THE 34TH INTERNATIONAL MEETING ON QUALITY CONTROL OF FRUIT AND VEGETABLES-BONN

QUALITY PRODUCTION OF RASPBERRIES AND BLUEBERRIES IN MOROCCO

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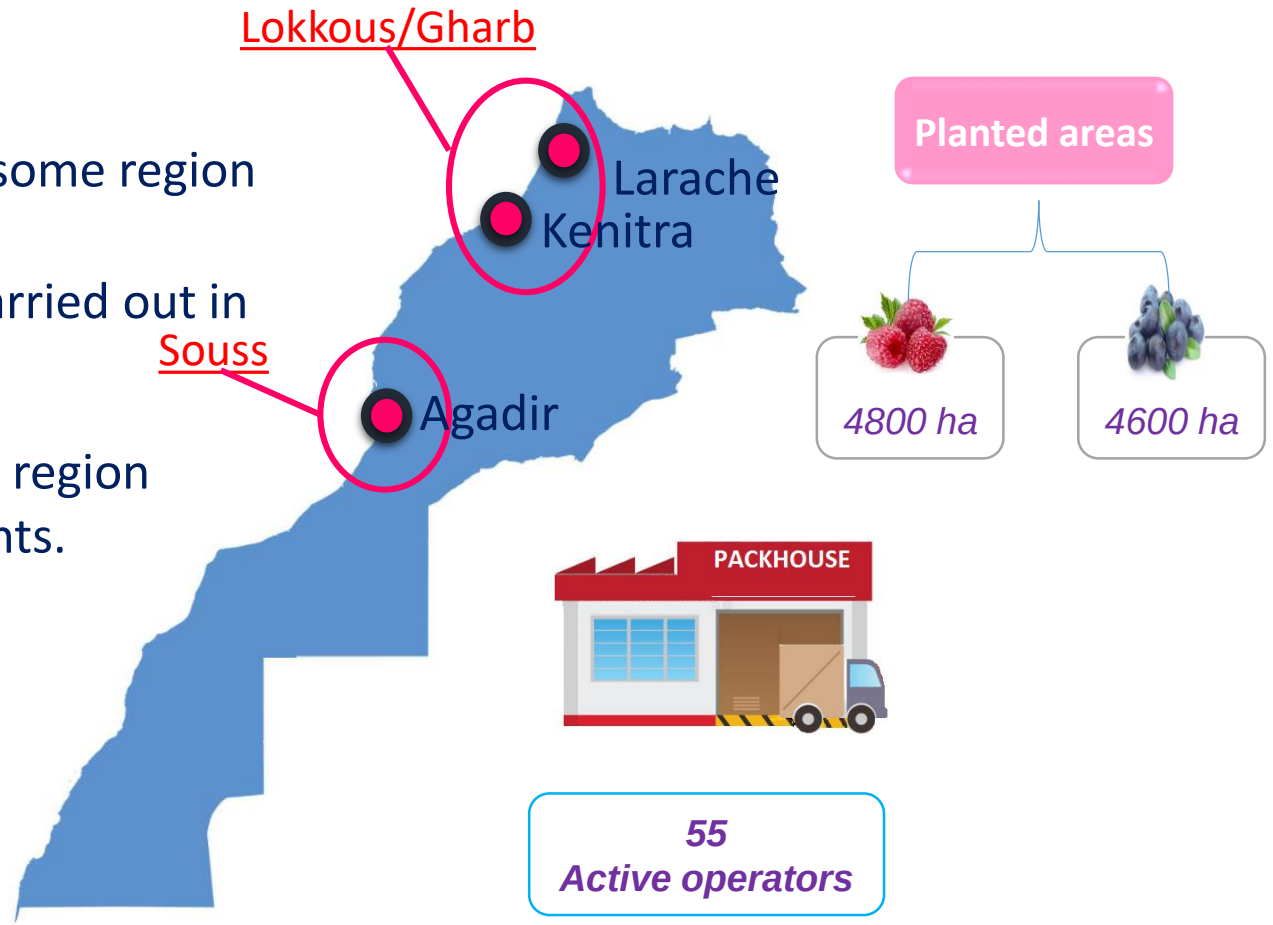
Summary

- OVERVIEW OF THE BERRIES SECTOR IN MOROCCO
- BERRIES AGRICULTURAL PRACTICES FROM PLANTING TO HARVESTING
- QUALITY INSPECTION BEFORE EXPORTATION

The berries sector in Morocco

- The early 1980s : first introduction of raspberry in some region
- Between 1990 and 1995 : Adaptation trials were carried out in Souss region but without much success.
- In 2000, the experiment relaunched in the Lokkous region with varieties known for their high cold requirements. This was not a wise choice
- From 2004, a third attempt was made in the same region with low cold requirements. This last attempt was successful.
- Since then the area planted has continued to increase



The berries sector in Morocco

4th world exporter

Raspberries

8th world exporter

Blueberries

2022 ***Production 72530 t***

2022 ***Exportation 55723 t***

Production 58952 t 2022

Exportation 52911 2022

2022

Exportation by market:

- *EU +UK :* ***99 %***
- *Other destinations :* ***1 %***

Exportation by market: 2022

- *EU+UK :* ***92,5 %***
- *Other Europe :* ***3,5 %***
- *Middle east :* ***2 %***
- *East Asia:* ***2 %***

AGRICULTURAL PRACTICES

- Selecting site
- Preparing site
- Plantation
- Training
- Harvesting
- Pruning

Selecting site

Soil

- moist but well-drained: sandy to sandy-loam soil
- wet clay soils will cause root rot and lack of O_2
- slightly acidic to neutral : pH 6 to 7 for raspberry
- acidic for blueberry pH 4,5-5
- rich in organic matter (2-4 %)

Light

- good exposure to the sun : north-south greenhouses orientation
- avoid shady sites
- use shade nets during the hot months to avoid leaves burn and fruit overripeness

Water

- **water must be in sufficient quantity and quality**
- **between 20-25t/day/ha depending on the species and the period**
- **preferably soft water, the optimum EC 0.2 - 0.8 mmhos/cm.**

wind

- good air circulation reduces humidity, which decreases disease infection and reduces the risk of frost
- strong winds reduce plant vigor and cause damage in hot and dry months
- Install windbreaks

Preparing site

- Adding organic matter: manure and compost
- Correction of the soil pH by adding sulphur for bluberry
- Plowing: the soil must be well worked, plowed and turned to a depth of 30 cm
- Disinfection against nematodes: after ridging and mulching

Preparing site

Greenhouses

Tunnel greenhouse

Canarian greenhouse

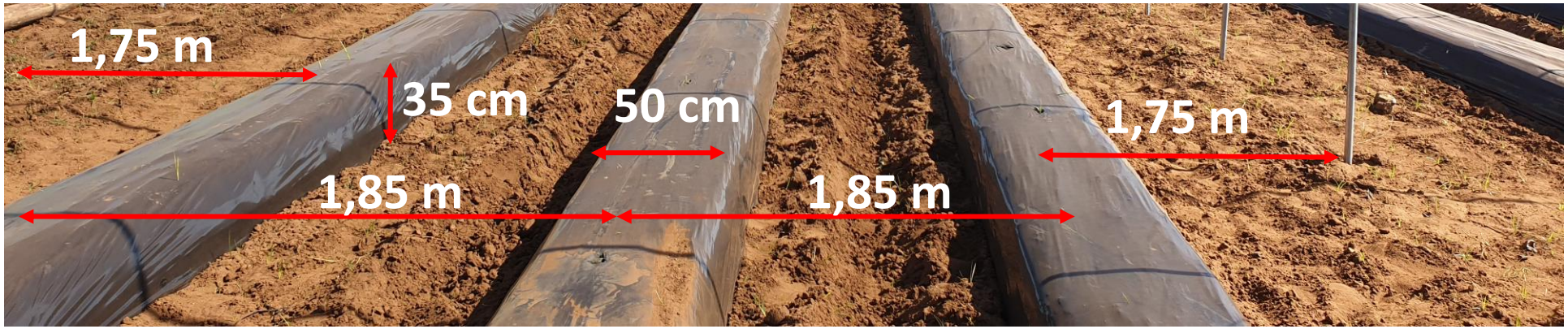
Preparing site

Ridging and mulching :

The number, size and distance between ridges, per tunel, depend on the following factors :

- tunnel width: 6-6.5-7-7.2-8.5 metres
- species: raspberry or blueberry
- varieties: root system, size of vegetation

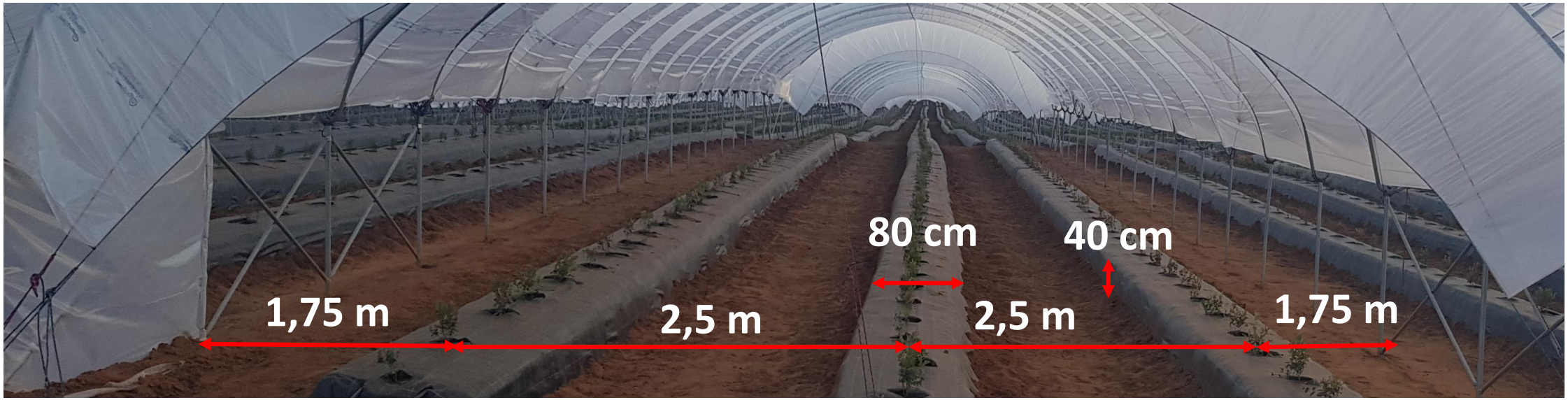
Raspberry in 7,2 m width tunnel greeenhouse



Preparing site

Ridging and mulching :

Blueberry in 8,5 m width tunnel greeenhouse



Preparing site

Setting up greenhouse structures and shading nets

- Offers 50 % of shading,
- Put in place from planting until the luminosity is reduced but before blooming

Planting

Three types of material:

Raspberry Bare roots

Raspberry Plug plant

Raspberry Green/Longcanes

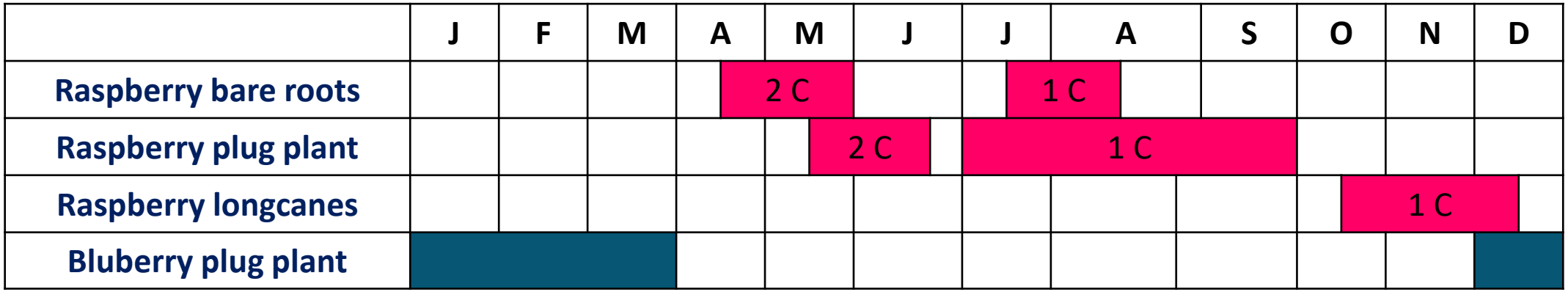
Bluberry Plug plant

Planting

Planting calendar:

The planting calendar takes into consideration the following factors:

- varieties behavior
- ensuring a daily quantity of product to honour contracts with customers
- avoiding peak production periods when prices are generally low
- taking advantage of certain periods when prices are favourable.
- expanding production as much as possible for better profitability

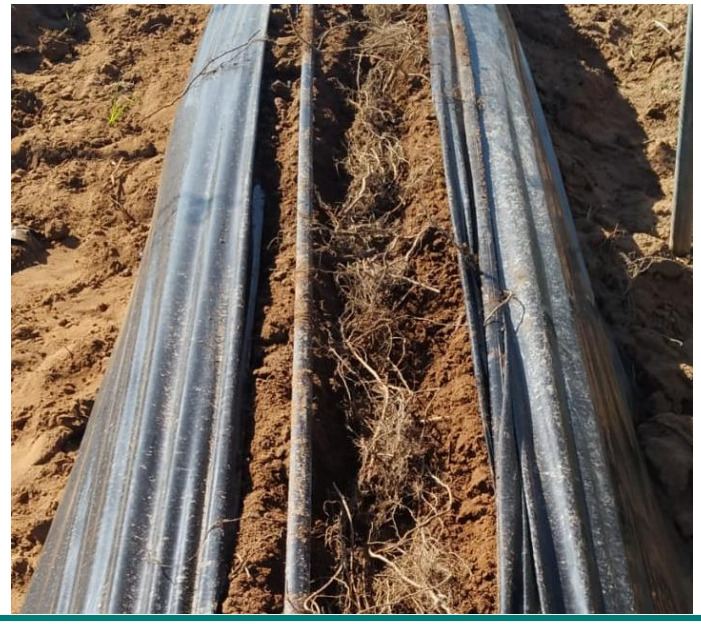


Planting

Raspberry in-ground cultivation :

- 25-33 cm the distance between each plug plant
- 50 cm in favors of a gain in size and quality/cost??

70-100 g (depending on variety) of root/linear metre in a groove of 15-20 cm width and 4-5 cm deep



Planting

Raspberry off-ground cultivation :

- 2 to 3 plug plants/pot
- 2 to 3 pot/linear metre

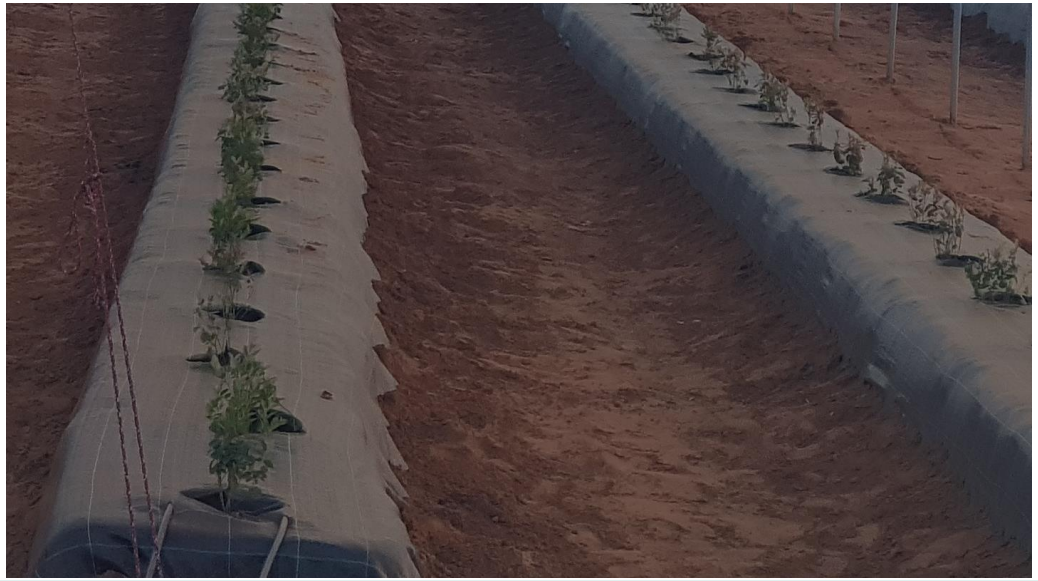
6 to 9 canes/linear metre

- Pot of 4,8 or 7 l
- The choise of pot size and density depend on :
  - variety
  - the expected number of cycles

Planting

Blueberry :

- Making a hole of 7 litre volume
- Filling with a blueberry special substrate to maintain a pH between 4.5 and 5.
- 0,8 to 1 m the distance between each plug plant or pot depending on the variety
- Pot of 30 or 40 l



Training/Trellising

Raspberries and blueberries have upright growing canes and stems, which need some kind of support to hold them up as they grow by using either strings or special training nets

Feeding

- **Berries trees are generally fertilised by a combination of 4 means :**

  1) **manure,**
  2) **granular fertilisers,**
  3) **liquid fertilisers from the drip irrigation system (fertigation)**
  4) **foliar fertilisation for micronutrients.**

- **Leaf analysis for nutrient content should be carried out at regular intervals during the growing season.**

- **Plant vigour, stem size, leaf size and foliage colour are useful indicators of plant health and the suitability of the fertilisation regime**

Polinization :

- The flowers of berries trees must be pollinated properly in order to obtain a fruit with a uniform shape.
- It is important to have a placement of honey bee colonies to ensure proper pollination of the flowers
- Bumblebees provide the best method of pollination. They are superior to honeybees and they are fast workers.

Pest controle :

- Raspberry and blueberry bushes can be infested with pests from the time of planting until after harvest.
- The main pests are weeds, insects, mites, diseases and nematodes.
- The options for pest control may combine prevention, by taking appropriate hygienic measures with chemical and biological control.

- Effective pest management is one that incorporates anticipation of potential problems, frequent monitoring, and if necessary, timely application of pesticide.
- The most popular pests and diseases : Thrips - Aphid -Mites - Drosophila suzuki - Noctuidae - Powdery mildew - Grey mould -Anthracnose - Rust - Soil diseases .

Harvesting :

- The most important ripeness index in berries is the external colour.
- Raspberry should be picked when the fruit is red and still firm,
- The sugar content does not increase after harvesting and the taste of harvested immature berries will be relatively acidic.
- harvested raspberries, while still immature, cannot be handled without causing some damage to the drupes.
- harvesting overripe berries can lead to some defect on fruits such as skin peeling off or bruising
- After harvesting, the fruit must be transported as soon as possible to the packhouses. The longer the fruit stay at the farm, the shorter is the shelf life

Pruning/Raspberry

After the harvest, there are different methods of pruning to extend the fruiting of both one cycle and two cycles plantation.

The choice of one of these methods depends on the following factors :

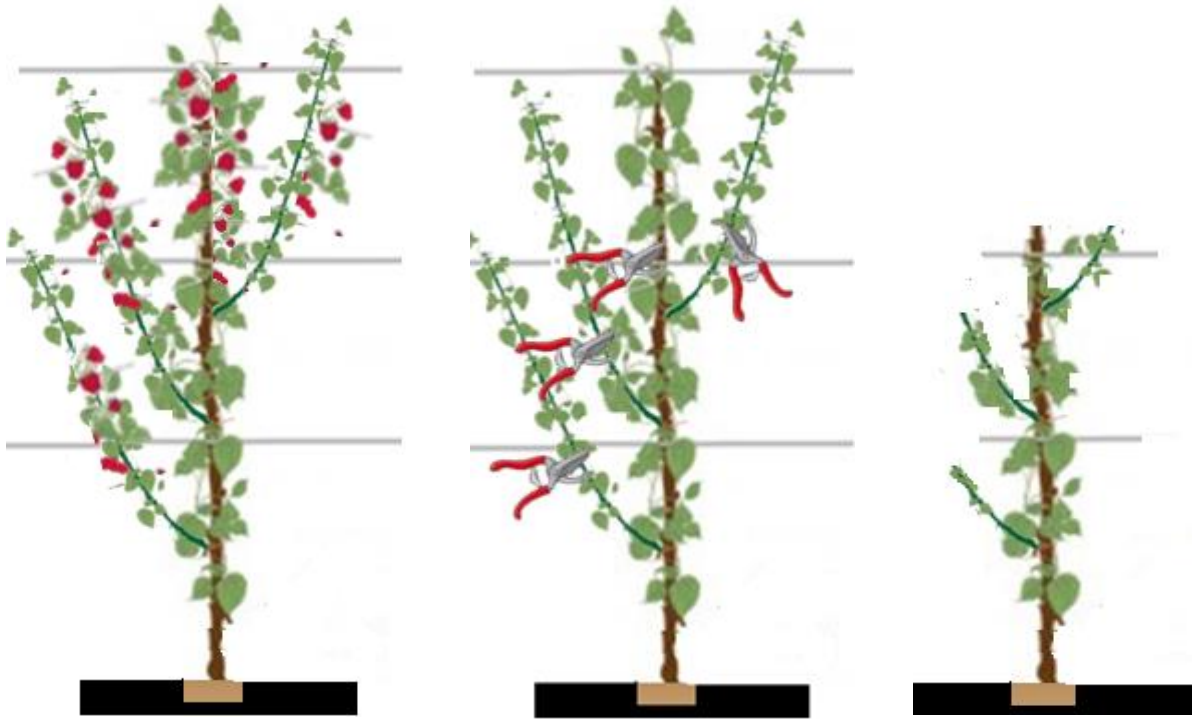
- **how many cycles the farmer wishes to operate with the same plant : 2C-3C-4C.**
- **the desired fruiting and harvesting period.**
- **the type of planting: in-ground or off-ground**
- **the return on investment**

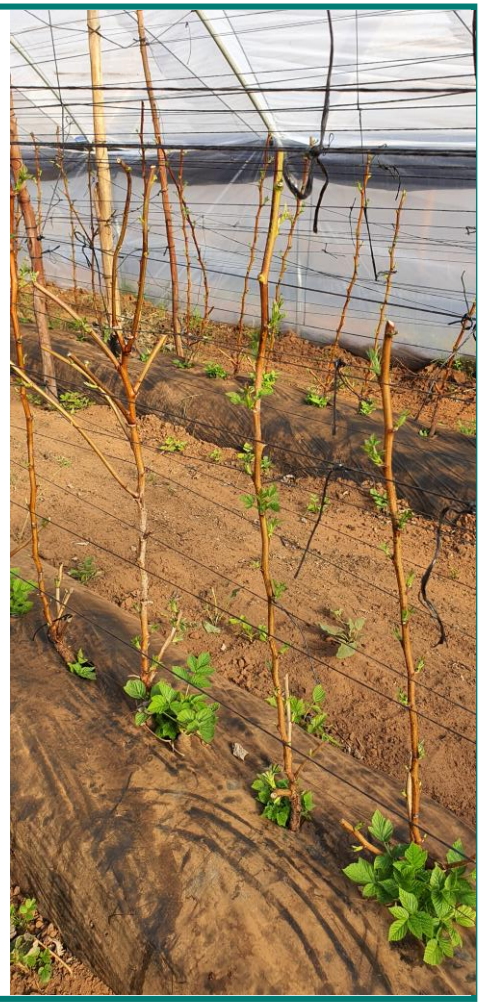
Pruning/Raspberry

CUT BACK :

1- Cutting at the last fruiting branch

2- Leaf stripping

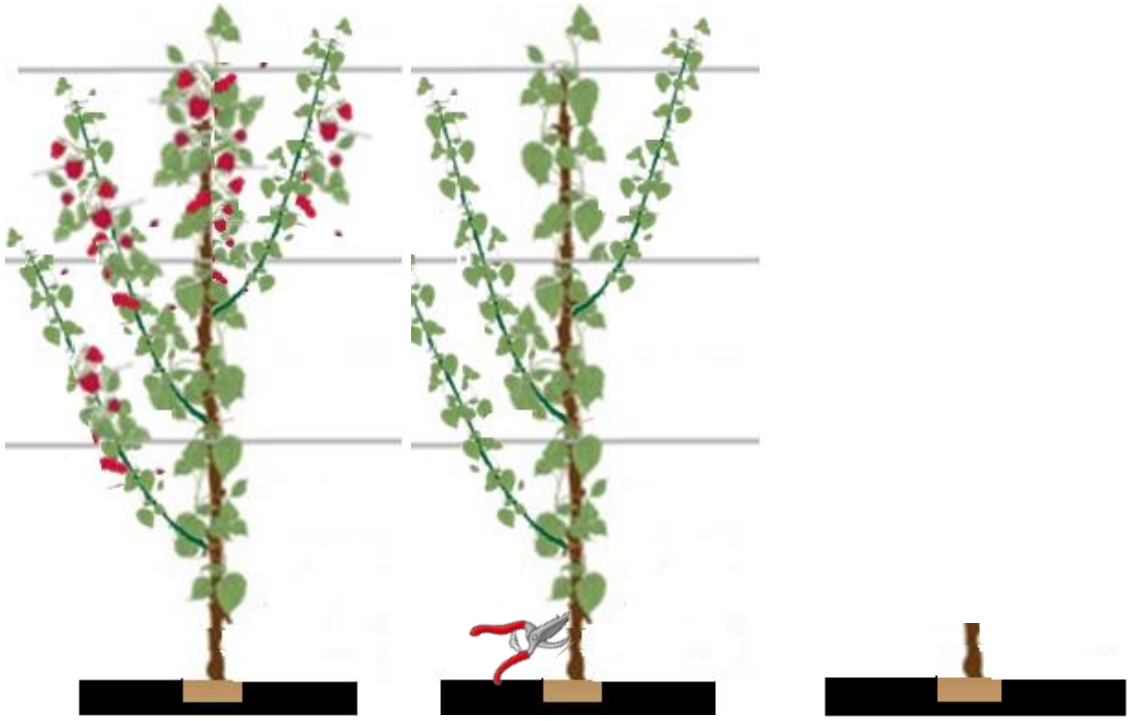




Pruning/Raspberry

MOW DOWN:

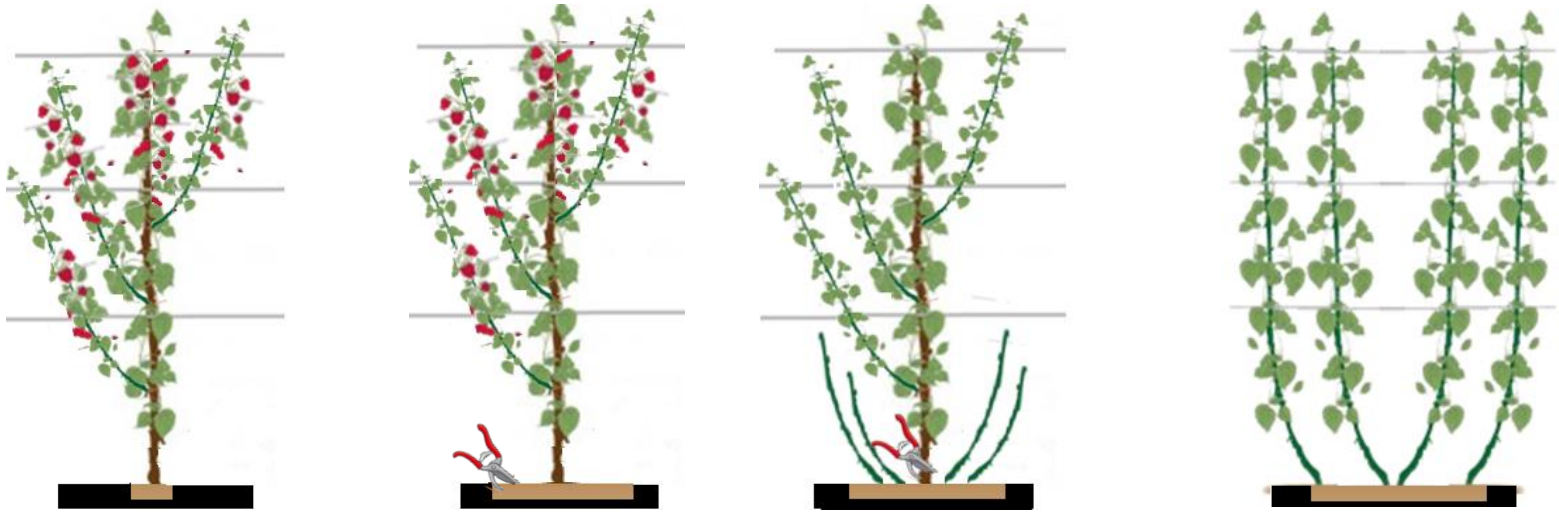
1- The canes get cut near the ground



Pruning/Raspberry

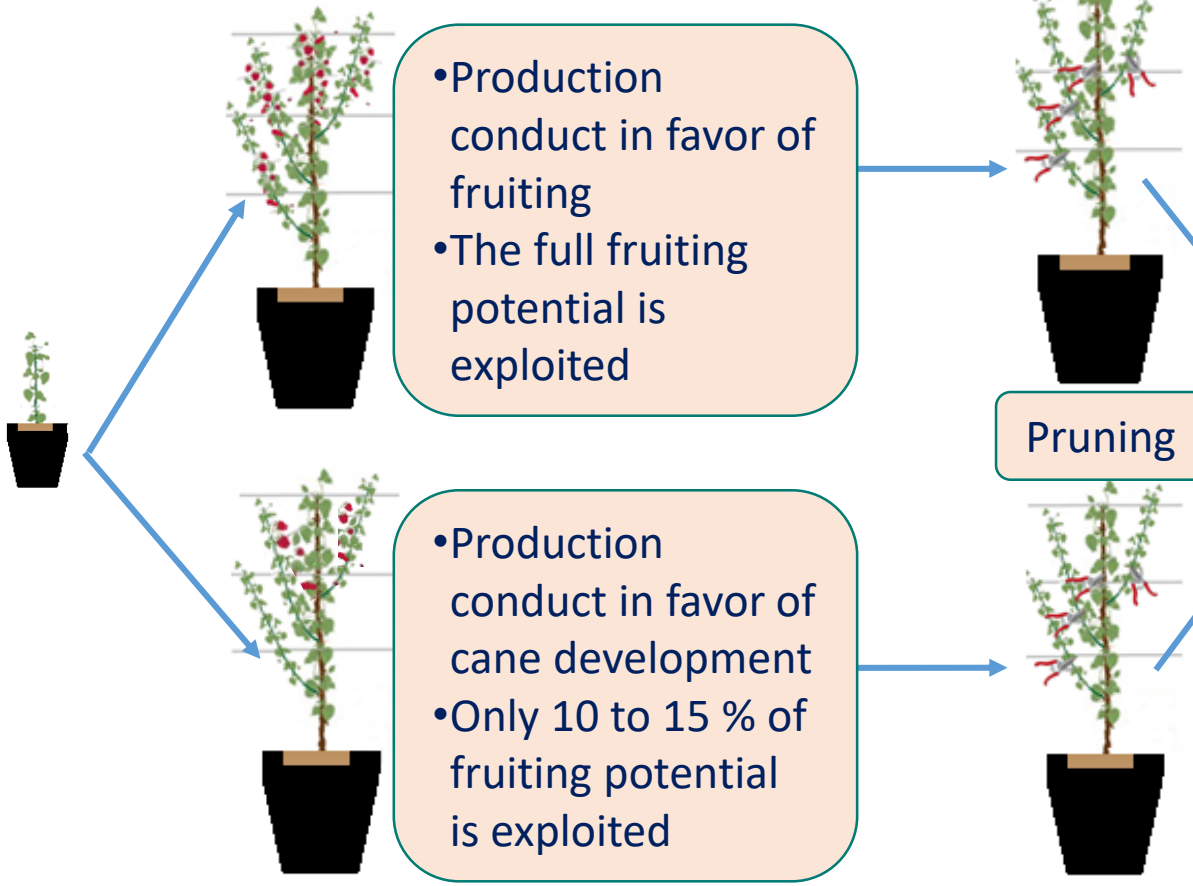
GROW THROUGH:

1- cutting plastic mulch 1 month before the end of the harvest to initiate the growth of new sackers
2- cutting mother cane after the end of harvest
3- selecting the most vigorous and strongest suckers at a rate of 10 to 12 canes per linear metre
4- fruit-bearing will only occur at the top of the canes



Pruning/Raspberry

2 outher methodes in off ground planting:



- Production conduct in favor of fruiting
- The full fruiting potential is exploited

- Production conduct in favor of cane development
- Only 10 to 15 % of fruiting potential is exploited

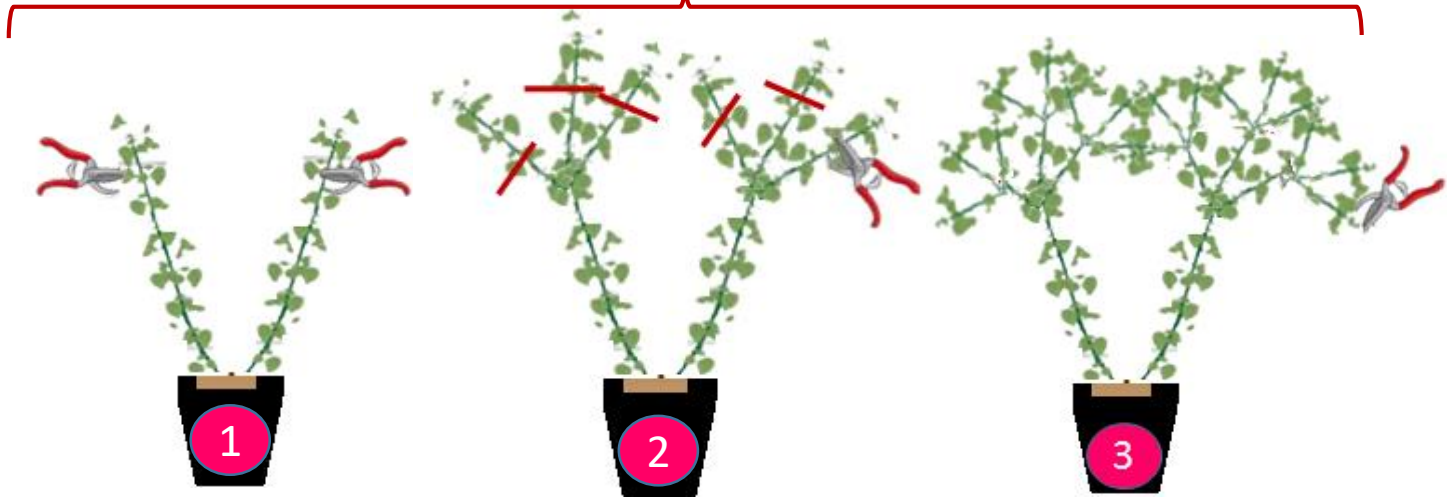
Pruning

Storage at a temperature of 1 to 3 °C, for 4 to 6 weeks depending on the variety.

Planting

Pruning/Blueberry

Planting	Training pruning	Pinching	After harvast pruning	Rejuvenation pruning
December	In early May remove the nursery stems and keep 6 young shoots	Cuting the branches as follows, From the end of May to the end of July, to increase productivity	Cutting at the last fruiting branch and renewal the pinching	After 4 years of production, remove 25% of the old branches



Pruning/Blueberry

QUALITY INSPECTION BEFORE EXPORTATION

Which standard to use?

UNECE standard FFV 57

- Minimum requirements
- Maturity requirements
- Classification : extra, I, II
- Tolerances : class I : 10 % & 2 %
- Presentation/Uniformity

The general standard of EU regulation 2019/428

- Minimum requirements
- Maturity requirements
- Tolerances : 10 %

- Exporter customers often require class in labelling
- Client specifications are often more severe than the standards
- Moroccan exportation must to be on the same quality level to avoid self-competition

Minimum requirements :

Intact

Undamaged: berries must not have any damage or injury affecting the integrity of the produce.

However raspberries must be free of the receptacle and blueberries must be free of the stalk.

Berries showing the following defects are therefore excluded:

- Injuries or damages
- Broken, fragmented fruit or drupelets missing (raspberry)
- Dry or wet Cracks (blueberry)
- Detached epicarp (blueberry)

Damage

Dry cracks

Wet cracks

Broken

Rasberry with receptacle

Blueberries with stalk

Detached epicarp

Minimum requirements :

Sound, not affected by rotting or deterioration such as to make berries unfit for consumption

Berries must be free from disease or serious deterioration which appreciably affects their appearance, edibility or keeping quality.
Berries showing the following defects are therefore excluded:

- Traces of damage caused by diseases :
  - Botrytis
  - Mildew
  - Cladosporium
  - Rust
  - Mold
  - Sooty mold
- Severe Bruising
- Severe Sunburn
- Wind rub

Botrytis

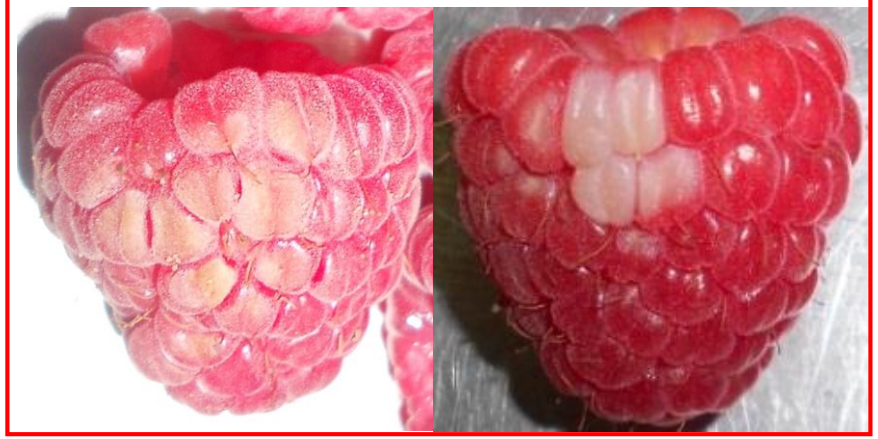
Mildew

Cladosporium

Rust

Mold

Sunburn



Brusing

Wind rub

Storage Mold

Wind rub

Sooty mold

Minimum requirements :

Clean, practically free of any visible foreign matter

Berries must be practically free of visible soil, dust, chemical residue or other visible foreign matter that can affect the presentation and acceptance of the berries.

Spider web

Dry petals

Soil

Chemical residue

Minimum requirements :

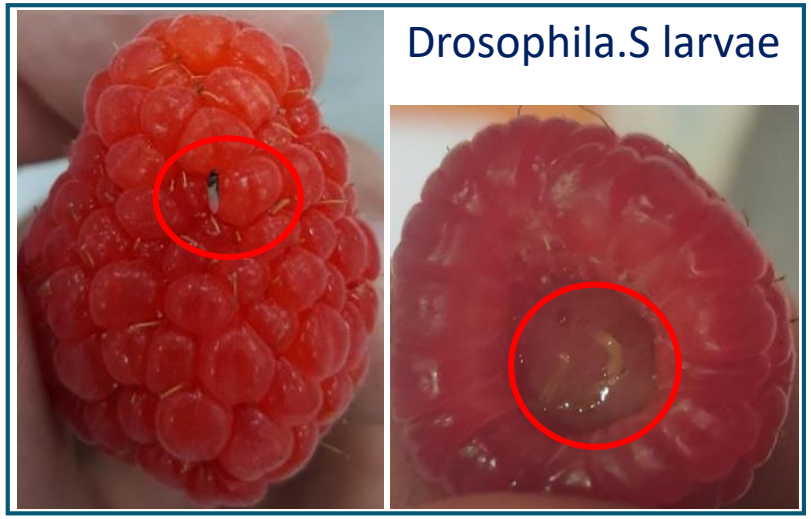
Practically free from pests

Berries must be practically free of insects, insect eggs or larvae such as Drosophila susuki larvae. This presence can affect the presentation and acceptance of the berries.

Insect eggs

Caterpillar

Drosophila.S larvae



Minimum requirements :

Practically free from damage caused by pests

Attacks by pests, such as caterpillars and thrips (at floral stage), affect the integrity of the fruit, its development, its appearance and its suitability for storage and consumption.

Caterpillar attacks

Minimum requirements :

Fresh in appearance

Berries that look old, shrivel or dry are not allowed,

Shrivel

Dry

Minimum requirements :

Free of abnormal external moisture

This provision applies in the event of excessive humidity and does not apply to condensation covering the products on leaving a cool storage. This humidity affects the appearance of the fruit and eliminates the blueberry bloom.

In which cases?

- During rainy periods :
  - if the greenhouses are not well maintained,
  - if the transport vehicles and/or the packhouses receiving platform are not waterproof.
- Storage of pallets underneath the evaporators of the cold rooms

Minimum requirements :

Free of any foreign smell and/or taste

In which cases?

- Transport vehicles poorly cleaned, having served for the transport of products with strong odors (Fishes, Fertilizers, manures, etc.),
- Berries stored together with other strong-smelling products,
- Smelling packaging materials.

Minimum requirements :

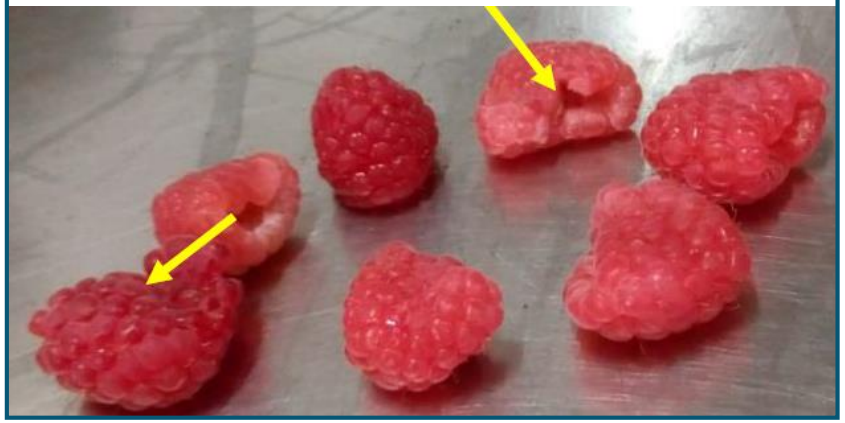
Development

- The development of the berries can be affected by frost, a lack of pollination, insect attacks or any other causes.
- Berries must be firm enough to withstand transportation and handling

Misshaping

Heterogeneous coloration

Lack of firmness



Maturity :

- The berries must be sufficiently ripe, they will never ripen once picked.
- Fully or partially green berries are excluded.
- Overripe berries must be rejected, as they will arrive at their destination in a deteriorated state.
- Berries must not collapse in package (punnets), this is a sign of overmaturity

Immature blueberries

Overripe

Green tip

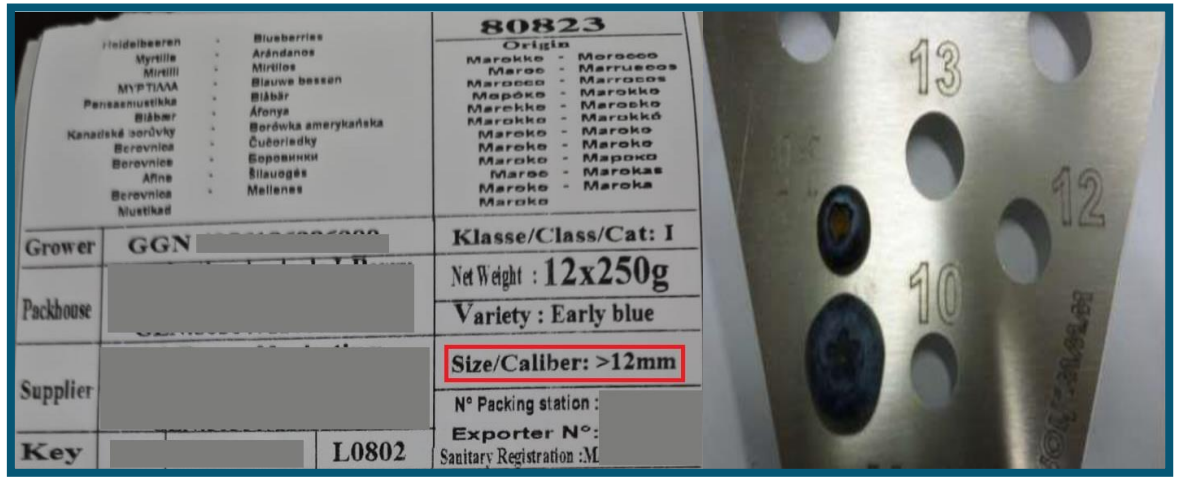
Classification/Class I :

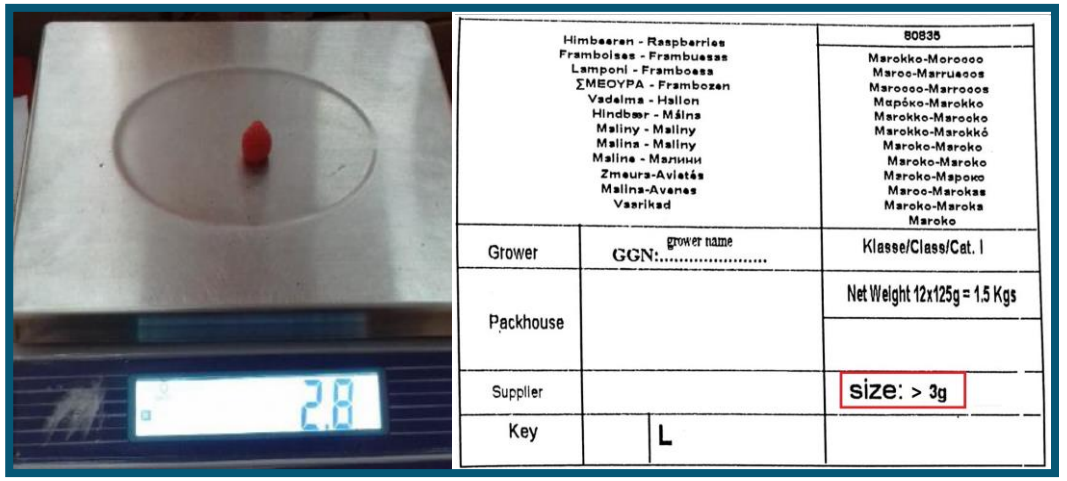
- Blueberries must be practically free of agglomerated berries.
- Blueberries must be practically covered with bloom, according to the varietal characteristics.
- Raspberry can show a very slight leakage of juice,
- Raspberry can show very slight bruising.

Presence of bloom	Lack of bloom
	

Sizing :

The size is not a requirement of the standard, but if it is mentioned on the label as required by the client it must be checked.





Presentation :

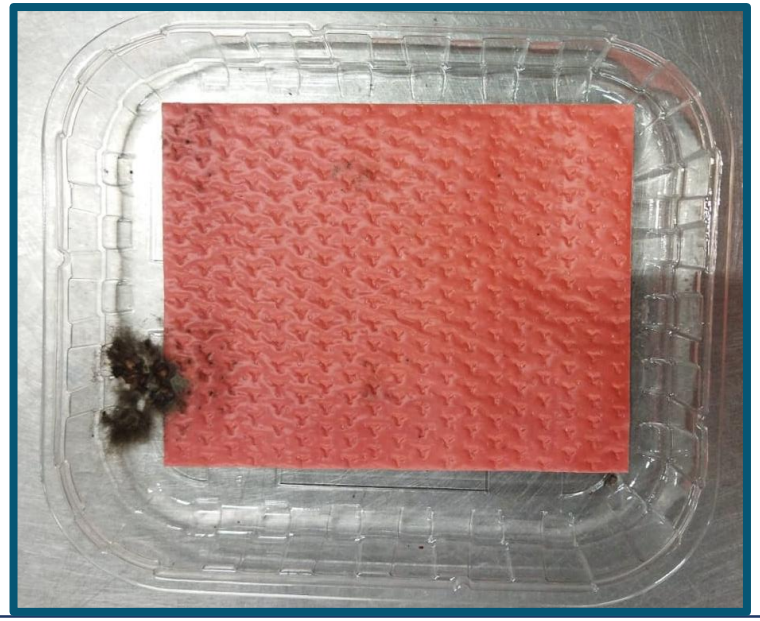
Uniformity

- The contents of each package must be uniform and contain only berry fruits of the same origin, variety and quality.
- Mixture of berries of distinctly different species and/or different colours of the same species may be packed together in a sales package, provided they are uniform in quality and, for each species and/or colour concerned, in origin.
- The visible part of the contents of the package must be representative of the entire contents.

Presentation :

Packaging

- Must provide protection for berries
- Must be clean
- Must be free of all foreign matter such as leaves, twigs dry petals.



THANKS FOR YOUR ATTENTION

MOROCCO FOODEX