

“Extending the green life of  
bananas to give better  
consistency, superior quality  
and less waste”

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Fruit Logistica Tech Stage

7th February 2018

# Introduction to Fruit Profits

Over 25 years' experience in the fresh produce industry with Chiquita, Syngenta, Driscolls and San Lucar Group

Advises companies on the harvest, packing, shipping, storage and ripening of fresh produce.

Expertise in process improvement, new product development and postharvest technology.

# Background to green banana life

Industry requires bananas to remain green during shipment and distribution until arrival at the ripening room

Under field stress conditions, the green life of bananas can be reduced significantly, to 22 days or less

In transit, ripening renders fruit unsalable and causes additional costs of unloading and discarding the ripened fruit plus the opportunity cost of fruit not sold

If bananas arrive with little green life left, ripening will not be homogeneous among boxes, or worse the delivery colour will be too yellow

# Shipping green bananas

Refrigeration at 13.5°C -14.0°C is the main method to preserve green life

Green life of banana is around 28-30 days at 14.0°C

Controlled and modified atmospheres extend life of green bananas

Controlled atmospheres in the vessel at oxygen levels between 2-4% O<sub>2</sub> are very effective in extending the green life of the fruit

Modified atmosphere bags (eg. BANAVAC) are used in the industry, which also provide a low oxygen environment

# Impacts on green banana life

Occasionally bananas ripen in transit for different reasons, mostly related to field stresses such as:

- ▶ Poor drainage
- ▶ Poor irrigation distribution
- ▶ Poor control of Sigatoka disease (*Pseudocercospora fijiensis*)

# Ethylene and green banana life

Scientific literature (Liu, 1976) indicates that removing ethylene in the ambient of green bananas prolongs green life.

Potassium permanganate a strong oxidant, is used for ethylene removal - However;

- ▶ Its' efficiency is low
- ▶ If wet it can stain the fruit purple
- ▶ Potential environmental issues with its disposal

It's Fresh! has developed a very efficient catalytic ethylene absorbent

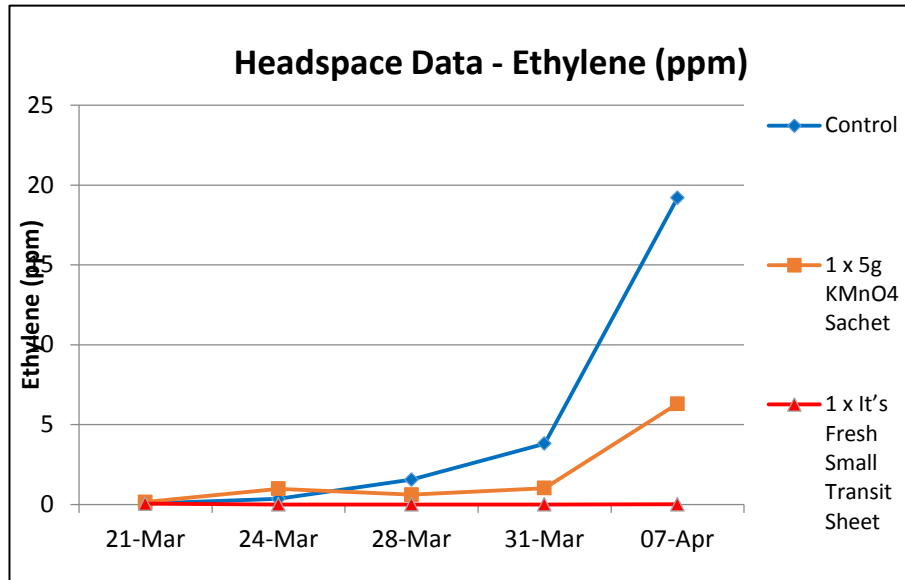
In vitro studies indicate high absorbance of ethylene compared to potassium permanganate and a control

# Preliminary Tests; It's Fresh! vs potassium permanganate

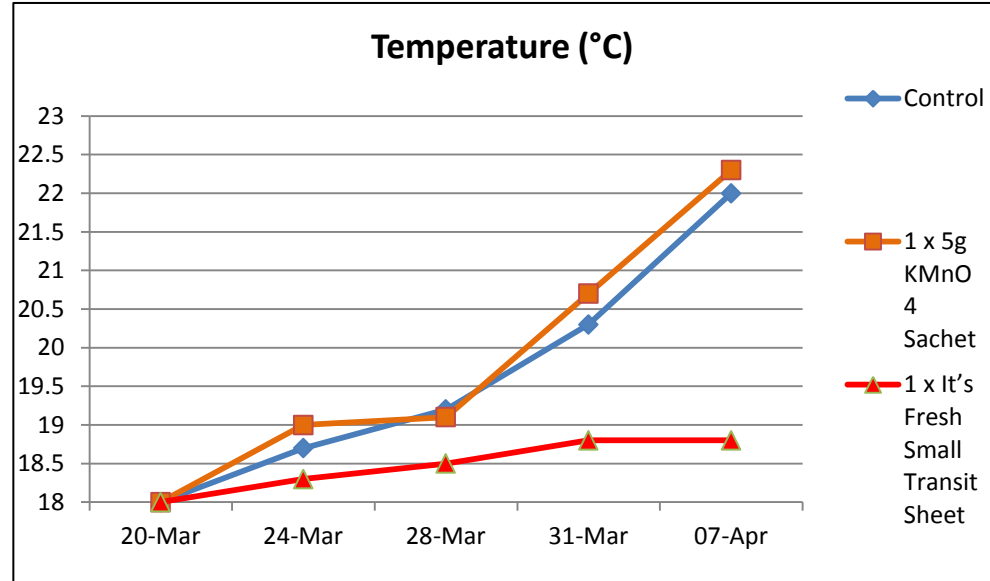
- ▶ Held at 18C for 3 weeks (accelerated test)
- ▶ It's Fresh transit sheet result - still green after 18 days
- ▶ KMnO<sub>4</sub> ripened after 1 week

|                        | Control  | Potassium Permanganate  | It's Fresh Small Transit  |
|------------------------|--|---|---|
| 20 March – Intake      |    |    |    |
| 29 March 2017 – Day 9  |    |    |    |
| 07 April 2017 – Day 18 |  |  |  |

# It's Fresh! ethylene headspace



- ▶ Ethylene concentration measured in head space showed effective removal by It's Fresh!



- ▶ Temperature rise with control due to higher respiration rate than It's Fresh! bananas



# Assess efficacy of It's Fresh! filters on green banana life:

Two tests were set up in Costa Rica at Fruit Profits Postharvest Laboratory in 2017:

- ▶ Test No.1; 27<sup>th</sup> July 2017 to October 10<sup>th</sup> 2017
- ▶ Test No.2; 26<sup>th</sup> October 2017 to 1<sup>st</sup> February 2018

# Assess efficacy of It's Fresh! filters on green banana life:

Applying It's Fresh!:

*It's Fresh!*<sup>TM</sup>  
as nature extended



# Assess efficacy of It's Fresh filters on green banana life:

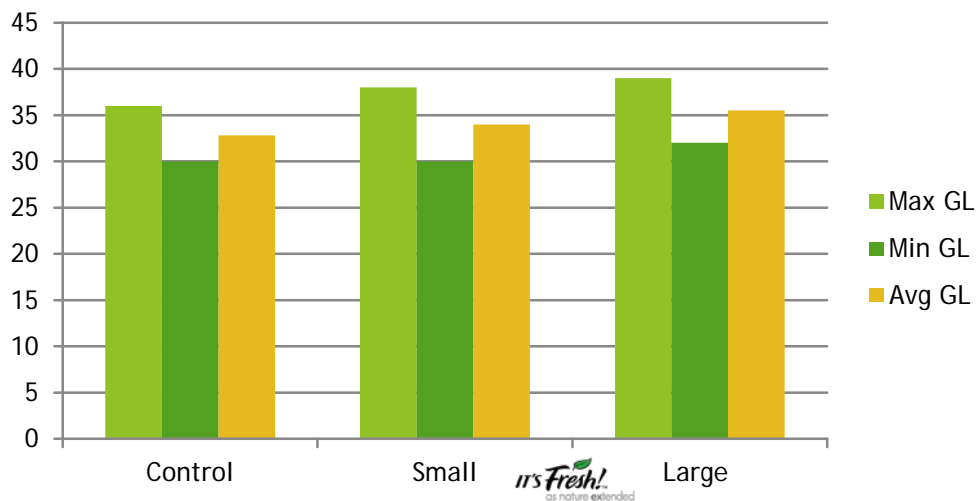
## Materials and methods:

- ▶ Two bags types i.e. Polypack perforated bag and Banovac/MAP
- ▶ Small It's Fresh! transit filter, Large It's Fresh! transit filter and control (no filter)
- ▶ 5 boxes per treatment - 72 clusters per treatment in total, Bunch age: 12 weeks
- ▶ Storage: Stored at 14°C. Clusters removed from the box upon evidence of 'turning'

# Trial results using polypack bag & It's Fresh!

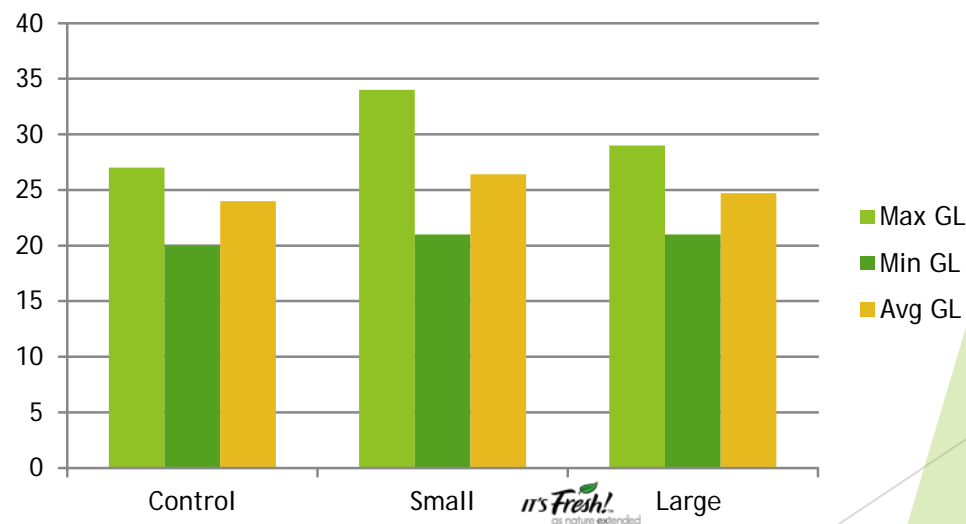
TRIAL 1

| Treatment   | Control | Small Filter | Large Filter |
|-------------|---------|--------------|--------------|
| Sample Size | 72      | 72           | 72           |
| Max GL      | 36      | 38           | 39           |
| Min GL      | 30      | 30           | 32           |
| Avg. GL     | 32.8    | 34           | 35.5         |
| St Dev      | 1.5     | 1.7          | 1.7          |



TRIAL 2

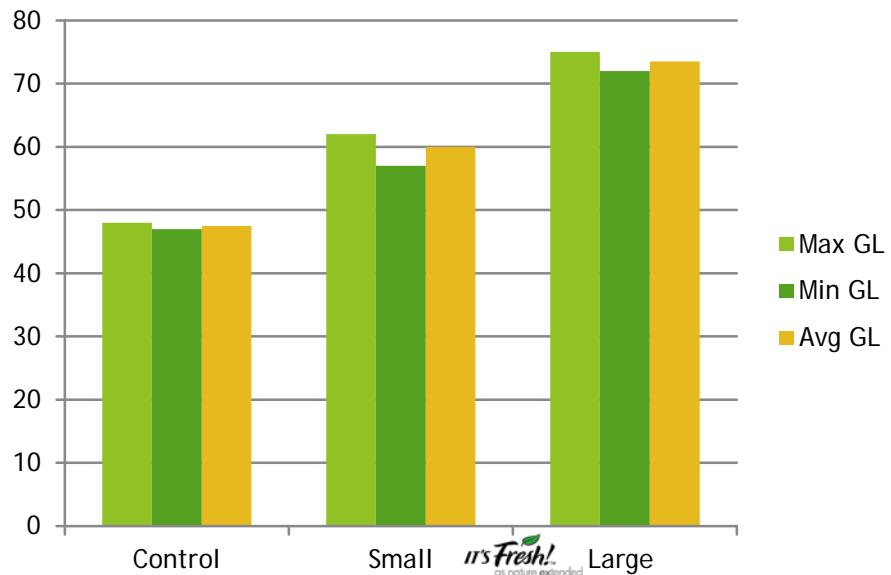
| Treatment    | Control | Small Filter | Large Filter |
|--------------|---------|--------------|--------------|
| Samples Size | 79      | 79           | 45           |
| Max GL       | 27      | 34           | 29           |
| Min GL       | 20      | 21           | 21           |
| Avg. GL      | 24      | 26.4         | 24.7         |
| St Dev       | 2.3     | 3.1          | 2            |



# Trial results using MAP & It's Fresh!

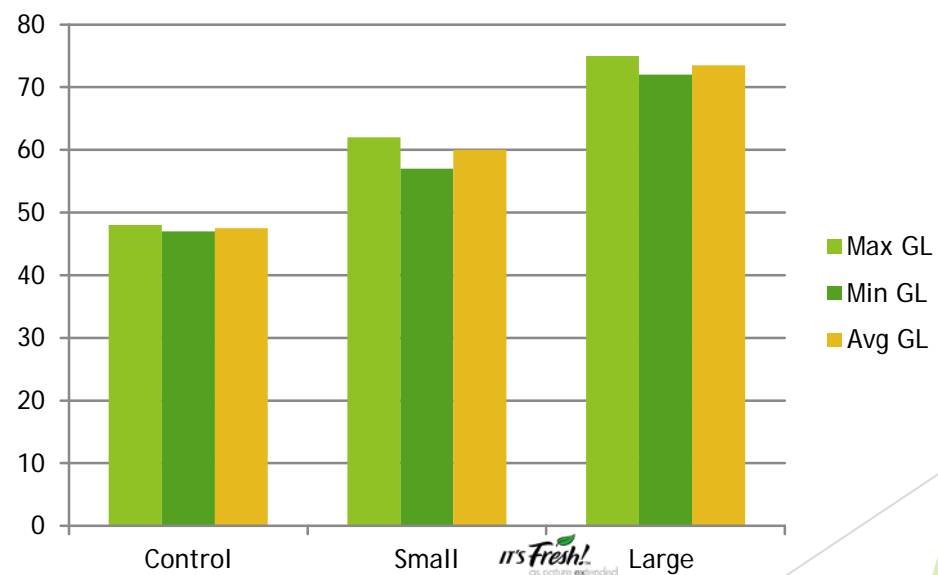
TRIAL 1

| Treatment   | Control | 1/2 Filter | 1 Filter |
|-------------|---------|------------|----------|
| Sample Size | 2 Boxes | 3 Boxes    | 2 Boxes  |
| Max GL      | 48      | 62         | 75       |
| Min GL      | 47      | 57         | 72       |
| Avg. GL     | 47.5    | 60         | 73.5     |
| St Dev      | 0.7     | 2.6        | 2.1      |



TRIAL 2

| Treatment    | Control  | 1/2 Filter | 1 Filter |
|--------------|----------|------------|----------|
| Samples Size | 10 Boxes | 10 Boxes   | 10 Boxes |
| Max GL       | 67       | 79         | 89       |
| Min GL       | 40       | 43         | 48       |
| Avg. GL      | 47.7     | 56.7       | 73.7     |
| St Dev       | 10.4     | 12.9       | 13.8     |



# Summary of Trial Results

## Polypak bags & It's Fresh!

- ▶ It's Fresh filters increased shelf life by +2 days (average)
- ▶ Represents a 6-10% increase in green banana shelf life

## Banavac MAP & It's Fresh!

- ▶ It's Fresh! filters increased shelf life by 26 days (average)
- ▶ Represents approx. 55% increase in green banana life
- ▶ Achieved outstanding performance using older fruit in second trial

# Conclusions

It's Fresh! filters provide substantial benefit in combination with an MAP bag extending green life by 50%

The benefit is maintained with older fruit (less green life)

Substantial benefits for long transit periods of +50 days

It's Fresh! Filters, in combination with MAP, can even maintain green life from field stressed bananas