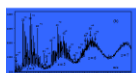


## ACTION C4. Monitoring of economic impact

*Deliverable C.4.1 Report on the current data on pesticide application costs and inputs*



SEADM



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## EXECUTIVE SUMMARY

The objective of action C4, where the present deliverable (C4.1) is included, is to monitor the economic impact derived from the increase of use of OVRA (Optimal Volume Rate Adjustment) tools and SDRTs (Spray Drift Reducing Techniques and Tools).

We have defined a questionnaire/survey to know the state of the art regarding Low Drift Nozzles use and water and fuel consumption on PPP application. Once that questionnaire was completed by the users, the analysis of the answers has given us valuable data on the current situation.

In synthesis and after analysing the obtained data we postulate a thesis “The use of Low Drift Nozzles is very low, and therefore the selling is also very low”. In particular, a null use in Spain (Valencia region) and less than 5% of selling in Italy.

In this context, the challenge is so big, and it will be necessary an extra effort convincing the farmer communities but also dealers about the advantages of this type of nozzles as a very important part in the way to promote the OVRA tools.

## 1 INTRODUCTION

To evaluate the economic impact is a key element of any project implementation, but especially for LIFE projects, where the sustainability of the effort made demonstrating a solution for an environmental problem must be reflected in terms of available market for the solutions demonstrated. “Market” means added value, i.e. value able to be detected as an opportunity by users but also for dealers and manufacturers.

To check if this added value has been considered as opportunity, during and after the project execution, a start point must be established. This starting point was set with two dimensions:

- The Number of low drift nozzles sold (or in other terms, used) in a season.
- Fuel and water consumption during the same season.

These dimensions can lead to 2 types of information:

- The increases of low drift nozzles selling.
- The perception of users in terms of reduction of fuel/water consumption by using low drift nozzles, and the potential change of the nozzle’s consumption pattern.

Nevertheless, these dimensions are not equivalent in economic terms, the first one is a long-term objective, the second one defines if the users may obtain savings in fuel and water consumption once OVRA tools and SDRT are implemented and, in this sense, is a short-term objective. Therefore, the second one, if achieved, it will be the engine to reach the first one.

Furthermore, those dimensions have 2 different targets groups, in the first case dealers or manufacturers, for the second one “users”, and both must be checked.

To obtain real data from both target groups was not a simple task, despite having defined a questionnaire very easy to implement. The manufacturers, in general, protected their data regarding selling and they do not share it easily. On the other hand, there are thousands of users and growers in the defined area of study, so it would need hundreds of questionnaires implemented to reflect robust data.

All this means that it was necessary looking for alternative sources of information able to give us verifiable information. The role of the federation of cooperatives has been key in this aspect, especially regarding citrus farmers and their PPP manufacturers.

## 2 IMPLEMENTATION

Three phases in the works were defined to implement this action:

1. To define the questionnaire.
2. To spread the questionnaire.
3. To analyse the data and to obtain results.

### 2.1 To define the questionnaire.

During the months of November and December of 2018, two meetings were set between CACV and IVIA (Valencian Institute for Agrarian Research) to define the questionnaires for manufactures/dealers and users.

The questionnaire had to define, on the one hand, what we wanted to know about the number of low drift nozzles sold, and on the other, the water and fuel consumption during an entire cycle of citrus and vines harvesting season.

After these meetings, a questionnaire draft was defined. It was sent to the rest of the partners involved in the action C4, especially UMA-UPC (Unity of Agricultural Machinery of the Polytechnic University of Catalunya) and DISAFA-UNITO (Department of Agriculture, Forest and Food Sciences of the University of Torino) to introduce their improvements. After that consultation, the final version of the questionnaire was approved in January 2019 (see annex 1 and 2).

This final version of the questionnaire for both studied crops (vine and citrus) has 2 parts. The first survey was composed of 2 questions directed to manufactures:

- The number of total nozzles sold per year.
- The number of low drift nozzles sold per year.

The objective of those questions was to establish the ratio of low drift nozzles in relation to the total of sold of nozzles. This ratio would be the main economic indicator to compare the situation after the project.

The second part of the questionnaire was focused on economic savings: fuel and water consumption reduction as a result of the use of OVRA tools and SDRT, contextualized according to different plagues. This part of the questionnaire was focussed on farmers and users in general (see annex 1 and 2).

## 2.2 To spread the questionnaire

Once the questionnaire was defined, the optimum number of answers (completions of the questionnaire) were established:

- For manufacturers (ratio of low drift nozzles in relation to the total sold): 9 (CACV, DISAFA and UPC).
- For users (economic savings): 30 implemented questionnaires (CACV, DISAFA and UPC).

CACV proposed to each one of the partners involved in this part of the action C.4.1 a pre-fixed optimum number of completed surveys:

- CACV: 3 Manufacturers and 20 Users
- DISAFA: 3 Manufacturers and 5-10 Users
- UPC: 3 Manufacturers and 5-10 Users

Furthermore, it was established a calendar for sending back the completed surveys to CACV, the deadline was the last week of May 2019.

Each one of the partners was free about how to obtain these number of surveys, having in mind that the representativity of the companies/users was the main element to contrast real information. It was better to obtain information from big companies (for example) than from small companies. The number of questionnaires implemented could be less important than the representativity of the data.

## 2.3 To analyse data and to obtain results

Once the implemented questionnaires were sent back to CACV (included the surveys made by CACV itself) the results were tabulated to prepare the analysis.

### 2.3.1 Manufacturers.

In relation to nozzles manufacturers for vineyards:

- Italy: Checked three main nozzles manufacturers /dealers. Result: Between 4-13% of the total are air induction (low drift) hollow cone nozzles.
- Spain: No data. It was no possible to obtain data from manufacturers or dealers regarding vineyards. Six manufacturers were contacted and visited but with different excuses kindly declined to participate or simply did not respond.

In relation to nozzles manufacturers for citrus crops:

- Spain: No direct data. The situation was like nozzles manufacturers for vineyards.

In this case, a very interesting and strong indirect evidence of the situation was obtained. We consulted GRUPITEAF S.L, a benchmark company in the Valencian Community dedicated to carrying out inspections of machinery used for PPP application. After the consult carried out, we were informed that between the campaigns 2017-2018, with 521 machines (atomizers) inspected approximately, none of them mounted low drift nozzles in their spray arcs. Besides, in 2019, with a total of 54 machines (atomizers) inspected, ether none of these machines mounted again low drift nozzles on their arcs. To check the error files, all inspections carried out by the inspection body were verified on the website of the Ministry of Agriculture, Fisheries and Food (MAPA).

### 2.3.2 Users: water and fuel consumption.

- In relation to citrus crops.

The cooperative movement for citrus selling and operations is very strong in the Valencia Region, the biggest region producing citrus fruit in Spain (and Europe). Due to this, many cooperatives have developed a specific section for treatment of plagues and pests for their affiliates and in this way, the service is cheaper, homogeneous and planned.

To obtain data from those sections means to reflect the situation for hundreds of farmers i.e. all the citrus farmers who are participating in the treatment service of the cooperative. In order to obtain these valuable data, to visit a considerable number of cooperatives, 12 in total, was necessary. During those visits, the focus was double, to explain the project, its objectives and expected results and, at the same time, dispelling doubts about how to understand the questions of the survey and insist on the importance of its implementation.





Figure 1. Cooperative La Vall D'Uixó. Warehouse of the treatment section.



Figure 2.- Interview with the Manager and Responsible for treatment section of the Cooperative La Vall D'Uixó.



The obtained data was extraordinary representative and it will be the basis for the comparison at the end of the project. (see details in the annex 3):

Water and fuel consumption by pest: **Red California Louse**

Red California Louse treatment	Average
Surface treated in a working journey by application team (Ha)	2,72
Capacity of the application equipment (litres)	1.514,00
Consumption of total water volume used in the working journey (litres)	9.000,00
Fuel consumption used in the working journey (litres)	43,00
Number of tank fillings in a working journey	6,00

Source: Prepared by the authors

Water and fuel consumption by pest: **Red Spider**

Red Spider treatment	Average
Surface treated in a working journey by application team (Ha)	2,72
Capacity of the application equipment (Litres)	1.514,00
Consumption of total water volume used in the working journey (litres)	9.000,00
Fuel consumption used in the working journey (litres)	43,00
Number of tank fillings in a working journey	6,00

Source: Prepared by the authors

Water and fuel consumption by pest: **Aphid**

Aphid Treatment	Average
Surface treated in a working journey by application team (Ha)	5,90
Capacity of the application equipment (litres)	1.514,00
Consumption of total water volume used in the working journey (litres)	7.300,00
Fuel consumption used in the working journey (litres)	44,75
Number of tank fillings in a working journey	5,00

Source: Prepared by the authors

- In relation to winegrowers.

Seven questionnaires were implemented by winegrowers with the following results. See Annex 3 for details:

Winegrowers	Average
Surface treated in a working journey by application team (Ha)	25,64
Capacity of the application equipment (litres)	1.100,00
Consumption of total water volume used in the working journey (litres)	3.000,00
Fuel consumption used in the working journey (litres)	62,00
Number of tank fillings in a working journey	4,50

Source: Prepared by the authors

### 3 CONCLUSIONS AND LESSONS LEARNED

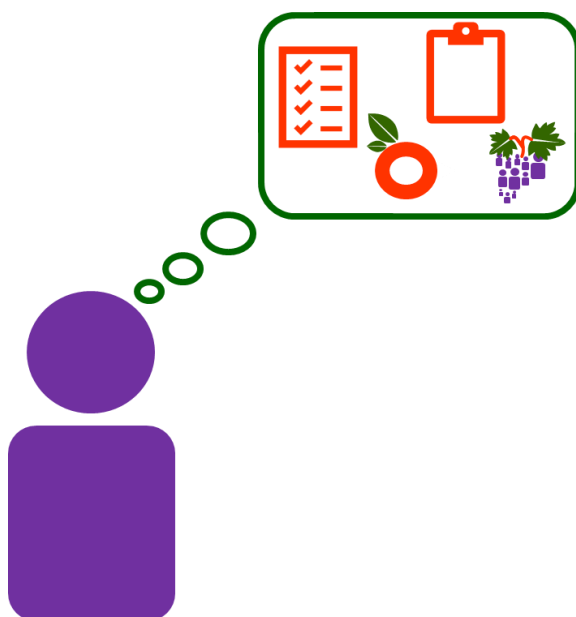
This deliverable shows the real situation in terms of economic indicators, related to nozzles selling and water/energy consumption, in the implementation areas of the present project.

With this data will be possible to compare, at the end of the project, the impact of the project in economic terms, calculating savings in fuel and water by repeating the questionnaires to the same public who have implemented the present questionnaires.

However, we want to highlight several lessons learned:

- About the manufacturers: They have been a collective with little inclination to participate. There is no pressure from the demand for low drift nozzles. In the case of citrus farmers is null.
- About the users: They were interested in the project, especially in the case of citrus farmers. Any reduction in the consumption of fuel and water has a direct impact on costs. To reach an effective reduction of pesticide by using tools like CitrusVol and SRDT will be key to develop the demand for low drift nozzles and “wake up” the offer of manufacturers.
- It will be interesting to maintain continuous communication channels with the people who have answered the questionnaire but also with manufacturers (even companies that did not answer the questionnaires), creating a favourable atmosphere in the framework of the project, highlighting advantages of the developed products and opening a line of networking. All the generated knowledge will be important to be able to collect comparative data within 3 years, even better data than in the present document, assuring the replicability.

## Annex 1. Questionnaire for economic impact in citrus.



## ACTIVITY C4: QUESTIONNAIRE FOR ECONOMIC IMPACT IN CITRUS.

### To the manufacturers of machinery

- Number of total nozzles sold per year
- Number of low drift nozzles sold per year

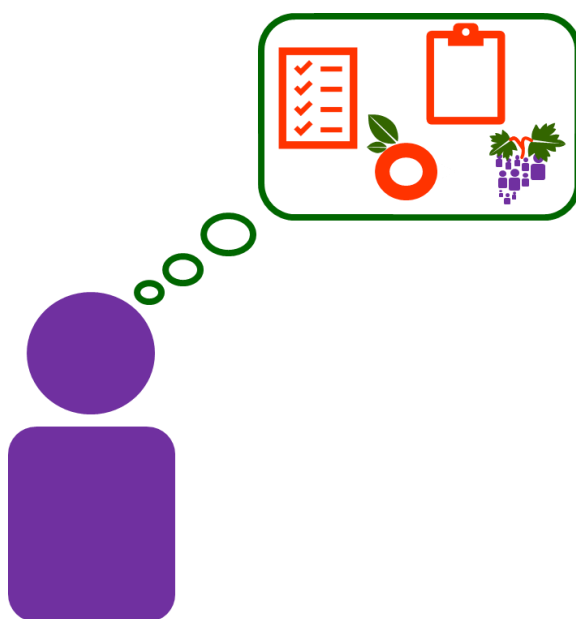
### To treatment companies

#### **3 surveys per company / 3 treatments: red California louse / red spider / aphid**

- Surface treated in a working journey by application team. Capacity of the application equipment (l)
- Consumption of total water volume (l) used in the working journey
- Fuel consumption (l) used in the working journey
- Number of tank fillings in a working journey

## Annex 2. Questionnaire for economic impact in vineyards.





## ACTIVITY C4: QUESTIONNAIRE FOR ECONOMIC IMPACT IN VINEYARDS.

### To the manufacturers of machinery

- Number of total nozzles sold per year
- Number of low drift nozzles sold per year

### To treatment companies

#### **3 surveys per company / 3 treatments: Mildew / Oidium / Botritis**

- Surface treated in a working journey by application team. Capacity of the application equipment (l)
- Consumption of total water volume (l) used in the working journey
- Fuel consumption (l) used in the working journey
- Number of tank fillings in a working journey

### Annex 3. Details about questionnaires completed.



Pesticide Reduction using Friendly and  
Environmentally Controlled Technologies  
LIFE/17/ENV/ES/000205



**Data obtained from citrus questionnaires.**

Source: Prepared by the authors

Red California Louse treatment	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Surface treated in a working journey by application team (Ha)	2,80	4,60	3,50	2,50	1,55	2,50	1,57	2,50	3,00	2,80	2,60	2,70
Capacity of the application equipment (litres)	1.500,00	2.000,00	1.500,00	1.000,00	2.000,00	1.600,00	1.000,00	1.400,00	1.600,00	1.600,00	1.500,00	1.470,00
Consumption of total water volume used in the working journey (litres)	10.000,00	16.000,00	7.500,00	10.000,00	6.500,00	7.200,00	6.000,00	8.000,00	10.000,00	10.000,00	8.500,00	9.000,00
Fuel consumption in the working journey (litres)	70,00	60,00	50,00	40,00	12,00	30,00	35,00	40,00	50,00	50,00	40,00	40,00
Number of tank fillings in a working journey	6-7	8,00	5,00	10,00	3-4	4-5	6,00	4,00	5-6	6-7	4-5	4-5

Red Spider treatment	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Surface treated in a working journey by application team (Ha)	2,80	4,60	3,50	2,00	1,55	2,50	1,57	2,50	3,00	2,80	2,60	2,70
Capacity of the application equipment (litres)	1.500,00	2.000,00	1.500,00	1.000,00	2.000,00	1.600,00	1.000,00	1.400,00	1.600,00	1.600,00	1.500,00	1.470,00
Consumption of total water volume used in the working journey (litres)	10.000,00	16.000,00	7.500,00	10.000,00	6000 - 7000	6400 - 8000	6.000,00	8.000,00	10.000,00	10.000,00	8.500,00	9.000,00
Fuel consumption in the working journey (litres)	70,00	60,00	50,00	40,00	12,00	30,00	35,00	40,00	50,00	50,00	40,00	40,00
Number of tank fillings in a working journey	6-7	8,00	5,00	10,00	3-4	4-5	6,00	4,00	5-6	6-7	4-5	4-5

Aphid Treatment	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Surface treated in a working journey by application team (Ha)	3,20	3,80	5,00	3,30	1,80	3,50	20,70	3,00	3,50	5,00	16,00	2,00
Capacity of the application equipment (litres)	1.500,00	2.000,00	1.500,00	1.000,00	2.000,00	1.500,00	1.000,00	1.500,00	1.500,00	1.500,00	1.500,00	2.000,00
Consumption of total water volume used in the working journey (litres)	8.500,00	8.000,00	7.500,00	9.000,00	7.000,00	5.600,00	5.000,00	8.600,00	7.000,00	7.500,00	8.000,00	6.000,00
Fuel consumption in the working journey (litres)	70,00	60,00	60,00	40,00	12,00	30,00	30,00	40,00	40,00	60,00	60,00	35,00
Number of tank fillings in a working journey	5-7	4,00	5,00	9,00	3-4	3-4	5,00	6,00	3-4	5,00	6,00	3,00

**Data obtained from vine questionnaires.**

For all the plagues	Q1	Q2	Q3	Q4	Q5	Q6	Q7
Surface treated in a working journey by application team (Ha)	7,50	40,00	11,00	80,00	10,00	20,00	11,00
Capacity of the application equipment (litres)	1.500,00	1.600,00	1.500,00	1500-2000	400,00	400,00	400,00
Consumption of total water volume used in the working journey (litres)	1500-3000	4000-6000	3000-4500	16.000,00	2.500,00	3.000,00	2200/4400
Fuel consumption used in the working journey (litres of fuel)	60,00	80,00	70,00		40,00	70,00	40/65
Number of tank fillings in a working journey	1-2	2-3	2-3	2,00	7	8	6-11