

Vegan must preclarification

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Omission of allergenic substances or animal products is attractive in wine-making for many reasons. More and more wine makers are relying on plant alternatives, whether because of their personal convictions or to meet the demands of commercial partners and the market.

Wine and juice are not automatically vegan or vegetarian. Since 2012 it has been mandatory to provide information on the label about the use of milk and egg-based treatment agents. Calls for a "clean label" for all animal ingredients have long been under discussion. Export markets have their own, specific requirements like "kosher" and "halal", for example. Last, but not least, a "vegan" designation also provides the consumer who considers wine and juice to be naturally vegan with specific guidance.

Efficacy of the product to the fore

The decisive factor for producers, however, is first and foremost the alternative products' efficacy. Established production processes and structures should not have to change. In the last ten years plant-based proteins have become established in practice.

Preclarification by flotation or sedimentation has become the norm in many businesses. The degree of preclarification achieved by these are the benchmark by which all other processes must be measured. The decisive factors are not only the clarification's refinement, but also the processing speed.

Effective partner/Fortified chitin glucan

The latest development is a combination of pea protein and chitin-glucan, LittoFresh® Chito-Flot.

Chitin-glucan consists of two different polysaccharides. Chitin and glucan are obtained from the biomass of fungi and yeasts, such as *Aspergillus niger*. The chitin-glucan complex is a copolymer formed from fungi cell walls. It consists of covalent bonded chitin and branched 1, 3/1,6-β-D-glucan. According to International Organisation of Vine and Wine (OIV) specifications, the ratio of chitin to glucan is between 25:75 and 60:40 (M/M/).

Both these polysaccharides consist of two linked polymers. Their molecular chains form a three-dimensional grid, which achieves both a clarifying and fining effect. The clarifying effect is further enhanced by synergistic effects in combination with pea protein.

Fast acting - shorter processing times

Flocculation, which occurs very quickly, not only allows strong preclarification, but also a drastic reduction in processing times. Tests show the characteristic behaviour curve (**Fig. 1**).

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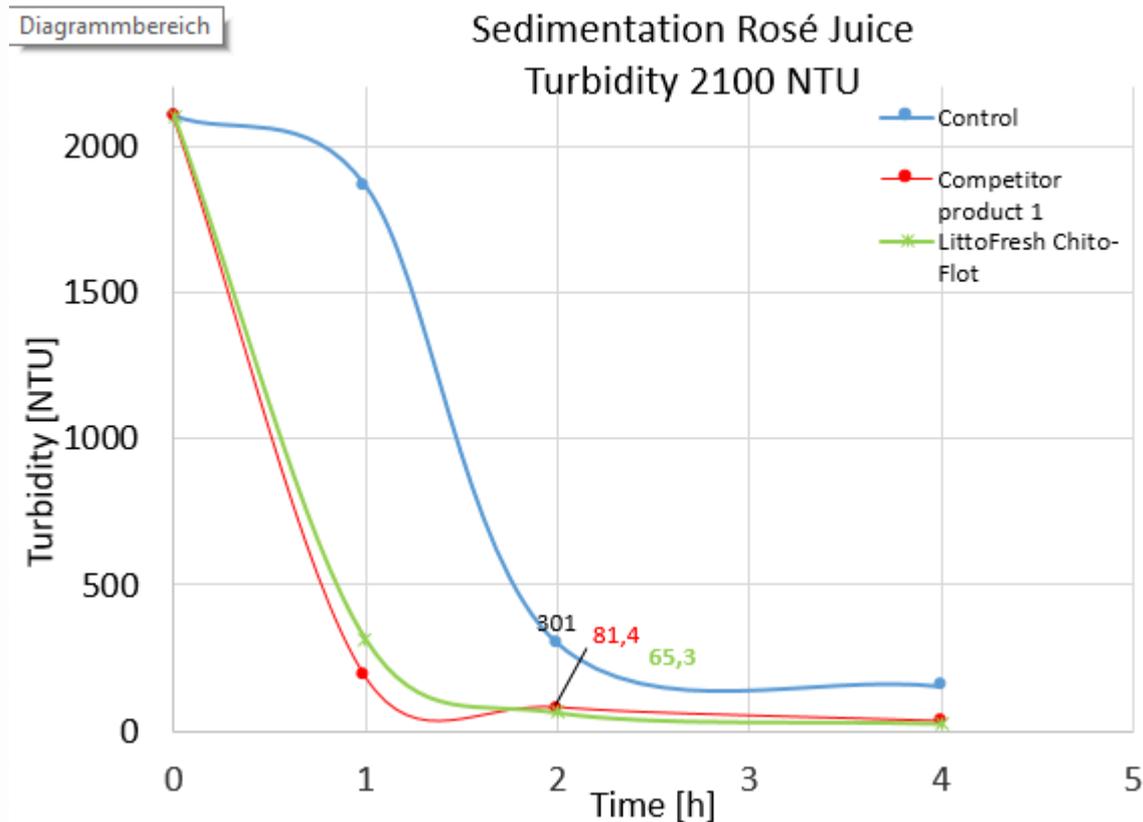


Fig. 1: Different phytoprotein products in the laboratory test

A clear clarifying effect can be seen after just 30 minutes, particularly compared to pure phytoproteins and the untreated control. These properties are then also exhibited in practice, always depending on the specific starting material, of course (**Fig. 2**).

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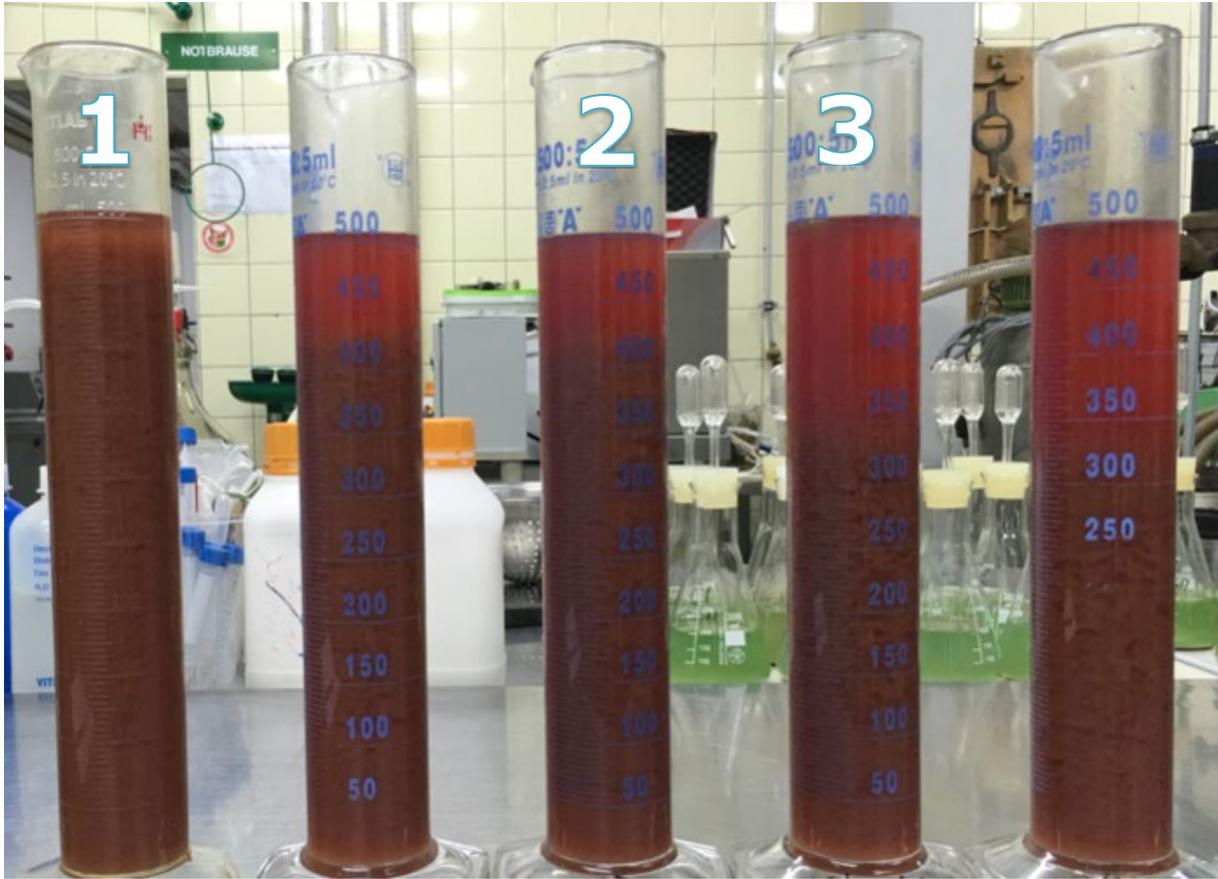


Fig. 2: After just 30 minutes clear differences in the test variants could be seen 1) Control, 2) Competitor product and 3) LittoFresh® Chito-Flot

The critical processing periods during the harvest are significantly reduced and failures during the technical bottleneck that is preclarification avoided. Thus, even in difficult years, production capacity can be increased rapidly in order to respond flexibly to weather conditions and to safeguard yields.

The flotation cake's standing time is identical to that of products already on the market. The clarification and sediment fraction can be cleanly separated and processed as usual. The strength of the degree of preclarification achieves turbidity values comparable with those achieved by conventional gelatine products (**Fig. 3**).

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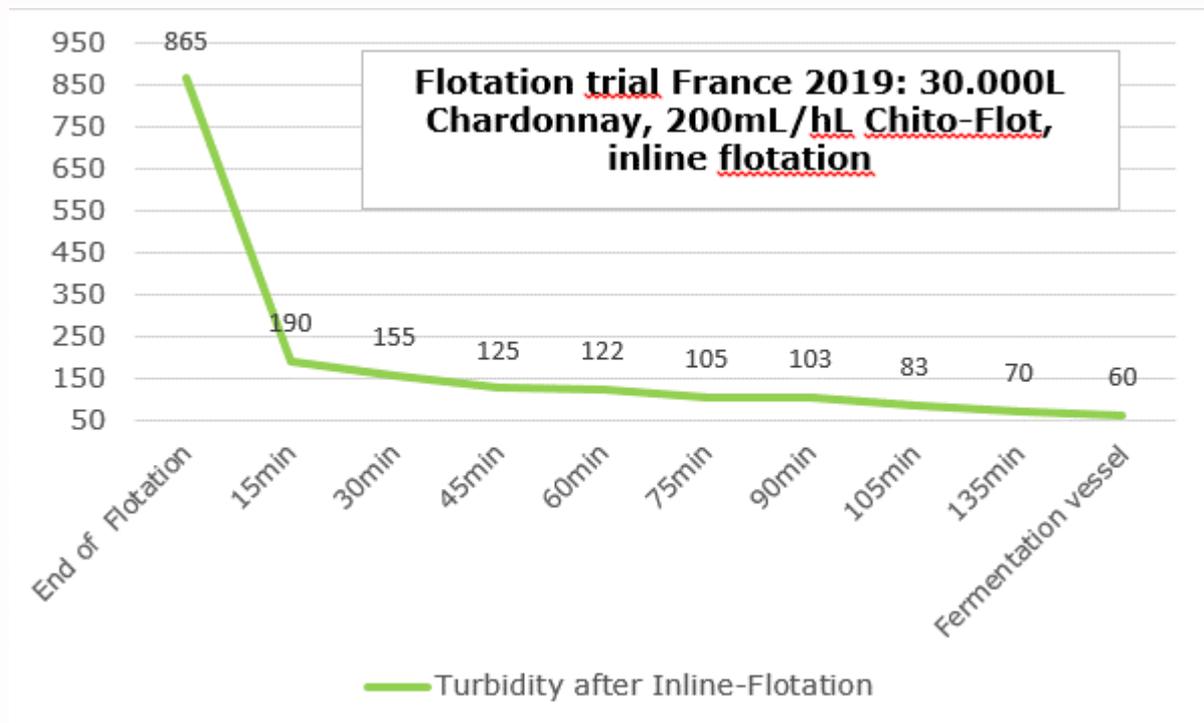


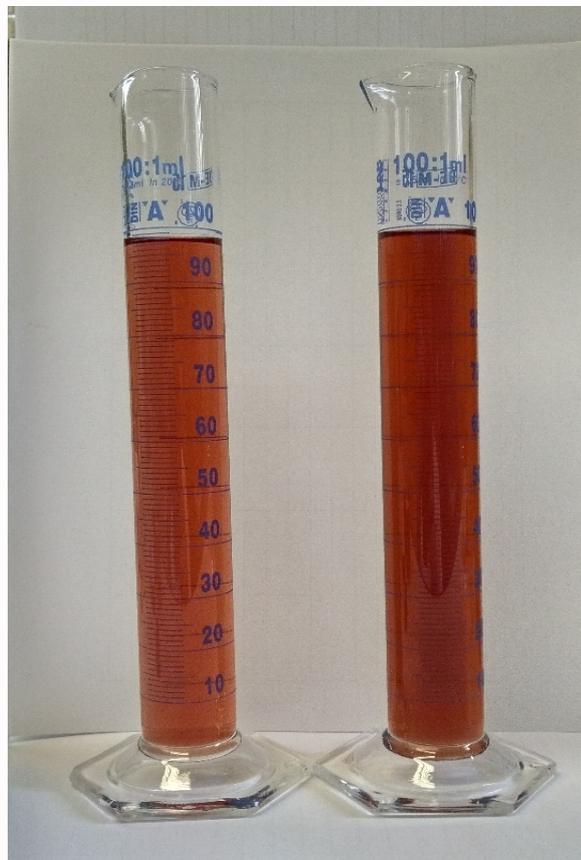
Fig. 3: Degree of clarity achieved by flotation with pea protein and chitin-glucon

Numerous positive side effects

Other positive effects have also been noted. The reduction of oxidised phenols considerably improves the wine's colour. Brown colour components are removed, leaving paler, clearer and brighter wines (**Fig. 4**).

Fig. 4: The improvement in colour (left) compared with a gelatine product (right) is clearly visible here. Brown tones are effectively reduced by removing oxidised phenols - a side effect of chitin-glucon.

Rheingau Pinot noir rosé must 2019
Left: LittoFresh® Chito-Flot 150 ml/hl – **77 NTU**
Right: LiquiGel Flot – 100 ml/hl – **69 NTU**



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In organoleptic terms, there is a clear harmonisation of the tannin structure and green, immature notes are minimised (**Fig. 5**).



Fig. 5: Diagram of sensory effect according to tastings in Germany and Italy

An Italian study arrived at very similar results (S. Pettinelli et al, 2020). The study results furthermore prove the positive effect of pea protein and chitin-glucan on the need for bentonite and the nutrient situation: the use of pea protein reduces the total protein content in the must, the risk of turbidity is reduced and the need for bentonite decreased. At the same time, the chitin-glucan produces significantly more nitrogen available to yeast (Tshinyangu et al), which in addition to improving nutrient supply for yeast cells, also supports the formation of aromatic esters.

The combination of chitin-glucan and pea protein reduces iron content and assists the removal of heavy metals. Mycotoxins are effectively removed from grapes affected by rot, for example, a factor which requires particular consideration for export markets.

Another interesting side effect, a reduction in the CO₂ footprint, ensues from the switch from classic gelatine products to phytoproteins. Depending on the protein source and dosage, it is possible for the carbon dioxide discharge of the preclarification-process to be reduced by up to 75% when using phytoproteins. Here, in particular, pea proteins are ideal for use as a logical component in a comprehensive operational concept, since they exhibit the lowest CO₂ imprint of all oenological proteins.

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Summary

Technically demanding applications such as flotation can be achieved without difficulty using phytoproteins. The novel combination of pea protein and chitin-glucan offers an excellent, fast clarification effect, combined with positive side effects on wine's colour, stability and sensory factors. Production processes are accelerated and procedures do not have to be changed, whilst wine production's CO₂ footprint is simultaneously reduced. The transition to animal and allergen-free proteins can therefore be completed smoothly.

Bibliography:

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Stefano Pettinelli, Matteo Pollon, Lorenzo Costantini, Andrea Bellincontro, Susana R o Segade, Luca Rolle, Fabio Mencarelli: "The effect of flotation and vegetal fining agents on the aromatic characteristics of Malvasia del Lazio (*Vitis vinifera* L.) wine" <https://doi.org/10.1002/jsfa.10577>