



TECHNICAL APPLICATION
INFORMATION



**Cloud Stabilisation of Pineapple Juice
produced from Concentrate**

INTRODUCTION

Fruit juices are still very popular with the consumer. Juices which are made from apples as well as from citrus fruits are traditional products in Europe.

With the possibility to concentrate fruit juices the technological progress had been immense; fruit juice concentrates are by far easier to transport as less freight space is needed.

At the same time the product is microbiologically easier to handle due to a now low aw-value and the combination of a low pH-value in the product.

These advantages make it easier to import exotic fruit products to Central Europe.

Only a few years ago pineapple juice which today is a standard offer in all super markets had been a novelty.

The juice can be extracted from the fruits in the country of origin and then concentrated before being sent to Europe. This means an extreme reduction of the production costs due to a cost effective production and the highest degree of product safety. The concentrate will simply be diluted and then pasteurised in Europe.

However, when using concentrate in the fruit juice industry influencing the quality of the fruit juice to be produced has its limits.

The quality strongly depends on the juice extraction and the concentration process.

The cloud stabilisation as one of the quality criteria for the consumer is afterwards very difficult or hardly to influence depending on the type of fruit. This is especially clear in juices produced from exotic fruits.

As ever the label says "Shake well before use to disperse the fruit pulp". The cloud particles settle quite quickly which leads to an unsightly product. After the EU changed the Miscellaneous Directive a possible quality improvement of pineapple and passion fruit juice is now given by adding pectin.

According to this new legal situation the industry has the opportunity to add pectin to pineapple and passion fruit juice as defined by the fruit juice regulation resp. the fruit juices and fruit syrups regulation.

The quantity is fixed here to a maximum of 3g non-amidated pectin per litre (E440).

Cloud stabilisation by using H&F Classic or Instant Pectin

In the technical application laboratory pineapple juice has been produced from pineapple juice concentrate by diluting the juice with water and adding Pectin Classic AJ 201 resp. Pectin Instant CJ 204.

In a centrifuge test which simulated a storage duration of 1 year of the product under normal gravity the cloud stabilising effect of the pectin was characterised.

Furthermore the viscosity of the serum has been measured. Pectin Classic AJ 201 and Pectin Instant CJ 204 are pectins which have been developed for the application in fruit juice beverages for building up a constant viscosity.

Their field of application is mainly the development of a more intensive mouth-feel in low-calorie fruit juice beverages. Pectin Instant CJ 204 is an agglomerated citrus pectin which can be stirred into the fruit juice without building any lumps.

By pasteurisation the pectin will dissolve so that it will develop its parameters in the final product. For the application of Pectin Classic AJ 201 – an apple pectin with very good viscosity enhancing characteristics – a pectin solution should be prepared with a fast running mixer as otherwise the pectin may build up lumps and the characteristics will not develop fully. During the trials both pectins had been used in a dosage of 0 - 0.24% to test the stabilising parameters of the applied pectins. An important quality criteria

for the consumer is the cloud stability in pineapple juice produced by diluting the fruit juice concentrate with water; we have been able to improve this criteria by using Pectin Classic AJ 201 and Pectin Instant CJ 204. Without the addition of pectin the fruit juice was practically not cloud stable.

Only a small dosage of Pectin Classic AJ 201 resp. Pectin Instant CJ 204 resulted in a clear improvement of the sedimentation behaviour. By adding 0.05% Pectin Classic AJ 201 the fruit juice could be produced cloud stable. For the production of a cloud stable juice with Pectin Instant CJ 204 0.1% of pectin had been used. The reason for the different dosage of this pectin is the different standardisation compared to Pectin Classic AJ 201. In contrast Pectin Instant CJ 204 is easier to handle.

By increasing the dosage to more than 0.15% the cloud stability could not be improved further. Two factors seem to be responsible for the improved cloud stability and its limitation: A positive influence of the cloud stability was thought to be the increase of serum viscosity and a pectin-protein-reaction with the protein of the cloud particles. This leads to a pectin-protein-complex which adapts the density of the cloud to the density of the serum by the water binding parameters of the pectin.

An increase of the serum viscosity as well as a minimizing of the density difference between cloud particles and serum leads to a strongly improved sedimentation behaviour of the cloud particles.

A dosage of 0.15% pectin will saturate the pectin-protein-reaction so that a higher pectin dosage will only have a viscosity increasing effect. Thus the pectin will only increase the cloud stability by the higher viscosity of the serum.

Further influences on the cloud stability of a pineapple juice are the production technology of the fruit juice concentrate as well as the production of the fruit juice itself. By a homogenisation process a very high degree of fine cloud in the juice can be produced which will not sediment as easily due to the smaller diameter of the cloud particle. With that additionally to the use of Pectin Classic AJ 201 or Pectin Instant CJ 204 a very high cloud stability of the fruit juice can be guaranteed.

Summary

Pineapple and passion fruit juice produced by dilution with water from concentrate can be improved in an important quality criteria, the cloud stability, by adding high methoxyl Classic or Instant Pectins. Even a small pectin dosage of 0.05% Pectin Classic AJ 201 resp. 0.1% Pectin Instant CJ 204 noticeably improved the sedimentation behaviour.

The cloud stability expressed in the relative turbidity could be improved to a value estimating a cloud stability for one year. Depending on the respective pectin type a limit of the relative turbidity at 0.15% pectin dosage was achieved. The positive effect on the cloud stability had been attributed to the increase of serum viscosity in the juice. As a further reason the possible complex building with protein particles of the cloud particle and the added pectin are discussed.

The limit can be put down to a completed reaction of the added pectin with the cloud particles so that a hydrocolloid shell develops which will reduce the density of the cloud particles. By a change in the legal system for the production of fruit juices from pineapple and passion fruit concentrate the fruit juice industry is now able to improve the quality of pineapple and passion fruit juices. The quality of pineapple juices will improve noticeably by adding Classic or Instant Pectins; thus the requests of consumers for a cloud stable product can be taken into consideration.

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