



Keep it Fresh



Shelf Life Extension Products for Fresh Produce

# AGENDA




- ▶ Introduction To Keep It Fresh
- ▶ Technology
  - ▶ Anti Microbial
  - ▶ Ethylene Adsorbers
- ▶ Products
- ▶ Trials
- ▶ FDA Status
- ▶ REACH




# Plants Outside India



 125,000 sq ft

*California, USA*



 35,000 sq ft

*Australia*



 50,000 sq ft

*Lyon, France*



 40,000 sq ft


*Dubai*



 100,000 sq ft

*Italy*



 85,000 sq ft

*Germany*





# Plants in India



*Corporate office*

 **2,500 sq ft**

**Delhi NCR, India**



 **80,000 sq ft**


**Mumbai, India**



 **150,000 sq ft**

**Delhi NCR, India**



 **250,000 sq ft**

**Punjab India**



 **50,000 sq ft**

**Delhi NCR, India**



 **30,000 sq ft**

**Chennai, India**

# ETHYLENE PROBLEM



- ▶ Ethylene is a gas naturally produced by fruit as it ripens
- ▶ Ethylene works as an accelerator to the ripening process
- ▶ Ethylene increases ripening exponentially
- ▶ Ethylene adsorbers reduce the ripening rate by adsorbing the ethylene molecules.
- ▶ Ethylene molecules form a bond with the keep-it-fresh additives and are trapped



Keep it Fresh  
The Technology

VBI Technology  
Anti microbial silver ions  
Ethylene Adsorbers

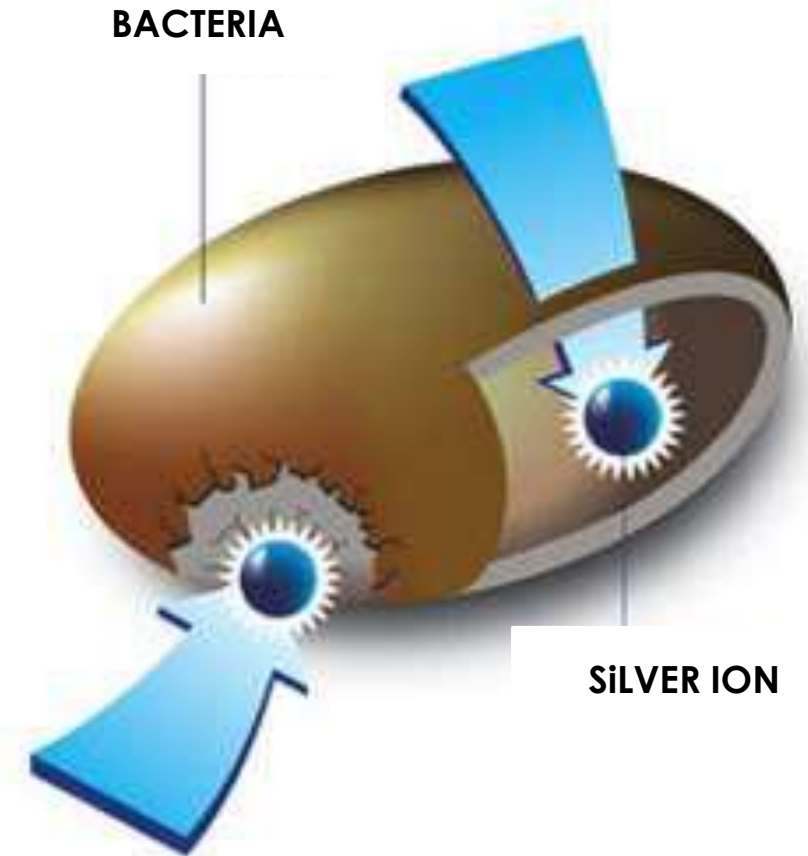
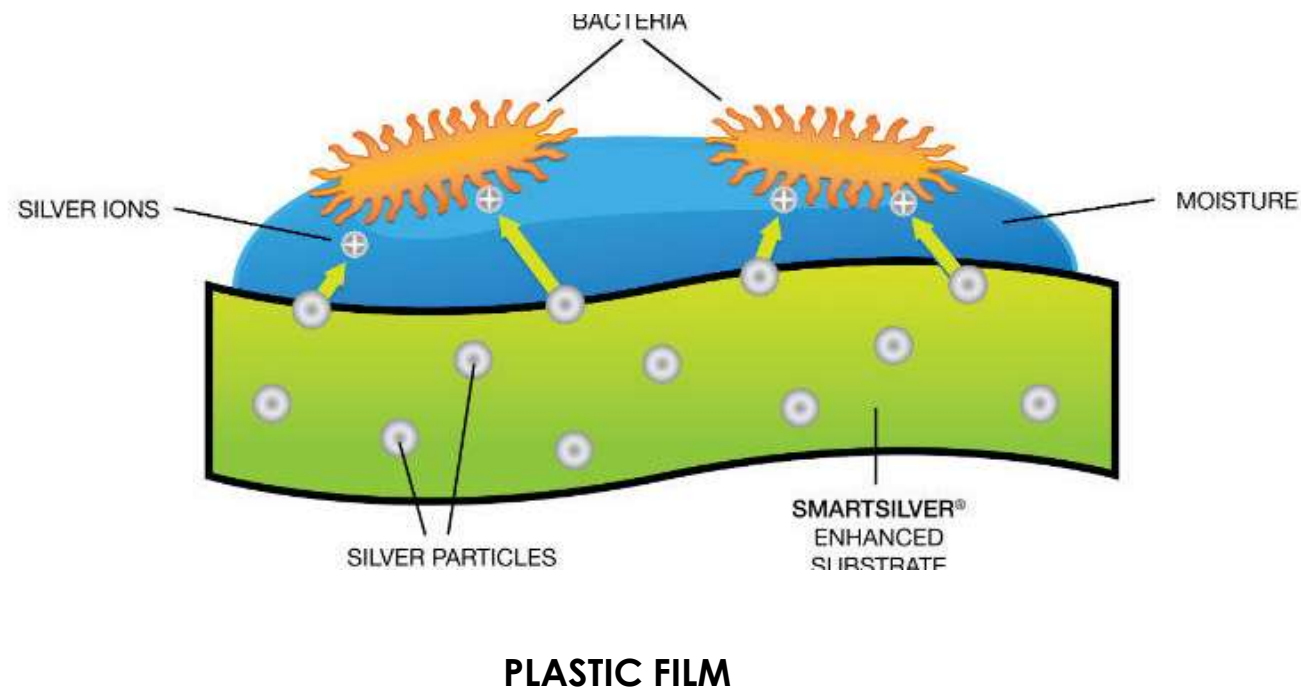


**3-IN-ONE**



# Anti Microbials

1. Bacteria deposits on plastic film with moisture
2. Cell Membrane is de-stabilized
3. Respiration is prohibited
4. Food nutrition intake is impeded
5. Cell Division is inhibited



# VBI Technology



1. Volatile Bacterial Inhibition
2. Lower vapor pressure anti bacterial additives vaporize in packaging
3. Forms anti bacterial environment not just on film surface but also around





# ETHYLENE PROBLEM



## ETHYLENE PRODUCTION FROM DIFFERENT FRUITS & VEGETABLES

LOW <1.0 ml/kg/hr	MODERATE 1-10 ml/kg/hr	HIGH 10-100 ml/kg/hr	VERY HIGH >100 ml/kg/hr
Pineapple, artichoke, cauliflower, broccoli, date, orange, spinach, beet root, green asparagus, celery, lemon	Banana, mango, plum, tomato	Apricot, nectarine, pear, peach	Apple, Avocado, cherimoya, passion fruit

# USFDA Testing from SGS

Passes USFDA 21 CFR177.1520 (Olefin Polymers)



SGS

TEST REPORT

Report No. : MAN:HL:7480003070

DATE : 18<sup>th</sup> February, 2016



HI TECH INTERNATIONAL  
PLOT NO-B 31, BEANT COLONY JAMALPUR  
LUDHIANA-141010  
INDIA

CONTACT PERSON : MR. SIDHARTH SAREEN

THE FOLLOWING SAMPLE(S) WAS/WERE SUBMITTED AND IDENTIFIED BY/ON BEHALF OF THE CUSTOMER AS :

SAMPLE DESCRIPTION ROT NOT BAG  
COLOUR GREEN  
BUYER HI TECH INTERNATIONAL  
COUNTRY OF ORIGIN INDIA  
SAMPLE RECD ON 08/02/2016  
TEST PERFORMING DATE 09/02/2016 TO 18/02/2016

TEST REQUESTED PLS. REFER TO SUMMARY

TEST METHOD & RESULT(S) PLEASE REFER TO NEXT PAGE(S)

SUMMARY OF TEST RESULTS:

TEST REQUESTED	CONCLUSION
US FDA 21 CFR 177.1520 (Olefin Polymers) Maximum Extractable fraction Maximum Soluble fraction	Pass

Per Pro SGS India Pvt Ltd.

Ashish  
Sr. Executive  
Email your Test Report Related Enquiries at Feedback.HLT@sgs.com

SGS

TEST REPORT

Report No. : MAN:HL:7480003069

DATE : 17<sup>th</sup> February, 2016



HI TECH INTERNATIONAL  
PLOT NO-B 31, BEANT COLONY JAMALPUR  
LUDHIANA-141010  
INDIA

CONTACT PERSON : MR. SIDHARTH SAREEN

THE FOLLOWING SAMPLE(S) WAS/WERE SUBMITTED AND IDENTIFIED BY/ON BEHALF OF THE CUSTOMER AS :

SAMPLE DESCRIPTION ROT NOT MASTERBATCH 3131  
COLOUR WHITE GRANULES  
BUYER HI TECH INTERNATIONAL  
COUNTRY OF DESTINATION NOT PROVIDED  
COUNTRY OF ORIGIN INDIA  
SAMPLE RECD ON 08/02/2016  
TEST PERFORMING DATE 09/02/2016 TO 17/02/2016

TEST REQUESTED PLS. REFER TO SUMMARY

TEST METHOD & RESULT(S) PLEASE REFER TO NEXT PAGE(S)

SUMMARY OF TEST RESULTS:

TEST REQUESTED	CONCLUSION
US FDA 21 CFR 177.1520 (Olefin Polymers) Maximum Extractable fraction Maximum Soluble fraction	Pass

Per Pro SGS India Pvt Ltd.

Ashish  
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# TESTING



# Tomatoes in open condition



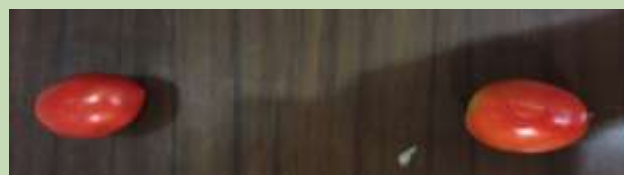
## ▶ KIF Bag



Tomatoes Day 1



Tomatoes Day 7



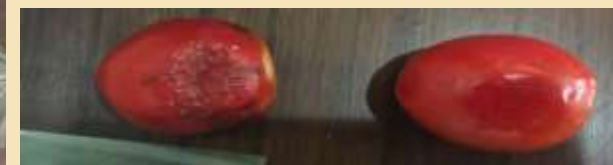
## ▶ Normal Plastic Bag



Tomatoes Day 1



Tomatoes Day 1



- ▶ Black spots observed on
- ▶ 3 tomatoes out of 4 in 7 days

# Testing on Bananas



## ► Open condition

Bananas Day 1



Bananas Day 7



## ► Test conditions



# Flowers



## ► Open condition



Roses Day 1

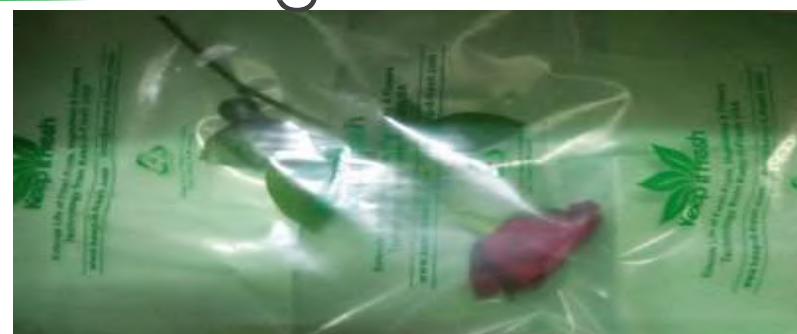


Roses Day 3



Roses Day 7

## ► KIF bag



Roses Day 1



Roses Day 3

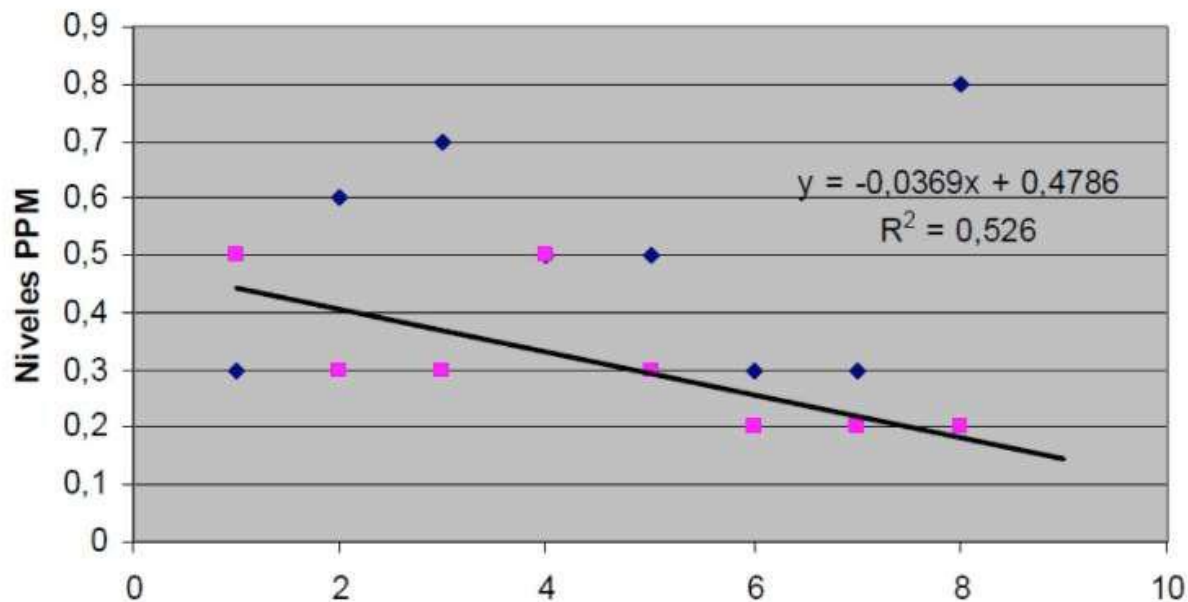


Roses Day 7

# Ethylene control in dry chamber



## Ethylene levels in the dry-environment chamber



Reduction due to dehydration, decay and over-ripening within the dry-environment chamber (8-12°C)

	Chamber without ethylene control In place for 3 days	Chamber with ethylene control In place for 3 days
Tomato	32%	12%

Reduction due to dehydration, decay and over-ripening within the dry-environment chamber (8-12°C)

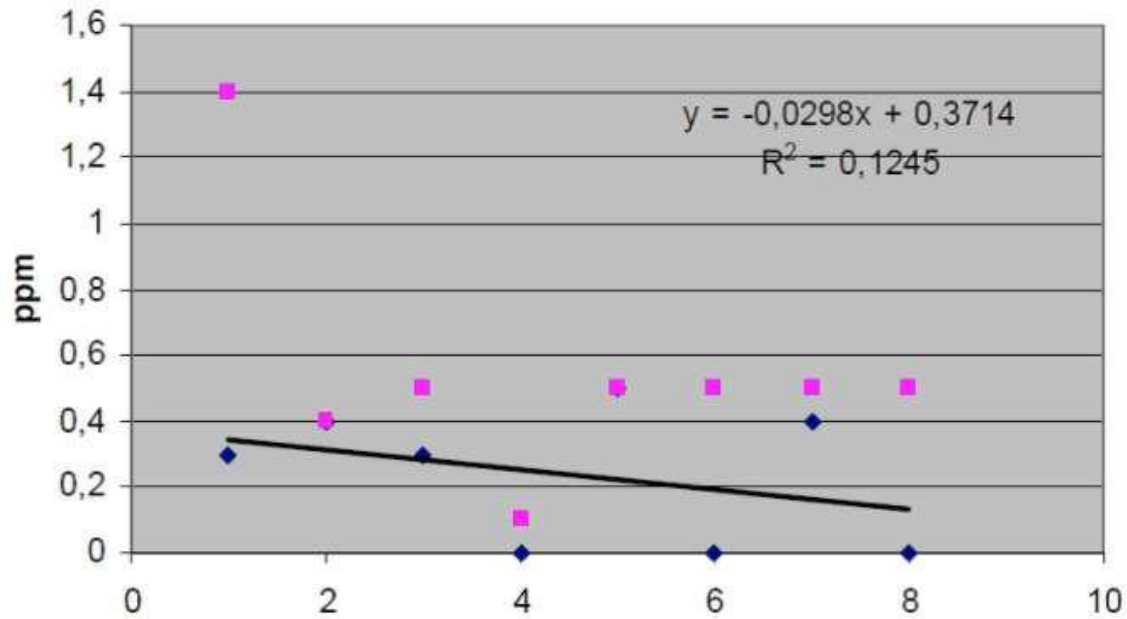
	Chamber without ethylene control In place for 3-8 days	Chamber with ethylene control In place for 3-8 days
Mango	20%	0%



# Ethylene Humid Environment Chamber Control



## Ethylene levels in the humid-environment chamber



Reduction due to dehydration, decay and over-ripening within the humid-environment chamber (2-4°C)

	Chamber without ethylene control	Chamber with ethylene control
Curly endive	80%	20%
Peach	21.6%	16.2%
Cucumber	22.7%	13.6%
Plum	12.8%	8.5%



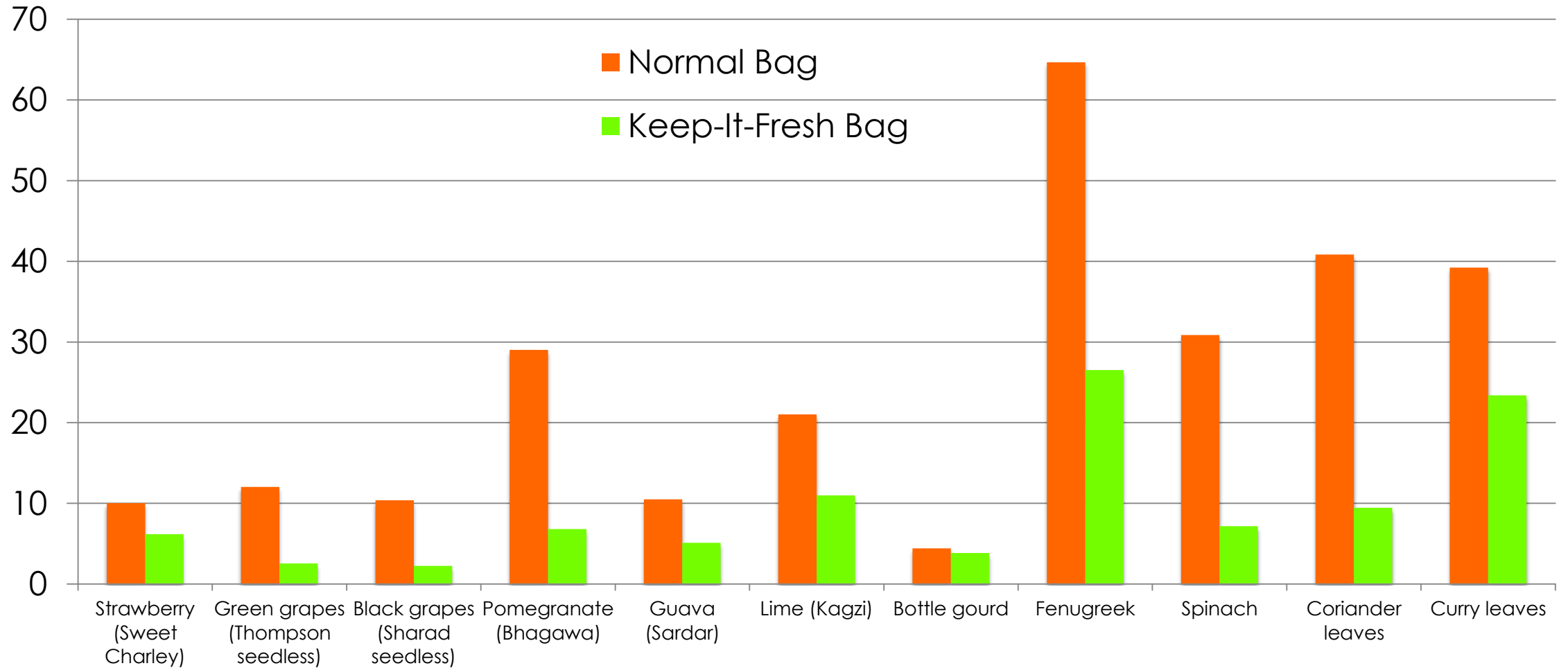


# Weight Loss over time



NO.	FOOD PRODUCT	Percentage Weight Loss (%) At Room Temperature		STORAGE DAYS At Room Temperature In Keep It Fresh
		Control bag	Keep It Fresh bag	
1.	Strawberry (Sweet Charley)	10.04	6.19	5
2.	Green grapes (Thompson seedless)	12.05	2.57	13
3.	Black grapes (Sharad seedless)	10.38	2.26	15
4.	Pomegranate (Bhagawa)	29.04	6.82	65
5.	Guava (Sardar)	10.50	5.12	8
6.	Lime (Kagzi)	21.02	10.99	13
7.	Bottle gourd	4.44	3.85	11
8.	Fenugreek	64.69	26.54	5
9.	Spinach	30.87	7.17	3
10.	Coriander leaves	40.85	9.45	3
11.	Curry leaves	39.24	23.40	5

# Weight Loss % of different fruits and vegetables in Normal bag compared to Keep-It-Fresh Bag



# Keep It Fresh Bags



- ▶ Made from food grade Polyethylene resins.
- ▶ Leave no harmful residues and are human safe.
- ▶ Preserve the freshness of perishables at room temperature as well as in refrigerator
- ▶ Certified and approved for food contact applications
- ▶ USFDA Tested by SGS Labs
- ▶ Recyclable



# Products



- ▶ Ethylene Adsorber Paper
- ▶ Ethylene Adsorber Sachets
- ▶ Ethylene Adsorber Masterbatch 3131
- ▶ Ethylene Adsorber Bags
- ▶ Ethylene Adsorber Injection-molded Products
- ▶ Oxygen Adsorber Sachets



# Ethylene releasing produce



- ▶ Apples
- ▶ Mangoes
- ▶ Durian
- ▶ Grapes
- ▶ Pomegranate
- ▶ Pears
- ▶ Plums
- ▶ Strawberries
- ▶ Peaches
- ▶ Asparagus
- ▶ Broccoli
- ▶ Carrot
- ▶ Cauliflower
- ▶ Lettuce
- ▶ Onion
- ▶ Bokchoy
- ▶ Bell Peppers

# Keep It Fresh Sachets



- ▶ Can be placed with the fresh fruit and vegetables
- ▶ Natural Clay Desiccant
- ▶ Natural Ethylene adsorbers
- ▶ 5 grams per cubic feet
- ▶ Packed in Tyvek by Dupont



# Keep-It-Fresh Capsules



- ▶ Plastic Capsules for 10 cubic feet
- ▶ Can be placed in refrigerators and with fresh produce
- ▶ Also available with adhesive backing



# Thanks!

SHELF LIFE EXTENSION FROM KEEP-IT-FRESH