

The correct treatment for every filtration stage - a new service from Erbslöh Geisenheim

| Cider | Crossflow | Enzymes | Filtration | Persimmon Juice |

The use of crossflow filtration has become standard in the production of beverage precursors. Clarified fruit concentrate manufacturers have been using this technology for more than 20 years and even new equipment is usually equipped with this “simple” process from the outset. In practice it is frequently the case that poorly prepared precursors cannot be filtered efficiently. Fining and filtration are two individual stages in a single process stage for cloudy juices and wines. Pretreatment with enzymes is a prerequisite here for rapid agglomeration of sediments, in order to subsequently separate these off more effectively. It therefore stands to reason that Erbslöh’s Fruit Processing team is also focussing increasingly on filtration.

Assessing filterability

A filter index can be established if clarified juices, beers and wines are already available. To do this, the sample is filtered using a suitable membrane in a “dead-end” process. Such a sample can be characterized by the filtration speed and filtrate volume until the membrane is completely blocked. In the case of cloudy liquids, however, this is not possible as the test membrane becomes blocked immediately and it is impossible to obtain a realistic assessment of the filterability.

A dynamic concept (crossflow) is therefore favoured for these media. In this principle, theoretically there is a continuous flow across the membrane, so filter performance is not reduced. In practice, however, certain characteristics of cloudy media, such as the presence of really sticky colloids, and particle size distribution, influence filter performance enormously.

Previously it was only possible to ascertain this effect in practical trials. In the case of an industrial plant, however, several thousand litres of test material can be required for each individual test. Furthermore, the filter membranes must be fully regenerated before every test, to guarantee comparability of results. Smaller-scale test equipment usually highlighted individual flaws, which is a major obstacle for the upscale on an industrial filter site.

The Novoflow Crossflow filter

The Erbslöh team has been using Novoflow GmbH’s dynamic crossflow filter since summer 2017. The equipment can be fitted with one to three ceramic filter disks. There is also a choice of different pore sizes to simulate a range of filtration scenarios. 0.060 µm (ultra-filtration) or 0.2 µm (microfiltration) are habitually used to assess the filterability of juices, ciders, etc. The filter’s total volume is 4,000 ml. At least 5,000 ml unfiltrate are required for filtration tests.

If the product was previously fed at high speed along the crossflow filter membrane, it is now alternatively possible to bring the product (wine, juice, or similar) held at excess pressure into contact with a rotating membrane. This principle is supposed to expose the product to less physical stress. In fact, in the case of the test equipment used in Erbslöh’s laboratory, much less heat transfer was observed than in the case of conventional crossflow equipment of a comparable size. This is real progress for objective assessment of filterability, as



Visualisation of a filtration problem – glucan isolated from raspberries.

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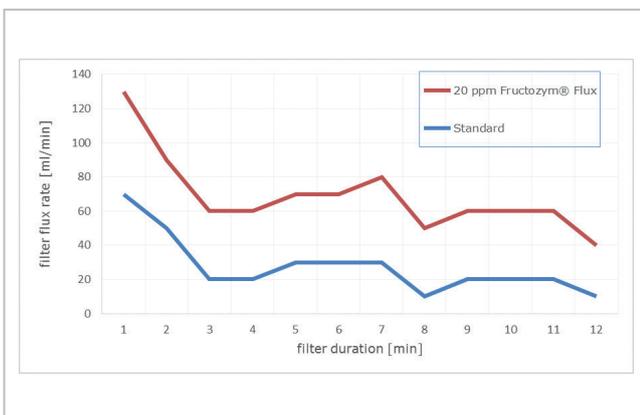
The Novoflow CRD 01.

heating of the unfiltrate naturally also considerably increases filterability and therefore significantly distorts the result.

Application example I: Cider base wine from a major international brewery

As clear apple juice concentrate is mainly used in cider fermentation, only a micro-membrane is required for filtration, to separate yeasts and large cell components. The number of yeast cells is relatively high and filterability usually unsatisfactory, even for a microfiltration plant too. This highlights the effect of a broad-spectrum hemicellulase such as Fructozym® FLUX. Polymers released by yeast autolysis (known as yeast glucans) are split and are now unable to form a filter-blocking coating on the membrane.

The use of Fructozym® FLUX during fermentation is recommended, as an enzyme's efficacy depends on dosing, temperature, substrate availability and, above all, time.



Filterability of cider base wine (UK).

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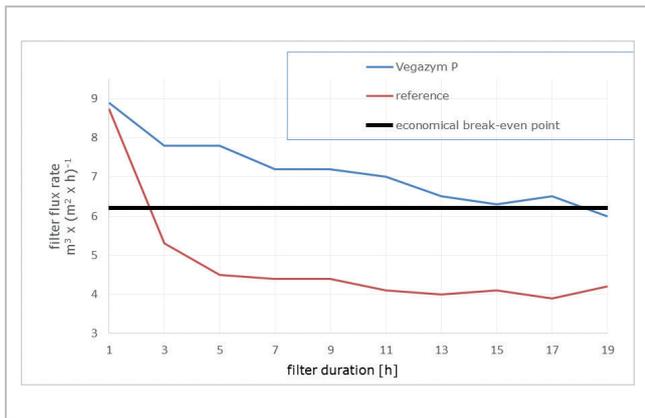
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A different use for a vegetable enzyme – optimised ultra-filtration of persimmon juice (17 °Bx)

Application example II: Filtration of persimmon juice from a Spanish fruit juice producer

At the time of processing, persimmon generally has a very high proportion of hydropectins that have already been dissolved with, at the same time, flesh with a relatively weak structure. As a direct consequence, untreated persimmon juice usually contains considerable quantities of fine sediment, which are difficult to centrifuge, even using suitable fining agents (the best results have been obtained almost exclusively with pure phytoprotein FloraClair®). The water-soluble colloids causing this can only be reduced with extreme difficulty, using proven filtration enzymes for apple, or perhaps berry fruit.

After isolating the problematic polymers, during various filtration runs it was possible to determine a promising pectinase complex from a range of potentially suitable raw

materials, using Vegazym P. This enzyme has already been very successfully used in vegetable processing. This random stroke of luck facilitated straightforward execution of whole test runs using the new filter system. The result was verified during further tests and a concrete application recommendation devised. The available filter set-up facilitates reliable translation to circumstances in industrial plants. It was therefore possible to achieve the level of filter performance required by the client for economic filtration (also on an industrial scale with the help of the enzyme formulation from the preliminary tests using the test equipment). Here are the typical equipment curves for southern European persimmon juice, with optimised enzymation and a standard filtration pectinase.

Summary:

It has already been possible to quickly solve several acute filtration problems in industrial beverage filtration with the new test filter. Frequently, optimised juice treatment can significantly improve downstream crossflow filtration. Erbslöh Geisenheim GmbH and the Fruit Processing team would be happy to make their knowledge available to you for further development and introduction of new processes.



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