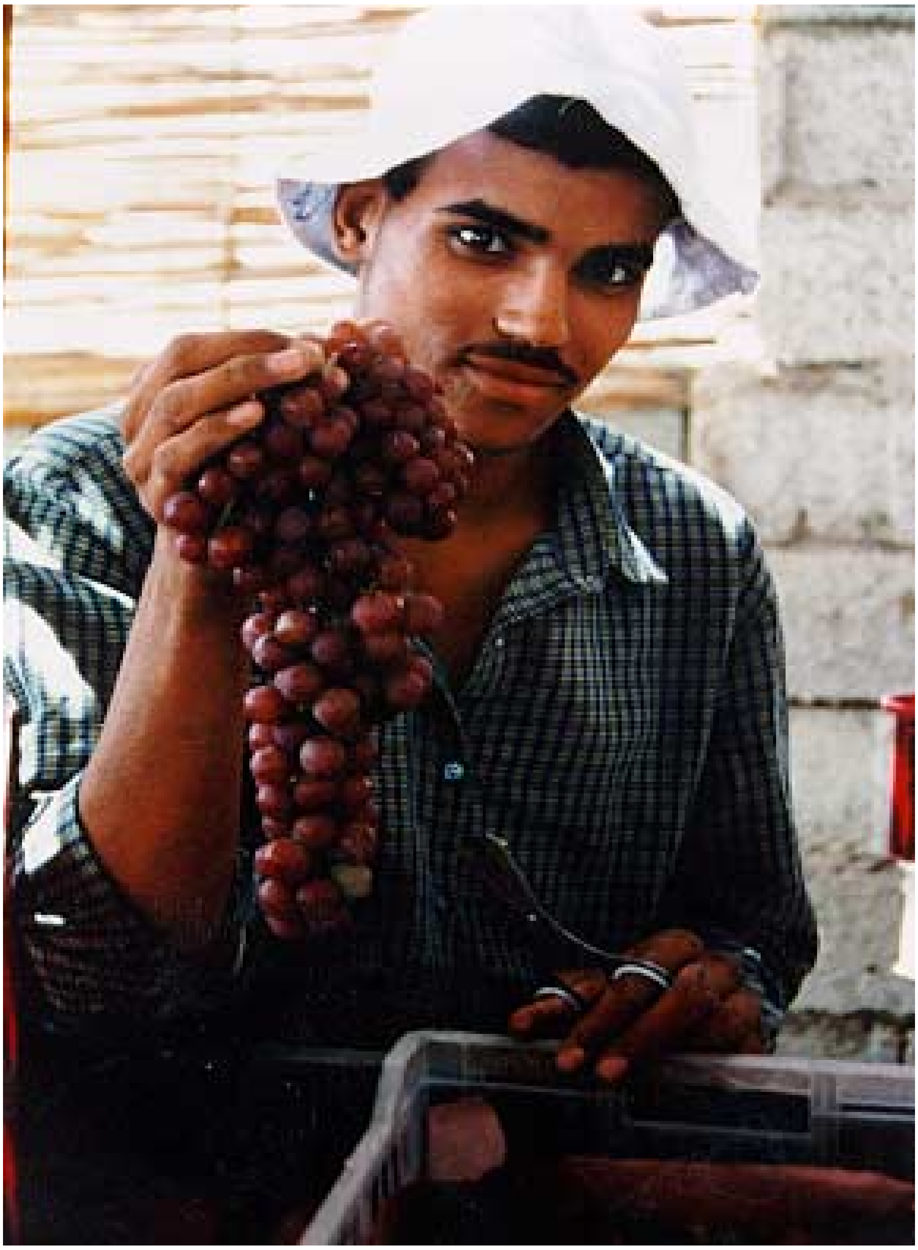
Improving Quality in Egyptian Grapes for Export



Identification of the problems

Introduction

In general, the growing-harvesting-selecting-packing-cooling-shipping-marketing process for seedless table grapes handled for export should be considered as a single system. This means that each growing and handling practice must have as its objective the quality of the end product.

With seedless table grapes, more than any other fruit, growing practices must be directed to the bunch (rachis elongation, GA thinning, GA berry enlargement, hand thinning, tail cutting, etc.). To accomplish this, an appropriate support and conductive system for the vine must be provided. This will distribute the bunches within the plant so that they can be easily seen and reached.

The training system currently in use in Egypt prevents appropriate management as described above. Moreover, it unnecessarily complicates the overall technological practices.
This situation has been understood by some grape growers, and encouraging-although isolated-changes have been observed (Figs 1, 2, 3 and 4).

Fig .1. Transformation of the conductive system from the traditional "T" edge (as seen in the back of the row) to a one similar to the Australian "Tatura" type (possibly a new Egyptian "pyramidal" system).

The various inappropriate growing conditions and handling practices in use may account for a large part of the so called "pre-harvest losses" (Lizana et al. - 1994.

Grapes. Pre-harvest losses. Vol. III, Ch. 4:73-77, in Harrison (Ed), "Market oriented Development for Majors Horticultural Crops in Egypt". NARP-MO. Cairo, Egypt).

To determine the problems that make table grapes unsuitable for export, samples were taken from packing houses with laborers trained in bunch sorting and cleaning procedures. Samples were taken from the boxes in which the culls were collected. This material was then classified according to the nature of the problem.

The most serious problems were found to have been caused by defective or ineffective growing practices.

The three main categories of causes for rejecting table grapes during selection for exports are discussed in the following subsections.

Fig .2 Front row of table grape vines trained to the "Tatura" type system. Observe the extra support for the 5 sets of wires per side.

Fig .3 Table grape vine conductive system, transformed from Hedge row type to Trellis system. If the top of the trellisesis too high, laborers must use ladders to perform hand thinning as shown in this Figure. Notice the grape parts on the ground, the by-product of thinning.

Fig .4 Table grape vines conducted in the open "V" system, but with a very good canopy management. Five sets of supporting wires maintain good distribution of the vegetative growth, with the fruit well placed under the canopy.

Sound grapes found in the rejection box

Examination of rejection boxes revealed sound grapes (no defects), either whole bunches, partial bunches, or individual.

Whole bunches: When whole bunches are found, it is usually because they did not fit the minimum requirements for export. The picker should have been instructed to leave them in the plant.. In the operations visited, this type of fruit is sold in the local market. The time spend taking such fruit to the packing house is wasted, and the export selection process is slowed.

Sound pieces: Clusters of two or more healthy berries are culled to give a certain pre-established shape to the bunch. These berries are usually cut from long tails or bulging shoulders. Such off-shape bunches are a result of a lack of consideration for the shape of the bunch during the growing period(Figs 5 and 6).

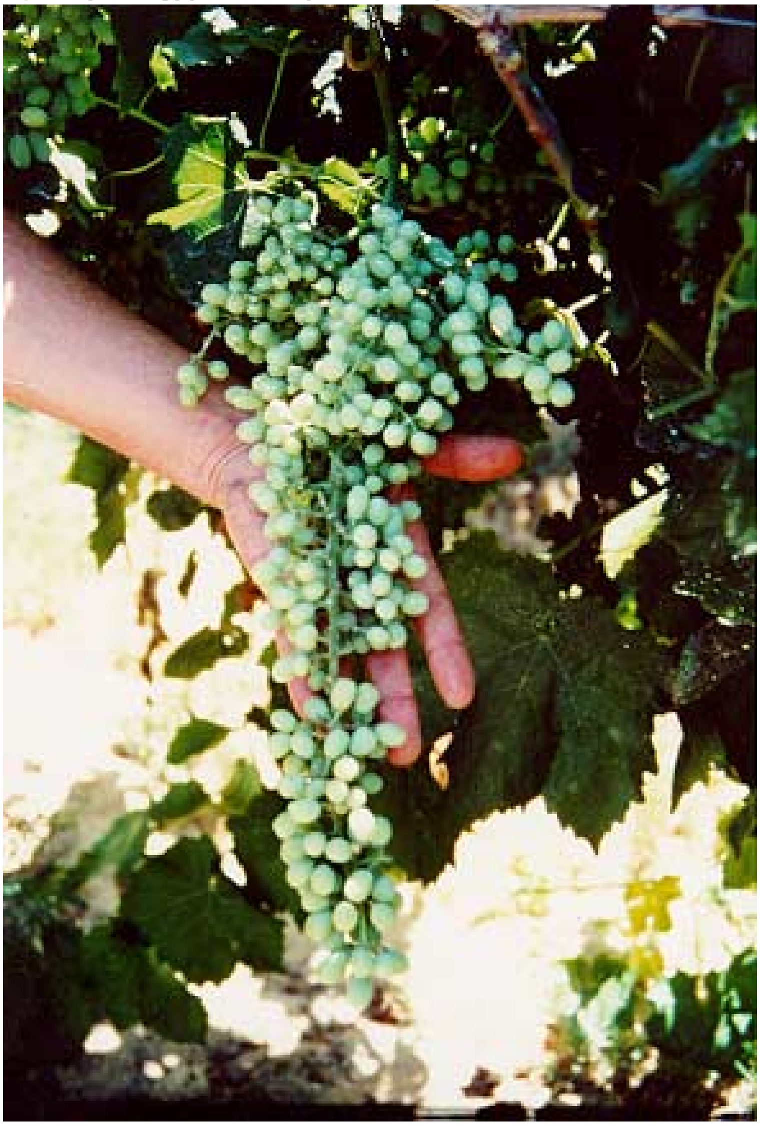


Fig. 5 Thompson seedless grape cluster with an excessively long "tail" that should have been removed much earlier. Notice that berries at the tail end are larger.

Sound berries: Individual healthy berries are sorted out in the export cleaning process to loosen tight bunches. This occurs as a consequence of a defective field operation, specially the chemical or mechanical thinning of berries(Fig 7)

Small berries: Berries that do not develop to expected minimum diameter must be eliminated to improve the homogeneity of the cluster. A possible cause of this problem is related to failure to apply gibberellic acid at the appropriate time.

Fig. 6 Two Thompson seedless clusters that demonstrate very good berry size, good and even berry thinning, but tails are too short.

Fig. 7 Well developed Thompson seedless grape bunch (approximately 2 to 3 weeks before harvest; SS = 9%) cultivated on a trellis system. Note the bunch compactness and the undesirable long tail.

Lack of color: This applies only to colored cultivars cvs, where minimal color is one of the quality requirements. Color formation depends on genetic factors related to the cv, temperature during development, locality, the number of clusters in relation to the leaf area, etc. Color is sometimes increased with trunk girdling or application of color enhancing compounds (ethrel). Lack of appropriate color may also be related to premature harvest. Since one of the main early table grapes for export in Egypt is Flame seedless, the eagerness that fruit exporters and growers may have to get to the export market may lead to premature fruit harvest. Unfortunately grapes belong to the type of fruit that does not ripen further after being served from the plant. So if the bunch is harvested green (immature), it will stay in that condition (Fig 8).

Fig. 8 Harvested Flame seedless showing good berry size, but some bunches lacking color that should have been left on the vine to attain the typical minimum export color for this cv.

Fig. 9 Leaf and berry damage from khamaseen winds in leaf and berries (Flame seedless) growing in dessert areas.

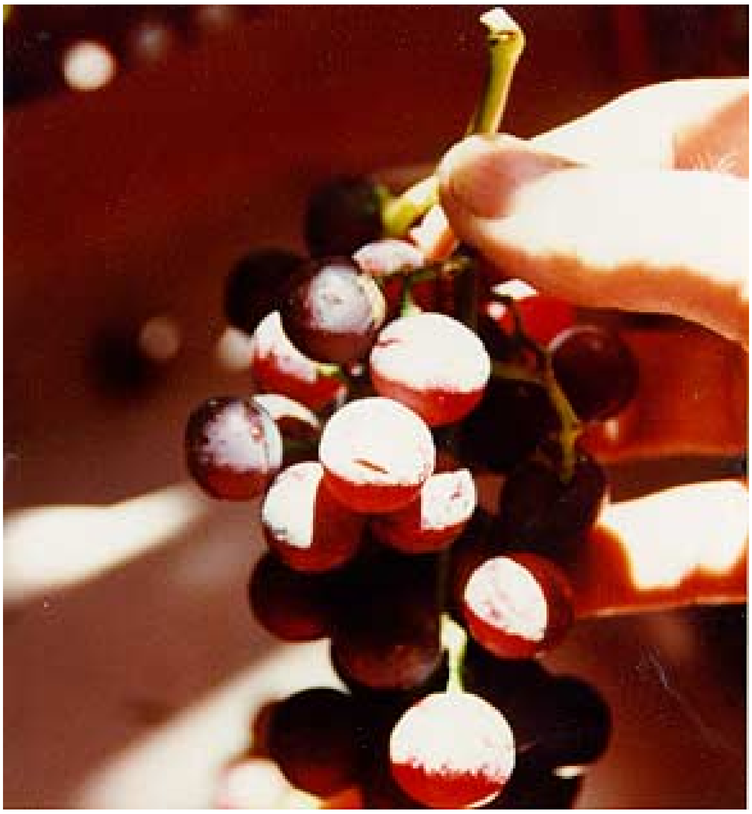


Fig. 10 Split berries in Flame seedless. This problem can be caused by poor irrigation practices, or by rough postharvest handling.

Fig. 11 Sun damage in Thompson seedless grapes

Pesticide damage: Some pesticides as well as other chemicals, may cause skin damage as shown in Fig. 12. Application of some chemical products, when done carelessly, may cause a spotted residue on the berries that is difficult to eliminate and which spoils cluster appearance (Fig. 13 and 14)

Careful consideration should be given to spray equipment, since some of these problems may relate to inadequate spraying nozzles and/or lack of a proper agitation system inside the tank. The problems result in a lower dose at the beginning and a higher dose at the end of spraying. The use of the wrong pesticide, or its improper use, cannot be overlooked.

Fig. 12 Thompson seedless berries with corky skin tissue as a result of chemical spray injury.

Fig. 13 Pesticide residue on Thompson seedless leaf and berries. This problem spoils the appearance of these very well developed berries, which prevent export**.**

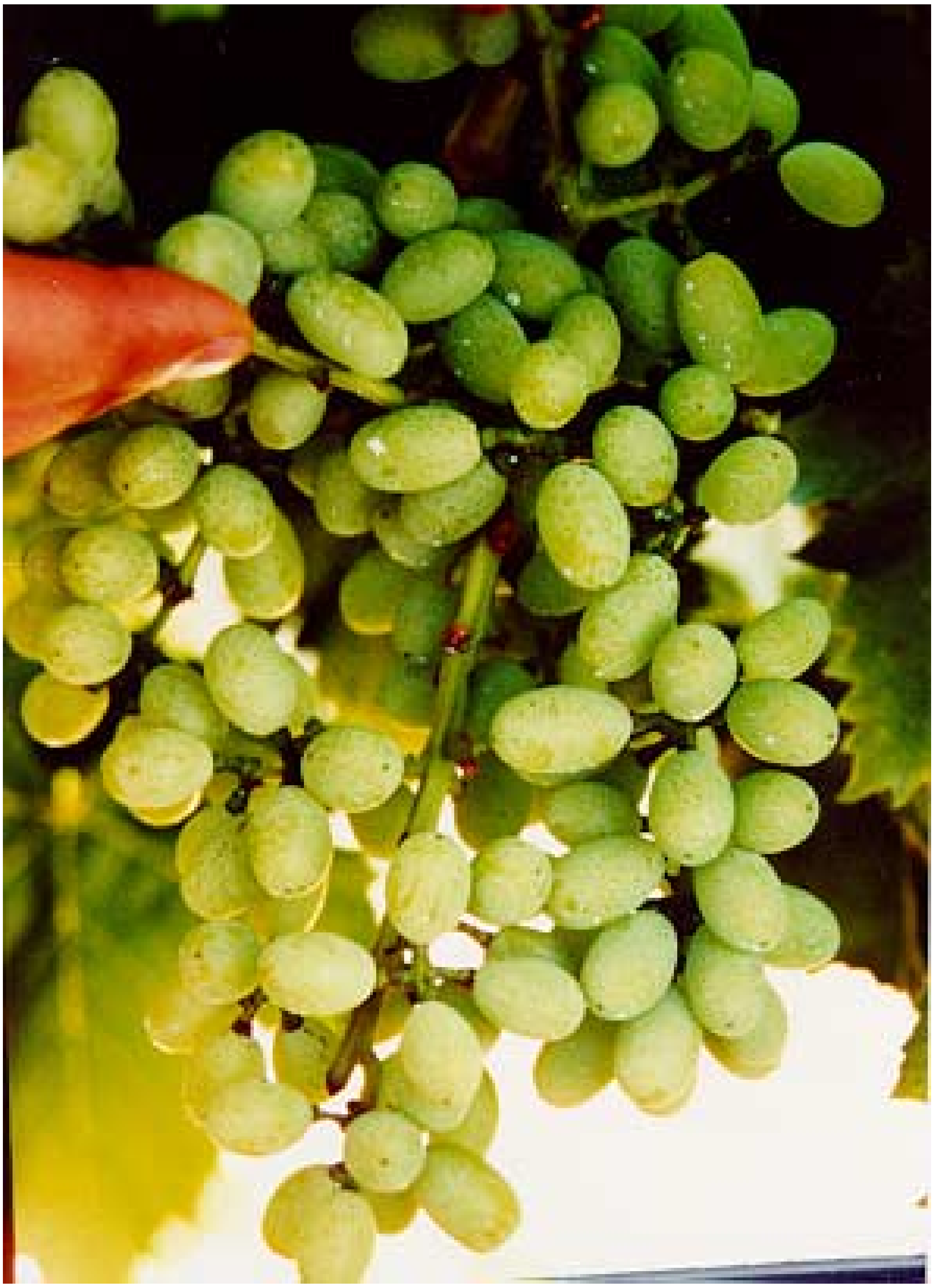


Fig. 14 Thompson seedless grape clusters with berries and internal clusters properly thinned All berries are very even in size and shape, very well spaced and distributed, with enough room for berry growth. Nevertheless, the appearance is marred by the noticeable pesticideresidue.

Fig. 15 Russeting resulting from thrips damage in Thompson seedless and Flame seedless.

Fig. 16 Very early thrips damage to Flame seedless berry grapes. Notice the pattern left by the insect feeding while the caliptra was still on the berry**.**

Fig .17. Thompson seedless berries showing superficial skin damage by mildew.

According to Dr. Korashi, the behavior of this moth is similar to another moth *Lobesia botrana* Schiff (Lepidoptera), a major grape pest in the western Delta. L. botrana is also present in Mediterranean regions and in Europe. In Alexandria it is found in winter (September-February)in a shrub, *Saimelia hirsuta*. The insect, according to Dr Korashi, can complete three generations in seedless grapes (early crop cvs) and five generations in seeded grapes cvs (late harvest local cvs);It attacks from flowering to well-developed bunches.(Figs 20 and 21).

Fig. 18 Thompson seedless cluster with a nest rot infection. The fungus (mainly *Aspergillus niger*) will develop inside the cluster. In this photo healthy berries have been removed to show the infected area**.**

Fig. 19 Thompson seedless cluster with Aspergillus nest rot infection and associated larvae and pupae (probably *Cryptoblabes ginidiella*).

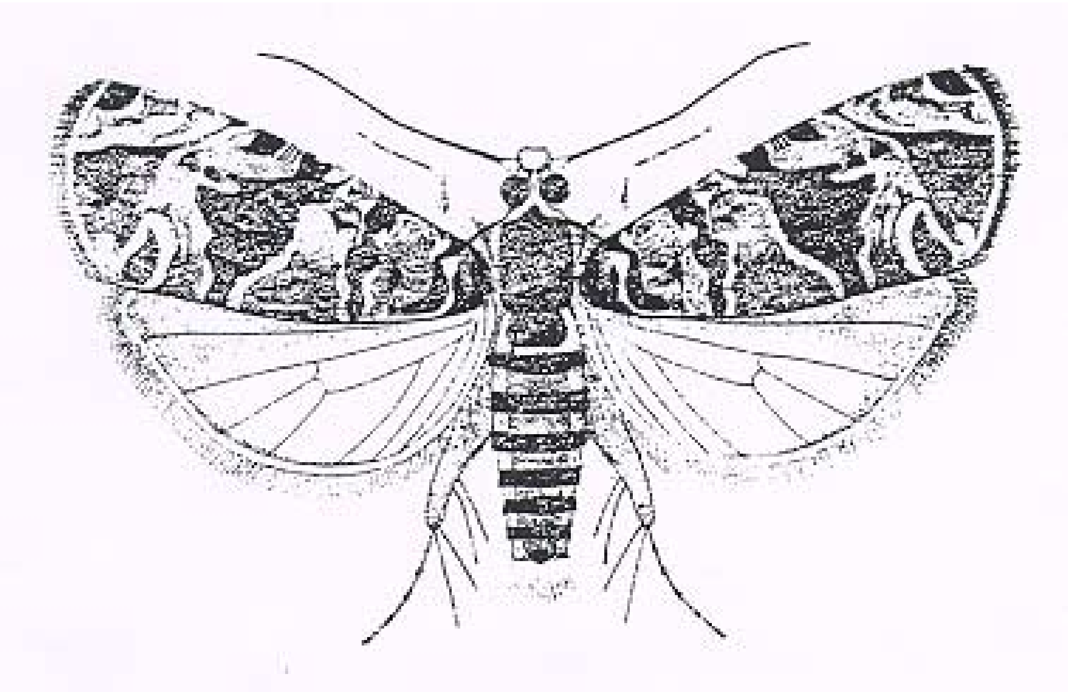


Fig. 20. The adult moth of *Lobesia botrana* Schiff. (after Dr. Alaa Korashi, Plant Protec. Res. Inst., ARC).

Ventilation holes, especially those situated along the lateral faces, decrease vertical pressure resistance. When deficient materials are used to construct the boxes, there

is a tendency to reduce the size of the holes to improve the strength of the wall. This reduces the air circulation capacity, and may stop it completely, because single berries can easily block the small holes.
When visiting various cold rooms, boxes inspected after only a few hours of stoarge at low temperatures and high humidity showed water absorption and a decrease in vertical pressure resistance (Fig. 22).

Fig. 22 Table grape boxes after a few hours in cold stoarge

temperature. Glass jars are used as moisture chambers for whole bunches (Fig. 24). Materials (tissue paper, water and jars) were sterilized. Berries were surface-sterilized by immersion in a 0.1 percent sodium hypochlorite solution or in a 70 percent ethanol solution for two minutes. Twenty five berries, either disinfected or naturally infected, were cultivated on a potato dextrose agar medium (PDA) in five replicates. Each replicate contained five berries/petri dish. Other berries were kept in petri dishes containing a double layer of moistened tissue paper. The cultivated berries were incubated at two different temperatures. The fungi, which were observed at seven days at room temperature and at 14 days at 10°c ,were isolated and cultured on PDA slants. The isolated fungi were investigated microscopically and identified according to Neergaard (1945), Barnett and Hunter (1972) and Raper and Fennelle (1965).

Fig. 24 Flask jars used to provide high humidity conditions for fungus development in grape clusters.

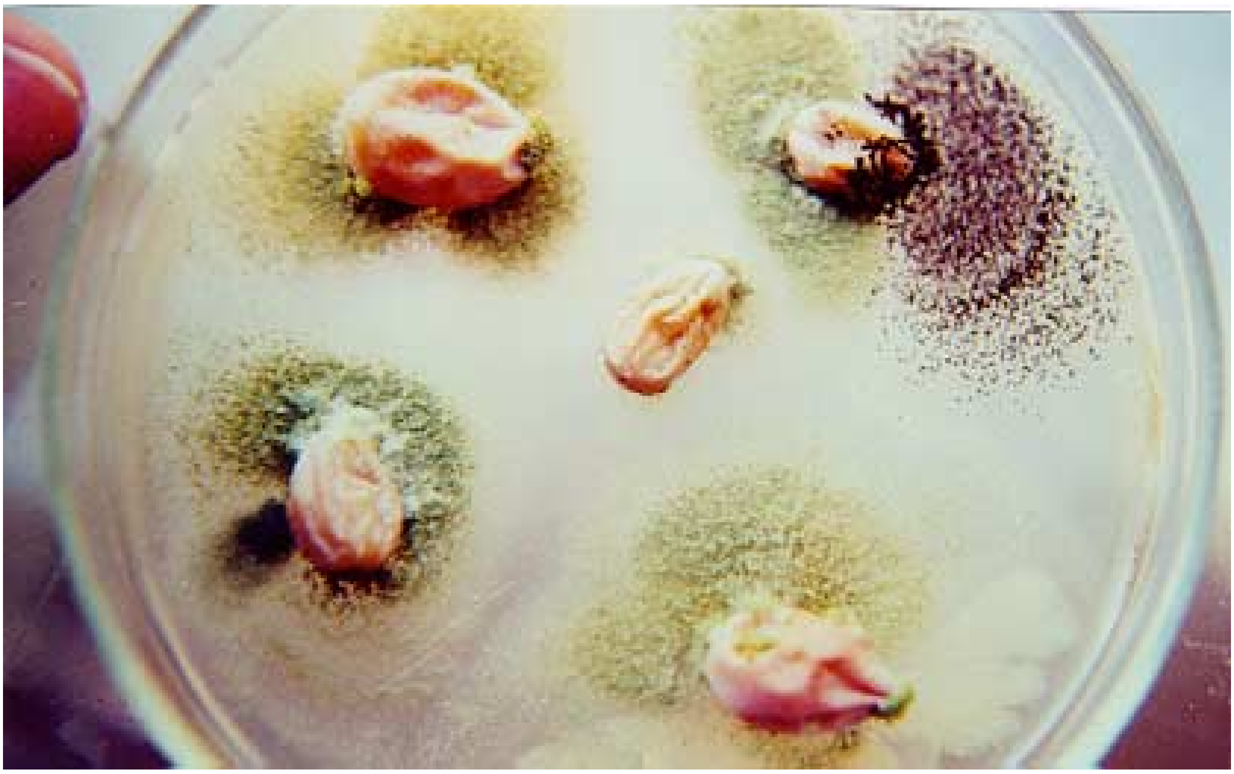


Fig. 25.Aspergillus niger and Aspergillus flavus developed in Petri dishes on PDA from brown grape berries collected in the field approximately two weeks prior to harvest**.**

Fig. 26 Typical sporulation of Aspergillus niger developed on Flame seedless berries kept in high humidity flask jars**.**

Fig. 27 Close up of Aspergillus niger phialides covering a Thompson seedless berry.

Fig. 28 Growth of mycelia and spores of Aspergillus niger and Aspergillus flavus on steam ends of brown berries of Thompson seedless after incubation in a moisture chamber at room temperature.

Fig. 29 Corrugated cardboard boxes of Thompson seedless demonstrating good presentation for export. Maintaining good appearance at the final market is a major factor in fruit export.

Table 10: Distribution of berry size and weight in superior seedless grapes.

Sample	Total berry weight (g)	Percent	Quantity	Individual berry weight (g)
17mm	23.8	10.5	7	3.4
16mm	62.7	27.7	21	3
15mm	34.5	15.2	14	2.5
14 mm	24.6	10.9	12	2.1
<14 mm	76.8	33.8	79	1
Rachis	4.3	1.9		
Total	226.7	100.0	133	weighted ave. per berry 1.7

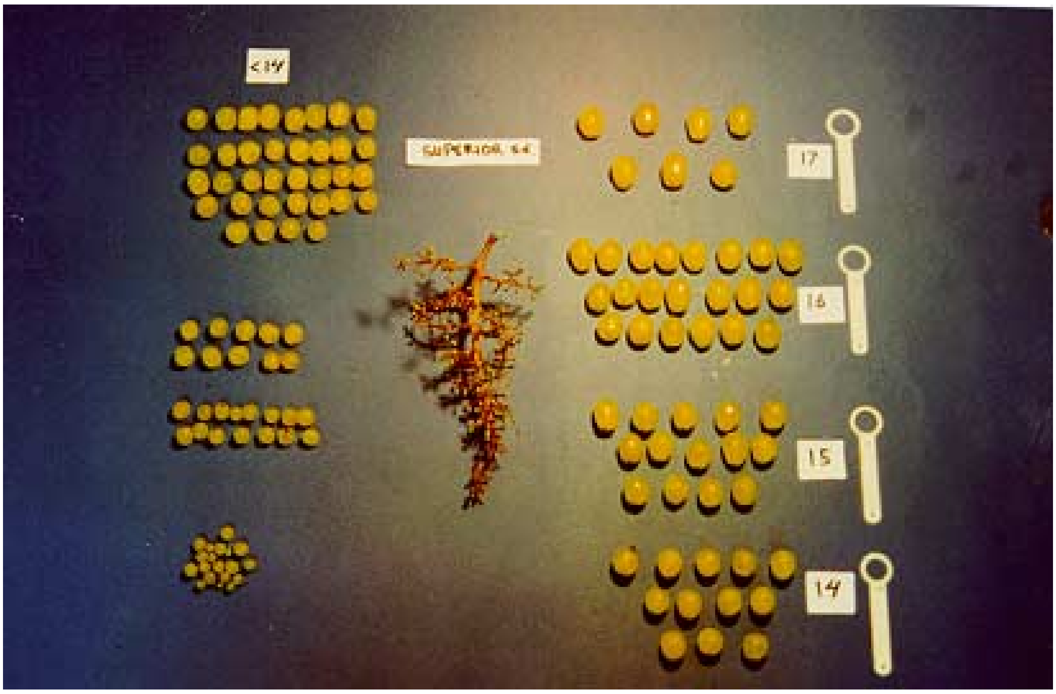


Fig. 30 Distribution of berry sizes in superior seedless table grapes.

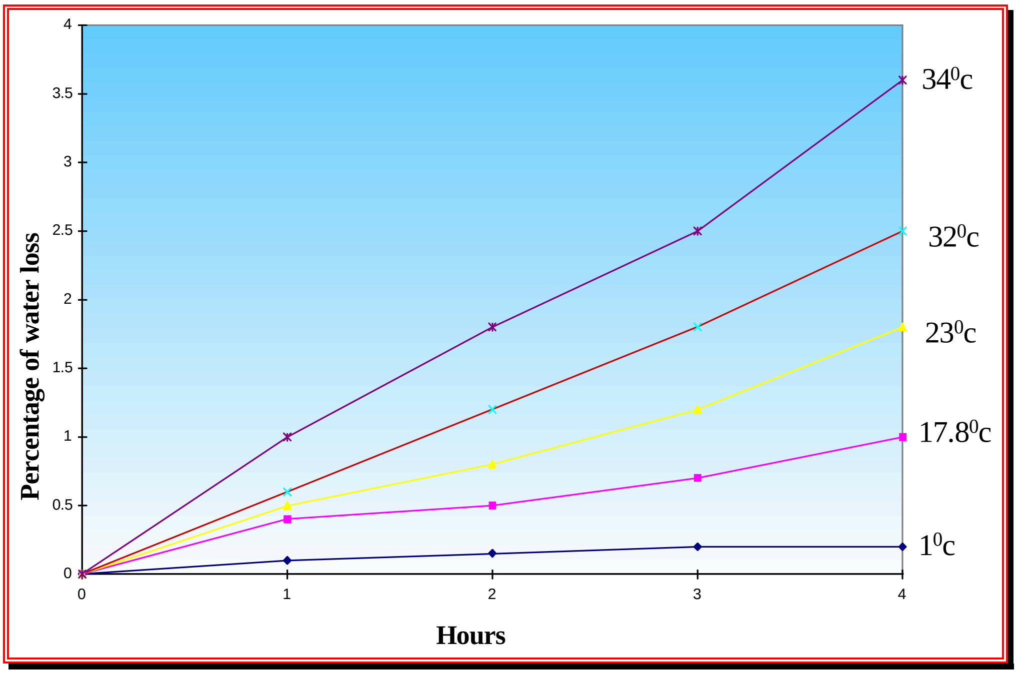


Fig. 31 Projection of post-harvest water loss by table grape bunches exposed at five different temperatures for four hours.

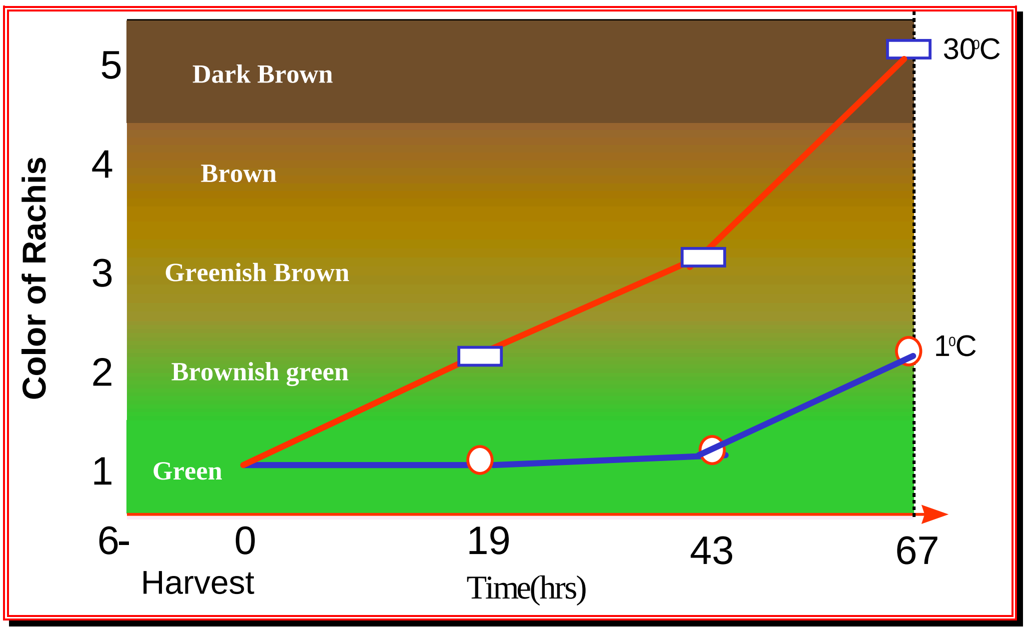


Fig. 32 Dehydration of Thompson seedless table grape bunches measured by rachis (stem) color change from green to brown (1^{o}C and 30 ^{o}C)