

General comments on the purpose and use of the A.I.J.N. Code of Practice (COP) and the Reference Guidelines (RG)

The products from natural food crops, which provide the raw material for the production of fruit juices, are not comparable to products of industrial technology based on man-made materials. The foodstuffs produced by nature are not constant.

Fruit composition is influenced by a large number of natural factors, namely the variety of fruit, the geographical location, the climatic zone, the soil, the fertilisation, the weather, the degree of maturity as well as other factors.

Fruit juice composition might be influenced by the extraction process and other technologies used in processing and packaging a juice. Treatments and use of processing aids may affect the raw materials and consequently can have an influence on the composition of that juice. These may be permitted in certain areas, but not in others, the EU for instance. However, fruit juice products (e.g. juices, concentrated juices, nectars as well as derived products) must meet the legal requirements of the market in which they are sold or consumed.

However, experience has shown that, in spite of all the different variables as mentioned above, a large number of parameters and values are subject to statistical laws. Therefore the consideration of these parameters is justified for the evaluation of juice products in respect to their quality, authenticity and identity, even though at times there are remarkable variations in the contents to be considered.

In conclusion it is not possible to establish any universally applicable **standards**¹ for processed fruit juices and for their authenticity. On the other hand, it is possible to give **minimum or maximum values** and/or **ranges** for the individual constituents. These are met in nature with a high degree of probability in a typical fruit juice and also take into account the regular influences of nature and appropriate processing.

The A.I.J.N. Code of Practice includes Reference Guidelines, which represent a collection of such minimum and maximum values and/or ranges. They were compiled over long years of experience and originate from proven authentic origin, taken independently by experts in situ and analysed by approved laboratories applying reliable analytical methods.

Inclusion of additional parameters or supplementary information as well as requests for correction of values or ranges must fulfil the same qualifying rules.

The A.I.J.N. Reference Guidelines are divided into 2 groups (A and B) which are to be assessed differently.

The parameters and values of **group A** characterise the basic quality requirements and are considered by the industry as being **mandatory** for all fruit juices marketed in the EU. Minimum or maximum values are given, each of which must be complied with. The indices are primarily based on the EU Fruit Juice Directive (see [annex](#)).

The parameters in group A are divided into 4 categories:

¹ The term "standard" refers here to a requirement, the fulfilment of which is mandatory without exception. All the values covered must be complied with.

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1. Industry agreed parameters, such as relative density and corresponding Brix values for direct juices and juices from concentrate;
2. Hygiene parameters, such as volatile acids, ethanol, D/L-lactic acid and patulin;
3. Environmental contaminants, such as Arsenic and heavy metals;
4. Compositional parameters, such as L-ascorbic acid, volatile oils, hydroxymethyl furfural (HMF).

Values listed in **group B** are given to evaluate the **identity and authenticity** of juice (including direct and from concentrate). Other parameters refer to quality. The ranges given reflect the usual natural and technological influences as mentioned above.

However, to make a system workable for the evaluation of raw materials and finished products, it is impossible to include in the ranges every possible or rare deviation produced by regional and extreme ecological circumstances.

Such extra-ordinary deviations, once demonstrated and confirmed by an independent body, are considered in the commentary notes.

Identity, quality and authenticity of raw material or finished product under assay are finally recognised by testing the parameters indicated. To complement and/or to guarantee analytical results, new validated methods may also be applied to secure the results of classic analysis.

MODERN SENSITIVE ANALYTICAL TECHNIQUES

The data generated in the Reference Guidelines were prepared using standard methods of analysis (enzymatic, HPLC, etc.). These methodologies have well defined LOD and LOQ. Modern sensitive analytical techniques can often reveal very low levels of compounds that were once thought to be absent. For example, the commentary note for sucrose in grape juice currently states:

“Small amounts detected can be due to analytical methodology.”

This remark is based on enzymatic methods of analysis. It is now recognised that techniques, such as ¹H-NMR, have identified that low levels of sucrose can be present naturally. It also needs to be recognised that the significance of an analytical result will depend on the analyte.

All such findings need to be evaluated on a case by case basis and great care needs to be exercised.

INTERPRETATION OF DATA FOR SINGLE FRUIT CULTIVAR JUICES

The majority of the data used to prepare the AIJN Reference Guidelines were from blends of fruit cultivars. This means that if a particular fruit cultivar shows any specific

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peculiarities, such as a high sucrose level, low mineral levels, these will have been “smoothed over” by the other fruits in the blends so that data will “appear” normal.

There is a growing trend to prepare and sell fruit juices prepared from a single fruit cultivar due to its specific taste and/or aroma, which offers a unique selling proposition. However, if this particular cultivar shows any peculiarities in their data these will show up in the finished products. Thus it is possible that these specific products will show data outside the “normal” ranges defined in the Reference Guidelines and it is unlikely that there will be any references in the commentary notes about these cultivar specific peculiarities either. Some typical examples of the effect are following: Sucrose, above the COP maximum, has commonly been seen in NFC products from “Pink Lady”, “Granny Smith” & “Golden Delicious” apple cultivars. Similarly “Bramley” apple juices will generally show titratable acidities & L-malic acid levels well above the COP range. “Maravilla”, a recently developed raspberry variety, can also show sugar and acid values outside of the normal COP ranges.

Thus the interpretation of data for these types of products should be handled with great care and the supplier should be consulted about the origin/nature of the fruit. It is also incumbent on a supplier if they are submitting these types of products for analysis they should clearly mark them with the cultivar name and that they are a single cultivar product. This would then allow the laboratory to collate cultivar specific data for use in interpretations.”

The interpretation and evaluation of the analytical results must be undertaken by experts who, on the basis of considerable experience, know-how and available database and EDP can assess the large number of nature-dependent or possible industrially influenced variations.

In cases of individual deflections from the expectation, the juice concerned **should not automatically** be declared as non-authentic.

Additional analyses and/or traceability survey (identification of origin, variety and/or actual climatic conditions, etc.) must be undertaken in order to determine whether the deviations are specific to the particular raw material or are attributable to a processing or adulteration procedure.

Generally, judgement of authenticity often cannot be restricted to the consideration of one single deviating parameter only, but should include a critical view of the entire analysis and additional information.