



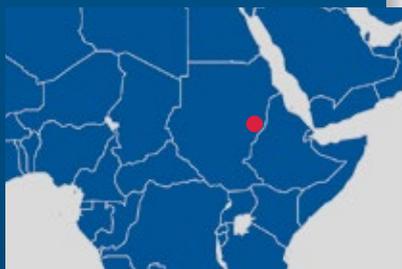
Güntner cools cut flowers from Africa

The Netherlands is the world's largest hub for fresh cut flowers. These originate mainly from Kenya and Ethiopia due to the stable, sunny climate. The flowers are transported via a closed cold chain to the retail stores in Europe, the USA and Japan. Güntner heat exchanger components are used for cooling and storing the sensitive goods.

Ethiopia has ascended to become the world's fourth largest exporter of cut flowers (as of 2016). Within ten years, an industry has emerged in the Horn of Africa, which took Kenya, the largest flower producer in Africa to date, almost 40 years to set up. And the market should continue to grow.

In the new refrigerated cargo terminal of Ethiopian Airlines in Addis Ababa, flowers, vegetables and fruits can be temporarily stored for export markets on 17,000 m²/ 182,986 ft² of surface area. The storage capacity is around 600,000 tonnes/661,200 short tons and the temperature is 2 °C/35.6 °F. By increasing its storage capacity five-fold, the airport at Addis Ababa has ascended to become the largest hub for agricultural products in Africa.

Kenya and Africa owe this boom in cut flowers to the preferred climate for this cultivation – plenty of light and the right humidity – that changes only slightly over the course of the year, but also to production costs, especially energy and labour costs. The cut flower business is industrialized and highly organized.



Overview

Business line:	Industrial Refrigeration
Application:	Fruit and vegetable cooling
Country/Region:	Africa/Ethiopia
Fluid:	HFC
Product:	Güntner condenser FLAT Compact Güntner air cooler CUBIC Vario

Güntner GmbH & Co. KG
Hans-Güntner-Straße 2 – 6
82256 FÜRSTENFELDBRUCK
GERMANY
www.guentner.eu



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▲ The long-stemmed special varieties are first placed in cold water after harvesting and sorting and cooled down to around 5 °C/41 °F in a cold room in order to prevent the roses from growing and to keep the buds closed.

Demanding logistics of cut flowers

Roses, in particular, must be delivered to the final customer as soon as possible. The long-stemmed special varieties are first placed in cold water after harvesting and sorting and cooled down to around 5 °C/41 °F in a cold room. At temperatures of 5 °C/41 °F and below, the roses are prevented from growing and the buds remain closed.

After several hours of pre-cooling in the cold room, a machine pulls leaves from the lower part of the stem and grades the roses according to size. Again by hand, workers bundle the roses, wrap a piece of paper around the flowers and, with a packet of flower food, the roses are packed into boxes for an overseas journey that takes about two to three days. By lorry, plane and lorry again, the roses travel predominantly to Europe, the USA and Japan. Seven to nine days are scheduled for transportation and sale. The flowers should then bloom for just over a week at the consumer's end.

Sensitive product regarding temperature and humidity

Cut flowers have an active metabolism and high demands in terms of temperature, humidity, availability of water, light and nutrients. In essence, there are three influencing factors that determine the shelf life of cut flowers:

1. The flowers release water vapour to the environment; the amount is influenced by both the relative humidity and the speed (draught) of the ambient air. If the water output is higher than the intake, the flowers' heads will droop.
2. The influence of metabolic activity on the shelf life of flowers is even higher than that of transpiration. If the ambient temperature is reduced by 10 K, the metabolic rate of the cut flowers drops to around half to one quarter of the starting temperature.
3. Yet another factor influencing shelf life is the maturation hormone ethylene synthesised by the flowers themselves. The higher the temperature, the less ethylene is needed to start the withering process. Therefore, a closed cold chain with temperatures between 2 °C/35.6 °F and 5 °C/41 °F at high relative humidity is essential for logistics. Cooling is to also prevent the multiplication of botrytis spores (grey mould), a plant pest causing early withering of cut flowers. This is true in almost 45 per cent of all cases where goods are „non-saleable“.

Three ways of cooling cut flowers

In principle, three methods have been established for cooling cut flowers: natural convection cooling, forced draught cooling and vacuum cooling. The methods each have a different impact on the shelf life of cut flowers whose water loss is highest when forced draught cooling is applied, and lowest when using vacuum cooling. With forced draught cooling, the plant pest grey mould also occurs much earlier than in the case of natural convection cooling and vacuum cooling.

Natural convection cooling is the oldest form of cooling. The cold is distributed in the room without the use of fans – the mere fact that cold air falls down and warm air rises results in a pool of cold air in the cold store and in little air movement.

By contrast, forced draught cooling with fans distributes the cold evenly in the room and is very powerful.

Vacuum cooling is used for products with a large surface area and is the „premier class“ for cut flowers, but technically the most time-consuming. The flowers to be cooled are first sprayed with water and the ambient temperature in the room is then lowered; the evaporation of water removes heat from the cut flowers. A carefully regulated pressure reduction in the vacuum chamber is also a prerequisite.

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Flower cooling „Made in the Netherlands“

A Dutch refrigeration company plays a key role in this business with its refrigeration systems and relies on Güntner heat exchanger technology for the cooling of sensitive goods. The company is well known among cut flower producers in Ethiopia, and its customers include the majority of Ethiopian rose farmers. The plant contractor has already been operating in Ethiopia for more than ten years, planning and supplying customised, turnkey cold stores, freezers and air-conditioning plants.

Güntner technology for cooling cut flowers

Usually, Güntner CUBIC Vario direct evaporative heat exchangers are used in the cooled logistics and storage rooms of the flower farms. The Eurovent-certified direct evaporators are approved in particular for establishments working according to the HACCP regulations.

This concept was developed to ensure the hygienic and safe production of food, and is now a key standard in the international drinks and beverages industry. The Güntner air coolers CUBIC Compact and CUBIC Vario are HACCP-certified by TÜV Süd and hence particularly suited for rooms that are subject to special requirements on indoor air hygiene.

The fans suck in (heated) air from the ceiling area and cool it down. The cold produced falls down to the floor as cold air and forms a cold-air pool that minimizes the metabolic activities of the cut flowers as well as the ubiquitous botrytis spores.