



*Breeding for Premium*

*Berries*

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Hortifrut Genetics Ltd.  
*February 27, 2024 • Wilmington, NC*





# Dedicated to:



Dr. Bernadine Strik (1969 – 2023)  
Professor and State Berry Crops Extension Specialist  
Department of Horticulture, Oregon State Univ.

[New York Times Article](#)





# OUTLINE

- ➔ 1. Company Introduction & Background
2. What is Premium?
3. Breeding for Premium Berries
- Genetics
  - Production
  - Product Development
  - Retail
4. Summary





“HORTIFRUT connects the best growers to consumers worldwide, creating a virtuous cycle based on innovation, **DRIVEN BY SUPERIOR GENETICS**, and technology for ongoing improvement.”



Presence  
in 37  
countries

> 500  
clients  
globally



**#1 Blueberry Production  
> 8,000 ha worldwide**

Revenues in  
2022  
totaled US\$  
960 MM

>100  
million kilos  
of berries  
produced

Own  
farms in  
10  
countries

30  
distribution  
centers  
globally



**#2 Raspberry Production  
> 1,000 ha worldwide**

>2,500  
full-time  
employees

> 50,000  
temporary  
workers



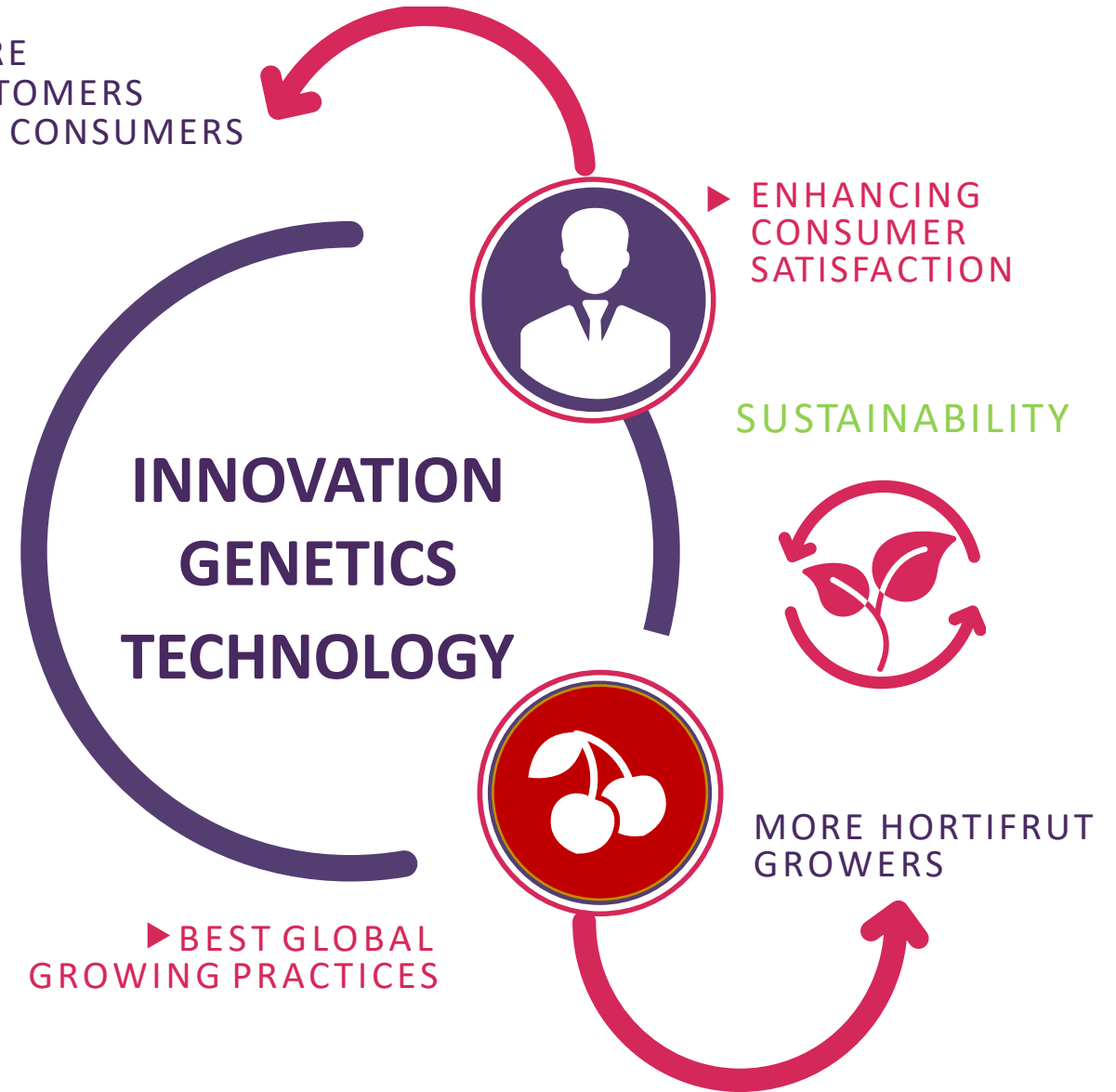


# HORTIFRUT MISSION

## Berries for the World Every Day



MORE  
CUSTOMERS  
AND CONSUMERS





# OUTLINE

1. Company Introduction & Background



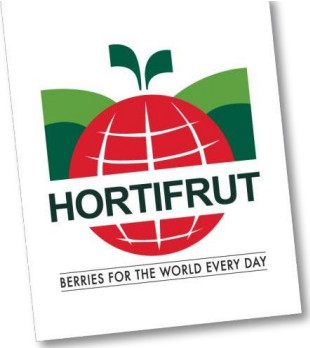
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# Premium

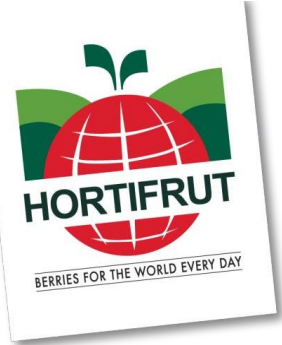
(pri • mi • əm)

“**Premium**” is derived from the Latin *praemium*, where it meant “**reward**” or “**prize**.”

Word has been in use since the 1740’s.

**Premium** products denote **rarity, superior quality** and are frequently a **higher price**.

A **Premium** is a price paid for **above and beyond** some basic or intrinsic **value**.



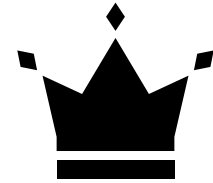
# How / where do **Premiums** present themselves?



**Location**



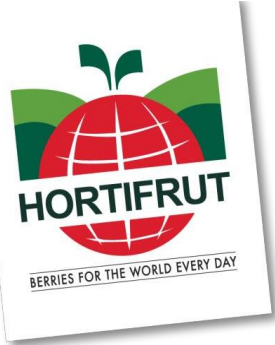
**Quality,  
Service or  
Performance**



**Experiences**







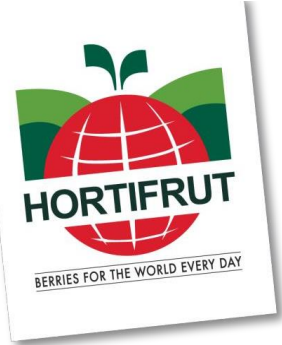
# How / Where do **Premiums** Present Themselves with Berries?



*Prime Seasonal Freshness*





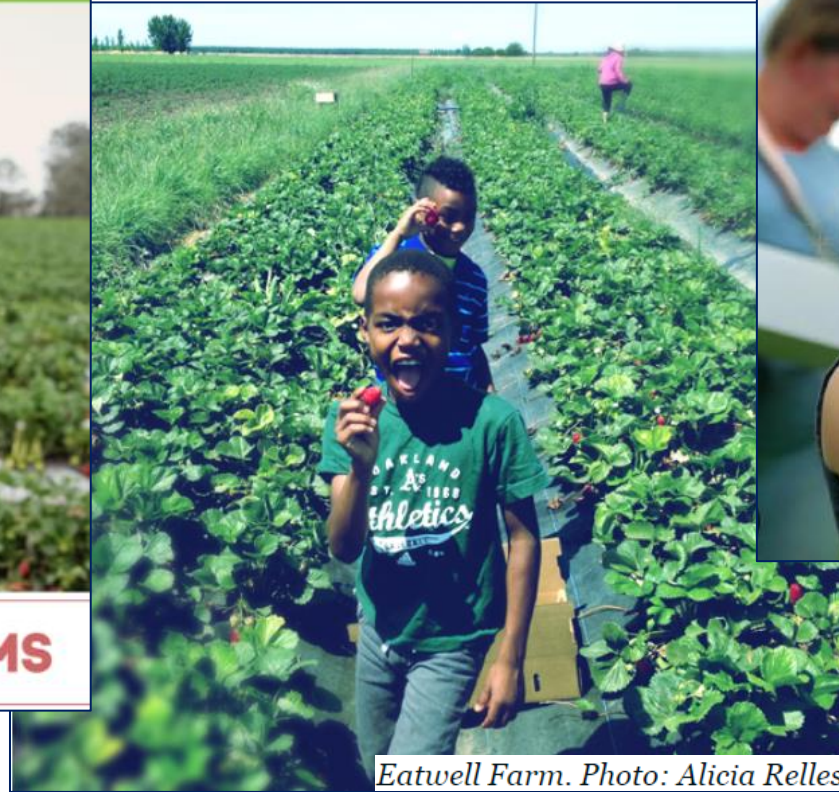


# How / Where do **Premiums** Present Themselves with Berries?



**U-PICK BERRY FARMS**

<https://www.familyfuncanada.com/edmonton/u-pick-berry-farms-in-the-edmonton-area/>



*Eatwell Farm. Photo: Alicia Relles*



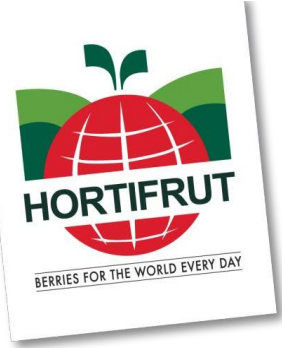
<http://www.woodsberries.ca/>



*Experiences that create memories*







# How / Where do **Premiums** Present Themselves with Berries?



*The fruits of labor*





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# Breeding for Premium Berries

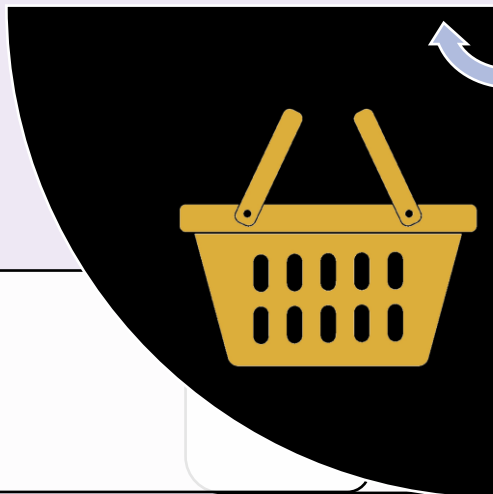
Genetics



Production

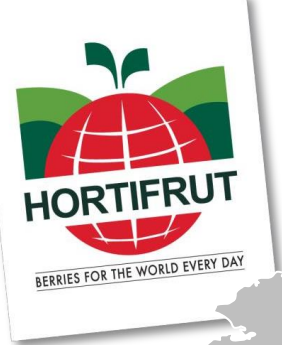


Retail

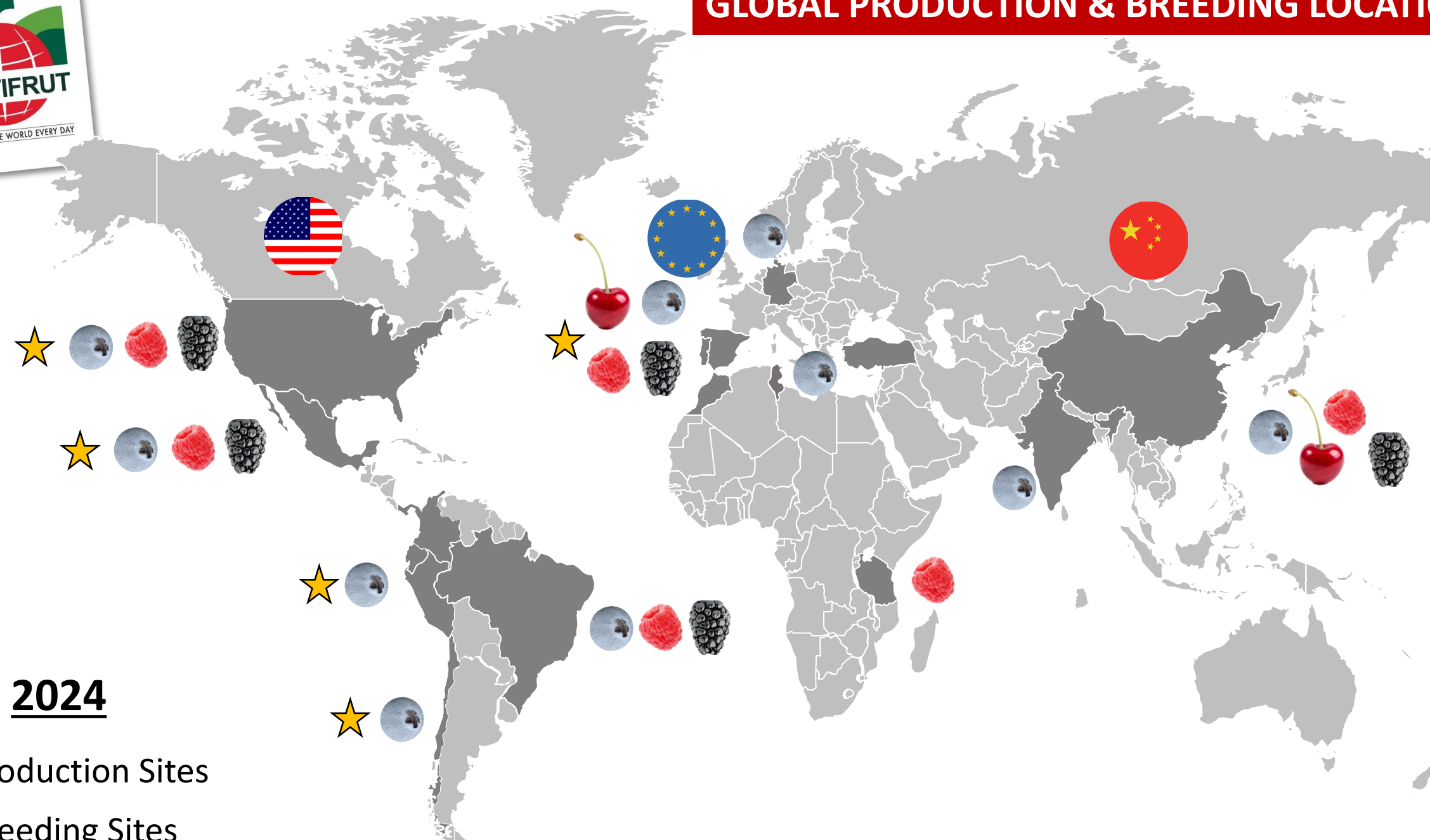


Product Development





# GLOBAL PRODUCTION & BREEDING LOCATIONS



**2024**

- Production Sites
- ★ Breeding Sites



# Breeding for Premium Berries



USA

Color

Jumbo  
Size

Super  
Sweet

Balanced  
Acidity



EU

Color

Super  
Sweet

Balanced  
Acidity



ASIA

Color

Jumbo  
Size

Super  
Sweet

Zero  
Acidity



# COLOR AS A PREMIUM



Florida Pearl®  
(Univ. FL)



Tropical Bliss  
(Driscoll's®)



Rosé Berries  
(Driscoll's®)



# COLOR AS A PREMIUM



Pink Cosmo  
(California Berry Genetics)



Groovy Blues  
(Univ. FL)





# COLOR AS A PREMIUM



BlazeBerries  
(Hortifruit)



Rosé Berries  
(Driscoll's®)

# (BLACK) COLOR AS A PREMIUM



Café au Lait



Boysen



Tayberry



# (BLACK) COLOR AS A PREMIUM

## Color Reversion



Affected drupelets show signs of structural damage  
– cracks, loose skin, loss of turgor pressure



# (BLACK) COLOR AS A PREMIUM

## Color Reversion



May be rejected by  
a retailer

Ideal / preferred  
by retailers

# (BLACK) COLOR AS A PREMIUM

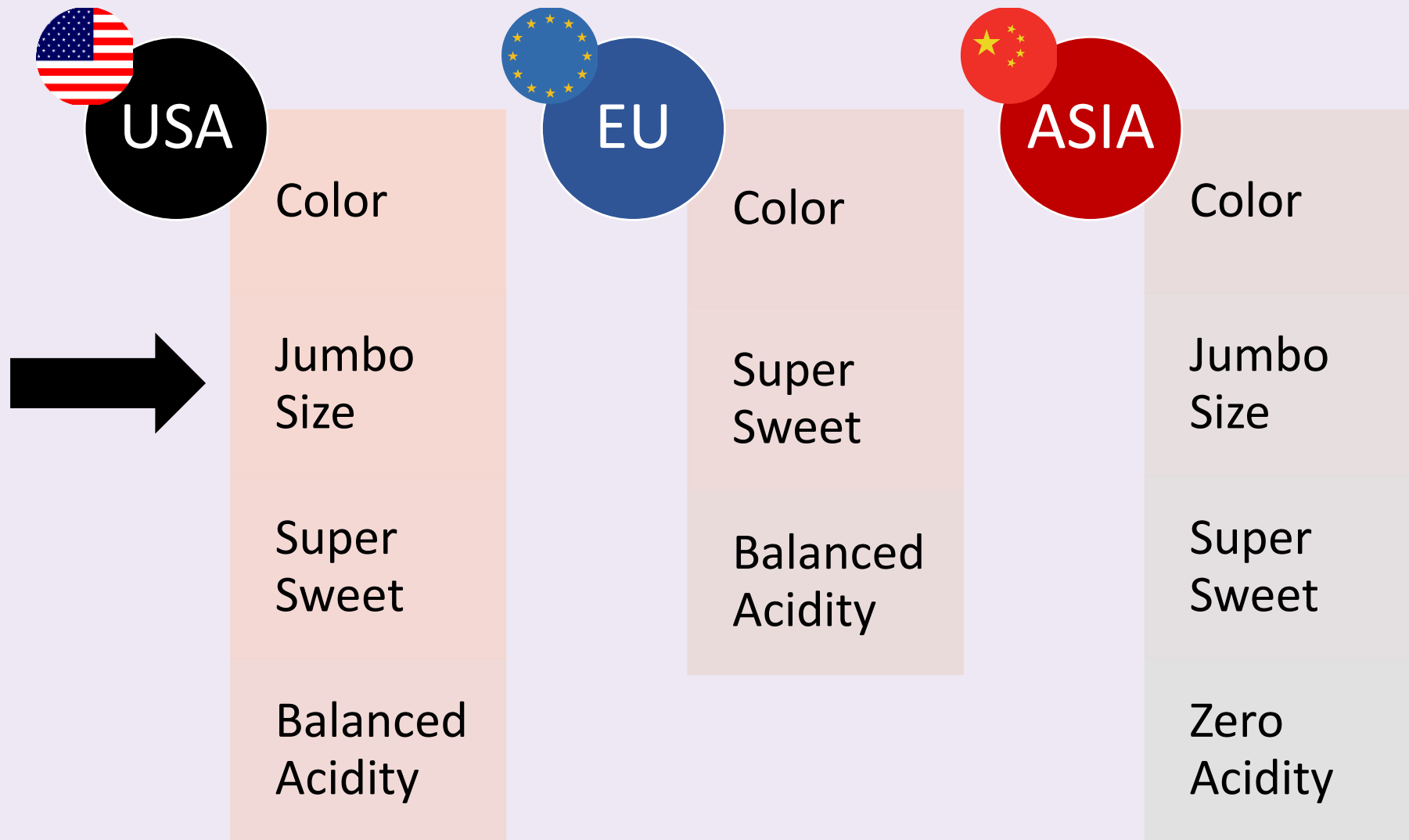
What do consumers think?



Threlfall, R. T., Clark, J. R., Dunteman, A. N., & Worthington, M. L. (2021). Identifying Marketable Attributes of Fresh-market Blackberries through Consumer Sensory Evaluations. *HortScience horts*, 56(1), 30-35. Retrieved Feb 26, 2024, from <https://doi.org/10.21273/HORTSCI15483-20>



# Breeding for Premium Berries



# JUMBO AS A PREMIUM IN THE USA



CALIFORNIA  
Strawberries







# JUMBO AS A PREMIUM IN CHINA



# JUMBO SIZE AS A PREMIUM



*Big berries = More kg*

*Jumbo berries don't size down as quickly*

*Size remains large even under lower-input systems*



# JUMBO SIZE AS A PREMIUM



*Would consumers pay a premium for jumbo raspberry or blackberry?*

# JUMBO SIZE AS A PREMIUM

What do consumers think?



Threlfall, R. T., Clark, J. R., Dunteman, A. N., & Worthington, M. L. (2021). Identifying Marketable Attributes of Fresh-market Blackberries through Consumer Sensory Evaluations. *HortScience horts*, 56(1), 30-35. Retrieved Feb 26, 2024, from <https://doi.org/10.21273/HORTSCI15483-20>

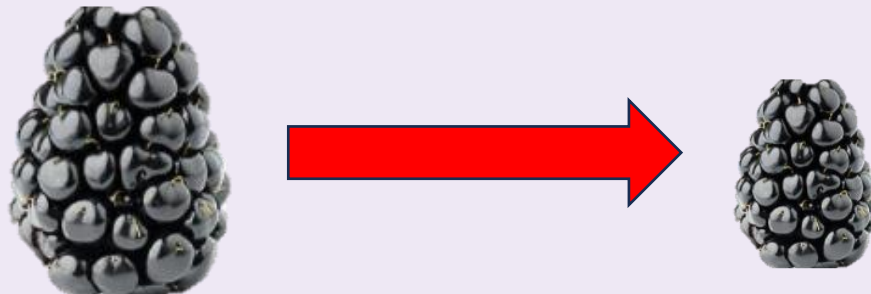


## FACTS:

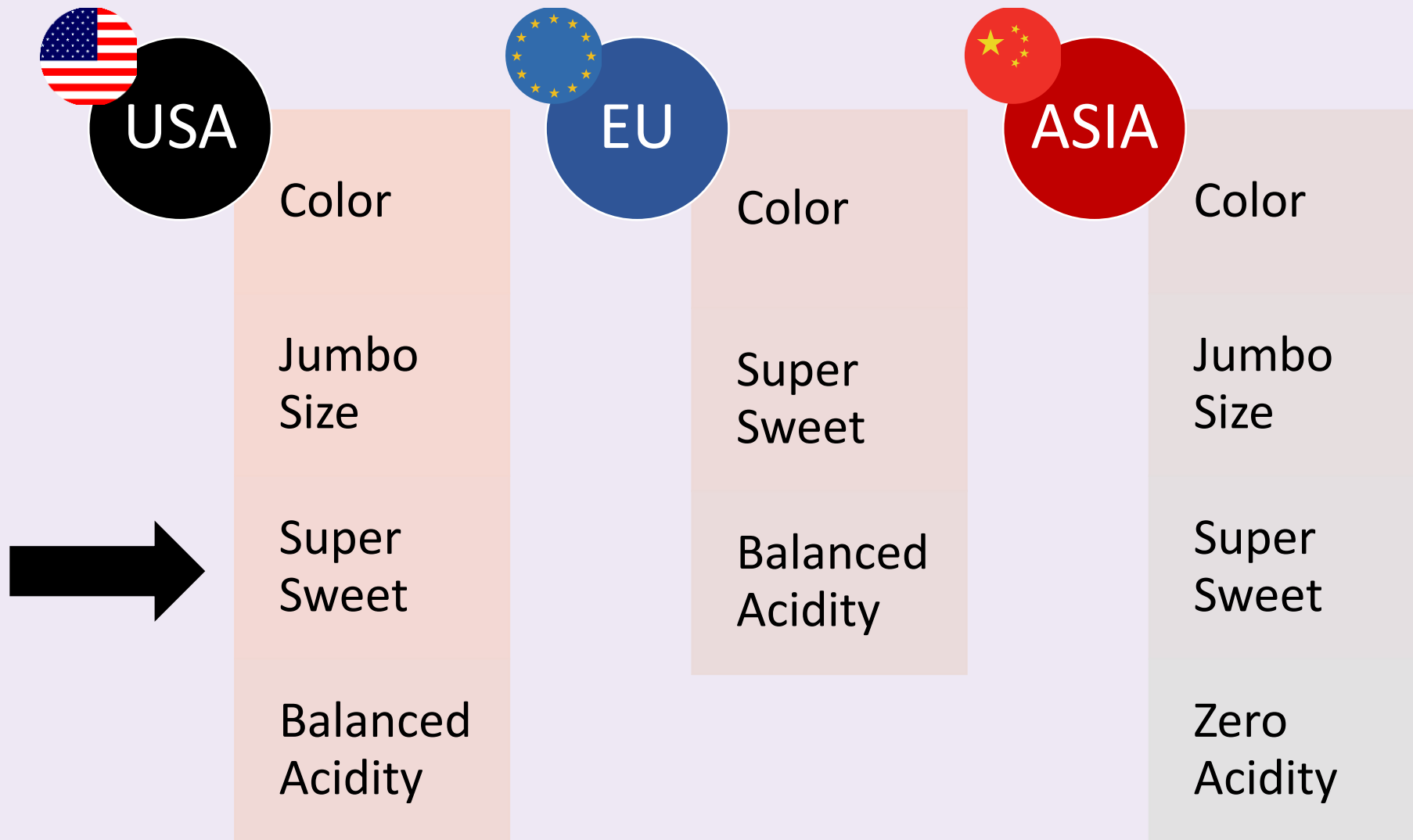
**Picking speed depends on fruit size**

**+ 1 gram of fruit = + 1 kg/hour picking speed**

**Rubus fruit size decreases under extreme heat, salinity, low-input systems**



# Breeding for Premium Berries





# SWEETNESS AS A PREMIUM



<https://www.sweetkaroline.com/>



<https://www.naturepefarms.com/>



<https://www.driscolls.com/>



<https://specialtyproduce.com/>



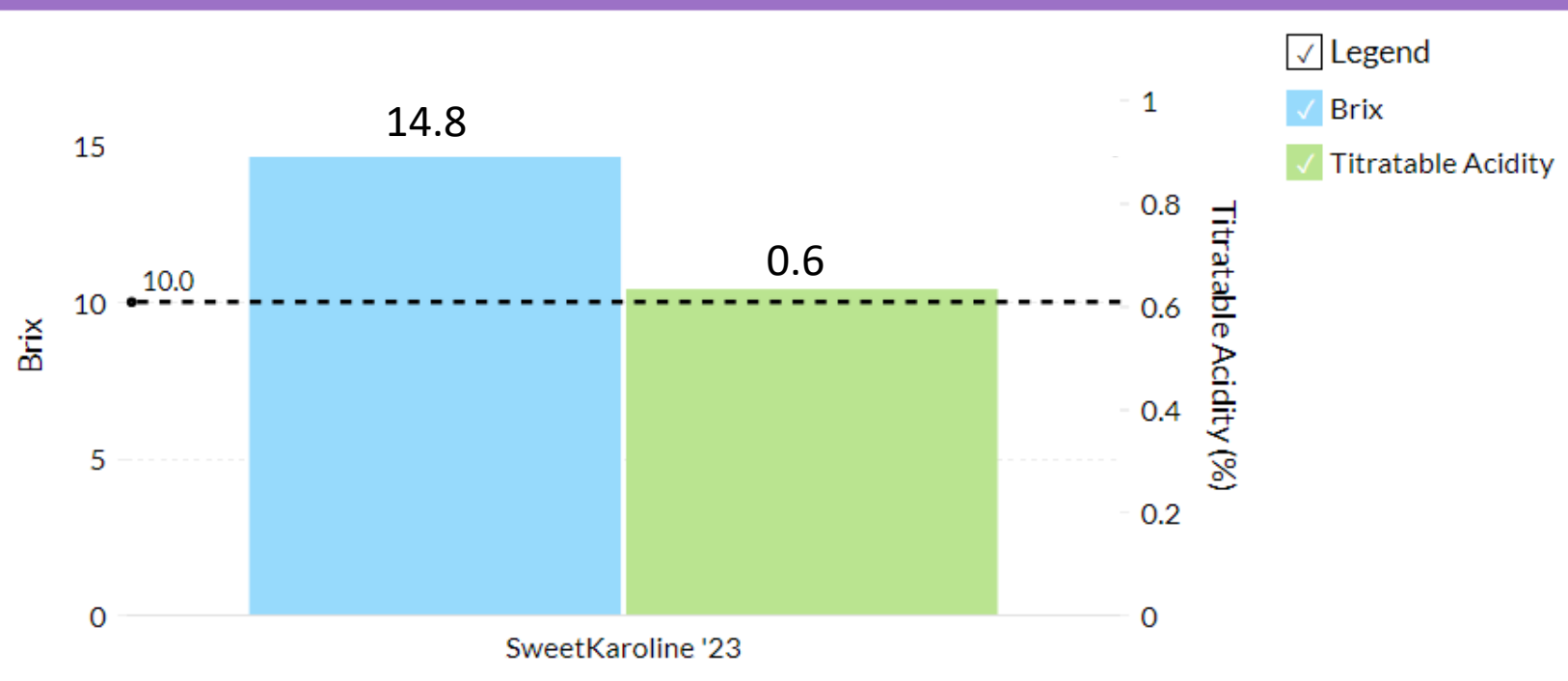
<https://www.sunsetgrown.com/>



# SWEETNESS AS A PREMIUM



Average Brix vs. Titratable Acidity





# Breeding for Premium Berries

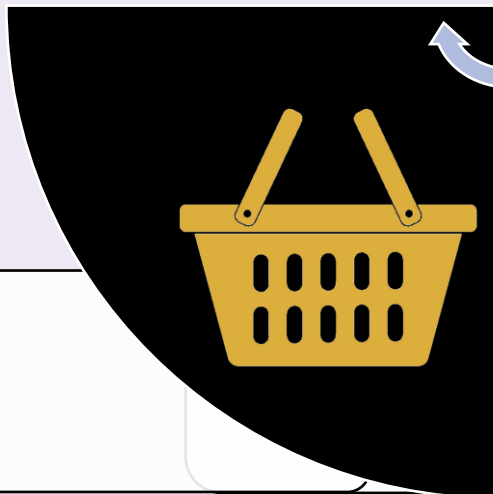
Genetics



Production




Retail




Product Development



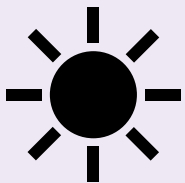
# PRODUCING PREMIUM BERRIES



**FACT:** Berries are naturally variable in sweetness, acidity & flavor, aromatics. Sensory attributes change day to day, and even hour by hour.

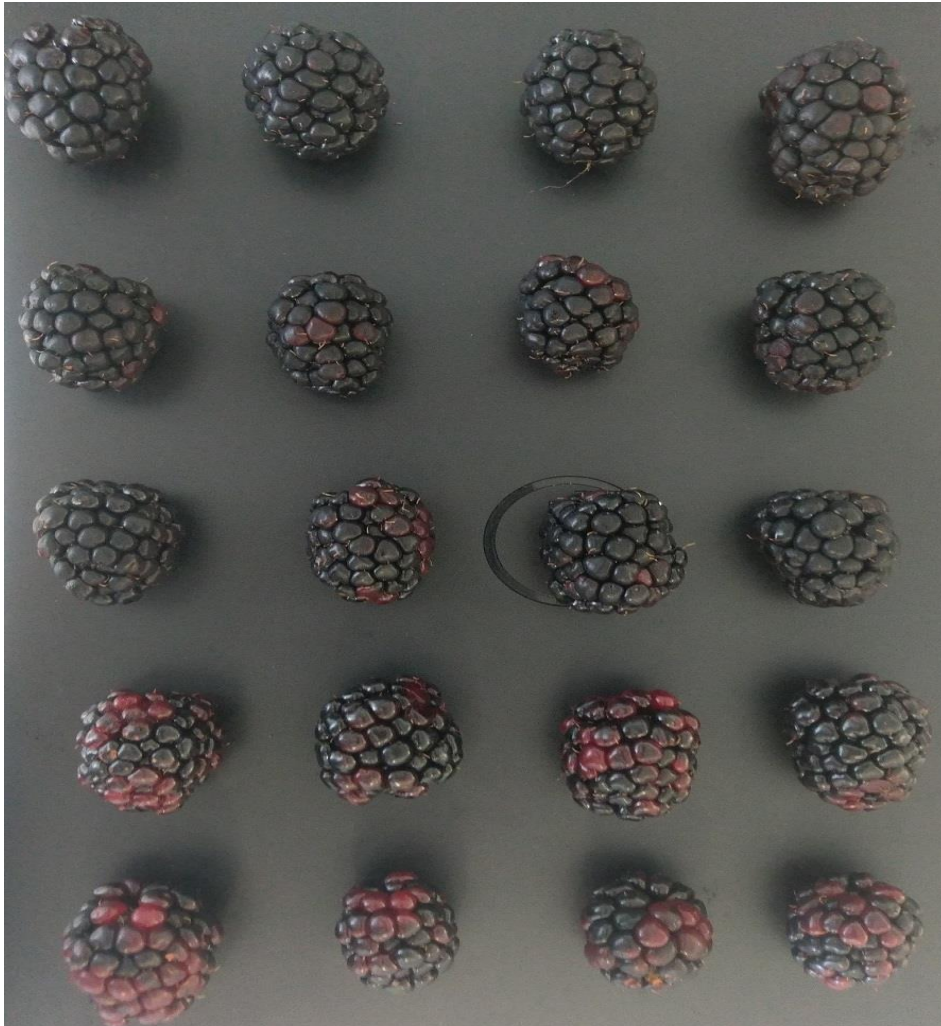


**FACT:** Premium berries which must fit specific parameters are influenced by location, season, crop management, harvest and handling practices.





# Harvest Conditions



6am – 12.7 °C

8am – 14.3 °C

10am – 18.8 °C

12pm – 25.1 °C

2pm – 30.5 °C

Slide courtesy of Dr. Max Edgely

[Effects of climatic conditions during harvest and handling on the postharvest expression of red drupelet reversion in blackberries](#)

M Edgely, DC Close, PF Measham, Scientia Horticulturae 253, 399-404

# Harvest Conditions



Fruit not handled during harvest

Fruit harvested with standard practices  
during warm conditions

Slide courtesy of Dr. Max Edgely

[Effects of climatic conditions during harvest and handling on the postharvest expression of red drupelet reversion in blackberries](#)

M Edgely, DC Close, PF Measham, Scientia Horticulturae 253, 399-404



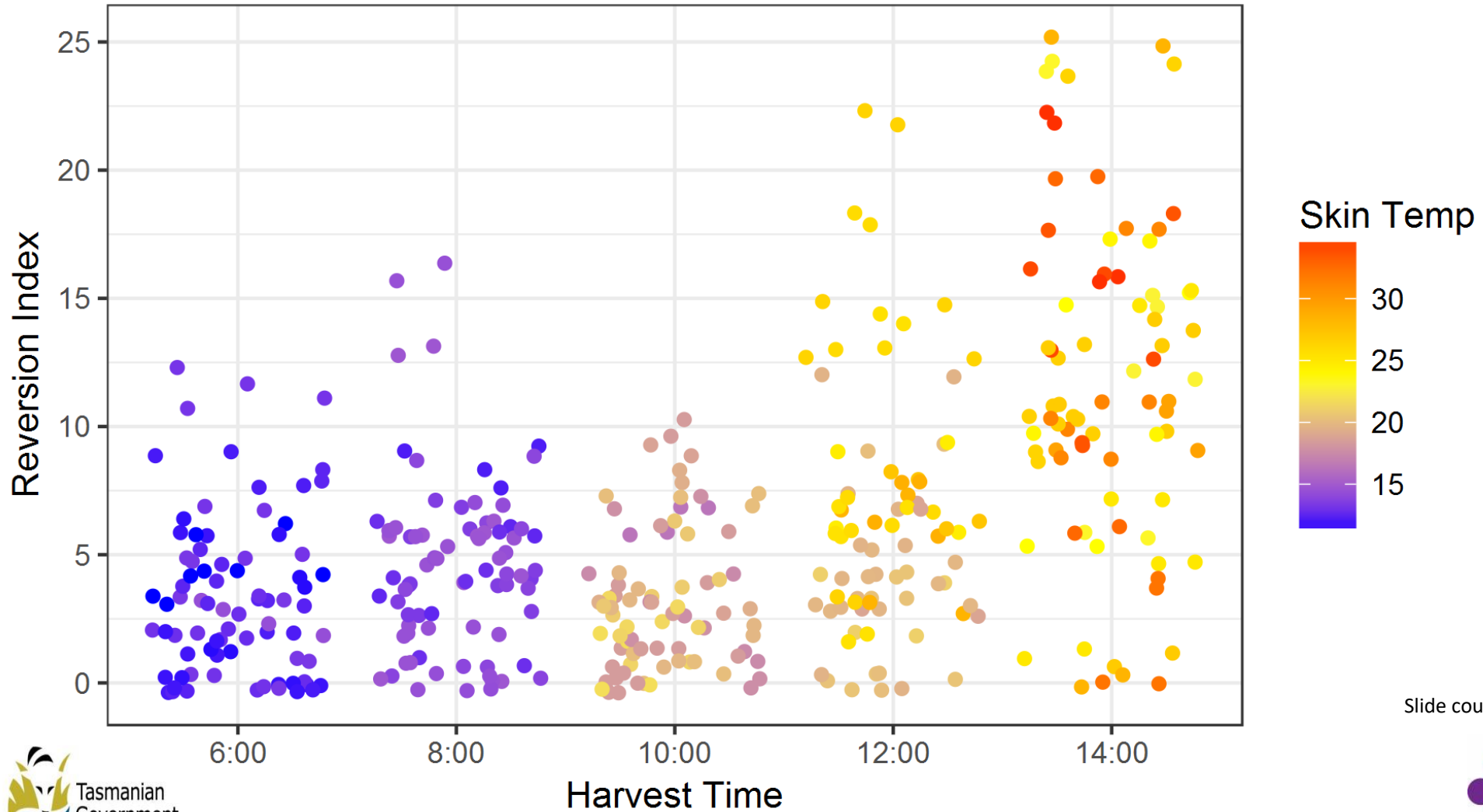
## A close-up photograph of a bunch of dark purple grapes, likely a variety like Concord or similar, showing their characteristic shape and color. The grapes are clustered together, with some showing a slight sheen.

A scatter plot showing the relationship between Skin Firmness (N) on the y-axis and Harvest Time on the x-axis. The y-axis ranges from 1.0 to 2.5 N, and the x-axis ranges from 6:00 to 14:00. A color legend on the right indicates Skin Temp, ranging from 15 (purple) to 30 (red). The data points are clustered into three groups based on time: 6:00-8:00 (purple, low skin temp), 9:00-11:00 (brown, medium skin temp), and 12:00-14:00 (yellow/red, high skin temp). Skin firmness values are generally higher in the first group (1.0-2.5 N) and lower in the later groups (0.5-2.0 N).



# Harvest Conditions

RDI With Harvest Time and Fruit Temperature





# Opportunities for Premium Products

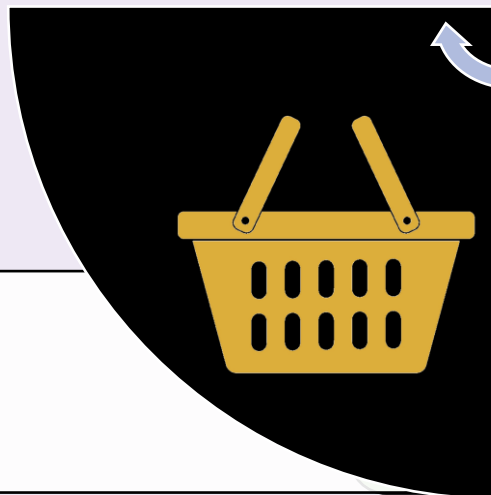
Genetics



Production



Retail



Product Development



# CATEGORY SEGMENTATION



VALUE TIER



PREMIUM & MID TIER



IMPROVED DESCRIPTORS & IMAGERY



COOKING & SWEET SEGMENTATION





# Lower Benchmarks = Lower Price



- Reducing food waste
- “Ugly Fruits” Movement
- Increasing consumption



# Product Development: *Home Garden Markets*

Black Cascade



Copyright Thompson & Morgan. Please note: The hanging basket pictured in this image is for illustration purposes only.

Baby Cakes®



<https://www.starkbros.com/products/berry-plants/blackberry-plants/bushel-and-berry-baby-cakes-blackberry>

Raspberry Shortcake®



<https://www.starkbros.com/products/berry-plants/raspberry-plants/bushel-and-berry-raspberry-shortcake>



# RETAILING PREMIUM PRODUCTS

Genetics



Production



Retail



Product Development



# **FACTORS DRIVING RETAIL SALES & CONSUMPTION**

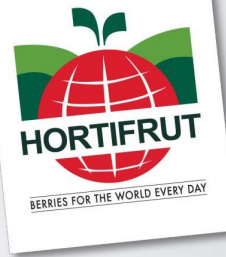
- Prominent in-store locations, berries are mostly sold in the front aisle
- Range extension with larger pack weights, tiering, segmentation and improved labelling
- Consumer health awareness and press coverage



# **FACTORS DRIVING RETAIL SALES & CONSUMPTION**

- Season extension, year-round availability and growing technique development
- In-house private labels by retailers
- Marketing and promoting the variety name

# BLACKBERRY CONSUMER DATA



## AROMATIC TASTE

Blackberries are loved for their aromatic and sweet taste. Also hinting towards their very high quality.



## THE LOOKS

They are furthermore loved for being quite robust and felt to be bigger. Also, the ripeness is easily recognizable via the color.



## WHAT CONSUMERS LOVE



## CHILDHOOD MEMORIES

Blackberries are connected to childhood memories, picking them straight from the bush.

Thus also more seldomly bought, but rather picked in nature.



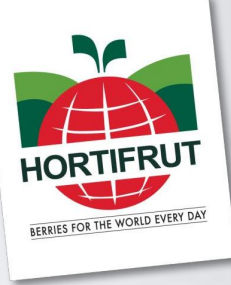
## HEALTH BENEFITS

They are perceived to be rather healthy, with a lot of healthy vitamins and nutrients.





# BLACKBERRY CONSUMER DATA



## WHAT THEY DON'T LIKE 👎



### RIPENESS HARD TO REACH

Blackberries are felt to be rarely properly ripe, being then too sour to enjoy.



### LIMITED AVAILABILITY

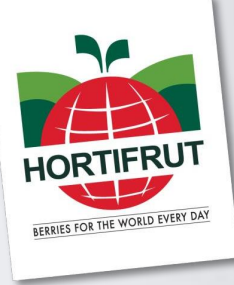
Overall, blackberries are less available in shops, thus awareness is less frequent.



### THE LOOKS

Furthermore, the center stalk (receptacle) is sometimes perceived to be too hard, the drupelets too big, and the hairs not pleasant.

# BLACKBERRIES – DELIGHT OR DISCOLORATION



The discoloration of blackberries is almost always associated with the lack of ripeness and thus a more sour taste. This acts as a clear purchase barrier.

## INSTANTLY RECOGNIZED

Discoloration is instantly recognized by the vast majority of consumers.

*"I know this from picking blackberries in my parents garden, they are not yet ripe like that." (UK, With partner)*



## INSTANTLY INTERPRETED AS SOUR

At the same time it is immediately associated with a more sour taste, and thus less pleasant taste associations.

## PURCHASE BARRIER

Due to consumers associating this appearance as negative, it acts as a clear barrier to purchase.

*"If I saw something like that in the pack, I wouldn't consider it. I'd take another pack." (ESP, Family)*

## COLOR REVERSION CHALLENGING

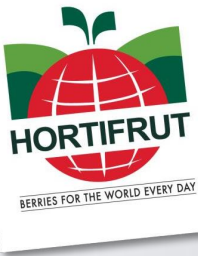
Getting used to different colors within the same berry – i.e. overcoming the existing associations – is a challenge for any new variety.

## UNIFORM COLOR PREFERRED

A new variety with different overall color hue appears more attractive and acceptable than a mottled version.



# CONSUMER DATA – RASPBERRIES, BLUEBERRIES, BLACKBERRIES



## Advantages

- More intense taste/aroma
- Very fruity
- Consistent quality & taste delivered across the year
- Close to taste/experience in nature

## Disadvantages

- More fragile
- Perish fast
- More cumbersome to prepare and check for worms
- Dissolve and disintegrate when heated, but create a delicious fruity core.

Tasty all year around despite being out of season and despite being imported



## Advantages

- More sturdy, less fragile
- More convenient: just wash and eat
- Longer lasting
- More accessible and cheaper

## Disadvantages

- Less consistency in quality and taste delivery
- Due to their stability they are more suitable for a variety of cooking/baking recipes (e.g. muffins, pancakes, cakes, etc.)

Less reliable in taste if out of season/ or imported, yet more robust.



## Advantages

- Aromatic taste and sweetness
- Vitamins and healthy
- High quality

## Disadvantages

- Less availability
- Even less consistency in taste

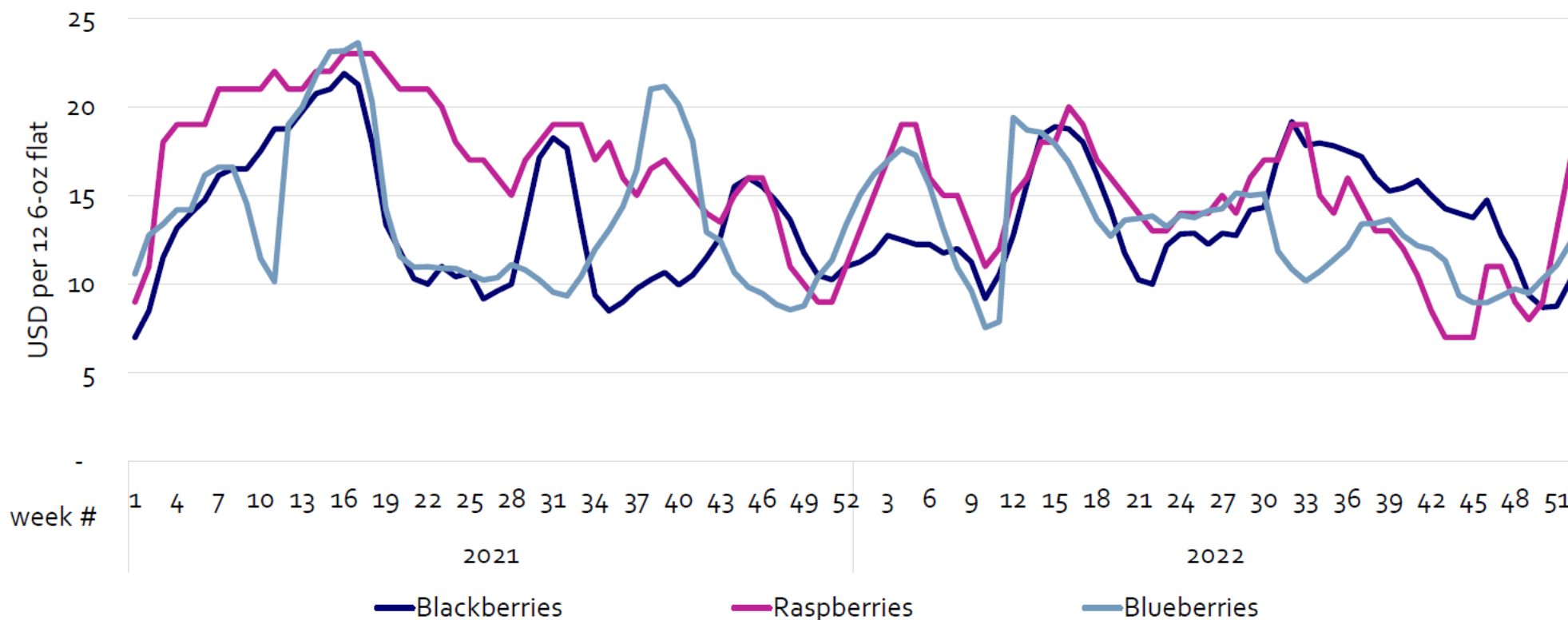
Often not delivering in terms of taste.  
Less availability in shops.

# Higher Benchmarks for Quality

Are berries complements or substitutes?



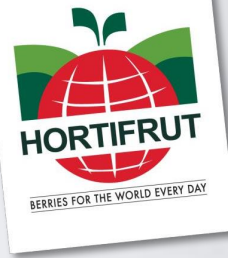
2021-2022



Source: USDA, Rabobank 2023



# MOST PEOPLE MIX THEIR USAGE OF BERRIES!



People often have a favorite, but generally are open to mixing or switching between different berries.

## THE ALTERNATIVE IS OFTEN ANOTHER BERRY

When we ask people what they would buy instead of their favorite – the default option is often just another type of berry.

## CHOICE DRIVEN BY AVAILABILITY

If the choice of one berry is limited (or they don't look good) people will choose the better berry.

Availability also seems to drive choice – e.g. blackberries not being as present.

## A LOT OF MIXED USAGE E.G. IN BREAKFAST

Lots of the photo examples in the online community show people mixing e.g. blueberries and raspberries.

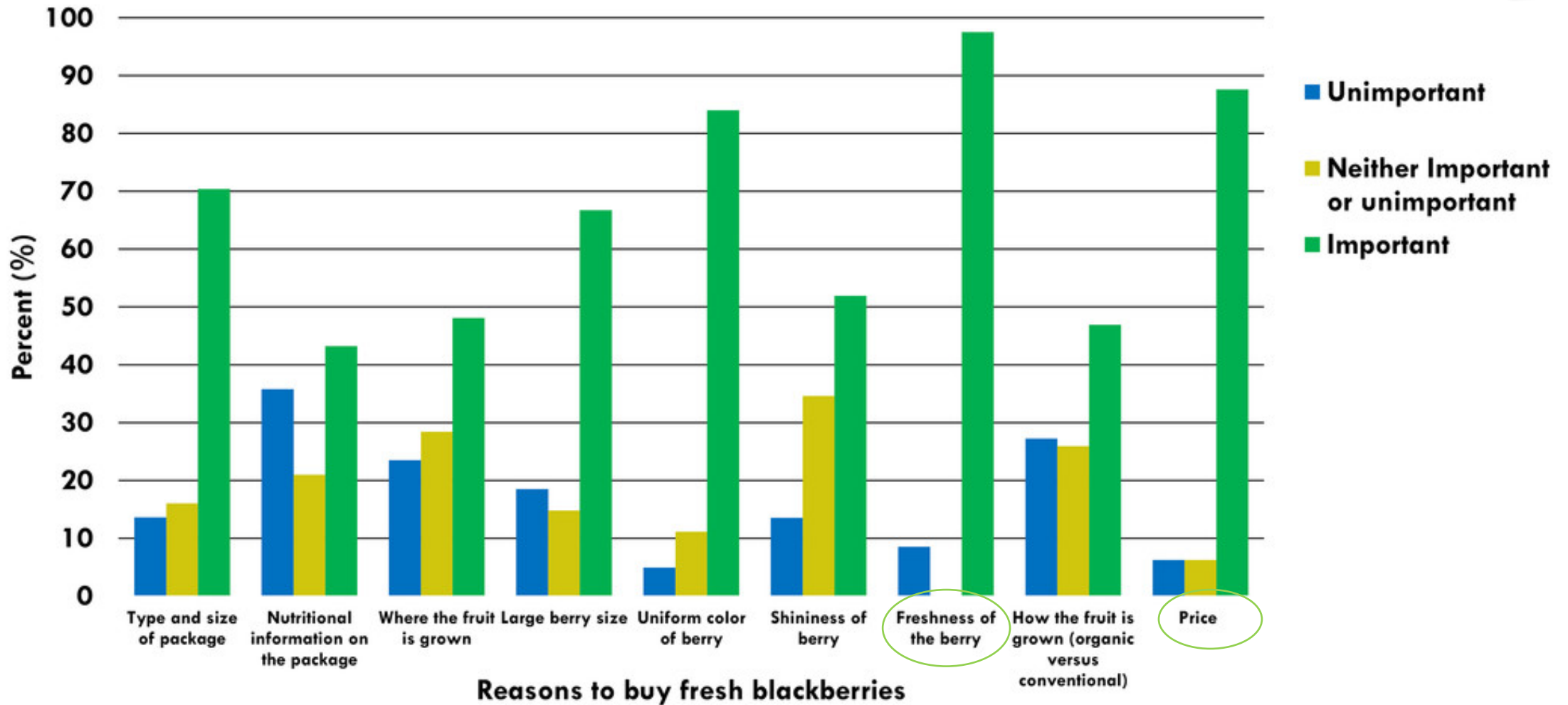


## THE ESTABLISHED DUO

Raspberries and blueberries often presented together – and thus substituted for each other or combined.

Blackberries generally a less frequent choice.

# Why do people buy fresh berries?





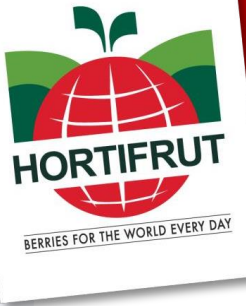


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# SUMMARY



**Premium** berry products are readily available locally, regionally and seasonally. The biggest hurdle is expanding Premium products into the retail space.



**Breeding** for premium berries varies based on the target market and consumer desires. Color, size, sweetness and acidity are major factors that influence the premium category.



**Production** is the biggest hurdle as variable environments influence berry quality each day. Growing, harvest and handling practices greatly influence (in)consistency in berries.



**Product Development:** Expanded segmentation of products, private and supermarket labels are creating opportunities to boost consumption. Home garden products also growing.



**Retail:** Prices and consumption for berries continue to increase steadily. Consumer research is on-going to understand drivers, needs, and to help define “premium”.



Thank *you*

BERRIES FOR THE WORLD EVERY DAY