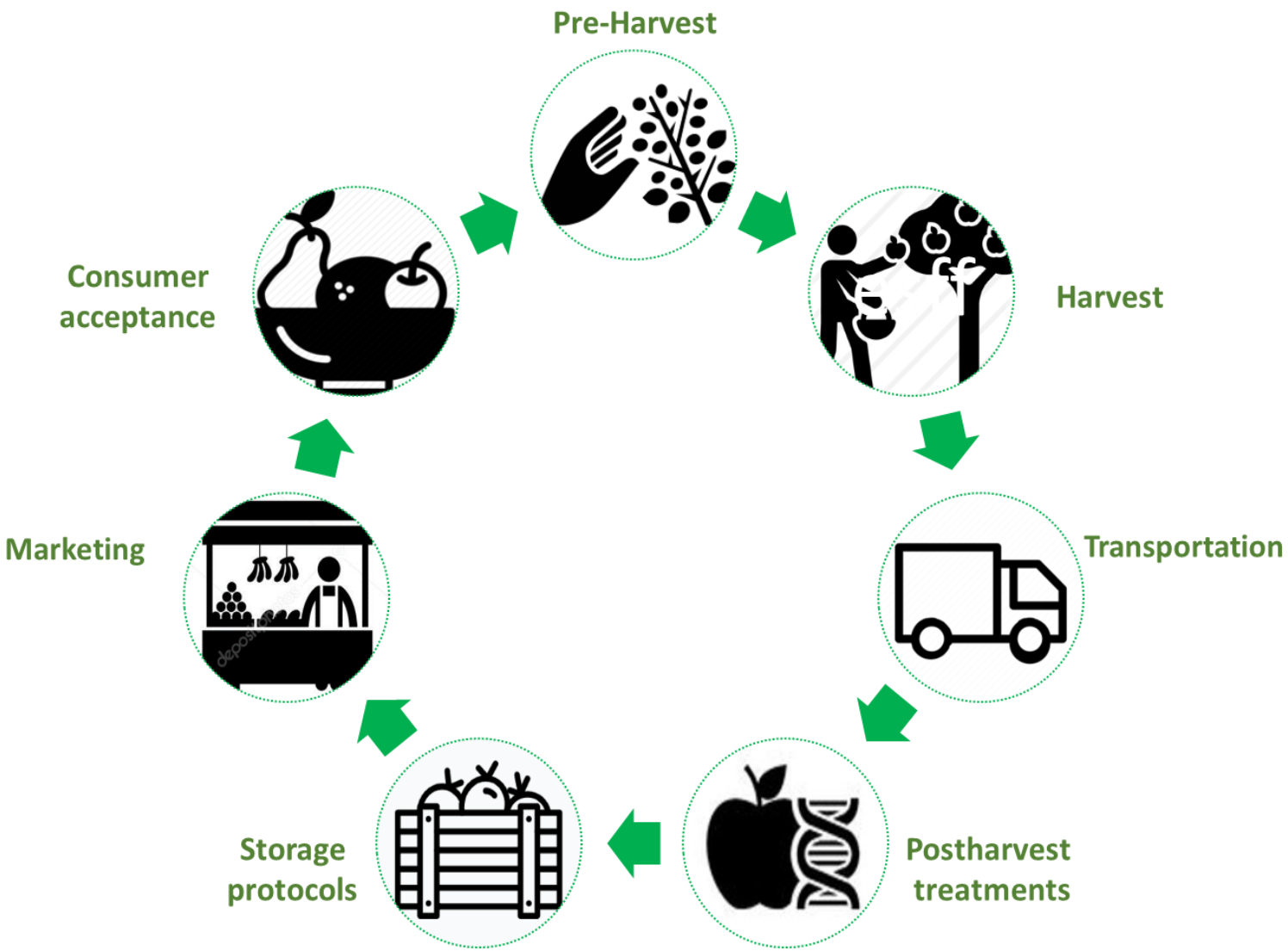
MIGAL
Galilee Research Institute

Applied Research Institute
& Technology accelerator

Postharvest Research Laboratory

PostHarvest – What is it?

To Prolong storage and marketing of agricultural products while maintaining their best quality and Increasing its economical value.



What are the postharvest Challenges?

Postharvest Pathological disorders- rots (decayed)

After harvest the fruit is sensitive to pathogens

Alternaria alternate

Botrytis cinerea

Penicillium

Alternaria alternate

What are the postharvest Challenges?

Postharvest physiological disorders

The fruit is very sensitive to many disorders after harvest.

Peel damage

Lenticels breakdown

Superficial scald

Watercore

Bitter pit

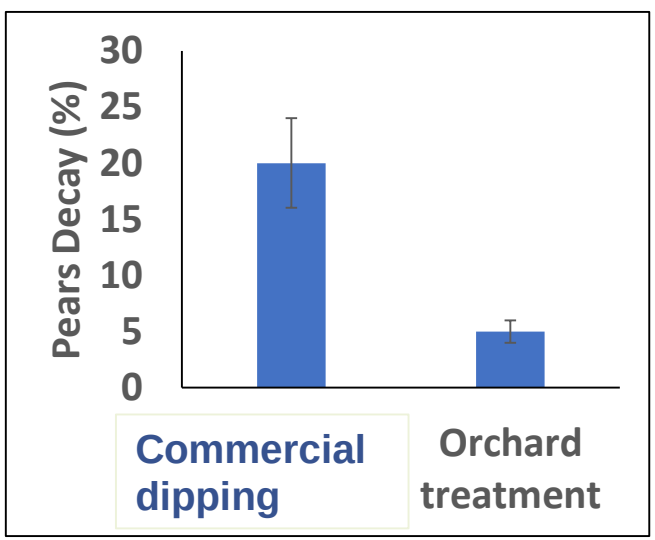
CO_2 Damage

Our holistic solution

Preharvest treatments

- Reduction of cracks and decay of pink lady apples
- Preventing postharvest decay by orchard sprays
- Induction of red peel color

Control ***Treated***



Our holistic solution

Transportation

Analyzing road quality to prevent impact bruises.

Our holistic solution

Harvest indices

We define the best ripening parameters for harvest to achieve the best fruit quality in storage.

Too early

The best ripening stage

Too late

Early harvest 11.5% sugar

Late harvest 13.5% sugar

Our holistic solution

Postharvest treatments

For example: 1-MCP treatments to delay fruit ripening and improve quality.

Superficial scald prevention

1-MCP Control

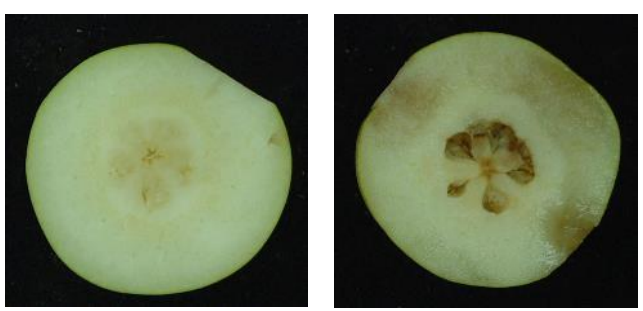
Our holistic solution

Storage protocols

- Develop and improve storage protocols.
- Implementation of new postharvest technologies: (for example DCA- Dynamic controlled atmosphere).

-0.5 ^{O}C
2% CO_2

-0.5 ^{O}C
5% CO_2



Spadona pears
9 months storage

0 ^{O}C
2% CO_2

3 ^{O}C
2% CO_2

Granny smith apples
10 months storage

Our holistic solution

Improving fruit flavor and nutritional quality.

2°C 4°C 7°C

Pomegranate - a case study

Preharvest- orchard treatments:

‘Superlon’- to reduce peel cracks.
Fungicides- to prevent storage decay.
‘Blush’- to improve peel color.

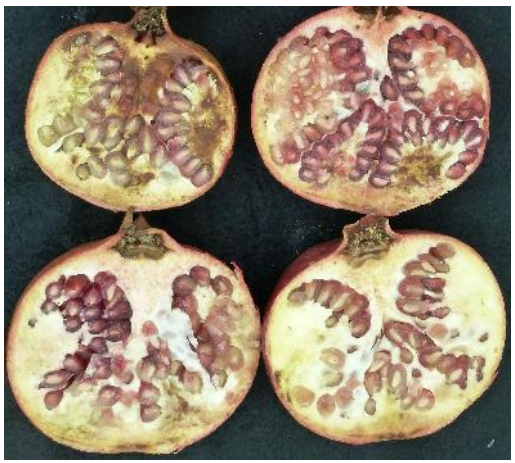
Control ***Treated***

Pomegranate - a case study

Definition of parameters for harvest:

Early harvest- Internal browning (sugar<16%).
The best harvest- (16%<sugar<18%).
Late harvest- sensitivity to decay (sugar>18%).

Too early



The best harvest

Too late

Pomegranate - a case study

Postharvest treatments and storage protocols:

1-MCP treatment- prevent husk scald
Improve storage protocol –better aril appearance and flavor.

Customer acceptance:

We supply a pomegranate with good appearance and good flavor over 4 months of storage

Preventing Postharvest decay solutions

- Preharvest orchard treatments.
- Looking for effective fungicide treatments.
- Examining alternative “friendly” solutions (new technologies: Ultrasonic waves, volatiles etc.).
- Sanitation activities (storage room fogging).
- Registration experiments of new fungicides.

Preventing postharvest physiological disorders

- Developing new storage protocols for fruit and vegetables (temperature, atmospheric composition, humidity)
- Developing harvest indices for the right ripening stage.
- Pre-storage treatments (hot water treatment, calcium dipping, curing, gradual cooling, more).
- Application of plant growth regulators to improve fruit quality (induction of red peel color and preventing peel browning).

Control

Treated

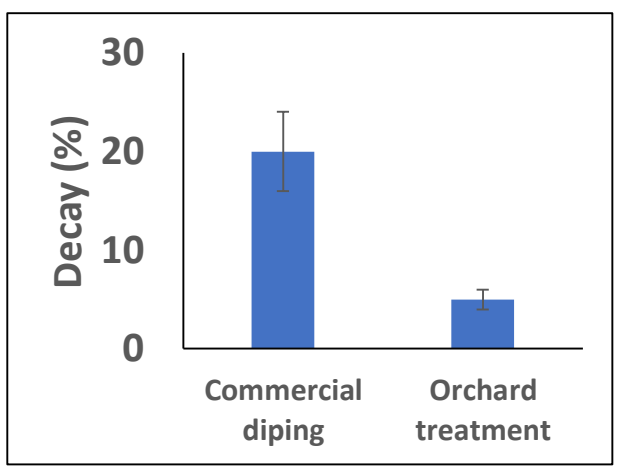
Improving food safety and nutritional quality

- Preventing storage rots using fruit peels extracts (total use, GRAS).
- Treatments to improve the nutritional quality (ascorbic acid, antioxidants content).
- Physical treatments to remove fungal spores and reduce the use of fungicides.

Control

Peel extract Treatment

Pears' rots reduction



Fruit & Vegetable Basket

TEMPERATE	SUBTROPICAL	MEDITERRANEAN	Other
Apple	Avocado	Date	Mushrooms
Cherry	Citrus	Fig	Carrots
Kiwifruit	Banana	Grape	Potato
Pear	Lychee	Pomegranate	Sweet Potato
Peach-nectarine	Mango		Onion
Persimmon	Passion Fruit		Garlic
Plum	Pitahaya		Watermelons
Almon	Papaya		Melons
			Lettuce
			Cabbage
			Broccoli















Postharvest Research Laboratory
Professional services

Commercial companies

- Experiments for the registration of new fungicides
- Estimating the effect of PGR on fruit (plant growth regulators)
- Modified atmosphere packaging companies
- New storage technologies
- 1-MCP treatment protocols

Training

- Training the staff of the storage facilities with quality assurance.
- Open days and seminars
- Sharing information of the research reports
- Yearly conferences

Professional services

- Diagnosis and solutions for postharvest physiological and pathological blemishes.
- Detection and analysis of gases in the storage rooms (Ethylene, ethanol, ect.)
- Consulting and escorting private experiments for the storage facilities.

Developing technologies

New technologies, tools and objective parameters:

- Image analysis and processing (Starch degradation index).
- Tissue deformation (Non destructive firmness).
- Transportation quality control.

Training

- Training the staff of the storage facilities for postharvest quality assurance.
- Open days and seminars.
- Sharing information of the research reports.
- Yearly conferences.
- Basic research by M.Sc. Students.

Commercial companies

Research collaborations

MIGAL
Galilee Research Institute

WASHINGTON STATE UNIVERSITY

Agricultural Research Organization - Volcani Center

Tel-Hai College

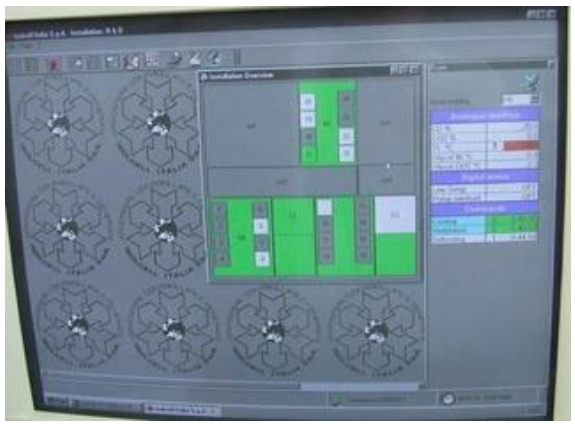
Postharvest Research Laboratory

Infrastructure: storage facilities

- 24 controlled atmosphere storage cabinets (5.5m^3).
- 2 semi-commercial storage rooms (50m^3) for controlled atmosphere experiments with 20 harvest bins each.
- 3 shelf life rooms (50m^3) for the simulation of marketing.
- 2 ethylene ripening controlled cabinets.

Infrastructure: control and management

- Computed system for the control of temperatures and atmospheric compositions.
- Advanced storage systems
  (DCA- Dynamic controlled atmosphere).
- Electronic nose- analysis of volatiles during storage.
- Gas analyzer for the atmospheric composition.



International Commercial collaboration

- Storage facilities contractors.
- Postharvest technology companies.
- Fungicides companies.
- Chemical companies.
- Universities and research institutes.

Infrastructure: measurement instruments

- Amilon- starch estimation tool.
- Penetrometer- firmness analysis
- Color-meter- peel and flesh color.
- Titrator- Acid content measurement.
- Refractometer- sugar content.
- Aweta- acoustic firmness.
- Sinclair- Elastic firmness.
- Ultrasonic bath- physical treatment.

Thank you!


merci
obrigado
grazie
gracias
kiitos
спасибі
tack
köszönöm
хвала
teşekkür ederim
danke
ačiū
hvala vam
tak
þakka þér
Dank u
ddiolch 'ch
σας ευχαριστώ
thank you
dziękuję
děkuji
Ďakujem
hvala
Takk
ありがとう
תּוֹדָה
Tapadh leibh
falemnderit
благодаря
mulţumesc
спасибо
شكرا
tänan teid
дзякуй
trugarez
Ви благодарам
धन्यवाद
谢谢
Go raibh maith agaibh
Paldies