Quality and standard

Teeranud Romphophak
Postharvest Technology Center
rditer@ku.ac.th

Quality

- degree of excellence

Quality – combination of characteristics

Quality component of each group

	appearance	firmness	Etc.
Producers	√		Few visual defect
Receivers, market distributors	√	√	Long storage life
Consumers	√	√	Good flovor, nutritive value, assuarance for safety

Various components of quality in relation to specifications for grades and standards

Main factors	Components
Appearance (visual)	Size, shape&form, color, defect
Texture (feel)	Firmness, softness, crispness, juiciness
Flavor (taste & smell)	Sweetness, sourness, astringency, bitterness, aroma, off-flavor
Nutritional value	CHO, proteins, lipids,vit. minerals
Safety	Nat.toxicants, contaminants

Quality factors for fresh vegetables in the U.S. Standards for Grades (U.S.) and the California Food and Agricultural Code (CA)

- Degree of quality

Standards; tools that use as a rule or basis of comparison in measuring/judging capacity, quantity, content, value, quality etc.

- Commond language for trade
- Help producers, handlers do better jobs
- Provide for incentive payments for better quality
- Serve as the basis for marketing report (prices & supplies quoted)
- Help settle damage claims and disputes

Quality factors for fresh vegetables

Veg.	Standard	Quality factors
Broccoli	US	Color, maturity, stalkØ,length,compactness
	CA	Freedom from decay and damage
Cucumber	US	Color, shape, turgidity, maturity,size (Ø,length), freedom from defect & decay
Eggplant	US	Color, turgidity, shape, size, freedom from defect & decay

Quality factors for fresh vegetables

Veg.	Standard	Quality factors
Pepper, sweet	US	Maturity, color, shape, size , firmness, free from defect& decay
	CA	Freedom from insect , bacteria spot &decay
Tomato	US	Maturity&ripeness(color chart), firmness, shape, size, freedom from defect & decay
	CA	Freedom from insect &damage
Watermelon	US	Maturity&ripeness, shape, uniformity of size, freedom from antractnose & decay
	CA	Maturity & freedom from decay , sunburn, flesh discoloration, & mechanical damage

Quality factors for fresh vegetables

Veg.	Standard	Quality factors
	US	Uniformity, maturity or firmness (solidity), trimming, color, freedom from defect& decay
	CA	Conform to US commercial grade or better
Kale	US	Uniformity of growth and color, trimming and freshness, freedom from defect & decay
Asparagus	US	Freshness(turgidity), trimming, straightness, freedom from damage & decay , stalkØ,% green color
	CA	Turgidity, straightness, % of white color, stalkØ , freedom from decay ,mechanical damage, and insect injury
Okra	US	Freshness, uniformity of shape and color, free from defect&decay

Number & grade names

- Eg; U.S.Fancy, No.1-3, Extra No.1, Extra Fancy,

International standards

European Economic Commission (EEC)International standards; 3 quality classes

Extra class=superior quality
Class I= good quality
Class II= marketable quality

Asparagus standard

Asparagus standard

Characteristics	Close spear	Open spear
Spear	-Tightly close	-Less open
	-Straight stem	- Straight stem
Length	15-25 cm with 15 cm or longer of green part	
Defect	Clean, no insect & disease damage, pesticide free	

Okra standard (Thailand)

- Minimum quality with 3 classes
  -extra, straigstness, no defect
  - - no.1, little in cuvation & defect
  - - no.2, less than no.1
  - **Size,** code 1-3 ; the length of pod
  - >12-14, >10-12 and <10 cm.
- Quality tolerance extra, with no.1 less than 10%
  - - no.1, with no.2 less than 10%

Codex standard for baby corn (CODEXSTAN 188-1993)

- Minimum requirements : sound, clean,free of damage……., fresh in appearance, practically free of silk
- Classification; Extra, ClassI, ClassII - **Size,** A-C; the length of cob 5-7, 7-9 and 9-12cm.
- Quality tolerance Extra, 10% by no. or wt. that not satisfying the requirements of the class,…
- Size tolerance
- Presentation: Uniformity, packaging

Quality

- External characteristics or appearance
- Internal characteristics

Quality Evaluation

- Subjective or Sensory Evaluation

- evaluate by tasting, seeing, touching, chewing and smelling
- depend on customer preference

- Objective determination

- using instrument
- give exact value and trustfully

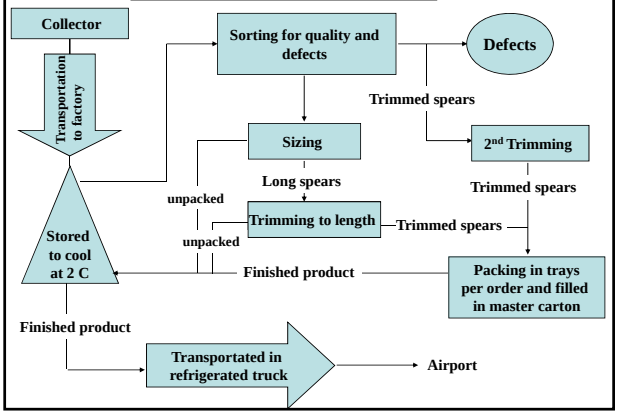
External characteristics

- Shape
- Size
- Color
- Gloss
- Defect
- Uniformity

Sorting, sizing and grading


Sorting, sizing and grading


Asparagus operation



Color changes

Chlorophylls
Carotenoids
Anthocyanins

Color chart

- C.I.E. system: Y, x,y
  Y (brightness),
  x (red),
  y (green),
  z (blue) = 1-x-y

Colormeter

Defects: external, internal

- Morphological defects :

sprouting of potatoes, onions, garlic;
rooting of onions;
elongation of asparagus;
curvature of asparagus;
seed germination inside tomatoes, peppers;
floret opening in broccoli

Defects: external, internal

- Physical defects :

shriveling and wilting ;
mechanical damage such as punctures,
cuts and deep scratches, skin abrasions,
deformation (compression), and bruising

Defects: external, internal

- Physiological defects :

Include temp.-related disorders (freezing, chilling, sunburn); puffiness of tomatoes; blossom-end rot of tomatoes, black heart of potatoes.

- Pathological defects:

decay caused by fungi or
bacteria and virus

Irregular ripening, and other disorders

Texture

- Firmness and softness

Water loss

Starch degradation

Cell wall lossening

- Toughness

Fiber formation (lignification)

Firmness determination

- Firmness tester
- Deformation by compression

Sweetness

- Starch degradation
- Sugar accumulation during growth & development

- Soluble solid content by hand refractometer

Rapid test for starch content

- 2% IKI

- show blue stain

Rapid test for phenol content

- 1% $FeCl_3$ solution Fe++ will react with phenol & show brown stain.

Sourness

- Acid accumulation during growth & development
- by titration of juice with alkali solution (NaOH)

Astringency

- Accumulation of phenolic compound
- Found in some green/immature fruits; banana, plum, jujube, etc.

Bitterness

- flavonoid accumulation such as limonoid in orange peel

Aroma

- Volatile compound biosynthesis during fruit ripening
- Preference is depend on nationality, age, familiarity and popularity of various customers

Food safety

- **1. Pesticide residue** -need to know MRL (Maximum Residue Limit)
- **2. Microbial contamination:** E coli., Salmonella spp.
- **3. Mycotoxins** - Aflatoxin in dry seed and grain
- **4. Plant toxin -** Solanin in potato

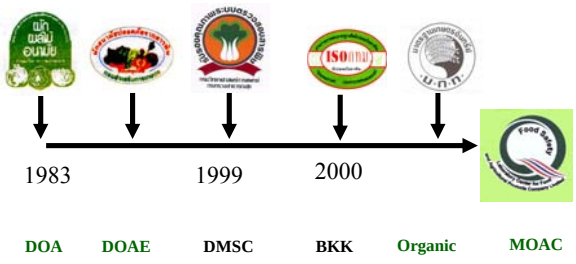
Nutrition value

- Most customers care of flavor rather than nutrition.
- ¤ Modern customers tend to concern more about healthy/functional food.
- ¤ “5 Colors a day” campaign is promoted in USA

Ministry of Agriculture and Cooperatives (MOAC)

National Bureau of Agricultural Commodity and Food Standards (ACFS)

- **Durian, Mango, Pummelo, Lichi, Longan, Mandarins, Pineapple, Mangosteen, Rambutan**
- **Asparagus, Chilli, Baby corn, Okra, Cabbage, Chinese cabbage, Yard long bean, Green bean**



Quality System of Fresh Fruits and Vegetables Residue Analysis Certification

Dept. of Medical Sciences (DMSC), MOPH

Information

- http://postharvest.ucdavis.edu
- http://ams.usda.gov.AMSv1.0/Standards
- http://www.eurep.org
  http://www.moac.go.th
  http://www.acfs.go.th
  http://www.moph.go.th