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Apricots — Guide to cold storage

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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 2826 was drawn up by Technical Committee ISO/TC 34, *Agricultural food products*, and circulated to the Member Bodies in June 1972.

It has been approved by the Member Bodies of the following countries :

Austria	Iran	South Africa, Rep. of
Brazil	Israel	Sweden
Egypt, Arab Rep. of	Netherlands	Turkey
France	New Zealand	United Kingdom
Germany	Pakistan	U.S.S.R.
Hungary	Poland	
India	Romania	

No Member Body expressed disapproval of the document.

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Apricots — Guide to cold storage

1 SCOPE AND FIELD OF APPLICATION

This International Standard describes methods for obtaining conditions for the more or less prolonged keeping of apricots by means of cold storage.

The limits of application of this guide are given in the annex.

2 REFERENCE

ISO 2169, *Fruits and vegetables — Physical conditions in cold stores — Definitions and measurement.* [1]

3 CONDITIONS OF HARVESTING AND PUTTING INTO STORE

3.1 Varieties

Generally the later ripening varieties, with large fruits, are suited for storage (prolongation of the season can only be justified economically for these varieties), while for the early varieties, with small fruits, temporary storage for, at most, a few days is recommended.

(A list of varieties suitable for storage cannot be given because of the indefinable character of the apricot varieties.)

3.2 Harvesting

Determination of the degree of maturity is difficult, principally on account of the different characteristics of the varieties. The means most frequently applied for establishing the optimum state of ripeness for harvesting are as follows :

— the basic colour of the fruit skin (to be distinguished from the red anthocyanin pigmentation, the intensity of which varies depending on the variety and, to some extent, the exposure to sunlight);

— the firmness of the flesh, which is assessed by sensory examination or with a spring penetrometer;

— the age of fruit, in days, reckoned from the date of full flowering. This reckoning, however, may involve several day's difference in ripeness between fruits of the same age.

These criteria are not universally valid : for a given variety they vary from one region to another and it is for the grower to choose, according to his experience, his own criteria for picking.

At the moment of picking, the flesh of the fruit should still be firm but sufficiently juicy, with an aroma and, according to the variety, have a slightly acid taste. The harvested fruit shall be rapidly cooled.

3.3 Quality characteristics for storage

Apricots intended for cold storage should be sound, free from bruises or visible signs of deterioration of bacterial, fungal or physiological origin and from any sign of mould or microbiological attack. They shall be clean and free from any trace of liquid water. However, when water cooling has been applied, it is not possible to avoid the presence of water on the fruit.

3.4 Various treatments before storage

Disinfection of storage rooms and packaging materials is recommended.

In the same way, the development of fungal deterioration and the appearance of degradation through age can be retarded by a preliminary fumigation treatment or by preliminary cooling of the fruit in ice-water, with or without the use of fungicides, taking into account any restrictions in national legislation (see clause 5).

3.5 Putting into store

The fruit should be put into cold storage as soon as possible — if possible, within 24 h.

3.6 Method of storage

Apricots should be handled with care during transportation and putting into store. If possible, packages should not contain more than two layers of fruit. The density of storage when the fruit is stored on pallets may be of the order of 100 kg/m^3.

1) At present at the stage of draft.

4 OPTIMUM STORAGE CONDITIONS[1)]

4.1 Temperature

For cold storage of apricots, temperatures between − 0,5 and + 0,5 °C are recommended. Temperatures lying outside these limits can only be justified in special cases, in particular when special varieties are concerned or because of ecological conditions in certain countries.

Thus, storage between + 5 and + 8 °C is practised in certain countries and may also be advised when the appearance of internal or external browning is feared. In these conditions, the keeping time will be shorter.

4.2 Relative humidity

A relative humidity of 90 % is recommended for storing apricots.

Apricots rapidly lose weight by evaporation. A relative humidity of 95 % has therefore been recommended in certain cases. This practice is advantageous for marketing but the degree of protection of the fruit against damage caused by mould is influenced by local conditions and temperature.

NOTE – Loss of moisture during storage may be significantly reduced by enclosing the packages of apricots, for example in polyethylene sheets.

4.3 Air circulation

The air circulation should make it possible to keep the temperature and relative humidity constant and uniform within the limits specified in 4.1 and 4.2.

4.4 Storage life

For varieties suitable for storage, a life of 2 weeks can be expected. A life of 4 weeks is biologically possible when all the conditions are favourable.

4.5 Operations at the end of cold storage

On removal from the cold store, whenever possible, the apricots should be warmed gradually in order to avoid the risk of condensation on the fruit.

On removal from the cold store, the apricots must be consumed or used as soon as possible.

5 ADJUNCTS AND OTHER METHODS OF KEEPING

The use of controlled atmospheres, as an adjunct to refrigeration, is recommended at normal storage temperatures (see 4.1). The optimum concentrations of carbon dioxide and oxygen can be varied according to the varieties and conditions of cultivation.

For example, the following gaseous mixture has been recommended :

$$3\ \%\ O_2,\quad 5\ \%\ CO_2$$

When it is necessary to carry out storage at temperatures of the order of + 5 to + 8 °C, the use of controlled atmospheres is strongly recommended, since in this range of temperature the expected storage life is very short.

The use of fungicides, by fumigation, can also be recommended – subject to the requirements of national legislation – both for treatment before storage (see 3.4) and during storage.

1) For definitions and measurement of the physical quantities affecting storage, see ISO 2169.

ANNEX

LIMITS OF APPLICATION – ECOLOGICAL EFFECTS AND DEFECTS ARISING DURING STORAGE

A.1 LIMITS OF APPLICATION

This International Standard provides guidance of a very general nature only. Because of the variability of the fruit according to the time and place of cultivation, local circumstances may make it necessary to specify other conditions of harvesting or other physical conditions in the store.

These recommendations do not apply unreservedly, therefore, to all varieties in all climates, and each specialist will himself decide any modifications to be made.

Moreover, this International Standard does not take into account the role played by horticultural factors, and wastage during storage is not dealt with. The importance of these two subjects has not been forgotten, but the influential factors (i.e. ecological or agrotechnical factors) are not very well understood; moreover, the origin of many of the most frequent physiological disorders is still uncertain, as are often the appropriate means of combating them. It has therefore seemed difficult to prepare International Standards on these two points.

Nevertheless, it has seemed useful to give, in this annex and for purposes of record, a few recommendations which appear sufficiently well founded in the present state of knowledge.

Subject to all possible restrictions arising from the fact that fruits are living material and may vary considerably, the application of the recommendations contained in this International Standard and this annex should enable much wastage in cold storage to be avoided and storage for a satisfactory period to be generally achieved.

Cold storage of apricots is not so general as that of other fruits; in most cases apricots to be processed by the canned food industry are stored temporarily. Long term storage of this fruit, especially at a low temperature, may easily cause damage.

A.2 INFLUENCE OF ECOLOGICAL FACTORS

Local conditions can give rise to differences in the state of the fruit at the time of harvesting, due in particular to the influence of the date of picking, the conditions of cultivation and the climate.

The methods recommended cannot therefore be applied to all varieties under all climatic conditions and the specialists who apply this International Stnadard must take these differences into consideration and modify the technique used.

Given the fact that it is very difficult to adapt to varying conditions, it is however desirable that cold storage of apricots be carried out only when it is possible to apply the methods indicated in this guide.

A.3 DEFECTS ARISING DURING STORAGE

Generally distinction is made between damage of cryptogamic origin and damage of physiological origin.

A.3.1 Cryptogamic damage

Damages of cryptogamic origin are very numerous. The only means of protection are preventive, i.e. the systematic removal of centres of contamination.

The following preventive measures may be mentioned :

– sorting of sound fruit before placing in cold storage;

– preliminary disinfection of cold store and packaging materials;

– frequent disinfection of sorting rooms;

– use of packaging material impregnated with disinfectants, provided that their use is not prohibited;

– disinfection of the air space of the store and of the fruit in it, provided that this is in accordance with sanitary requirements.

A.3.2 Physiological damage

The most frequent damage of physiological origin of apricots is external and internal browning.

Keeping at too low a temperature or for too long a period at a temperature which would normally be tolerated may cause internal browning. In addition, storage for too long a period may inhibit the development of the aroma and may not allow the normal ripening of the fruit.

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