

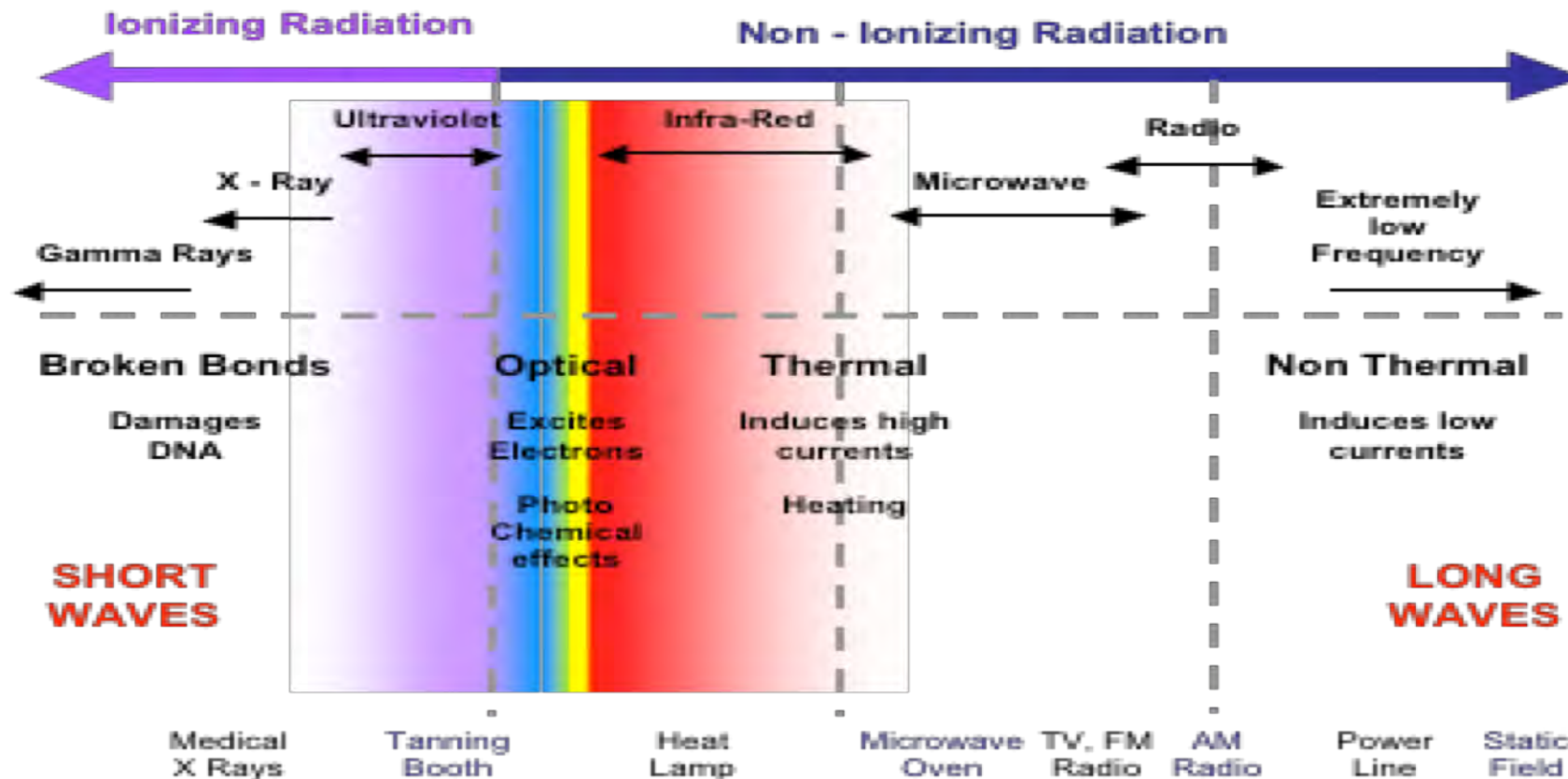


Novel Use of Infrared in sprout process

New Generation Emitters – reducing, cost, time, energy & process footprint.

Infrared

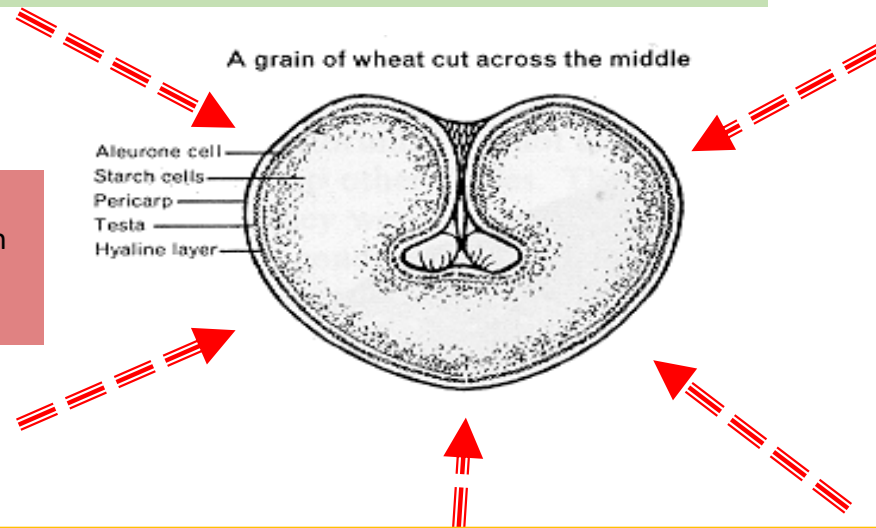
Types of Radiation in the Electromagnetic Spectrum



Irtech have developed emitters that can use the whole infrared spectrum of wavelengths or select within the band to achieve customers specific outcomes.

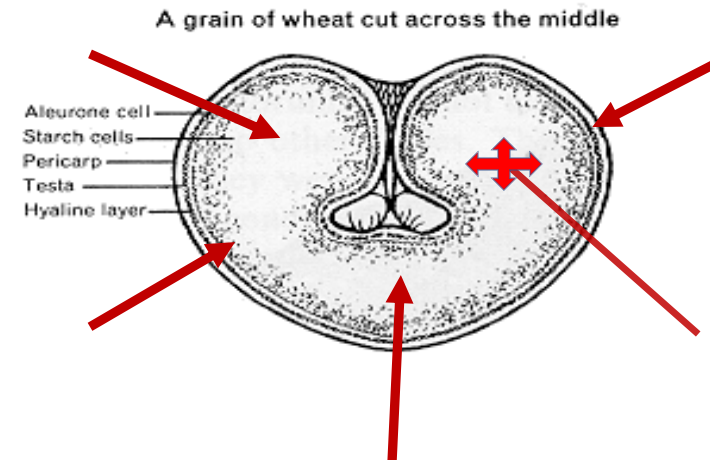
How Infrared Works

Traditional Conductive heating methods



Note: Heat moves from outside of grain into the middle with outer surface

IR Light Source Assured

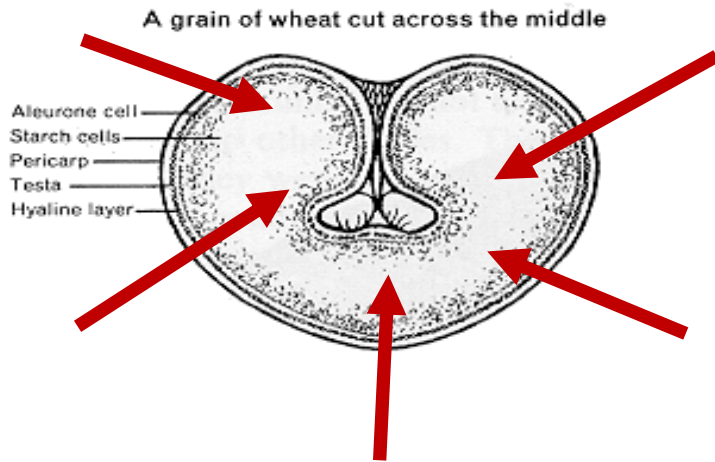


Note: The infrared energy is transferred directly to and within the product.

- Infrared waves not only strike the surface they also penetrate depending on matrix 4-6 mm
- The absorption of the waves at the surface or within the matrix creates thermal conductance that radiate out.
- This results in a rapid temperature rise of the product

What Benefits IR Offers

IR Light Source Assured



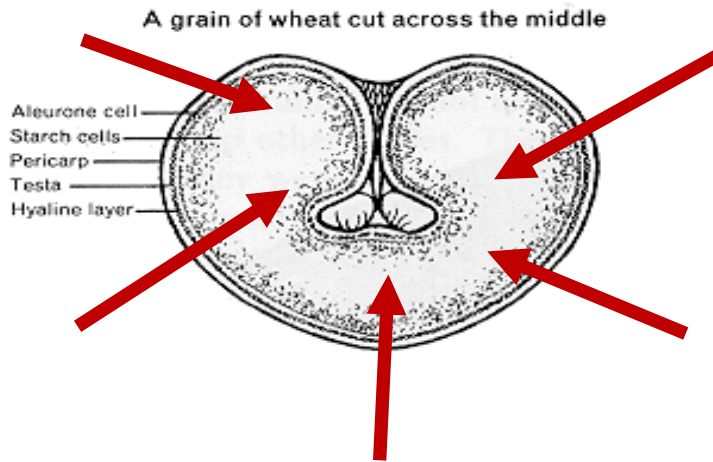
Note: Penetrates through grain surface to raise the kinetic energy of water molecules heating throughout grain at lower temperature

Lifting temperature very quickly and focusing of energy direct onto the product has a number of immediate benefits

- Less energy for thermal processing
- Lower temperature
- Reduce in time and exposure to thermal process
- Foot print of equipment

What the Potential

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Note: Penetrates through grain surface to raise the kinetic energy of water molecules heating throughout grain at lower temperature

- Reduce micro loads using thermal process
- Have a process that is cleaner
- Assures treatment of entire grain not just surfaces
- Reduce chemical usage
- Potential to be used at seed stage, primary as well as sprouting operation

Application Points



Use IR in dry cleaning to reduce

- Hard Seed
- Disinfestation
- Reduction in micro-organisms

Use as a CCP that can be validated for specific log reduction and controlled on temperature and time

With Pathogen control prior Chlorine level becomes control point for maintaining pathogen free environment

FM CCP unchanged

No Change

How it fits into a Food Safety Plan

- Use of a rotating drum passing product under a the emitters gives a controllable process that assures 100% treatment.
- Work as QCP and CCP
- Validated parameters are easily controlled and data recorded.
- As clean process less risks from to be managed in other ways.
 - Chemical

Results to Date

Feasibility Trials So Far

- Soy and Mung bean treatment to improve sprouting (temperature Below 70-90C)
- Treated Mung Beans Pilot amounts 50Kg at 70 -90 C and 45 -60 Sec
 - Sprouted through commercial plant in line with standard
- Treatment of Lucene seed to 50 Kg 45- 60 sec
 - Sprouted through commercial plant in line with standard
- Treatment of rice achieving 2-3 log reduction of Coliforms
 - 80-90 C retention time extended
- Various drying and micronisation of grains for food and feed industry

Our Next Steps

- Working with 3rd Part on Standardised method of Validation for Grains and Seeds
 - D value Confirmation
 - Z value
 - Process to optimise time and temperature for desired material and log reduction that will achieve.
- Use this information to get approval of process as valid and accepted kill step



Pilot Machine



Larger
Pilot
model

- Clean process.
- User friendly.
- Efficient.
- Low maintenance.
- Practical.
- Unique.
- Environmentally safe.
- Maximum operational safety.



irtech ***Infrared Technology***

Infra Red Light Source Assured

The power of next generation emitters