



Customer Success Story:
Vegan production of fruit juice

Market segment:
Food & Beverage

Gelatin was yesterday – plant protein is today

Location:

Germany

Challenge:

Finding a plant-based gelatin substitute for the vegan production of apple juice without changing the production process

Solution:

Plant-based SIHA Pea Protein combined with bentonite and silica sol

Result:

The production of a clearer, more stable vegan fruit juice that does not require any changes to the production process or new investments

“Eaton not only provides entire filtration systems to fruit juice manufacturer but also helps with process optimization and finding solutions, using a holistic approach.”

*Amos von Bruening,
Area Sales Manager
Fruit Juices and Spirits
Eaton Technologies GmbH*

Background

The trend towards vegan nutrition is well underway and in more demand than ever, which is having a particular impact on the production of fruit juice. To expand the range of available vegan products, beverage manufacturers and the retail sector are required to satisfy the high demand for juices that do not use adjuvants of animal origin.

A well-known fruit juice manufacturer produces around 32 million gallons (120 million liters) of juice – from high-quality freshly squeezed juices (NFC – not from concentrate) to juice concentrates and even purées of pome, stone, and soft fruit, each year. The focus is on the processing of around 150,000 tons of apples, from which some 8 million gallons (30 million liters) of apple juice and apple juice concentrate is filtered per year.

In order to extract apple juice and apple juice concentrate, various process steps are carried out. At the beginning, there is the enzymation of the mash. As part of this, the material for pressing is optimally prepared for juicing and the viscosity of the

liquid phase is lowered by breaking down soluble pectin. After pressing, the extracted juice once again undergoes enzymatic treatment, and pectin and starch are completely broken down at around 122 °F (50 °C). Now it is optimally prepared for the subsequent clarification, while starch and araban secondary hazes are avoided. Following this, fining, clarification, and stabilization take place using a fining combination from bentonite, gelatin, and silica sol. It ensures fruit juices and concentrates are effectively clarified, and stabilizes them against protein and tannic secondary hazes by removing components that cause turbidity.

This step follows a two-stage filtration process: first over membranes (ultrafiltration) and subsequently over depth filter sheets, which serve to remove thermo acidophilic bacteria as well as their spores, such as *alicyclobacillus acidoterrestris*. The clear juice or the apple juice concentrate (after an additional concentration process) are finally stored or shipped.

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Challenge

In principle, fining agents help remove undesirable turbidity and the causes of turbidity from fruit juices, making them visually and sensorily appealing to consumers. Until now in traditional fining of juices, fruit juice manufacturers have used gelatin as a fining agent for juice clarification and stabilization.

As gelatin is an animal protein, however, even using it purely as a technical tool does not comply with the principles of vegan nutrition. Consumer demand for vegan juices is continuously growing, due to increasing environmental awareness or the religion of the target group.

In response to this trend, the fruit juice manufacturer decided to include vegan apple juice in its range and turned to its long-standing business partner Eaton to replace the traditional gelatin with vegan products, such as pea and potato proteins. The challenge was achieving the same level of clarity and stabilization with the plant proteins as the gelatin, while not changing the existing production process.

"Eaton not only provides entire filtration systems to fruit juice manufacturer but also helps with process optimization and finding solutions, using a holistic approach," explains Amos von Bruening, Area Sales Manager Fruit Juices and Spirits at Eaton.

Solution

To achieve the same results as with gelatin, application specialists from Eaton developed a standard combination fining with SIHA® Pea Protein with the help of preliminary tests. Due to its plant origin, and good clarification and stabilization properties, it is suitable as a vegan gelatin substitute. An additional benefit is that no new investments in equipment or additional tools are needed. In addition, it is allergen-free and GMO-free.

For the best results, Eaton also determined in the preliminary tests the order in which the three fining agents: bentonite, pea protein, and silica sol should be added. The dosage and reaction time of the individual components also plays an important role in maintaining a clear and stable product.

As part of the vegan combination fining, the pea protein (which is pre-soaked in water) is evenly distributed in the filtered juice via an agitator. After a short reaction time, bentonite (which is also pre-soaked) is then included, before the last component of the combination (silica sol) is added. The fining agent and cloudy substances are subsequently separated using the ultrafiltration system, while germs and spores are removed with a downstream plate and frame filter.

Result

The SIHA Pea Protein was able to be integrated into the fining process without any problems and will be used as an equivalent alternative to gelatin. The pre-soaking of the pea protein and the amended order of the individual products in the combination fining were the only minimal adjustments for the manufacture of clarity and storage-stable vegan apple juice.

It was demonstrated in the downward ultra and sheet filtration that the apple juice clarified with the pea protein could be filtered at the same filtration velocity (flux rate) as the non-vegan apple juice.

By using plant proteins, the fruit juice manufacturer has not only found a vegan alternative for clarifying and stabilizing their fruit juices but also partnered with Eaton's experts to develop a solution that does not change their tried and tested production process.



SIHA Pea Protein is a vegan beverage treatment agent. The natural pea protein is extracted from peas and is GMO-free and allergen-free. In the combination fining using bentonite and silica sol, it replaces gelatin for vegan fining and clarification of beverages, such as fruit juice and wine.

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