

# Opinion on the potential micro-biological risk arising from the presence of moisture in tea (expressed on 19<sup>th</sup> September 1997)

## Terms of reference

To advise the Commission on the potential micro-biological risk associated with the presence of moisture in tea and to indicate in general terms, an acceptable upper limit from the view point of public health.

## Background

In 1995, the FAO (Food and Agricultural Organisation) international group established a standard on black tea (1). This standard includes a paragraph specifically on moisture content and states that tea should be packed with a moisture content of less than 4 percent. The document also states that it is likely that during transport to the point of export and further shipment to the importing country, tea absorbs more moisture and that tea with a moisture content of 6 percent and above deteriorates in quality.

## Discussion

The preservation of foods by a reduction in water content is based on the fact that micro-organisms and enzymes need water in order to be active. Yeasts and moulds are adapted to low-moisture foods and the limits for growth depend on available water and temperature. Traditionally, "moisture content" has been the parameter used to identify appropriate levels of moisture for the safe storage of low-moisture foods. However, this measure is usually regarded as inaccurate in determining inhibitory levels for mould growth. More recent literature refers to levels of moisture being expressed as water activity ( $A_w$ ). Water activity of a food is proportional to relative humidity (RH) and indicates the amount of free water that can be used for microbial growth. Water activity also takes in account "hysteresis" an effect characterised by differences in water activity in a drying and a wetting system with similar moisture content. A literature review of tea shows that tea is strongly hygroscopic and easily absorbs moisture from the atmosphere (2).

Many mould species are known for their potential to produce mycotoxins. In many cases this occurs in inaccurately dried and stored low-moisture foods. After harvest black tea undergoes a step by step technical process including withering, maceration, fermentation and firing/drying. Moulds and bacteria have the opportunity to grow under this process (3). However, with respect to tea the literature does not identify organisms causing health hazards. The drying process before packaging prevents the further growth of contaminating micro-organisms, and drying at high temperatures inactivates parts of contaminating micro-organisms. The high content of anti-microbial active polyphenolic compounds in tea will contribute to an additional safety margin (4, 5)

The FAO document CCP TE 95/7 on quality standards refers to mould growth in respect of deterioration but does not mention the growth of mycotoxinogenic variants (1). The ISO standards 1573 and 3720 mentioned in the FAO document specify levels for moisture content (6,7).

A review of available literature identifies the lack of data to underpin explicit advice to the Commission on the potential micro-biological risk with the presence of moisture in tea and acceptable upper limits. Tea seems to have a safe history of use. Because of the lack of data concerning associated fungi in tea, it has not been possible to identify health hazards due to elevated moisture content in tea, and moisture levels of up to 10% seem to give an acceptable safety margin.

On the other hand, occurrence of moulds and mycotoxins in similar commodities such as spices, herbs and grain

products, are quite frequent and there appears to be a need to review acceptable water levels in low moisture foods. These *levels* should be related to the water activity. Very few mould species are able to grow below  $A_w < 0.65$ . Mycotoxin production occurs at  $A_w > 0.80$ .

## Conclusion

Tea has a long history of safe use and the Committee is not aware of any safety problems related to moisture in tea. This may be attributed to low moisture content (i.e. water activity) and the high content of anti-microbial substances. Moisture levels of up to 10% seem to give an acceptable safety margin for the storage of tea. A lower level may be needed in order to restrict quality defects.

However, a general review is recommended for acceptable levels of water in low moisture foods. Assessment of acceptable levels should focus on potential growth of mycotoxigenic moulds. Acceptable levels should be based on water activity ( $A_w$ ) and follow the general principles for safe storage.

## References

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