APPLICATION REPORT

Filterability of wine
Insights into practical operation

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Determining the filterability of wine is an important factor in wine production. The available methods, however, are limited.

In practice, oenologists attempt to devise a suitable filtration concept based on the wine hazing and maturation stage. Diatomaceous earth filtration with subsequent sheet filtration is used for wines with yeast hazing, i.e. directly after racking. Filtration with depth filter sheets is used instead of diatomaceous earth filtration for wines that have already developed a high degree of self-clarification during storage. Just how challenging it is to find the right balance for the filtration concept becomes clear before bottling. At this stage, the actual filtration characteristics of the wines are determined and it becomes evident under which circumstances a change in filterability takes place. The following experimental setup illustrates how the filterability (laboratory index) can change.

A commercially available white wine from 2012 was treated with commercially available tannin (treatment/fining agent) in a low dosage of 0.5 g/hl. The subsequent filtration through a 0.45-µm, 0.65-µm, and 0.8-µm PVDF membrane (Ø 2 cm) was carried out immediately and three days and eight days, respectively after the tannin treatment. The tests were carried out in repeated determination mode. The laboratory index was determined by analyzing the filtration time after 200 ml and 400 ml of the sample was filtered. The laboratory index (dimensionless number) ratings are shown in Table 1.

Laboratory index	Filterability
< 15	Easy to filter
> 15 to < 30	Average to filter
> 30	Difficult to filter

Table 1: Laboratory index classification

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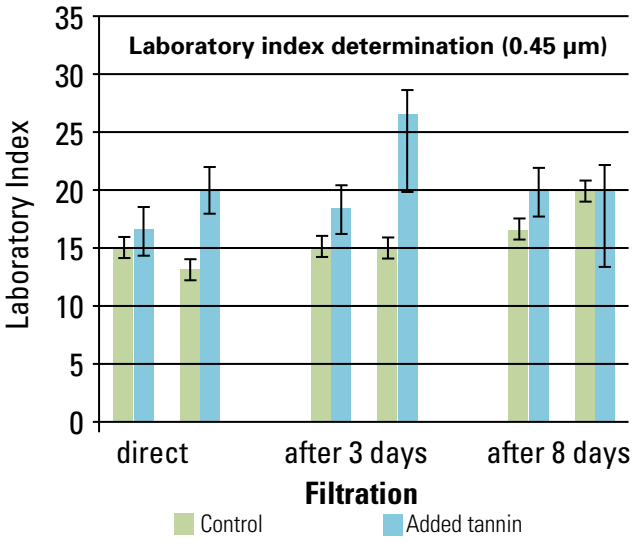

Fig. 1: Laboratory index measurement (0.8 µm), control sample compared with immediate tannin addition, after three days, and after eight days (note: error indicator: control: 1.2, tannin addition: 1.5), evaluation: Jelena Bohn

Filtration through a 0.45-µm membrane under constant test conditions shows that the filtration characteristics of the wine are affected by the addition of tannin. This is particularly evident in the "Direct" and "After three days" results. The laboratory index is increased, i.e. the wine is more difficult to filter compared with the control sample

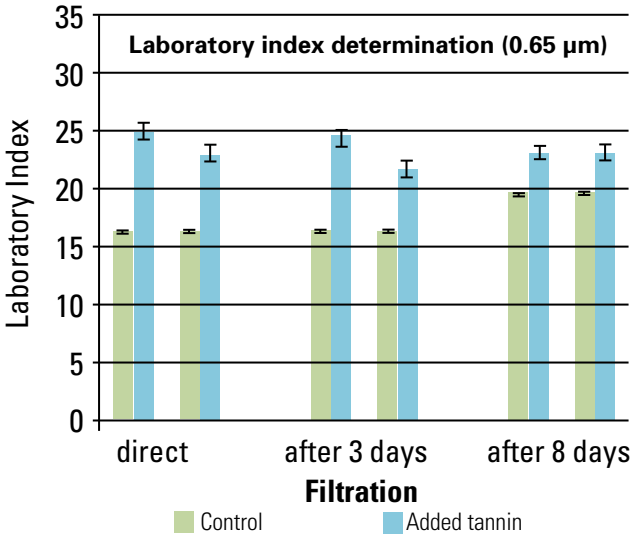

Fig. 2: Laboratory index measurement (0.65 µm), control sample compared with immediate tannin addition, after three days, and after eight days (note: error indicator: control: 0.1, tannin addition: 0.7), evaluation: Jelena Bohn

Fig. 2 shows that the laboratory index was higher in the wine samples with added tannin at any time during the trial with a 0.65-µm membrane.

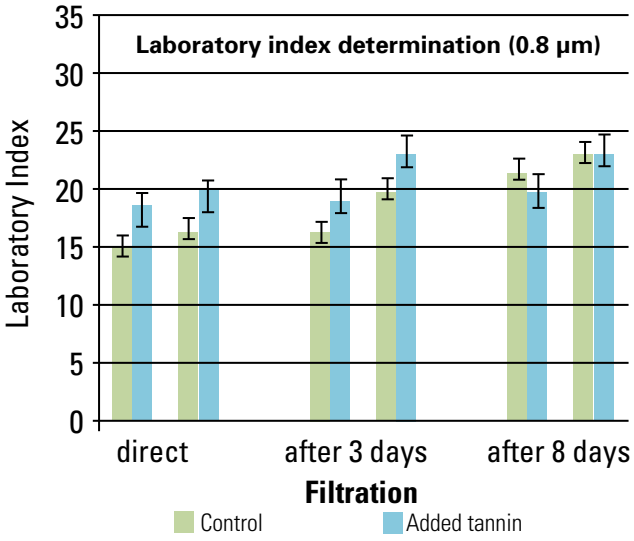

Fig. 3: Laboratory index measurement (0.8 µm), control sample compared with immediate tannin addition, after three days, and after eight days (note: error indicator: control: 1.2, tannin addition: 1.5), evaluation: Jelena Bohn

With membrane pore sizes of more than 0.8 µm, the laboratory indexes of control samples and samples with added tannin begin to converge. However, the values of the samples with added tannin are still higher than those of the control samples.

This experimental setup shows that even very small dosages of treatment and fining agents at the sterile stage, i.e. just before bottling, can change the filtration characteristics of wines significantly.

Fig. 4: A BECO® LiquiControl$_2$ index measuring device

The laboratory method is very suitable for determining wine filterability and deriving appropriate recommendations. A portable test device is a suitable alternative (see Fig. 4) for wineries that do not have suitable laboratory equipment or other means for determining the laboratory index. This test device has several advantages:

1. It is able to use greater volumes (up to 1.3 gallons/5 liters for service media, 0.8 gallons/3 liters for wine) for determining the filterability.
2. The test filter medium can be a membrane (e.g., 0.45 µm, 0.65 µm) or a depth filter sheet (e.g., BECOPAD® 120, BECOPAD 170).
3. The filtration is possible at constant pressure. The pressure for determining the filterability through a 0.45-µm membrane can be set to a constant value of 14.5 psi (1 bar). To determine the filterability through a filter sheet, the pressure can be set to 21.8 – 43.5 psi (1.5 – 3 bar).
4. The filtration results are visualized directly on the display of the test device and simultaneously stored. The data can then be transferred to a computer via an interface.
5. The equipment can be CIPed and fully drained.
6. In addition to determining the wine filterability, it is also possible to test the filterability of the operating and utility media, such as the water for the filter regenerations and the steam condensate.

This index measuring device allows oenologists in wineries to determine wine filterability in detail, without the need for laboratory equipment. Wineries are able to configure their filtration concept and wine style individually and optimally based on these test results. The phenomenon of filter media blocking, whether filter sheets, filter cartridges, or membranes, should therefore be a thing of the past from a technological standpoint. The exact choice of filter media, increased service life, and the reduction of downtime makes winery operations more profitable.

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