



Ageing Experiment

Document Tonelería Nacional, Producteurs du Mont Tauch, ICV

Materials and Methodology

Wine

Merlot 2001, national wine, Producteurs du Mont Tauch

Lots

1. Control barrel: TB4
2. Cask + Inserstave + micro-oxygenation: TB1
3. Cask + micro-oxygenation: TB3
4. Barrels. Source: XXX, French Oak, medium toasting
 - Start: 17/02/02
 - End: 30/05/02
 - Batónnage of all the wines (casks and barrels) every 15 days
 - Micro-oxygenated casks (TB1 and TB3): 2 ml once p/month for the first month, 1 ml once p / month in the 2 following months

4 Series of samples taken for both traditional and sensory analysis

- 20th of February 2002. The “barrel” wine does not yet exist, as the barrels have not been filled yet
- 19th of March 2002: The “barrel” wine of this date does not appear on the sensory results, given that the sampler scheduled for these tests was absent from the sensory analysis of July 30th 2002.
- 29th of April 2002
- 30th of May 2002

The wines are all analysed simultaneously on the 19th of July, for the traditional physical and chemical analysis. All the wines are tasted on the 3rd of July by the sensory analysis group ICV / Producteurs du Mont Tauch, trained in “Production in Wood” Experiments since 2000. The group consists of the Export Managers and the Technical Director of Producteurs du Mont Tauch, along with their two assistants, as well as the Director of the Narbonne Wine Center and the Science Director of ICV (Institut Coopératif du Vin). The wines are tasted blind, and in series.

A series consists of wines whose samples were taken on the same date. The evaluations are made by consensus.

Results

Results of sensory analysis

- Tables in Appendix 1 + Excel spreadsheet “Appendix 1 Tech-Stave 7 oct 2002.xls”.
- The data in these tables is illustrated graphically in the diagrams in Appendix 2 + the PowerPoint presentation “Appendix 2 Inserstave 7 oct 2002.ppt”. In addition, the profiles of the wines in the 4 sampling stages are reported in the diagrams of Appendix 7 + the PowerPoint presentation “Appendix 7 Inserstave 7 oct 2002.ppt”.

Analytical results of the wines

- Tables in Appendix 3 + Excel spreadsheet “Appendix 3 Inserstave 7 oct 2002.xls”.
- The information in these tables relating to colour and polyphenols are illustrated graphically by the diagrams in Appendix 4 + the PowerPoint presentation “Appendix 4 Inserstave 7 oct 2002.ppt”.

Special analytic results of the wines

- Analysis of polychlorophenols and polychloroanisoles: table in Appendix 5 at the end of this document.
- Analysis of Ochratoxyn A in the wines: Appendix 6 at the end of this document.

Discussion

Sensory profiles of the wines

Colour: at the end of the experiment, the “Inserstave” wines and “barrel” display a more interesting colour: these wines display more colours/ shades of red and blue: see Appendix 1, diagrams 1 and 2. These wines become differentiated from the wines in casks without wood (micro oxygenated or not) during the third month of the experiment.

Dangerous aromas (vegetable and sulphurous): the “Inserstave” wine is always the wine that presents the least of these defects. The “barrel” wine displays no change regarding its “sulphurous” quality by the end of the experiment. Undoubtedly, though, its “vegetable” aroma has intensified. See Appendix 1, diagrams 3 and 4.

Fruit and spice aromas: the “Inserstave” wine is definitely the most intense of all at the beginning of the experiment, in terms of the 3 aromatic descriptors: see Appendix 1, diagrams 5, 6 and 7. The intensity of the “red syrup fruits” aroma diminishes noticeably as the experiment goes on. The “confectioned” and “spicy” aromas are intense during months 1 and 2, but start to fall in intensity during month 3.

Woody aromas: the “Inserstave” wine displays a strong “Boise” aroma for the duration of the experiment: see Appendix 1, diagram 8. The traces of wood are first toasted and coarse (classified as “table” for the wood descriptor) and quickly evolve into softer traces (classified as “toasted” and “vanilla”). On the other hand, the “barrel” wine begins with traces of vanilla, but these evolve into “table” aromas by the end of the experiment.

Aromas upon initial mouth contact: the “Inserstave” wine provides the most interesting sensations here: the volume sensation is the highest of all the wines for the duration of the experiment, its acidity is the lowest, and its tannic intensity is high as is the case with the other wines in the experiment.

It should be noted that these tactile sensations are associated with the weakest of the more aggressive aromas (sulphur and vegetable) and the strongest fruity aromas (confectioned and spicy). This generates an intense impact upon the initial mouth contact, at once both smooth and complex. See Appendix 1, diagrams 10 to 12.

After-taste aromas: the “Inserstave” wine provides the most interesting sensations at this point: the weakest astringency, and the weakest dryness and bitterness throughout the entire experiment. This is associated with the smooth and spicy aromas, which delivers a silkier and longer after-taste. See Appendix 1, diagrams 13 to 15.

Analytical Profiles of the Wines

There is no notable difference between the wines, in terms of the traditional analytical characteristics. See Appendix 3. With regard to the colour and polyphenol indexes, the “Inserstave” wine rates between the cask wines without wood, and the “barrel” wine. See Appendix 4, diagrams 16 to 20.

Chemical contaminations

The wine at first did not display a noticeable content of polychlorophenoles, polychloroanisoles or Ochratoxyn A.

At the end of the experiment, none of the wines displays a detectable contamination by polychlorophenoles, polychloroanisoles or Ochratoxyn A: see Appendixes 5 and 6.

Conclusion

The “Inserstave” wine presents very different sensory characteristics from the other wines in the experiment. Since the beginning of the experiment, it displays a much more attractive profile, from a commercial point of view, than the cask or barrel wines: a significant reduction in vegetable and sulphurous aromas, the development of sweet, spicy and confectionary aromas, and with a more intense and well-rounded mouth experience. See Appendix 7, figure 25.

The wood characteristics evolve more rapidly from the toast and woody traces (classified as “table”) to the more interesting traces of toasted and vanilla aromas.

The volume sensations upon initial mouth contact and the final smooth dryness develop more rapidly, covering in this fashion the tannic characteristics of an imperfect maturity.

Based on this experiment, and with said wines, we can assume that a shorter exposure (1.5 to 2 months) would, however, have been of greater value from a commercial point of view. The results would have been more intense, concentrated, and smooth. A greater intensity is also an interesting factor for blends with wines processed in casks. See Appendix 7, diagram 25.

Analytically speaking, the “Inserstave” wine displays higher absorption rates than the other cask wines at 520, 4220 and 280 nm.

As regards the other compounds tested, no noticeable differences were found

Dominique DELTEIL
Science Director ICV.

Appendix 1

Appendix 1

February 20, 2002

Reference	Cuve 82. Merlot. 17/02/2002	TB4 = control cask of 20/02/2002	TB1 = staves of 20/02/2002	TB3 = micro- oxygenated of 20/02/2002
Red or yellow	3	3	3	3
Green or blue	2	2	2	2
Brown	0	0	0	0
Sulphurous	2	1,5	0	2
Vegetable	3	2,5	1	3
Red syrup fruit	1	1	2	1
Confectioned	2	2	3	1
Spicy	2	2	3	2
Wood taste	0	0	3 g,p	0
Animal	0	0	0	0
Mineral	2	1	1	2
Volume	3	3	4	3
Acidity	2,5	2,5	2,5	2
Tannic intensity	3	3	3,5	3,5
Astringence	1,5	1	2	1,5
Dryness	2,5	2,5	2,5	3
Bitterness	2	1	0	2
	*	*	*	*
Scale from 0 to 5				
* = concensus				

Appendix 1

March 19, 2002

Reference	TB4= control cask of 19/03/2002	TB1 = staves of 19/03/2002	TB3 = micro- oxygenated of 19/03/2002
Red or yellow	3	3	3
Green or blue	2	2	2
Brown	0	0	0
Sulphurous	1	1	1
Vegetable	2	1	3
Red syrup fruit	0	1	0
Confectioned	2	3	1
Spicy	1	3	1
Wood taste	0	2v,g	0
Animal	0	0	0
Mineral	1	1	1
Volume	3	4	3
Acidity	2,5	2	2,5
Tannic intensity	3,5	3	3
Astringence	1	1	1
Dryness	2	2	3
Bitterness	1	0	2
	*	*	*
Scale from 0 to 5			
* = concensus			

Appendix 1

April 29, 2002

Reference	TB4= control cask of 29/04/02	TB1 = staves of 29/04/02	TB3 = micro- oxygenated of 29/04/02	Barrels of 29/04/02
Red or yellow	3,5	3,5	3	3,5
Green or blue	2	2	2	2
Brown	0	0	0	0
Sulphurous	1	0	1	0
Vegetable	2	0	2	1
Red syrup fruit	1	0	0	0
Confectioned	1	3	1	2
Spicy	1	3	1	2
Wood taste	0	2,5v,g	0	1v
Animal	0	0	0	0
Mineral	1	2	1	1
Volume	3	4	3	3,5
Acidity	2,5	2	2,5	3
Tannic intensity	3,5	3,5	3	3
Astringence	2	2	2	1
Dryness	2	2	3	2
Bitterness	1	0	1	1
	*	*	*	*
Scale from 0 to 5				Brûlant
* = concensus				

Appendix 1

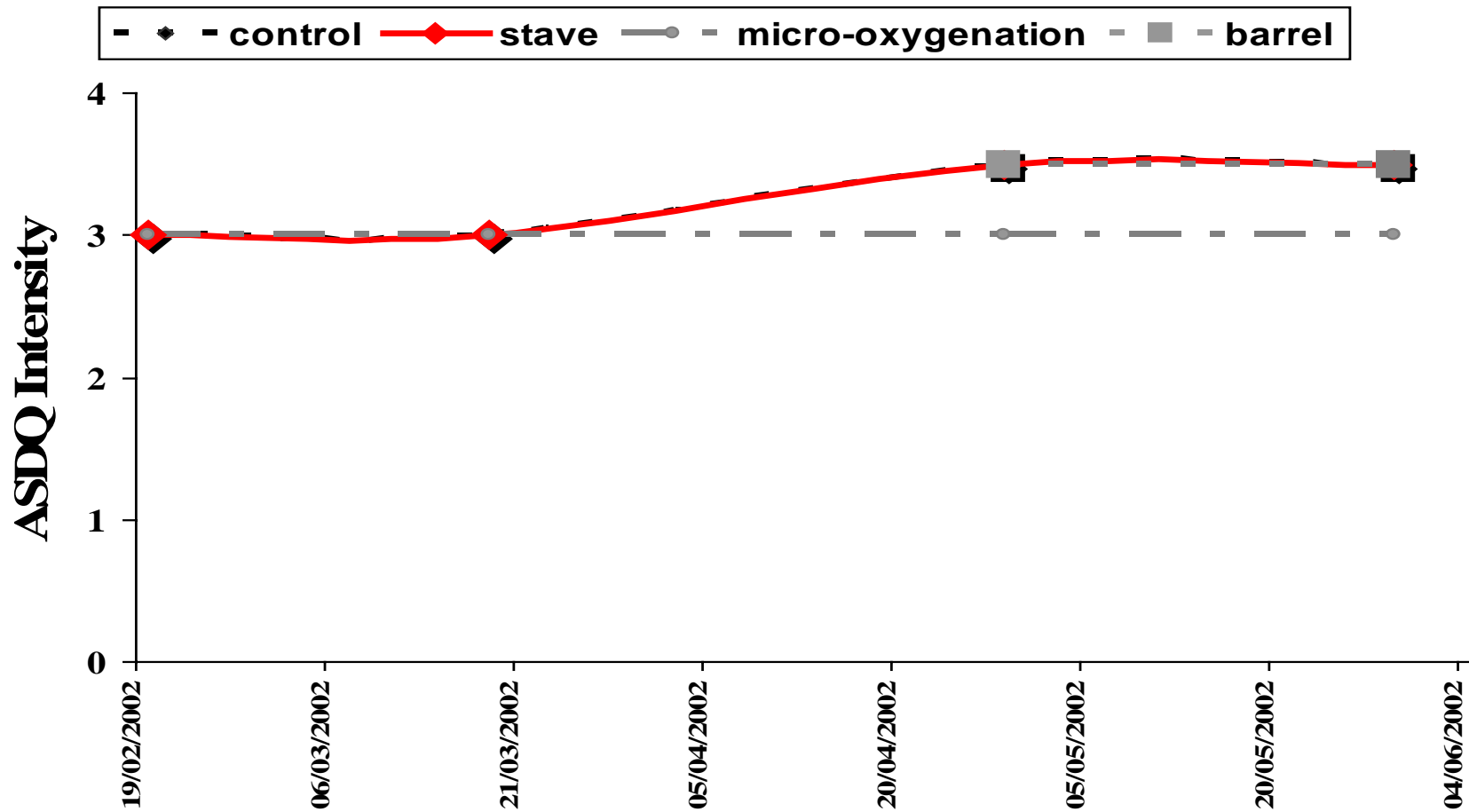
May 30, 2002

Reference	TB4 = control cask of 30/05/2002	TB1 = staves of 30/05/2002	TB3 = micro-oxygenated of 30/05/2002	Barrels of 30/05/2002
Red or yellow	3,5	3,5	3	3,5
Green or blue	1	2	1	2
Brown	0	0	0	0
Sulphurous	1	0	0	0
Vegetable	1	0	1	1
Red syrup fruit	0	0	1	1
Confectioned	2	2	2	1
Spicy	1	2	1	1
Wood taste	0	2v,g	0	2v,p
Animal	0	0	0	0
Mineral	1	1	1	1
Volume	3	4	4	4
Acidity	3	2	2,5	2
Tannic intensity	3	3,5	4	4
Astringence	0	0	1	2,5
Dryness	3	1	2	3
Bitterness	1	0	0	1
	*	*	*	*
Scale from 0 to 5				
* = concensus				

Appendix 2

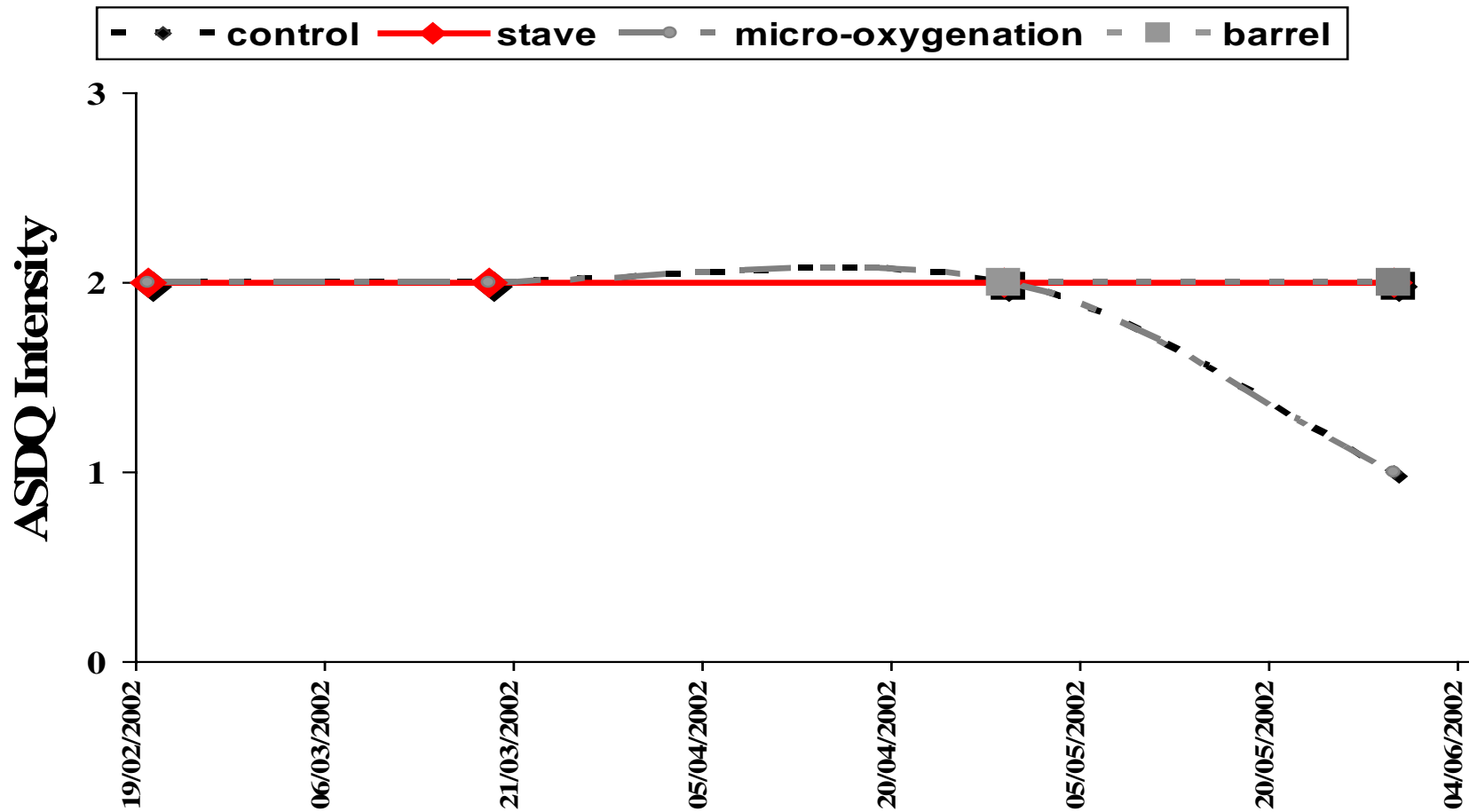
Appendix 2

Diagram 1 : evolution of descriptor « red »



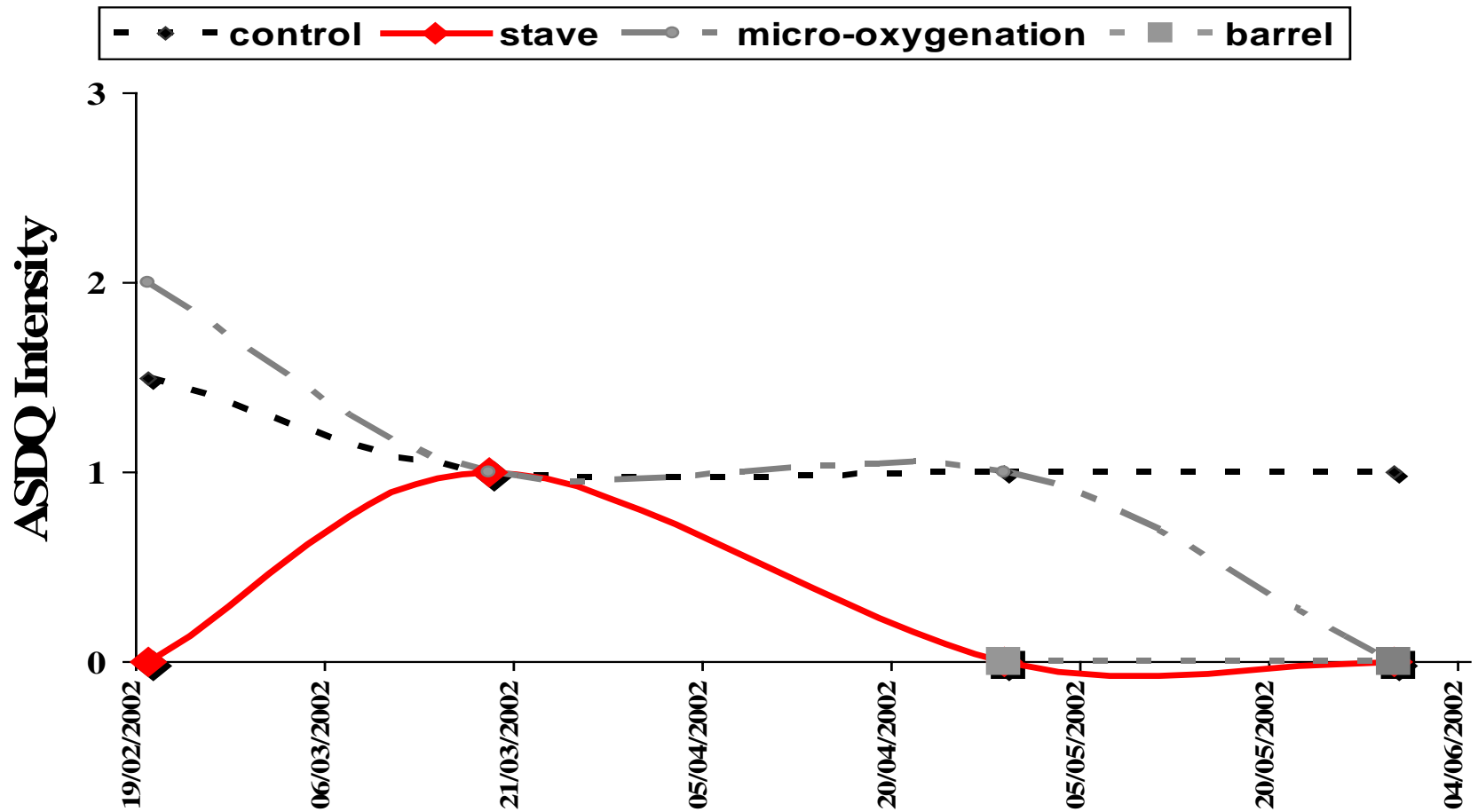
Appendix 2

Diagram 2 : evolution of descriptor « blue »



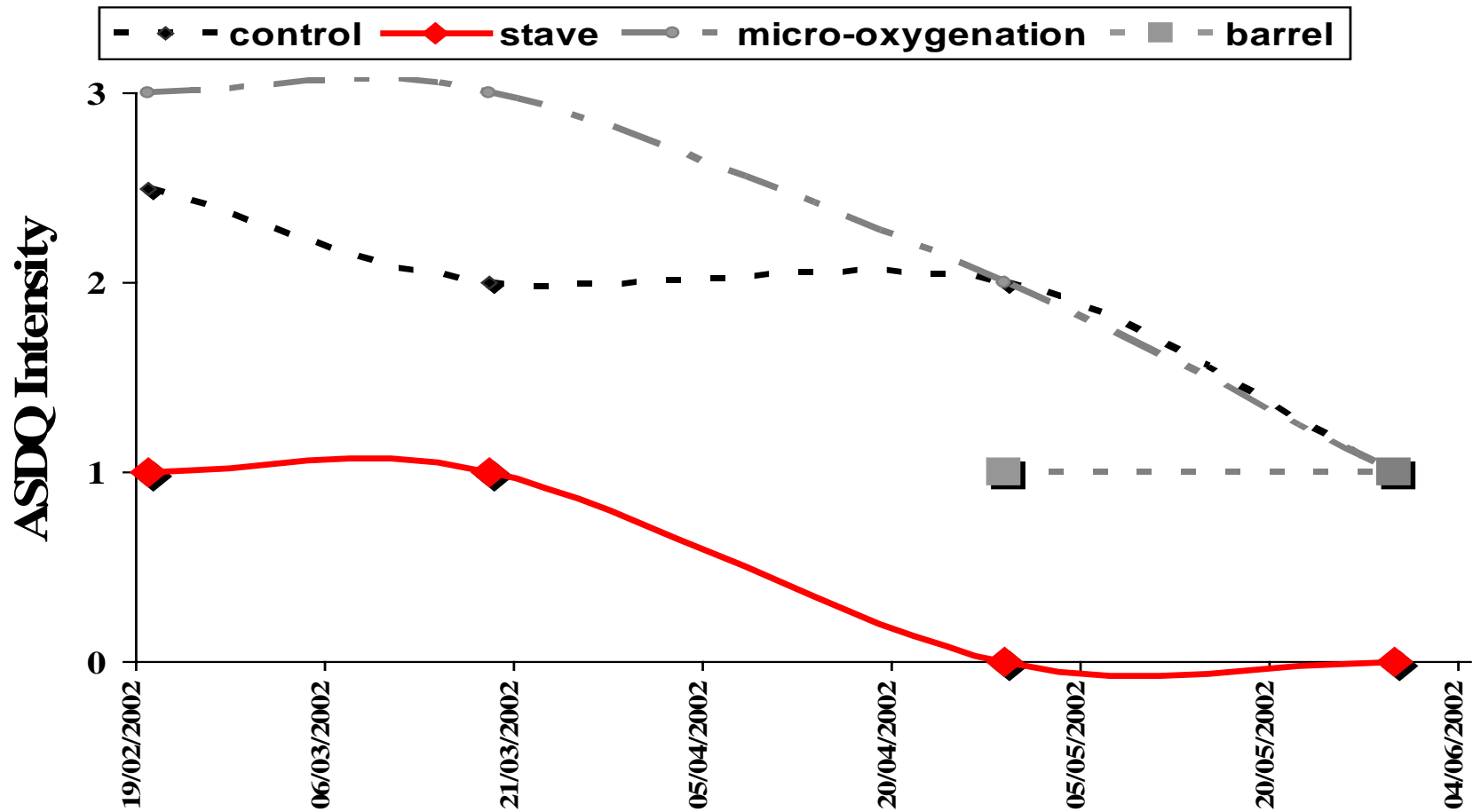
Appendix 2

Diagram 3 : evolution of descriptor « sulphurous »



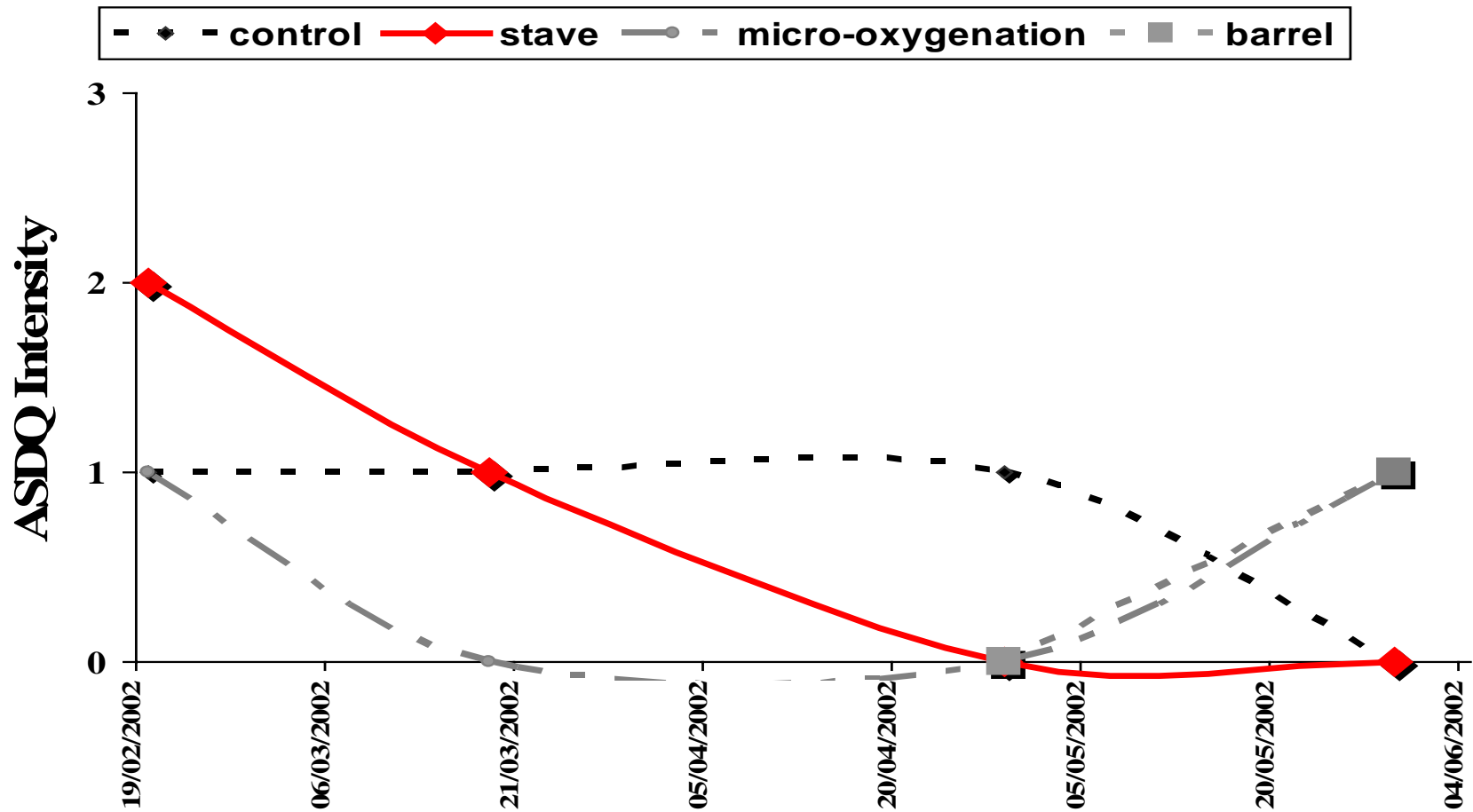
Appendix 2

Diagram 4 : evolution of descriptor « vegetable »



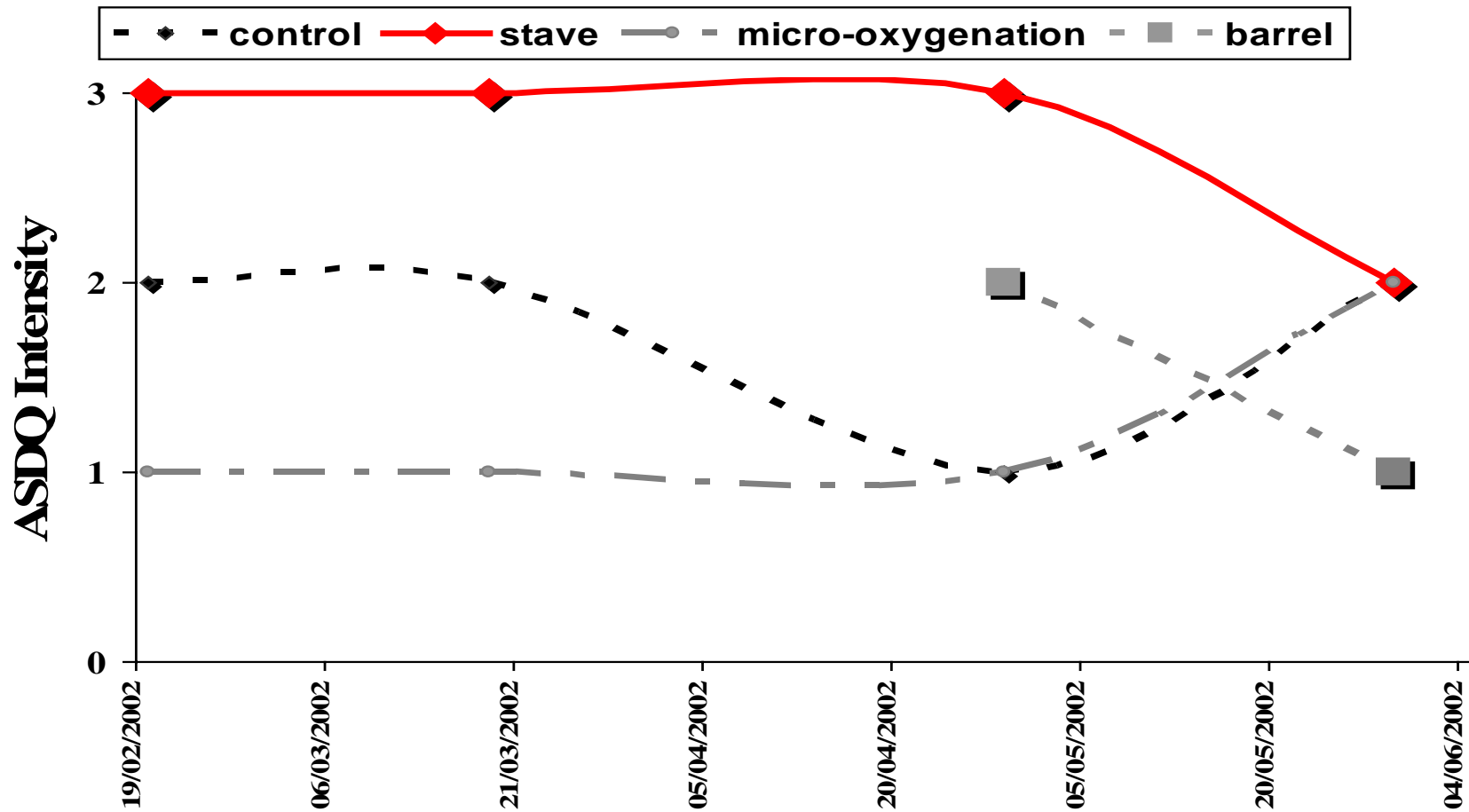
Appendix 2

Diagram 5 : evolution of descriptor « red syrup fruit »



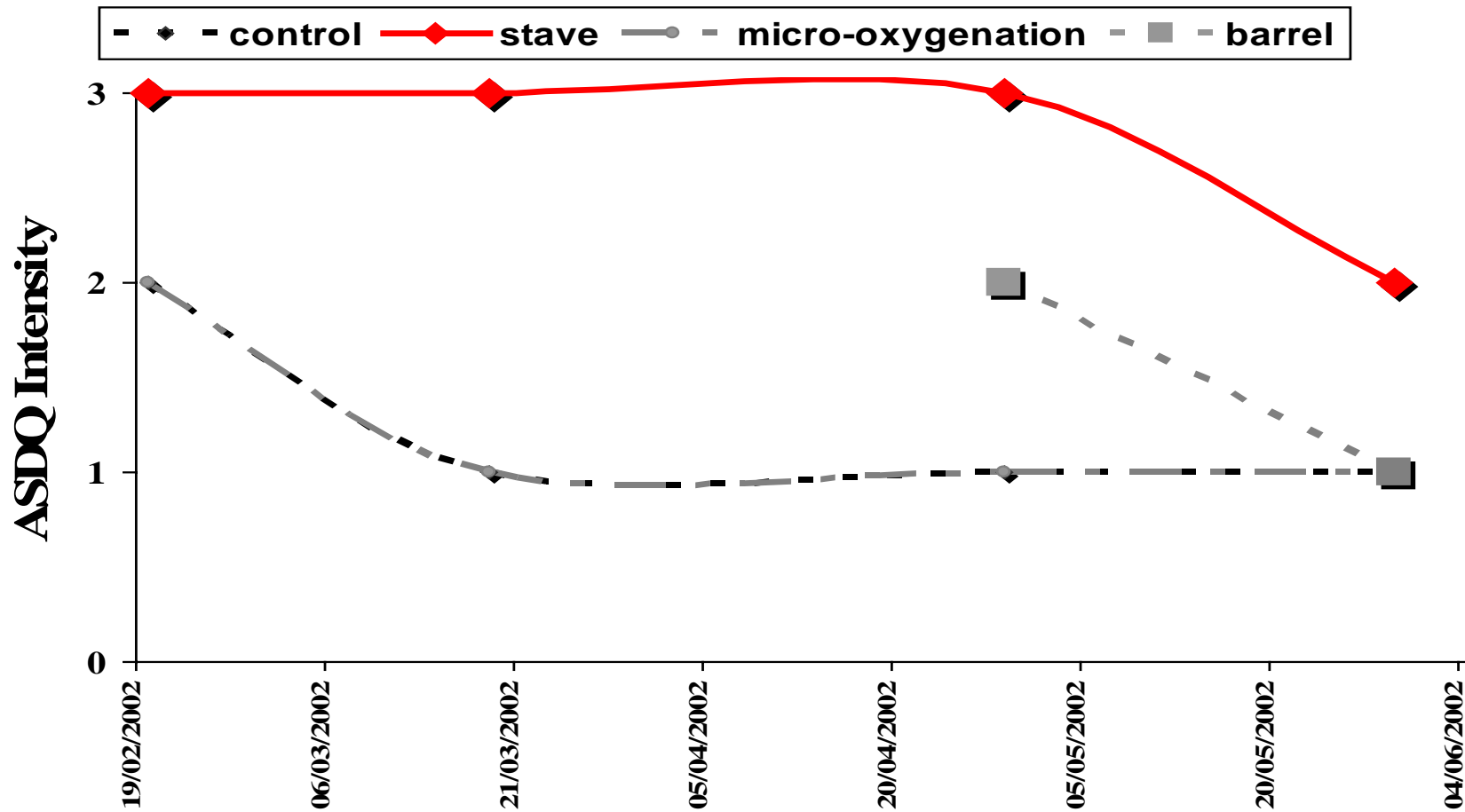
Appendix 2

Diagram 6 : evolution of descriptor « confectioned »



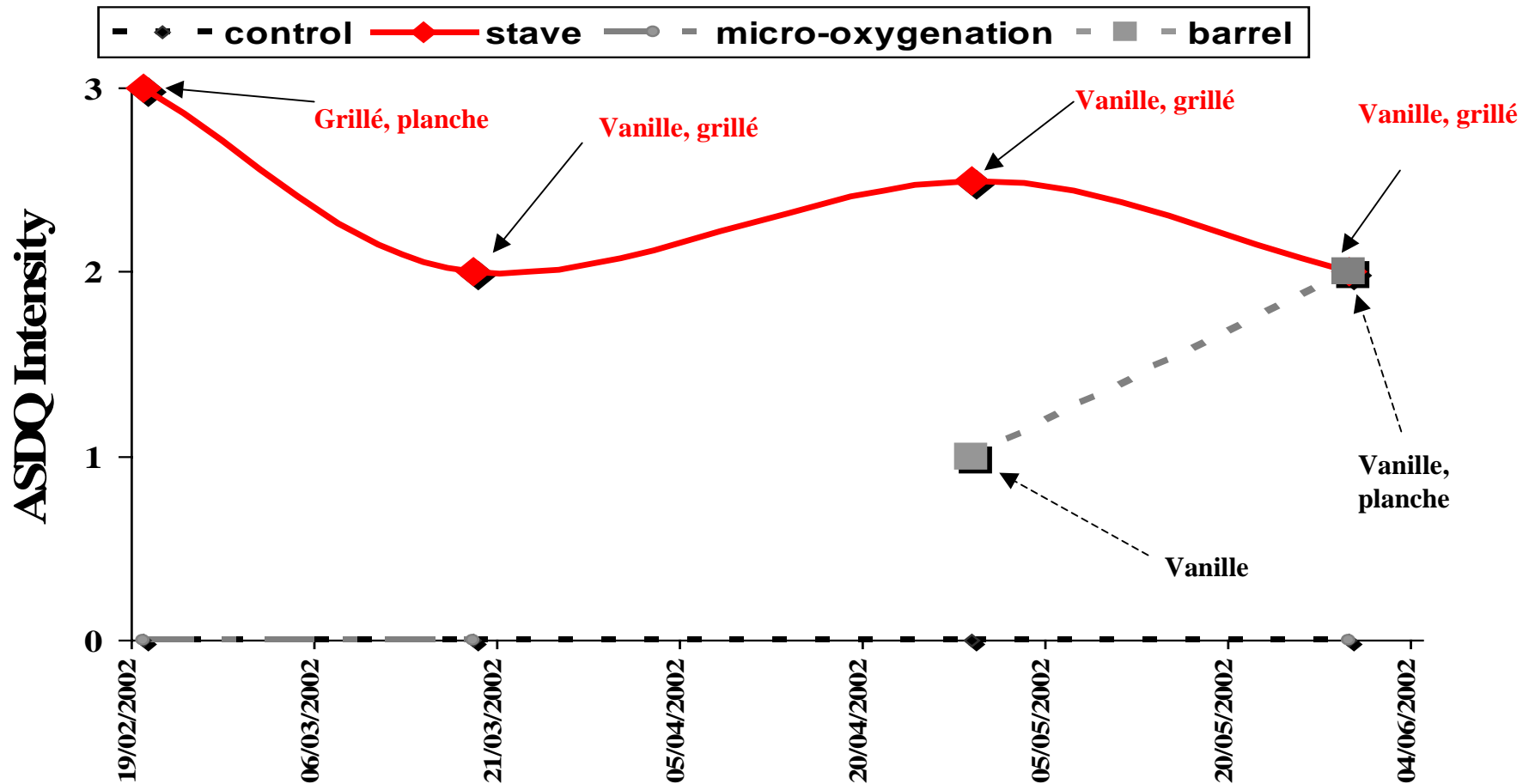
Appendix 2

Diagram 7 : evolution of descriptor « spicy »



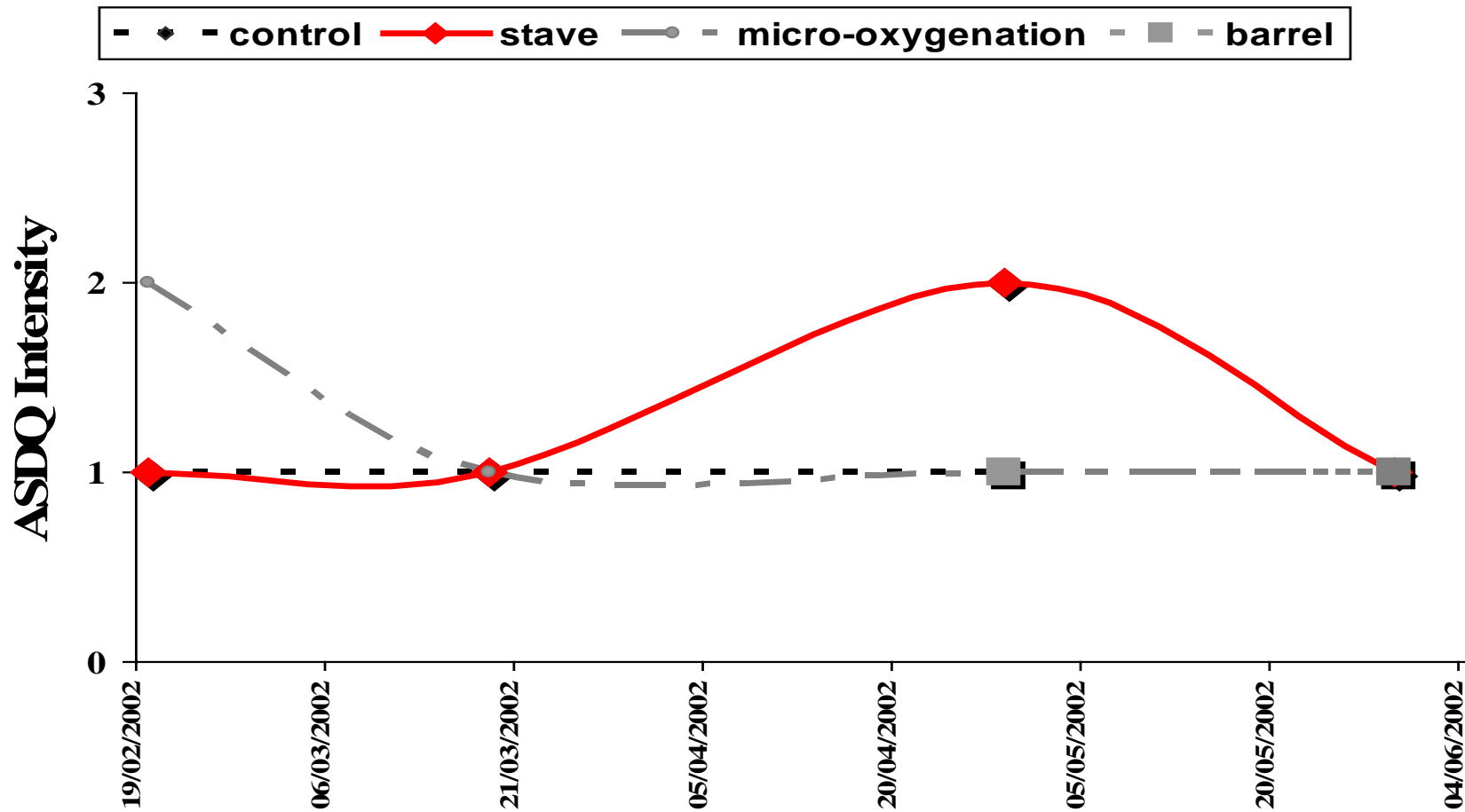
Appendix 2

Diagram 8 : evolution of descriptor « wood flavor »



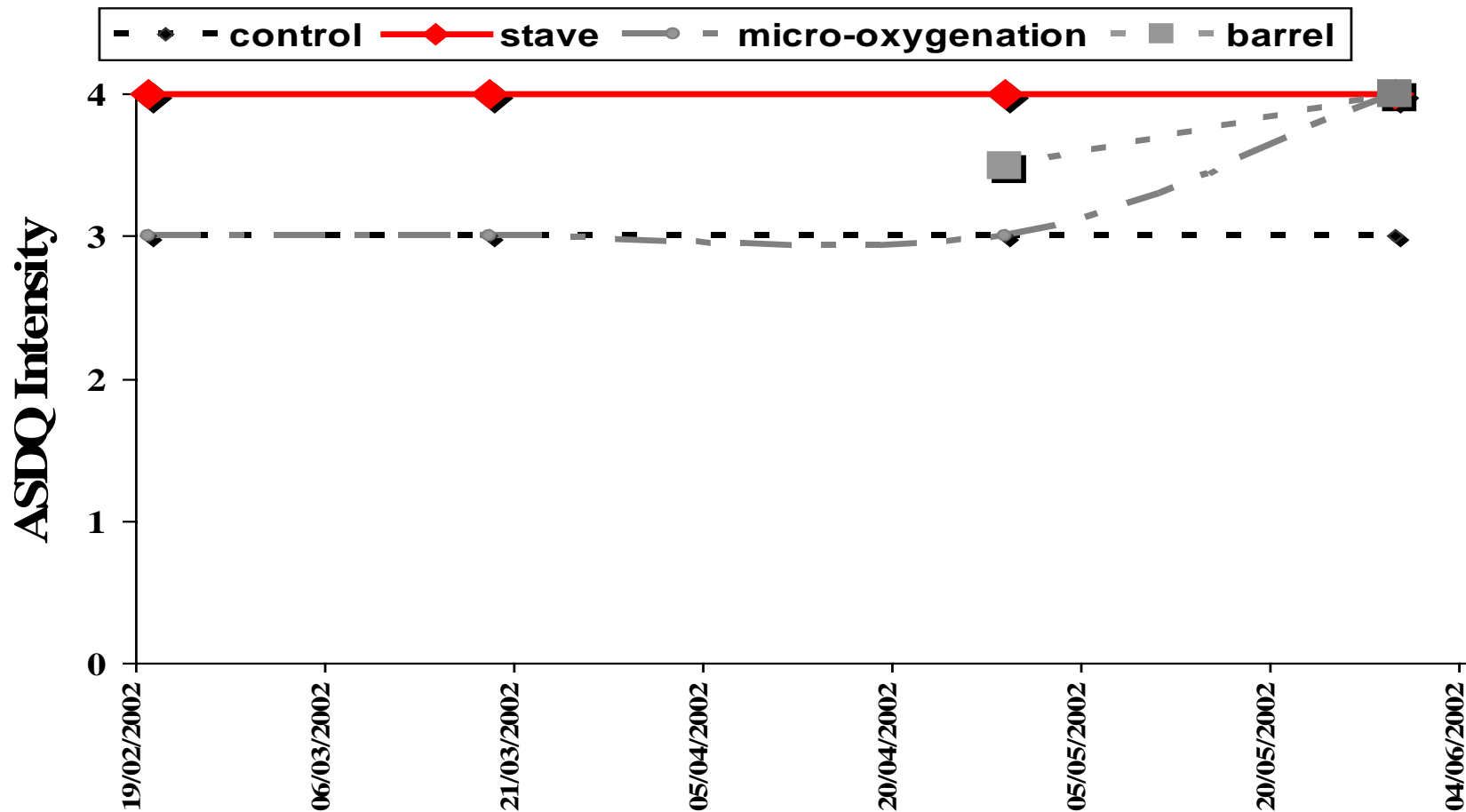
Appendix 2

Diagram 9: evolution of the descriptor « mineral »



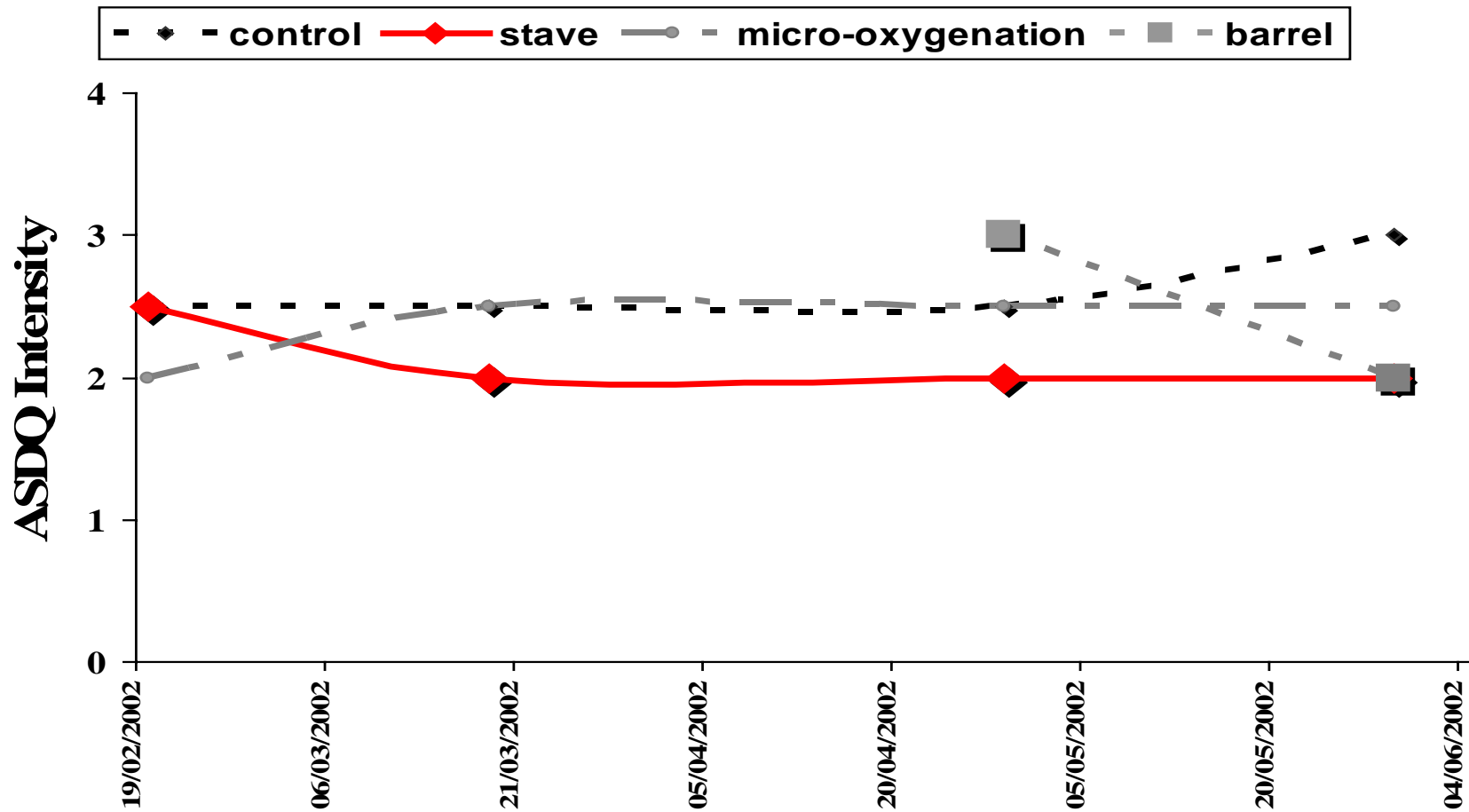
Appendix 2

Diagram 10 : evolution of descriptor « volume in mouth »



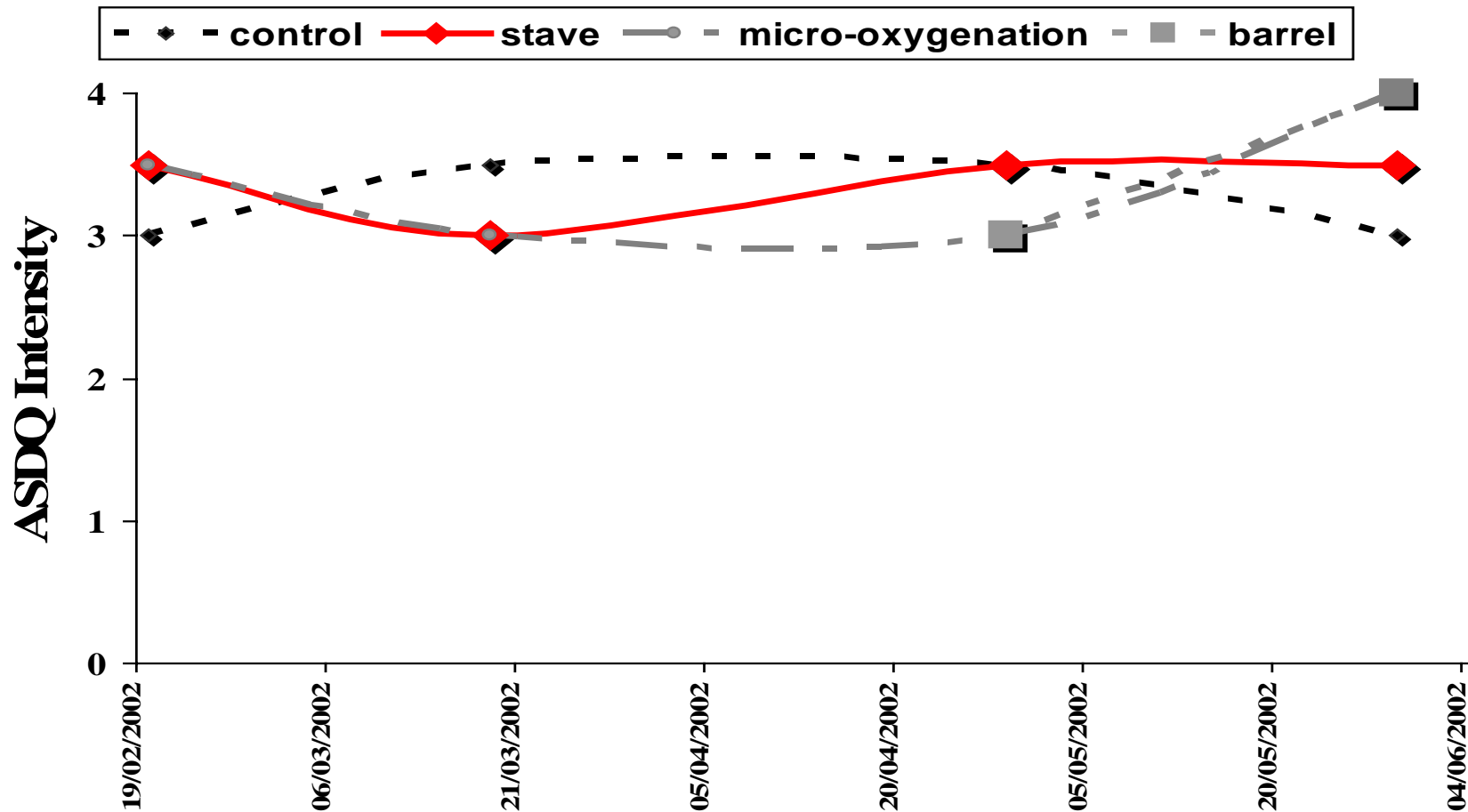
Appendix 2

Diagram 11 : evolution of descriptor « acidity »



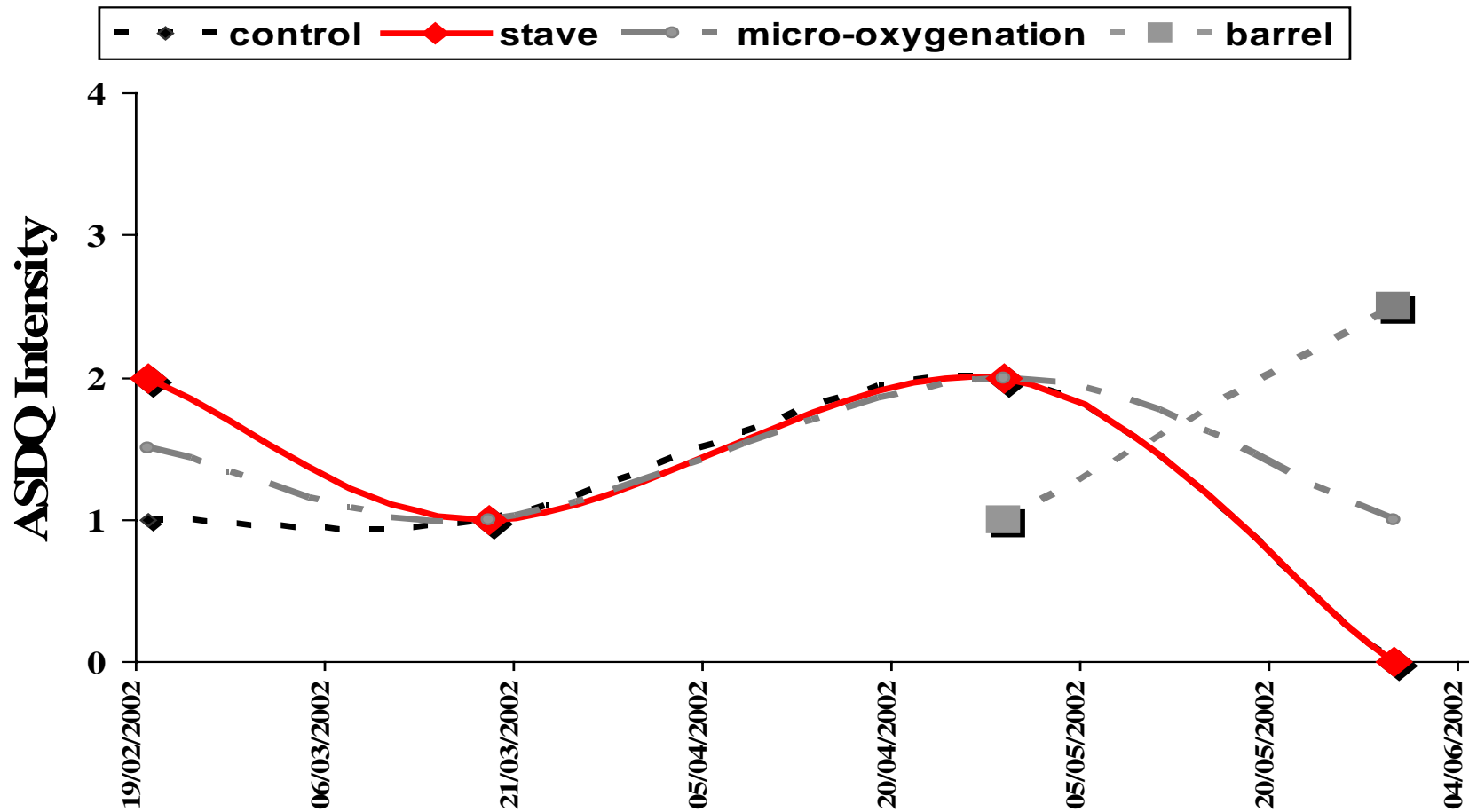
Appendix 2

Diagram 12 : evolution of descriptor « tannic intensity »



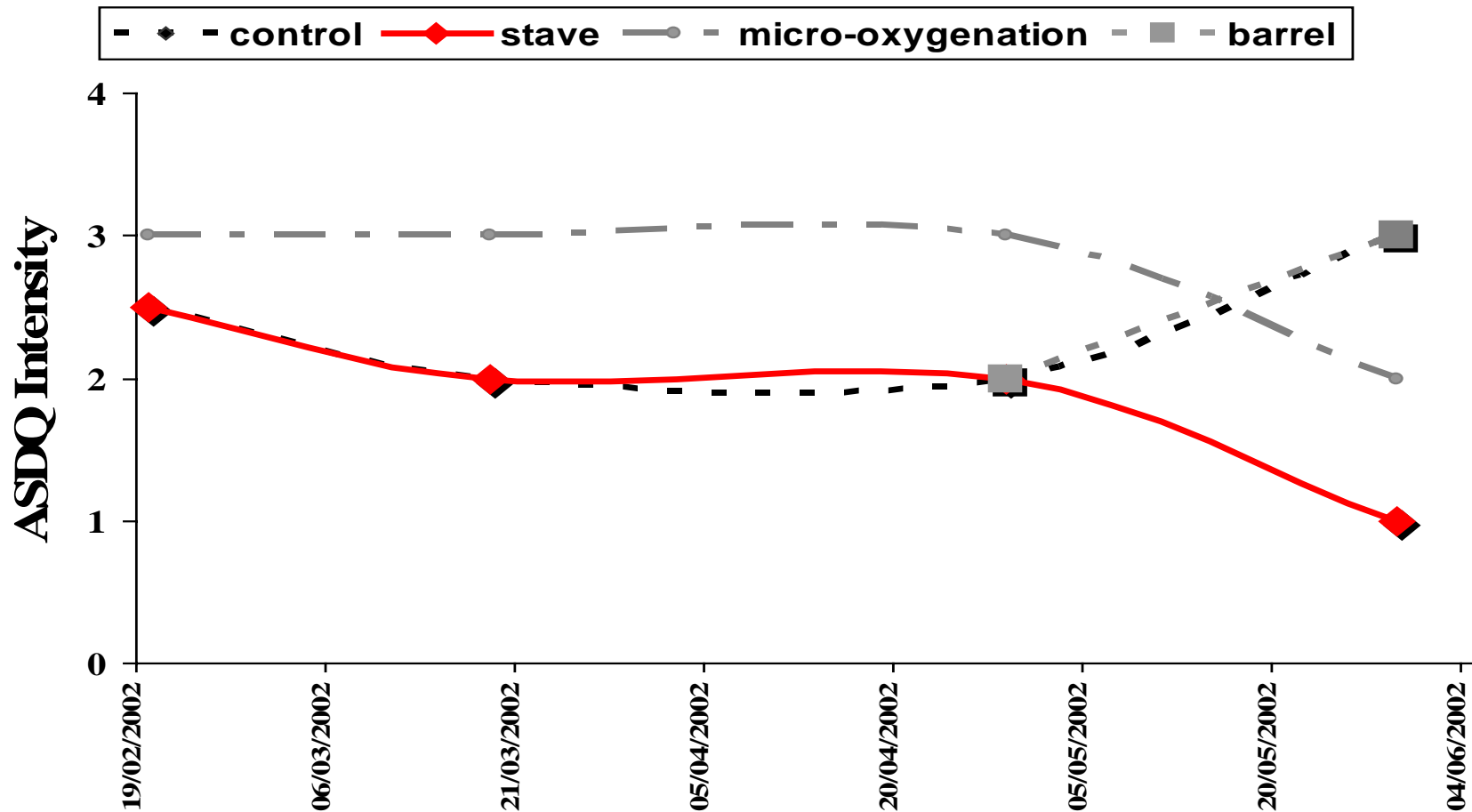
Appendix 2

Diagram 13 : evolution of descriptor « astringence »



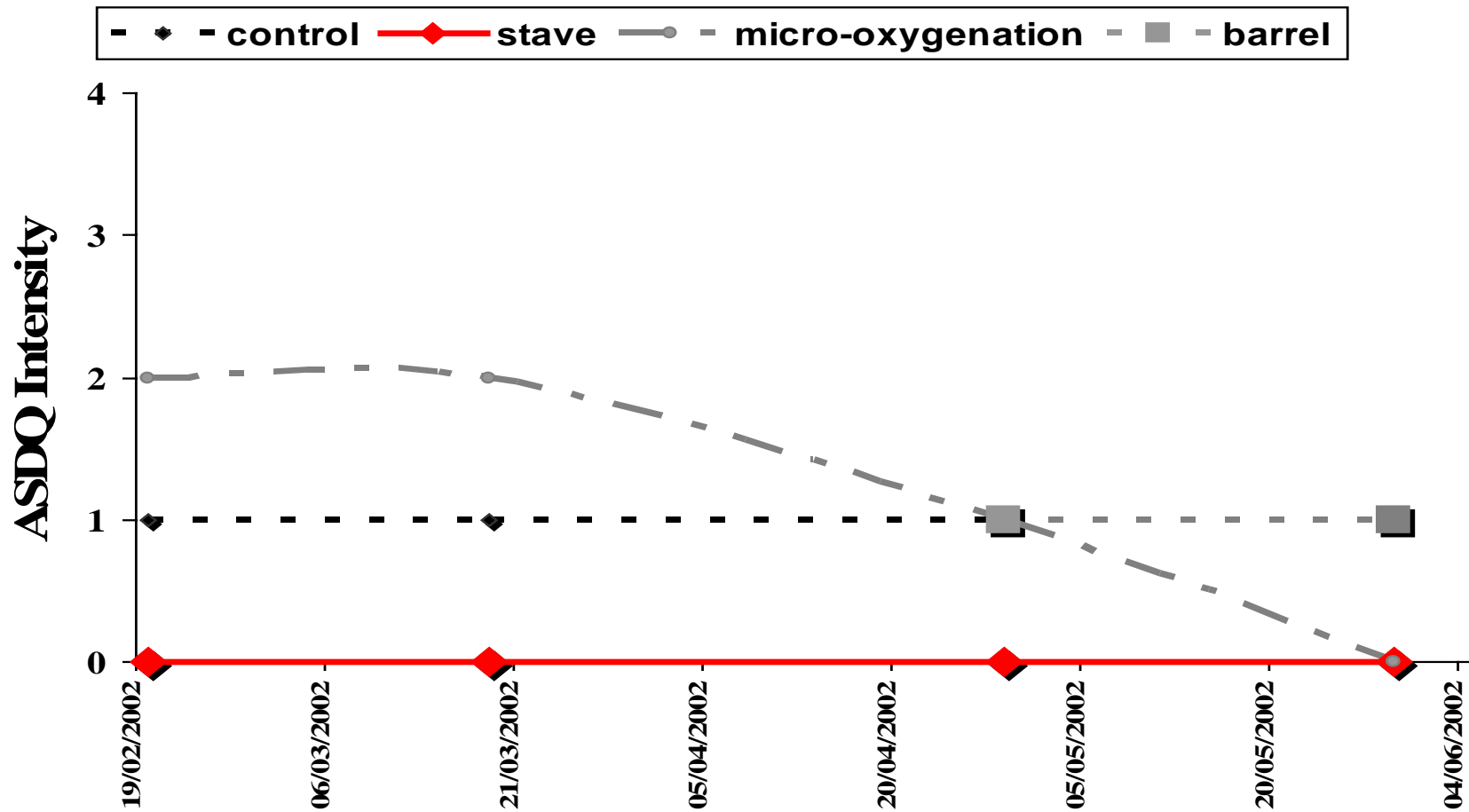
Appendix 2

Diagram 14 : evolution of descriptor « dryness »



Appendix 2

Diagram 15 : evolution of descriptor « bitterness »



Appendix 3

Appendix 3

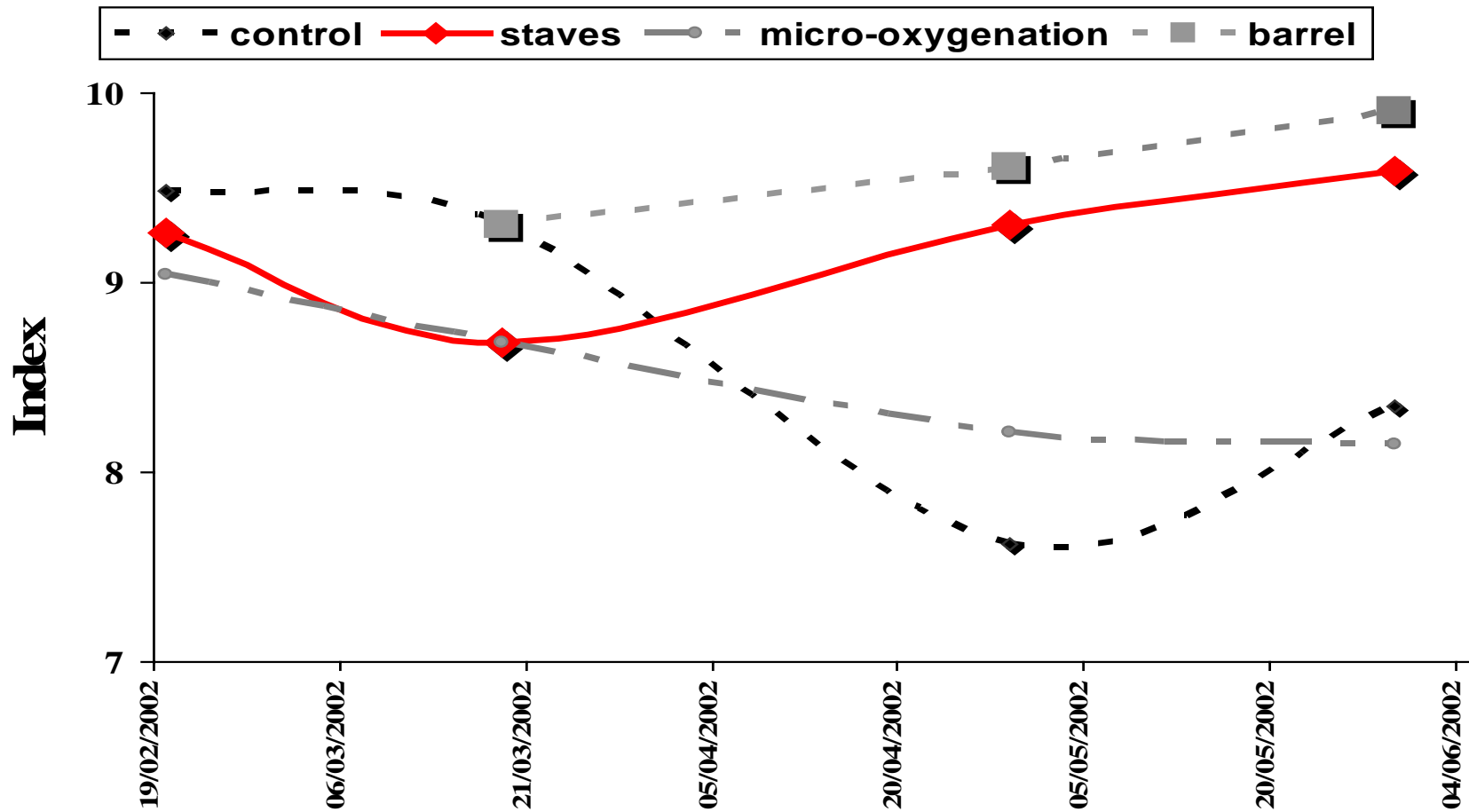
Analysis of 16-07-02

Date	Sample Identification	Reductive Sugars IR in g/l	TAV IR in % vol	Total acidity IR gH ₂ SO ₄ /l	Volatile acidity IR gH ₂ SO ₄ /l	Total SO ₂ mg/l	Free SO ₂ mg/l	pH IR	Malic acidity IR g/	Lactic acidity	D0420 + D0520	Shades DO420 / DO520	DO280
20-02-02	Control TB4	1,8	13,85	2,88	0,38	40	25	3,77	<0,3	1,03	9,48	0,7	52,1
20-02-02	Inserstave TB1	1,5	13,83	2,88	0,41	52	30	3,73	<0,3	0,95	9,26	0,71	52,6
20-02-02	Control + micro 02 TB3	1,6	13,7	2,84	0,37	54	29	3,76	<0,3	1	9,04	0,7	51,2
19-03-02	Control TB4	1,6	13,77	2,86	0,39	48	34	3,74	<0,3	0,93	9,3	0,69	52
19-03-02	Inserstave TB1	1,7	13,74	2,92	0,42	41	24	3,75	<0,3	0,95	8,68	0,72	50,1
19-03-02	Control + micro 02 TB3	1,8	13,64	2,85	0,38	51	31	3,72	<0,3	0,95	8,68	0,72	50,1
19-03-02	Barrel	1,5	13,65	2,87	0,41	39	27	3,74	<0,3	0,93	9,3	0,69	52
26-04-02	Control TB4	1,6	13,78	2,88	0,37	75	52	3,71	<0,3	0,94	7,62	0,75	51,4
26-04-02	Inserstave TB1	1,5	13,77	2,91	0,42	47	30	3,73	<0,3	0,98	9,31	0,7	53,2
26-04-02	Control + micro 02 TB3	1,6	13,66	2,85	0,38	60	40	3,74	<0,3	0,96	8,21	0,72	51,4
26-04-02	Barrel	1,5	13,65	2,87	0,41	40	22	3,73	<0,3	1	9,61	0,68	52,4
30-05-02	Control TB4	1,7	13,78	2,87	0,39	55	35	3,73	<0,3	0,87	8,35	0,71	53,2
30-05-02	Inserstave TB1	1,7	13,75	2,94	0,41	44	21	3,76	<0,3	0,93	9,59	0,68	53,8
30-05-02	Control + micro 02 TB3	1,9	13,6	2,86	0,38	61	37	3,73	<0,3	0,88	8,15	0,73	49,8
30-05-02	Barrel	1,8	13,62	2,92	0,44	39	18	3,74	<0,3	0,89	9,9	0,67	55,1

Appendix 4

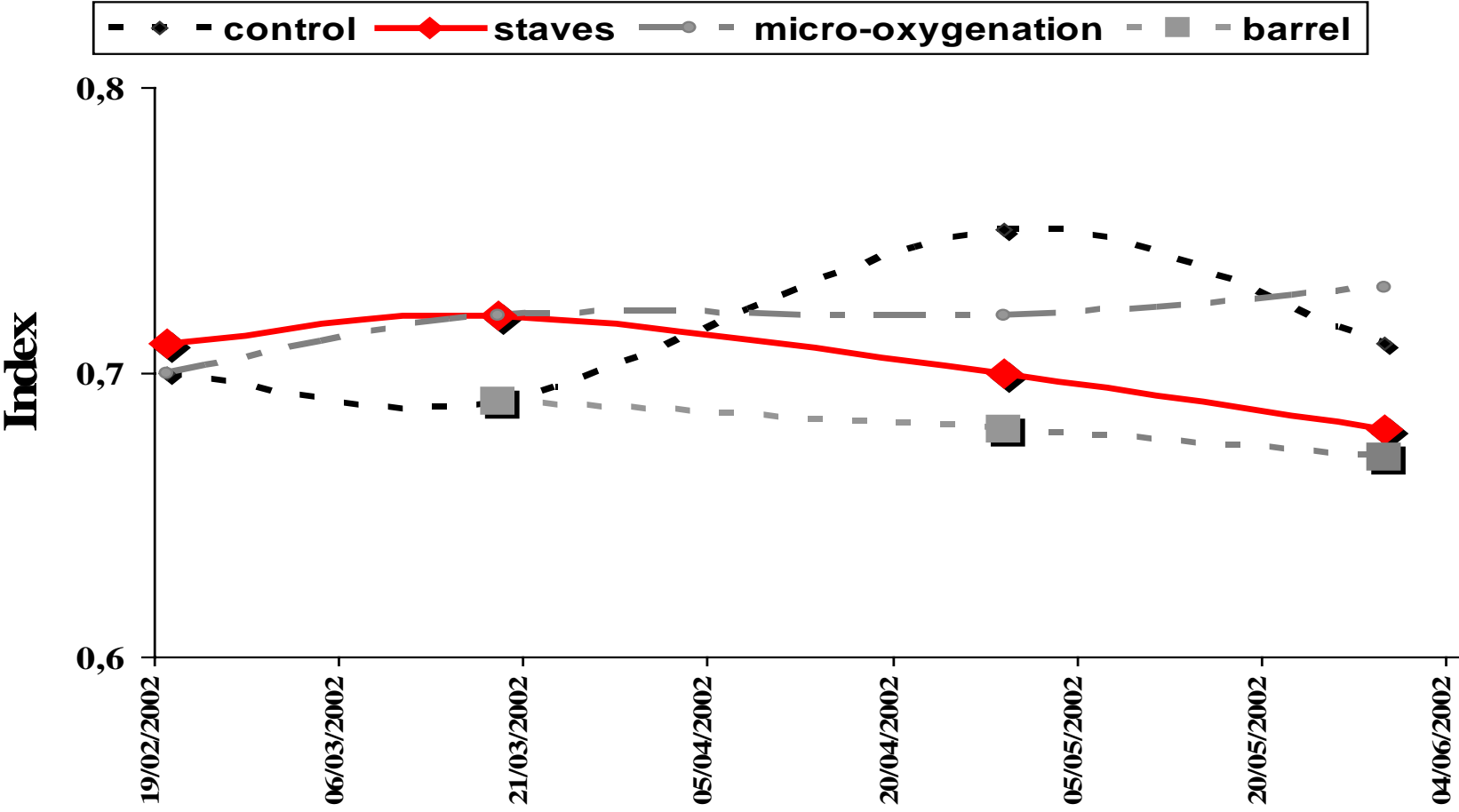
Appendix 4

Diagram 16 : evolution of color intensity



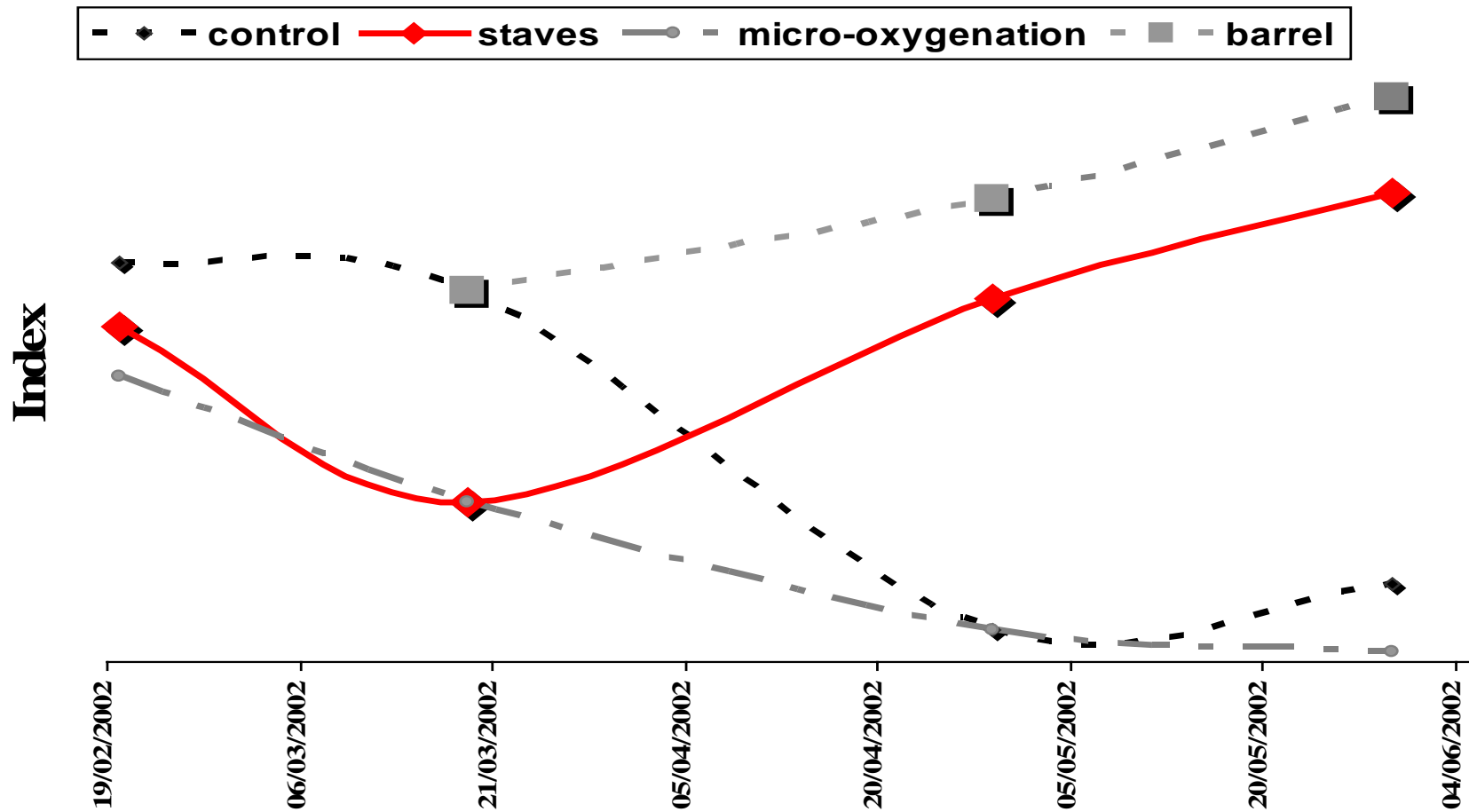
Appendix 4

Diagram 17 : evolution of color tone



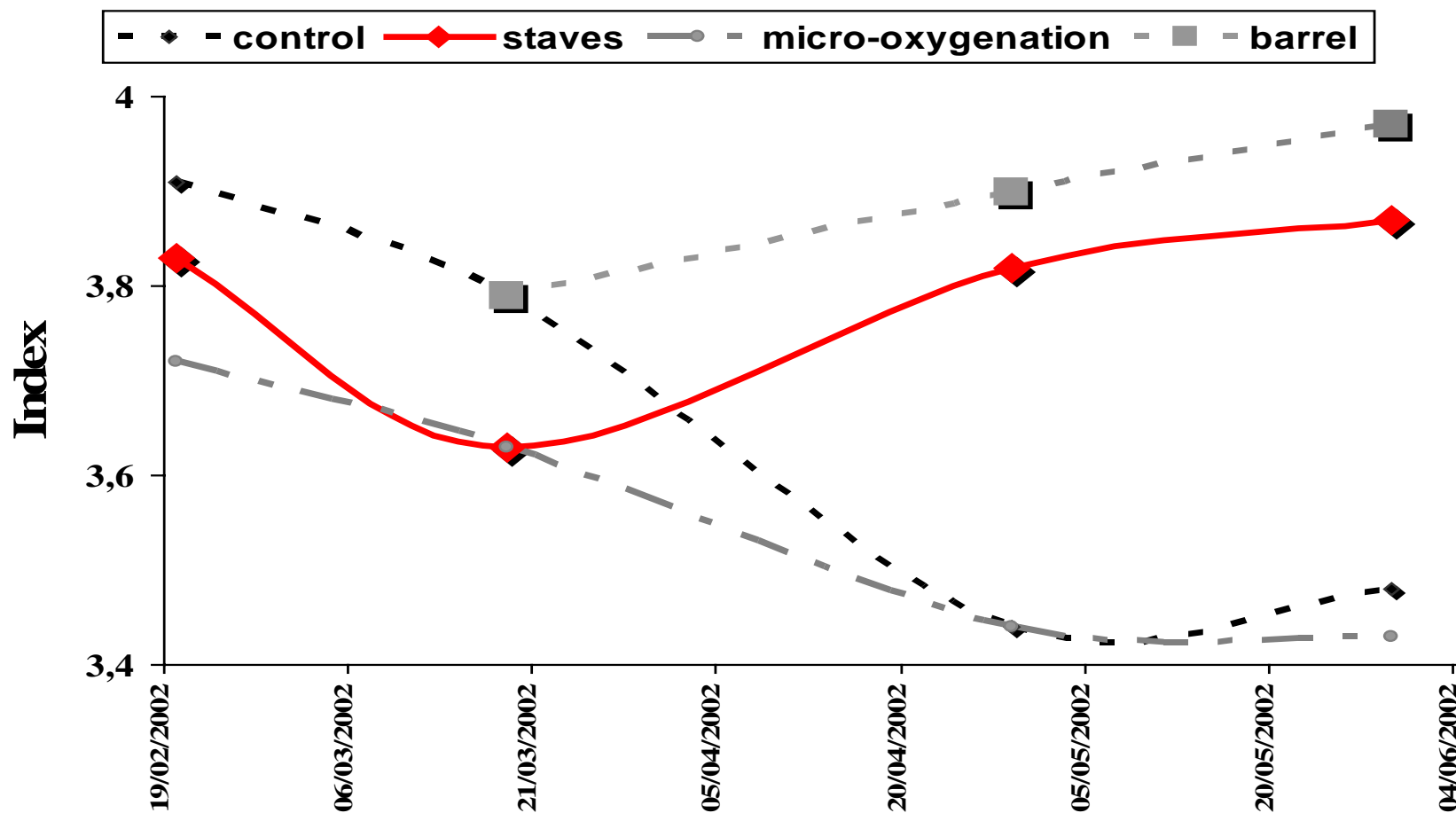
Appendix 4

Diagram 18 : evolution of absorption at 520 nm



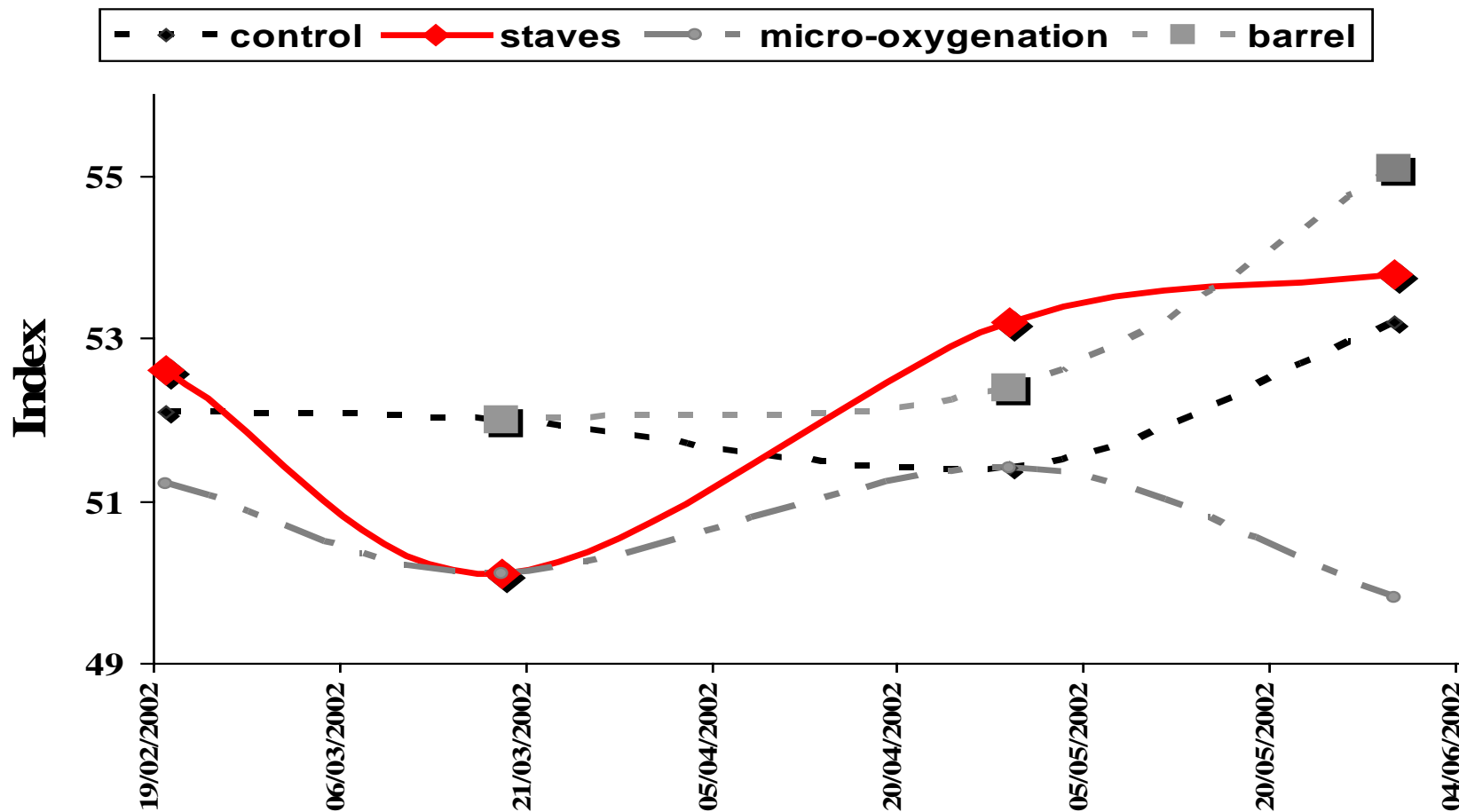
Appendix 4

Diagram 19 : evolution of absorption at 420 nm



Appendix 4

Diagram 20 : evolution of absorption at 280 nm



Appendix 5

Appendix 5

Analysis of polychlorophenoles y polychloroanisoles in the wines

Identity of the wines

22706 - 1: 30/05/2002 - TB 4 – Control Merlot

22706 - 2: 30/05/2002 - TB 1 – Tech-Stave Merlot + μO_2

22706 - 3: 30/05/2002 – Barrel Merlot

22706 - 4: INITIAL TUCHAN 17/02

- Research and dosage of the Polychlorophenoles and Polychloroanisoles in the wines (sst)

Referent Molecules	CHLOROANISOLES ($\mu\text{g/l}$)				CHLOROPHENOLES ($\mu\text{g/l}$)			
	2,4,6-TCA	2,3,4,6-TeCA	PCA	Other chloroanisoles	2,4,6-TCP	2,3,4,6-TeCP	PCP	Other chlorophenoles
22706 - 1	Nd*	Nd*	Nd*	Nd*	Nd*	Nd*	Nd*	Nd*
22706 - 2	Nd*	Nd*	Nd*	Nd*	0.004	Nd*	<0.002	Nd*
22706 - 3	Nd*	Nd*	Nd*	Nd*	0.017	0.003	<0.002	Nd*
22706 - 4	Nd*	Nd*	Nd*	Nd*	0.019	Nd*	<0.002	Nd*

Appendix 5

Method used: chromatography in gaseous phase and high resolution with detection of captured electron: ECD⁶³Ni.

Detection limit of the compounds analyzed: 0.002µg/l

* Nd = not detected

- 2,4,6-TCA=2,4,6-trichloroanisol
- 2,4,6-TCP=2,4,6-trichlorophenol
- 2,3,4,6-TeCA=2,3,4,6-tetrachloroanisol
- 2,3,4,6-TeCP=2,3,4,6-tetrachlorophenol
- 2,3,4,5,6-PCA=2,3,4,5,6-pentachloroanisol
- 2,3,4,5,6-PCP=2,3,4,5,6-pentachlorofenol

Conclusion of the polychloroanisoles y polychlorophenoles analysis.

The wines do not contain polychloroanisole molecules.

Simples 22706-2, 22706-3 et 22706-4 contain 2,4,6-TCP molecules in levels below the perceptual thresholds for white wine.

Appendix 6

Appendix 6

Dosage for the liquid chromatography (CLHP) of Ochratoxyn A in the wines

Detection limit: 10 ng/l

22706 - 1: 30/05/2002 - TB 4 – Control Merlot

22706 - 2: 30/05/2002 - TB 1 – Tech-Stave Merlot + μO_2

22706 - 3: 30/05/2002 – Barrel Merlot

22706 - 4: INITIAL TUCHAN 17/02

Results

22706 - 1: not detected

22706 - 2: not detected

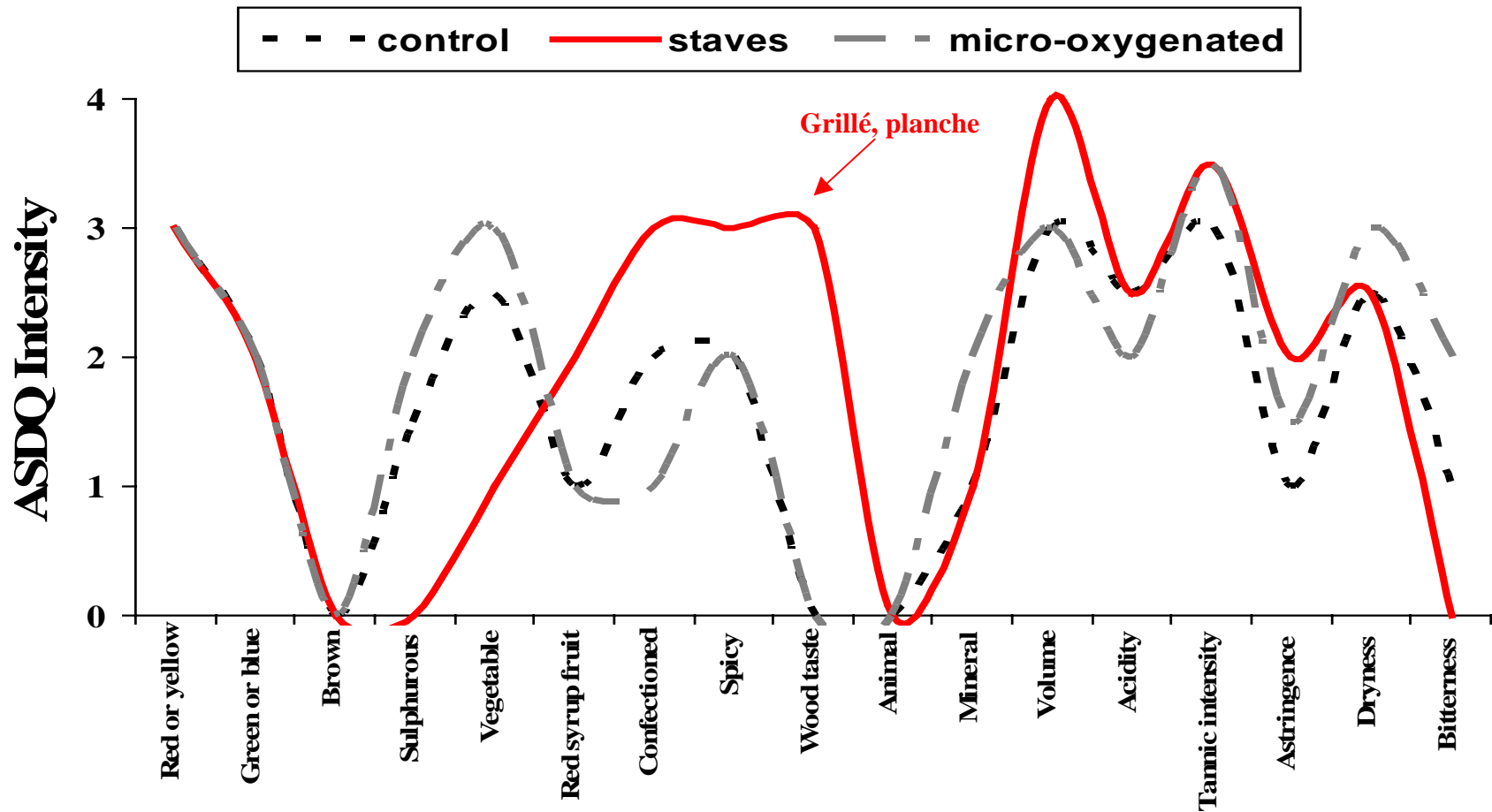
22706 - 3: not detected

22706 - 4: not detected

Appendix 7

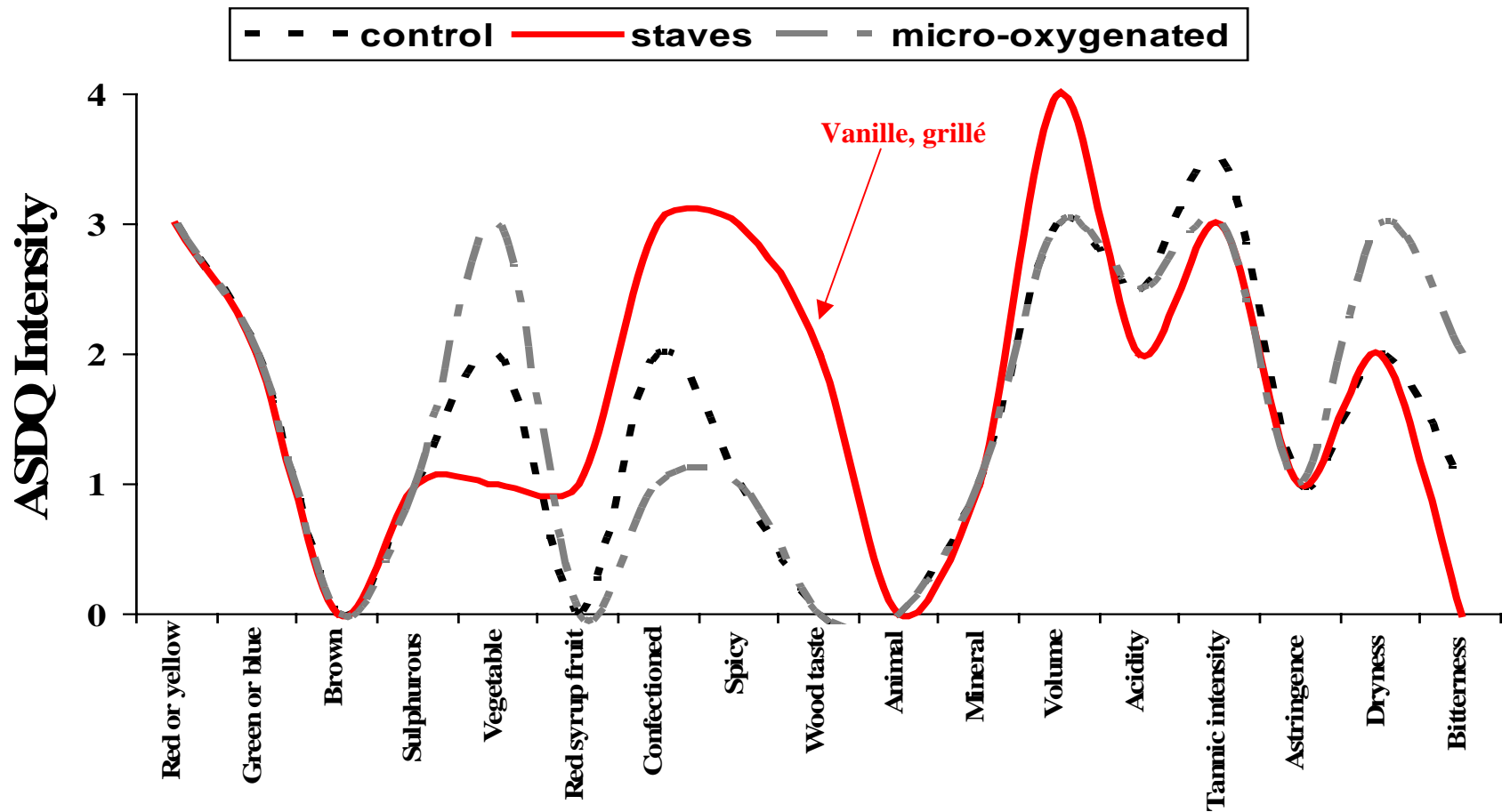
Appendix 7

Diagram 21 : sensory profiles of the wines of 20/02/2002. Sensory analysis on 03/07/2002



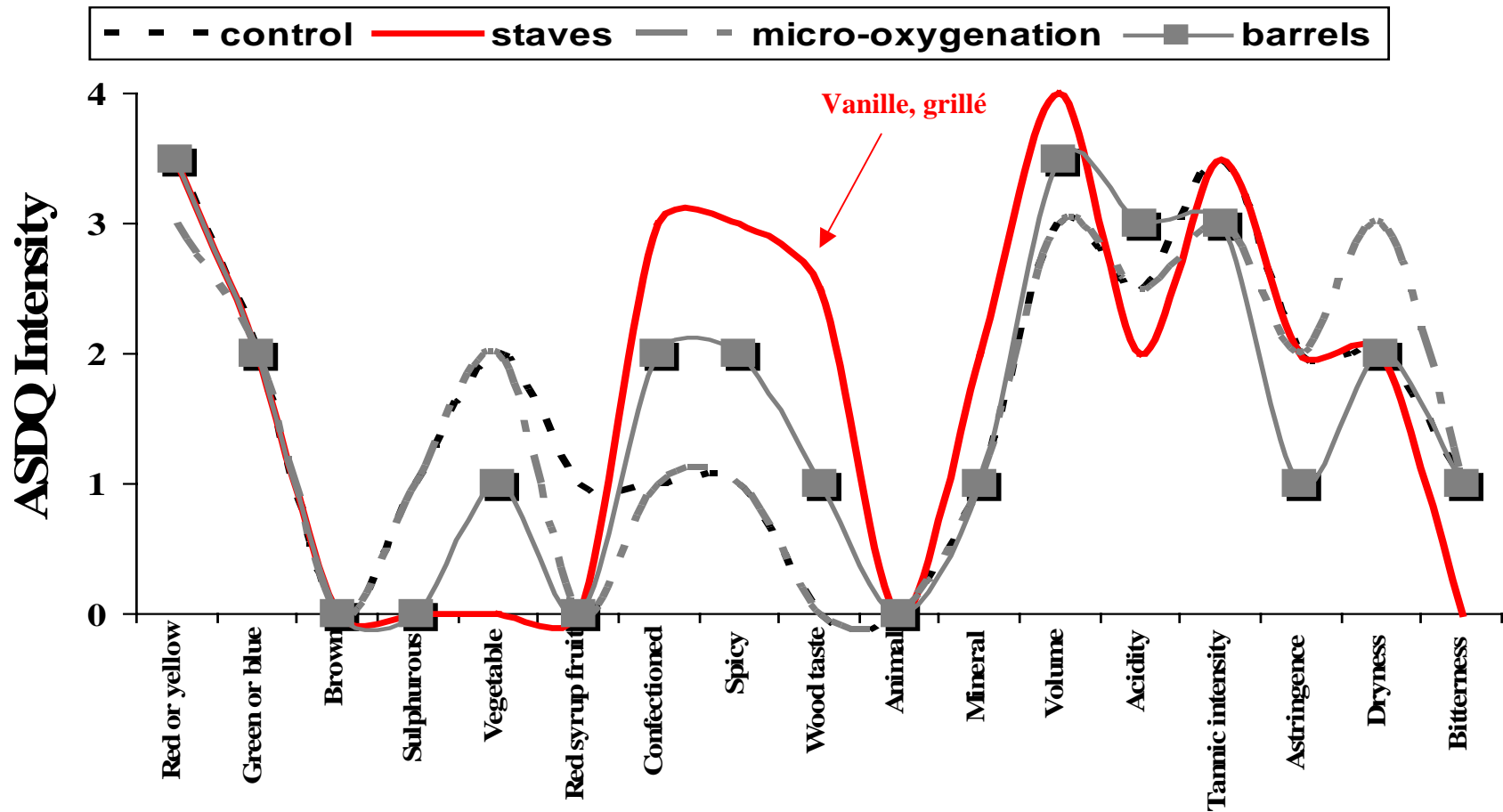
Appendix 7

Diagram 22 : sensory profiles of the wines of 19/03/2002. Sensory analysis on 03/07/2002



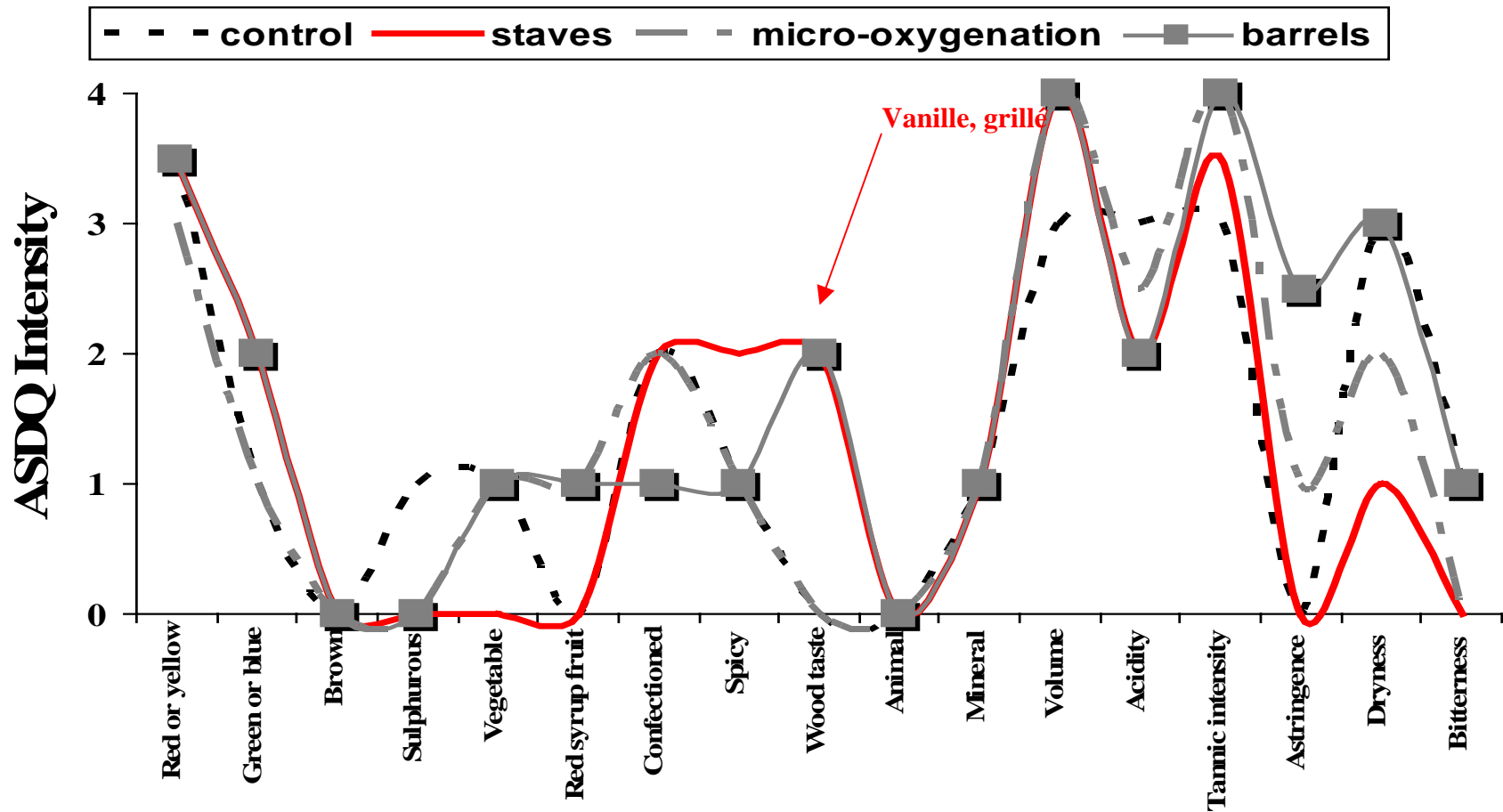
Appendix 7

Diagram 23 : sensory profiles of the wines of 29/04/2002. Sensory analysis on 03/07/2002



Appendix 7

Diagram 24 : sensory profiles of the wines of 30/05/2002. Sensory analysis on 03/07/2002



Appendix 7

Diagram 25 : evolution of the sensory profile of the « Inserstave » wine of 20/02/02 to 30/05/02. Sensory analysis on 03/07/2002

