

**SYNTHESIS OF WP2 ACTIVITY 2.2,  
TASK T1 and T2  
[Output 2.2 Final study report on KIT practices]  
(Version 2, 21 December 2017)**

**Work package No. 2 (WP2):** Development of a conceptual framework for the establishment of demo-farms

**Activity 2.2 (A2.2):** Analysis of existing knowledge transfer practices in research organisations (ROs)

**Task 1 (T1):** Review of the existing institutional knowledge transfer practices of research organisations involved in the project

**Task 2 (T2):** Identification of relevant knowledge transfer practices undertaken by other national sectoral research organisations

## **1. Introduction**

This report summarises existing practices of knowledge and innovation transfer (KIT) in research organisations active in the fruit growing and processing sectors in Latvia, Lithuania and Poland and the project participants' research organisations, in particular. This report is intended to evaluate the state-of-the-art of the former cooperation in the knowledge transfer between research organisations and entrepreneurs, and to facilitate the exchange of this knowledge and experience between research organisations.

Common guidelines were provided to perform an analysis of the existing KIT practices undertaken by research organisations dealing with topics related to fruit growing. All project partners representing the research sector identified, documented and mapped both their own KIT practices (T1) and those known of other sector-specific research organisations in their respective country (T2). Those of the latter were identified by means of screening public information sources (incl. press articles and research studies) and, where necessary, through interviews with representatives of these organisations, as well as from the personal knowledge possessed by other project's non-research partners.

The analysis is based on the written inputs provided by the following project partners:

*PP1 – Institute of Horticulture, Latvia University of Agriculture*

*PP2 – Institute of Horticulture, Lithuanian Research Centre for Agriculture and Forestry*

*PP3 – Research Institute of Horticulture, Poland*

*PP9 – Institute of Agrobiotechnology, Faculty of Agriculture, Latvia University of Agriculture*

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While the initially intended focus of this analysis was on knowledge transfer to entrepreneurs (SMEs), the supplied information covered a broader scope of target audiences. Therefore, a wider coverage of KIT target groups is provided in the following review of the reported practices. This report aims to serve as an inventory of the present practices and as a basis for contextualising the role and potential contribution of the research organisations in the development of demo-farms. It will serve to complement the document on "SWOT analysis and requirements for demo-farms" (O2.1), which is to be more focused on the demand side factors, with a perspective of the supply side agents.

The study report informs on the key research domains of each research institute involved in the project (Section 2), types of knowledge and innovation transfer practices in the project countries (Section 3), aim of these practices (Section 4), subject matters (Section 5), target audiences (Section 6), implementation period and regularity (Section 7), major qualitative and quantitative results (Section 8), main difficulties encountered in the implementation of the practice and lessons learnt (Section 9). The final section summarizes the identified KIT practices and their typical characteristics.

## 2. Key research domains in the Project's research institutes

The four research institutes involved in the project from Latvia, Lithuania and Poland all represent the broader domain of horticulture, and their research undertaken in fruit science (including diverse topics dealing with fruit and berry cultivation, storage, and processing) occupies one particular strand of their scientific work (see Table 1).

**Table 1. Overview of the key research domains of the Project's research organisations**

Name	Key research domains
Institute of Horticulture, Latvia University of Agriculture (LUA)	<ul style="list-style-type: none"> <li>- Diversification and breeding of garden crops' varieties suitable for the Baltic Sea region;</li> <li>- Environmentally friendly growing systems of garden crops;</li> <li>- Storage and processing technologies of garden crops;</li> <li>- Studies of biological foundations of horticulture science.</li> </ul>
Institute of Horticulture, Lithuanian Research Centre for Agriculture and Forestry	<ul style="list-style-type: none"> <li>- Biotechnological approach for improvement of resistance to biotic and abiotic factors in horticultural plants, identification of specific genes, development of molecular markers;</li> <li>- Complex effect of climate and environment changes on agricultural ecosystems;</li> <li>- Accumulation of primary and secondary metabolites in horticultural plants depending on environmental conditions;</li> <li>- Morphogenetic and photophysiological effects in horticultural plants, important for increase of productivity potential and quality;</li> <li>- Monitoring system of phytopathogens and pests in horticultural plants;</li> <li>- Novel, safe to environment, organic and competitive plant growing technologies;</li> <li>- Changes in biologically valuable compounds, contaminants and quality of processed fruits, vegetables and berries;</li> <li>- Storage and processing technology for development of innovative products.</li> </ul>
Research Institute of Horticulture (Poland)	<ul style="list-style-type: none"> <li>- Fruit, vegetable, ornamental plant and bee sciences;</li> <li>- Physiology, biochemistry and molecular biology;</li> <li>- Biotechnology, creative breeding;</li> <li>- Protection of genetic resources;</li> <li>- Agronomy, plant pathology;</li> <li>- Integrated and organic fruit and vegetable production;</li> <li>- Fruit and vegetable storage and processing;</li> <li>- Food safety;</li> <li>- Horticultural engineering;</li> <li>- Economics and marketing.</li> </ul>
Institute of Agrobiotechnology, Faculty of Agriculture, Latvia University of Agriculture	<ul style="list-style-type: none"> <li>- Horticulture – production technologies of fruit, berries, vegetables, and herbs and ornamental plants; genetics of horticultural crops; ornamental plants, garden design;</li> <li>- [Also: Production of apiculture products; bee genetics and breeding; Crop farming (cultivation technologies of arable crops; energy crops; seed science; breeding and genetics; grassland management and fodder production; organic agriculture); Animal science (production of products of animal origin; animal genetics and breeding; animal feeding and welfare)].</li> </ul>

### 3. Types of knowledge and innovation transfer practices

There is a broad range of knowledge and innovation transfer practices carried out (or planned for the nearest future) in the project countries by the project partners or by other research institutes and training/educational organisations in the fruit growing sector. We categorise these practices into two types (and four sub-types), primarily based on the communication means used.

- (1) **Direct (face-to-face) KIT practices** – practices of knowledge communication requiring personal presence of or direct communication between the involved individuals:
  - **Individual interactions:** one-to-one interactions that take place between a researcher/advisor and the person seeking/acquiring/sharing knowledge, mostly in the form of on- of off-site individual consultations.
  - **Group interactions:** interactions between a researcher/lecturer/advisor with a smaller or larger group of individuals, covering such practices as lectures, seminars, workshops, conferences, “open days”, demonstrations, and field/rural days at research institutes, as well as field visits to farms or enterprises.
- (2) **Indirect (non-interactive) KIT practices** – practices of knowledge communication not requiring personal presence of or direct communication between the involved individuals:
  - **Communication via textual materials:** all kind of publications in various formats, including books, scientific articles, specialised journals, articles in professional press and/or periodicals, leaflets, and information sheets. These materials can also be made available in a digital form.
  - **Communication by audio-visual means:** TV and radio broadcasts (including weekly telecasts), websites, DVDs, applications for portable devices.

Both types of KIT practices can be used for various aims with one of the possible distinctions made between the kinds of knowledge being communicated:

- (1) **Communication of approved knowledge (instruction):** these practices are aimed at disseminating approved knowledge to broad audiences. Albeit they can include informing on novelties, their principle task is to provide approved technical knowledge and solutions.
- (2) **Communication of latest knowledge (innovation):** these practices are more explicitly focused on introducing the target groups with new knowledge and innovations and can be (though not necessarily in all cases) more interactive in their format.

In practice, the individual KIT practices, of course, are often interlinked and can combine various communication formats in a single activity and can follow a mixed logic. For instance, individual consultations can be both aimed at providing basic as well as more advanced, innovation-oriented information, while “Rural days” may involve a mix of activities, including lectures, field visits, practical demonstrations, dissemination of printed and audio-visual material, etc. Yet, the classification can be helpful in mapping and structuring the diversity of approaches to KIT in terms of the communication means applied and the contents of the communicated information.

An overview of the existing and planned KIT practices in each of the project’s research organisations as well as in other organisations in the participating countries is provided in Table 2. Apart from the institutes’ own initiative, the KIT practices are also initiated, supported by and/or carried out in cooperation with town or rural communities and public programmes (e.g., Rural Development programme in Lithuania). While the overview is not an exhaustive one and there is varying intensity and patterns in the use of various practices by different organisations, it indicatively shows that the most common KIT practices tend to be those organised in the form of lectures, training courses and seminars for professionals along with individual consultations to practitioners and open days.

**Table 2. Existing (X) and planned (O) knowledge and innovation transfer practices in the Project partners' countries**

	Direct							Indirect								
	Lectures, study courses for students	Lectures, training courses, seminars for professionals	Life-long learning courses	Conferences	Individual consultations	Open days, demonstrations, expositions	Field visits to farms	Scientific articles	Books	Professional journals and articles in professional press	Articles in periodicals	Leaflets and information sheets	TV and radio broadcasting, telecasts	Website	DVD, video	Applications for portable devices
<b>Project partners</b>																
Institute of Horticulture, LUA (LV)		X	(X)	X	X	X	X	X	X	X		X		X	X	O
Institute of Horticulture, Lithuanian Research Centre for Agriculture and Forestry (LT)		X		X	X	X	X	X <sup>O1</sup>	X		X	X	X	X	X	O
Research Institute of Horticulture (PL)		X		X	X	X	XO	X		XO				X		O
Institute of Agrobiotechnology, Faculty of Agriculture, LUA (LV)	X		X	X	X	XO <sup>2</sup>		X		X						
<b>Other organisations</b>																
Latvian Rural Advisory and Training Centre (LV)		X	X		X	X				X		X		X		
Latvia University of Agriculture (LV)	X		X	X				X	X	X				X		
Bulduri Horticultural technical school (LV)	X	X	X													
Agriculture consultative centres (PL)		X	X	X	X	X		<i>"informative and publishing activities"</i>								
Research Centre for Cultivar Testing (PL)								X		X						
Experimental Orchard, Warsaw University of Life Sciences (PL)		X				X										
Research and Didactic Station, Wroclaw Univ. of Environmental and Life Sciences (PL)	X	X			X	X		X								
Pomology and Apiculture Research Station, Agricultural University of Cracow (PL)	X	X			X	X		X								

Agriculture and Pomology Research Farm, Poznan University of Life Sciences (PL)	X	X				X		X								
Association Valley Nemunas (LT)		X					X					X				
Aleksandras Stulginskis University (LT)		X		X	X			X			X					
Kaunas University of Applied Sciences (LT)		X		X	X			X			X		X			
Botanical Garden of Vytautas Magnus Univ.(LT)		X			X	X		X			X					
The Chamber of Agriculture (LT)		X			X						X					
Private fruit sector supply companies (LT, PL)		X			X				X		X <sup>3</sup>					

<sup>1</sup> abroad; <sup>2</sup> demonstrations; <sup>3</sup> including advertising

#### 4. Aim of knowledge and innovation transfer practices

The principle aim of all the KIT practices is delivering knowledge of fruit growing and processing for the various target audiences (see Table 3). The content of knowledge may differ between specific KIT practices and target audiences. For instance, while lectures for students aim to provide the basic knowledge in fruit growing, lectures and seminars for professionals are rather focused on specific knowledge issues and updating knowledge. Often the aim is to deliver some specific knowledge related to growing, processing, consumption (lectures, seminars). Dissemination of research results and (foreign) experiences (professional articles), providing **theoretical knowledge**, and regularly informing on novelties (professional journal, expositions, demonstrations) were distinguished as more specific aims of knowledge and innovation transfer.

**Table 3. Aims of KIT practices**

		Basic knowledge and skills	Improve knowledge, incl. on specific issues	Disseminate research results, expert knowledge	Theoretical issues	Disseminate novelties	Disseminate experience	Collect accumulated knowledge	Discuss, obtain feedback from fruit-growers	Address current issues, problems	Address specific individual needs	Practical demonstrations	Popularize specific varieties	Tastings
Direct	Lectures for students	X						X				X		
	Lectures, courses, seminars for professionals		X	X	X	X			X	X	X	X	X	X
	Life-long learning courses	X		X										
	Individual consultations		X	X		X					X			
	Conferences		X	X							X	X		X
	Open days, demonstrations, expositions		X	X		X			X	X	X	X	X	X
	Field visits to farms						X		X			X		X
Indirect	Scientific articles			X										
	Books		X	X		X		X					X	
	Professional journal			X		X				X			X	
	Articles in periodicals (incl. professional)	X	X	X		X				X			X	
	Leaflets and information sheets		X	X									X	
	TV and radio						X						X	
	Website		X										X	
	DVD		X	X			X					X		
App for portable devices												X		

There were several aims of KIT practices which were more explicitly **practice-oriented** – like, practical demonstrations, promotion of specific varieties, to introduce and taste new products, addressing specific practitioners' needs and current problems. In particular, individual consultations address the specific needs and problems of the particular producer or enterprise and are aimed at finding solutions best adapted to the particular local situation. These consultations with individual clients are also useful for getting an overview of the general situation in the fruit growing and processing sector in the country. Discussing and receiving feedback from fruit growers about various fruit growing issues, technologies, problems was another specific aim in this group.

There is a slight difference of aims between direct and indirect KIT practices, pointing to the fact that some means of knowledge transfer are more suitable for specific aims. Such aims as discussing and obtaining feedback from fruit-growers, addressing specific individual needs, practical demonstrations and tasting seem to be better addressed in face-to-face KIT practices. In turn, indirect KIT means are preferred when popularising specific varieties and particular experiences in broad audiences.

### **5. Subject matters of knowledge and innovation transfer practices**

Thematically KIT practices at the research institutes cover the whole process of fruit growing and processing, starting from the choice of cultivars/varieties and ending with distribution. There was no evident link between specific KIT practices and subject matters – all KIT practices may provide knowledge on any of these subjects. Demonstration and exposition practices tend to focus more on presenting novelties, but not exclusively, though. Often, only general topics like growing, processing, technologies or “wide range of topics” were mentioned in the reports. Some of the subject matters were more detailed, as presented below.

**Fruit growing** was the most popular KIT subject matter reported and it was also comparatively more detailed. Under it, fruit and berry crop cultivars/varieties take a prominent place, with such topics as choice of varieties, including new, less known, recommended varieties, their properties and use. Some KIT practices are dedicated to individual cultivars (blueberries, golden currants, cherries, strawberries, raspberries, plums, apples, also pharmaceutical plants, etc.). Next, all kind of topics related to orchard management were evoked: choice of a site for an orchard, orchard systems, establishment, laying out, plantation, and maintenance of the orchard, crop load management, new fruit tree rootstocks, fruit tree pruning and grafting, mineral nutrition, fertilisation. KIT practices address also plant physiology and fruit development – pollination, ripening, establishment of mellowness and determination of fruit picking time, growth and yield optimization. Technological side of fruit growing was also explicitly stated as a subject matter – growing technologies, their choice and advancement, tools, machinery and other means of production for fruit growers. Plant protection, plant diseases, pests, and pest and disease monitoring and control was another topic identified under this theme. Finally, in some occasions, commercial and amateur fruit-growing were distinguished as specific KIT topics.

**Harvesting**, including harvesting technologies (also research results pertaining to this domain) and post-harvest treatment, was mentioned as a theme in KIT practices, though without explicitly detailing it. Similarly, **storage** and **processing** were quite frequently mentioned, but less detailed topics. KIT practices regarding storage cover such specified topics as research results on cold storage of fruit. Processing issues, in turn, include approbation of processing technologies, development of new horticultural products and their properties, as well as biochemical evaluation.

We can distinguish also **novelties** and emerging issues as a specific and crucial subject matter, although it relates to all the stages of the process of fruit growing and processing mentioned above.

Novelties cover such topics as newest findings, recent research results, current experiments, up-to-date trends in the practices of fruit growing, technological innovations, novel varieties, evaluation of newest varieties and rootstocks, other topical issues in the sector, along with technological or economic issues of importance at specific moments.

Other topics, like **institute's work** (current work, ongoing scientific projects, field trials, laboratory experiments, but also future development prospects, research undertaken by young scientists), **experiences** of other (also foreign) research institutes, **economic** issues, were comparatively less reported among KIT themes.

## 6. Target audiences of knowledge and innovation transfer practices

The reported KIT practices are aimed at various audiences, extending far beyond the primary group of fruit growers (see Table 4). We categorize these audiences into five general groups.

**Agricultural producers:** this group includes farmers in general, fruit growers and their organisations and professional groups. Often some subgroups of fruit growers are distinguished as a specific target audience: small or big growers, commercial, professional, amateur and hobby growers, new entrants and those willing to diversify their economic activities to processing, farm workers, as well as other physical and legal persons involved in agricultural and forestry activities. Altogether, agricultural producers and specifically fruit growers represent the most popular target group, all the listed KIT practices are addressing them. Professional/commercial and amateur/hobby farmers were the most often mentioned subgroups.

**Food businesses:** this group covers processors, including processing companies, small processors and domestic producers, and other commercial businesses.

**Agricultural knowledge actors** form another target audience covering researchers, scientists, agricultural and rural advisors and experts, lecturers, students at universities and vocational schools. Students are the most popular target audience in this group, and almost all the listed KIT practices refer to them. Other subgroups of agricultural knowledge actors are rather targeted by more specific events, like seminars, conferences, open days and expositions, scientific articles.

Another target group is attributed to the **general public**, ranging from an unspecified lay audience to more specific groups, such as consumers, community members, NGOs, other interested persons as well as mass media.

Finally, **public administration**, notably officials at the Ministry of Agriculture and regional agencies of agriculture are also addressed by some KIT practices (seminars, expositions, individual consultations).

Looking more in detail at the target audiences of the KIT practices, it appears that no specific practice is linked to one specific target audience. Each KIT practice has at least a couple of groups they are targeting. Some of these practices – (1) seminars, lectures, (2) individual consultations, and (3) open days, demonstrations and expositions – address more diverse audiences; these KIT practices are targeting all the five general groups. Other KIT practices are more narrowly focused, i.e., applications for portable devices are primarily aimed at fruit growers and consumers, while professional articles mainly address fruit growers and producers.



**Table 4. Target audiences of KIT practices<sup>1</sup>**

		Direct							Indirect								
		Lectures, study courses for students	Lectures, training courses, seminars, for professionals	Life-long learning courses	Conferences	Individual consultations	Open days, demonstrations, expositions	Field visits to farms	Books	Scientific articles	Professional journal	Articles in periodicals	Leaflets and info sheets	TV and radio reportages	Website	DVD, videos	Application for portable devices
Agricultural production	Farmers		X			X	X	X	X		X	X	X		X	X	X
	Fruit growers		X		X		X		X	X	X		X		X	X	X
	Commercial fruit growers		X	X		X	X	X	X		X	X	X		X	X	X
	Professional fruit growers		X				X	X	X	X	X	X	X	X	X	X	
	Big growers		X			X	X	X	X		X	X	X		X		
	Small growers		X			X	X	X	X		X	X	X		X		
	Hobby and amateur growers, owners of small land plots		X	X		X	X		X	X		X		X		X	
	New entrants in fruit growing		X	X		X	X		X		X	X	X		X		
	Farm workers		X	X			X	X	X		X		X			X	
	Farmer organisations and producer groups		X			X	X										
Other physical and legal persons involved in agricultural and forestry activities		X					X										
Food business	Processors				X	X			X		X		X				
	Processing companies		X				X				X				X		
	Small processing companies					X											
	Domestic producers					X											
	New entrants in fruit processing			X													
Trade companies					X												

		Lectures, study courses for students	Lectures, training courses, seminars, for professionals	Life-long learning courses	Conferences	Individual consultations	Open days, demonstrations, expositions	Field visits to farms	Books	Scientific articles	Professional journal	Articles in periodicals	Leaflets and info sheets	TV and radio reportages	Website	DVD, videos	Application for portable devices
Agricultural knowledge actors	Researchers, scientists		X		X		X		X	X	X	X			X	X	X
	Agricultural and rural advisers		X		X	X	X		X		X	X	X		X	X	X
	Agricultural experts						X		X		X	X			X		
	Lecturers, teachers		X		X		X		X	X	X	X	X			X	
	Students	X	X		X	X	X		X	X		X	X		X	X	
	Pupils at vocational schools	X					X								X		
General public	Broad public											X		X	X		
	Consumers						X		X			X	X	X	X		X
	Other interested persons		X		X		X			X							
	NGOs						X										
	Members of rural communities		X														
Mass media					X	X					X		X	X			
Public authorities	Policy makers, officials of the Ministry of Agriculture						X								X		
	Regional agencies of agriculture		X			X									X		

<sup>1</sup> In the table, the target audiences are presented as they were introduced by the project partners. In practice, some of these groups can largely overlap (for instance, professional, commercial and large fruit growers). However, in order to keep the diversity of target groups these have been listed separately.

## 7. Regularity of knowledge and innovation transfer practices

The reported KIT practices differ regarding their regularity, duration and implementation period, starting from a weekly frequency to unique events. Table 5 provides with an approximate overview of the regularity of various KIT practices. Some KIT practices demand regularity (study and training courses), other are once registered and consultable any time afterwards (printed, online materials), still other are once implemented with no or limited public access to their delivered knowledge later (individual consultations, conferences).

Regularity of KIT practices is linked to their institutional framework and backup. Study courses at the university were the most stable and enduring KIT practice reported. Some KIT practices have become more regular and frequented since there has been established an institution taking charge of them (for instance, individual consultations at the Latvia University of Agriculture became more intensive with the establishment of the Technology and Knowledge Transfer Unit; the Centre of Life-long learning organises regular courses). Existence of such dedicated institutions communicates more clearly to potential clients where they can look for support and advice.

**Table 5. Regularity of KIT practices**

		Regular / on a weekly basis / all year round	Once, twice a month	Several times a year	Once, twice a year	Irregular, from time to time	Project- based
Direct	Lectures for students	X					
	Lectures, training courses, seminars for professionals	X		X	X		X
	Life-long learning courses						X
	Conferences				X		
	Individual consultations		X			X	
	Open days, demonstrations, expositions				X		
	Field visits to farms				X	X	
Indirect	Books					X	
	Scientific articles		X	X			
	Professional journal		X				
	Articles in periodical press (incl. professional)		X				
	Leaflets and info sheets			X			X
	TV and radio	X	X				
	Website	X				X	
	DVD					X	X
App for portable devices						O	

Projects, funded from public sources, is another formal framework which has allowed to implement some concrete KIT practices – several seminars, field days have been organised, and DVD and books have been prepared as part of these projects. Whereas such projects have been crucial in carrying out some targeted KIT activities, those activities can be limited only to the project's duration and cease after its ending. Registering projects' results in some durable forms is helpful to overcome this limitation. Some KIT practices – like books and videos – demand more time to prepare them, accumulation of knowledge, financial resources, and therefore are less regular.

## 8. Main quantitative and qualitative results and outcomes

Quantitative outcomes of various KIT practices were estimated in the number of participants for events and in the number of copies for various printed publications. Those numbers varied a lot (from 1 to 53 000) for different kind of KIT practices (see Table 6). Taking into account the great diversity of KIT practices these numbers are not directly comparable. However, in general, the numbers of copies for various publications tend to be higher than the number of participants in various face-to-face activities. However, this does not automatically imply that printed materials reach broader audiences, as participatory events are usually repeated.

Qualitative outcomes can be categorised in several groups:

**Knowledge outcomes:** the main outcome of all KIT practices is delivered and improved knowledge on fruit growing both with regards to different aspects of production, storage, and processing, but also marketing, economics, legislation, etc. Often updating knowledge was reported as an outcome, like, delivered knowledge on novelties, new research, new technologies and products. Improved practical knowledge and gained practical skills.

Not only practitioners, but also scientists gain new knowledge in KIT practices. In particular, KIT practices which involve interaction between practitioners and scientists – seminars, lectures, training courses, demonstrations at institutes – provide the latter with information on the situation in the fruit growing sector, including the problems fruit growers and processors face, spread of diseases and pests, informative feedback on varieties and growing technologies, current trends on the market of production means provided for horticulture, growth opportunities. These events inform researchers also on fruit growers' knowledge needs. Likewise, these events help to generate **ideas** for new projects, products, etc.

Some KIT practices, in particular individual consultations and also field visits to farms, have direct **practical results**. These involve solved urgent practitioners' problems, improved growing and processing technologies and practical application of knowledge on farms. For instance, advising on feasible implementation of new fruit crops, identification of an optimal input combination for a farm, helping at the right choice of machines and equipment for farm and orchard/plantation operations, advising on the new possible fruit crops most suitable for farm and new cultivation methods as well as the ways of reduction of loss in fruit storage, highlighting the importance of soil testing and plant material analysis all have high importance in practice. These measures improve productivity and quality of yields and increase income and economic performance of farms and companies. When accumulated at the sectoral level, these impacts are estimated to improve the **sector's competitiveness** (advanced development of fruit growing and processing sector – increased yields, improved storage outcomes, better fruit quality, reduced costs), which, in turn, boost the economic development the whole regional economy.

**Social networking** is another important outcome of KIT practices. In particular, collective, face-to-face KIT practices are facilitating communication, exchange of experience and knowledge among practitioners. Some of these have strengthened cooperation between scientists and practitioners and helped to establish contacts for future individual consultations. International knowledge events contribute to trans-border networking and knowledge exchange.

Some results were reported specifically for research institutes as organisational units. These include **gaining public visibility** and **attracted public funding** for educational activities.

**Table 6. Major quantitative and qualitative results of KIT practices**

		Reported quantitative outcomes (illustrative)	Delivered/improved knowledge in fruit growing	Updating knowledge (novelties, new research, new products)	Gained, improved practical skills	Knowledge on legislation	Information on the situation in the sector, practitioners problems	Ideas for new projects, products	Solved practitioners' problems, on-farm application of knowledge	Strengthening the sector, sectoral development	Established contacts for future individual consultations	Communication and exchange of experience among participants	Improved cooperation with practitioners	Public financial support for educational activity	Gaining visibility
Direct	Lectures for students	10-20 ind-s/year	X	X	X										
	Lectures, courses, seminars for prof-s	20-70/event	X	X	X	X	X			X	X			X	X
	Life-long learning courses		X	X								X			
	Individual consultations	20/year	X						X	X			X		
	Conferences	150-250/event													
	Open days, demos, expositions	5-700 particip-s/ event	X	X	X		X	X				X			X
	Field visits to farms	10-30/event		X					X						
	Scientific articles	68 since 2012		X											
Indirect	Books	200-10000 copies	X										X		X
	Professional journal	1	X												
	Articles in periodicals	35 since 2012		X											
	Leaflets, info sheets	200 copies		X											
	TV and radio	65 appearances since 2012		X											
	Website	14448 visitors, 52906 visits	X												
	DVD	4 (23 videos)	X		X										X
	App for portable devices		X												

## 9. Main difficulties and lessons learnt

There are various and often interlinked difficulties that organisers of KIT activities face (see Table 7), which can also be used for drawing lessons for the future knowledge transfer events.

One of the principal difficulties that almost all KIT practices encounter with regards to their uptake and attendance is the **limited audience** – the reports state lack of motivation and interest in fruit growing or in the particular form of information or knowledge delivered (e.g. scientific articles are not very popular among fruit growers) by the target audience. The limited interest from different stakeholder groups may go hand in hand with **advertising constraints** faced by research organisations in their efforts to make use of various opportunities for reaching their target groups.

- **Lessons:** Increasing or improving advertising of events through various media – institute's website, social media, traditional mass media. Developing more attractive and easy-to-perceive ways of communicating information. Organising KIT practices (e.g. seminars) in regions with higher numbers of fruit growers. Providing additional bonuses like snacks, small lotteries with practical prizes for enlarging the attendance of events. Concentrating the information for fruit growers scattered across various sources (printed press) in a devoted sectoral journal.

Limited resources at organisations' disposal create another barrier for more efficient knowledge and innovation transfer. On the one hand, research organisations face **financial limitations** – irregular, insufficient funding for KIT practices, but also for research that generates the content for KIT. Some KIT practices (books) are not profitable and require quite notable investments. On the other hand, organisations also face constraints in terms of **human resources**: there is a limited number of staff, and people may lack the required skills to communicate research results to specific target groups. Even if possessing these skills, many KIT practices (individual consultations, videos, books) can be very labour- and time-consuming for the staff charged with many other tasks. In addition, notice has to be taken of the competition in R&D that involves competition for both funding and audience.

- **Lessons:** Introducing moderate entry fees for seminars to be able to cover relevant applied research costs (albeit this may reduce the number of participants and the extent of the dissemination of knowledge. Consider turning competition into cooperation and join efforts to attract funding and audience.

Several **organisational and management** issues form another group of obstacles for an efficient implementation of KIT practices – e.g. complicated project administration, difficulties to run a webpage, organise a study group. Some of the organisational problems are explicitly linked to difficulties in communication with farms involved in projects, course organisers, and other partners.

- **Lessons:** Timely planning of events. Cooperation with other agricultural knowledge agents, e.g., innovation brokers (as a part of Networks for Innovative Agriculture), regional agencies. More intensive use of successful practitioners in sharing their experience in public.

The **physical conditions** can also present a hindering factor for face-to-face activities – large distances, bad weather conditions, bad timing of activities were reported among the obstacles.

- **Lessons:** Timely planning of events. Organisation of face-to-face knowledge and innovation transfer events, like seminars, meetings, open days outside the peak season for fruit farmers.

Last, but not least, **limited user feedback** on delivered knowledge and no track of innovations was another difficulty that public research organisations report on and remains a challenge.

- **Lessons:** Be more pro-active in receiving feedback from target audiences. For instance, prepare and provide simple feedback forms to fill in by participants at KIT events.

**Table 7. Main difficulties encountered in the implementation of KIT practices**

		Little interest, low attendance	Timing unsuitable for farmers	Limited advertising opportunities	Dispersed articles	Difficult to find / select suitable farms	Limited, irregular financial resources; unprofitable	Limited human resources	Poor skills to communicate research	Labour and time consuming	Distance, weather	Complicated project administration; difficult to administrate	Difficult to communicate and cooperate with farms / partners	Difficult to organise a group of attendants	Less applied research	No feedback, no track of innovation	Competitors in R&D
Direct	Lectures for students	X															
	Lectures, training courses, seminars for professionals	X	X	X			X	X				X	X				
	Life-long learning courses	X															
	Conferences	X		X													
	Individual consultations			X			X	X		X	X					X	
	Open days, demos, expositions	X	X	X			X		X		X						X
	Field visits to farms					X					X		X	X		X	
Indirect	Books	X					X			X							
	Scientific articles	X															
	Professional journal			X			X										
	Articles in periodicals (incl. professional)				X												
	Leaflets and info sheets						X								X		
	TV and radio																
	Website											X				X	
	DVD					X	X			X							
App for portable devices												X					

## 10. Summary

As outlined in this report, there is a great variety of KIT practices established and employed by research and other sectoral organisations which cover a range of topics of fruit growing and address various knowledge needs of numerous target groups. This inventory can serve as an impetus for the development of new and improvement of existing KIT.

KIT demands specific skills and resources which go beyond the conventional research function of research organisations. This regards firstly social and related professional skills: communication, and more specifically online and digital communication skills, together with cooperation and collaboration with different partners and target groups turn out to be key for successful implementation of knowledge transfer.

While direct face-to-face knowledge transfer seem to be very effective, there is an increasing number of virtual and digital forms of knowledge transfer. This potentially broadens the reach of KIT audience, but development of these new tools demands specific knowledge and skills – both technological knowledge and skills to build these tools, and knowledge and skills to communicate by their means (content-wise and in terms of addressing, engaging with the audience).

Researchers turn out to be knowledge recipients themselves in KIT practices as they receive feedback on delivered knowledge and gather information on problems in the field, practitioners' experiences and new knowledge needs. Knowledge creation is an interactive process with feedback loops between various stakeholders involved. So, it requests ability to communicate with different audiences, openness to and receptiveness of various world-views, and capability to address and integrate them in joint solutions.

The difficulties identified by the project partners inform on a range of factors which influence implementation of these KIT practices. Whereas research organisations themselves can deal with several of the difficulties (like, facilitation of feedback, planning of KIT practices), many of the difficulties (funding, motivation, cooperation with partners, etc.) demand multi-actor cooperation and a more systematic approach to solve them.