RESOLUTION OIV-VITI 592-2018

OIV GOOD PRACTICES FOR MINIMIZING THE IMPACTS ASSOCIATED WITH THE APPLICATION OF PLANT PROTECTION PRODUCTS IN VINEYARDS

THE GENERAL ASSEMBLY

At the proposal of Commission I "Viticulture",

IN VIEW of article 2, paragraph 2 b) i of the Agreement of 3 April 2001, establishing the International Organisation of Vine and Wine, and under the points 1.b and 4.a.i of the OIV Strategic Plan 2015-2019, which foresees to "*Promote sustainable vitiviniculture* and *Characterise and evaluate sustainable production methods and principles*" and "*Undertake assessment and provide scientific opinions on viticultural and enological treatments, processes and practices*" respectively,

CONSIDERING the many works presented during the meetings of its expert groups and particularly the "*Vine Protection and viticulture techniques*" Expert Group, and following a proposal made by this group of experts "PROTEC",

CONSIDERING the need to respect the principles of sustainable winegrowing as indicated in Resolution CST 518/2016 on OIV general principles of sustainable vitiviniculture - environmental - social - economic and cultural aspects; especially the parts concerning the handling and application of phytosanitary products,

CONSIDERING Resolutions OIV CST 1/2008 on OIV GUIDELINES FOR SUSTAINABLE VITIVINICULTURE: PRODUCTION, PROCESSING AND PACKAGING OF PRODUCTS; OIV-VITI 422-2011 on OIV GUIDELINES FOR SUSTAINABLE VITICULTURE ADAPTED TO TABLE GRAPES AND RAISINS: PRODUCTION, STORAGE, DRYING, PROCESSING AND PACKAGING OF PRODUCTS,

CONSIDERING Resolution OIV/ VITI 01-2003 on COORDINATION OF PRIORITY THEMES IN VITICULTURE, especially the recommendations about some crucial points that should be developed in the future like: biodiversity, conservation of the environment and soil characteristics, the evaluation of the effects of cultivation techniques concerning qualitative, health and social requirements or the knowledge and stimulation of the grapevine's natural bio-defences against parasites while respecting the eco-physiological balance and;

CONSIDERING Resolution OIV/ VITI 01-1999 on INTEGRATED VINEYARD PRODUCTION, especially the part concerning integrated strategies to be developed while considering the interaction between pests and pathogens, environmental and management factors and;

CONSIDERING that there are several protocols for plant protection products worldwide which are currently available or in the process of being developed and require a standardised criteria for their use among different countries,

CONSIDERING that there is a genuine concern about the correct use of these products in vineyards and trying to define minimum standardized criteria to reduce human and environmental risks from plant protection products used in vitiviniculture and to allow a comparison and their possible common effects among countries,

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DECIDES to adopt the following OIV good practises for minimizing the impacts associated with the application of plant protection products in vineyards.

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GOOD PRACTICES FOR MINIMIZING THE IMPACTS ASSOCIATED WITH THE APPLICATION OF PLANT PROTECTION PRODUCTS IN VINEYARDS

Under a proposal from the group of experts Vine protection and viticulture techniques "PROTEC", OIV is suggesting some recommendations, which come from the results of the questionnaire launched in 2014: 15 Member States have given their answers and the results show that all of them have an Official List for prohibited and allowed products for grapevine protection and almost all of them (90%) have an official methodology about applications limits.

These good practices are the basis for rational use of plant protection products (PPP) and optimal technical recommendations for PPPs application in vineyards. The criteria suggested are based on different official protocols provided by OIV members (see Annexe 4) and focus on the maximum reduction possible of risks for humans and the environment within the scope of a responsible and sustainable framework. These guidelines should be revised periodically.

Prevention or elimination of harmful organisms must be achieved by implementation of practices on integrated management of pests and diseases which increase the number of available tools for managing by the producers.

1 Methodology

The methodology and the recommendations for the application of the PPP should be established depending on the different factors which help to determine the optimum volume of application (primary factor for an effective application and a possible reduction of the use of plant protection products), but it is not the only one. For appropriate use of the PPP it is necessary to take into consideration the following factors:

- ✓ Phenological stages of grapevines;
- ✓ Leaf area development;
- ✓ Varietal susceptibility to diseases supressed
- ✓ Climate and soil conditions;
- ✓ Training and trellising system
- ✓ Application techniques used
- ✓ Diseases / pest species, infestation or infection pressure of the pathogen.
- ✓ Specificity of the product and consideration of worker safety and protection.
- ✓ Weather forecasts, models and field observations
- ✓ Age of the plantation

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Professional users will have to verify the efficiency of phytosanitary measures in compliance with the recorded data and, if it exists, those related to the use of PPPs and pest monitoring.

2 Pest and fungal diseases monitoring and forecasts

Pest Monitoring is an important tool for reducing the use of PPPs. Pest monitoring and forecasts can be done by monitoring through biological monitoring tools (traps, oospore maturation monitoring, etc.), observations in the field (including untreated plots) or with computer simulations based on data provided by a weather station network.

3 Products

A product can only be used if it has undergone a formal evaluation procedure for the use concerned resulting in a marketing authorization of each State. The authorization procedure for one product involves a science-based assessment of the health impact on the applicator, the worker, the consumer, the environment (including non-target species) and the efficacy of the product on the desired targets.

In order to obtain a good control and to allow the registration of the doses of an active substance in viticulture products used in each country, OIV recommends undertaking (before its authorization to the use on grapevine with regards to plant protection products application) field trials and external audits given by official national departments or independent competent bodies.

As far as possible, these methods should define a specific limit for each product referring to the range among the treatments or doses used for it and should consider the possible risks of selecting pathogens resistant to plant protection products.

The applied products will have to be as specific as possible for the intended target pest organism, and they should have the least side effects for the human health, organisms and the environment.

When there is a risk of resistance of a pathogen to an active substance or mode of action (all substances acting on the same target pest or pathogenic organism), and the pressure of harmful organisms requires a repetition of the application of the product in the vineyard, resistance-management strategies must be deployed against the emergence of the phenomenon of resistance, in order to increase and extend the efficiency of the products. Alternate or combined use of several PPP's with different mechanisms of action should be put in place or, where possible, products with a nonspecific range of effects; the use of alternative non-chemical methods (which can limit the pressure of product selection) should be considered. The important factor here is the classification in resistance classes according to FRAC[1].

Every product must be deployed respecting the maximum number of applications (labelling) and the quantitative limits of the formulation for each intervention according to sustainability principles for every vegetative season or fixed by the competent territorial authorities.

[1] Fungicide Resistance Action Committee

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4 Units

The units used should be in the International System of Units (SI).

5 Dose rate adjustment for reducing the use of plant protection products

The aim of the dosing is to apply the amount of product necessary to control diseases and pests and to avoid over- or under-dosing.

However, historical and local traditions, variability in climate and soil, the need for mechanization and other production objectives, have led to a variety of vine growing systems worldwide, involving different row distances, training and trellising systems that produce several heights and canopy thickness which means different interventions or product management are required.

The quantities of plant protection product per hectare and per treatment must be determined on the basis of the volume or surface targeted to be treated (Annex I).

One way of reducing the amount of PPPs in vineyards is to correctly adjust PPP application rates to actual needs of the foliar surface in order to avoid excessive dosages while ensuring necessary crop protection. Although some labels may recommend different doses depending on the growth stage or the degree of disease pressure, no information is generally reported on how to adjust the dose rates to account for different canopy size or shape.

Proposed doses can be defined as an interval (minimal and maximal doses), that must be managed according to the epidemic risk level and the level of resistance of the particular grape cultivar.

Even in uniform vineyards, important differences can be observed in canopy density and thus in canopy volume. The use of electronic or other systems in precision viticulture capable to determine these differences in real time and the ability to adjust the working parameters according to these variations should be used to achieve savings in the total amount of sprayed pesticides (1).

Referring to the spray volume, volume levels should be fixed depending on the machinery, product, pest, phenology, climate, vine canopy-volume or surface area and other factors.

6 Machinery for plant protection product application

The design, construction and maintenance of machinery for PPPs application play a significant role in reducing the adverse effects of PPPs on human health and the environment. OIV recommends using the most efficient and environmentally friendly technologies (2). According to this principle, spraying or air assisted sprayer techniques using injection nozzles, techniques which allow a homogenous application side by side and if it's possible its recycling (panels or other recovery systems) are strongly recommended. Regarding PPPs application equipment already in professional use, adequate criteria for a correct distribution and efficiency of the equipment and requirements for the inspection and maintenance to be carried out on such equipment should be respected. Full implementation of regular sprayer inspection and calibrating procedures will be essential for the success of any method for dose rate adjustment (3).

The key to the appropriate dose expression is the optimal sprayer function which ensures delivery and distribution of a certain volume of spray liquid. Spraying Machines Application equipment should

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be adjusted before application by checking flow rate and travel speed in relation to the intended spray volume.

7 Handling of plant protection products

According to the general principles of sustainability of the resolution CST 518/20016, handling of PPPs, including storage, diluting and preparation and distribution of the PPPs and cleaning of PPPs application equipment after use, and recovery and disposal of tank mixtures, empty packaging and remnants of PPPs are particularly prone to unwanted exposure of humans and the environment. Therefore, it is appropriate to provide for specific measures addressing those activities (4).

Empty pesticide containers must not be re-used and must be disposed of in a manner that avoids exposure to humans and contamination of the environment. Empty containers, obsolete or unwanted chemicals should preferably be sent back to suppliers or alternatively be removed by certified or approved chemical waste disposal companies.

Record-keeping (notebook) and information about the purchase, storage and use of plant protection products should be established in order to raise the level of protection of human health and the environment by ensuring the traceability of potential exposure, to increase the efficiency of monitoring and control.

The handling and application of PPPs should require the setting of minimum health and safety requirements at the workplace, covering the risks arising from exposure of workers to such products, as well as general and specific preventive measures to reduce those risks, as fixed in resolution CST 518/2016.

Safety instructions should be prominently displayed and employees fully trained. The following are especially recommended:

- ✓ Suitable techniques and protective equipment should be used by the operator in order to avoid any risk of exposure or contamination associated with the preparation of the mixture, with spraying, concerned grapevine parts and with the rinsing of equipment,
- ✓ Provide a filling area for the tanks, equipped with a system that avoids possible network contamination and a system that limits the risk of accidental overflows or spillage,
- ✓ Calculation of the filling of the tanks according to the final surface to be treated
- ✓ If the topographic conditions permit, rinse the tanks of the spraying machine in the plot, then spray the vine with the diluted rinsing water,
- ✓ More sustainable systems for the recovery, the evaporation of unused mashes and waste water from washing of equipment for distribution must be privileged; dispose or recovery of the dry residue in according to the current rules and regulations
- ✓ Handling or washing of the spraying machine should not be undertaken near a watercourse or water catchment area,
- ✓ Maintenance and calibration of the spraying machine should be regularly carried out by the operator and, if necessary, it should be periodically checked using an approved procedure.

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8 Drift Reduction

PPPs drift refers to the undesirable diffusion of products during application. This concerns mainly off-target contamination due to spray drift and runoff from plants (5).

Therefore the use of Drift Reduction Technology should be encouraged:

These technologies include:

- drift-reducing nozzles;
- spray shields and;
- drift- or runoff-reducing adjuvant chemicals;
- Adjustment of the flow and the speed of the air in hydro pneumatic sprayers;
- Side by side applications devices.

9 Training

It is essential to set up formal systems of both initial and additional training for advisors and professional users of PPPs and recording such training so that those who use or will use PPPs are fully aware of the potential risks to human health and the environment and of the appropriate measures to reduce those risks as much as possible. Training should also focus on an accurate knowledge and diagnosis of pests and diseases and the understanding of their life cycles (6).

10 National plant protection products Plan

It is desirable that each member state has a national action program aimed at setting quantitative objectives, targets, measures, timetables and indicators to reduce risks and impacts of PPP use on human health and the environment and at encouraging the development and introduction of integrated pest management (IPM) and of alternative approaches or techniques in order to reduce dependency on the use of PPPs.

Beside of the application of these guidelines, every national and international legislation about PPPs must be respected by the concerned OIV countries (i.e. Directive 2009/128/EC for the OIV EU members), and, where fixed, all the regulations for eco sustainable production.

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ANNEX I. Methodologies for the determination of the doses/volumes of application

The method based on area (kg/ha ground surface) does not take into account area of the canopy and the method based on concentration (%) does not take into account spray volume needed per hectare by the different spray technologies. In vineyards, spray is directed at a three-dimensional structure and winegrowers commonly use air-assisted sprayers that reduce the volume of water per hectare while improving penetration of the canopy and the quality of application. In order to improve the efficacy of treatments, dose rate methods such as Tree Row Volume (TRV) or Leaf Wall Area (LWA) have been developed to meet this issue and to adapt the dose rate to the area where the treatment is needed.

The Tree Row Volume (TRV) or Vine Row Volume (7) model is a quite simple and objective method of determining foliage volume of vineyard canopy.

TRV (m^3/ha)= (H) x (W) x 10,000 m^2/ (R) (Fig 1)

H = canopy height (m)
W = canopy width (m)
R = row spacing (m)

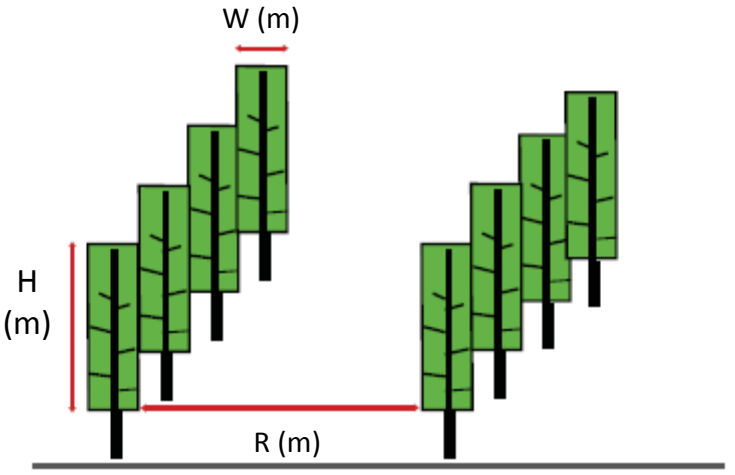

Fig 1. Adapted from AgrarBerater document (2015) (8).

In order to use the TRV Model, the dose indicated on the product's label instruction should be expressed as kg per m^3 of Tree Row Volume.

The Leaf Wall Area model (9) uses two parameters, canopy height (H) and row spacing (R). It may be considered as a particular case of the Tree Row Volume method, under the assumption that the canopy width (W) is either constant or not relevant. The definition "leaf wall area" is normally applied to the area of the fruit wall, or foliage wall, in a crop which mainly develops in a vertical plane as in vineyards trained to a vertical wall (espalier vineyards).

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LWA (m^2/ha) = 2 x H x a /R

H = canopy height (m)
a = ground area ha (10,000 m^2 /ha)
R = row spacing (m)

In order to use the LWA model, the dose indicated on the label instruction of the product should be expressed in kg per m^2 of Leaf Wall Area

It is recommended to use the following algorithm of the calibration formula (10):

$$\text{Water volume (L/ 10,000 m}^2\text{)} = \frac{\text{Nozzle flow rate (L/min) x number of nozzles x 600}}{\text{Row spacing (m) x travel speed (km/h)}}$$

The treated area is defined by the area that is covered by the spray band of the working nozzles.

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ANNEX II. Example of decision Support System for the determination of the quantity of phytosanitary product and the volume of water - DOSAVIÑA®

The characteristics and the vegetation representing a key factor for the logical determination of the quantity of phytosanitary product (almost like water volume) during the process of the PPP application. The structure of vegetation, together with the used technical application, have a direct influence on the calculation of the optimum quantity/volume distribution.

The concept of Leaf Wall Area (LWA) represents a method adapted for the calculation of optimal dose in crops which form a uniform vertical wall. However, it should be noted that whatever is the proposed method, it should be easy to apply by the user.

Considering the previous premises, DOSAVIÑA® (11) has been developed, a system that helps taking decisions, that allows to calculate the optimal volume and quantity of phytosanitary product application, taking into consideration the factors that described above.

Process:

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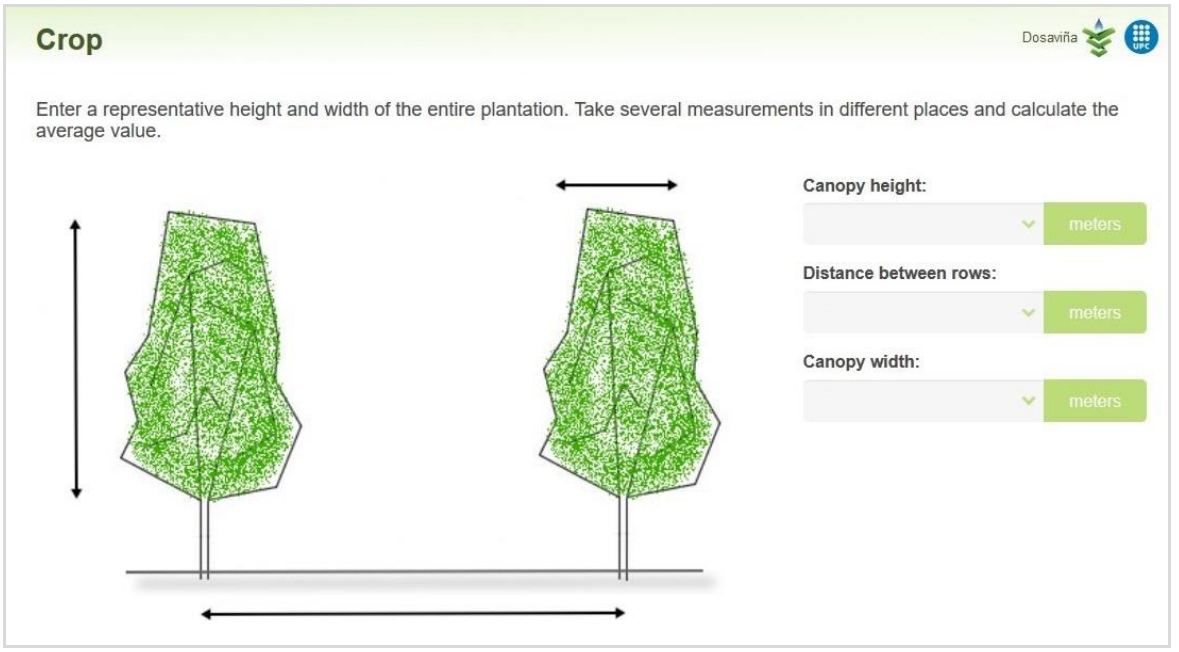
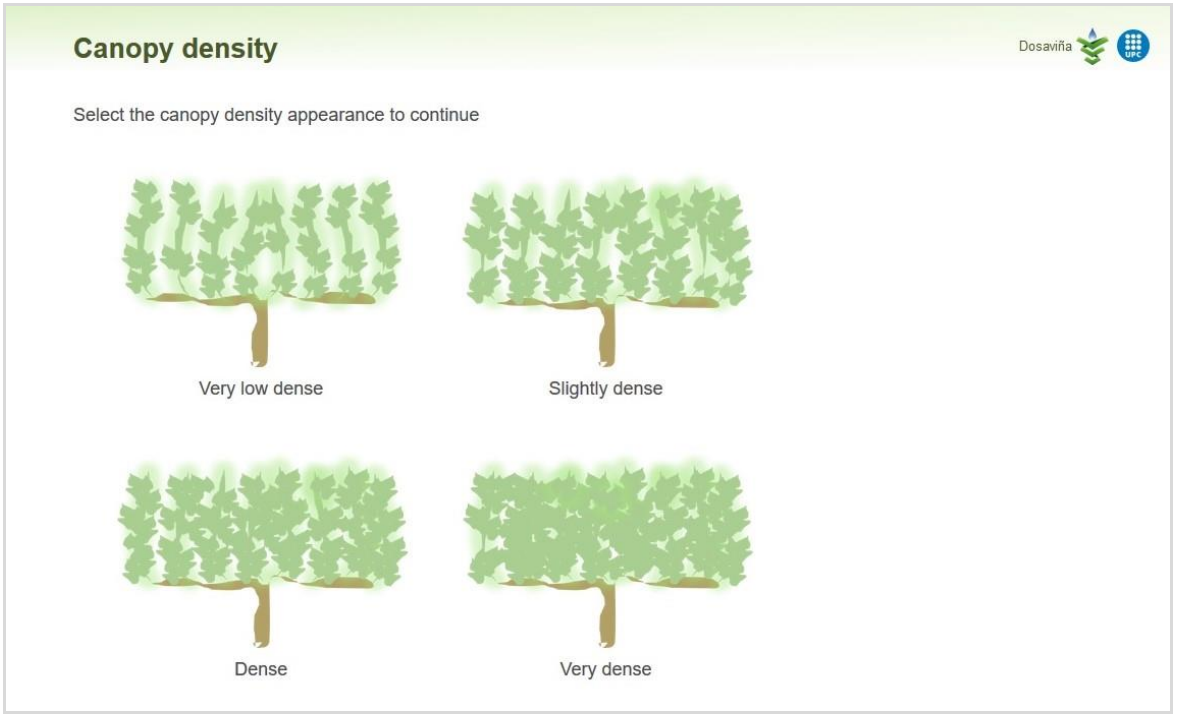
i. Introduction of the vegetation parameters





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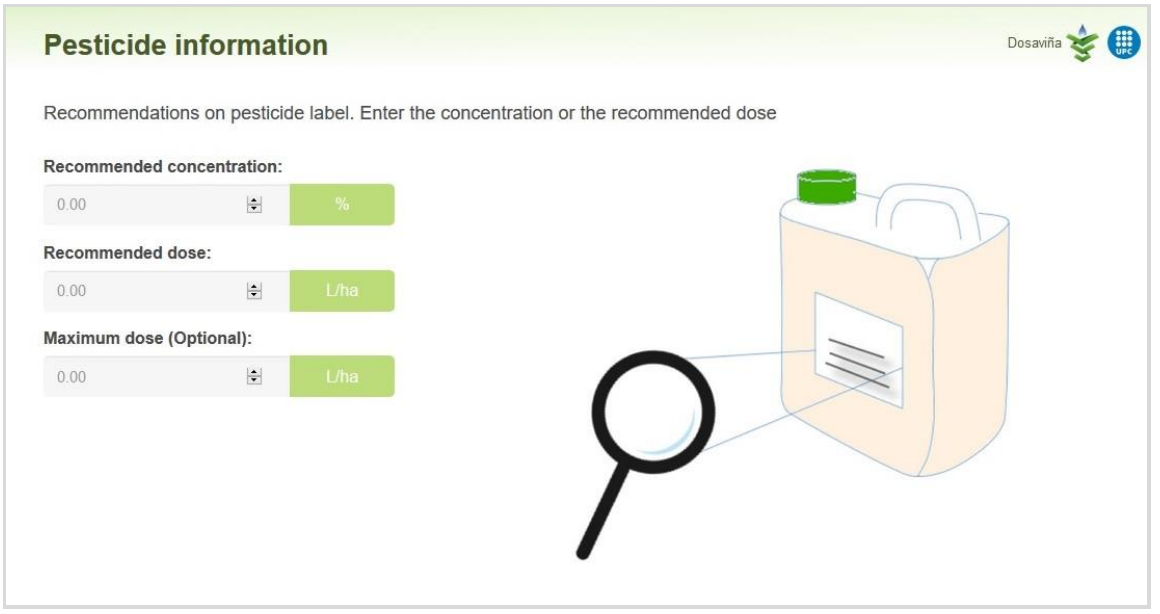
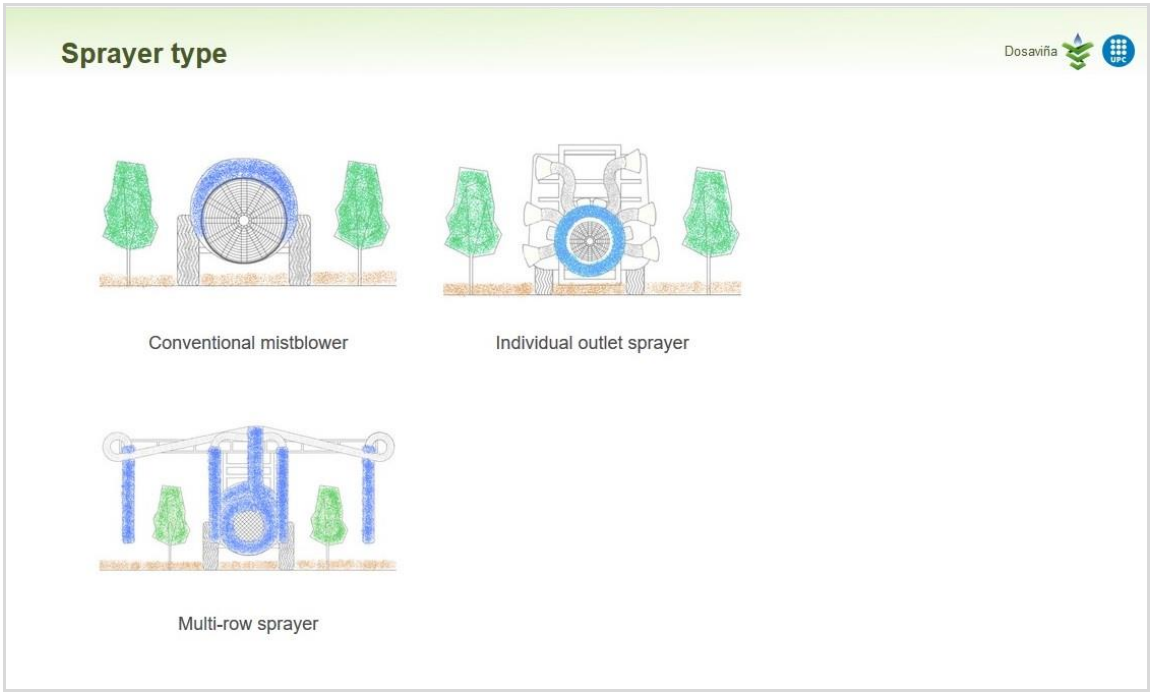
ii. Data of the applied phytosanitary product



iii. Selection of the type of equipment



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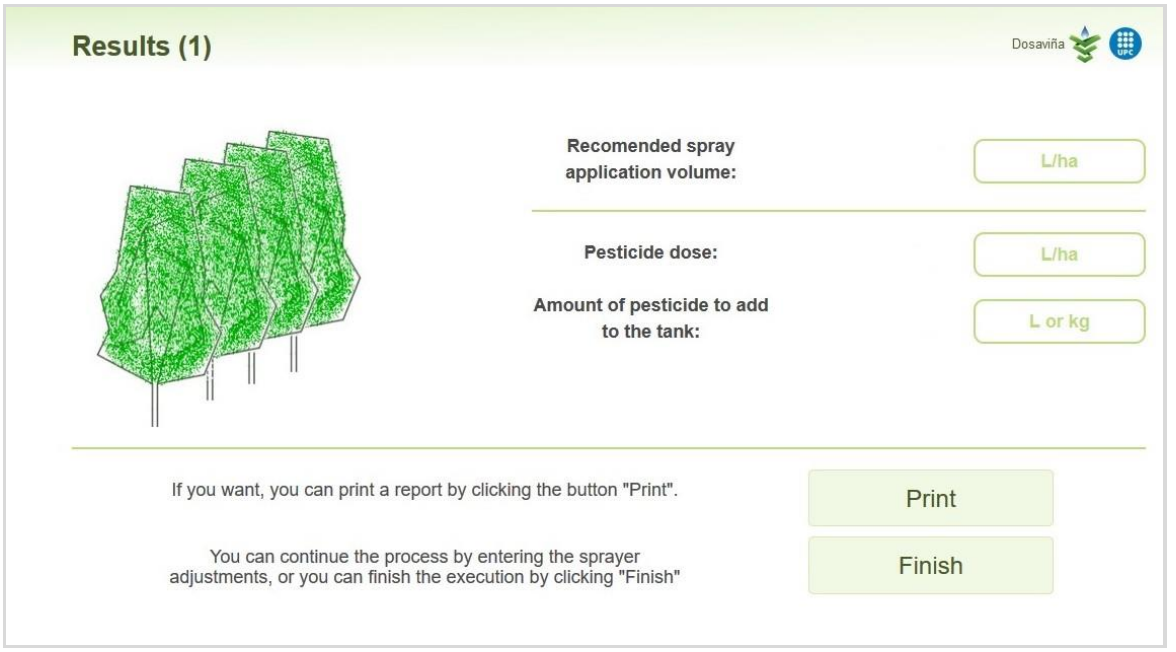
iv. Calculation of recommended volume and quantity of phytosanitary product



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ANNEX III. Expression of doses three-dimensional crops. Conversion factors

Whatever is the selected method for expressing the dose of the plant protection product on the product label, it is recommended to easily transform the units so that all possible options can be correctly interpreted. This annex includes a practical example of the existing relationship among the different ways of expressing the doses in products for trees.

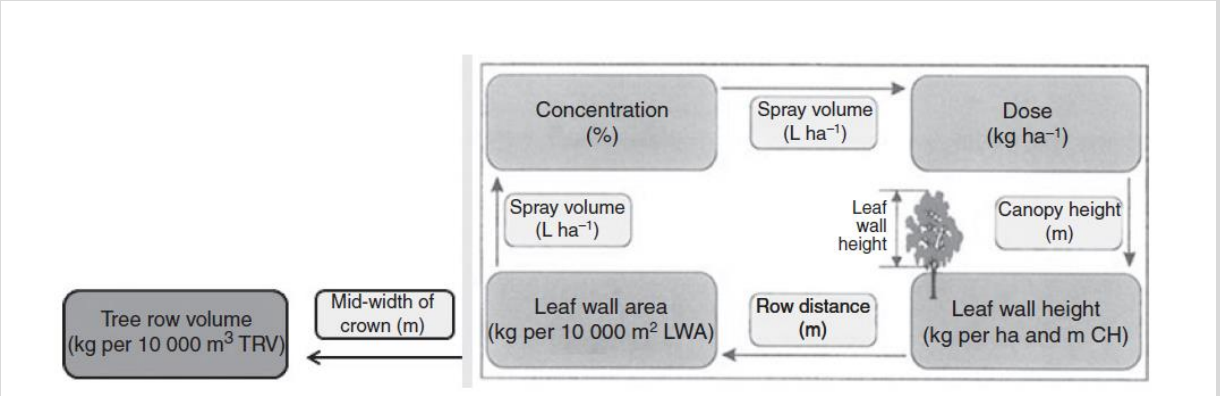

Fig 2. EPPO guidelines PP1/239(2) - Dose expression for plant protection products (12).

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ANNEX IV. List of official departments and websites related to PPPs national rules and recommendations

Country	Official Departments	Websites for Official List for avoided and allowed Products and Methodology Recommendations		
ARG	INTA and SENASA	www.inta.gob.ar	www.senasa.gov.ar	http://www.senasa.gov.ar/contenido.php?to=n&in=1447&io=15900 en
AUS	Departments of Agriculture/Primary Industries	https://portal.apvma.gov.au/pubcris	http://www.awri.com.au/industry_support/viticulture/agrochemicals/agrochemical_booklet/	
AZE	Ministry of Agriculture (Phytosanitary control department and Plant protection department of Azerbaijani Scientific Research Institute of viticulture and Wine-making)	http://eco.gov.az/en/19-laws		
BEL	Audit system IPM	www.fytoweb.be		
CHE	Agroscope	www.agrometeo.ch/sites/default/files/u10/index_phyto_viti_2014.pdf	http://www.blw.admin.ch/psm/produkte/index.html?lang=fr	http://www.blw.admin.ch/themen/00011/00075/index.html?lang=fr
CZE	ÚKZÚZ (Central Institute for Supervising and Testing in Agriculture; Department of Control and Application Machinery)	http://eagri.cz/public/app/srs_pub/fytoportal/public/#ior|met:884afd608455f503ba13e4dc4000b5b9|kap1:plodiny|kap:c18ccd9cbe2ba381e37b810d0c259841	http://intranet.srs.cz/public/web/mze/zivotni-prostredi/udrzitelne-pouzivani-pesticidu/	http://intranet.srs.cz/public/web/mze/zivotni-prostredi/udrzitelne-pouzivani-pesticidu/narodni-akcni-plan-cr-nap/
DEU	Federal Office of Consumer Protection and Food Safety (BVL; http://www.bvl.bund.de)	http://www.bvl.bund.de/SharedDocs/Downloads/04_Pflanzenschutzmittel/psm_verz_3.pdf?__blob=publicationFile&v=7).		http://www.gesetze-im-internet.de/bundesrecht/pflschanwv_1992/gesamt.pdf
ESP	MAPAMA (www.mapama.es)	http://www.mapama.gob.es/es/agricultura/temas/sanidad-vegetal/productos-fitosanitarios/registro/menu.asp		

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Country	Official Departments	Websites for Official List for avoided and allowed Products and Methodology Recommendations		
FRA	Catalogue des produits phytopharmaceutiques et de leurs usages, des matières fertilisantes et des supports de culture autorisés	https://ephy.anses.fr/		
ITA	local phytosanitary services lay out specific protocols and technical guidelines for PPP application	http://www.salute.gov.it/fitosanitariwsWeb_new/FitosanitariServlet		
LUX	Institut viti-vinicole (Administration depending from the ministry of agriculture): http://www.ivv.public.lu	http://www.asta.etat.lu	https://saturn.etat.lu/tapes/tapes_fr_lst_pdt.jsp?sel=	http://www.ivv.public.lu
NZL	Ministry for Primary Industries (MPI). Recommendations – annual spray schedule developed by MPI and industry – NZ Winegrowers	http://www.foodsafety.govt.nz/elibrary/industry/register-list-mrl-agricultural-compounds.htm		
	Industry programme for sustainability– New Zealand Winegrowers	http://www.nzwine.com/sustainability/sustainable-winegrowing-new-zealand/		
PER	SENASA	http://www.senasa.gob.pe/senasa/plaguicidas-restringidos-y-prohibidos-en-el-peru		
POR	Ministério da Agricultura e Mar – Direção-Geral de Alimentação e Veterinária	http://www.dgav.pt/fitofarmaceuticos/guia/finalidades_guia/Herbicidas/vinha1.htm		
SVK	Official Deparments: Central Control and Testing Institute in Agriculture/Department of Pesticides Registration	Websites for Official List for avoided allowed Products and Methodology	http://www.uksup.sk/orp-cinnost/; www.mpsr.sk/download.php?fID=14512	

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TUR	Regulation on Prescription, Implementation and Registration of Plant Protection Products	http://www.tarim.gov.tr/TAGEM/Belgeler/yayin/BİTKİ%20ZARARLILARI%20ZİRAİ%20MÜCADELE%20TEKNİK%20TALİMATLARI.pdf	http://www.tarim.gov.tr/Konu/934/Yasaklanan-Bitki-Koruma-Urunleri-Aktif-Madde-Listesi	http://www.tarim.gov.tr/Konu/922/Ruhsatli-Bitki-Koruma-Urunleri-Yeni-Tavsiyeler-Gecici-Tavsiyeler-Ruhsat-Devri-Yapilan-Ruhsati-İptal-Edilen-Bitki-Koruma-Urunleri
ZAF	Integrated Production of Wine (Wine & Spirit Board of South Africa)	www.croplife.co.za	www.agri-intel.com	Scheme for Integrated Production of Wine (www.ipw.co.za)

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(3) Gil, E. 2007. Inspection of sprayers in use: a European sustainable strategy to reduce pesticide use in fruit crops. *Applied Engineering in Agriculture*, 23(1):49-56.

(4) TOPPS (2017). Best management practices to reduce point sources. Available at: http://www.topps-life.org/key-documents2.html

(5) TOPPS (2017). Best management practices to reduce drift. Available at: http://www.topps-life.org/key-documents.html

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Certified in conformity
Punta del Este, 23rd November 2018
The General Director of the OIV
Secretary of the General Assembly

Jean-Marie AURAND

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