

## Technical needs in organic fruit growing in Europe: results of BIOFRUITNET' survey

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### Abstract

*From June to November 2021, a survey has been conducted to identify the practices, the needs, and the gaps in organic fruit production of apple, pear, apricot, peach, plum, cherry and orange. 149 fruit growers and 100 technical advisors were surveyed in a total of 26 countries. Nine European countries represent 80% of the respondents. The experience in organic fruit production for the farmers and advisors ranged from 6 to 21 years and from 8 to 20 years, respectively. The four topics mentioned as being of greatest concern were diseases and pests' control, knowledge of varieties and tree /soil nutrition, whatever the fruit species. Among a total of 54 pests and 45 diseases suggested in the questionnaire, a gradient of importance of pests and diseases has been quantified for each fruit species. The number of pests and diseases of concern ranged respectively from 7 to 14 and from 7 to 15 according to fruits species. Regarding the evolution of pests and diseases pressure, the perception of the fruit growers and technical advisors allowed to identify the most threatening ones for each fruit species: e.g. *Halyomorpha halys*, *Anthonomus pyri*, *Hoplocampa brevis*, *Myzus persicae*, *Delottococcus aberiae* and *Aleurocanthus spiniferus*. For the 7 fruits species, the most important criteria in a cultivar choice remained fruit quality. Concerning rootstocks, the ranking of criteria was almost identical among fruit species: vigour and pests / diseases susceptibility appeared to be the two most important criteria.*

**Keywords:** organic fruit growing, survey, pests, diseases, cultivars

### Introduction

As organic orchard management is very demanding in terms of technical knowledge, accessing and sharing this knowledge is a major challenge. The European project BIOFRUITNET aims at facilitating access to technical knowledge and knowledge sharing. In order to identify the technical subjects for which expectations are highest for farmers and advisors, a survey was set up to identify the needs, the knowledge gaps and the practice in organic fruit production in Europe for pome fruits, stone fruits and citrus. This short communication presents some results of this survey.

### Material and Methods

An online questionnaire was implemented in English (<https://forms.gle/mCACak3s6g6jSa1RA>), and national versions were translated for each country to facilitate the collection of information from respondents. The organization of the questionnaire was based on the recommendation of Parizot I. (2012). The questionnaire was composed of a common part

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to all fruit species, and one part specific to each fruit species considered: apple, pear, apricot, peach, plum, cherry and orange. The topics covered by the questionnaires were functional biodiversity, soil and fertilization for the common part, and plant health, varieties and rootstocks for the specific one. In order to best target how to disseminate technical knowledge, we asked about the media and interactive ways used to get technical information (multiple choice questions). In each country, the choice of the respondents was done to cover a high diversity of pests and diseases, the best diversity of production areas and a high diversity of the level of inputs used for pest and disease management.

## Results

From June to November 2021, 149 fruit growers and 100 technical advisors were surveyed in a total of 21 countries (Figure 1 left). Nine countries represent 80% of the respondents: Italy, France, Spain, Germany, Poland, Czech Republic, Austria, The Netherlands and Switzerland. Concerning fruit species, 114 answers were collected for apple, 44 for pear, 18 for plum, 10 for peach, 20 for cherry, 15 for apricot and 31 for orange (Figure 1 right).

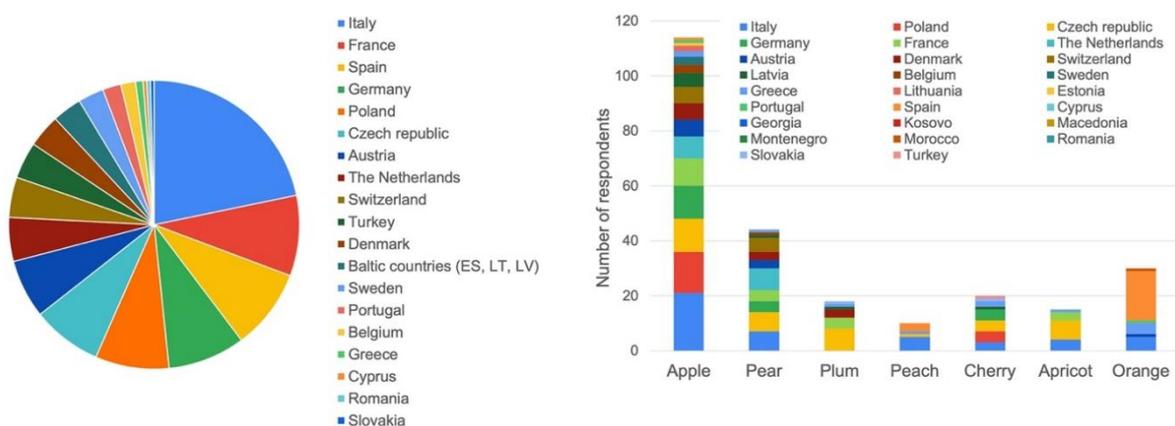


Figure 1: Origin of the respondents of the main questionnaire (left) and number of respondents obtained for the 7 questionnaires dealing with a specific fruit species (right).

The experience in organic fruit production for the farmers and advisors surveyed range respectively from 6 to 21 years and from 8 to 20 years (data not shown). 79% of the farmers surveyed have 100% of their orchard grown in organic. The mean level of experience of the farmers surveyed seems high, in view of the current dynamics of the development of organic fruit production. The work dedicated to organic farming by the advisors surveyed represented 35 to 80% of their professional activity.

Among the media used to search for technical information, the Internet resulted to be the most preferred tool, followed by conferences or documents in paper format (Figure 2 left). Internet was the most preferred tool in 10 out of 15 countries, while printed materials in a foreign language was the least popular. It should be noted that the Internet is a tool for accessing information that covers a wide range of media: written text, video, webinars, blogs, forums, social networks, etc. Among the interactive ways of obtaining technical information, exchanges with an advisor were the most used, followed by exchanges between farmers, open-field-days and meeting, and training. Surprisingly, social media were the less mentioned when considering all respondents, but their use ranged from 2% to 20% depending on the country.

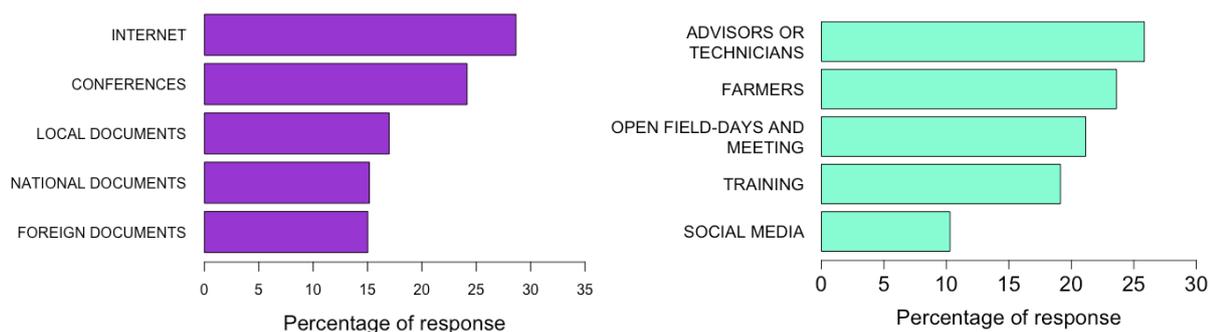


Figure 2: Ways to access technical information concerning organic fruit growing. Questions asked: What media do you search for technical information (left)? What are important ways to get technical information (right)? The percentages were calculated on the sum of the responses obtained.

Four topics were mentioned as being of greatest concern for farmers and advisors when considering technical knowledge of every fruit crop concerned by the survey: disease and pest control, cultivars, soil management and tree nutrition (Figure 3). An exception resulted the "rootstock", which appeared among the four priority themes for peaches.

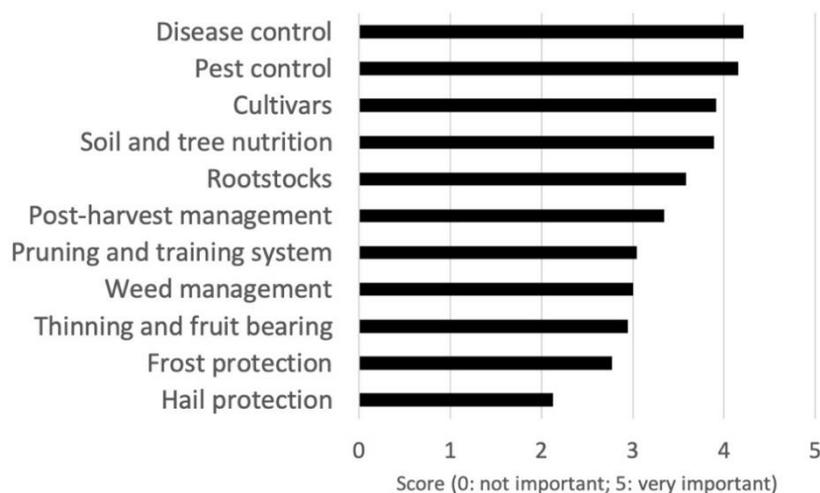


Figure 3: Mean score obtained expressed by respondents concerning the need for technical information in organic fruit growing for the 7 fruit species covered by the questionnaires ( $n=249$ ). Respondents were asked to rate the topics from 0 (not important) to 5 (very important).

The perception of the fruit growers and technical advisors regarding the evolution of fruit pest pressure in recent years was also assessed. In case of apple, brown marmorated stink bug and apple leaf miner were mostly perceived as putting an increasing pressure (Table 1). For pear, more than 60% of the respondents considered pear bud weevil, brown marmorated stink bug and pear sawfly to be increasingly damaging pests. With regards to stone fruits, aphids and flies were an important part of the increasing pests. While the increasing pressure in spotted wing *Drosophila* is well documented, it is less the case for other pests such as plum sawfly. The respondents evidenced concerns about the new invasive pests who are seriously threatening the organic citrus production in the Euro-Mediterranean area. In this context, particular emphasis was given to the mealybug *Delottococcus aberiae* in Spain, the orange spiny whitefly in Italy and Greece, and the Brown citrus aphid in Spain and Portugal. Considering the lack of knowledge on biological cycles and ecological behavior of these pests, technical information for the different control measures is highly expected by the farmers/advisors.

Table 1: Pests mentioned as the most increasing by at least 50% of the respondents. The table mention the fruit species concerned, the number of pests proposed in the questionnaire for a given fruits species, the number of respondents for a given pest and the percentage of respondents who mentioned this pest as increasing. Citrus refers to orange and lemon.

Fruit species	Nb of pests	Pest name		Nb of respondents	Increasing status (%)
Apple	11	Brown marmorated stink bug	<i>Halyomorpha halys</i>	16	63
		Apple Leaf Miner	<i>Leucoptera spp</i>	20	50
Pear	13	Pear bud weevil	<i>Anthonomus. pyri</i>	6	67
		Brown marmorated stink bug	<i>Halyomorpha halys</i>	11	64
		Pear sawfly	<i>Hoplocampa brevis</i>	11	64
Peach	9	Green peach aphid	<i>Myzus persicae</i>	4	75
		Mealy peach aphid	<i>Hyalopterus pruni</i>	3	67
Apricot	7	Flat-headed root borer	<i>Capnodis tenebrionis</i>	3	67
Cherry	8	Spotted wing drosophila	<i>Drosophila suzukii</i>	9	67
		Cherry fruit fly	<i>Rhagoletis cerasi</i>	7	57
Plum	8	Plum sawfly	<i>Hoplocampa sp.</i>	6	50
Citrus	14	Maelybug	<i>Delottococcus aberiae</i>	8	100
		Orange spiny whitefly	<i>A. spiniferus</i>	3	100
		Cotton aphid	<i>Aphis gossypi</i>	3	67
		Wooly whitefly	<i>Aleurothrixus floccosus</i>	7	57
		Citrus mealybug	<i>Planococcus citri</i>	9	56
		Red mite	<i>Panonychus ulmi</i>	6	50
		Citrus brown mite	<i>E. orientalis</i>	4	50

## Discussion

This communication focuses only on some results from the survey, others results are available on the BIOFRUITNET webpage ([www.biofruitnet.eu](http://www.biofruitnet.eu)). Pest and disease control, knowledge of cultivars and soil and tree nutrition appears the most important ones for the seven fruit species surveyed. Pest and disease control remains as a top priority, likely because technical control means allowed organic farming are limited. The diversity of pests to manage is increasing, which makes organic fruit production even more technically demanding, and should therefore emphasize the need to diversify the agro-eco-systems at plot, farm or region scales. Emerging pests, such as the brown marmorated stink bug (e.g. Haye and Weber, 2017), or *Xylella* disease raise new challenges for organic fruit production. The diversity of technical topics to be managed suggests the relevance of a global 'systemic' approach, occurring at different space and time scales, for better designing and managing orchards that prevent pests and diseases development.

## Acknowledgements

This work has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no.862850.

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