SUPPLEMENTARY DATA
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Supplementary data

SUPPLEMENTARY TABLE S1. List of plant material included in this study: 45 *Vitis vinifera* L. cultivars and a hybrid (Hibernal).

Cultivar name	Berry colour	Country of origin	Genetic prole	Plant material origin	Plantation date
Alvarinho	White	Portugal	occidentalis	*NA*	2010
Arinarnoa	Red	France	occidentalis	INRA BX	2009
Assyrtiko	White	Greece	*NA*	Vassal	2009
Cabernet-Sauvignon	Red	France	occidentalis	CA 33	2009
Cabernet franc	Red	France	occidentalis	CA 33	2009
Carignan	Red	France	occidentalis	ENTAV	2009
Carmenere	Red	France	occidentalis	CA 33	2009
Castets	Red	France	occidentalis	INRA BX	2009
Chardonnay	White	France	occidentalis	INRA BX	2009
Chasselas	White	France	orientalis	INRA BX	2009
Chenin	White	France	occidentalis	ENTAV	2009
Colombard	White	France	occidentalis	CA 33	2010
Cornalin	Red	Switzerland	occidentalis	INRA BX	2009
Cot	Red	France	occidentalis	CA 33	2009
Gamay	Red	France	occidentalis	ENTAV	2009
Grenache	Red	Spain	orientalis	ENTAV	2009
Hibernal	White	Germany	*NA*	Geisenheim	2009
Liliorila	White	France	occidentalis	INRA BX	2009
Marselan	Red	France	occidentalis	ENTAV	2009
Mavrud	Red	Bulgaria	pontica	*NA*	2010
Merlot	Red	France	occidentalis	CA 33	2009
Morrastel	Red	Spain	occidentalis	ENTAV	2009
Mourvedre	Red	Spain	occidentalis	ENTAV	2009
Muscadelle	White	France	occidentalis	CA 33	2009
Petit Manseng	White	France	occidentalis	CA 64	2010
Petit Verdot	Red	France	occidentalis	CA 33	2009
Petite Arvine	White	Switzerland	occidentalis	INRA BX	2009
Pinot noir	Red	France	occidentalis	ENTAV	2009
Prunelard	Red	France	orientalis	IFV Gaillac	2009

Riesling	White	Germany	occidentalis	INRA BX	2009
Rkatsiteli	White	Georgia	orientalis	INRA BX	2009
Roussanne	White	France	occidentalis	ENTAV	2009
Sangiovese	Red	Italy	occidentalis	ENTAV	2009
Saperavi	Red	Georgia	orientalis	INRA BX	2009
Sauvignon	White	France	occidentalis	CA 33	2009
Semillon	White	France	occidentalis	CA 33	2009
Syrah	Red	France	occidentalis	CA 11	2010
Tannat	Red	France	orientalis	CA 64	2010
Tempranillo	Red	Spain	orientalis	ENTAV	2009
Tinto Cao	Red	Portugal	occidentalis	Vassal	2009
Touriga Francesa	Red	Portugal	occidentalis	Vassal	2009
Touriga Nacional	Red	Portugal	occidentalis	INRA BX	2009
Ugni blanc	White	Italy	pontica	CA 33	2009
Vinhao	Red	Portugal	occidentalis	*NA*	2010
Viognier	White	France	occidentalis	ENTAV	2009
Xinomavro	Red	Greece	*NA*	*NA*	2010

General descriptive information for each of the cultivars is given in the Vitis International Variety Catalogue (VIVC, www.vivc.de) for berry colour and country of origin; and by Bacilieri *et al.* (2013) for genetic prole. The origin and plantation date of the plant material was provided by Destrac Irvine and van Leeuwen (2016).

The origin of the plant materials was as follows: INRA Bx = Domaine de la Grande Ferrade, Centre INRAE Nouvelle Aquitaine Bordeaux, 33882 Villenave d'Ornon, France; ENTAV = Etablissement National Technique Amélioration Viticulture, 30240 Le Grau-du-Roi, France; Vassal = Domaine de Vassal INRA, 34340 Marseillan, France; CA 33 = Chambre d'Agriculture Gironde - Vinopôle Bordeaux Aquitaine, 33295 Blanquefort, France; CA 64 = Chambre d'Agriculture Pyrénées-Atlantiques, 64000 Pau, France; CA 11 = Chambre d'Agriculture Aude, 11570 Palaja, France; Geisenheim = Hochschule Geisenheim University, 65366 Geisenheim, Germany; Gaillac = Institut Français de la Vigne et du Vin, V'Innopôle Sud-Ouest, 81 310 Peyrole, France).

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SUPPLEMENTARY TABLE S2. Description of the rating scale used to assess esca foliar symptoms and plant dieback.

Rating	Description
0	No esca symptom or plant dieback
1	Slight esca symptoms on one arm (some drying or discoloration restricted to a few leaves)
3	Pronounced esca symptoms on one arm (pronounced drying or discoloration on several stems)
5	Very severe esca symptoms on one arm (drying, discoloration and bunch wilt)
7	Apoplexy on one arm (generalised wilting)
9	Dead arm
99	Dead vine (both arms)

For each code, a short description of the corresponding phenotype is supplied. The scoring system was adapted from Lecomte *et al.* 2012 (Plant Disease, 96(7), 924-934). The scores from both symptomatic arms can be averaged to describe esca foliar symptom severity at the plant level.

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SUPPLEMENTARY TABLE S3. Description of the method used to correct N-tester values for interspecific comparisons

Cultivar	Years	Average N-tester score at flowering	Difference relative to reference variety	Correction for the group
Chasselas	2015-2021	324.2917	+110	
Grenache	2015-2021	346.1591	+88	
Xinomavro	2020-2021	347.5	+86	
Tinto Cao	2020-2021	371.5	+62	
Petite Arvine	2020-2021	375.5	+58	**+70**
Vinhao	2015-2021	375.8864	+58	
Semillon	2015-2021	385.2273	+49	
Colombard	2015-2021	391.2955	+43	
Prunelard	2020-2021	397.25	+37	
Viognier	2015-2021	402.4583	+32	
Carmenere	2015-2021	403.5	+30	
Marselan	2015-2021	404.2273	+30	
Touriga Nacional	2015-2021	406.087	+28	
Hibernal	2020-2021	409	+25	
Syrah	2015-2021	410.1591	+24	
Alvarinho	2015-2021	411.4091	+23	
Ugni Blanc	2015-2021	416.8958	+17	**0**
Cot	2015-2021	419.2273	+15	
Chardonnay	2015-2021	419.3409	15	
Sangiovese	2015-2021	419.7583	+14	
Castets	2015-2021	420.0455	+14	
Muscadelle	2015-2021	423.2045	+11	
Gamay	2015-2021	429.0682	+5	
Sauvignon	2015-2021	433.6304	0	
Saperavi	2015-2021	437.9545	-4	
Tannat	2015-2021	439.0455	-5	
Cabernet Franc	2015-2021	443.0227	-9	
Petit Manseng	2015-2021	445.1136	-11	
Cabernet-Sauvignon	2015-2021	456.2955	-22	
Chenin	2015-2021	458.4375	-24	
Riesling	2015-2021	460.0909	-26	
Mourvedre	2015-2021	463.3864	-29	**-40**
Pinot Noir	2015-2021	465.8409	-32	
Carignan	2015-2021	467.3333	-33	
Roussanne	2015-2021	468.2045	-34	

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Liliorila	2020-2021	469	-35	
Morrastel	2020-2021	469	-35	
Merlot	2015-2021	476.8125	-43	
Petit Verdot	2015-2021	479.7727	-46	
Tempranillo	2015-2021	481.2292	-47	
Arinarnoa	2020-2021	483	-49	
Assyrtiko	2020-2021	485.75	-52	
Mavrud	2020-2021	486	-52	
Touriga Francesa	2015-2021	494.8043	-61	
Rkatsiteli	2015-2021	513.2045	-79	
Cornalin	*NA*	*NA*	*NA*	***NA***

Mean N-tester values at mid-flowering, across several years, are given for 45 cultivars. For each cultivar, the difference with respect to the reference cultivar (Sauvignon Blanc) is shown. Different colours indicate different groups according to an ascendant hierarchical classification (AHC). The mean correction applied to the whole set of cultivars in each group is provided.

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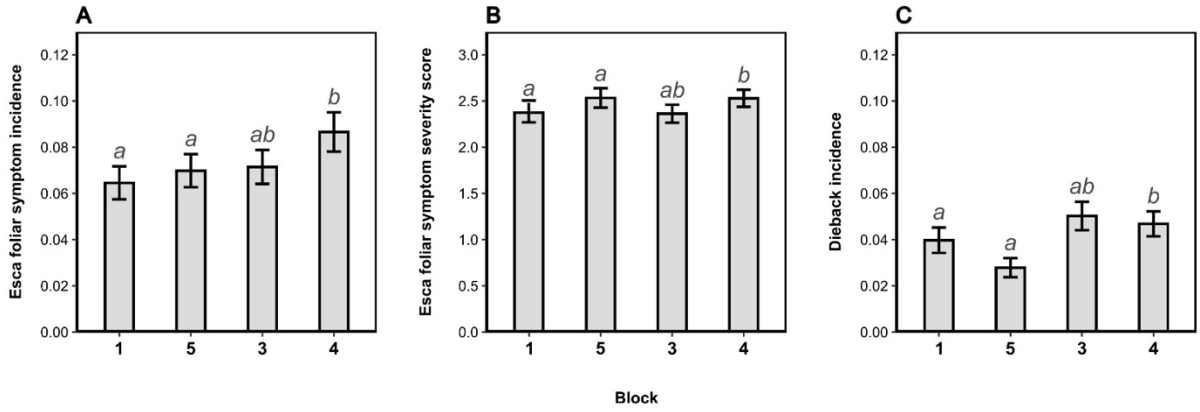
SUPPLEMENTARY TABLE S4. Overall statistics for ecophysiological and phenological data in the VitAdapt common garden experimental vineyard (Villenave d'Ornon, France) between 2017 and 2022.

Trait	mean	SD	RSD	min	max
Flowering date	149.3	5.7	3.8%	136.6	165 .1
Bud burst date	92.8	7.7	8.3%	65.0	122.1
Veraison date	213.5	7.7	3.6%	191.6	235.7
$\delta^{13}C$	-25.8	1.38	5.4%	-28.8	-22.2
N-tester at flowering	436.9	56.8	13.0%	169.0	436.9
Pruning weight (in g)	645.3	194.7	30.2%	157.5	1395.9

The statistics shown are the mean, standard deviation, relative standard deviation, minimum and maximum. For each trait, values are calculated from 1,104 observations (46 cultivars; four blocks; six years). Calendar dates were used for the analysis (day number within the year).

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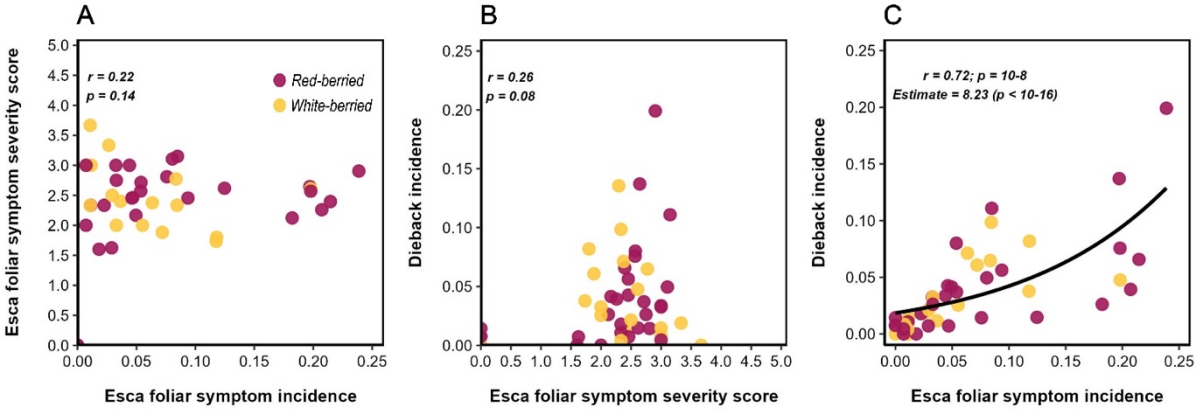
SUPPLEMENTARY FIGURE S1. Effect of block on the esca and dieback epidemiological metrics of all cultivars for the period 2017-2023.



(A) Esca foliar symptom incidence (mean ± SEM); (B) Severity of esca foliar symptoms (mean ± SEM), i.e. mean severity index (according to the rating scale described in Supplementary Material 2) calculated for the set of plants with symptoms; (C) Plant dieback incidence (mean ± SEM). The letters correspond to the groups of significance according to Tukey's test with an alpha risk of 5 %.

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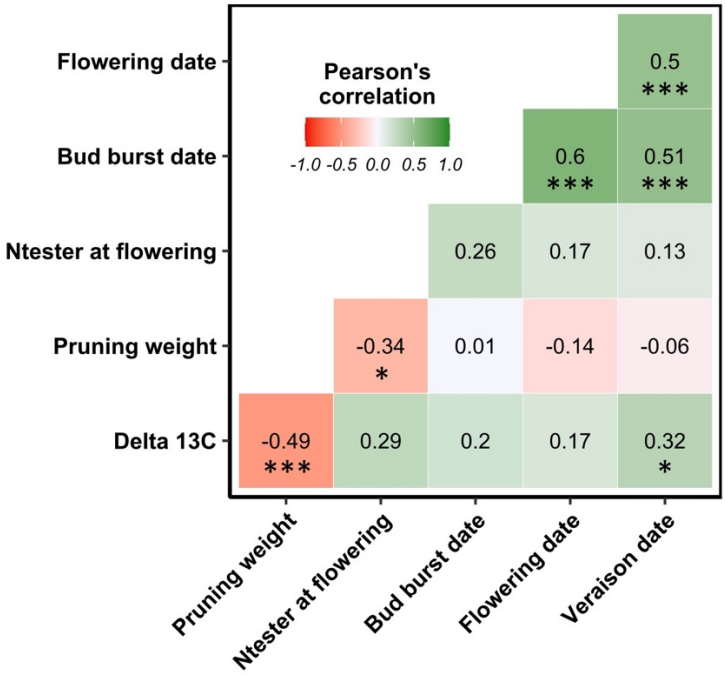
SUPPLEMENTARY FIGURE S2. Scatterplots showing the relationships between the three esca and dieback epidemiological metrics. Each dot corresponds to the mean value for all years and blocks for a given cultivar (for the period 2017-2023)



(A) Relationship between foliar symptom incidence and plant dieback incidence. The regression line corresponds to a binomial model with a cloglog link; (B) Relationship between foliar symptom incidence and foliar symptom severity; (C) Relationship between plant dieback incidence and foliar symptom severity. Pearson's correlation coefficients are indicated for each relationship. White-berried cultivars are shown in light yellow and red-berried cultivars are shown in dark purple.

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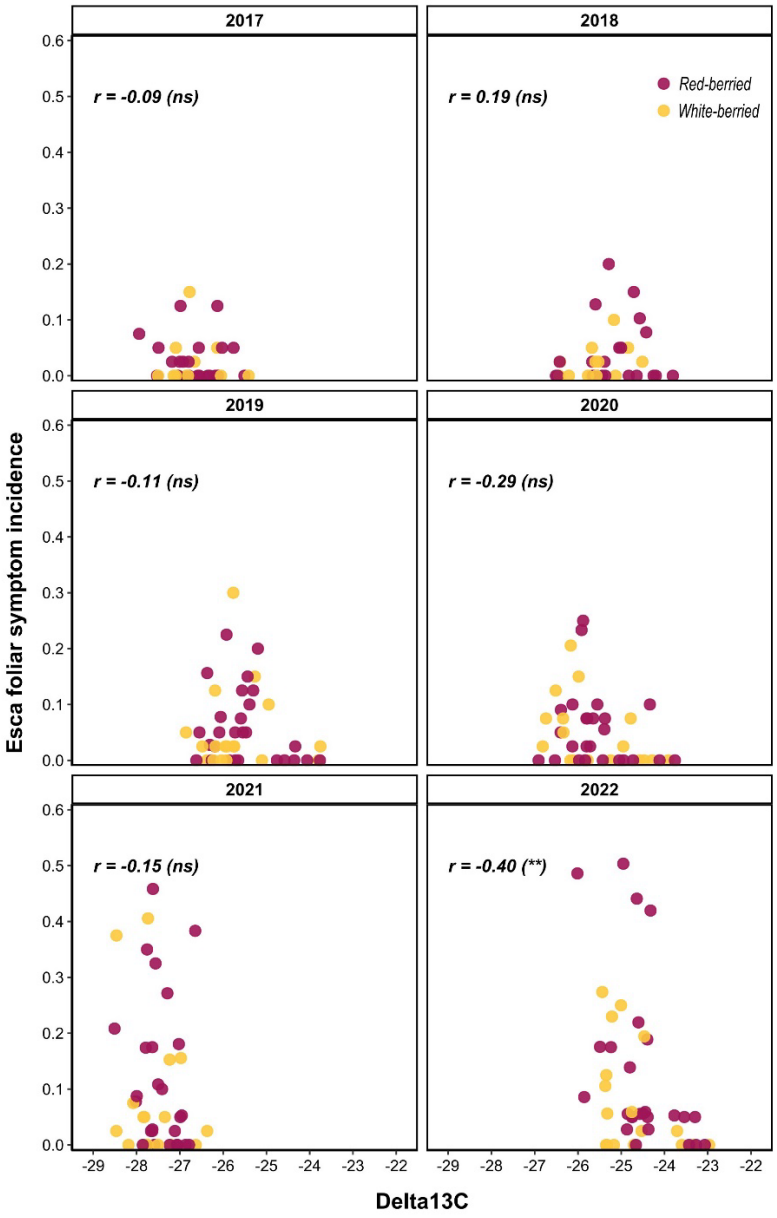
SUPPLEMENTARY FIGURE S3. Correlations between mean varietal values for ecophysiological and phenological variables.



Pearson's correlation coefficients marked with asterisks are significant at the 5 % threshold; *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$.

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SUPPLEMENTARY FIGURE S4. Scatterplots showing the relationships between foliar symptom incidence and $\delta^{13}C$ for the various years.



Each dot corresponds to the mean value for all blocks for a given cultivar (for the 2017-2022 period). Pearson's correlation coefficients are indicated for each relationship. White-berried cultivars are shown in light yellow and red-berried cultivars are shown in dark purple.