Joint FAO/IAEA Programme
Nuclear Techniques in Food and Agriculture

Joint FAO/IAEA Division
of Nuclear Techniques in Food and Agriculture
50 years, 1964–2014

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Research Needs for Phytosanitary Irradiation

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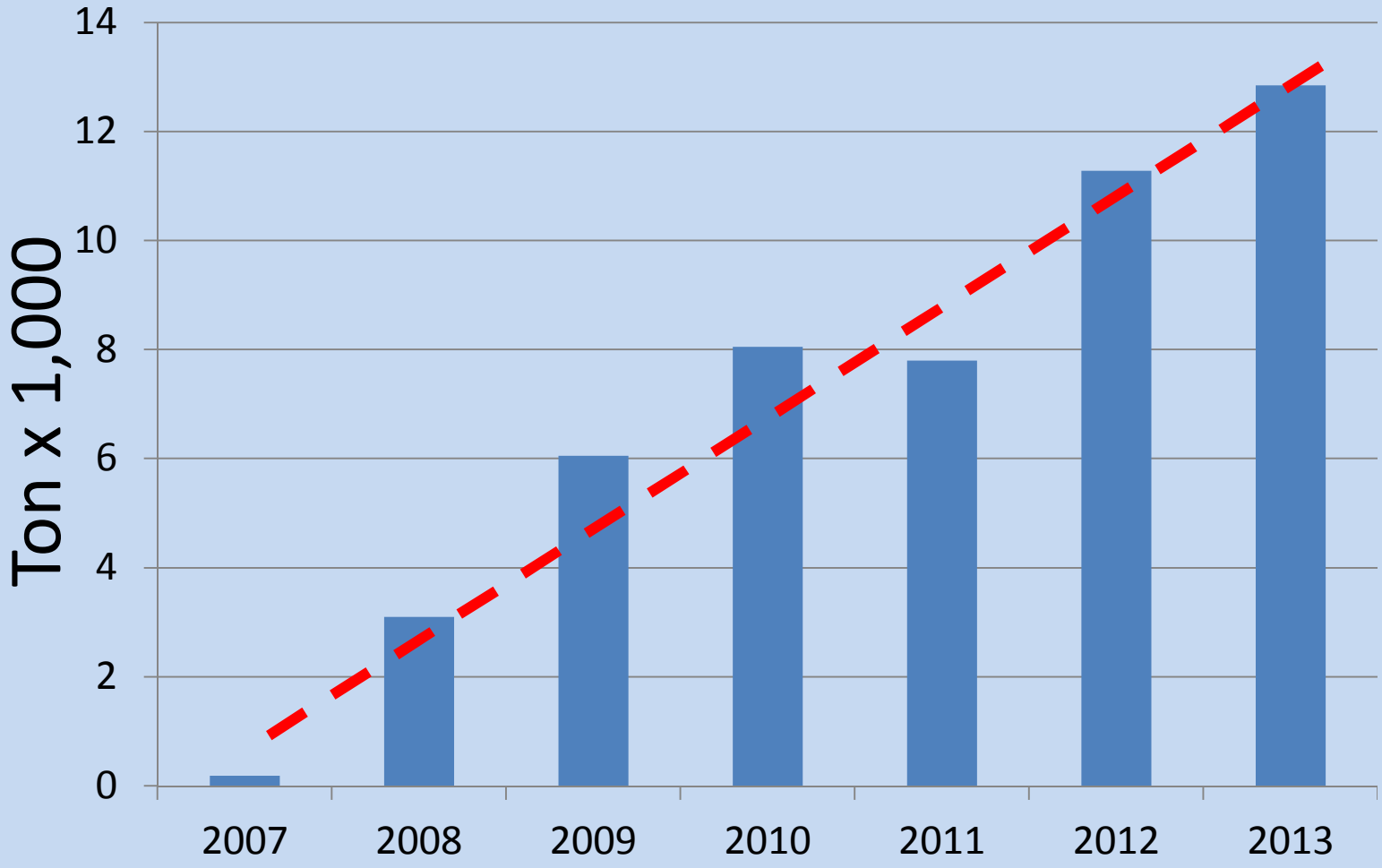
Web: http://www-naweb.iaea.org/nafa/

Fresh Fruit Export Volumes to the USA using PI



Mexico is the lead international user of PI, supplying 3/4ths of total PI imports by the US; mostly guava.

Mango box with hot water treatment stamp

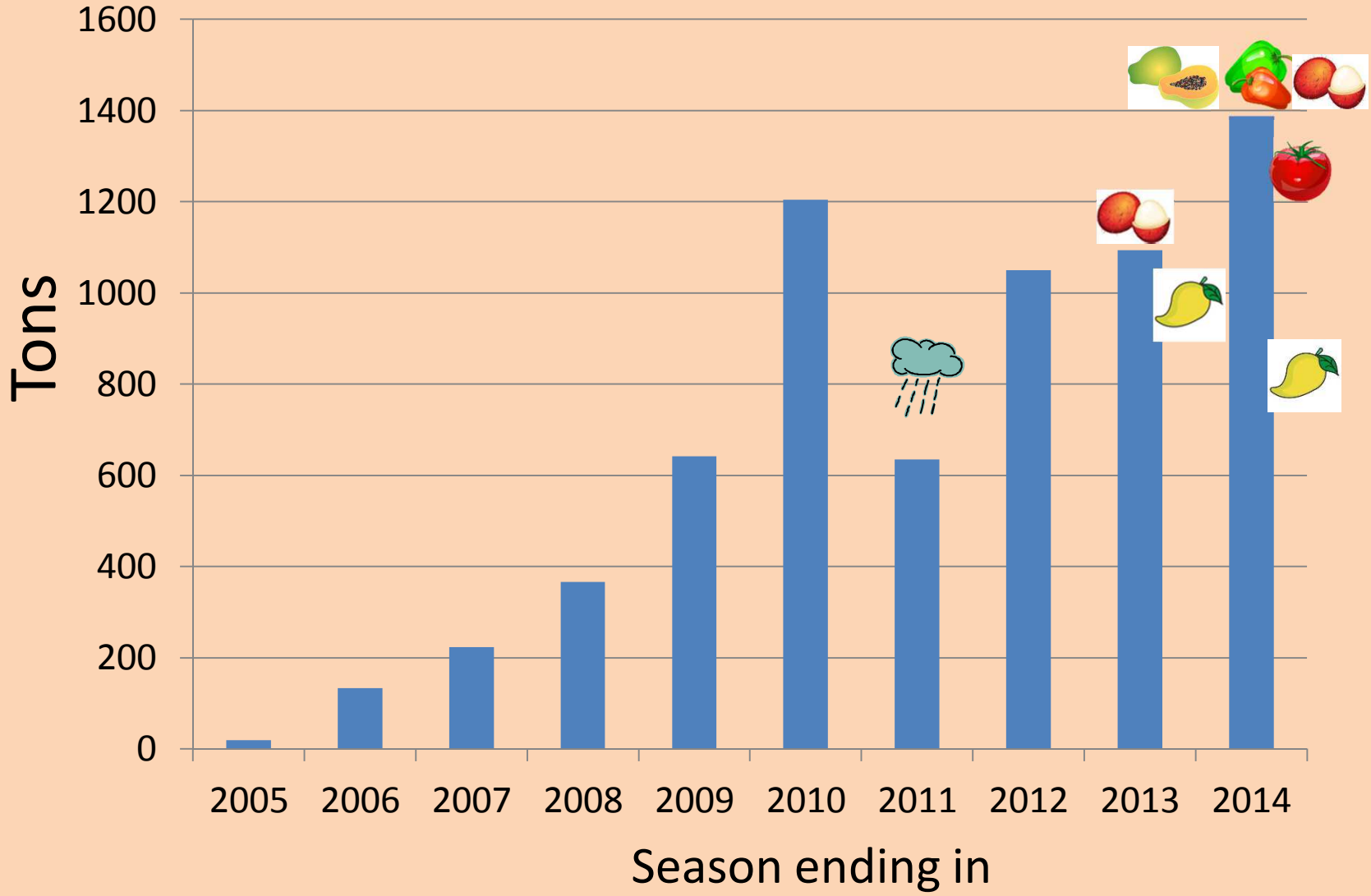
Acceleration in PI could come from mangoes. Mexico exports >180,000 tons (and growing) to the US annually; almost all treated with hot water immersion which produces a lower quality mango than PI and has resulted in food poisoning due to unsanitary water not hot enough (at 46°C) to kill bacteria.

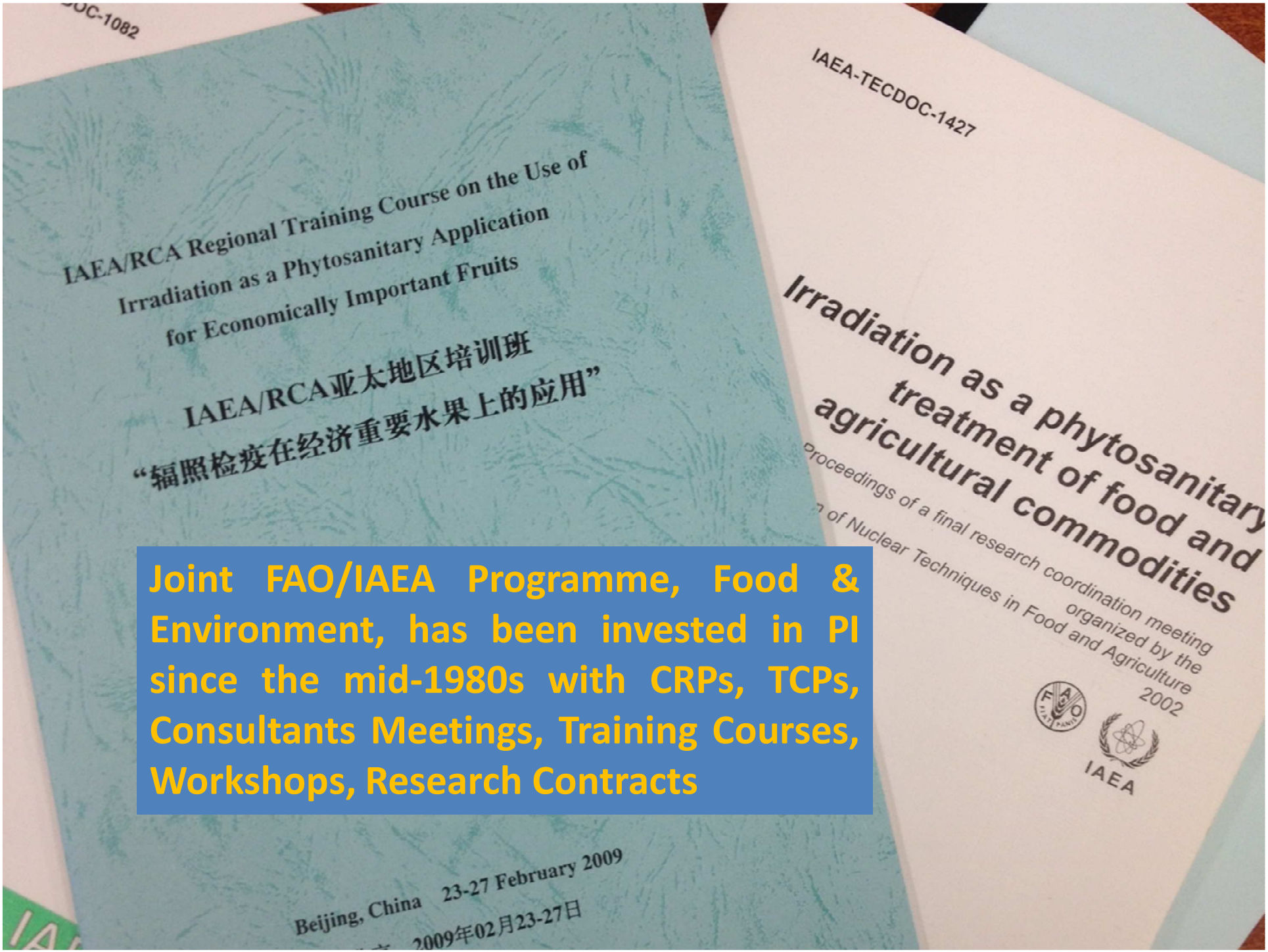
Hot water immersion equipment is aging, and as marketers and consumers become accustomed to safety and better quality of irradiated mango a quantum shift to mango irradiation could occur *if* the facilities are in place.

Aging hot water immersion equipment


(Australian Irradiated)
SPECIAL
Tomato
$6.98
KG
Irradiated Foods
What you need to know

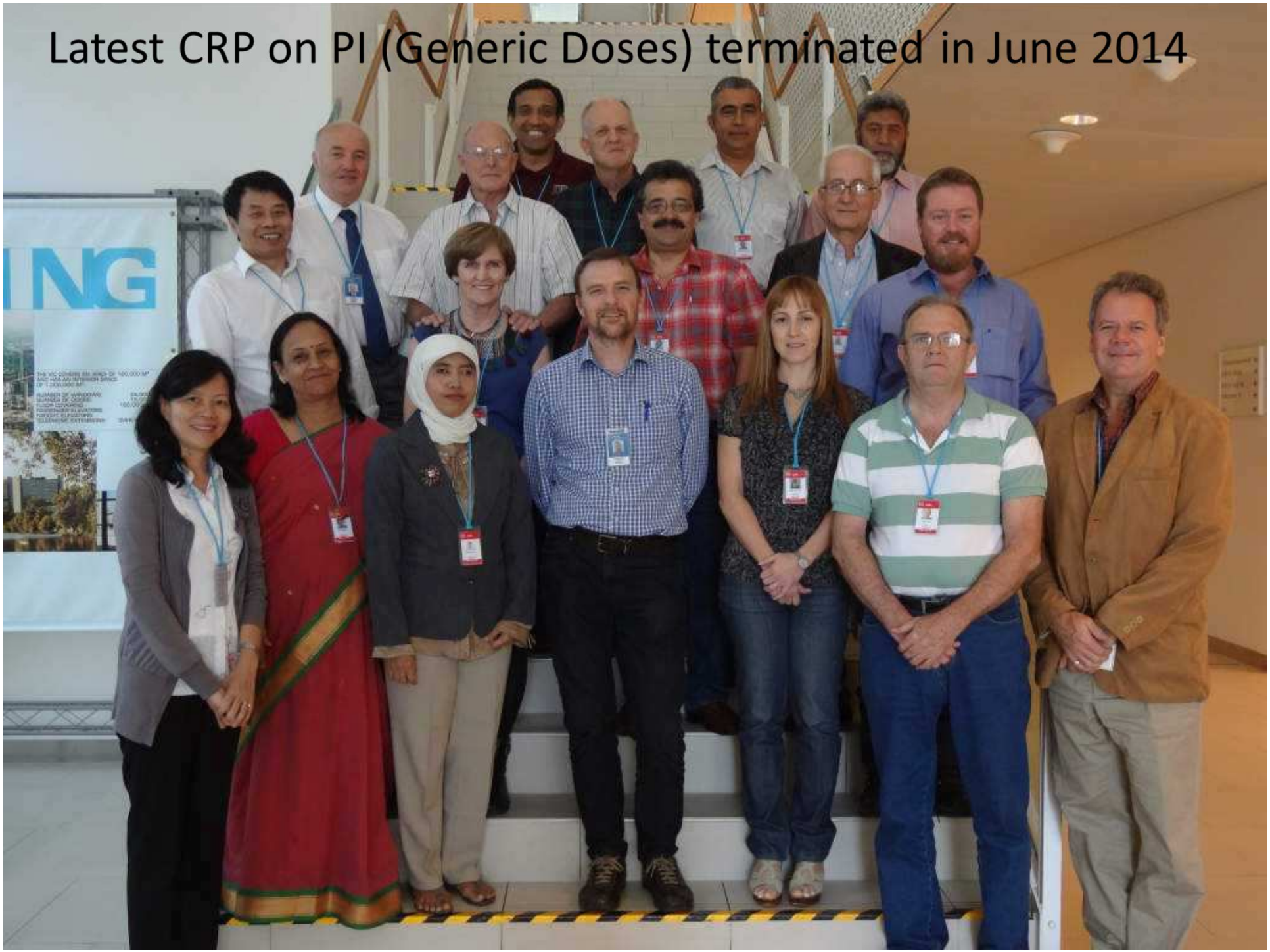
Fresh Commodity Export Volumes to New Zealand from Australia using PI





Joint FAO/IAEA Programme, Food & Environment, has been invested in PI since the mid-1980s with CRPs, TCPs, Consultants Meetings, Training Courses, Workshops, Research Contracts

Latest CRP on PI (Generic Doses) terminated in June 2014



The CRP on Generic Doses achieved its objectives:

- ✓ Large-scale confirmatory testing was completed for 16 pest species
- ✓ 2 doses for specific pests will soon be included in ISPM 28
- ✓ 2 generic doses plus various specific doses will be further presented to the IPPC
- ✓ Factors that might affect efficacy were explored
- ✓ Radiotolerances for a number of fresh commodities were established

Nevertheless, researchable items to fully optimize commercial application of PI remain, and two major ones are:

- ❑ More generic doses
- ❑ Significance of hypoxia on efficacy

Generic treatment doses cover groups of pests and/or commodities, thus, are more broadly applicable than traditional specific treatment doses which may only be valid for one pest infesting one commodity.

Generic doses allow for broad commercial application and may be proactive.

The IPPC has approved one generic dose: 150 Gy for all tephritid fruit flies on all commodities.

Mediterranean fruit fly

More generic doses are needed; will require more research with a variety of species chosen from key groups.

May not be possible to get IPPC approval for a generic dose for all insects (such as the 400 Gy dose accepted by the USDA).

Therefore, generic doses of key regulated pest groups within the Arthropoda may be an alternative; doses may leave out relatively insignificant groups.

Suggested generic doses

Regulated pest group	Possible generic dose (Gy)
Aphids and relatives	100
Weevils	170
Thrips	250
Scale insects	250
Lepidoptera eggs & larvae	250
Lepidoptera pupae	400
Mites	350

Low levels of oxygen during irradiation have long been known to reduce radiation damage and used to maintain quality of insects for SIT. Likewise, it may reduce efficacy of PI, and regulatory agencies have responded by limiting commercial application to commodities not stored under hypoxic conditions.

For example, apples are stored at 1-2 kPa O_2 (ambient is 21 kPa)

PI dose for plum curculio under ambient atmospheres is 92 Gy

Twice that dose *might* be required at 1-2 kPa

On the other hand, doses for oriental fruit moth and apple maggot *may* not need to be increased

Furthermore, commodities may experience hypoxic conditions unintentionally when stored in gas impermeable containers at temperatures that permit respiration.

Therefore, more precise determinations of relationships between levels of hypoxia and efficacy are necessary.

Reverse labelling!

Fresh commodities are being irradiated for phytosanitary purposes without consumer backlash.

Irradiated fruits sell, but there is strong competition for market share.