

Using remote data loggers to monitor air-freight temperatures in stone fruit

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Background

There are many types of temperature data loggers available to industry for remote monitoring of fruit along the export chain. Each type of temperature logger has its own merits ranging from ease of use, cost, accuracy, reliability, single use or reusable, SMS/email notifications and airline approved. Many exporters currently use USB temperature loggers which are generally discarded, or the data never accessed unless there is a dispute. So generally, there is no feedback of information to the exporter. A benefit of using remote temperature loggers is that the exporter can choose to receive alerts in 'near real time' so that decisions on the consignment can be made sooner rather than having to wait for it to arrive at the final destination, which could otherwise be too late. In this study, Xsense® HiTag2 loggers (disposable wireless radio frequency temperature loggers) were used to remotely monitor air-freight consignments to two Asian markets.

Temperature monitoring

One HiTag2 logger was placed in multiple stone-fruit consignments after packing to monitor temperatures every 60 minutes during the trip. A control unit (CU) was installed at the importers warehouse in both Malaysia and Singapore to upload and transmit data to the Xsense browser-based system when the logger was within a 200 meters radius in open space (Figure 1). The exporter could then view the data and make informed decisions regarding the fate of the fruit. One benefit of using this emerging technology is that export consignments could be tracked at regular intervals if CU's were installed at various points along the cold chain.

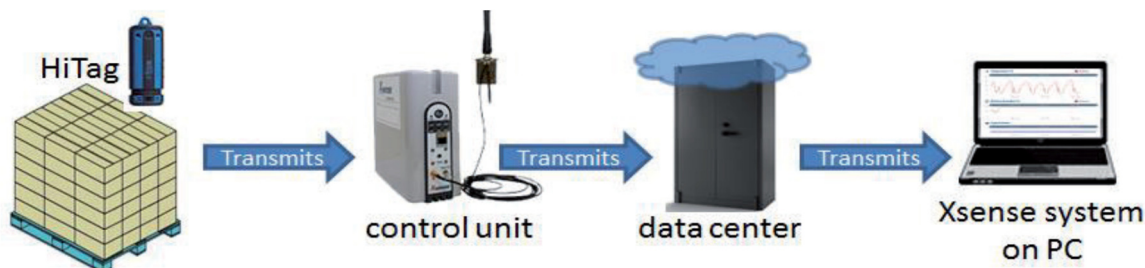


Figure 1. Overview of how the Xsense® system works. Diagram from Xsense® shipments - User guide (www.ororagroup.com)

Summary of findings

- Xsense® data logger continuously recorded temperatures and GPS location and status map along the export cool chain, from packing to importer
- 12 air-freight consignments were monitored this season (7 to Malaysia and 5 to Singapore)
- Export temperatures varied between 3 °C and 12.5 °C to Malaysia and 2.5 °C and 11 °C to Singapore (Figure 2) during the ~10 hour transit time
- Fruit were subjected to the “killing zone” temperature (3 to 8 °C) for majority of the trip which may affect shelf-life and marketing if cultivar is susceptible to chilling injury
- Chilling injury symptoms are generally not expressed until fruit is ripened and therefore consumers can experience poor tasting fruit that shows internal “bleeding” or browning, mealiness, dryness, flesh translucency and lacks flavour
- Xsense® data loggers provide a cost-effective means of monitoring air-freight consignment temperature and location once a control unit (CU) is set-up and operational (Sensor and loggers cost ~\$35 and lease of CU ~\$200/month)

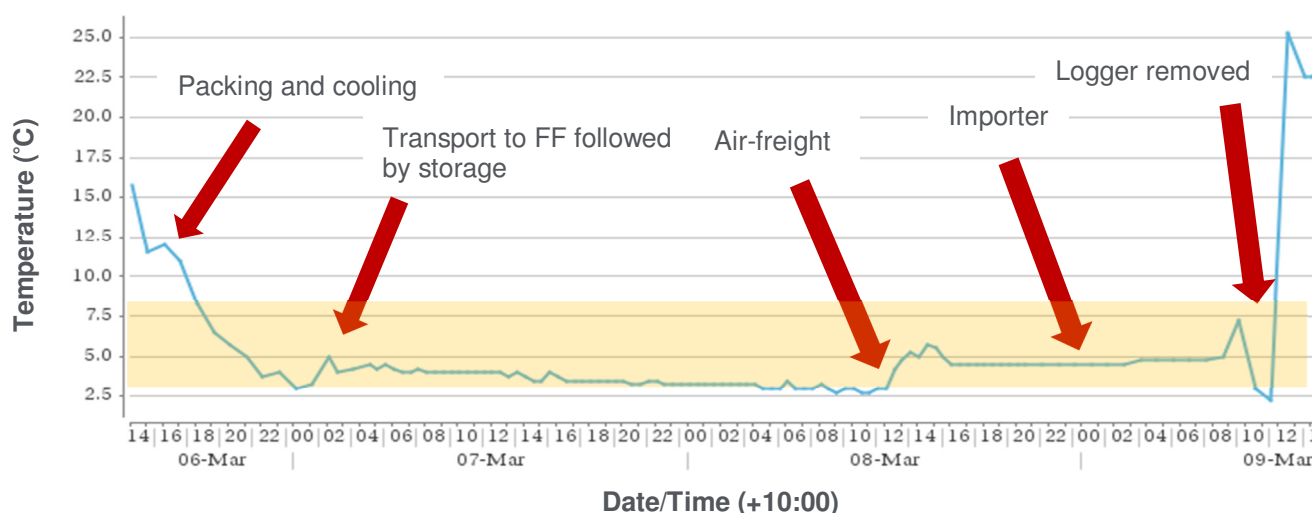


Figure 2. Temperature profile for a typical air-freight consignment of stone fruit to Singapore. FF = freight forwarder. Orange band is the “killing zone” temperature for stone fruit susceptible to chilling injury.

Acknowledgements:

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