

Gamma for Phytosanitary Processing

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CONFIDENTIAL

- Who is Nordion
- Why choose Gamma?
- Processing issues for Phytosanitary products
- Gamma Designs for Phytosanitary Processing



Safeguarding Global Health™



Gamma Technologies (GT)

- **Global leader in Cobalt-60 ("Co-60") supply**
 - Co-60 is the key input for Gamma sterilization
 - Established market leader
- **Exclusive long-term Co-60 supply contracts with nuclear reactors at multiple reactor sites**
- **40 active customers including contract sterilizers and medical device OEMs, served via multi-year agreements**

Medical Isotopes (MI)

- **Leading global supplier of critical medical isotopes for research, diagnostic and therapeutic uses**
- **Manufactures various medical isotopes for the nuclear medicine industry**
- **Supply relationships with TRIUMF, Canada's particle accelerator centre as well as research reactor sites**
- **Customers include pharmaceutical companies, hospitals, and radiopharmacies.**

**Safeguarding Global Health –
with every critical isotope we supply.**

Why Choose Gamma for Phytosanitary Processing?

- Used for over 60 years
- Over 200 large scale irradiators in the world
- Equipment is simple
- Reliability is high, does not fail
- Maintenance of equipment – low and cheap
- Good penetration for high density product

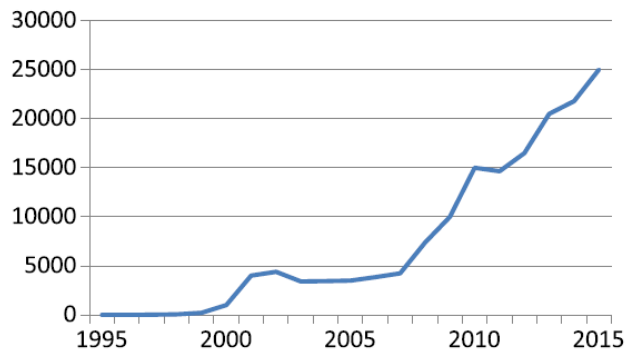


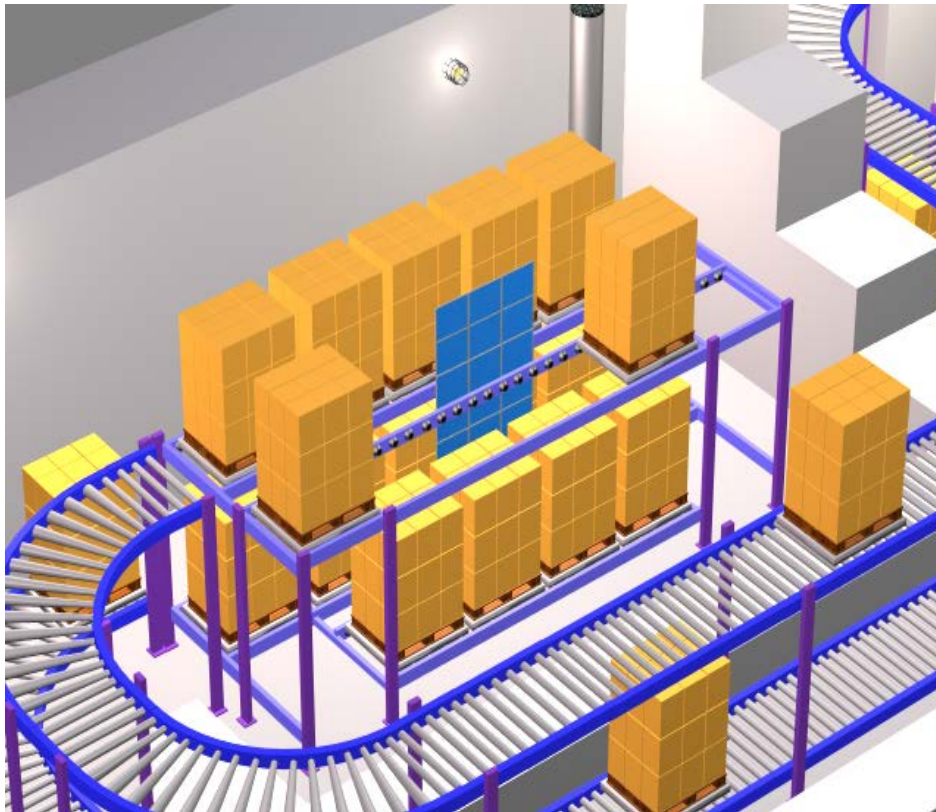
Fig. 1. Tons of produce (left margin) irradiated per year for phytosanitation worldwide since continuous commercial use began in 1995.

*Source: Recent Development of Nuclear Application Technology, Sueo Machi, IAEA, 2012

Phytosanitary Irradiation – Development and Application, Guy Hallman, Paisan Loaharanu, IAEA, 2016

- Product Handling
 - Damage
 - Weight
 - Pest Control
- Dose Delivery
- Cold Chain
 - Temperature Control

2 pass, 2 level Parallel Row Pallet Irradiator

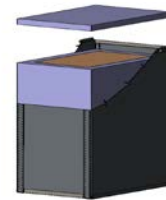


- Ability to process a large variety of pallet sizes (80 cm W to 122 cm W with varying product height and length)

- Nordion's Parallel Row Pallet Gamma Irradiator
 - Allows less manipulation of product, unloaded directly from truck
 - Pest Controls already in place would not be compromised by extra handling
 - If product is not unloaded off the palettes then less labour will be required
 - Heavy product is moved with lift trucks into the irradiator instead of manually transferring product onto a conveyor
 - DUR 2.3 for a 0.4 g/cc product stack

- Cold Chain

- Temperature controlled shipping from the grow/packing site to the facility
- Controlled cold rooms at the facility to maintain temperature prior to irradiation
- Product insulation by blankets or covers to maintain temperature
- Insulating the carrier system
- Using dry ice to maintain or lower temperature
- Cooling the irradiation chamber



- Gamma is the solution for phytosanitary processing for these reasons:
 - Simplicity
 - Reliability
 - Adaptability
 - Proven Technology
 - Experience in industry

Thank you
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Learn more about Sotera Health at www.soterahealth.com

