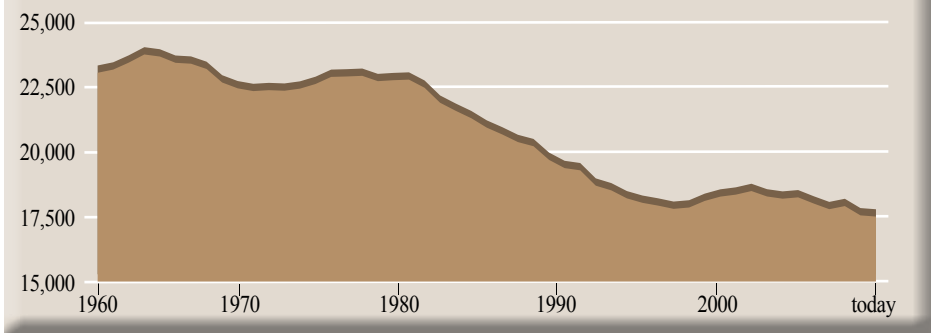
Index

Vineyard surface in the world (acre x 1,000 - Source FAO)

	Country	'60	'70	'80	'90	'00	'10
AFRICA	Algeria	824	586	374	160	159	190
	Egypt	24	47	89	124	150	159
	Ethiopia	0	0	0	2	5	5
	Ethiopia PDR	0	2	2	1	0	0
	Libya	7	13	13	18	20	21
	Madagascar	1	2	4	5	6	6
	Morocco	182	141	133	119	125	125
	Namibia	0	0	0	1	9	14
	South Africa	202	261	242	256	280	278
	Tunisia	113	87	79	67	65	73
	United Republic of Tanzania	0	1	3	6	7	9
	Zimbabwe	0	0	1	1	1	1
	Africa	**1353**	**1142**	**942**	**760**	**827**	**882**
AMERICA	Argentina	658	785	729	504	521	546
	Bolivia (Plurinational State of)	3	7	9	9	12	10
	Brazil	166	153	142	146	177	205
	Canada	31	26	27	17	23	26
	Chile	261	262	288	299	440	482
	Colombia	1	3	4	3	4	6
	Cuba	0	0	0	1	5	4
	Guatemala	1	2	4	4	6	6
	Mexico	34	68	141	105	79	67
	Paraguay	4	4	5	3	1	1
	Peru	21	25	23	25	29	39
	United States of America	538	620	750	795	940	956
	Uruguay	47	48	42	28	22	20
	Venezuela (Bolivarian Republic of)	0	1	2	2	2	2
	Americas	**1766**	**2005**	**2165**	**1941**	**2261**	**2371**
	North America	**603**	**715**	**917**	**916**	**1042**	**1049**
	Central America	**1**	**2**	**4**	**5**	**10**	**11**
	South America	**1163**	**1289**	**1244**	**1020**	**1209**	**1312**
ASIA	Afghanistan	144	172	141	133	131	152
	Armenia	0	0	0	41	34	36
	Azerbaijan	0	0	0	167	22	29
	China	37	55	225	387	1010	1361
	Cyprus	91	110	77	51	36	19
	Georgia	0	0	0	148	128	121
	India	15	19	35	91	145	269
	Iran (Islamic Republic of)	270	405	496	599	689	554
	Iraq	39	70	54	38	25	26
	Israel	28	19	13	12	16	17
	Japan	53	68	70	55	47	41
	Jordan	41	13	10	14	9	9
	Kazakhstan	0	0	0	26	24	24
	Kyrgyzstan	0	0	0	13	17	15
	Lebanon	50	42	61	59	33	30
	Occupied Palestinian Territory	0	0	0	12	18	18
	Pakistan	6	6	7	18	34	38
	Philippines	0	0	0	1	1	1
	Republic of Korea	7	18	35	55	56	43
	Saudi Arabia	1	7	12	23	23	28
	Syrian Arab Republic	172	201	265	199	138	122
	Tajikistan	0	0	0	61	79	91
	Thailand	0	2	6	6	9	11
	Turkey	2012	2004	1620	1389	1264	1174
	Turkmenistan	0	0	0	34	33	46
	Uzbekistan	0	0	0	185	247	300
	Viet Nam	0	0	0	0	4	2
	Yemen	9	20	34	50	41	33
	Asia	**2976**	**3233**	**3164**	**3868**	**4315**	**4608**
EUROPE	Albania	30	34	46	17	16	22
	Austria	105	117	135	126	112	108
	Belarus	0	0	0	0	1	3
	Belgium-Luxembourg	4	3	4	3	0	0
	Bosnia and Herzegovina	0	0	0	7	12	13
	Bulgaria	468	403	366	295	297	199
	Croatia	0	0	0	108	109	81
	Czech Republic	0	0	0	21	34	40
	Czechoslovakia	52	75	93	26	0	0
	France	3411	2985	2528	2200	2092	1917
	Germany	170	204	227	250	246	247
	Greece	580	513	429	319	291	250
	Hungary	576	507	378	256	205	185
	Italy	3839	3259	2838	2296	2012	1857
	Luxembourg	0	0	0	0	3	3
	Malta	2	2	2	2	3	4
	Montenegro	0	0	0	0	10	24
	Netherlands	1	0	0	0	0	0
	Portugal	612	649	643	655	551	446
	Republic of Macedonia	0	0	0	58	61	50
	Republic of Moldova	0	0	0	332	349	323
	Romania	792	751	598	602	509	435
	Russian Federation	0	0	0	160	127	109
	Serbia	0	0	0	0	59	124
	Serbia and Montenegro	0	0	0	160	101	0
	Slovakia	0	0	0	39	32	22
	Slovenia	0	0	0	36	40	40
	Spain	4031	3911	3874	3005	2834	2474
	Switzerland	30	32	35	37	37	37
	Ukraine	0	0	0	255	203	169
	United Kingdom	0	0	0	2	2	2
	USSR	1752	2020	2302	425	0	0
	Yugoslav SFR	648	614	585	105	0	0
	Europe	**17102**	**16079**	**15081**	**11798**	**10346**	**9181**
OCEANIA	Australia	125	150	148	162	368	409
	New Zealand	1	6	12	16	53	80
	Oceania	**126**	**156**	**160**	**178**	**421**	**490**
WORLD		**23324**	**22616**	**21510**	**18545**	**18170**	**17533**

Evolution of the vineyard surface 1960 - today (acres x 1,000)



SOILS OF ARGENTINA

LA RIOJA: the sandy soil is of alluvial origin, deposited by the flow of water that runs down the valleys of the Andes. Scarcely endowed with organic material and not particularly fertile, which obligates viticulturists to install irrigation systems.

SALTA: made up of earth extracted from the mountains, the soil is rich in skeleton as well as schist and mica, which bring mineral aspects to the wine. Being an extremely loose soil, vineyards require irrigation systems and continuous additions of fertilizer in order to ensure the life of the plant.


E. Peterlunger


Aconcagua

E. Peterlunger

MENDOZA: of alluvial origin, this rocky-sandy soil is poor in organic material and relatively infertile. Because it has sandy soils, Phylloxera is not a problem in this region. It is for this reason that franc de pied or ungrafted vines are found here.

RIO NEGRO: the soil is alluvial, in general chalky and rich in sand and silt.


Cuyo-Mendoza

E. Peterlunger

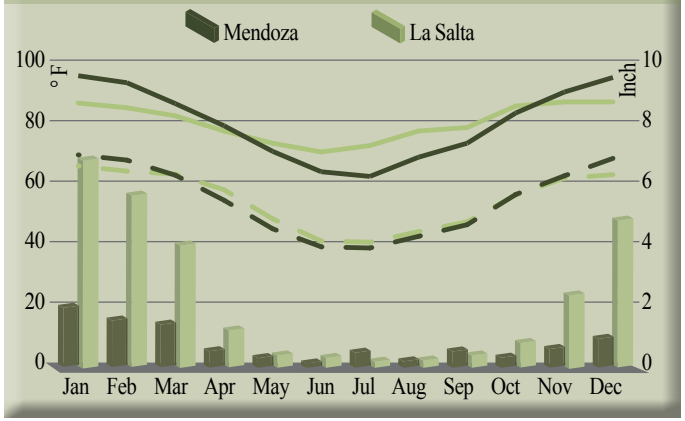

Aconcagua

E. Peterlunger

CLIMATE OF ARGENTINA

The climatic characteristics of this country's viticultural areas are exceedingly diverse depending on the zone. The amplitude of the territory and the geographic characteristics determine a wide variability of thermic and pluviometric conditions. There are in fact extremely dry areas characterized by annual rainfall of around 8-12 inches and others with 27 inches. The driest months correspond to those of the Southern Hemisphere's winter while the data during the course of the summer are much higher, surpassing 6-6.5 inches in zones endowed with greater precipitation. The range of mean annual temperatures are markedly accentuated with average minimum monthly values a little above freezing and average maximum temperatures during the summer months that vary between 82 and 90 °F depending on the area. The thermic variance among winter and summer months decreases moving north.

The graph below represents the maximum (continuous line) and minimum (dotted line) monthly temperatures of two Argentine viticultural regions, averaged over the course of the last thirty years. The bars indicate average monthly precipitation.




Aconcagua vineyard, Argentina

E. Peterlunger

HEAD PRUNED


Head Pruning without supports.
F. Mistretta


Bush vine trained with supports. The close-up shows how the vine has been pruned, allowing the spurs to occupy maximum space.
Viten
Viten

This training system, referred to also as Gobelet and Bush vine, is traditionally very scarce in that it limits vegetation growth. The fact that the fruiting zone of the vine is very near the ground makes this a well-adapted system for dry climates and soils. Head pruning is found in arid regions as well as cold climates, such as mountainous areas of Northern Italy and Switzerland. In these zones, the soil is usually very loose. The proximity of the vegetation to the ground allows for a greater accumulation of heat. A head pruned plant is characterized by a series of spurs, each one with 2-3 buds, which given the density of vineyard, can sum to over 40,000 buds per acre. The reduced height of the vine means there is no need for supports or trellises, although new vineyards tend to replace the typical bush shape with a flatter, wall-like form. This practice facilitates mechanized operations, but it requires the use of posts and wires. Mechanization also requires the modification of the pruning system, leaving one or two permanent cordons in a row, closer to a typical cordon pruned vine. The plant must also be shorter. In this way, all vineyard work can be done by machine, including the harvest, as long as the fruiting zone is at least a foot high. Diffusion: Mediterranean regions, some areas of South Africa and Australia.


Viten


Head pruning is a pruning system that can be adapted to both arid climates, such as Southern Italy...
Viten


... and cold climates, such as Switzerland.
Viten


It is also possible to train head-pruned vines by supporting the branches with a wire...
Viten


...or by harnessing the vegetation with a rope.
Viten


Modified head-pruned vine that has been trained along the row instead of being allowed to grow outwards. This favors mechanization.
D. Lanati


With this training system, the cost of planting can be very low due to the absence of posts, wires, and supports.
Viten
Viten


Modification of a vertically-grown head-pruned vine. Also referred to as a vertical cordon-pruned.
D. Barkson

PRINCIPAL VIRAL DISEASES

Fanleaf

Infectious Degeneration or **Fanleaf** caused by the *Grapevine fanleaf virus* (GFLV).

Infected vines have shortened internodes in a zig-zag form, bifurcation and flattening of the shoots, in addition to malformation of the leaves and bunches.

Color developer strains cause mosaic yellowing characterized by bright coloration. (197, 200, 201, 203, 212, 213, 228, 236, 241)

Leaf Roll

Leaf Roll, caused by numerous viruses (*Grapevine Leafroll associated Viruses*).

It represents the most diffuse virosis worldwide, very damaging because it causes reduced production and lowering of quality.

Easy to diagnose visibly; using healthy propagation materials is the only means of defense. (236, 241, 242)

Rugose Wood

Rugose Wood: also this virosis, present throughout the world's viticultural areas, is caused by diverse viruses in association.

The virosis causes functional alterations in the transport systems and malformations near the graft site. (218)

Red Blotch

Red Blotch on Malbec varietis: a newly discovered grapevine virus has been discovered associated with a set of disease symptoms. (228, 243)

Graft Disaffinity: this syndrome is still not well-identified, however it has been documented in Europe and California. (216)

Graft Disaffinity

Enation: the causal agents of this rare disease are still unknown. Characterized by outgrowths on the leaves.

Enation

Vein Necrosis, classified as a virus-like particle, even though the causal agents are still unknown.

Vein Necrosis

PHYTOPLASMAS AND BACTERIOSIS

Flavescence Dorée

Flavescence Dorée, caused by the phytoplasma 16srV, transmitted via graft and vectors, in particular *Scaphoideus titanus*.

In addition to the typical chromatic alteration, the shoots do not lignify and the bunch dries up. In many cases the plant dies.

The symptoms vary, depending on the cultivar and the intensity of the attack. (199, 232, 236, 237, 243)

Bois Noir

Bois Noir, also known as Stolbur, is caused by the 16rXII phytoplasma. It is transmitted by vectors (*Hyalestes obsoletus*) and grafting materials.

The symptomatology is very similar to that of Flavescence Dorée, distinguishable only via molecular analysis.

On average, the bunches wither and desiccate later compared to cases of Flavescence Dorée. (232, 236)

Pierce's Disease

Pierce's Disease is caused by the bacterium *Xylella fastidiosa*, transmitted by the leafhopper *Homalodisca vitripennis*.

The bacterium blocks the xylematic tissue, causing yellowing, leaf fall, and plant death within 1-5 years.

For now limited to California, Central and South America, although expansion to other viticultural zones is feared. (217, 218, 232, 251)

Crown Gall is caused by *Agrobacterium tumefaciens*, a bacterium that attacks the vine as well as other plants.

Crown Gall

Present mostly in cool and humid environments. It penetrates the plant via wounds, especially those caused by freezing. (197, 218)

Bacterial Blight, caused by *Xylophilus ampelinus*, affects the base of the shoot, causing deep cracks. (209)

Bacterial Blight

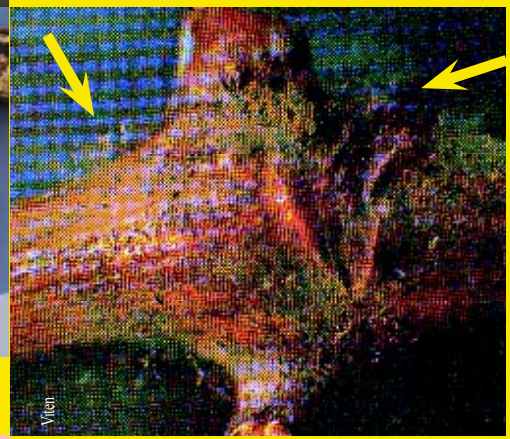
To simplify the recognition of problems (even in the case of similar symptoms, which are deliberately placed next to each other) the symptoms are organized chronologically according to the season in which they appear, starting with winter.

Symptoms caused by disease are on a Yellow background
Those caused by deficiencies are on a Green background
Those caused by various other agents are on a Pink background

Winter appearance of *Phomopsis viticola* at the base of the cane.

Gummy secretions (above) produced by *Synoxylon spp*. This insect digs tunnels, potentially destroying fruiting canes, branches and permanent cordons.

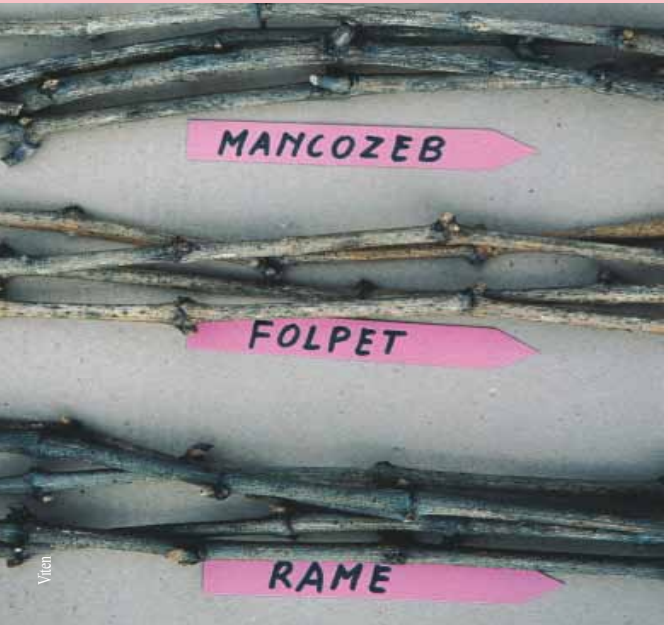
These blackish spots on this shoot are the pycnidia of Powdery Mildew, which will propagate the infection.



A rainy autumn intensifies the development of Botrytis on the canes, facilitating infection during the following spring.

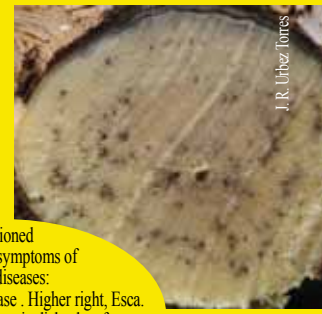
An intensely cold winter will damage the wood in vineyards on valley floors, favoring the development of crown gall (*Agrobacterium tumefaciens*).

Treatments can influence the color of the canes normally without interfering with ripening, except in unusual cases. Mancozeb and folpet in particular leave the wood lighter, while copper turns it darker.



The reactivation of the root system in the spring brings about the leaking of water from the stump. This dried secretion can take on an orange color, which is startling, but innocuous.

A heavy attack of the European red mite, unchecked by predators or treatments, leaves an excessive quantity of eggs that will hatch during shoot growth.



Sectioned trunk with symptoms of wood diseases: Higher left, Petri desease . Higher right, Esca. Lower left, Botryosphaeria dieback, a fungus associated with Esca. Lower right, classic symptoms of Eutypa dieback (*Eutypa lata*).

When pruning, it is easy to find instances of bifurcation, shortened nodes, stripes and canes in the form of a zig-zag. These are typical symptoms of infective virosises that cause malformation.