International Standard 6664

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Bilberries and blueberries — Guide to cold storage

Myrtilles — Guide pour l'entreposage réfrigéré

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 6664 was developed by Technical Committee ISO/TC 34, *Agricultural food products*, and was circulated to the member bodies in May 1981.

It has been approved by the member bodies of the following countries :

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The member bodies of the following countries expressed disapproval of the document on technical grounds :

France
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Bilberries and blueberries — Guide to cold storage

1 Scope and field of application

This International Standard describes the optimum conditions for the cold storage of bilberries (*Vaccinium myrtillus* L.), blueberries (*Vaccinium angustifolium* Ait.) and cultivated varieties (cultivars) of *Vaccinium corymbosum* L.

The limits of application are given in annex A.

2 Reference

ISO 2169, *Fruits and vegetables — Physical conditions in cold stores — Definitions and measurement.*

3 Conditions of harvesting and putting into store

3.1 Harvesting

The fruits should not be picked when moist (due to rain or dew) as they may be attacked by mildew.

They may be picked by hand or by means of special combs provided that these cause no bruising of the fruits. Since the fruits ripen very little during storage, they should be picked at a stage very close to maturity, i.e. they should be completely developed, fully coloured, firm, and covered by their natural waxy coating.

They should be picked carefully and placed directly into flat baskets or other solid light packages to avoid further handling. The capacity of the baskets should be such that the lower layers are not crushed. Packages should be neither too full nor insufficiently packed.

All packages filled with fruits should be placed in the shade immediately after picking and should not stay there longer than necessary.

On arrival at the store, the fruits should be refrigerated.

3.2 Qualitative characteristics for storage

Fruits intended for cold storage should be healthy, fresh, without any sign of fermentation, at a stage close to maturity (not too ripe), free of abnormal external humidity, firm, covered by a natural waxy coat, free of bruises, and free of any visible signs of attack by fungi and by insects. They should be free of other species of small fruits and, if necessary, leaves and twigs.

3.3 Various treatments

Because of their perishability, the fruits should be precooled for several hours after picking to remove natural heat. Precooling by means of a jet of cold air is preferred.

3.4 Putting into store

The fruits should be put into the cold store as soon as possible after picking (not later than 12 h) and stored with products having the least possible odour.

3.5 Method of storage

The baskets (or other packages) containing the fruits should be handled gently and with care. They should be stacked in a way which will ensure uniform circulation of air through the mass and avoid crushing of the lower layers in the baskets. The baskets should be placed on a floor covered with duckboards to allow ventilation below the baskets. The cold store should be disinfected beforehand and should be free from odours.

To ensure the strength of the packages and to make the most economic use of the store, the packages should be stacked on post pallets which should then be stacked to the height permitted by the store.

4 Optimum storage conditions

4.1 Temperature

An optimum temperature between −0,5 °C and + 0,5 °C is recommended, but, depending on the means of refrigeration, higher temperatures (up to 4 °C) may, sometimes, be used.

4.2 Relative humidity

The optimum relative humidity of the air is from 85 to 90 %.

4.3 Air circulation

Intense air circulation is recommended during the period of cooling to accelerate and homogenize the cooling of the bulk.

The air circulation ratio (see ISO 2169) should be 30 to 50 until the temperature reaches −0,5 °C to + 0,5 °C.

4.4 Storage life

Fruits intended for consumption in the fresh state may be stored under the recommended optimum conditions for up to two weeks, and those intended for processing for up to three weeks, depending on the rate of cooling and the storage conditions. Consequently, the higher the storage temperature, the faster the fruits deteriorate.

During the storage period, the fruits should be examined with respect to ripeness, taste and the possible development of diseases (see annex B).

Fruits stored for too long a period lose their freshness and firmness, appear withered and unattractive, their taste deteriorates (it may become bitter) and they may show significant changes due to deterioration.

4.5 Operations at the end of storage

When removed from the cold store, the fruits should be gradually warmed to avoid condensation on the surface of the fruits. Light ventilation to avoid condensation is also recommended during warming.

5 Additives and other procedures of preservation

5.1 Additives

In certain cases and in certain countries, in order to achieve more rapid cooling and to control the ripening process and avoid rotting, a modified atmosphere (with a higher carbon dioxide and/or nitrogen content and lower oxygen content) may be used. For this purpose, carbon dioxide in the form of dry ice and liquid nitrogen may be used.

5.2 Disinfection

To avoid cryptogamic disorders, preliminary disinfection of the cold store and of the packages is necessary.

Annex A

Limits of application

This International Standard provides guidance of a very general nature only. Local conditions (inherent in the variability of the fruits with time and location) may, therefore, make it necessary to define other conditions for harvesting and other physical conditions in the store.

This International Standard does not apply unreservedly, therefore, to all types of bilberries and blueberries in all climates, and it will remain for each specialist to be the judge of any modifications to be made.

Bilberries and blueberries belong to the class of perishable fruits which are susceptible to deterioration. They breathe intensely and ripen rapidly. For this reason, they are not usually stored for a long period of time, but are sent to the market or for processing directly after having been harvested. Nevertheless, the fruits can sometimes be stored for several days and, in this case, it is recommended to store them under refrigeration.

Annex B

Cryptogamic disorders

Grey rot caused by *Botrytis cinerea* may develop on the fruits during storage. The effect of changes during storage appears to be associated with the atmospheric conditions which prevail during the period of growth. The disorders are favoured by the temperature and humidity of the air. Over-ripe fruits or those having bruises are more susceptible to infection than healthy ones, and should not be picked and stored.

Sometimes, the fruits may be covered by a penicillin mould. This is inclined to develop on bruised fruits when stored at a temperature of about 4 °C.

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