

TASTE VS WASTE:

Fruit & Vegetable Innovations To Maximize Taste & Mitigate Waste

June 29, 2021

**PRODUCE FOR®
BETTER HEALTH
FOUNDATION**





WENDY REINHARDT KAPSAK, MS, RDN

**PRESIDENT & CEO
PRODUCE FOR BETTER HEALTH FOUNDATION**

MODERATOR

ABOUT PBH



OUR PURPOSE

The Produce for Better Health Foundation (PBH), a 501(c)3, is the only national non-profit organization 100% dedicated to helping people live happier, healthier lives by eating and enjoying more fruits and vegetables, in every form, each and every day.

PBH, along with its strategic partners, will elevate new fruit and vegetable consumption behaviors as a national priority – *accelerating growth and serving the public good.*



THE AWARD-WINNING HAVE A PLANT® MOVEMENT REACHES MILLIONS

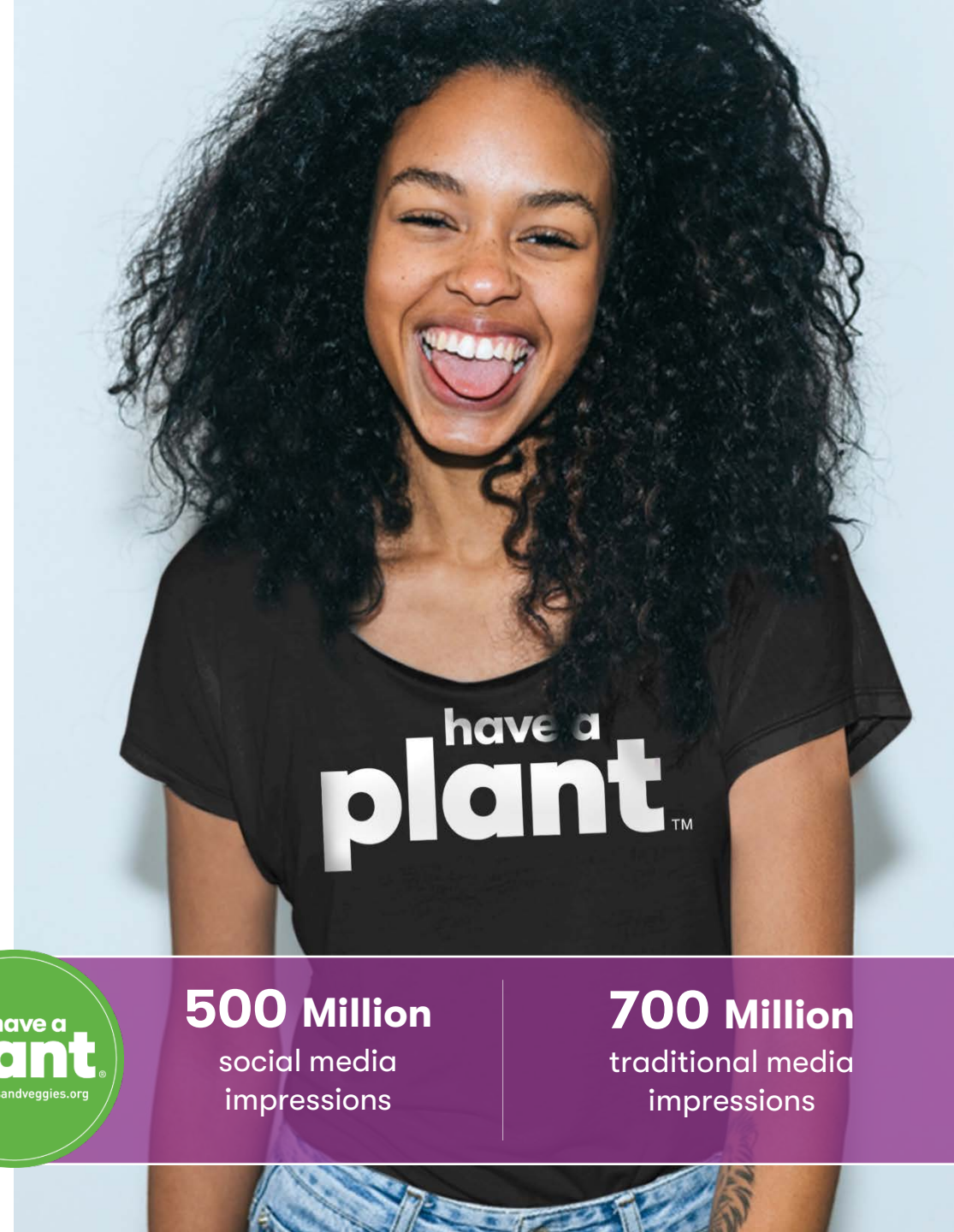
The award-winning **Have A Plant® Movement** is a way to inspire lasting behavior change by tapping into the emotional connection consumers have to the fruit and vegetable eating experience.

PBH is an undeniable resource for health & wellness professionals, given its trusted third-party credibility, breadth of nutrition and behavioral research, and strong consumer, influencer and industry reach.



500 Million
social media
impressions

700 Million
traditional media
impressions



Have a Plant®: The Plant-Forward Eating Guide

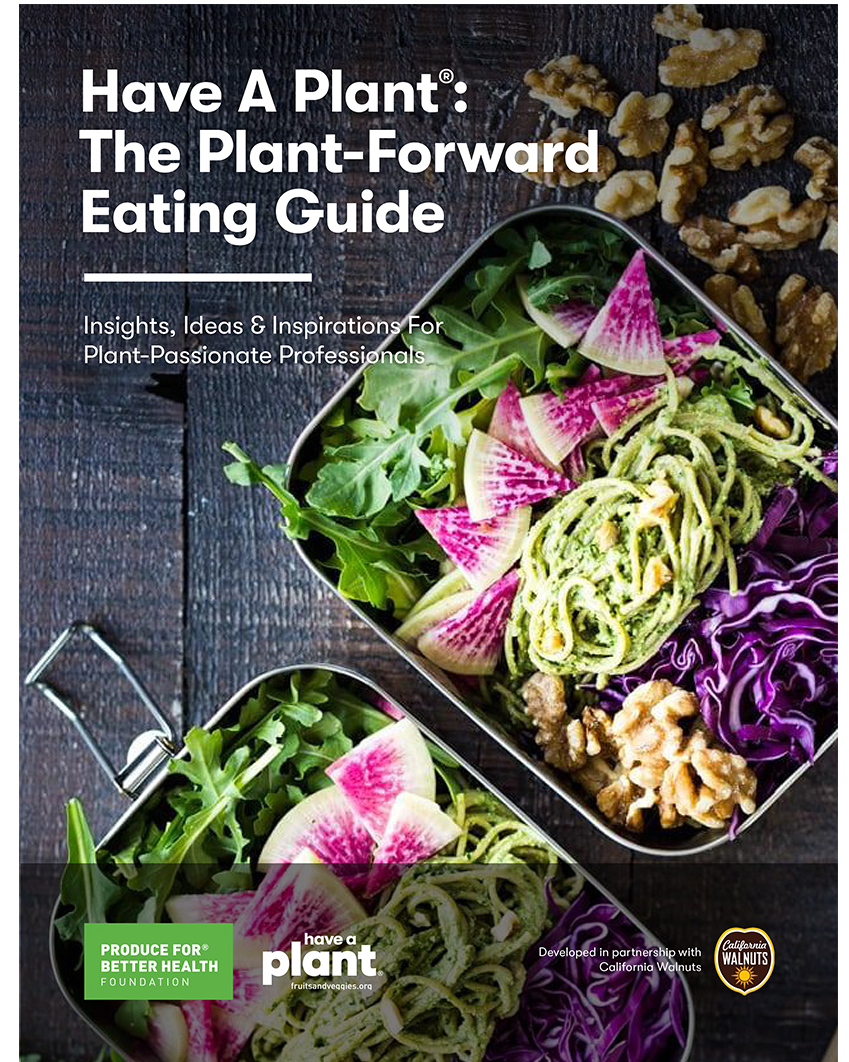
*Insights, Ideas & Inspirations for
Plant-Passionate Professionals*

Find the guide at:

www.fruitsandveggies.org/plantforwardguide

Turnkey resources are also available to put
your plans into action at:

www.fruitsandveggies.org/plantforwardtoolkit



The 2020 PBH State Of The Plate Research Toolkit Provides Health and Wellness Professional With Helpful Resources.

PUBLIC TOOLKIT

PBH State Of The Plate Research Toolkit with executive summary, key messages, consumer marketing and social media assets as well as activation ideas

[fruitsandveggies.org/
stateoftheplatetoolkit](https://fruitsandveggies.org/stateoftheplatetoolkit)

Fruits & Veggies Stories Recipes Expert Advice State Of The Plate

PBH FOUNDATION **STATE OF THE PLATE**

2020 PBH State Of The Plate Toolkit

[f](#) [t](#) [e](#) [p](#)

The results are in. As a society, we are chronic underachievers at eating our fruits and veggies and, subsequently, we are short-changing the health and well-being of generations of Americans. In 2020, PBH commissioned an update to our trended fruit and vegetable consumption research. Sadly, the news is not as encouraging as we would hope. America's fruit and vegetable consumption continues to erode over time. We must act NOW to reverse this trend.

We owe it to Americans to help them easily eat, enjoy and maybe even love more fruits and vegetables for improved health and happiness. Please use the resources and insights at the links below to join us in making a new era of conscious consumption a reality! #haveaplant

2020 PBH State Of The Plate Executive Summary
Additional access to the PBH 2020 State of the Plate research is exclusive to PBH members and [Lead The Change](#) supporters. Send us an [email](#) to request access.

Key Messages & Supporting Data Points
[\[pdf\]](#) [\[docx\]](#)

Frequently Asked Questions

Sample Social Media Posts
[\[pdf\]](#) [\[docx\]](#)

Digital & Social Media Graphics

View Official 2020 PBH State of the Plate Press Release

Sample Media Pitch
[\[pdf\]](#) [\[docx\]](#)

Activation Ideas
[\[pdf\]](#) [\[docx\]](#)

Solutions To Help Americans Easily Enjoy More Fruits & Vegetables

Start With Fruits & Veggies
Make a habit of eating a fruit or veggie first during at least 1 meal each day.

Have A Plan, Have A Plant®
Map your meals and snacks, making fruits and veggies the stars.

Count All Forms
Mix up fresh, frozen, dried, canned and 100% juice.

Make The Doing Easy
Keep it simple and pair 1 more fruit or vegetable with a fave food each day.

Hit Repeat
Consistent repetition will turn consciously eating more

IF YOU LIKED IT THEN YOU SHOULD PUT A RING ON IT

For more information on the PBH State of the Plate research visit www.fruitsandveggies.org/stateoftheplate
Follow PBH on social media for plant-packed inspiration. #haveaplant

plant

Housekeeping



1 CPEU available through the Commission on Dietetic Registration (CDR)

You will receive a link to the certificate of attendance, the webinar recording and PDF of the presentation.

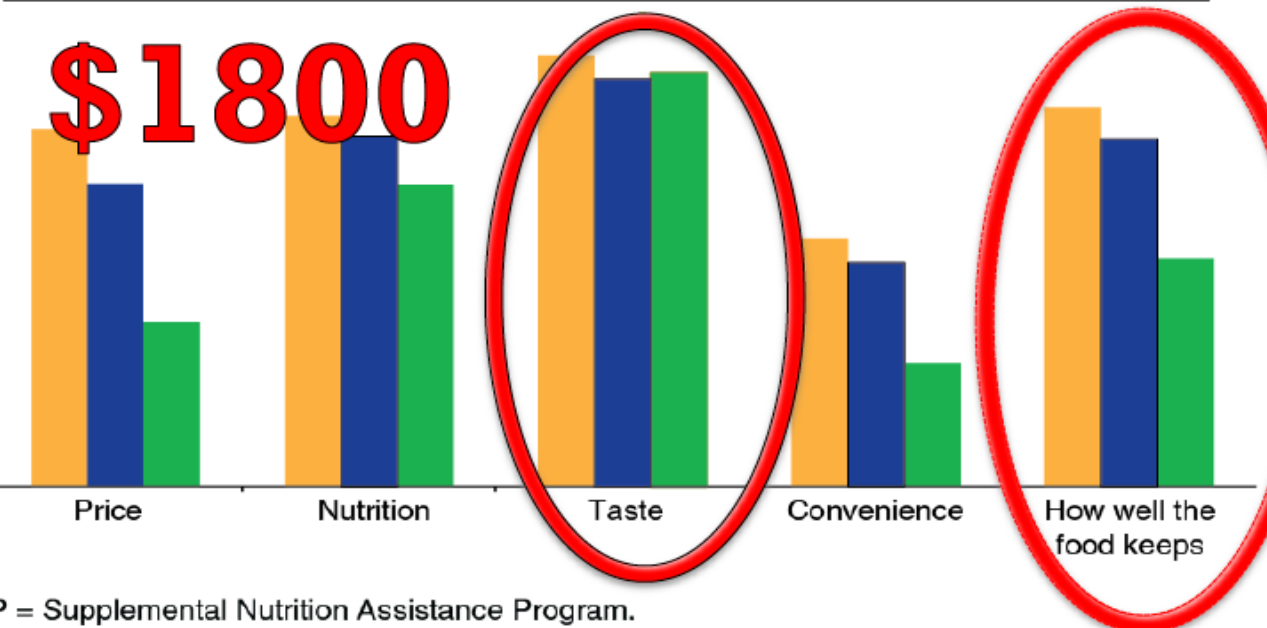
Type your questions and/or comments into the Q&A section located at the bottom of your screen at any time during the webinar.

TASTE RULES

Food attributes as ranked by NHANES respondents, 2007-10

Percentage of respondents who believe _____ to be very important
when buying food from a grocery store.

■ SNAP participants ■ Income-eligible non-participants ■ Higher-income non-participants



SNAP = Supplemental Nutrition Assistance Program.

Higher income non-participants have household incomes above 185 percent of the Federal poverty threshold.

Source: USDA, Economic Research Service analysis of 2007-10 National Health and Nutrition Examination Survey (NHANES) data.

WASTE

1.3 billion tons of food wasted each year.

Represents 1/3 of human food produced globally.

Contributes to 8% of the greenhouse gas emitted.





Developed Nations

Agriculture is productive and efficient.

Waste occurs after food gets to market.

Per capita food waste is 200-250 pounds/year.

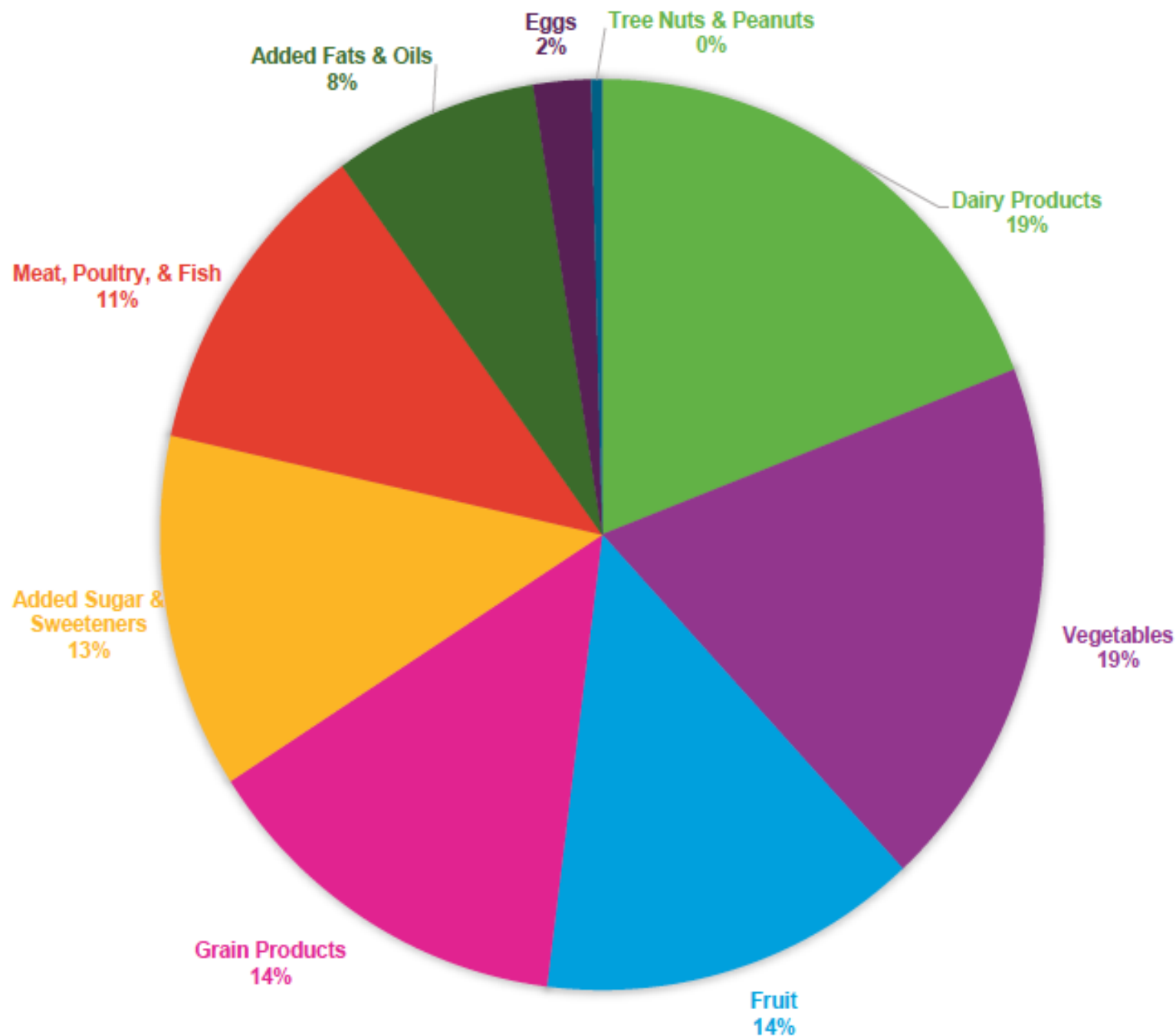
Developing Nations

Waste occurs before food gets to market.

Lack of infrastructure.

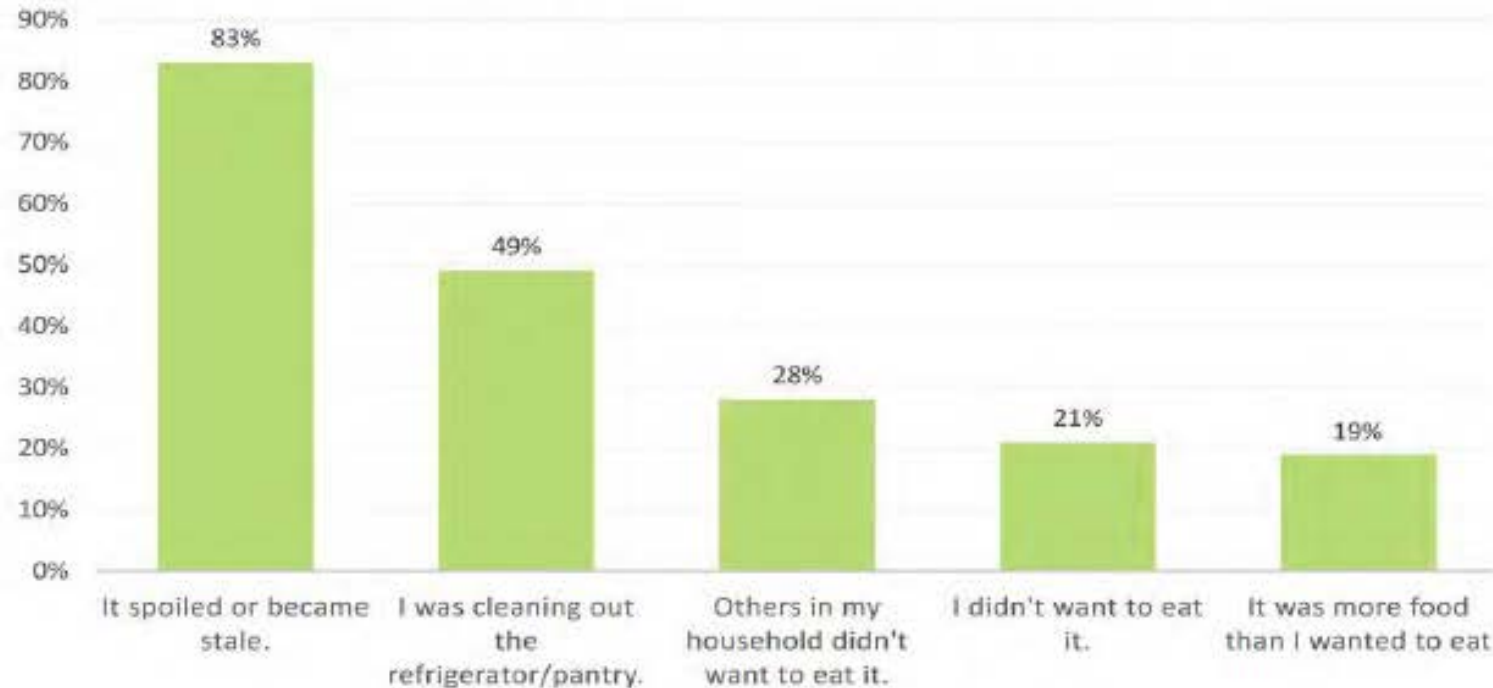
Consumers each throw away 13-24 pounds/year.

Estimated Total Amount of Food loss in the U.S. by Food Groups



Consumers

SPOILED OR STALE FOOD IS THE TOP REASON FOODS END UP IN GARBAGE



Q2. Why do these foods end up in your garbage? Please select your top two reasons.

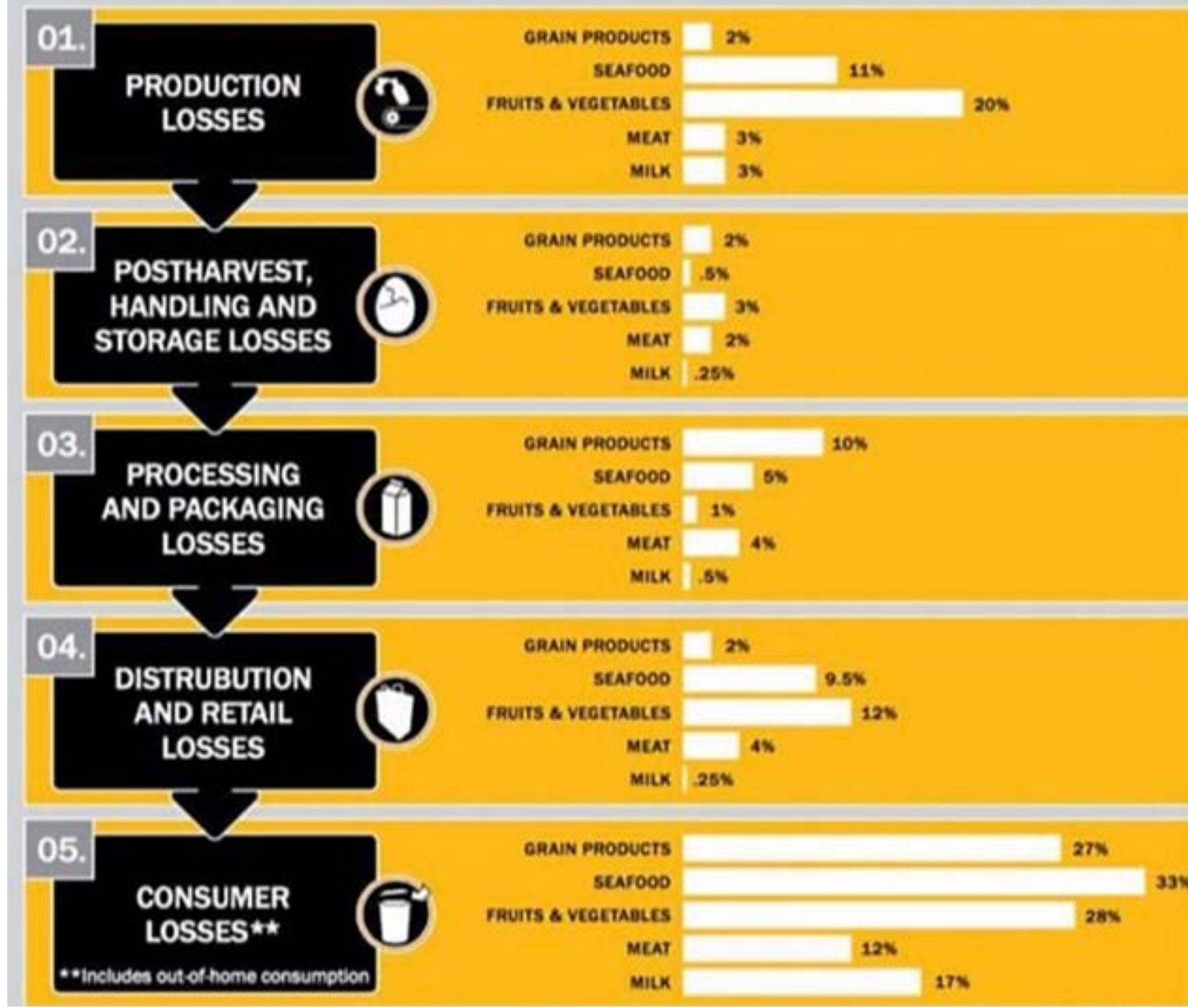
A SURVEY OF CONSUMER BEHAVIORS AND PERCEPTIONS OF FOOD WASTE | IFIC FOUNDATION 2019 | FOODINSIGHT.ORG

Where is produce waste happening?

#1. Consumer

#2. Production

#3. Distribution and Retail

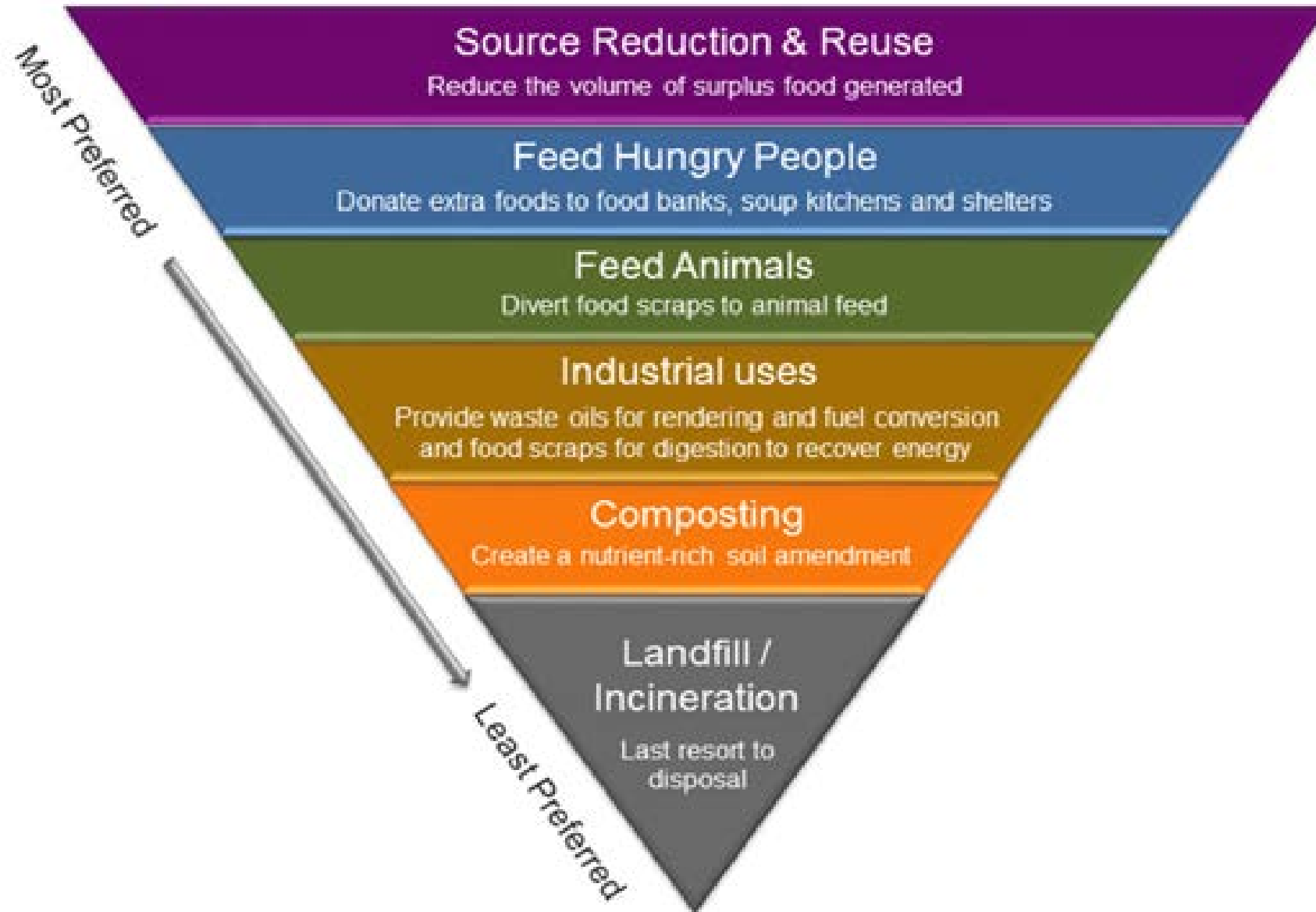


Retailers are taking action to reduce waste.





Food Recovery Hierarchy



TODAY'S PANEL

Garrett Patricio, Westside Produce

Elen Jones Evans, Bayer Crop Science

Dr. Elizabeth Mitcham, University of California Davis





Westside Produce
Firebaugh, CA



California Cantaloupe Production



WHEN IS CANTALOUPE IN SEASON?

APRIL



DEC.





Mandatory Food Safety Program

- All California cantaloupe growers, packers and handlers must all follow specific food safety practices.
- We are audited regularly by the government.
- Required to pass ALL food safety checkpoint in each audit.



Cantaloupe Varieties 101

Western Shipper Variety

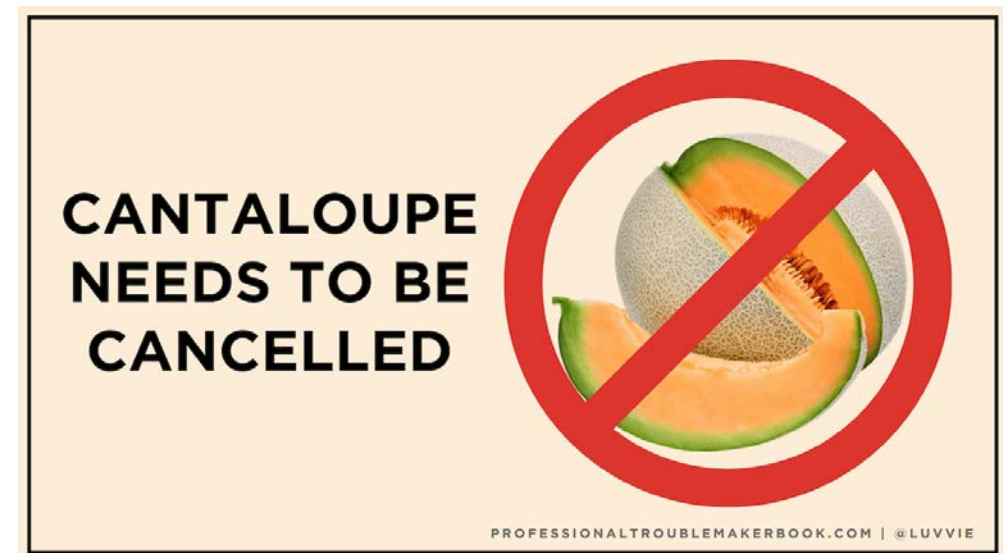
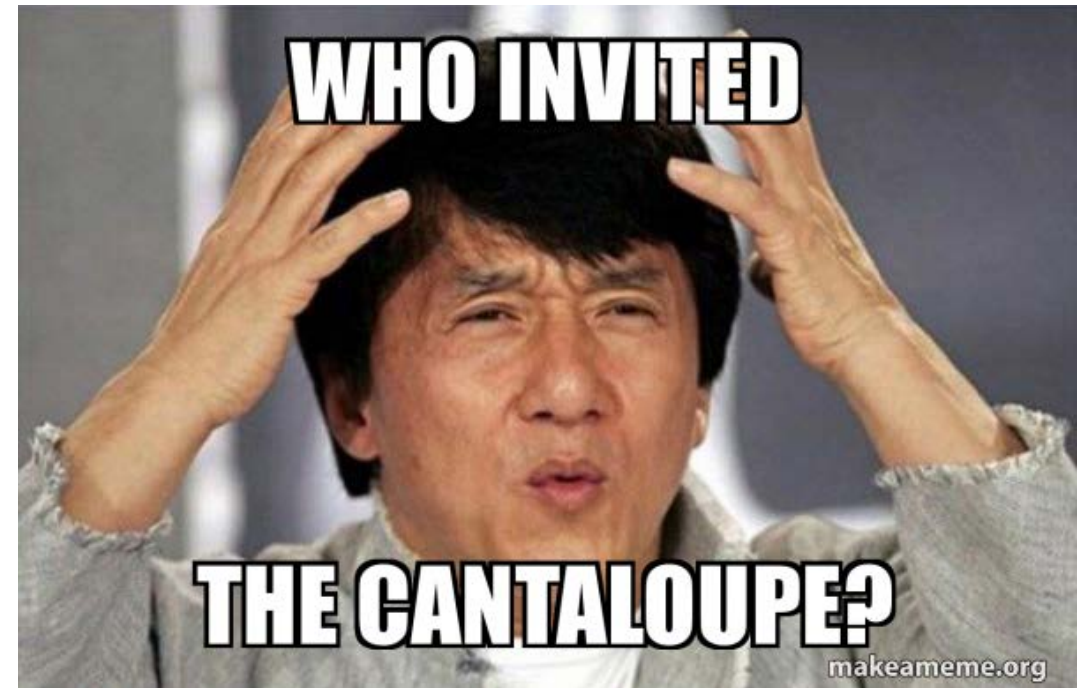


Long or Extended Shelf-Life Variety



Changing Buyer Demands





Updated Maturity Standards



California has Mandatory Quality Standards for Sugar

California has always had a higher maturity standard than USDA. California requires a minimum of 9 brix at harvest. CCAB has added new standard for LSL and ESL varieties. 12 brix to improve consumer eating experience.



Growers/Seed Companies Working to get better flavor AND long shelf life.





Produce for Better Health Webinar «Taste v Waste»
*Understanding factors affecting taste
in US Cantaloupes*

// June 29 2021

// Elen Jones-Evans

// The Vegetable Seeds Business Unit of
Crop Science, a division of Bayer



exponential³

VEGETABLES R&D
PIPELINE
PROCESS
PEOPLE
p3



Our Vegetables R&D Global Organization



4 regions
28 countries
35 locations

Gender Diversity



About 47% of our global workforce are women



48% of our extended leadership team (N-4) are women

Six major vegetable crops



Tomato



Pepper



Cucumber



Spinach



Broccoli



Sweet Corn

*More than 15 crops represent the product portfolio in Vegetables



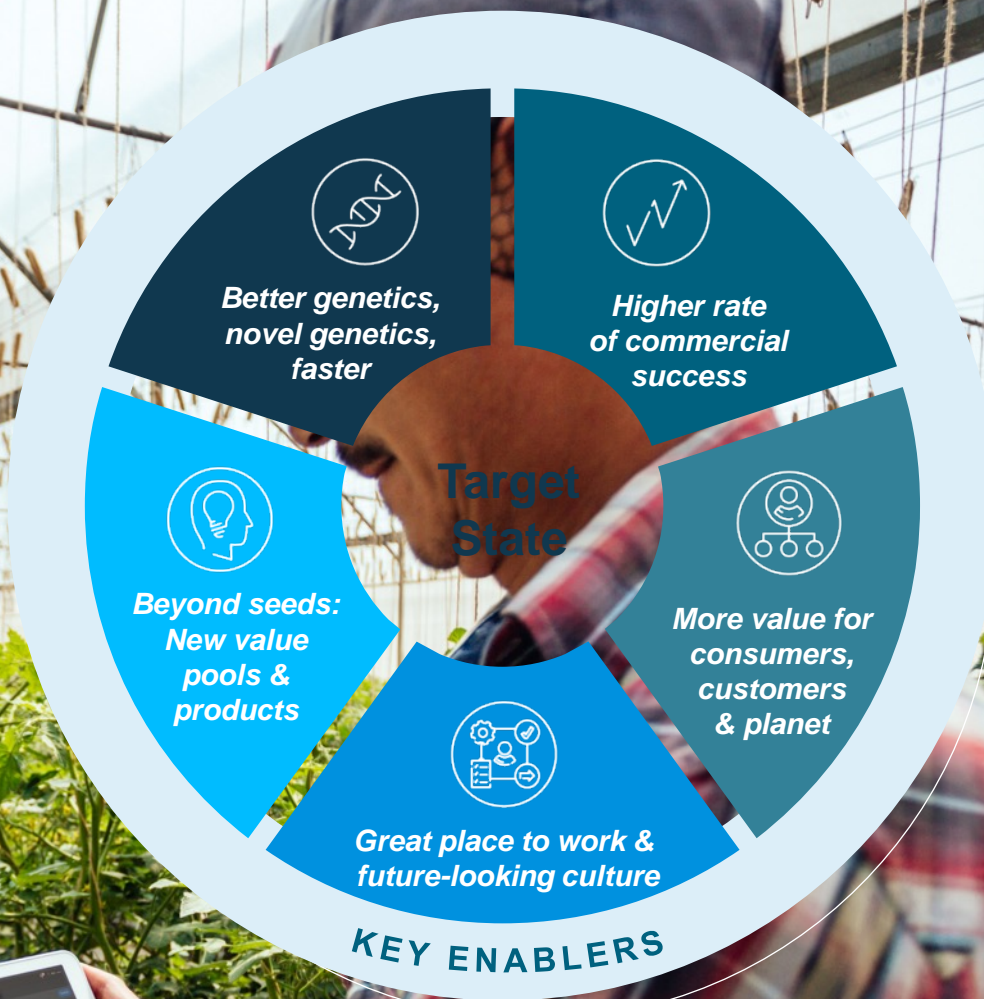
HOW WE'LL GET THERE

Our Mission

Delivering **disruptive**,
sustainable solutions to
meet the needs of **growers**,
consumers and the
value chain.

Health for all,
Hunger for none

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Germplasm enhancement

Tailored solutions

Predictive breeding

People & culture

Data insights & advancement

Logistics & prescriptive seed productions

PUBLIC

A changing landscape requires continuous evolution

Our Breeding pipeline is strong across crops and addresses grower and consumer benefits

Grower Benefits



Yield



Resistance



Harvestability

Consumer Benefits



Quality Produce



Convenience



Sensory Experience

Product highlights



Sweet Pepper:
convenience –
shelf life –
snacking



Watermelon:
eating pleasure
– seedless

Cherry tomato:
convenience –
eating pleasure
& taste



The perfect cantaloupe!

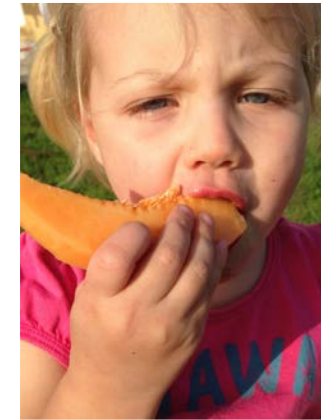
- Good looking
- Good tasting
- Not too firm
- Aromatic
- Sweet



.....AFTER SHIPMENT AND HANDLING



Factors affecting fruit quality -The Melon Journey!



GROWER

SHIPPER

CONSUMER

Focus

Yield
Fruit Quality
Field holding ability
Disease resistance

Flesh firmness
Fruit cavity diameter
Skin thickness
Fruit Netting

Aroma
Brix (sweetness)
Flesh color

Day 0

time

Day 10



Specific breeding traits involved in taste

1. **Disease resistance package** – protects yield and quality potential, enhances Sustainability principles

2. **SHELF –LIFE:**

ESL – Climacteric melons (Ethylene burst) versus LSL

	ETHYLENE	SKIN COLOR	AROMA	SLIP	FLESH FIRMNESS	SHELF LIFE (RT) DAYS
ESL	Yes	Yellow	High	Yes	Soft	4
LSL	No	Green	Low	No	Hard	10



3. **Brix** – Total Soluble Solids content of fruit

4. **Aromatic profile**

Finding the right balance between SHELF LIFE – flesh firmness and sugar levels



Bayer Cantaloupe Global Program

Different Areas, Different goals, one breeding pipeline – **global diversity, local delivery**

✓ Sutured Cantaloupe
is light or deep
sutured & netted



CAN- Cantaloupes



CHA -Cantaloupe Charentais

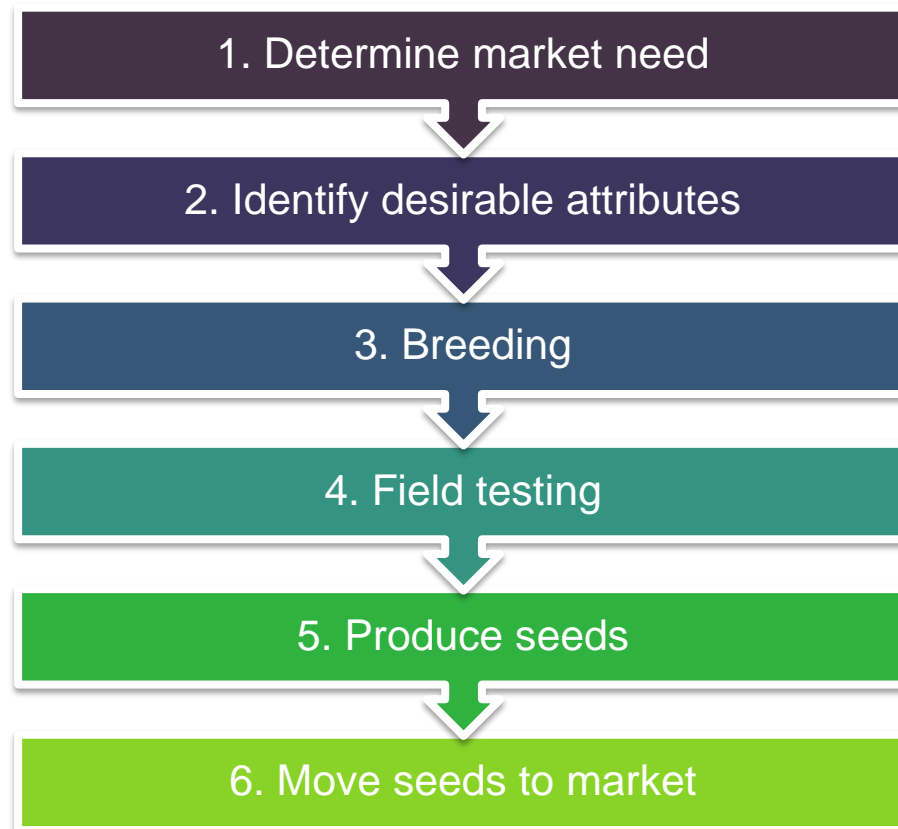


ITA – Cantaloupe Italians



✓ Cantaloupe is non-sutured
& full netted

Steps in developing a better tasting Cantaloupe

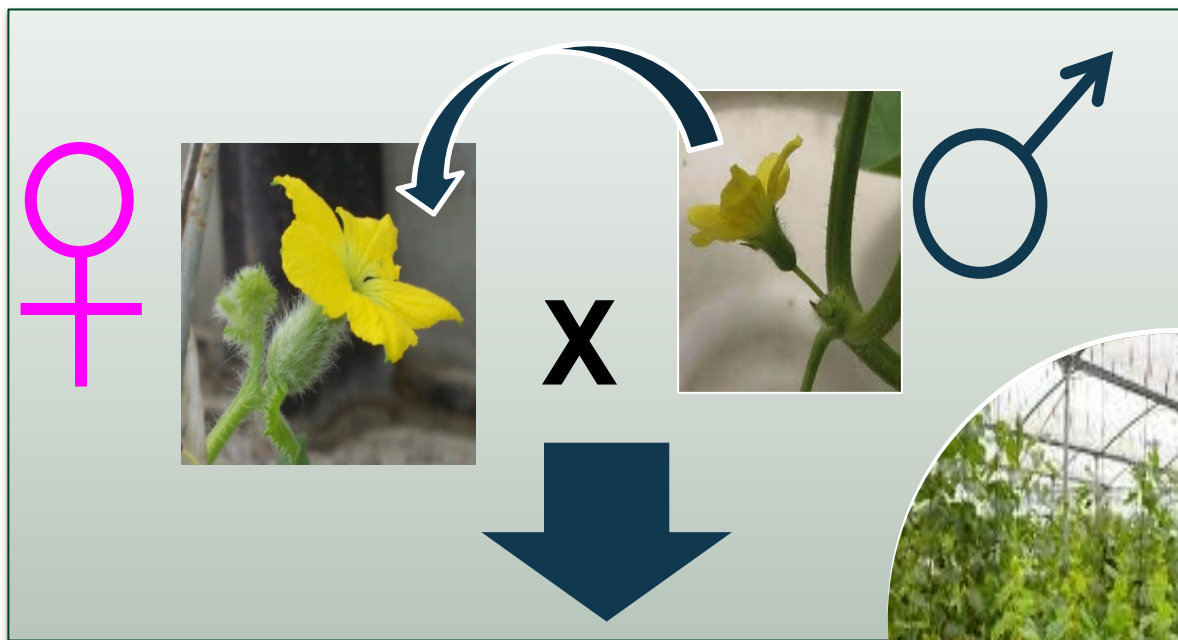


- Meet grower needs
- Yield
 - Resistance to disease, pests, weather conditions
 - Uniformity

- Increasing consumer appeal
- Flavor
 - Aroma
 - Color
 - Texture
 - Nutrition



Breeding for enhanced fruit quality



Germplasm diversity



DH/Fast cycling/
Technologies



Genotypic and
phenotypic
selection

Digital tools

Genetic gain over time

3. Breeding

Better
tasting
products,
FASTER

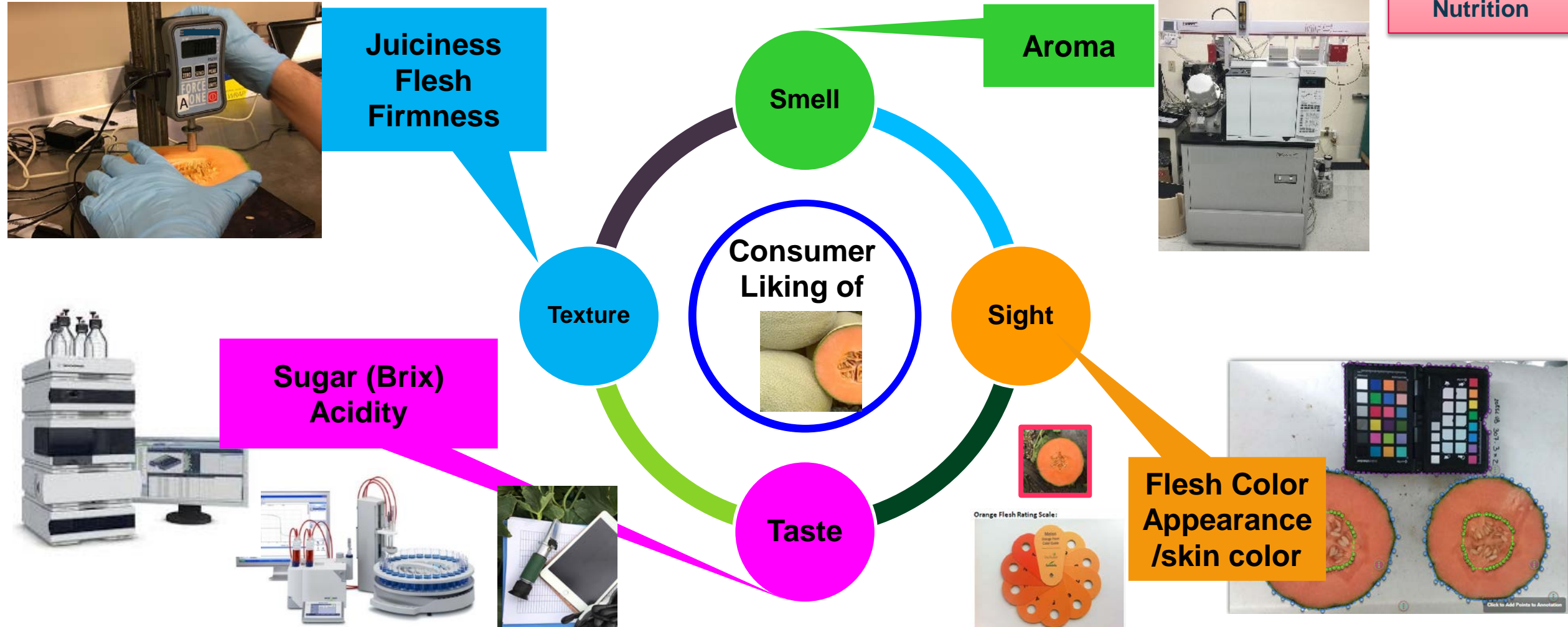


2. Identify desirable attributes

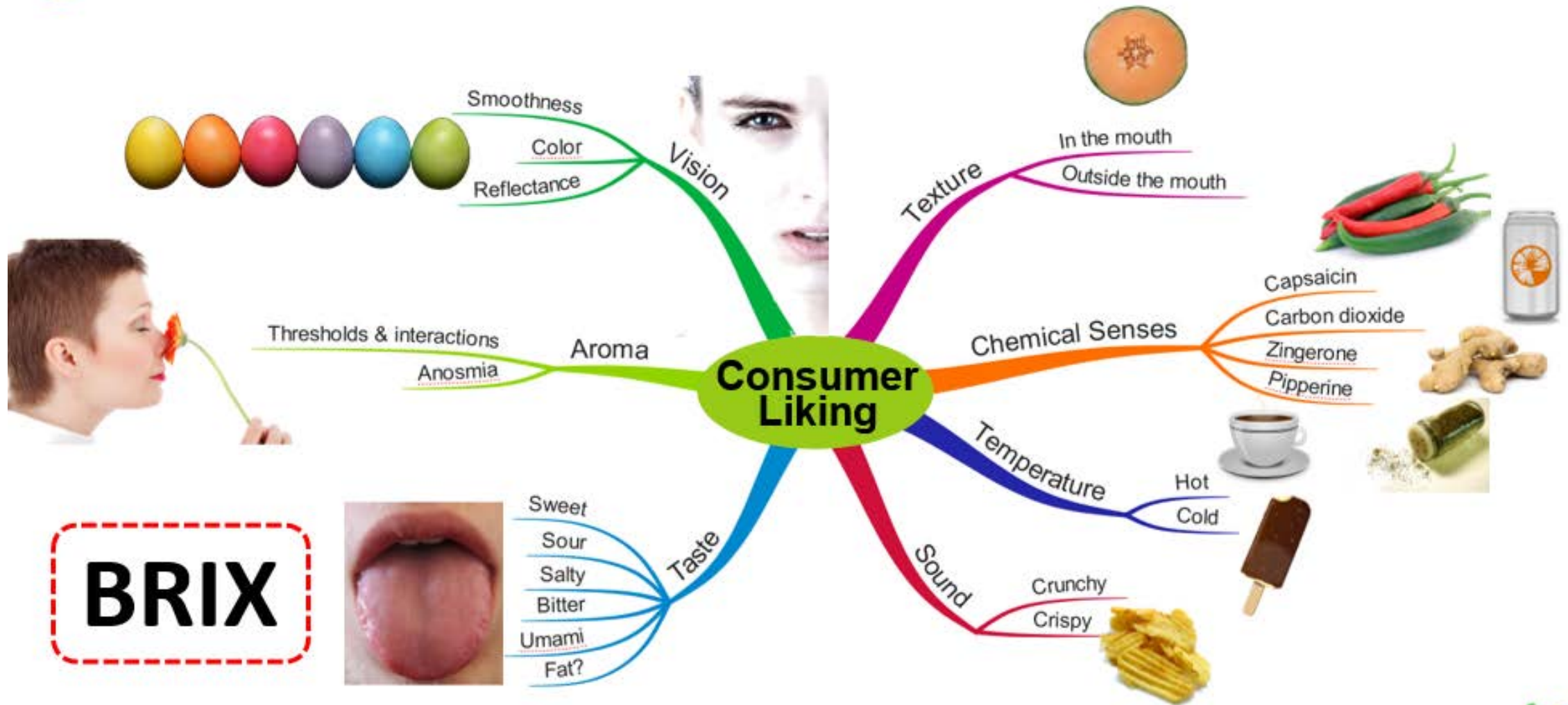
Improving fruit quality by measuring its key components

Bringing the expertise and analytical toolbox together to enhance breeding

Flavor
Aroma
Color
Texture
Nutrition



Understanding consumer preference





Qualitative understanding

Identify the difference

Quantify the difference

Quantify liking

**Sensory
inSights**
For better flavors



Consumer Test – Screening, location & design

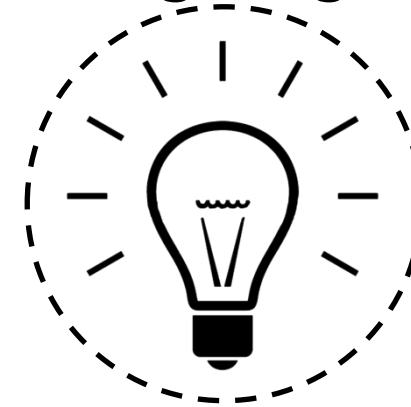
150 consumers per country



Consumers of melon



Lighting

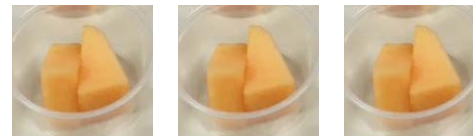


1 country

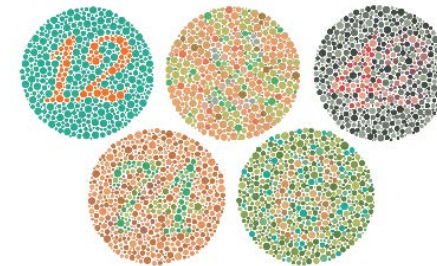


U.S.A.

3 samples per day x 1 day



Ability to taste & not color blind





Sensory analysis



Cantaloupe A

(10.5 °Brix, cavity; 6 lbF)

Don David

(11.1 °Brix, cavity ; 13.4 lbF)



Preference Test: in Tennessee, 150 melon consumers were asked to choose between Cantaloupe A and Don David. After tasting melon cubes, 136 consumers stated a preference and 66% of those consumers preferred the eating quality of Don David.

When asked to choose between Cantaloupe A and Don David...	34%	66%
Because it has more of...	juicy soft sweet flavor	sweet juicy taste crisp firm soft fresh flavor ripe slight
...and less of...	tough firm bland hard crisp bitter	sour soggy hard sweet crisp bitter bland watery soft taste dry mushy

¹Results from a preference test of cut Cantaloupe A and Don David melons stored at 4F for 7 days at the University of Tennessee during May 2018 involving 150 consumers who enjoy eating melon. Number of no preference was 13 out of 150, and were excluded from the data set. Don David was significantly preferred ($p = 0.0002$) over Cantaloupe A. A preference of 50% means there is no preference for either varieties.

Winning products – new concept

New

Don David

Commercial



Don David Cantaloupe melon offers:

- Uniformity, attractive netting and flesh color
- Good plant size and fruit set and a good balance between vegetative and generative growth.
- Featuring high average Degrees Brix, competitive yield and good fruit quality.
- High resistance to Fusarium wilt races 0 and 1

SVMF6766



- Yellow skin – different perception
- Red flesh – intense color perception = good tasting
- LSL gene – improve field hold and transportability and
- Good sugar levels

	Cantaloupe 1 (11.6 °Brix, cavity; 16.1 lbF)	SVMF6766 ✓ (13.6 °Brix, cavity; 14.2 lbF)
When asked to choose between Cantaloupe 1 and SVMF6766...	31%	69%
Because it has more of...	soft, juicy, sweet, hard, taste, flavor	orange, juicy, taste, sweet, flavor, soft, hard, moist, color, ripe, texture
...and less of...	sweet, hard, taste, soft, bland	bitter, watery, acid, dry, soft, crisp, hard, bland, taste, sour, fruity, sweet, flavor

Taste vs. Waste

The Case for Pear Fruit

Elizabeth Mitcham

Director, Postharvest Technology Center
University of California, Davis



Juicy, Creamy, Sweet

This is the
experience
consumers want!



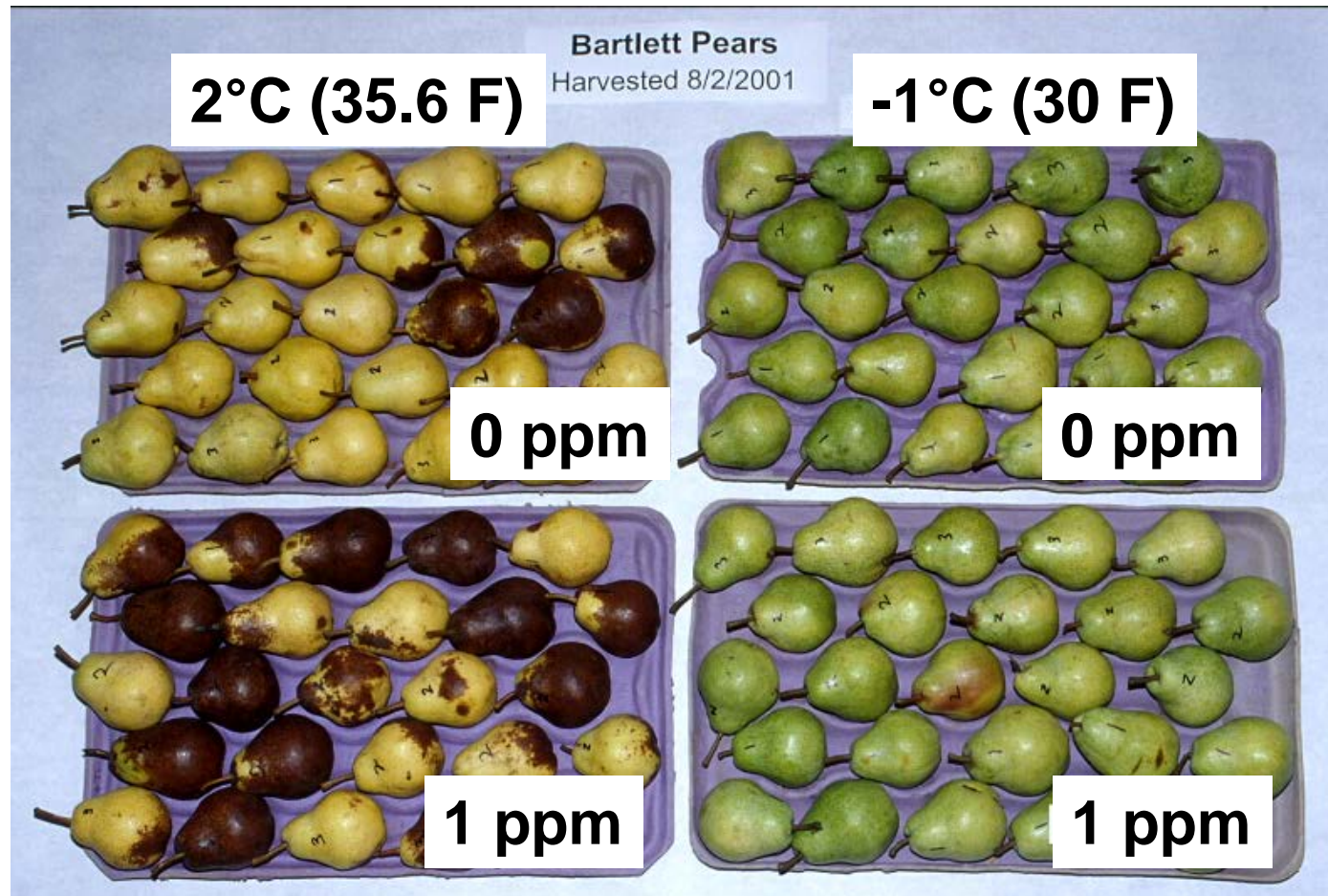
Handling of Fruit After Harvest

- Harvest – fruit are firm but mature
- Storage – weeks to months
- Conditioning – to assure ripening to good quality
- Partial Ripening – before marketing
- Final Ripening – consumers home



Effects of Temperature and Ethylene on Post-Storage Quality

Stored 3 months

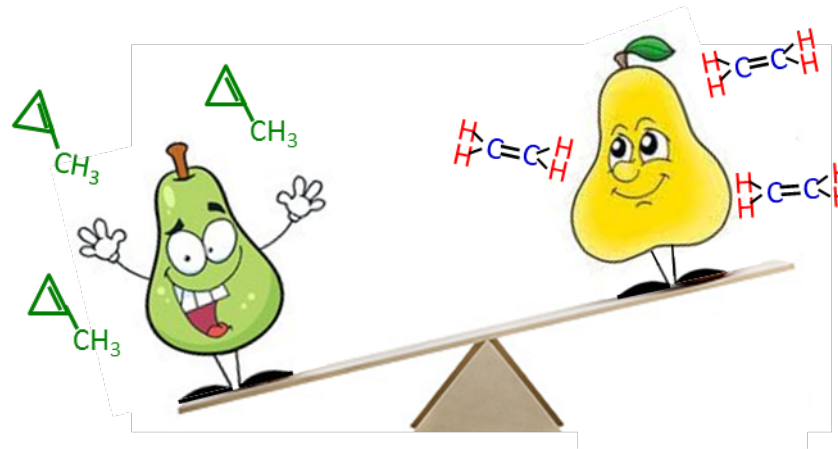


Mechanisms to Delay Ripening during Storage and Shipping

- Low storage temperature
- Storage atmosphere - O₂ , CO₂, ethylene
- 1-methylcyclopropene

1-MCP to Slow Ripening

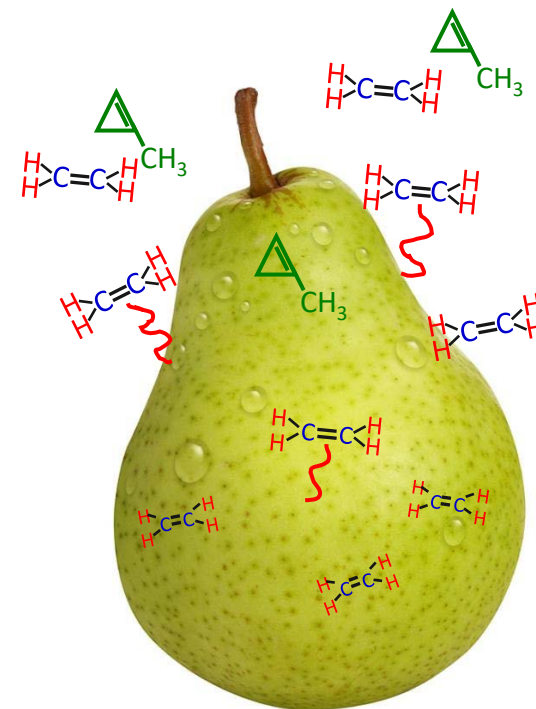
- Extend storage life in air storage
- Warmer temperatures in storage to save energy
- Shipment of fruit to tropical climates or areas without cold chain



1-Methylcyclopropene (1-MCP)

- Fruit produce ethylene gas and ethylene can also be applied
- Ethylene binds to receptors in fruit to promotes ripening
- 1-MCP is a safe gas with a similar structure to ethylene
- 1-MCP blocks ethylene from binding to receptors and inhibits ripening

Treated with 300 nL/L 1-MCP

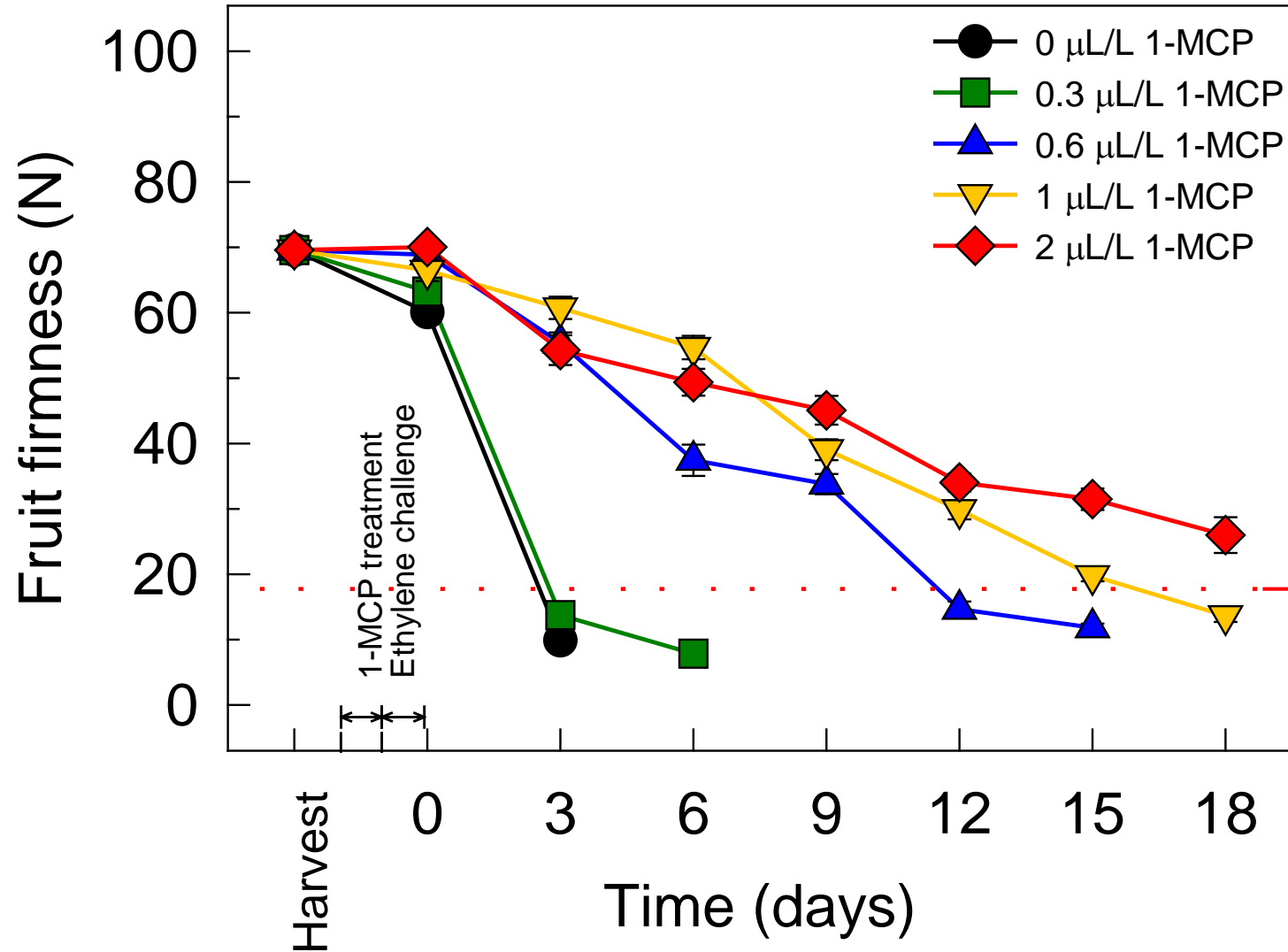


European Pears



- Ethylene is required to develop creamy texture and good flavor
- Promotes production of flavor compounds
- It is often challenging for 1-MCP to wear off in time to allow pears to ripening to good eating quality

Effect of 1-MCP on Pear Softening



Handling Pears at Home for Best Quality

Purchase light green or light-yellow pears

- Should be partially ripened

Option #1. For fruit you plan to eat in a couple days

- Place in a bowl on the counter to finish ripening (1-2 days)
- Unlike bananas, ripe pears can be placed in the produce bin until you are ready to eat them.

Option #2. For fruit you plan to eat later:

- Place unripened pears in the produce bin of your refrigerator.
- Remove a few fruit for ripening on the counter, as needed



Q&A

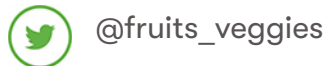
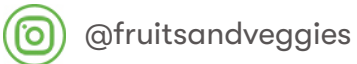
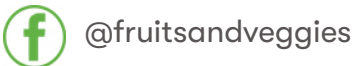
Join The Movement



have a
plant
fruitsandveggies.org

Show your support by taking and sharing the Have A Plant® pledge at fruitsandveggies.org. While you're there, check out the useful resources to equip you with the tools you need to enhance your nutrition knowledge and empower consumers to enjoy more fruits and vegetables every day.

Follow PBH's social channels to keep up to date on all the insights and inspiration. #haveaplant



**SEPTEMBER IS NATIONAL
FRUITS & VEGGIES
MONTH**
#HAVEAPLANTPLEDGE
#HAVEAPLANT #NFVM2021

September is National Fruits & Veggies Month and each year we celebrate Have A Plant® during this monumental moment. This year's theme:

PBH celebrates the International Year of Fruits and Vegetables in the U.S. during National Fruits and Veggies Month 2021!
Have A Plant® Nation Goes Global!

**Start planning today for this
year's celebration with our
National Fruits & Veggies Month
Toolkit!**

<https://fruitsandveggies.org/nfvm-toolkit/>



A catalog of PBH's past webinars is available at fruitsandveggies.org/expert-professionals/webinars.

Continuing professional education units (CPEU) are available for live and pre-recorded webinars.



THANK YOU

We live at the center of produce,
partnership and passion.

**WE ARE SO HAPPY
YOU'RE WITH US!**

