9	9	9
Valnosia	9	9	9	9	9	9	9	9

4. **Grape Composition:** In Rovereto (Navicello), all varieties achieved medium-high sugar content, ranging from a minimum of 19.0 (Johanniter and Valnosia) to a maximum of 22.6 °Brix (Muscaris). Solaris, Bronner, Souvignier Gris, and Termantis ranged between 20.3 and 21.0 °Brix (Fig. 4). Total acidity (TA), expressed in g/L of tartaric acid, remained remarkably high despite the sugar levels, particularly for Souvignier Gris (8.5 g/L) and Solaris (9.2 g/L) (Fig. 5). Yeast-Assimilable Nitrogen (YAN) was generally low; the 150 mg/L threshold required for optimal fermentation kinetics was exceeded only by Johanniter in Telve and by Solaris and Charvir in Rovereto (Fig. 6).

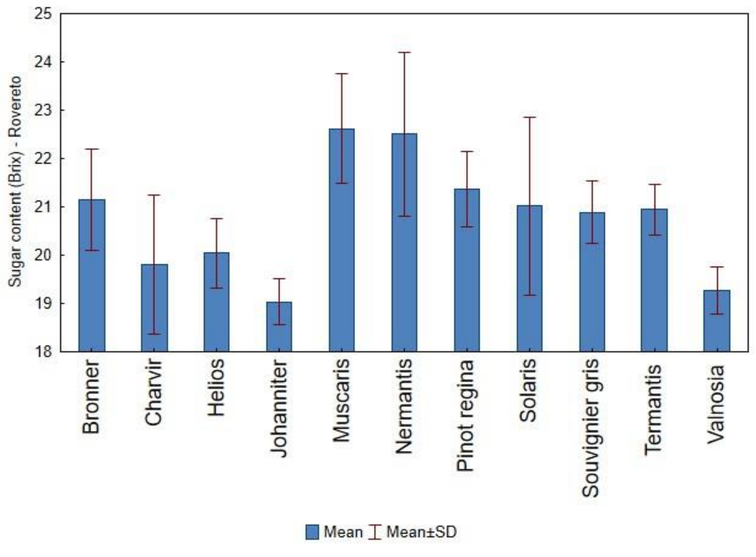


Fig. 4: Grape Ripeness Index for each variety

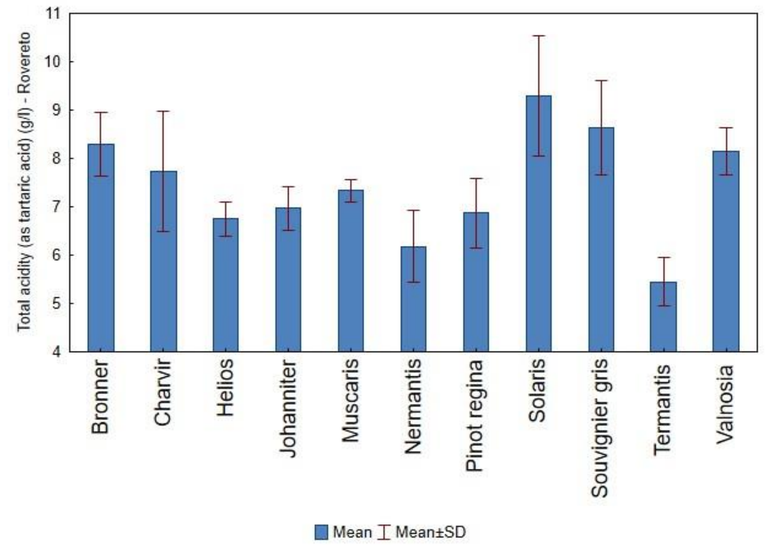


Fig. 5: Total acidity (TA) in grapes for each variety

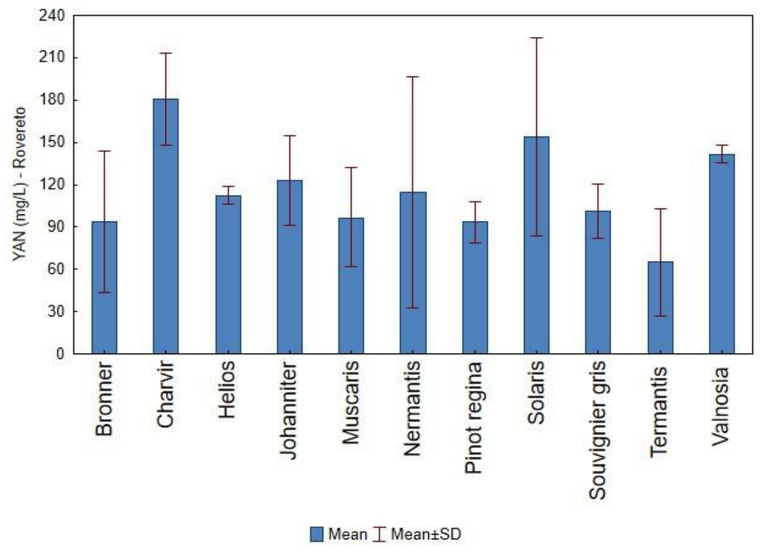


Fig. 6: Yeast-Assimilable Nitrogen (YAN) (mg/L)

Conclusions

The combination of a short vegetative cycle and excellent disease resistance makes these PIWI varieties highly suitable for viticulture in challenging environments. By requiring fewer phytosanitary applications to remain healthy, these varieties support the preservation of historic vineyard landscapes in areas where mechanization is complex. Furthermore, these varieties offer an effective strategy for crop diversification in marginal, high-altitude areas and in "sensitive" zones - such as those near urban centers, schools, and cycle paths - where reducing chemical drift is a priority.

Acknowledgments: Margoni Michele, Mattedi Flavio, Roman Tomas, Cappello Nicola, Malacarne Mario (Centro Trasferimento Tecnologico – FEM), Stefanini Marco, Vezzulli Silvia (Centro Ricerca Innovazione – FEM), Betalli Vincenzo (CIVIT).