

Information sheet 1.04

Chemical treatments on consignments or during processing

This information sheet is a supporting document to Appendix A ('Standardised checklist of risk reduction options') of the Guidance of the EFSA Plant Health Panel on quantitative pest risk assessment

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A. Description of the RRO

Chemical compounds may be applied to plants or to plant products after harvest, during process or packaging operations and storage. These compounds may be registered pesticides (fungicides, insecticides...), surface disinfectants (chlorine...), process additives (additives for seed extraction...) or protective compounds (wax on fresh fruits...). These chemical compounds may be fumigated, sprayed or used for dipping / bathing.

Chemical treatments on consignments or during processing therefore represent a family of possible options to reduce pest populations.

Such measures can be considered as control measures against pest in the EU (for instance acid extraction or chlorination for tomato seeds, waxing of fresh fruits, fumigation of fruits...).

Fumigation consists of submitting a plant product in an air tight container to a biocide in a gas phase.

Sprayed pesticides are biocides sprayed on consignments.

Surface disinfectants are biocides which are not considered as pesticides that nevertheless show a pesticide action (for instance, chlorine) which are applied on plant parts by various methods (spray, washing, dipping...).

Process additives are chemical compounds that are used during the process of plant products for technological reasons (for instance acid extraction of tomato seeds from tomato pulp).

Protective compounds are chemicals that may be applied on the surface of plant products to prevent alterations and extend shelf-life (for instance, waxing of citrus fruit).

Grains, tubers, corms and other plant parts not used for plantation can also be treated with pesticides to reduce losses during storage.

Treatments on planted plants and on seeds for sowing are dealt with in another information sheet (1.03). Treatments aiming to clean facilities or equipment are also dealt in another information sheet (1.05).

Table 1. Pests susceptible to chemical treatments on consignment or during processing.

Plant pests	RROs				
	fumigation	Sprayed/dipping pesticides	surface disinfectants	process additives	protective compounds
insects, mites	x	x			
fungi	X	x	x	x	x
bacteria	X		x	x	
nematodes	x				
virus, virus like organisms					

Table 2. Material that can be subjected to chemical treatments on consignment or during processing.

Plants or plant parts	RROs				
	fumigation	sprayed/dipping pesticides	surface disinfectants	process additives	protective compounds
plant material for food / feed	x	x	x		x
plant material for ornamental uses (cut flowers, leaves...)	x	x			
plant material for other uses	x	x	x	x	

B. Risk factors

The use of this RRO reduces the likelihood of the association of the pest/vector in consignments by acting on the survival of the pest/vector in the consignments. It also reduces the pest load of consignments and limits their multiplication during transport. The use of this RRO reduces the likelihood of the pest/vector escaping other existing management procedures, considering that detection during field inspections, in the packinghouse or at entry point may be poorly effective and that those existing management measures are not all effective against the targeted pests.

Table 3. Nodes for the application of RROs.

Points where measures may be effective	RROs				
	fumigation	Sprayed/dipping pesticides	surface disinfectants	process additives	protective compounds
post-harvest	x	x	x	x	x
transport	x				
import	x	x	x		
destination	x	x	x		x
establishment	X	x			
spread	X	x			
impacts	x	x	x		x

C. Parameters to consider regarding effectiveness of the RROs

Table 4. Main parameters to take into consideration regarding the modulation of the efficacy of the RROs.

Parameters to be considered as they may influence the effectiveness of RROs	RROs				
	fumigation	sprayed pesticides	surface disinfectants	process additives	protective compounds
Parameters related to the chemical compound used					
Efficacy of the product used for treatment	x	x	x	x	x
Legal delay between treatment and consumption	x	x			
Persistence of the product used		x			x
Parameters related to the application of the compound					
Effect of temperature	x	x	x	x	
Effect of humidity	x	x			x
Effect of pH	x			x	x
Effect of duration of the treatment	x				
Parameters related to the pest load on the consignment and to the localization of the pest					
Effect of the pest load		x	x		
Effect of the localization of the pest (surface, inside plant tissues...)	x	x	x		x
Prevalence of pest population that may be resistant to the treatment		x			
Parameters related to the re-colonisation of consignments post treatment					
Possibility of re-colonisation by the pest after the treatment	x	x	x		
Other parameters					
Impact of dust and/or organic material in the consignment		x	x	x	

D. Applicability / feasibility of the RRO

Table 5. Potential limitations to the practical application of RROs.

Limits to be considered regarding applicability	RROs				
	fumigation	sprayed pesticides	surface disinfectants	process additives	protective compounds
Regulatory limitations	x ¹	x ¹	x ¹	x ¹	x
Technical difficulties	x ²		x	x	x ²
Environmental limitations	x ³				
Social or ethical aspects	x ⁴	x ⁴			
Potential side effects	x	x	x ⁵	x ⁵	x ⁵
Economic considerations	x ⁶	x ⁶	x ⁶	x ⁶	x ⁶

¹ Chemical used shall be authorised in the EU for the intended use.

² May require dedicated facilities or equipment.

³ Potential health and environment risks.

⁴ Social reluctances for pesticides.

⁵ Potential side effects on product quality or increased susceptibility to other problems.

⁶ Extra costs.

E. Other RROs that may lead to similar effects

Field applications of pesticides in the country of origin may lead to similar effects by reducing the prevalence of pests in harvested products, which may therefore no more need post-harvest treatments. Non-chemical methods (e.g., biological, physical, cultural controls) applied in the country of origin or of destination may lead in some circumstances to similar effects by reducing the prevalence of pests in fields or under protective growing condition.

Physical treatments of consignments (heat and cold treatments, irradiation, sorting and grading...) may also lead to similar effects.

It may happen that a chemical treatment applied for other reasons (i.e. quality of the consignment) may be effective against a pest. Nevertheless, there is no general rule; effectiveness of various RROs highly depends on plant products, on associated pests and on the prevalence of those pests in the field at origin.

F. Combinations of RROs that include this RRO

Chemical treatments of consignments or addition of biocides during processing of plant parts can be stand-alone measures. Nevertheless, those RROs most often occur in combination with other RROs, e.g. field application of pesticides, IPM practices, physical cleaning of plant products (brushing, sieving, washing...) and/or grading sorting (to remove plants or plant parts showing symptoms or with bad aspect), that are additional measures that may make chemical treatment of the consignments more effective (removal of compounds that may inhibit chemicals, removal of heavily contaminated/infested plants or plant parts that may be difficult to clean from the pest...).

G. Conclusions

Synoptic table for the RRO.

Targets	place of application	expected effect	main technical limitations	RROs with similar effects / most often in combination
Fumigation				
pest or vector	Processing premises/ packaging facilities, transport	reduction of the prevalence of the pest or of its vector in the consignments	availability of authorized fumigants, availability of facilities for fumigation, all plants or plant parts cannot support fumigation, pests that are inside plants or plant material can hardly be killed, existing MRLs	field application of authorized pesticides/ cleaning – brushing - washing and grading – sorting /
Sprayed pesticides				
pest or vector	Processing premises/ packaging facilities, points of entry	reduction of the prevalence of the pest or of its vector in the consignments	availability of authorized pesticides for treatment of plants and plant products, systemic pesticides needed for pests that are inside plants or plant products, existing MRLs	field application of authorized pesticides / cleaning – brushing - washing and grading – sorting
Surface disinfectants				
pest	Processing premises/ packaging facilities	reduction of the prevalence of the pest in the consignments	availability of disinfectant that can be used on the commodity, impossibility to kill pests that are inside the plant or plant product	cleaning – brushing - washing and grading - sorting / packaging of the product intended for the final consumption
Process additives				
pest	processing premises/ packaging facilities	reduction of the prevalence of the pest in the consignments	availability of processing additives that can be used on the commodity, impossibility to kill pests that are inside the plant or plant product	- / -
Protective compounds				
pest	Processing premises/ packaging facilities	reduction of the prevalence of the pest in the consignments	availability of protective compound with biocide effect that can be used on the commodity, impossibility to kill pests that are inside the plant or plant product	field application of authorized pesticides / cleaning – brushing - washing and grading – sorting / packaging of the product intended for the final consumption

References

EPPO (European and Mediterranean Plant Protection Organization), 2009. Sulfuryl fluoride fumigation of dried fruits and nuts to control various stored product insects. PM 10/4 (1). Bulletin OEPP/EPPO Bulletin 39, 29–30.

- EPPO (European and Mediterranean Plant Protection Organization), 2012. Phosphine fumigation of grapevine to control *Viteus vitifoliae*. *PM 10/20 (1)*. Bulletin OEPP/EPPO 42, 496–497.
- EPPO (European and Mediterranean Plant Protection Organization), 2012. Phosphine fumigation of stored products to control stored product insects in general. *PM 10/21 (1)*. Bulletin OEPP/EPPO Bulletin 42, 498–500,
- EPPO (European and Mediterranean Plant Protection Organization), 2012. Phosphine fumigation of stored products to control *Trogoderma granarium*. *PM 10/22 (1)*. Bulletin OEPP/EPPO Bulletin 42, 501–503.
- EPPO (European and Mediterranean Plant Protection Organization), 2012. Phosphine fumigation of dried fruits and nuts to control various stored product insects. *PM 10/23 (1)*. Bulletin OEPP/EPPO Bulletin 42, 504–506.
- ISPM 28, 2016. Phytosanitary treatments for regulated pests. International Plant Protection Convention (IPPC), FAO, Rome.