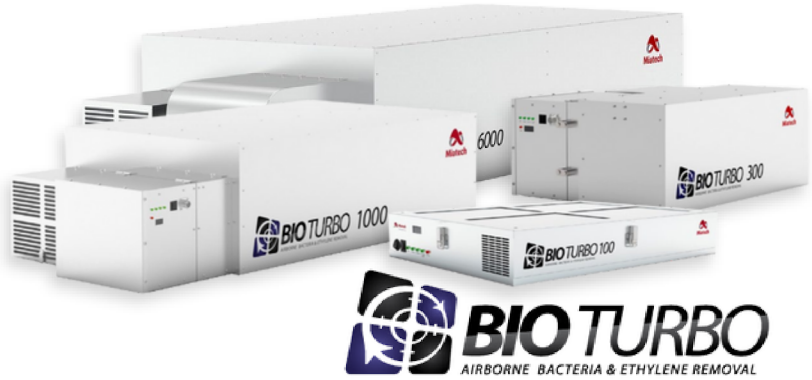
pacific data systems
Australia



Ethylene Gas, Moulds, Pathogens & Fresh Produce



* Emissions Measurement * Drug + Alcohol * Environmental Monitoring * Post Harvest Technology *

Pacific Data Systems Australia Pty Ltd

Address: 27 Hi-tech Court, Eight Mile Plains, QLD 4113 Phone: +617 3361 2000 Email: sales@pacdatasys.com.au Web: www.pacdatasys.com.au

Thank you for considering Bio Turbo!

PACIFIC DATA SYSTEMS AUSTRALIA have 20+ years' experience supplying, and developing, post-harvest technology solutions.

In meeting with yourselves, specific areas were highlighted where improvements could be made along the fresh produce chain. Primarily, these improvements relate to freshness, prevention of loss, prolonged and safer storage life, as well as improving overall customer satisfaction when purchasing fresh produce.

The product is MIATECH'S BIOTURBO, a solution that is used internationally at every level of the post harvest chain.

As Miatech's authorised Australian reseller, PACIFIC DATA SYSTEMS are pleased to make this technology available for implementation within the market at every level of fresh produce handling; farm storage, transport, wholesale, and retail.

Miatech
AUTHORIZED DEALER

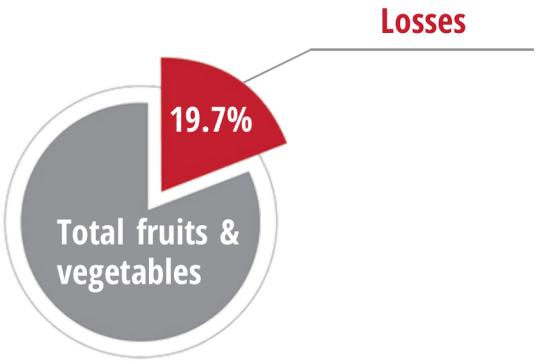
BioTurbo - Certificate of Suitability*
(NSW Office of Fair Trading)
***Exclusive to Pacific Data Systems Australia**



pacific data systems Australia
Solutions. Technology. Simple.



Loss of Product & Increase in Commodity Wastage



Each year, millions of tonnes of fresh produce are lost as wastage occurs at all points along the line - farm, transport, storage, wholesale, retail, and especially in the home. This equates to wastage estimates being as high as 20% from seed to shelf!

Traditionally loss has been a built-in cost factor, but ultimately it is a loss that can be avoided.

The primary reasons for such high spoilage is over-ripening and cross contamination due to improper storage and handling conditions.

Whilst the majority of cold rooms currently utilise temperature and humidity control to combat this, in the majority of cases, little to nothing is being done to address the damage caused by exposure to ethylene and harmful airborne pathogens.

Annual Losses Globally*

92 Million Tons



Vegetables

60 Million Tons



Fruit

**Source: FAO. 2011. Global food losses and food waste – Extent, causes and prevention.*

Ethylene & Airborne Pathogens

Ethylene is one of the major reasons for premature ripening causing produce to become soft and rotten. As produce spoils, it creates favourable conditions for mould spores and airborne bacteria.

Since higher humidity can increase the opportunity for mould growth, technology should be utilised which effectively deals with airborne bacteria and ethylene, minimising these concerns.
Consequently, spoiled items can infect the rest of the produce with cross contamination issues.

What is Ethylene?

Ethylene, or ripe gas as it is sometimes referred, is an odourless, colourless hydrocarbon gas that is produced naturally by fruit, vegetable and plant produce. It can also occur due to combustion and other man-made processes (e.g. gas-drive forklifts), and is the hormone primarily responsible for controlling the growth and development of the produce.

Certain produce omit higher levels of ethylene than others which, when stored adjacent to more ethylene sensitive commodities, proves to be an unwanted accelerator of ripening, cross contamination and rot - a storage process often employed by large wholesale and retail storage facilities, alike.

The Impact

Affected Commodities



Premature Ripening



Browning / Yellowing



Russet Spotting



Shrinkage / Shrivel



Anthracnose



Mould Build-up

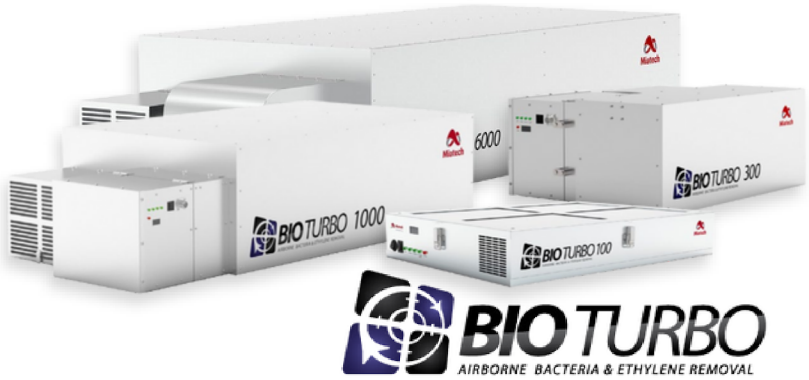


Fungi Development



Rotting

The Solution: Miatech's Bio Turbo



BIO TURBO
AIRBORNE BACTERIA & ETHYLENE REMOVAL

Airborne Bacteria & Ethylene Removal

The most advanced ethylene gas removal and airborne pathogen killing system available on the market...

The Bio Turbo System

Miatech's Bio Turbo is a patented technology for cleaning the air from all sorts of airborne organic compounds. It effectively removes ethylene gas, bacteria, mould spores and viruses.

Eliminates 99,5% of Pathogens - Extends Storage Life

Significantly improves the lifespan and the quality of stored produce by cleaning storage and atmosphere of pathogens.

Removes Ethylene - Prevents Premature Ripening

Bio Turbo effectively eliminates the ethylene gas from the air. This helps slow down the natural ripening process and protects ethylene sensitive products such as apples, avocados, kiwifruits, and many more.

Minimises Cross Contamination

By killing airborne bacteria, Bio Turbo prevents cross contamination which often takes place when produce of various types are stored in one cold room.

Decreases Odours

Bio Turbo significantly cuts down on the odours caused by ethylene. It helps to provide a more pleasant environment for the staff to work around.

Want to know more about the Bio Turbo Product?
Download a free QR-Code App (iOS / Android) to access a Bio Turbo video and technical brochure

VIDEO
Scan QR-Code

BROCHURE
Scan QR-Code

Bio Turbo: Complete Supply Chain

Bio Turbo Maintain Freshness at any Stage of the Supply Chain







Consumption

Broken cold chain reduces significantly the product storage life. This, together with overstocking, causes waste at the household stage.





Retail

Improper demand forecast, along with poor storage conditions result in the throwing away of many products.



Distribution

Even with short-term storage period, product shriveling and mould-spreading bring noticeable shrinkage at this stage.

Processing & Packaging

Improper handling and disease cross-contamination lead to further quality reduction.

Harvest & Post Harvest

Losses are primarily caused by overproduction, improper storage conditions and during grading.

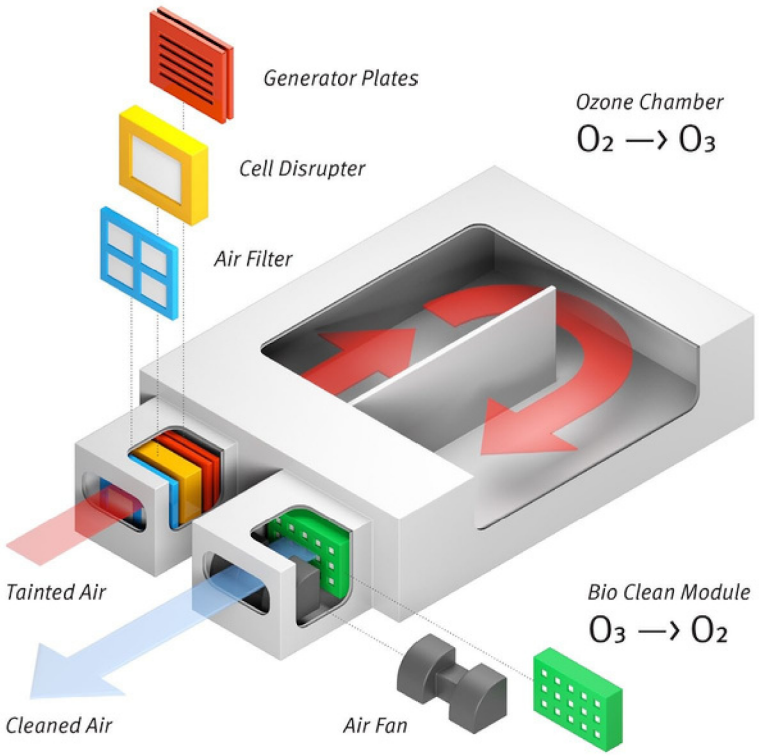
Transportation

Best practices include avoiding improper temperature, airborne pathogen spreading and exposure to ethylene.

Bio Turbo : Technology Overview

How It Works

Bio Turbo units use a patented 4-stage purification process to achieve highest results in reducing ethylene and airborne bacteria:



Stage 1
Air Filter
Removes dust and other particles from incoming

Stage 2
Ozone Chamber
Ozone destroys ethylene and bacteria

Stage 3
Cell Disrupter
Cell membranes are destroyed

Stage 4
Bio Clean Module
Ozone turns back into oxygen

Eliminates 99,5 % of pathogens

Bio Turbo effectively removes 99.5%+ of airborne pathogen from storage area, preventing bacterial contamination, mould growth and unpleasant odours

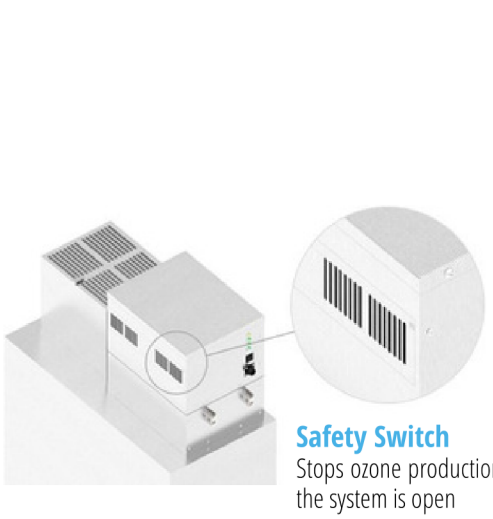
Removes ethylene

Bio Turbo eliminates ethylene gas successfully preventing premature ripening and decay

Bio Turbo : Competing Technology

Bio Turbo - Comparison with Similar Technology

	BIO TURBO	POTASSIUM PERMANGANATE ELLETS	'NASA TECHNOLOGY SPECIAL LIGHTS IN COMBINATION WITH CATALYST	OZONATING ROOM
Active Against	Ethylene and airborne pathogens	Ethylene only	Ethylene and airborne pathogens	Ethylene and airborne pathogens
Initial Investment	Average	Low	Relatively high	Relatively high
Maintenance Cost	Low	High	High	High
Maintenance Labour	Change air filter and ozone plates annually	Monthly check-ups to find out if pellets are still good. Replacing pellets 2 to 6 times per year as they expire, each pellet load is upto 50kg.	Replacing special light bulbs annually	Trained personnel necessary for operating equipment
Maintenance supplies	Air filter and set of ozone generating plates	100 - 300 kg of pellets for each system per year.	A set of UV lamps	
Safety Considerations	None	None	None	Exposure to ozone in high concentrations is dangerous
Unit Capacity	One unit can cover up to 6000 cubic meters in 24 hours	one unit covers up to 4,000 cubic meters	One unit covers up to 1,500 cubic meters	



Safety Switch
Stops ozone production when the system is open





Ozone Plates
Replace annually

Air Filter
Replace Occasionally

Bio Turbo : Rapid Return on Your Investment

Bio Turbo: Example ROI for Apple Storage

The following graphic shows how the Bio Turbo solution can deliver a return on investment in less than a season.

Average apple price per kg $1.20
Average weight per box 25Kg
Average value of box $30
Total boxes in cold room 5,000
Total value of apples stored $150.000

APPLES BOX

1 Kg 25 Kg
$1.20 $30.00

COLD ROOM

5000 boxes
125, 000 Kg
$150,000



With the **Bio Turbo 1000** costing on average $10,000 delivered and installed, the return of investment is less than a season.

Every season without the Bio Turbo costs $18,000 to the apple dealer

The above data is taken from observations in various apples storage facilities in India.

After 3 months

12% of losses during storage
$ 18,000

BOX

23 Kg
$26.70

COLD ROOM

5000 boxes
117,500 Kg
$132,000

Without Bio Turbo there is an average of at least $1.50 reduction on the prices that each box fetches in the market.

There is also about 1.5 Kg losses in apples that must be thrown away (per box) due to ethylene and airborne pathogens.

Total value $26.7 per box

The $3.6 difference represents 12% of losses during storage time which could be avoided with the Bio Turbo.

That is $18,000 in a 3 month period.

After 3 months with BT

Return on Investment
3 less then months

BOX

24.5 Kg
$29.40

COLD ROOM

5000 boxes
122,500 Kg
$147,500

With Bio Turbo, only 1.6 % of losses during storage time due to ethylene and airborne pathogens the quality is still the same.

Bio Turbo : Field Test Results

Bio Turbo Field Test - Results and Summary

Bio Turbo is a solution designed to prevent premature spoilage of produce and mould growth by removing airborne bacteria and ethylene from storage facilities. This study describes a test of Bio Turbo and its ability to remove ethylene.

This test was conducted in March 2012 by one of the UK's leading fresh produce manufacturers, specialising in the supply of bagged salads, leafy salad bowls and trays and prepared fruits to major retail and food service companies.

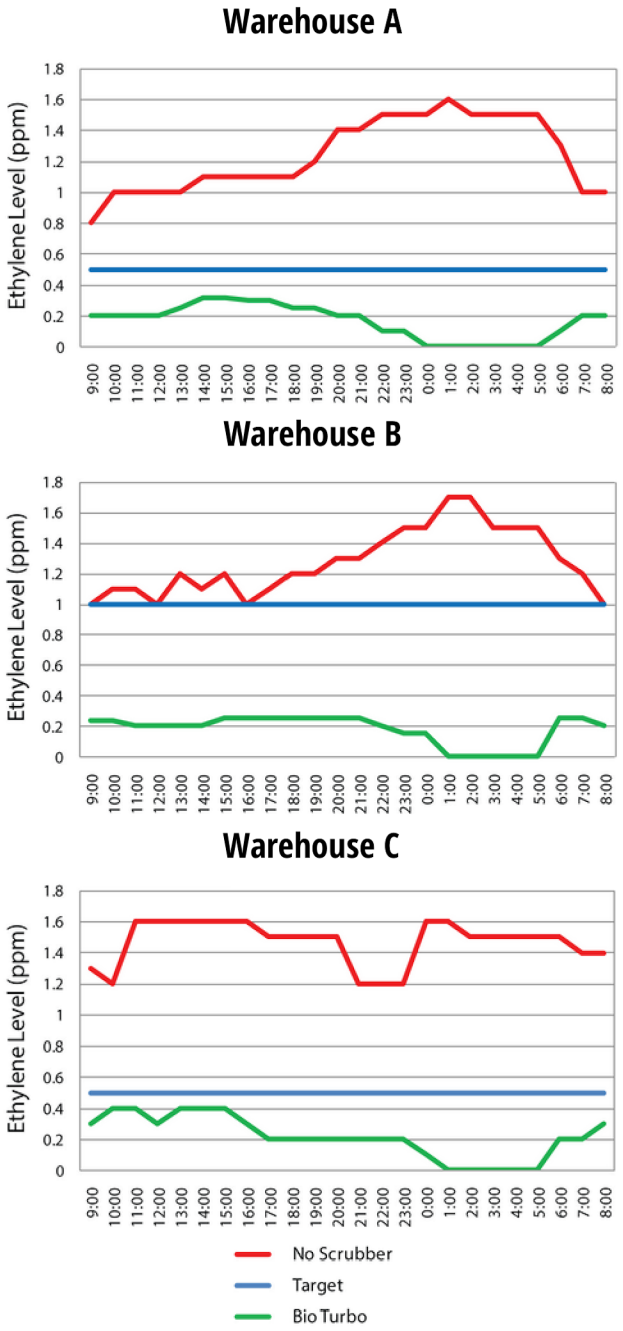
The Bio Turbo 6000 was tested in three different locations with results showing that Bio Turbo can effectively reduce ethylene levels to zero.

Bio Turbo Field Test - Results and Summary

The Bio Turbo 6000 ethylene removal systems were installed in three warehouses in March 2012. They replaced potassium permanganate systems.

Below is a table showing the size of each warehouse and the target level of ethylene that was sought to be achieved. The target levels are based upon the type of fruit stored in each warehouse and its sensitivity to ethylene.

	warehouse size (m3)	*target ethylene level (ppm)*
Warehouse A	2777	0.5
Warehouse B	2652	1
Warehouse C	5576	0.5



The graphs show the average ethylene ppm (parts per million) in each warehouse over a 24 hour period with and without the Bio Turbo system installed. For each set of data, the ethylene levels were recorded for 24 hours over 4 consecutive days. An average was then calculated of the 4 different ethylene levels at each hour. The target level for each room is shown by the blue line in each of the graphs. The target levels are based on the type of product stored in each warehouse and their sensitivity to ethylene.

All the graphs show that the ethylene levels without the Bio Turbo units were generally above the target level. The levels vary throughout the day due to several factors such as the volume of fruit at any given time and the movement within the warehouses. The levels tend to be lower during production hours as there is a lot of movement of the fruit within the warehouses and doors are being opened and closed which displaces the air within the warehouses and therefore some of the ethylene. During non-production hours the levels of ethylene increase without the Bio Turbo units.

With the Bio Turbo units in use, the ethylene levels are kept below the target ppm throughout the day. There is some variation in the levels throughout the day but this can be attributed to the same reasons as before. The graphs show that with the Bio Turbo units in use during hours of non-production, the ethylene in the warehouse decreases to 0. This shows demonstrably that, in a closed environment, Bio Turbo units are able to eliminate ethylene over time.

Overall these results show that the Bio Turbo units exceeded the targeted goals and were able to effectively control the ethylene produced by fruits.

Bio Turbo : Case Study

Bio Turbo: Avocado Test - May 2016

Bio Turbo influence on waste and quality loss of fruits due to ethylene and airborne pathogens

This test was conducted by MIATECH's dealer in Kenya, **Ice In Refrigeration Engineering** (Mr. George Olweny Arogo, Director) at Olivado Ltd, one of the world's largest producers of extra virgin cold pressed avocado oil. For this test, the company compared quality of Hass avocados after one week of storage in two separate cold rooms. Factors such as temperature and humidity levels were the same in both rooms, but one room was also utilising a Bio Turbo ethylene removal system. www.olivado.com

Ethylene Removal

The test showed that Bio Turbo minimized ethylene concentration in the cold room to 1-5 ppm, compared with up to 12 ppm in the cold room without Bio Turbo. After 7 days storage in the cold room with Bio Turbo, ripened avocados looked clean and fresh.

Eliminating of Airborne Pathogens

Testing of airborne pathogens elimination demonstrated, that in the cold room with Bio Turbo, fungi and other pathogens were prevented from spreading. Therefore, there was no cross-contamination in that cold room.



Unripe avocados before being loaded in the cold store.



Fruits proximate to infected ones were not contracted after one week storing.

The Result - Total Losses

After 1 week without Bio Turbo



Avocados stored in the cold room without Bio Turbo were affected by pathogens and ripened faster due to ethylene influence, having lost much of their quality.

Wasted fruit in this cold room reached 20-30% per ton.

After 1 week with Bio Turbo



In the cold room with Bio Turbo there were 2-5% of wasted fruit per ton.

Most of this waste came from fruit that had been affected with fungi, moulds or pathogens before test.

View more case studies and testimonials at www.pacdatasys.com.au

pacific data systems Australia

Solutions. Technology. Simple.

pacdatasys.com.au

About Pacific Data Systems Australia

Pacific Data Systems was established in 1984 offering electronic scientific and industrial instrumentation, service and calibrations for a broad range of applications including agriculture.

Since this time we have grown in capability and now have strong customer base both within and outside Australia.

Our post-harvest technologies are being used across the globe to improve visibility on operations, product quality and minimise food wastage

we continue to invest in our people, processes, performance and technologies to ensure longevity and of equal standing provide working solutions, utilising the latest technology and making it as simple as possible for our customers.

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