

TAINT NECESSARILY SOLVED

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SABATÉ CLAIMS TO HAVE COME UP WITH A TECHNIQUE FOR SOLVING CORK TAINT, AN AILMENT THAT ATTACKS 5% OF NATURALLY SEALED WINES. BUT WILL THE PROCESS, SUCCESSFUL IN TESTS, PROVE VIABLE IN MASS PRODUCTION ? JAMIE GOODE REPORTS.

I'll begin with the big news. Sabaté, the second largest cork manufacturer, may have found a cure for cork taint. Its new, supercritical carbon dioxide (CO₂) extraction process, called 'Diamant' ('Diamond', in English), was recently unveiled to a group of 18 journalists – 16 French, one Italian and me – at a press conference held at the high-security research laboratories at the Commissariat à l'Énergie Atomique (French Atomic Energy Commission, CEA) near Montelimar in Provence. Using the Diamond technique, developed in conjunction with the CEA's Supercritical Fluids and Membranes laboratory, Sabaté has successfully removed as much as 97% of 2,4,6-trichloroanisole (TCA), a compound that causes musty taint in wines at even fantastically low concentrations. But although this looks like a highly significant breakthrough, Sabaté will have to wait two years for a factory to be built in which the Diamond process can be operated on an industrial scale. In the meantime, Sabaté has got closures to sell and customers to keep loyal to existing products.

Amorim, the world's largest cork manufacturer, has also got a new industrial process, called 'ROSA'. Unlike Sabaté's Diamond process, ROSA doesn't take out virtually all the TCA but Amorim hopes that the 60-80% reduction it says this process achieves will be enough to cut TCA to levels where the incidence of taint is commercially acceptable. Because of the patent situation, precise details of this technique, which relies on steam treatment, are still confidential. Of course, we have all heard previous claims for TCA-eliminating techniques that have come to nothing, so a degree of caution – if not scepticism – is entirely appropriate. And with such significant commercial interests at stake, solid independent data are needed to back up any claims made by closure manufacturers. With this in mind, it is worth comparing the two processes and assessing whether a cure for cork taint really could be on the horizon. I'll also discuss what sorts of further studies are needed to verify the claims made by Sabaté and Amorim about the

effectiveness of their taint-beating processes.

IS IT TIME TO FORGET ABOUT CORKS ? Faced with the extent of the problem of TCA contamination – which reliable studies put at around 4-5% of all wines sealed with natural corks – shouldn't we just switch to synthetic closures and forget about natural corks ? This is certainly the attitude of certain sectors of the wine industry, most notably in New Zealand and Australia. But synthetic closures are not without their problems. The Australian Wine Research Institute's ongoing closure trial may have found that wines sealed with a range of synthetic closures are taint free, but almost all the wines also showed unacceptable levels of oxidation after just 30 months. This suggests that synthetic corks may be suitable only for wines destined for early consumption. (As an aside, it should be mentioned that different designs of synthetic cork, and not all leading makes were tested in this study; some brands that were not tested may have better long-term sealing properties.) The general challenge is that plastic corks don't have the same elasticity as natural cork, and thus a compromise has to be reached between tightness of seal and ease of extraction. The same study indicates that screwcaps provide a good, taint-free seal, and one that is considerably better than that of natural corks. This sounds like a good thing, but where wines sealed with screwcaps have been compared with the same wines sealed with corks, the consistent verdict has been that those under screwcaps taste fresher. Of course, with some New World wine styles, fresher and fruitier may be better, but the same isn't necessarily the case with Old World classics. Put another way, we like the way that wines age when they are sealed with a natural cork that isn't tainted. No buyer wants to wait 50 years for their newly-purchased First Growth to come round, especially if they are in middle age, but they certainly don't want them to age into something quite different. Get rid of the taint problem and suddenly the market for alternative closures has shrunk dramatically.

However, because cork is a natural product, it is variable, so fine wines sealed with natural corks will evolve at slightly different rates. Despite this variability, it is likely that taint-free natural corks, if they could be produced, would be the closure of choice for most winemakers.

SABATÉ'S DIAMOND PROCESS

So how does Sabaté's 'cure' for cork taint work? The Diamond process uses supercritical CO₂ for selective extraction of volatile compounds from cork. Work on this process was initiated in 1997 and patented in 1999, the patent being shared by Jean-Marie Aracil, Sabaté's head of R&D, and Guy Lumia and Christian Perre of the CEA (whose goals include 'guaranteeing national Independence by designing, manufacturing and maintaining dissuasion tools'). 'Sabaté has exclusive use of this patent in the wine closure industry', says Aracil.

Supercritical CO₂ is a slightly difficult concept to explain in simple terms, but I'll have a go. If you pressurise a gas, at a certain point it becomes a liquid. If you then juggle parameters of pressure and temperature, at a specific combination of these – known as the critical point – the interface between the two disappears, and you then have the penetration power of a gas and the extraction power of a liquid. For CO₂ this point is at 31.1°C and 73 bars of pressure – a conveniently low temperature, even if the pressure is on the high side (73 times atmospheric pressure). Other advantages of using CO₂ are that it is cheap and environmentally friendly. The technique is already used to remove caffeine from coffee and by the perfume industry to extract fragrances. 'The Diamond process shows an efficiency rate of around 97% for TCA extraction', says Aracil.

Initially, the Diamond process was used to treat the cork flour that is the basis of Sabaté's Altec closure – it is later blended with polymer microspheres and stuck together with a binding agent. Wines sealed with prototype Diamond-treated Altecs showed no detectable TCA, both by sensory and chemical analysis, in a rigorous independently conducted panel study carried out in the UK last year. So, it looks like Diamond works.

'For obvious reasons, Sabaté rejects any idea of offering a "zero TCA" guarantee', says Aracil. 'First of all, because TCA can come from sources other than cork, and also because 0% doesn't exist from a scientific point of view.' But he says that the maximum residual level of TCA is 'between the quantification and detection limits of the analytical method; that is, between 0.2 and 0.5ppt [parts per trillion].'

Since then, and significantly, the Diamond process has been extended to treating sheets of raw cork bark, which can then be used to produce what are effectively taint-free natural corks. 'We had to face some difficulties with deformation in the early stages of our trials', says Aracil, 'but we've since been able to optimise the parameters to get satisfactory results with cork planks.' Tests show that the cleaning process doesn't alter the mechanical properties of the cork significantly.

The production capacity of treated corks at the CEA facility is small, at around 100,000 per year – sufficient only to supply test corks to customers. Sabaté has decided to imple-

ment the Diamond process on an industrial scale, but first it has to build a new factory. This will be in Estremadura, in Spain, where it already has a facility, and the first commercial release of Diamond process closures will be in spring 2005 – almost two years away. The overall investment in the project is around 15 million (£10.4 million). Initially, two product lines are envisaged: a range of Altec-like technological corks and a range of high-grade natural corks targeted at ultra-premium producers. If it all works out, then Sabaté will extend the industrial site to increase capacity.

AMORIM'S ROSA PROCESS

'A great part of my mandate is to change the PR culture', says Carlos de Jesus, Amorim's newly-installed marketing and communications director. Many wine journalists have been infuriated by the communication style commonly adopted by cork companies, who have largely denied the existence of cork-taint and sought to deflect attention away from the topic by bringing in issues such as protection of cork forest ecology and consumer preference. 'The traditional response has been to run for cover' agrees de Jesus, 'but when you are confronted with an overwhelming amount of evidence, you have to get your act together. The only way to move forward is to align our interest with that of the wine industry and bring debate to a rational level.' In terms of addressing taint by means of research and development, 'we've done more in the last year and a half than in the previous 30 years', says de Jesus.

'We first became aware of the problem of cork taint in 1978', recalls Antonio de Barros, Amorim's executive vice-president, 'and we've been trying to fight it ever since.' He admits that in the past, the industry tended to ignore cork taint. The problem has become more apparent as wine has become more sophisticated and subtle; winemaking has changed a lot. Over the past ten years we have been doing whatever is necessary to try to control the problem.' De Barros says a key step was to renew Amorim R&D department, bringing in Professor Miguel Cabral, 'with a total focus on TCA control and removal'. Amorim has adopted three approaches to dealing with taint, explains Cabral. 'The first is a new boiling system that has been in place for a few years. It is completely different in several ways, the most significant difference being that the cork planks are extracted with boiling water, plank by plank. In the previous system, the planks were close together, so extraction was not so easy'. Linked to this boiling system, Amorim has devised a process known as Convex (for 'continuous volatile extraction'), by which all the volatile elements present in the water during the boiling process are cleansed at the same time.

Amorim's second approach has been to add chemical analysis for TCA to its quality control process, involving gas chromatography-mass spectrometry/solid phase microextraction (GC-MS/SPME). Amorim has five different machines. 'We can do 400 analyses of cork soaks in 24 hours', reveals Cabral, 'and the threshold is 5 ng/l [1ng/l = 1 ppt] TCA for a soak of 50 corks.' According to Cabral, half the volatiles from the soak would be expected to get into wine after 14 months, so this threshold would correspond to a wine with a TCA level of 2.5ng/l. How many batches of cork fail to meet this threshold? 'An enormous amount of batches are clean', says Cabral, 'but some have 20% to 30% of bales with above threshold levels.'

Thirdly, and most importantly, Amorim has also developed a curative strategy. 'We have tried a few different approaches', says Cabral, 'but the best is ROSA.' ROSA, which stands for 'rate of optimal steam application', is a special method of steam cleaning. Cabral claims that it reduces the TCA in cork granules by between 80 to 85%. 'We've asked two institutes to validate this independently', he reveals: 'the Cambden and Chorleywood Food Research Association (which found a 80% reduction) and Gelsenheim (which showed a 75% reduction).'

Amorim already has two ROSA machines in place, with three more expected to come into operation by the end of the year. 'By July, 80% of granules will be ROSA treated, and all our granules will be treated eventually', says Cabral. The ROSA technique can also be used for discs and corks. 'The reduction in TCA has been very good, but there has been high deformation: we had to change from a continuous to a batch system', says Cabral. Amorim is now doing ROSA tests on an industrial scale. 'We have not yet achieved the same results, but we are not far off, with a 60 to 70% reduction in TCA', he told me. 'There is no problem with the mechanical performance of the treated corks.'

This raises a critical question. What effect will a 60-70% TCA reduction in cork sheets have on the incidence of cork taint? Without proper data, it is almost impossible to tell. This could be enough to bring the level of TCA in the 5% or so of corks that are tainted down to below threshold levels, effectively eliminating taint; or, alternatively, 30-40% of the current TCA level in those corks might still be enough to taint the wine.

WHAT NEXT ?

For the trade and the consumer alike, what matters is the number of bottles that are ruined by cork taint. From this perspective, any measure that results in a reduction in taint is to be welcomed, whether it involves the replacement of natural corks with screwcaps or synthetic corks. The apparent unsuitability of screwcaps and synthetic closures for fine wines destined for ageing makes the prospect of taint-free natural cork an exciting one. If Sabaté manages to produce commercial quantities of effectively taint-free natural corks – as seems possible – then it would be hard to imagine a fine wine producer that could afford not to use these closures. Likewise, if Amorim's ROSA process produces corks that show sufficiently low rate of taint – say, less than 1% - this should be enough to satisfy many producers.

Good independent data on taint rates associated with closures that have been through these treatments are badly needed. Sabaté has set the standard with its independently run, rigorous scientific panel test of wines sealed with a range of Altecs, including prototypes, that have been through the Diamond process. The company needs to repeat some of this work for Diamond-treated natural corks, and Amorim should carry out a similar, transparent and independently verified testing of ROSA-treated closures to prove the efficacy of this process in a real world situation, with bottled wines.

These developments, particularly the Diamond process, are very exciting. But I'm not going to get carried away until I see treated, virtually taint-free corks rolling off production lines in numbers sufficient to bottle significant quantities of

wine. There's always the danger that the added cost – both to the manufacturer and the producer – of eliminating TCA from cork will prove to be a barrier to the large-scale application of these techniques, no matter how effective they are. In some markets, such as France and Italy, consumer acceptance of screwcaps and synthetic is poor, and this, coupled with the low profile of cork taint in these countries, might mean that wine producers are unwilling to pay a premium for closures displaying significantly lower levels of taint.

But I wouldn't want this rather depressing thought to take too much of the gloss off some very promising and highly significant developments. And I'm also looking forward to seeing some rigorous scientific trials of treated corks in the near future.