



# EPPO Workshop 2016

## EPPO Workshop on harmonized dose expression for the zonal evaluation of plant protection products in high growing crops

Austrian Agency for Health and Food Safety  
Vienna, 2016-10-18/20





# EPPO Workshop 2016

European and  
Mediterranean  
Plant Protection  
Organization  
(OEPP/EPPO)

## Programme

### EPPO Workshop on harmonized dose expression for the zonal evaluation of plant protection products in high growing crops

AGES, Spargelfeldstraße 191, 1220 Wien

Tuesday, 18 October

08:15 Registration

#### OPENING MORNING PLENARY SESSION

Chair: Vlasta Zlof

Opening address

- 09:00 Charlotte Leonhardt - *Head of Division for Food Security, AGES*  
Monika Stangl - *Head of Unit for Plant Products, Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW)*

Key notes

- 09:25 The need to harmonize dose expression in the zonal efficacy evaluation  
Ingrid Langer - AGES, Austria
- 09:55 EPPO Standard PP1/239 *Dose expression of plant protection products*: status and use of this Standard based on the results of the Dutch workshop in 2009  
Erwin Mol - NPPO, the Netherlands
- 10:15 Dose rate expressions in high growing crops: need for harmonization from the perspective of the plant protection product industry  
Frank Meier-Runge (Syngenta) and Martin Teichmann (BASF) - ECPA
- 10:40 Discussion on presentations
- 11:05 Coffee break

Presentations per Zone based on the questionnaire filled in by countries

Chair: Ingrid Langer

- 11:30 Southern EU Authorization Zone  
Veronique Mironet - ANSES, France
- 12:10 Northern EU Authorization Zone  
Lise Christina Deleuran - Aarhus University, Denmark
- 12:40 Results of the questionnaire for Switzerland  
Pierre-Henri Dubuis - Agroscope, Switzerland
- 13:00 Lunch



# EDP Workshop 2016

European and  
Mediterranean  
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## Programme

Tuesday, 18 October

### AFTERNOON PLENARY SESSION

Presentations per Zone based on the questionnaire filled in by countries (Continued)

Chair: Claudia Jilesen

- 13:50      **Central EU Authorization Zone**  
Géza Nagy - National Food Chain Safety Office, Hungary

- 14:30      Discussion on all zonal presentations

Dose expressions and implementation with dose adjustments

- 14:50      The implementation of the dose expression per hectare Leaf Wall Area (LWA) in vertical crops in Belgium  
Pierre Hucorne - CRA-W, Belgium

- 15:05      A proposal for dose expression and dose adjustment in the EU-Southern zone (DOSA3D system)  
Santiago Planas - University of Lleida/Generalitat de Catalunya, Spain

- 15:20      Pesticide dose adjustment to the crop environment (PACE)  
Jo O'Leary-Quinn and Kathryn Robert - CRD, United Kingdom

- 15:35      Discussion on presentations

- 16:00      Coffee break

- 16:30      Stakes for a new model of dose expression in viticulture: advantages and point to be taken into consideration  
Sébastien Codis - IFV, France

- 16:45      Dose adjustment for fruit orchards in France: proposals for the near future  
Florence Verpont - Cifl, France

- 17:00      Upcoming changes of dose expression for PPP into kg or L/ha LWA considered for the evaluation and registration of grapevine uses in Germany  
Gregor Kral - BVL, Germany

- 17:20      Technical aspects of crop parameter measurements  
Ralph-Burkhardt Toews (Bayer CropScience) – ECPA

- 17:40      Discussion on presentations

Working groups: Introduction and practical information

- 18:00      Introduction and practical information - Ingrid Langer, Vlasta Zlof  
18:15      Close of the first day



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## Programme Wednesday, 19 October **WORKING GROUP SESSIONS**

08:30 - 17:00 (Parallel sessions)

### Working Group on Grapevine

**Chair:** Gabriele Kovacs

**Co-chair:** Ralph-Burkhardt Toews

**Rapporteurs:** Ingrid Langer and Frank Meier- Runge

### Working Group on Pome Fruit

**Chair:** Pierre Hucorne

**Co-chair:** Jean Pierre Huby

**Rapporteurs:** Ewa Matyjaszczyk, Grzegorz Doruchowski and Peter Schlotter

### Working Group on High Growing Vegetable Crops (Tomato)

**Chair:** Claudia Jilesen

**Co-chair:** Martin Hommes

**Rapporteurs:** Martin Teichmann and Maria Torne

### Working Group on Citrus (Olives / Isolated Tree Orchards)

**Chair:** Patricia Chueca

**Co-chair:** Antonio Miranda

**Rapporteurs:** Agusti Soler and Dario Sterzi - Support: Juan M. Cantus and Elena Gutiérrez

10:15 – 10:45              Coffee break

12:30 – 13:30              Lunch

15:00 - 15:30              Coffee break

15:30                      Preparation of the conclusions and presentations (in each group)

17:00                      Close of the second day



19:00                      **Workshop Dinner**

*The Institute for Plant Protection Products at AGES invites participants to dinner at Augustinerkeller (Augustinerstrasse 1, 1010 Vienna)*



# EPPO Workshop 2016

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## Programme

Thursday, 20 October 2016  
**MORNING PLENARY SESSION**



Chair: Ingrid Langer and Claudia Jilesen

### Presentation of results from the Working Group

- |       |  |
|-------|--|
| 08:30 | <b>Working Group on Grapevine</b>                                |
| 08:50 | <b>Working Group on Pome Fruit</b>                               |
| 09:10 | <b>Working Group on High-Growing Vegetable Crops (Tomato)</b>    |
| 09:30 | <b>Working Group on Citrus (Olives / Isolated Tree Orchards)</b> |
| 09:50 | <b>Discussion</b>  |
| 10:15 | Coffee break   |
| 10:45 | <b>Workshop's Conclusions and Recommendations to be drafted</b>  |
| 12:15 | Closing of the workshop  |
| 12:30 | End of morning plenary session                                   |
| 12:30 | Lunch (packed lunches)   |
| 13:00 | Departure for the field trip                                     |
| 22:00 | Return at the latest (the bus may stop at some hotels)           |



## **The Need to Harmonize Dose Expression in the Zonal Efficacy Evaluation**

**Ingrid Langer**

**Austrian Agency for Health and Food Safety (AGES), Institute for Plant Protection Products, Wien, Austria**

The dose expression of a plant protection product is characterized by the amount of product, linked to a certain reference unit. The use of a certain dose expression in the evaluation approach clearly influences the accuracy of results and their value for registration and local practice.

Dose expressions have been discussed on many occasions in Europe within the last decades. During this time, the EPPO Standard PP1/239 was prepared and adopted and common ground summarized. However, findings were rarely implemented in the evaluation of plant protection products.

Since Regulation (EC) 1107/2009 raised the evaluation of plant protection products from national to zonal level, harmonization of the evaluation approach in general and the use of a harmonized dose expression in high growing crops in particular gained considerable importance. Thereby, the selection of a certain dose expression is triggered by the need for accuracy of the evaluation, by the need for validity of zonal conclusions to all member states and an easy convertibility to national registrations and dose expressions.

However, when selecting the most appropriate dose expression for the zonal evaluation, numerous factors have to be considered, such as the legislation on EU and on member state level, local practice (crop structure, technical equipment, history of efficacy evaluation, expression of dosing) and the information provided in single trial reports.

In this workshop, evaluators, applicants, contractors and authorities should become aware of the current challenges and needs in the zonal efficacy assessment of high growing crops. Major steps towards harmonization should be made including the specification of the most appropriate dose expression for zonal efficacy evaluation and the definition of terms essential for a common understanding.

## **EPPO Standard PP 1/239 Dose expression of plant protection products: status and use of this Standard based on the results of the Dutch workshop in 2009**

**Erwin S.N. Mol  
National Plant Protection Organization, Wageningen, the Netherlands**

In 2009 a meeting was held with regulators, applicants and scientists to discuss the different dose expression methods for foliar pesticide applications in apple trees in different European countries. A harmonized dose expression is needed for regulators for mutual recognition, for applicants to harmonize data packages and for growers to have a clear understanding of the dose expression on the label. The current situation, the relation between the dose expression and the tree structures in the countries, and possibilities to harmonize the dose expression were discussed.

It was concluded that more harmonization is needed, but there was no agreement on a harmonized system of dose expression. However, it was agreed that:

- extra information on maximum doses and spray volumes on the labels is necessary;
- all relevant information should be available in trial reports to allow conversion to other expressions;
- 3-dimensional expressions are suitable;
- a web based service to convert to other expressions should be created;
- the need for a glossary of terms.

These agreements were discussed at EPPO, resulting in an adjustment of the Standard PP 1/239 'Dose expression for plant protection products' in 2012.

This Standard shows how to convert between different dose expressions in high-growing crops. It can be done directly from the experimental data, when all relevant parameters in the efficacy trials are available. It can also be done from the doses expressed on the label in a country, assuming this relates to a known standard structure, and, where relevant, to a specific growth stage. Having all necessary data of the crop structure and the treatment, it is possible to use this Standard to convert between different dose expressions.

## **Dose rate expressions in high growing crops: need for harmonization from the perspective of the Plant Protection Product industry**

**Frank Meier-Runge, Martin Teichmann**  
**European Crop Protection Association (ECPA)**

Authors: Ralph-Burkhardt Toews<sup>1</sup>, Jean-Pierre Huby<sup>2</sup>, Bernardo Pollmann<sup>3</sup>, Martin Teichmann<sup>4</sup>, Peter Schlotter<sup>5</sup>, Frank Meier-Runge<sup>6</sup>

<sup>1</sup>Bayer CropScience AG, <sup>2</sup>DuPont de Nemours S.A.S., <sup>3</sup>Adama Agriculture B.V., <sup>4</sup>BASF SE, <sup>5</sup>Dow AgroSciences, <sup>6</sup>Syngenta Crop Protection AG

The dose rate defines the amount of an active ingredient placed as an initial deposit on the target area, which is adequate to control a certain target organism.

We must distinguish between:

- Dose expression: the **unit** in which the dose is expressed
- Dose rate: the **quantity** of product to be applied
- Dose adjustment: the adjustment of the dose rate to the specific field situation

Recommended dose rates in vertical crops are expressed in various ways on product labels within the European Union countries. The current EPPO guideline PP1/239(2) revised in 2012, also permits various dose rate expressions.

Spraying machines deliver a certain water volume to a specific area. The treated area is defined by the area that is covered by working nozzles. In vertical crops the nozzles cover a vertical plane, defined by row length and spray hedge height from both sides of the crop row. Therefore, the correct dose expression unit cannot be the ground area used for example in arable crops.

The Plant Protection Product industry recommends the use of “treated Leaf Wall Area (tLWA)” as a common dose expression unit in biological trials in vertical crops for new active ingredients.

$$\text{treated Leaf Wall Area (m}^2\text{)} = 2 * \text{Treated Canopy Height (m)} * \text{Row Length (m)}$$

$$\text{treated Leaf Wall Area (m}^2\text{)} = \frac{2 * \text{Treated Canopy Height (m)} * \text{Groundarea (m}^2\text{)}}{\text{Row Distance (m)}}$$

The implementation should be a zonal approach to facilitate the registration process and focus first on key crops.

The PPP industry needs planning security and clarity concerning transition of dose rate expression and implementation timelines as well as clarity on validity of existing risk assessments. An adequate transition period of at least 3 years is necessary.

## **The implementation of the dose expression per hectare Leaf Wall Area (LWA) in vertical crops in Belgium**

**Pierre Hucorne**

**Wallon Agricultural Research Center (CRA-W), Gembloux, Belgium**

In Belgium the first attempts to express the dose per ha LWA were made in 1996, focusing on authorizations of new active substances in top fruit. In 2007, this dose expression was also implemented in glasshouse fruiting vegetables, for small fruit and for grapevine.

A long-lasting official stewardship has been put into place to explain this new approach in top fruit production. The growers are now well informed and apply this dose expression in practice. However, the grower himself/herself or the stewardship service still recalculate the dose in L/ha soil. According to the Federal Food Agency recommendations, the doses of applied products must be expressed in ha in the cadastral area.

The fruit and vegetables growers do not apply the dose per ha LWA yet in everyday practice. However, the stewardship service recalculates the corresponding dose in concentration/spray volume for the grower.

A significant amount of experience has been gained in Belgium in evaluating trials from Maritime EPPO zone countries and translating their various dose expressions. Dose translation to ha LWA is needed for mutual recognition of authorizations from the neighbouring countries.

The dose per ha LWA (EPPO Standard PP 1/239(2)) is an appropriate harmonization tool and should be used as common standard in efficacy trials and when conducting assessments for crops treated as “vertical surfaces”:

- It reflects exactly how the treatment is done in practice.
- It can be converted to all country specific risk assessment scenarios (provided that the assumptions of the model are known) and to national dose expressions.

A complete reporting of the trial parameters is needed for a successful conversion. Implicit assumptions like “standard orchard dimensions”, “theoretical spray volume” should be avoided.

## **A proposal for dose expression and dose adjustment in the EU-Southern zone (DOSA3D system)**

**Santiago Planas**  
**University of Lleida / Generalitat de Catalunya, Spain**

Authors: Santiago Planas<sup>1,2</sup>, Carla Roman<sup>1</sup>, Ricardo Sanz<sup>1</sup>, Joan Ramon Rosell<sup>1</sup>

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Approximately 10 M ha of fruit orchards and vineyards are located in Europe, mainly in the Southern Zone (93%). In this zone these 3D crops are usually grown in a wider and, frequently, higher canopy than is usual in the Northern and Central zones.

Recently, crown height (CH) and leaf wall area (LWA) are being promoted as harmonized methods for dose expression. Nevertheless, they seem to be too simplified and uncertain for the Southern canopy structures to ensure the minimum (safe) but sufficient (efficient) amount of chemicals are sprayed in order to comply with the SUD Directive (2009/128/EC).

Although air assistance spraying systems are largely implemented, one of the main constraints in the Southern zone is the penetration of the spray droplets into the wide canopies. Consequently, canopy width is a mandatory dimension to be considered. Other factors to be considered are the growth stage or preferably the leaf area index (LAI) which differs significantly as the season progresses and, finally, the operating conditions because the more efficient the spraying operation the lower the quantity of pesticide required.

The DOSAFRUT system assumes the labelled concentration (%) and calculates the pesticide dose (kg or L ha<sup>-1</sup>) determining the optimized spray volume rates (L ha<sup>-1</sup>) considering the above mentioned variables. With this aim the LAI is robustly estimated at a field level in a straightforward way by the solid housing parameter (height and thickness minus the porosity).

In the recent years a tool to operate this system is accessible worldwide at [www.dosafrut.es](http://www.dosafrut.es). The system has been extensively validated in deciduous fruits when applying adjusted doses with significant pesticide saving. More recently similar trials have been carried out on grapes, also providing good results. Subsequently, the system has been renamed as DOSA3D.

*This work is being developed within AGVANCE (ES-AGL2013-48297-C2-2-R).and EUCLID (633999-H2020-SFS-2014-2) projects, financed by the Spanish Government and the EU, respectively.*

## **Pesticide dose adjustment to the crop environment (PACE)**

**Jo O'Leary-Quinn and Kathryn Robert**  
**Chemical Regulation Directorate, York, United Kingdom**

The UK has provided funding to allow the development of a method to enable those applying pesticides in orchards to achieve an approximately constant deposit on trees of different size and canopy density. Thus where trees are small and less dense it is possible to determine a reduced dose that will still maintain biological efficacy. Additionally, funding was provided to ensure that there was a transfer of the scheme to growers so that it is used in practice and growers fully understand the scheme.

We will explain the background to the scheme and why it is important to distinguish between dose expression and dose adjustment and the role that the label or other specific advice can play in ensuring that the pesticides are applied efficaciously in the orchard. The scheme considers the following key parameters; the tree height and spacing (the aspect ratio) as well as the canopy density and on this basis the dose for the crop is adjusted whilst still remaining within the maximum application rate e.g., g a.s./ha. This scheme is widely used in the UK and now has a proven track record and provides a practical approach to dose adjustment taking into account the full range of different types of orchards that occur e.g. standard modern, multi-row, cider and 'heritage' orchards.

Details are available at: <http://www.pjwrc.co.uk>

## **Stakes for a new model of dose expression in viticulture: advantages and points to be taken into consideration**

**Sébastien Codis**  
**French Wine and Vine Institute, Montpellier, France**

The current dose expression system in France (fixed dose rate per hectare) or in Italy and Spain (%, max volume/ha) does not aid compliance with the new objectives of increasing the sustainability of pesticides use. Indeed, at early growth stages, the current dose expression systems lead to doses higher than that required and substantial off-target losses that could be avoided using doses adjusted to the development of the canopy. An ideal dose expression system would integrate crop parameters and would lead to constant and sufficient deposits per unit area on the target in order to ensure protection efficacy.

IFV (French Wine and Vine Institute) and IRSTEA (French Research Institute of Science and Technology for Environment and Agriculture) have carried out studies in order to assess spraying performance in a wide range of field conditions. The indicators used are the normalized average deposition of product per unit area on the crop (ng/dm<sup>2</sup> for 1 g applied per ha) and the homogeneity of deposition within the canopy (CV, %).

Studies aimed to identify the best combination of crops parameters on which a new dose expression could be based. Results show a much more accurate correlation between deposit and TRV (Tree Row Volume) than between deposit and LWA (Leaf Wall Area) although TRV is not always easy to measure in the field.

Considering a dose expression system only based on LWA, the strongly varying spray deposits (from 1 to more than 2) associated with the same LWA, due to not taking into account canopy thickness, would imply that over dosage would be recommended in a lot of cases.

Deposition measurement shows that a linear adjustment of doses to the LWA leads to under-dosing at early growth stages which may be detrimental to production objectives. Thus, it would be necessary to accompany LWA dose expression with 2 thresholds: firstly a maximum threshold of LWA (LWA max) that will cover most of the situations and would be considered for risk assessment and secondly a minimum threshold of dose used for very low LWA should be considered to guarantee efficacy for early growth stages.

## **Dose adjustment for fruit orchards in France: proposals for the near future**

**Florence Verpont**

**Technical Institute for fruits and vegetables (Ctifl), Prigonrieux France**

In France the applied dose of phytosanitary products in fruit growing is an important concern. Orchards have a high diversity of canopy structures (fruit hedges for pome fruits, goblets for stone fruits, and large volumes for nuts). In addition, for each structure there is a significant change in the vegetation volume between bud break and harvesting. In the past a common way of spraying orchards was to apply spray until run off. The French dose expression for the registration of the product was a number of kgs or Ls of product / hL of spray volume. At present, with the new sprayers which allow low volume treatments, the producers multiply the dose per hL by ten (on the basis of 1000 L/ha) and apply this single dose whatever the sprayed volume. This then gives an equivalent to a fixed dose per ha that the French registration authority set up a few years ago as a maximum applied dose. This practice is easy to implement by the producer but it leads to very variable deposits per unit of foliage area depending on the vegetation. Dose adjustment to the crop growth stage is a clear goal of reducing inputs identified by the French government. One of the aims of the national project PULVARBO (2015-2020, optimizing spray practices in orchards) is to create a support tool for the practical implementation of dose adjustment. To reach this objective trials have been set up: characterization of orchards by different indicators (treated height of the trees, width of canopy, distance between rows, leaf wall area, tree row volume), measurements of deposits linked to the canopy structure, biological trials to evaluate the impact of a dose adjustment during a complete season. At this stage of the project some preliminary answers can be given.

## **Upcoming changes of dose expression for PPP into kg or L/ha leaf wall area (LWA) considered for the evaluation and registration of grapevine uses in Germany**

**Gregor Kral**  
**Federal Office of Consumer Protection and Food Safety, Braunschweig, Germany**

In Germany the current dose expression system in grapevine uses is based on per ha ground area taking into account 4 stages (basic rate, BBCH 61, BBCH 71, BBCH 75). This system is entitled the “factor system”.

In view of the change in dose expression recalculation, from the current factor system to the upcoming LWA system, the dose rate per ha LWA differs during the season. Thus, an adaptation of already authorized uses into the new dose expression system is not possible. It seems that it will only be possible to use the new dose expression system with new applications (new products and renewals).

In the case of renewal applications the question is how should existing efficacy study reports be used without referring to crop structures. Recalculation into the LWA dose expression system is then only possible when referring to the already authorized maximum application rate on a standard LWA, e.g. 18 000 m<sup>2</sup>/ha ground area.

Which LWA standard should be used will be discussed. It is a delicate balance between using a too low or too high LWA standard.

A too high LWA standard results in:

- too low application rates per LWA from the efficacy point of view,
- too high authorized application rates per ha ground with possible problems that could be raised during risk assessment.

A too low LWA standard results in:

- too high application rates per LWA with possible residue problems,
- too low authorized application rates to treat high LWA situations.

After changing the dose expression the following information concerning dose will be included into the GAP:

- the maximum single application rate per ha ground area,
- the total dose per ha ground area,
- the dose per ha LWA.

## Technical aspects of crop parameter measurements

Ralph-Burkhardt Toews  
European Crop Protection Association (ECPA)

Authors: Ralph-Burkhardt Toews<sup>1</sup>, Jean-Pierre Huby<sup>2</sup>, Bernardo Pollmann<sup>3</sup>, Martin Teichmann<sup>4</sup>, Peter Schlotter<sup>5</sup>, Frank Meier-Runge<sup>6</sup>

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**Introduction:** The documentation of crop parameters in trials is essential to accurately describe the crop for product applications. In trial reports different terms may be used to describe the same parameter, undermining consistency. Therefore agreed harmonized terms, definitions and measurement methods of crop parameter in trials are proposed.

**Treated Canopy Height:** The term Treated Canopy Height should replace currently used terms like Canopy Height, Foliage Height, Plant Foliage Height or others.

Treated Canopy Height describes the actual oversprayed treated height of the canopy of grapes or pome fruit and is very often equivalent to the working dimension of the sprayer and may vary per application. If only a part of the crop is treated this height is the Treated Canopy Height and has to be reported as such. Generally, the trunk is disregarded.

**Row Spacing:** The term Row Spacing should replace currently used terms like Row Distance or Distance between Rows.

Other parameters like Plant Height, Spacing within row, Sides applied or Rows per Plot are still valid and should be documented in grape and orchard trial reports.

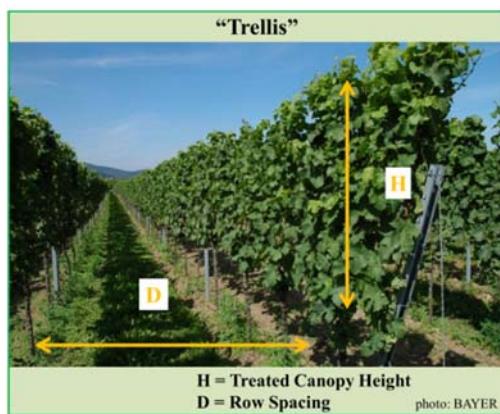


Fig. 1 Measurement of crop parameter

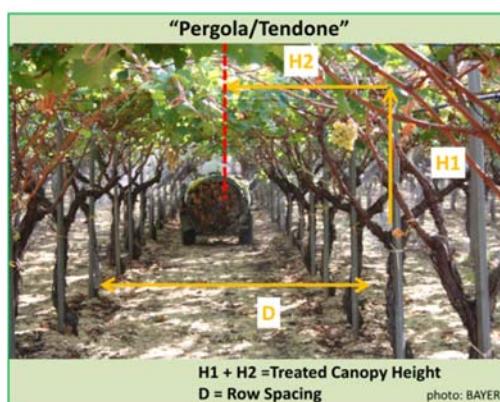


Fig. 2 Treated Canopy Height

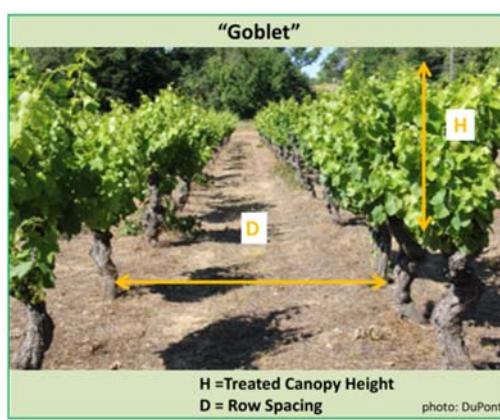
**Measurement of crop parameters in grape trials:** The main growing systems in the European vineyards trials are defined which have to be reported in trial documentation.



**Fig. 3** Measurements in Trellis



**Fig. 4** Measurements in Pergola



**Fig. 5** Measurements in Goblet

## PARTICIPANTS

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