Phytosanitary treatments
Traitements phytosanitaires

Disinfestation of wood with ionizing radiation

Specific scope

This standard describes the use of ionizing radiation to control wood-borne insect pests and nematodes in round or sawn wood. It is an alternative to the standard PM 10/7 *Methyl bromide fumigation of wood to control insects* (previously PM 3/51).

Specific approval and amendment

First approved in 2008-09.

Introduction

Round wood and sawn wood may be infested by a range of insects such as Scolytidae, Buprestidae and Cerambycidae as well as wood-borne nematodes. Such material serves as a pathway for the spread of the mentioned organisms. Several wood-related harmful organisms are listed in the EPPO A1 and A2 lists as well as in the Alert list.

Commodities/regulated articles

Round and sawn wood (with or without bark) either of conifer or deciduous trees.

Pests

Wood-related insects: e.g. Anobiidae, Buprestidae, Cerambycidae, Scolytidae.
Wood-related nematodes: *Bursaphelenchus* spp.

Treatment schedule

Treatment name: irradiation
Treatment type: ionizing radiation
Irradiation can be carried out using:

- Gamma rays from radionuclide cobalt-60 (60_{Co}) or caesium 137 (137_{Cs})
- X-rays, generated from machine sources up to 5 MeV[1]
- High energy electrons derived from an electron beam accelerator (accelerated electrons) of up to 10 MeV.

[1] Limits according to International Consultative Group on Food Irradiation (ICGFI, 1995).

The unit of measurement for the absorbed dose is gray (Gy).

Under practical conditions to date, gamma radiation is the only treatment used for wood irradiation. Irradiation treatment, depending on the dose used, leads to prevention of emergence of eggs or larvae, sterilization of adults or the death of the organism (Burditt, 1994).

Organism	Wood species	Dose (kGy)
Wood nematodes (e.g. *Bursaphelenchus* spp.)	all	10
Insects	all	1
Insects and nematodes	all	10

Efficacy of treatment

The Australian Quarantine and Inspection Service requires a dose of 10 kGy for killing timber insects and nematodes in round wood (AQIS, 2008). The use of irradiation as a phytosanitary treatment against insects in stored products up to a dose of 1 kGy occurs in many countries (Diehl, 1990). Eichholz *et al*. (1991) report a dose of 8 kGy to kill pinewood nematode *Bursaphelenchus xylophilus*.

Notes

- The requirements of ISPM No. 18 *Guidelines for the use of irradiation as a phytosanitary measure* should be followed (FAO, 2003).
- Penetration depth and therefore surface applied dose depends on the density of the wood. With a higher moisture content a higher initial dose should be used to reach the target dose on the whole cross section of the wood.
- Irradiation, at doses concerned, does not lead to immediate death of the treated organism. Irradiated insects suffer from

'radiation syndrome' which means that they have absorbed a lethal dose and will die within several days or weeks after treatment.

References

AQIS (2008) Import Conditions Database – ICON – AQIS. Import case details, commodity logs, treatment T9924, gamma irradiation – timber insects and nematode pests. http://www.aqis.gov.au/icon32/asp/ex_querycontent.asp [accessed on 1 September 2008].

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Eichholz GG, Bogdanov AA, Dwinell LD (1991) Radiation sensitivity of pine wood nematodes in woodchips. *Applied Radiation and Isotopes*. **42** (2), 177–179.

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