AVOCADOS AND DON'TS

European Avocado Best Practices Guide

Mission
PRODUCE EUROPE B.V.

Mission Produce has grown to become the world's leader in producing, distributing and marketing fresh Hass avocados. As a vertically integrated company, our total focus is avocados. We provide our customers with a year-round supply of superior quality avocados that are ripened to perfection.

We pack once with care, which reduces handling and bruising. Mission Produce's 20-year history of pioneering avocado ripening practices means there is less inventory to carry, less guessing about ripeness and less shrink. Our state-of-the-art ripening and distribution facility in Breda is perfectly positioned to service all of Europe.

But the hero at the end of this avocado success story is you. Yes, YOU!

On the pages that follow, we've outlined the best practices for avocado handling that consistently result in increased sales. By following these simple practices, you can offer your shoppers the world's finest avocados at their peak quality and flavor, when they are ripe and ready to eat.

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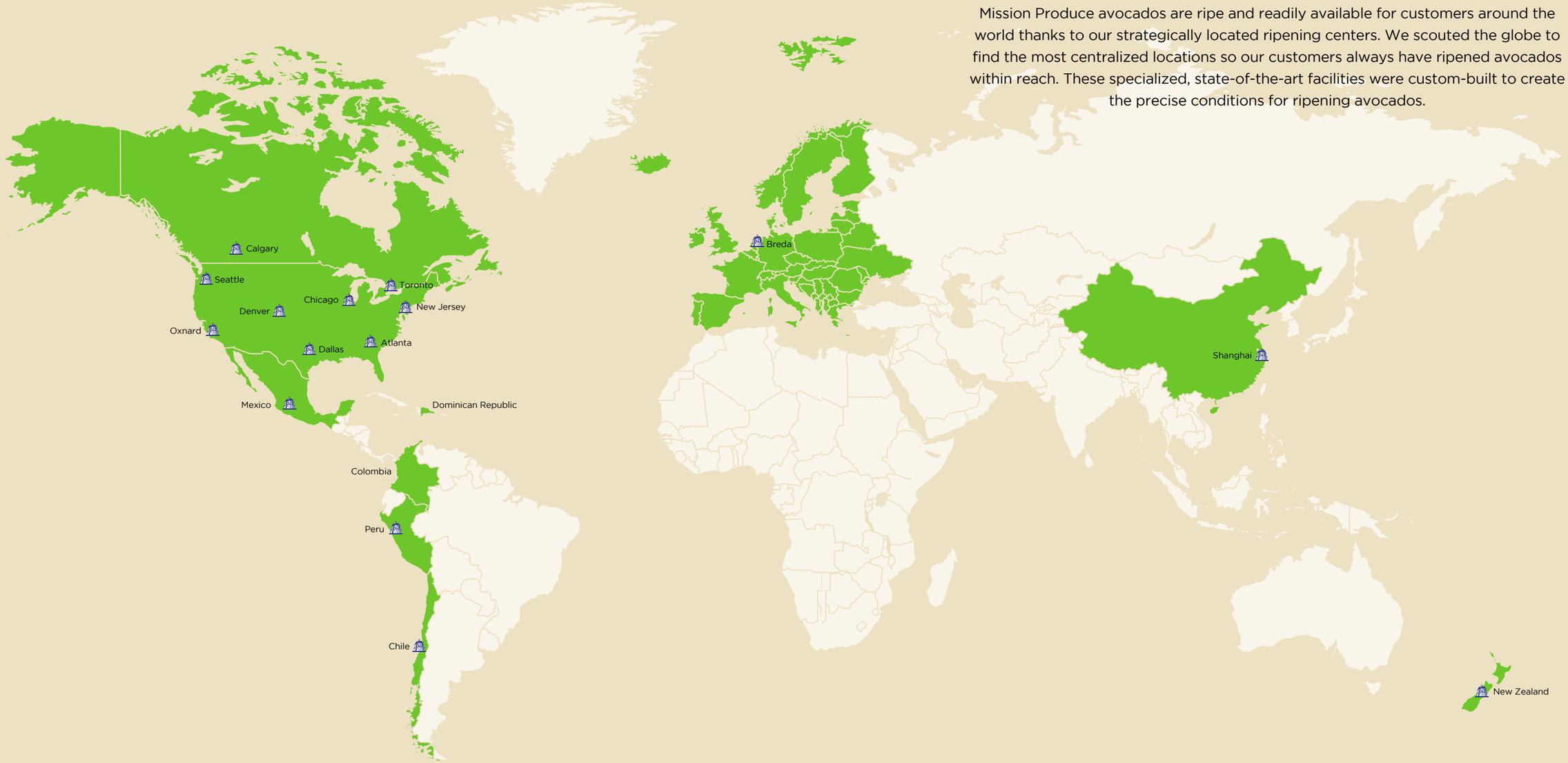
READY FOR THE WORLD

Mission Produce avocados are ripe and readily available for customers around the world thanks to our strategically located ripening centers. We scouted the globe to find the most centralized locations so our customers always have ripened avocados within reach. These specialized, state-of-the-art facilities were custom-built to create the precise conditions for ripening avocados.



VARIATIONS ON A GREEN

Throughout the harvest season, avocados can exhibit color variations in skin. Early in the season they're light green; later in the season they're dark green; and in the mid-season they're a green in-between. No matter the time of season, avocados are delicious with the signature avocado flavor and creamy consistency consumers adore. Avocado pros will note subtle differences throughout the season.

EARLY SEASON GREEN

Light green color
Bright green while ripening
Lower dry matter
Slightly longer shelf life

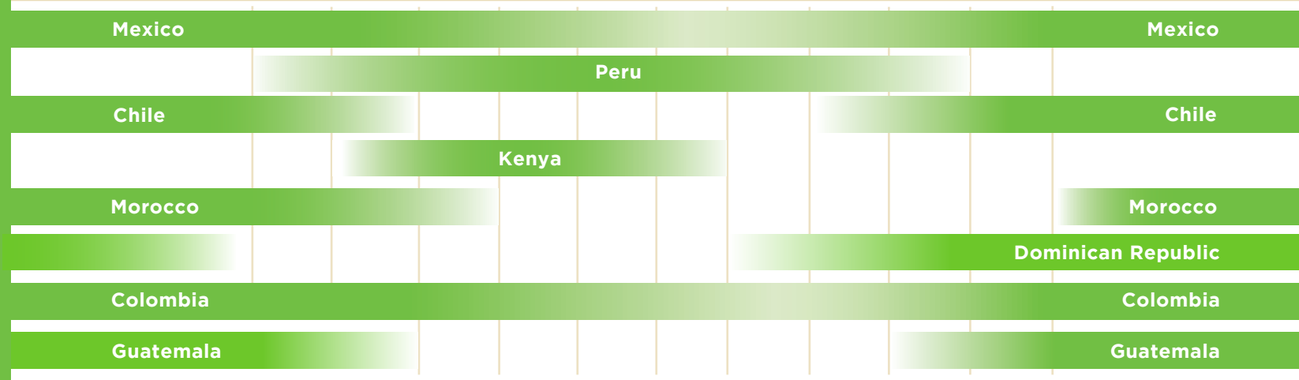
MID SEASON TURNING COLOR

LATE SEASON DARK GREEN

Dark green color
Stays dark green while ripening
Higher dry matter
Slightly shorter shelf life

*Colors may vary based on your screen or monitor settings.

WITH MISSION, IT'S ALWAYS AVOCADO SEASON



Each country of origin has its own unique climate and soil, and as a result our delicious avocados exhibit subtle physical differences based on where they were grown.

Mexico
Main Season: Slightly bumpy green or black skin with some ridging. Skin will darken during ripening.

Off Bloom: Smooth bright green skin. Skin may not darken and may possibly checkerboard during ripening.

Peru
Thick, bumpy skin that may turn amber/red when ripe. Skin may not darken when ripe; thick skin may feel firm even when ripe.

Chile
Elongated shape, bumpy skin. Depending on maturity, skin may not darken during ripening.

Kenya
Elongated shape with thick, pebbly skin that changes from light green to deep brown when ripe.

Morocco
Slightly round shape with bumpy skin. Depending on maturity, skin may not darken during ripening.

Dominican Republic
Slightly round shape with bumpy skin. Depending on maturity, skin may not darken during ripening.

Colombia
Oval shape, granulated rough skin. Smaller in size with dark green skin that turns purple-black when ripe.

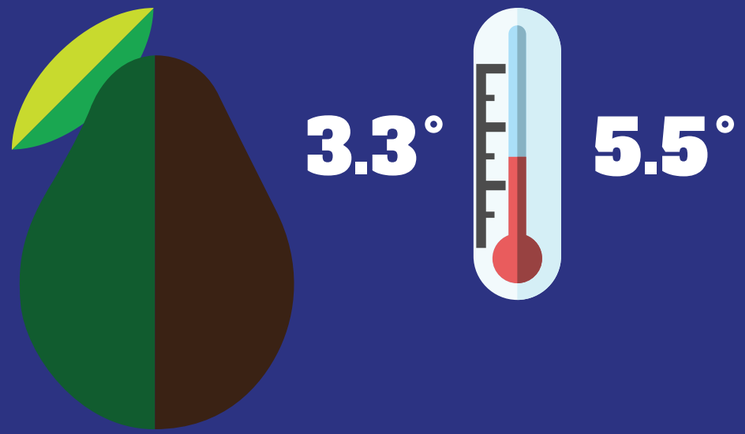
Guatemala
Oval shape, granulated rough skin. Smaller in size with dark green skin that turns purple-black when ripe.

HANDLING AND STORAGE

Recommended storage temperatures for avocados can vary due to seasonality and country of origin. In general, cooler temperatures between 3.3°C and 5.5°C are acceptable for all countries of origin throughout the year.

Low maturity fruit will maintain its quality and shelf life at slightly warmer temperatures such as 5.5°C. As the maturity and dry matter of the fruit increases, the storage cooler temperature should be reduced in order to increase shelf life. Higher maturity fruit will begin the ripening process more quickly due to higher oil content.

Once ripe, cooler temperatures around 3.3°C will extend the shelf life of the ripe fruit and help to slow down the fruit from continuing the ripening process. Note that ripe fruit is less susceptible to cold damage, so storing at these temperatures will also help to maintain quality.



RECOMMENDED STORAGE AND HANDLING TEMPERATURES

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mexico	4.4-5.5°C	3.3-4.4°C	3.3-4.4°C	3.3-4.4°C	3.3°C	5.5°C	5.5°C	5.5°C	5.5°C	5.5°C	5.5°C	4.4-5.5°C
Peru	6°C	6°C	6°C	6°C	6°C	6°C	5.5°C	4.4-5.5°C	4.4-5.5°C	4.4°C		
Chile	3.3-4.4°C	3.3-4.4°C	3.3-4.4°C	3.3-4.4°C					5.5°C	5.5°C	5.5°C	3.3-4.4°C
Kenya			5.5°C	5.5°C	5.5°C	4.5°C						
Morocco	5°C	4.5°C	4.5°C	4.5°C	4.5°C							5.5°C
Dominican Republic	3.3°C							4.4-5.5°C	4.4-5.5°C	4.4°C	3.3°C	3.3°C
Colombia	3.3-4.4°C	3.3-4.4°C	3.3-4.4°C	3.3°C	3.3°C	3.3°C	5.5°C	5.5°C	5.5°C	5.5°C	4.4-5.5°C	4.4°C
Guatemala	4.4-5.5°C	3.3-4.4°C	3.3-4.4°C	3.3-4.4°C						5.5°C	5.5°C	5.5°C

DID YOU KNOW?

Mission Produce supplies avocados from different growing regions with overlapping seasons of availability in order to provide a consistent year-round supply. The Country of Origin (COO) is clearly marked on each box, so you can adjust your optimal storage temperatures (as advised in the above chart) accordingly.

HANDLE WITH CARE

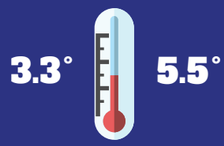
You'll be an avocado pro in no time by familiarizing yourself with the following storage and handling procedures. With our industry-leading Ripe Program, our ripening experts have already begun ripening the fruit to your preferred stage of ripeness. Adhere to these simple practices to offer your shoppers the finest quality avocados.

Bring inside the store immediately upon arrival. Heat is the greatest factor in destroying quality.

Determine stage of ripeness.

When stacking boxes, place those with ripe avocados on top.

Do not toss or drop boxes. Avocados bruise easily at any ripe stage.



Store ripe avocados at 3.3-5.5 degrees to slow ripening and avoid cooler damage.

Do not store near other tropical fruit or ethylene-sensitive produce such as bananas or mangoes.

FOOD SAFETY BEGINS WITH MISSION PRODUCE

All of Mission's avocados are handled with the utmost care, with food safety in mind. Our packing and distribution facilities meet and exceed the highest global compliance standards for safety.

- Micro and Molecular Biology Scientists on staff specializing in fresh produce food safety
- Superior food safety audit scores in the PrimusGFS and BRC schemes
- Extensive micro program includes 400+ samples per month
- Global sanitation program conducting daily testing and maintaining extensive pathogen reduction steps
- Health and safety programs safeguarding workers worldwide
- Robust sustainability programs reducing global carbon footprints

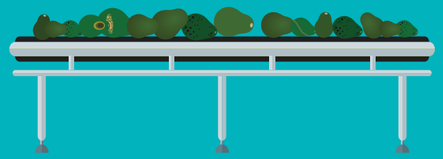
DID YOU KNOW?

We can arrange for a ripening expert to come to your distribution center and advise on best practices to ensure consumers get the highest quality fruit. Email **mpequality@missionproduce.com** to tap into our expertise!

STEPS QUALITY ASSURANCE TAKES

1

Receive fruit and cool it to preserve shelf life.



2

Fruit is inspected during packing. QA pulls samples to check for color, internal and external defects, size and stage.

3

Dry matter tests are conducted to determine maturity.

4

3.3° 5.5°

Fruit is consistently stored at 3.3-5.5°C.

5

Pallets are inspected by QA prior to shipping to the customer.

DID YOU KNOW?

Mission quality begins in the field. From the moment the fruit first appears on the tree to the day of harvest, our team takes a hands-on approach to ensuring ours are the world's finest avocados.

QUALITY CONDITIONS

On the pages that follow we show how to identify common quality conditions that are likely to be seen throughout the year. While this will serve as a valuable reference in your operation, know that Mission Produce's experts are available all year long to help answer any questions you may have at mpequality@missionproduce.com.

CHECKERBOARDING

WHAT IS IT?

Checkboarding is a term coined to describe uneven ripening within a case or pallet of fruit. It is possible to see fruit at different stages of the ripening process within the same box. A box may have fruit that was ripened to a stage 3 yet some pieces in the box could be at a stage 2 or, to the extreme, a stage 5.

WHAT CAUSES IT?

Avocados can grow at different maturity and dry matter levels within the same orchard and the same tree. The maturity and dry matter values greatly impact the ripening process.

Dry matter is a measurement of the oil content within the fruit. Early season fruit has lower dry matter values and as the fruit matures on the tree, the oil increases throughout the season. The greater spread within the dry matter values, the greater the probability of checkerboarding to occur.

Early season fruit with lower dry matter values tend to have a greater chance of uneven ripening.

WHAT CAN BE DONE?

It is difficult to prevent checkerboarding from occurring during ripening, but steps can be taken to help mitigate the amount. Mission's experts monitor ripening time and temperatures, which can help reduce checkerboarding within the case of fruit.

Does not cause internal damage

Fruit will ripen and taste normal

Fruit will ripen at different times

COPPER SULFATE RESIDUE

WHAT IS IT?

Copper sulfate is used for many organic and conventional fruit bearing trees as a fungicide to kill bacteria, algae, and fungi. The application of copper sulfate can leave a light residue on the surface of the avocado. It has a blush white appearance and is completely safe and harmless to the consumer.

WHY USE IT?

The copper binds to proteins in the fungi and damages the cells, causing them to die. It is a very effective method and has been used for many years in avocado farming. Anthracnose, a common fungus in avocado production, causes black circular spots about one-half inch in diameter to appear on the surface of the fruit. During moist or rainy periods, the fungus can proliferate and spread into the flesh of the fruit, causing decay. Copper sulfate is very effective at controlling this disease.

WHAT CAN BE DONE?

Mission Produce thoroughly washes all fruit with fresh water and an agitating brush to help remove any dirt or residue on the fruit's surface. Due to the nature of copper sulfate, complete removal is difficult. It is common to see a small amount of fruit that contains a residual blush white deposit on the surface of the fruit once it has been packed. Know that it is safe and harmless, and has no effect on the interior pulp quality, texture, or flavor.

Does not cause internal damage

Fruit will ripen and taste normal

HOLLOW PIT

WHAT IS IT?

Occasionally when you cut open an avocado you might see something missing: the seed! Don't be alarmed, the avocado will still taste just as creamy and buttery as one with the seed. The seed has turned a dark brown and dehydrated completely leaving behind a hollow hole where the seed was.

WHAT CAUSES IT?

An avocado tree can support only a certain amount of volume each season. When more flowers are pollinated beyond the amount that the tree can support, the tree must terminate some of the fruit. Once this happens, the seed in the fruit dies and the piece stops growing. The seed is the life source of the fruit, which is why hollow seed is mainly seen in small avocados, not in the larger sizes that have received full nutrition for their life span.

WHAT CAN BE DONE?

Climate may have an impact, causing the tree to stress more than normal and reject a higher percentage of viable fruit. There is no harm to the fruit itself and it will continue to ripen and taste like a normal avocado.

Does not cause internal damage

Typically affects only small sizes

Fruit will ripen and taste normal

LENTICEL SPOTTING

WHAT IS IT?

Lenticel are small 1-5mm diameter brown spots that develop on the surface of the avocado skin. Lenticel develop after harvesting, especially during the rainy season. They can increase in size on the fruit in the days after harvest and start to form larger black areas referred to as spotting. Lenticel spotting does not affect the internal quality of the fruit. An avocado with lenticel will ripen as normal and as the skin color darkens, the lenticel will become less apparent.

WHAT CAUSES IT?

Lenticel is caused when the fruit has taken up water prior to harvest. The cells become turgid and filled with water. The swollen cells become more sensitive and brown quickly on the surface. Jostling and rubbing during transportation and packing can agitate the turgid cells causing them to burst and lenticel to develop more rapidly.

WHAT CAN BE DONE?

Steps are taken to prevent the development of lenticel, including delaying harvest after rain, cooling the fruit post-harvest and gentle handling methods. Allowing the fruit to "rest" after harvest before packing also aids reduction of lenticel development by allowing the turgid cells to dehydrate.

Does not cause internal damage

Fruit will ripen and taste normal

RIDGING

WHAT IS IT?

Ridging is small raised lines or protuberances on the surface of the avocado skin. They do not cause any damage to the internal quality of the fruit.

WHAT CAUSES IT?

The main cause of ridging is not completely understood, but most experts agree that it is caused by thrip or mite activity during the flowering stage. The skin is damaged at an early stage and as the fruit grows, the small ridge is stretched across a greater percentage of the fruit's surface. The growth of the young fruit is also slightly stunted, which explains why ridging is more commonly seen in small sized fruit.

WHAT CAN BE DONE?

While ridging cannot be completely eliminated, it can be reduced by proper integrated pest management practices in the field. The ridges themselves can become more susceptible to light scarring simply due to the fact that they are raised higher on the skin's surface. As long as the fruit is handled properly after harvest, no further damage will occur.

Does not cause internal damage

Fruit will ripen and taste normal

More commonly appears in small sized fruit

LIMB RUB SCARS

WHAT IS IT?

Scars are brown or black spots on the skin of the avocado. They are an external defect that has no impact on the quality of the internal fruit. The severity of the scarring will determine the grade of the fruit when it is packed.

WHAT CAUSES IT?

Scarring is caused by the rubbing of the fruit on surrounding twigs and branches, which is exacerbated with windy conditions. The wind damage will often occur when the fruit is very small and as it grows larger, the scar stretches over a larger portion of the surface. This type of damage is easily hidden when the fruit ripens. More serious damage to the avocado can result in a tear in the skin that heals by forming a rigid scar that rips and heals repeatedly as the fruit grows, resulting in a bigger scar. The result is a "russet" type blemish on the skin that has angular "netting" and is sometimes referred to as alligator skin.

WHAT CAN BE DONE?

Limb rub scars are a fact of life for all tree fruit. Avocados with excessive scarring are sold as grade 2, although the pulp of the avocado maintains the same quality as one with no scars.

Does not cause internal damage

Fruit will ripen and taste normal

THRIPS SCARRING

WHAT IS IT?

Brown scars with scabby or leathery appearance are caused by avocado thrips, small flying insects that feed directly on immature fruit. Internal fruit quality is not affected, but obvious feeding scars can cause downgrading or culling of affected fruit.

WHAT CAUSES IT?

As fruit grows, this early feeding by thrips becomes apparent as scars expand across the skin. Thrips scarring is sometimes called “alligator skin.” Scarred fruit can continue to grow in size, although they are often smaller than normal, while the flesh remains healthy and green. Scarring from limb rub also causes fruit scarring that can be confused with injury from avocado thrips.

Thrips move to young fruit when leaves harden. Almost all damage occurs when the avocado is 0.2 to 0.6 inches (5–15 mm) long. Although Hass avocados are susceptible to feeding until they reach about 2 inches (50 mm), thrips feeding rarely causes scars on fruit larger than about 0.75 inches (19 mm). This scarring on young fruit may not become obvious until fruit enlarges. It is important to recognize that this is only an external defect that does not cause any internal fruit damage.

WHAT CAN BE DONE?

Proper field management can help reduce the presence of pests throughout the season. Mission growers implement integrated pest management systems to consistently monitor pest activity.

Does not cause internal damage

Fruit will ripen and taste normal

SUNBURN

WHAT IS IT?

Sunburn can range from a pale yellow discoloration to a black, brown, red or withered spot. Internal quality of the fruit is typically not affected, however large spots of discoloration can cause heating and drying of the tissue, which results in downgrading or culling of affected fruit.

WHAT CAUSES IT?

Sunburn can occur both prior to and after harvest. It is caused by exposure to direct sunlight, which is usually most severe in fruit on the south or southwest sides of the trees. New plantings with fewer leaves on the tree to shade the fruit are at higher risk for sunburn than leafy mature trees.

WHAT CAN BE DONE?

Careful pruning methods and tree care help reduce overexposure of growing fruit. Post-harvest sunburn is avoided by storing bins of harvested avocados in cool, shaded areas.

Does not cause internal damage

Fruit will ripen and taste normal

VOLCANIC ASH

WHAT IS IT?

Avocados grown in the Southern areas of the State of Jalisco are near one of the most active volcanoes in Mexico, the El Colima. As a result, some residual ash that naturally occurs in the climate can be seen on the surface of the avocado.

WHAT CAUSES IT?

Small daily eruptions from the El Colima produce ash that is carried on the wind to the towns below. The ash does not pose any threat, is completely safe, and does not cause any food safety threats. In fact, the ash contributes to what makes the avocado orchards thrive. It is comprised of pulverized rock, minerals (iron and magnesium) and volcanic glass, which wash into the soil and enrich it with nutrients. This nutrient-dense soil is great for producing high quality, rich agriculture.

WHAT CAN BE DONE?

While these regular dustings of ash do not cause any harm to the avocado orchards, they can make the fruit appear dirty. After harvest, all avocados are washed with clean water and a series of high power brushes designed to remove all dirt and dust. Most of the ash is removed in this process but occasionally some ash residue remains. It is completely harmless and safe for consumption.

Does not cause internal damage

Fruit will ripen and taste normal

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5 STAGES OF RIPENESS

The first step to watching your avocado sales soar is understanding the stages of ripeness for Hass avocados. **Color is NOT always an indicator of ripeness.** The best way to judge ripeness is to feel for uniform softness.

STAGE 1
Hard

Fresh off the tree, the avocado is very hard with no give.

APPROXIMATELY
5+ DAYS
UNTIL RIPE IF HELD AT ROOM TEMPERATURE

STAGE 2
Pre-Conditioned

Ripening has begun, but the avocado is still very firm.

APPROXIMATELY
4-5 DAYS
UNTIL RIPE IF HELD AT ROOM TEMPERATURE

STAGE 3
Breaking

As it ripens, the avocado is firm but yields slightly to pressure.

APPROXIMATELY
2 DAYS
UNTIL RIPE IF HELD AT ROOM TEMPERATURE

STAGE 4
Firm-Ripe

The avocado is ripe, and yields slightly to gentle pressure.

RIPE
BEST FOR SLICES AND CUBES

STAGE 5
Ripe

The avocado is ripe, and yields easily to gentle pressure.

RIPE
BEST FOR MASHING AND GUACAMOLE

FEELS SO RIPE

There are two ways to judge avocado ripeness. Most experts recommend that you feel for uniform softness to determine the ripe level. A penetrometer can also be used to measure avocado maturity, however testing has proven that using a penetrometer is inconsistent. **There are pros and cons for each method:**

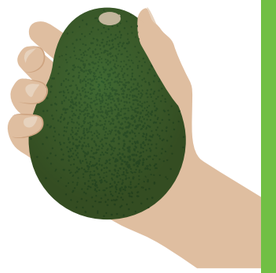
ASSESSING RIPE STAGE BY HAND

PROS

- Non-destructive testing method
- Can assess a large sample size on every pallet/pack
- No special equipment required
- Quick
- Assessor considers whole fruit characteristics

CONS

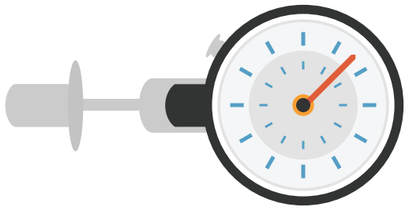
- Subjective; dependent on person



ASSESSING RIPE STAGE BY PENETROMETER

PROS

- Only a small amount of training needed



CONS

- Destructive testing method (can only assess a small sample)
- Small sample size may not be representative of entire pallet/pack
- Not always consistent with true stage
- Inconsistent readings unless using a fixed stand
- Requires specific and expensive equipment
- Results can vary based on fruit temperature
- Inaccurate results if procedure is not followed
- Outputs quantitative measurement that is often inconsistent and does not consider factors like seasonality and temperature

THE BUTTON METHOD

Until you get the hang of judging an avocado's ripeness by how soft it feels, there's another trick for determining avocado ripeness. "The Button Method" will allow you to have more confidence in your assessment. Here's how:

1

Press lightly near the neck of the avocado and feel for gentle yield.

2

If you're unsure it's ready to eat, 'pop the stem button.'

3

If the stem button is removed easily, your avocado is ready to eat. If not, the avocado needs a couple more days of ripening.

DON'T OVERDO IT

Your shoppers prefer to have the button intact, so do not use this method to judge ripeness of all the avocados in a shipment. A relatively small sample size of 2–3 avocados in a shipment will tell you all you need to know.

IT'S IN THE WAY THAT YOU USE IT

Whether firm-ripe at Stage 4 or fully soft and ripe at Stage 5, Hass avocados can be served in a variety of ways.

STAGE 4

Best for slicing and dicing

- Salads
- Sandwiches
- Burgers
- Tacos
- Omelets

STAGE 5

Best for mashing and smashing

- Guacamole
- Smoothies
- Spreads
- Avocado Toast
- Baby Food

DO

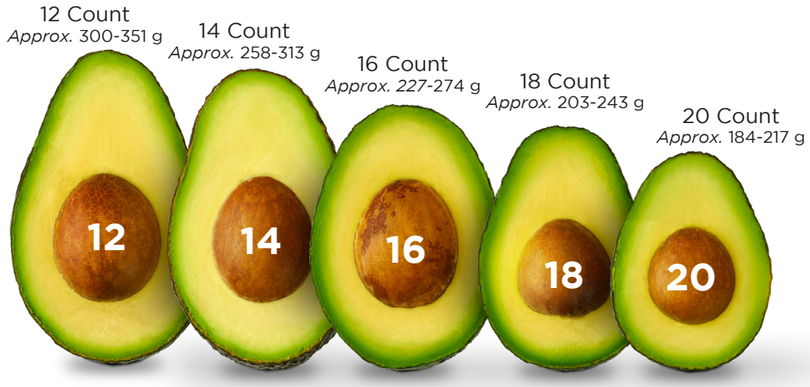
Feel an avocado for softness to judge ripeness. If it yields easily to gentle pressure, it's fully ripe and ready to eat.

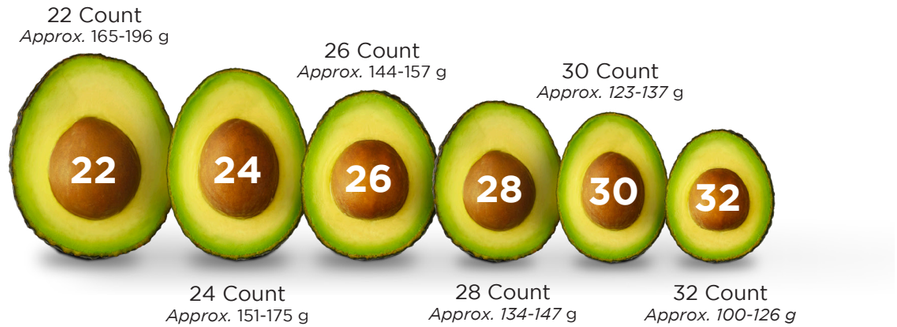
DON'T

Don't rely on color to judge ripeness. Feeling the avocado for uniform softness is the best indicator.

ONE SIZE DOES NOT FIT ALL

Size is determined by the number of avocados that fit in a standard box that weighs approximately 4 kilos when full. For example, a size 18 avocado refers to the fact that 18 avocados fit into that standard size box. Therefore, the larger the size number, the smaller the avocado. Conversely, the smaller the number, the larger the avocado.





DID YOU KNOW?

Every 4-kilo box yields roughly the same volume of pulp. So you can make the same amount of guacamole with a box of 22s as a box of 14s!

A NUTRITIONAL POWERHOUSE

While they may be relatively high in calories and fat, avocados are a good caloric investment because they are nutrient dense and the fat they contain is the 'good' kind—monounsaturated, which is readily used by the body as energy.

Nutrition Facts

3 servings per container
Serving size **1/3 medium (50g)**

Amount per serving	
Calories	**80**
	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Polyunsaturated Fat 1g	
Monounsaturated Fat 5g	
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Total Carbohydrate 4g	**1%**
Dietary Fiber 3g	**11%**
Total Sugars 0g	
Includes 0g Added Sugars	**0%**
Protein 1g	
Vitamin D 0mcg	0%
Calcium 10mg	0%
Iron 0.3mg	2%
Potassium 250mg	6%
Vitamin A 0mcg	0%
Vitamin C 4mg	4%
Vitamin E 1mg	6%
Vitamin K 11mcg	10%
Thiamin 0.04mg	4%
Riboflavin 0.1mg	8%
Niacin 1mg	6%
Vitamin B_6 0.1mg	6%
Folate 45mcg DFE (0mcg folic acid)	10%
Pantothenic Acid 0.7mg	15%
Phosphorus 30mg	2%
Magnesium 15mg	4%
Zinc 0.3mg	2%
Copper 0.1mg	10%
Manganese 0.1mg	4%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

FOODIE FACTS

- 3 servings in 1 medium avocado
- Zero sugar, sodium, or cholesterol
- 8g Good source of fiber, 8g
- Vegan
- Gluten Free

*Nutritional facts are based on United States standards

DID YOU KNOW?

96% of health professionals surveyed recommend avocados when recommending increased intake of fruits and vegetables.

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