

## Temperature Critical in Transport and Storage of Fresh Produce

*Summary: Fresh produce degrades much more rapidly as temperatures rise. Cost and complexity of existing data loggers limit their use to pallet or container level. Low cost liquid indicators can provide temperature / time monitoring down to the smallest packs, ensuring product quality is maintained throughout the lengthiest supply chains.*

### Background

Global food supply markets are rapidly evolving as consumers change their buying habits, and transport systems are disrupted. Managers responsible for every stage of food production from growing to retailing need to review and improve current practice. This is especially true in the case of fresh produce, where a re-evaluation of cold chains and procedures is needed to ensure maximum efficiency and to minimise wastage.



### Temperature is the Enemy

Each stage of the produce cold chain from

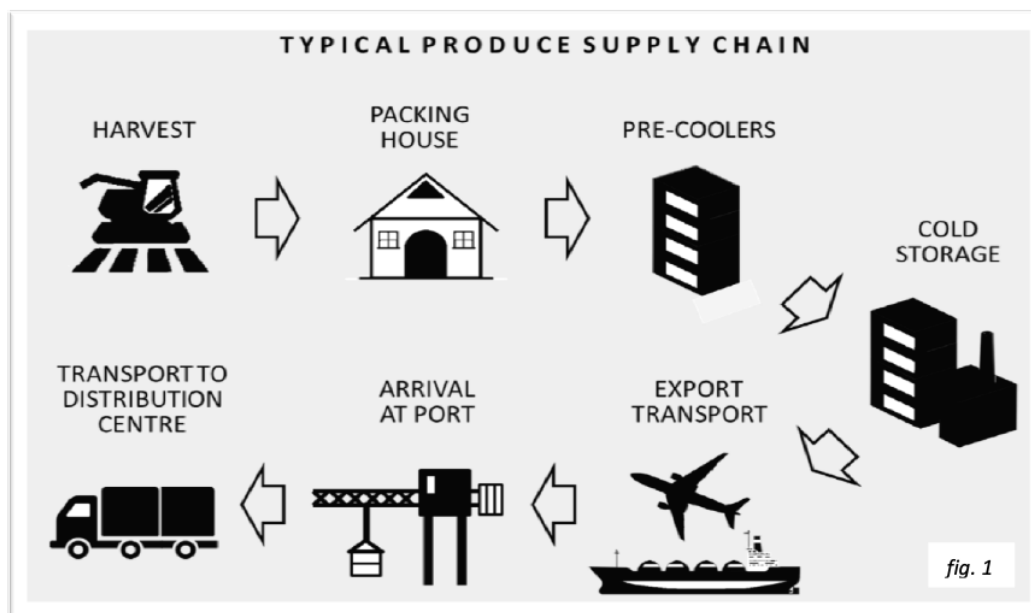
harvesting to packing house must be designed to safeguard the product from unplanned temperature excursions (see fig. 1).

Vegetables such as asparagus, lettuce, and spinach, or fruits such as plums, berries and peaches are highly temperature sensitive, and so demand proper temperature management from the harvesting process to the pre-cooler and packing process.

Temperature sensitive produce can lose sugars and freshness quickly at



temperatures as low as 20°C. For example, asparagus, if exposed to conditions of 24°C for just eight hours will lose up to seven days of shelf life.



Produce such as blueberries, grapes, lettuce, strawberries and so on have target limits of 2-3°C after picking, while studies have shown that produce can sit in the field at temperatures close to 30°C for many hours due to logistics and handling issues. Produce can also be left sitting for long periods at an unrefrigerated warehouse location due to inventory backlogs. Reductions in pre-cooler capacity can also negatively and irreversibly impact the freshness and quality of the produce.

Considering just one aspect of the complex cold supply chain, transport is perhaps the most critical process for temperature sensitive produce, with the highest risk to quality and loss of freshness. Refrigeration units mounted within trucks or reefer containers can malfunction, and inadvertent power loss may occur.

Transport delays can occur due to mechanical failures, border crossing and customs issues. Valuable produce can be

exposed to high temperatures sitting on the tarmac due to mismanaged transfer handling at airports, receiving warehouses, or ports of entry at borders or seaports.



### **Temperature Monitoring and Response**

Temperature management during the critical stages have been sorely neglected. Electronic temperature data loggers have been used but often omitted at the critical harvesting to packing stage, due to their relatively high cost, the complexity of operating and setting up the loggers in the

field, as well as extant issues within the field environment, such as rain and dust.

### **Timestrip Solutions**

Fortunately, help is at hand: Timestrip temperature indicators offer low cost, easy to use solutions for the harvesting to packing process.

Timestrip smart indicators are available in two types: liquid indicators and electronic. Both are small, easy to store and use and have a long shelf life. Timestrip solutions travel with the produce to detect and react to any temperature breaches.

They are suitable for field use, simple to use and manage, and can be attached to produce cartons using the self-adhesive backing.

### **Liquid Indicators**

Timestrip Liquid indicators have been well proven as reliable, cost effective devices producing a clear, irreversible visual indication when specific temperature or time limits have been reached.



At the harvest to pre-cooling stages, simple liquid indicators from Timestrip provide visual alerts if the temperature rises above a set level for a time.

For example, for asparagus, an 8°C / 4 hour alert may be selected for better quality management and to maintain freshness.

### **Electronic Indicators**

eTimestrip Complete 'TC489' electronic indicator is an intelligent device that monitors temperature data every minute with high accuracy; it is highly versatile and can be attached to products at unit, case or pallet level. The key alert temperatures can be selected as standard e.g. 2-8°C, or can be specified as bespoke across a wide temperature range as low as -30°C or as high as 60°C.

The TC489 communicates wirelessly using near field communication (NFC) via a free



Android app, creating a comprehensive data report for download and analysis. Weighing just six grams, TC489 also provides a clear visual signal using built in LEDs.

At the International shipping stage, TC489 indicators can provide peace of mind and validation to the receiving party that temperature conditions of storage and transport have been under control each step, thus assuring product freshness.

## **Conclusion**

In summary, use of Timestrip smart indicators for temperature / time monitoring:

- Avoids wastage and cost of spoiled product
- Provides a guarantee of quality down the supply chain
- Encourages good quality procedures
- Helps meet regulations and customer requirements.

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**Timestrip Time & Temperature Management Solutions  
for Fresh Produce Throughout the Food Chain**