Content

- What is commercial quality?
- Why are standards needed?
- Why are quality standards important for MSMEs?
- Who sets the standards?
- How are they applied and controlled?
- Legislative framework
- The importance of inspection
- Resources

UNECE

Definition of quality: What is (commercial) quality?

Quality is a relative concept and as such means different things to different people.

In the context of fruit, vegetables, nuts and dried fruit, commercial quality is defined by sensory and measurable parameters.

UNECE

Commercial quality of fruit and vegetables: The sensory and measurable parameters

Sensory parameters

- Colour
- Shape
- Texture
- Odour/ smell
- Taste

Measurable parameters

- Size
- Firmness
- Sugar content (e.g.kiwi, peaches, melons, apples, table grapes)
- Dry matter content (e.g. avocado, kiwi)
- Juice content (e.g. citrus fruit)
- Fruit acidity / sugar – acid ratio (table grapes)
- Starch content (apples, peaches)
- Moisture content (dry and dried fruit)

UNECE

Agricultural quality standards – Why are they needed?

- Define a common trading language for all parties in the value chain
- Facilitate domestic and international transactions through common quality requirements
- Enables groups of producers to market produce of harmonized quality
- Support quality production
- Increase profitability
- Build confidence and competitiveness on a market
- Prevent placement and sale of low-quality products on a market
- Protect customer interests
- Market development, market access
- Ensure keeping quality, thus reducing food loss and waste

UNECE

Importance of agricultural quality standards

- Used by producers, distributors and traders at all market stages.
- Use of the standards can facilitate trade negotiations between all parties involved. They all use the same "language", which enables a better understanding of requirements.
- Used in domestic and international trade worldwide.
- At country level, they may be part of the national regulatory framework or used at company levels (via contractual arrangements) .

Why are quality standards important for MSMEs?

The standards facilitate:

- Uniform understanding **what quality is**
- Uniform application of agreed **quality parameters**
- Better **product value**
- Increased **consumer trust** in the produce and by extension the producer/company contributing to an increase in sales and profitability
- Better prospects to enter **new market segments** domestically and internationally
- **Reduction of the food loss** and waste

UNECE

Who sets the standards?

Agricultural quality standards are set by:

- **National** (usually national ministries and standardization bodies);
- **Regional** (in line with internationally recognized standards); and
- **International entities** (international standard setting bodies)

Some of the most well-known and widest spread in terms of international application and use are the standards developed by:

- United Nations Economic Commission for Europe (UNECE)
- Codex Alimentarius (FAO/WHO)

UNECE

Who participates in the standard setting & who gives input?

Defining trade quality is the task of the participating parties:

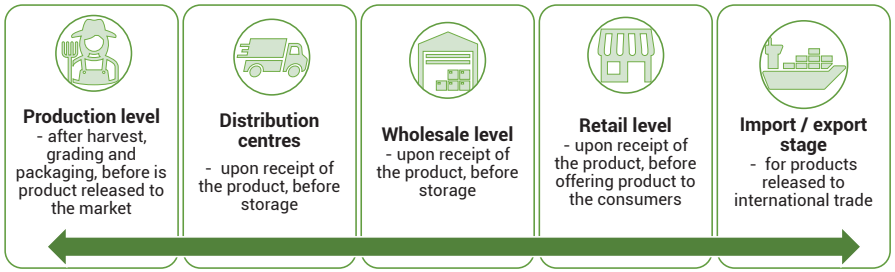
- Participation is defined by the rules of procedure of the standard-setting entity
- It can be limited to governmental delegations and/or include input from producers, wholesale associations, consumers associations, retail representatives, NGOs, academia, etc.

UNECE

Food and Agriculture Organization of the United Nations | World Health Organization | CODEX ALIMENTARIUS

Where are standards applied and controlled?

Standards can be applied on a voluntary basis, by being incorporated into commercial contracts, or they can be applied on a compulsory basis by being incorporated into legislation.
They are controlled:



UNECE

Who controls the standards? (Case of the EU)

At all market stages, it is necessary to continuously monitor the quality of the produce, so that e.g. produce affected by disease or rotting is removed.

Producers (primary production)	Producers and/or packer (pack stations)	Buyers, exporters, importers	Distributors	Retail
• First quality control is at harvest point where the produce is preselected. • Harvesters need to be trained in quality standards to be able exclude the lowest quality or inedible (and sellable) produce.	• Quality control takes place: • before placing the produce in storage; • during the grading and packing operations; • before dispatch to clients according to agreed quality parameters.	• Quality control takes place upon reception of the produce according to agreed quality parameters.	• Quality control takes place before dispatch to retail or to other clients according to agreed quality parameters	• Quality control takes place upon reception of the produce, according to agreed quality parameters

UNECE

Who controls the standards: **Official quality control**

- Official inspection services can be organized in various ways: 1) a fully publicly organized and financed services; 2) a publicly appointed and fee-based service; or 3) any mixture thereof
- Officially appointed inspection services operate at national level - at all marketing stages from production to retail - as well as at export/import stages
- Official controls are performed in conformity with established national legal provisions (in EU member states also EU legal provisions).
- The frequency and targets of the inspections often follows risk-based approaches based on previous inspection results, a classification of the operators, size and turnaround of produce etc.
- Countries determine and organize the fee structure applied, measures in case of non-compliance and resulting fines and remedial measures

UNECE

International standard setting bodies: United Nations Economic Commission for Europe (UNECE)

Mission

- Since 1949, develops internationally applicable quality standards by defining minimum requirements together with delegations from all over the world
- Prepares guides and interpretation and training materials, posters, color charts to illustrate the provisions of the standards

Aim

Help countries develop markets (domestic and foreign), facilitate trade and improve market access based on standards developed and set in consultation (at national level) with the private sector (buyers, sellers, retailers, growers, etc.)

Result

Close to 60 standards for fresh fruit and vegetables, (over 100 when including nuts and dried fruit, seed potatoes, meat and eggs)

UNECE

Resources for MSMEs: Explaining and checking the provisions of standards

UNECE guidance and publications

- Repository of UNECE standards in 3+ languages (English, French, Russian)
- Organizing of trainings for groups of countries or operators upon request
- Participation of MSME representatives in international training courses
- Illustrated guidance material for interpreting standards

More information

- https://unece.org/trade/wp7
- https://unece.org/trade/wp7/FFV-Standards

UNECE

Resources for MSMEs: Explaining and checking the provisions of standards

OECD Scheme for the Application of International Standards for Fruit and Vegetables

Since 1962, national inspection services jointly interpret and illustrate the provisions of international standards such as the UNECE and the Codex Alimentarius standards in produce-specific brochures, manuals, guidelines, and color charts.

The OECD Scheme fosters cooperation between national inspection services and undertakes peer reviews of the national inspection services.

Aim

- Harmonized understanding of the standards and their use and improved quality control measures.

More information: https://www.oecd.org/agriculture/fruit-vegetables/

UNECE

Agricultural quality standards: The legislative and regulatory frameworks

International standards are voluntary **BUT can become mandatory at...**

Contractual level:

- Supermarket chains and individual distributors can define in the contract exact requirements of the product, using international quality standards

National level:

- If countries wish to apply these standards and have their operators use them, they first need to adopt them to the national legislation.
- When a country adopts a standard, all producers and traders are obliged to follow the standard requirements. SME operators thus need to be aware of the quality requirements, as this helps them to reach new markets and build trust.

Regional level:

- For example, the EU marketing standards are based on the UNECE standards and integrated into EU legislation, and thus apply in all 27 member states.

UNECE

Checking quality at MSME levels: the importance of inspection

It is common practice that the contracting buying/importing party checks the quality upon arrival. If the quality is not satisfactory and does not correspond to the agreed requirements, the product can be refused, or the price is lowered/reduced. Producers then risk reduced or lost income.

- Quality management is a key element of the successful business
- Abiding by quality requirements helps maintain the market value of the product
- Business partners /traders trust producers only when they obtain consistently assured high quality of products.
- High quality performance build a good image of the company, and of the producing country.
- Conformity checks performed by trade partners, as well as by national inspection services at all market stages, and during export and import

UNECE

Content

- Food quality and food safety
- Achieving quality – steps from soil/seed to market
- Public standards vs. Private schemes/standards
- Pro's and con's of private schemes
- Product quality control
- Official quality control – inspection

UNECE

Food quality and food safety

From soil to market, the number one concern at every step is food safety

- Quality of food consists of 2 elements – quality standards requirements and food safety requirements.
- There can be cases of compliance with adherence to food safety requirements without compliance with quality standards.
- Both aspects must be taken into consideration at the same time.
- Example: EU's "Farm to Fork strategy" deals with general aspects of food safety, environmental conditions, combat climate change impacts.

UNECE

Quality of agricultural produce is achieved by following many steps – from soil/seed to market

- **Sowing / planting**
  - It is recommended to use only certified seed and planting material
  - A verified origin influences the quality of the plants, it constitutes the baseline for high yield.
  - A good selection of the varieties helps to meet consumers' expectations.
  - Climate change influences new varieties breeding, varieties must be adapted to the possible effects of climate change – e.g. drought resistant, climate proof varieties.
- **Pre-sowing treatment** – seed coating with fertilizers and pesticides gives better starting point for plants.

UNECE

Quality of agricultural produce is achieved by following many steps – from soil/seed to market (cont.)

- **Growing, cultivation**
  - Soil management, agro-technical practices at the right time, plowing, sowing.
- **Examining possible contamination of the soil or the environment** – possible environmental burden, heavy metals, pollution from industry, traffic, etc
  - Weed-free maintenance.
  - Disease and pest control, pest monitoring, right selection of the pesticides requires good identification of the pests, advisory services recommended.
  - Environment friendly growing procedures are preferred – organic production, Integrated production, integrated pests management.
  - Integrated production is on the half way from conventional to organic production, limited scale of pesticides, agro-technical practices are determined.

Cultivations - examples

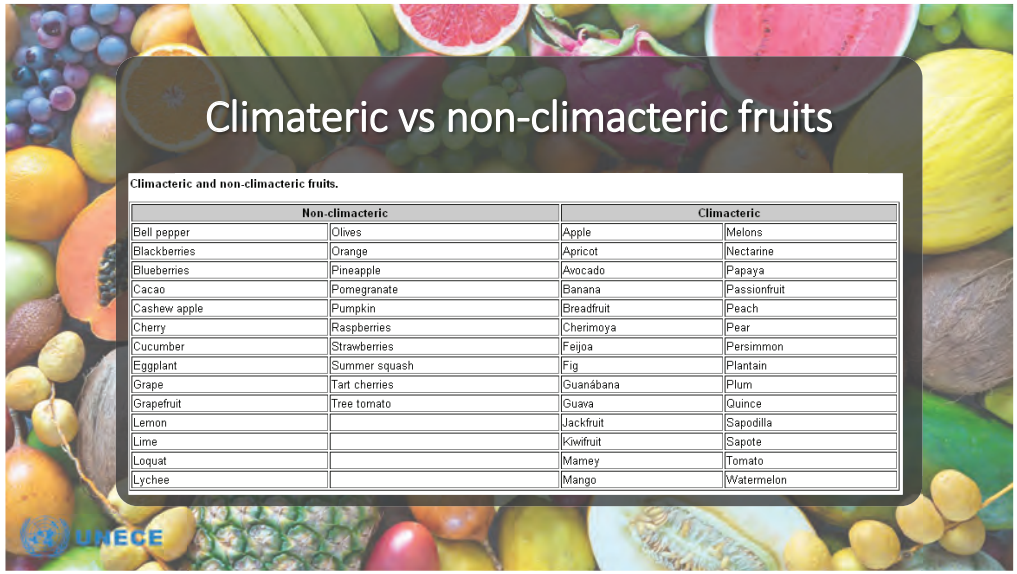
Quality of agricultural produce is achieved by following many steps – from soil/seed to market (cont.)

- **Pre-fertilization step** – the first step is the soil analysis, which is done according to the plants' nutritional needs and set up a fertilization plan, doses and nutrients used and composition of the doses.
- **Fertilizers** – organic and mineral.
- **Water use, irrigation** – have a reliable source of irrigation water and processing water, the water quality is checked and analyzed regularly as unknown water sources may contain bacteria and other hazards.

Harvesting and post-harvest handling

Harvesting and post-harvest handling

- Way of harvesting – manual harvesting is more considerate/gentle, mechanical harvesting is suitable for less sensitive crops.
- Time of picking – quality of the product can be influenced e.g. by rain, low or high temperature, sun exposure.
- Fruit condition when picked – maturity of the fruit is a key parameter for picking.
- 2 groups of products – climacteric and non-climacteric
  - Climacteric fruit are those that can ripen after being picked, produce high quantity of ethylene.
  - Non-climacteric fruit cannot ripen once removed from the plant.



Climateric vs non-climacteric fruits

Climacteric and non-climacteric fruits.

Non-climacteric		Climacteric	
Bell pepper	Olives	Apple	Melons
Blackberries	Orange	Apricot	Nectarine
Blueberries	Pineapple	Avocado	Papaya
Cacao	Pomegranate	Banana	Passionfruit
Cashew apple	Pumpkin	Breadfruit	Peach
Cherry	Raspberries	Cherimoya	Pear
Cucumber	Strawberries	Feijoa	Persimmon
Eggplant	Summer squash	Fig	Plantain
Grape	Tart cherries	Guanábana	Plum
Grapefruit	Tree tomato	Guava	Quince
Lemon		Jackfruit	Sapodilla
Lime		Kiwifruit	Sapote
Loquat		Mamey	Tomato
Lychee		Mango	Watermelon

The role of public standards

The role of public standards governing minimum quality is to:

- ensure that food that is traded, sold and bought is of good edible quality and preserves its attributes.
- provide ground rules that help assure not only the quality but eventually also the right price for the efforts made and the resources put into achieving the desired quality.

Private schemes

While public standards set the requirements for minimum quality, many operators - including importers, traders, buyers, retailers - ask for more.

Different types:

Private specifications

- Requirements set by private retailer companies with the purpose of distinguishing the company's products from those of its competitors.
- They can replace marketing standards or, more commonly supplement them by adding further requirements.

Quality assurance schemes (Global Gap, ISO, BRC and HACCP)

- Developed as a tool for companies to have well functioning quality assurance systems.
- They don't provide standards but a tool for the company to follow the quality of their products.

Who develops private schemes?

- Industry (firms, national and regional commodity organizations) – economic reasons
- Supermarket chains have also range of their own "standards" – specifications with detailed description of the quality requirements, going beyond the public quality standards requirements
- ISO – require yearly fee for using their standards
- Others – including GlobalGAP – paid accreditation guarantees that user obtains infrastructure/system ensuring correct use of private standards

Private schemes focus

"Voluntary" sets of requirements

Focused on various areas ranging including:

- food safety and health
- plant and animal health
- social and working environment
- labour protection and rights of children or minorities
- occupational safety and health
- sustainability
- environmental protection
- additional quality requirements – specifications

UNECE

The origin of private schemes / standards

Why are they developed? The limit of public standards? Or filling a necessary gap?

- Serious health problems, particularly in the area of food safety led to food scandals - with food of plant and animal origin
- Consequence: Consumers getting more attentive to sustainability, environment, livelihood, labour rights and social issues in the production, trade and marketing of agri-produce.

Examples of food scandals:

- Breadford sweets containing arsenic trioxide used by mistake instead of sweetener, GB, 1868, 20 people died, tighter legislation as a result
- Antifreeze scandal, Austria wines, 1985.
- Salmonella infected eggs, UK, 1988.
- Mad cow disease (BSE) - Bovine Spongiforming Encephalitis, 1990.
- Walkerton tragedy – water and food contamined with E. coli, Ontario, Canada, 2000.
- South Wales – meat contaminated with E. coli, UK, 2005
- Milk scandal – industrial melanin found in powdered milk, close to 300,000 were taken ill, China, 2008.
- Exploding watermelons – fruit treated with growth accelerator exploded when ripe, China, 2011.
- Euro cucumber scare – panic over Spanish cucumbers claimed being contaminated by E. coli, not proven, but organic bean sprouts coming from Germany from contaminated seeds from Egypt were suspected.

UNECE

Why are they developed?

The food safety crisis and increased consumer concern for sustainability, social and environmental issues led to:

- Crisis in consumer´s confidence – decreased interest in agri-products
- Demands for guarantees from producers and sellers that these concerns are addressed

RESULT: A surge of private standards and specifications to keep and ensure sales and protect brands, to meet and prove compliance with legal requirements, to promote improved production conditions and better quality and to increase the responsible handling and care of products, the production and processing environment.

UNECE

Private standards /quality assurance schemes which cover spheres wider than required physical properties and health parameters of the product

Advantages

- Determine methods of production, harvesting procedures, post-harvest procedures, delivery schemes and sale practice.
- Induce interest – brands, certification, consistent delivery – differentiating factor in retail sphere.
- Controllable and coordinated deliveries.
- Common trade language, control mechanisms, technical requirements – reduction of trade costs. Build trust to firm and its procedures.
  - Reduce operational costs.
  - Consistent quality, and mostly consistent price for producer.
  - Help reduce and prevent legal action arising when selling low quality products or with safety risk.
  - Help decrease concerns over foodborne infections and diseases arising in low hygiene conditions.
  - Make audit of verification procedures possible.

EXAMPLES of the most commonly used ones: GAP, HACCP, SQF, BRC, AQS..

UNECE

Private schemes which cover more than physical properties and health parameters of the product

Disadvantages for producers

Many producers experience problems when trying to meet the required and often more stringent specifications required under certification schemes or by retailers.

Result:

- Producers are forced to make a lot of efforts and invest heavily both money and time during the production process in order to meet all the criteria.
- Producers face increased costs to meet requirements of private standards (including certificate-related costs, audit and compliance), but often cannot increase the price of the product.

→ BUT TODAY without adhering to the private standards schemes, producers cannot compete on the market or enter supply chains, particularly, of large retailers.

UNECE

Private schemes – why have they become a such huge part of fruit and vegetable markets and trade?

Today, private standards – are required mainly to enter supply chains of large retailers (supermarket chains) where about 60-75 % sales of fruit and vegetables are covered by one or the other private standard. All those who want to access these supply chains and many others have to accept private standards or their produce remains unsaleable.

The advantage for the buyer requesting private standard compliance is mainly linked to the perishability of fruit and vegetables. They can easily replace and substitute their certified suppliers in case of problems meeting demand or unavailability of requested amounts.

Private standards are not negotiated in any kind of open forum, and future users are not invited to negotiate during the standard development process.

Private standards are mostly part of an audits and certification scheme which endures compliance but also costs money. The costs are linked to the establishment of the conditions for the initial certification and then the continuous compliance and audits throughout the year(s). Different private schemes have various number of audits per year, but minimum is one audit per year.

UNECE

Practical examples how standards can raise or decrease the market value of the products

- Meeting the minimum provisions of standards is not always easy and requires adapting practices used at every stage of the supply chain process.
- This also very important for the last stage, when produce is transported to or presented at the final point of sale. Particular attention is required by all parties involved to ensure that the produce arrives in its best and safest marketable condition.
- The following slides illustrate some examples.

Good quality – but no proper packaging and this lowers the price of the product

Nice and fresh product – and suitable for local market places only

Proper packaging increases the market value of products, increases export opportunities and consumer trust

Consumers are buying attractively presented produce of a high quality class.
This will help earn more money.

Presentation

- Presentation is a key success factor.
- Only produce graded according to the standards has a chance to be displayed in an attractive way.

Product quality control

The final operation after packaging at sorting and packaging facilities, or at the production plant, is quality control by the operators.

- Staff must be trained on quality standards' requirements and it is recommended to have educational and explanatory materials displayed and easily available.
- Product quality control need to be performed on dedicated space, equipped with inspection tables, lights, magnifying glasses, explanatory brochures, posters, etc.
- For food safety checks, it is necessary to take samples of the produce and analyse it in laboratories. Some of the analysis do not require sophisticated equipment (e.g. nitrate content analysis), but others require well equipped labs (e.g. pesticides residues). For such analyses, it is recommended to send samples to the accredited laboratories (state, private).
- It is recommended to establish at least basic quality assurance system with corresponding measures, based on control points with critical impact on quality.

UNECE

Product quality control – company level

- Quality control is performed at production level or in packing stations

UNECE

Official quality control – inspection

- Official quality control is performed by a governmental body. Examples of private inspection services exist, but they have been appointed by government (the Netherlands, Switzerland, South Africa).
- Private inspection services are obliged to report inspection results to the responsible governmental body (in most cases ministries).
- Official quality control is based on risk analysis, which considers results of previous controls, delivery area, risk characteristics of product (e.g. perishability) size of the operator, level of technical equipment, etc.
- Official quality control is performed at all market stages (production, wholesale, retail) and at point of export/import.
- According to country decision, quality control at the retail stage can be excluded.
- Result of non-compliance (re-grading, re-labelling, rejection of the product) – costs are borne by the operator.
- Most serious non compliance can be punished (financial rate is decided by law).

UNECE

Resources and useful links

There are various quality standards, brochures and posters available at UNECE and OECD web sites:

- UNECE quality standards for fresh fruit and vegetables: https://unece.org/trade/working-party-agricultural-quality-standards-wp7
- UNECE quality standards for dry and dried fruit and vegetables: https://unece.org/trade/wp7/DDP-Standards
- UNECE brochures and explanatory posters: https://unece.org/trade/wp7/brochures-and-publications
- UNECE Code of Good Practice - reducing food loss and ensuring optimum handling of fresh fruit and vegetables along the value chain: https://unece.org/sites/default/files/2021-11/WP7_2021_INF1_0.pdf
- OECD explanatory brochures: https://www.oecd.org/agriculture/fruit-vegetables

UNECE

Overview: General classification of standards

A			B
Standards by measurement	➡	⬅	Standards by definition
Standards for products	➡	⬅	Standards for processes
Standards on design	➡	⬅	Standards on performance
Public standards	➡	⬅	Private standards
Mandatory standards	➡	⬅	Voluntary standards

UNECE

Generic structure of agricultural quality/marketing standards: Public standards

1. Definition of produce
2. Provisions concerning quality
   A. Minimum requirements
   B. Maturity requirements
   C. Classification
3. Sizing
4. Tolerances
5. Presentation
6. Marking/labelling

UNECE

1. Definition of produce

- Botanical reference/ national, Latin name
- Example:
  - **Standard applies to Cherries - *Prunus avium (L.)* and *Prunus cerasus (L.)***
- Supplied fresh to the consumer
- Produce for industrial processing is excluded- standards are not applied to fruit intended for e.g. jams, marmalades, pickles, freezing...

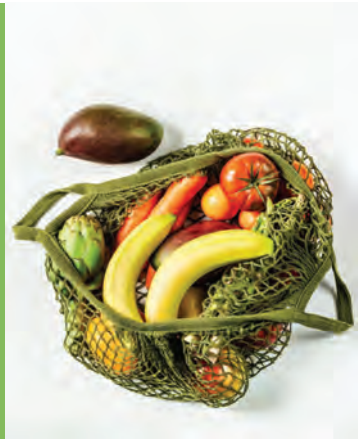
UNECE

2. Provisions concerning quality

Standards define the minimum quality requirements of produce.

They can be applied at various stages of the supply chain:

- After preparation and packaging
- Domestic markets (wholesale or retail)
- Export and import stages



UNECE

2.A. Minimum requirements:
Intact

Intact

- Damages or injuries are not allowed – e.g. cuts, broken roots, bruising.
- Damages and injuries are usually the result of rough handling during harvest or post-harvest operations.

UNECE

2.A. Minimum requirements:
Sound

Sound

- **Product must be free from disease or rotting**
- No deterioration affecting product appearance is allowed
  - ✓ Presence of rotting, fungal disease or other deterioration make the product unfit for human consumption.
  - ✓ Proper checks before releasing product for commercialization and sale are necessary; higher temperature and humidity can destroy value of product very quickly.

UNECE

2.A. Minimum requirements:
Clean

Clean

- **Products must be practically free from dust, soil, pesticides residues and other chemical treatment residues, as well as bird droppings or other animal excrements.**
- Harvesting in rainy weather increases the risk of soil adhering to the produce.
- A soiled product can be rejected by inspection services, or by the buyer, and be excluded from being marketed (this being mostly a food safety issue)

UNECE

2.A. Minimum requirements:
Practically free from pests

Practically free from pests

- Disease or insects create a visible defect which is not accepted. It can decrease the commercial value of the product and lead to it being rejected.
- "Practically free" means occasional insect or disease presence in the package can happen. Example – aphids on cauliflower.

Practically free from damage caused by pests means only very slight traces of damage caused by pests are acceptable.

Damage caused by pests (disease or insects) usually affect the flesh, no matter if pests are still present or not.

UNECE

2.A. Minimum requirements:
Fresh in appearance

Fresh in appearance

- Freshness is conditioned by temperature and humidity during storage.
- Weather conditions during harvest have a direct influence on freshness (e.g. wind, direct sunshine, high temperature).

- Fresh in appearance – green and turgid leaves

- Not fresh in appearance – wilted leaves

UNECE

2.A. Minimum requirements:
Free of abnormal external moisture

- Free of abnormal external moisture
  - ✓free of water inside the boxes
  - ✓leakage of juice from the fruit is considered also as abnormal external moisture.
- Condensation – i.e. water drops on a product which appear following the release from a refrigerated vehicle or cold storage – is **not** an abnormal external moisture. It disappears quickly.

UNECE

2.A. Minimum requirements:
Free of foreign smell or taste

- Most products are sensitive to absorption of smell or taste from surroundings.

➢ **Products with volatile odours must be stored separately from others.**

  - ✓Example – potatoes, garlic and apples cannot be stored together in the same place.

- The same effect results from storage in poor conditions (e.g. storing chemicals or petrol with fruit and vegetables).

UNECE

2.B. Maturity requirements

Maturity requirements depend on the produce

- Sugar content values (see next slide)
- (Brix°) – watermelons, peaches, kiwi
- Solidity – checked by penetrometer - avocado, kiwi

Note: At harvest – due consideration must be given to the possibility of the produce continuing to ripen in storage – if it is a climacteric fruit.

- Climacteric fruit must be harvested at a minimum stage of ripeness to allow the fruit to continue to mature during storage
- Non-climacteric fruit must be harvested at a satisfactory stage of ripeness

UNECE

Sugar content measurement

Sugar content is measured in **Brix**° with the help of a refractometer (see photo)

Sugar content indicates the stage of maturity, measured with a simple tool, the refractometer (a laboratory test is not needed)

Another possibility is to use an **iodine test for certain produce**. Iodine tests show the ratio between starch and sugar and indicate the right harvest time only. In the case of apples, it is used to determine harvest maturity and ripeness (in this case, sugar content changes the colour of the fruit to dark blue, while high starch content does not change the colour).

UNECE

2.C. Classification

In commercial quality/ marketing standards for fresh fruit and vegetables, some products have defined requirements for **quality classes.**

EXTRA CLASS

CLASS I

CLASS II

UNECE

EXTRA CLASS

- Extra class represents approx. 5% of the fruit and vegetables sold worldwide
- Superior (highest possible) quality
- Product must be uniform in all varietal or commercial type characteristics
- Uniformity in shape, colour, development and size is required,
- Only very slight superficial defects are allowed, they cannot affect the general appearance of product, its quality, keeping quality and presentation in the package.

UNECE

EXTRA CLASS

UNECE

EXTRA CLASS

UNECE

CLASS I

- **The majority of fresh fruit and vegetables are sold as Class I**
- Good quality
- Characteristic of the variety or commercial type must be kept
- Slight defects are allowed in shape, colour and development, provided that these do not affect the general appearance of the product, its quality and keeping quality, as well as the presentation in the package.

UNECE

CLASS II

- Class II includes all those that do not qualify for inclusion in Extra Class and Class I and satisfies the minimum requirements defined.
- Different defects are allowed, but product must retain its essential characteristics in quality, keeping quality and presentation in package.
- Product must be of reasonable quality and suitable for human consumption

UNECE

CLASS II

UNECE

Generic structure of agricultural quality/marketing standards: Public standards

1. Definition of produce
2. Provisions concerning quality
   A. Minimum requirements
   B. Maturity requirements
   C. Classification
3. Sizing
4. Tolerances
5. Presentation
6. Marking/labelling

UNECE

3. Sizing

- Sizing requirements are determined by diameter, length or weight of the product. Sizing measurement depends on the product.
- For each quality class, they are determined by minimum and maximum sizes, which can be packed together in one box.
- Size range (size code) is the scale of sizes allowed in one package.

UNECE

4. Tolerances

Fruit and vegetables are «living» and highly perishable products.

Tolerances mean that certain margins are allowed for deviating from the quality of a particular class because of the handling and the natural deterioration of fresh product over time.

Quality tolerances

- Extra Class: a tolerance of 5 % is allowed by number or weight of the product which is not satisfying Extra Class requirements, but meeting the Class I requirements. This tolerance covers all shape, skin and colour defects, allowed in Class I.
- Within this 5% tolerance a maximum of 0,5% of Class II product, e.g. bruises, is allowed.

Size tolerances

- Uniform tolerance for all classes
- 10% by number or weight of the product not conforming to the size parameters.
- For individual products size tolerances are defined separately.

Example: for cherries the size tolerance is defined as follows:

- 10% tolerance of cherries not conforming to the minimum size allowed, provided the diameter is not less than
  - 17mm in Extra class
  - 15mm in Class I and II.

UNECE

5. Presentation

Uniformity

- In each package, the content must be uniform in origin (come from the same country or region), quality (be of the same quality class), size (have the same size)
- The visible part of the package must be representative of the entire content.
- The presentation should not be misleading, the content of the package must be homogenous and must match the labelling particulars, for example, produce of lower quality hidden in lower layers is not allowed.

Packaging

- Packaging must protect the product properly.
- Materials used must be new, clean and not cause external or internal damage to the product. All materials must be non-toxic and suitable and safe for contact with food.

UNECE

Different presentation options

UNECE

Example: Extra Class presentation

UNECE

Example: Class I - consumer package

UNECE

Example: Class II presentation

UNECE

6. Marking/labelling

Each package must be marked and contain information on:

- **Identification of packer /dispatcher** (name and address)
- **Nature of produce** – if not visible from outside, mark it, e.g. "table grapes"
- **Origin** – name of the country, name of the region is also possible, but only if the country of origin is marked.
- **Commercial specifications** – quality class and size.

Recommendations on storage temperature or way of use is voluntary. However, if the temperature is marked, it must be kept at all marketing stages.

An official control mark is the official logo of the national inspection service, responsible for the quality control. This is optional information and may be used only by inspection service or with its permission. Inspection services concerned may set up their conditions for such permission.

UNECE

Marking of each package

NOTE: Incorrect marking/labelling is the biggest cause of rejection. Meeting the quality requirements but marking incorrectly means efforts made until this stage are annihilated, or costs are incurred related to rejection and relabelLing.

UNECE

Example of incorrect marking: missing identification

- ✓ Name and address of producer/dispatcher is not included.
- ✓ The address is part of a "traceability" process which ensures commercial, quality and food safety tracing is in place.

UNECE

Generic structure of agricultural quality/marketing standards: Public standards

1. Definition of produce
2. Provisions concerning quality
   A. Minimum requirements
   B. Maturity requirements
   C. Classification
3. Sizing
4. Tolerances
5. Presentation
6. Marking/labelling

UNECE

Thank you!

Contact us

Agricultural Quality Standards, Market Access Section
Economic Cooperation and Trade Division
United Nations Economic Commission for Europe (UNECE)

Email: agristandards@un.org

Website: www.unece.org

https://unece.org/trade/working-party-agricultural-quality-standards-wp7

Credits

Content and presentation
Viera Baričičová, PhD

Peer-review
UNECE Working Party on Agricultural Quality Standards

Photos
Depositphotos; and
Viera Baričičová

Design
Eva Johannsen

UNECE

Module 4

Reducing food loss and waste

1. Definitions and reasons
2. Producers
3. Traders
4. Transporters
5. Retailers
6. Measuring food loss and waste

UNECE

Reducing food loss and waste – why it matters

Currently a third of all food produced is lost or wasted

- 14 per cent in the food supply chain, from harvest prior to reaching retail
- 17 per cent at the household, food service and retail levels

- This means that the resources used to produce the food - water, land, energy and labour - go to waste.

This has important impacts on environment, food security and incomes

- As around 70% of fresh water is used for agriculture, it means that 25% of the world's fresh water supply, and 8-10% of greenhouse gas emissions, and large tracts of land is used to grow food that ends up being discarded.
- At the same time 820 million people around the world suffer from hunger.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Sustainable Development Goal (SDG)12.3:
"By 2030, halve per capita global food waste at the retail and consumer level and reduce food losses along production and supply chains, including post-harvest losses."

UNECE

Food loss and food waste - definitions

"**Food loss** is the decrease in the quantity or quality of food resulting from decisions and actions by food suppliers in the chain, excluding retail, food service providers and consumers."

"**Food waste** is the decrease in the quantity or quality of food resulting from decisions and actions by retailers, food services and consumers."

Source: FAO 2019

UNECE

Changing habits to reduce food loss and waste

Addressing food loss and waste in fresh fruit and vegetables supply chains requires a vast array of measures, including changing current habits and practices.

This requires:

- More attention by producers, buyers, distributors, retailers and transporters to ensuring optimal handling of produce at all stages of the supply chain.
- More attention on monitoring market demand to avoid the excessive orders followed by cancellation and the need to dispose surplus.
- Targeted awareness raising campaigns to sensitize consumers to change buying habits and ensure more sustainable and responsible consumption.

UNECE

Most common reasons for food loss

Food is lost for various reasons, all resulting in loss of food and income

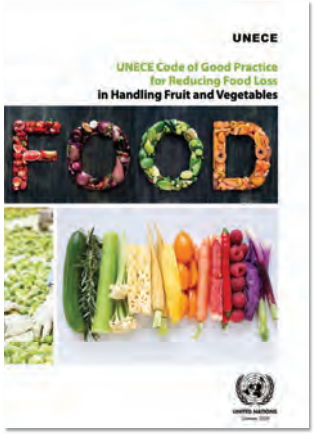
- Unfavourable weather conditions.
- Inappropriate handling and storage throughout the chain.
- Inappropriate packaging.
- Logistic issues that arise due to freight, local transportation, including storage at destination.
- Last-minute cancellation of orders.
- Improper planning, production and distribution without knowing the market demand, quality requirements (e.g. Class 1, Class 2); and pricing.
- Shortage of access to data on production, price, requirement, policy, storage facility etc.
- Stringent buyer requirements.
- Price fluctuations that impact produced goods supply, resulting in food loss.
- "Natural overproduction" due to favourable growing conditions.

UNECE

A practical approach: UNECE Code of Good Practice

The UNECE Code of Good Practice - reducing food loss and ensuring optimum handling of fresh fruit and vegetables along the supply chain

- Voluntary guidelines for all interested parties on measures that help reduce and prevent losses at different stages along the supply chain.
- Focuses on four major segments / steps of the fruit and vegetable supply chain: (i) producers; (ii) traders; (iii) transporters; and (iv) retailers.



UNECE

Module 4

Reducing food loss and waste

1. Definitions and reasons
2. Producers
3. Traders
4. Transporters
5. Retailers
6. Measuring food loss and waste

UNECE

Segment 1: Producers – primary production

Producers (primary production) need to follow:

- **Good Agricultural Practice**
  - ✓farm techniques to achieve safe and high-quality product (see module 2)
- **Hygiene requirements**
  - ✓food safety requirements must be implemented and monitored
- **Manufacturing practices**
  - ✓good practices must be followed and monitored
- **Training of the staff**
  - ✓workers, quality managers/inspectors must be trained and understand the consequences of poor handling and storage

UNECE

Segment 1: Producers (cont.)

Production planning is critical

- Production planning and crop management is one of the key parameters to avoid surplus production and subsequent food loss and waste.
- Production planning must include careful consideration of species and variety planted, size, colour and quality (e.g. according to the UNECE quality standards) demanded to meet consumers' expectation at the end of the supply chain
- Quality standards are established with input from the market, and provide commonly agreed descriptions of the quality expected, and thus provide valuable information on quality requirements for producers and buyers

UNECE

Segment 1: Producers (cont.)

- **Harvesting must happen at the right stage of maturity** of the produce
- **Avoid damage to the produce during harvest** – cuts, bruises, tearing, breakages, etc. Damages tend to shorten storage and shelf life, thus increasing waste.
- **Harvest conditions** can affect the quality and perishability of the product – high temperature, rainy weather, dust, wind, extreme sunshine can shorten the shelf life of the product, thus risking increased loss and waste.

UNECE

Segment 1: Producers (cont.)

Post-harvest treatment starts with proper cooling of the product immediately after harvest, as early as on the field.

Appropriate storage temperatures are an essential factor.

- For example, asparagus cooled directly on the field right after harvest to a temperature close to 0°C can keep its quality.
- Leafy vegetables must be cooled in high humidity, to avoid loss cells water and following wilting of the leaves.

UNECE

Segment 1: Producers (cont.)

- **Post-harvest treatments are used to increase shelf life and reduce losses and waste.**
  - ✓ They are intended for both organic and non-organic production of fruit and vegetables.
  - ✓ Authorization for use is necessary in producing country and importing country.
- **Proper packaging which protects the products is very important.**
  - × Improper packaging can result in external and internal defects of the product during storage and transport.
  - × Careless and inadequate handling during storage and transportation can lead to losses, especially sensitive and soft-skinned fruit can be affected heavily.

UNECE

Segment 1: Producers (cont.)

Planning alternative outlets for surplus product

- To avoid food loss and waste, it is highly recommended to plan for and find alternative outlets and channels for surplus product.
- This could be:
  - ✓ new markets
  - ✓ changed product presentation to attract consumers
  - ✓ donations to charity, schools, elderly houses
  - ✓ processing
  - ✓ innovative new products
  - ✓ alternative marketplaces.
- The aim is to keep food as much as possible in the human consumption chain (animal feed being a last resort).

UNECE

Module 4

Reducing food loss and waste

1. Definitions and reasons
2. Producers
3. Traders
4. Transporters
5. Retailers
6. Measuring food loss and waste

UNECE

Segment 2: Traders

Traders - buyers, distributors, wholesale, and distribution centers of supermarket chains are the second stage of the marketing chain.

- **Operators' staff needs to be trained** on quality standards and proper handling of products.
- **Selling products within shelf-life limits** is a key priority and factor for avoiding food loss and waste.

UNECE

Segment 2: Traders (cont.)

Order adjustment and seasonality

To minimize losses and food waste it is necessary to plan and adjust ordered volumes to demand according to the market's seasonality.

Communication with producers on specifying market maturity requirements, together with logistical arrangements can facilitate product arrival at retail stage.

There are seasonal **demand swings**, as the sale of the fresh fruit and vegetable depending very much on weather, temperature, holidays and different regional events. In planning orders and quantities all these must be considered to avoid surplus of stocks.

→ This leads to reduced loss and waste at both retail and later, also at consumer levels.

UNECE

Segment 2: Traders (cont.)

The cool chain must be uninterrupted. Optimum product temperature is therefore one of the most important factors.

Canceling orders short time before dispatch can result in problems for producers.

Quality control upon arrival of products must be performed in line with agreed rules**.** Rejection of products at wholesale level due to non-conformity is a major case of food loss.

UNECE

Module 4

Reducing food loss and waste

1. Definitions and reasons
2. Producers
3. Traders
4. Transporters
5. Retailers
6. Measuring food loss and waste

UNECE

Segment 3: Transporters

- When contracting delivery services, the type of product, its age and the duration of the transport must be considered.
- The most appropriate means of transport and transport package must be chosen.
- The goal is to deliver produce to all destinations in good, marketable condition, thus avoiding possible economic and food losses due to non-optimal transport conditions.

UNECE

Segment 3: Transporters (cont.)

Optimum conditions – temperature, humidity, cooling

- **Cooling of produce** before transport has a direct impact on its keeping quality.
- Recommended temperatures vary, depending on produce characteristics.
- The **cooling equipment of transport vehicles** can not lower produce temperature, just maintain it.
- **Humidity level** is another important factor which can affect the produce quality.
- There is a direct connection between temperature and humidity and their impact on the keeping quality of produce.
  →A **combination of low temperature and high humidity** lead to increased shelf-life of the produce.

UNECE

Segment 3: Transporters (cont.)

Optimum conditions – additional recommendations

- Non-refrigerated transports are preferable for short distances.
- Transport must be properly ventilated.
- Assure complete of the produce to protect it from external impact of weather – sunlight, wind, rain, dust.
- Loading should be done the shade or in a covered storage area.
- Minimize stops and reloading.
- During loading and unloading avoid temperature changes and physical injuries of the produce.
- For refrigerated transports, ensure to maintain and monitor temperatures during the entire transport time.

UNECE

Segment 3: Transporters (cont.)

To achieve this:

Transporters must be sufficiently trained on how to handle with produce and how to keep best conditions during transport.

Transporters need to be aware of the transport temperature and record it.

Vehicles and transport containers must be clean and free of evidence of previous cargo.

All cleaning stuff must be suitable/ approved for contact with the food.

UNECE

Module 4

Reducing food loss and waste

1. Definitions and reasons
2. Producers
3. Traders
4. Transporters
5. Retailers
6. Measuring food loss and waste

UNECE

Segment 4: Retailers

Supermarket chains, medium size shops, small greengroceries

Reducing food loss and waste at retail and beyond

This is the final stage of the product value chain. If there is failure at this stage, all previous efforts by producers and trade operators to ensure optimal quality for consumers are lost.

To reduce food loss and waste:

- Retail staff need to know how to handle fresh produce (storage, handling, product placement and display practices). Therefore, **training of retail staff** is required.
- **All practices recommended for previous stages are applicable**

UNECE

Segment 4: Retailers

Supermarket chains, medium size shops, small greengroceries

Display, temperature, placement and promotion

Display of products must be appropriate and adjusted to the specificities of the individual fruit and vegetables.

Frequent changes in temperature in the stores should be avoided, to ensure a long shelf-life.

Product in the store should be optimally placed to ensure it is kept in its best condition.

Promotional campaigns which encourage consumers to buy more than they can consume should be minimized, as it risks pushing the food waste problem to the consumer.

UNECE

Module 4

Reducing food loss and waste

1. Definitions and reasons
2. Producers
3. Traders
4. Transporters
5. Retailers
6. Measuring food loss and waste

UNECE

Measuring food loss and waste

WHY?

You cannot manage what you can't measure…

Companies who are aware of the amount of food loss in their operations, and who understand the causes and have the means to measure it, have a better ability to reduce food loss and waste.

- Operators (including retail) can better identify where problems with food loss and waste occur if they regularly track it.
- By reviewing and analyzing food loss and waste data it is easier to start devising measures that lead to reduced losses.

UNECE

Measuring food loss and waste – WHO?

Who should measure?

Farms - including areas where product is collected.

Distributors - the interface between producers and trade.

Wholesale and distribution centres of supermarket chains.

Food Processors buying fresh products for further processing, like juices, jams, canned products etc.

Packing Stations - which may be at farms, cooperatives or producers' organizations, or independent companies providing packing for customers (e.g. logistics providers, warehousing facilities or packing stations next to international airports).

Source: UNECE food loss and waste measuring methodology for fresh produce supply chains "Simply Measuring".

UNECE

Measuring food loss and waste – HOW?

Measure losses at the following stages

- Produce grading and sorting operations
- Storage
- Packing
- Transport

Source: UNECE food loss and waste measuring methodology for fresh produce supply chains "Simply Measuring".

UNECE

UNECE resources on food loss and waste

Code of Good Practice

UNECE Code of Good Practice - reducing food loss and ensuring optimum handling of fresh fruit and vegetables along the supply chain (second edition, forthcoming, 2022)

UNECE Code of Good Practice for Reducing Food Loss in Handling Fruit and Vegetables (ECE/TRADE/454), UNECE 2020

Food loss and waste measuring methodology

Simply Measuring - Quantifying Food Loss and Waste: UNECE food loss and waste measuring methodology for fresh produce supply chains (ECE/TRADE/453), UNECE 2020

Food waste management

FeedUP@UN: feedup.unece.org

UNECE

Thank you!

Contact us

Agricultural Quality Standards, Market Access Section
Economic Cooperation and Trade Division
United Nations Economic Commission for Europe (UNECE)

Email: agristandards@un.org

Website: www.unece.org

https://unece.org/trade/working-party-agricultural-quality-standards-wp7

Credits
Content and presentation
Viera Baričičová, PhD

Peer-review
UNECE Working Party on Agricultural Quality Standards

Photos
Depositphotos; and
Viera Baričičová

Design
Eva Johannsen

UNECE