FERTINNOWA news
ISSUE 1 • January 2016

FERTINNOWA kick-of meeting: a single step in a three year long European water-journey

On Tuesday and Wednesday 26 and 27 of January the FERTINNOWA project, fully 'transfer of innovative techniques for sustainable water use in fertigated crops' started at Proefstation voor de Groenteteelt (PSKW) – coordinator of the project- in Sint-Katelijne Waver, near Mechelen in Belgium. FERTINNOWA brings together 23 relevant partners out of 10 countries: Belgium, Spain, Italy, South-Africa, The Netherlands, Poland, France, UK, Slovenia and Germany. For 6 organisations it is the first Horizon 2020 project.

This thematic networks aims at closing gaps on water management. The topics are triple: water sources, water (re)use efficiency and end of pipe solutions. The project identified several gaps: that between scientific knowledge and its use in practice, that of the lack of exchanging experiences between regions and sectors, that of the lack of the applications of industrial knowledge and development and its use in agricultural applications, etc. Together, the partners will do something about the gaps by identifying bottle necks, look for solutions, exchange solutions, make them available for farmers and put them at work at farms by showcasing innovations.

During the 2 day seminar, many participants met for the first time physically after numerous skype meetings, email contacts and telephone calls during the formulation of the project.

The triple-topic-project seminar was successfully closed with another triple: a splendid beer of the local brewery Gouden Carolus.

With the kick-off meeting, participants entered in the FERTINNOWA-boat who weighed anchor and will navigate for 3 years in search of durable water management in European horticulture

This newsletter will inform you about the highlights of the first meeting of the General Assembly. We hope you will enjoy reading.

Raf De Vis
Els Berckmoes
Ingrid Van Damme

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Horizon 2020

FERTINNOWA news

ISSUE 1 • January 2016

Highlights of the 1st meeting of the General Assembly 26th & 27th of January 2016, Belgium

On the first day, the project was overviewed and the 6 work package leaders made their first arrangements with the partners to start the activities. On the second day, participants were submerged in the water management of vegetable, strawberry and ornamental farms in Flanders.

"Tranferring knowledge into use, that's where it's all about!"

"Before we start the discussions on the different work packages, let me welcome you all to this first meeting of FERTINNOWA's General Assembly. Writing this winning proposal was a first job but now we will have to start the real job!", speaking is Raf De Vis, FERTINNOWA's project coordinator. "But before we start the discussions on each work package, let me first introduce you to the roots of FERTINNOWA", continues Els Berckmoes. "The first initiatives to FERTINNOWA were taken already some years ago when several Flemish research stations and universities carried out a benchmark study on the implementation of nutrient legislation in the European Member states. During the numerous visits to farmers and researchers all over Europe, it became clear that growers of horticultural crops are facing similar problems. When we focus on the fertigated crops we see that growers are facing scarcity of qualitatve water and are struggling to achieve good status under the European water and nutrient legislation. On the other hand we see that a lot of innovative technologies are available but are not implemented at the farms level. Important gaps exist between the growers and research and policy level." Therefore FERTINNOWA will collect, exchange, showcase and transfer innovative water management solutions and best practices for fertigated crops in order to improve water quality, water use efficiency and reduce the environmental impact of fertigated crops.

The final aim of FERTINNOWA is to transfer knowledge into use . "FERTINNOWA will do this on a tailored way as European fertigated crops are very divers. ", Els concluded.

Who are Raf De Vis & Els Berckmoes?

For more than 10 years, Raf De Vis is the director of the Research Station for Vegetable Poduction (PSKW) in Belgium. Raf will be the coordinator of FERTINNOWA.

Els Berckmoes has 10 years of relevant experience in horticultural water research. She will assist Raf De Vis and take care of all technical matters of FERTINNOWA.

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Horizon 2020

FERTINNOWA news
ISSUE 1 • January 2016

WP1: "Keeping records is essential!"

Without any doubt, this was the most important message Ingrid Van Damme (PSKW), Financial Support Officer of FERTINNOWA, passed on to the audience during her speech. Whit this she referred to one of WP1's main tasks which is to maintain the communication with the European Commission. Therefore the EU requests both a technical and a financial report after 18 and 36 months. "All beneficiaries must bear in mind that FERTINNOWA involves up to 23 partners and 1 linked third party", said Ingrid. "These reports must be completed within 60 days following the end of each reporting period. A correct and complete report is essential in order to achieve on time payment of the interim and final grants. Each time the European Commission demands additional clarification, the deposit of the grant can be delayed with 90 days. Therefore it is essential to continuously keep records." In order to keep good overview of FERTINNOWA's deliverables', milestones and financial status, the Project Management Team will request all partners for an additional interim reporting after 12 and 30 months.

Furthermore Ingrid gave a short explanation about the required documents for personnel carrying out actions in FERTINNOWA. "First and all, persons carrying out tasks for FERTINNOWA must be on the pay list of the beneficiary. Secondly, the beneficiaries must keep time records." Within the next weeks the Project Management Team will provide a template for this time recording. Every 3 months these time sheets will have to be sent to the Project Management Team.

The following documents will be prepared to help you with this reporting:

- Template for time recording (release 15th of February)
- Info sheets containing guidelines on continuous en periodic reporting (release 29th of February)

Who is Ingrid Van Damme?

Ingrid works at the Research Station For Vegetable Production (PSKW) in Belgium. She has gained a lot off expertise in bookkeeping. The coming 3 years she will be responsible for the financial reporting to the EU.

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WP2 and WP3: "From data to knowledge"

One of FERTINNOWA's most important goals is to achieve an overview of the situation in the whole of Europe and create the possibility to compare local situations with regards to water sources, growth system, crop type and technology use. This will result in the identification of best practices.

"We will achieve this by drafting a questionnaire that will be used in the different countries for different growing systems and crops", explains Esther Lechevallier from CATE in France. This questionnaire will allow us to collect information from the grower's level. We will ask for technological but also socio-economic and regulatory information. Why is the grower using this technology? What bottlenecks is he/she facing?".

FERTINNOWA

Horizon 2020

FERTINNOWA news
ISSUE 1 • January 2016

There will be a very tight collaboration between WP2 and WP3. This questionnaire, for example, will be prepared by the members of WP3 and will be the guiding instrument for the partners of WP2.3 who will carry out the individual consultations. At first only growers, advisors and industry will be consulted in order to achieve relevant data from the growers level", says Veronika Valentar (CAFS, Slovenia), WP-leader of WP2.

The collected data will be put in a database and processed. Within WP3 these results will lead to the identification of best practices and existing bottlenecks.

But water research and innovation involves a much wider variety of stakeholders like policy sectors, decision makers, consumers, … . By lack of adequate knowledge exchange, the expertise of this diverse group was not exploited optimally in the past. Therefore the results of the benchmark will be transferred to the members of WP2.4 for a second round of consultations. This time, all groups of stakeholders will be consulted, not only the growers. Also policymakers, ngo's, consumer organizations … will be involved. Probably this will be collective stakeholders consultations in which all groups can discuss and evaluate the results of the benchmark study.

Who is Veronika Valentar?

Veronika is working for the Chamber of Agriculture and Forestry in Slovenia. She will be the leader of work package 2. Veronika will be coordinating the consultations and will be the responsible for the contacts with the stakeholders.

Contacts:
Veronika.Valentar@kmetijski-zavod.si

Who is Esther Lechevallier?

Esther will be the WP3's leader. She works for the CATE in France. Organizing the development of the questionnaire and the evaluation of the gathered information will be her main task.

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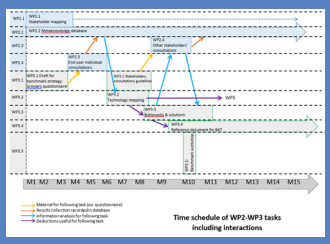
esther.lechevallier@cate.bzh

More information about the close collaboration and specific tasks of WP2 and WP3 you can find by clicking on the schemes below.



FERTINNOWA

Horizon 2020

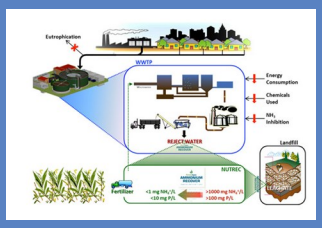
FERTINNOWA news
ISSUE 1 • January 2016

WP4: "Thinking out of the box"

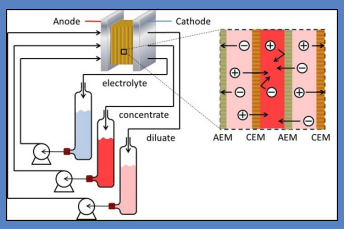
Besides the identification of best practices, the benchmark study will also point out existing bottlenecks that set back improvements regarding water use efficiency, environmental impact and achieving good status under EU water legislation like the Water Framework Directive for fertigated crops. Currently used technologies might be inadequate to solve these bottlenecks. "Within FERTINNOWA we will scout for innovative technologies from other sectors that can be implemented to the fertigated growth sector", explains Wilfred Appelman from TNO. Together with Willy Van Tongeren (TNO) he will coordinate the activities of WP4. "Technologies that are already common practice in e.g. the process industry or mining industry are not yet known in the horticultural sector but can have serious potential." Wilfred showed already some possible technologies like photocatalytic oxidation, electrodialysis and the "Nutrec" project of Fraunhofer.

More information on some of the technologies mentioned by Wilfred you can find by clicking the figures below.

Nutrec



Electrodialysis



Who are Wilfred Appelman & Willy Van Tongeren?

Wilfred and Willy both work at TNO in the Netherlands. Within FERTINNOWA they will scout for new technologies from other sectors that can be implemented to the fertigated growth sector. Wilfred and Willy will use their expertise on this to lead WP4.

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WP5: "Showcasing technologies at farms level"

FERTINNOWA aims to actively exchange technologies between the different regions, crop and growing systems in order to fulfil the remaining gaps identified by the benchmark study. "Promising technologies will be implemented at farms level for 1 to 2 years. This will lead to practical experiences of the exchanged technology under new conditions. Decision rules will be formulated which will serve farmers to take the appropriate decisions on using those techniques", explains Elisa Suarez from IFAPA.

FERTINNOWA

Horizon 2020

FERTINNOWA news
ISSUE 1 • January 2016

Showcasing these technologies on farm level is essential in order to convince growers of the technologies possibilities and advantages". A map showing the location of all exchanged technologies will be developed and placed on the FERTINNOWA's website. Visitors of the website will have a good overview of the exchanged technologies and can easily access the relevant information. All exchanged technologies will be demonstrated during a workshop and during the final conference in 2018.

WP6: "We don't just want lots of engagement, we also want uptake!"

With this quote Ross Newham (EMR-United Kingdom), stressed FERTINNOWA's final aim to make the end-users, in this case growers, industry, policy-makers, … effectively use the gathered knowledge. "We will have to accept that everyone learns differently and often very differently from the science community", Ross continued. All members of FERTINNOWA will actively be involved in the dissemination activities. They will organize showcase events, present FERTINNOWA at events, … but also translate documents in the different European languages in order to eliminate the language barrier.

Within the next weeks the FERTINNOWA's website will be developed, so FERTINNOWA will become known by the wider audience.

FERTINNOWA's website will be launched within the next weeks.

We keep you informed!!

Who is Elisa Suarez?

Elisa works at IFAPA in Sevilla, Spain. She will lead WP5 on the exchange of technologies between the different partners of FERTINNOWA.

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Who are Ross Newham & Eleftheria Stavridou?

Ross and Eleftheria both work at East Malling Research which is located in the United Kingdom. EMR has a lot of expertise on communication and this expertise they will use to lead the dissemination activities of FERTINNOWA.

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FERTINNOWA

Horizon 2020

FERTINNOWA news
ISSUE 1 • January 2016

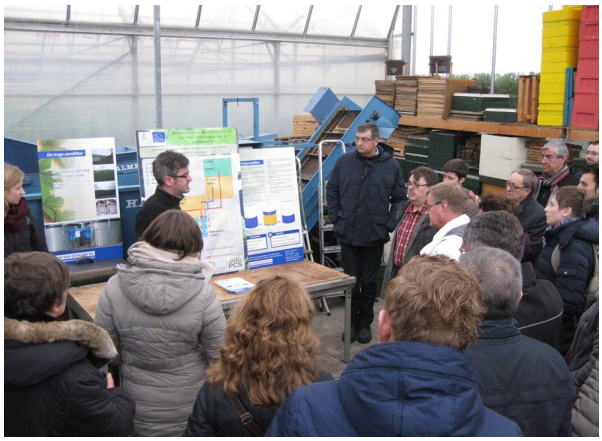
Field visit 1: Sustainable water use in strawberries

The Fertinnowa partners brought a visit to a strawberry grower with solely substrate cultivations. In Holland and Belgium growers work almost exclusively with june bearing varieties and the growers produce their own plant material needed to cultivate the greenhouses and tabletops. The Fertinnowa group focused on the water schematics of the farm, which optimizes the use of collected drain- and rainwater in the greenhouses and the open air plant production field or trayfield. Peter Melis of Research centre Hoogstraten acted as a guide at the farm and explained together with the grower both the cultivation and the sustainable water use.

Composition of the strawberry farm

The visited strawberry farm consisted of 1,1 ha of glasshouses and 1,75 ha of tabletops with plastic rain cover. At the moment of visit only in the glasshouses strawberry plants were present. The first glasshouse was planted with the cultivar Clery for the earliest harvest beginning of March. The cultivar Sonata occupied the tabletops in the second glasshouse and finally also the second cultivation of Elsanta was present. Elsanta is the primary variety on the farm and will be planted throughout the entire year in the different cultivation systems. Clery and Sonata are only chosen for their high quality in the early spring cultivations.

To provide plant material to the different cultivation systems the farm has a trayfield of 1,5ha. A trayfield is formed by a water proof foil on top of the soil. On top of this foil trayplates with substrate are aligned to grow the trayplants. Nutrition is executed by spraying fertilizers up to 4 times a week, followed by an irrigation to get the nutrients into the root zone. This trayfield is planted in July and all plants for the next production year are developed here. At the beginning of December the grower collects the plants and puts them in cold storage. Each time in the following production year a system has to be planted, the number of plants needed is taken out of the cold storage.



The closed water system explained by Peter Melis by a scheme of the different flows of drain and rain water

The grower uses a white peat substrate with added perlite in the glasshouses and on the tabletops. On the trayfield he uses a mixture of coir, peat and perlite.

A closed water system with integration of the trayfield

The farmer uses two primary water sources. The first is the collection of rainwater on the rooftops of the glasshouses, this water is collected in a first basin of 1200m³. The second is the recovery of drain water originating in the different cultivations. Al tabletops consist of gutters which leed the drain water to a 2nd basin of 1200m³.

Also the water running of the trayfield is collected, even when precipitation occurs. The presence of gutters on the trayfield guide the drain water to a well of 7m³ equipped with a pomp capacity of 150m³/h. The water is pomped toward the 2nd basin of 1200m³. All of the collected drain water is filtrated through a slow sand filtration system with a capacity of 3 m³/h. Also when the trayfield is empty in spring the rainwater is collected and filtrated before reuse in fertigation schemes.

FERTINNOWA

Horizon 2020

FERTINNOWA news
ISSUE 1 • January 2016

After filtration the now clear drain water is collected in a 3rd basin of 1200m³. All the collected drain water is reused and mixed with pure rain water (30-70% drain water) to serve as starting water for the production of new fertilization solutions. The grower has a very large water storage capacity of 3600m³ and uses an almost completely closed water system on his farm. Only in periods with excessive precipitation the pump in the well on the trayfield cannot cope with the large amounts of rain water and an overflow to the adjacent creek occurs. 3 to 4 samples of filtrated drain water are taken each year to analyse for de nutrient composition. The water content seems to be very stable, but when necessary the grower can easily adapt the manufacturing of the wanted composition of the fertilizer solution.

Peter Melis

PCH, Belgium



Field visit 2: Strawberries at Research centre Hoogstraten

Research centre Hoogstraten (PCH) is one of the most innovative centres in horticultural research in Flanders. Especially the expertise in strawberry is very advanced and the most urgent problems and issues are handled in several trials and projects. Also the sustainable use of water is an important research topic.

Next to strawberry, PCH specializes in the cultivation of bell pepper and tomato. Both crops are grown on rock wool substrate in glasshouses. For each crop PCH has a highly experienced research team covering the different important topics. Strawberry trials are executed in several cultivation systems with Elsanta being the most important variety. At the time of the visit by the Fertinnowa partners the glasshouses were occupied with the early cultivations of Clery and Sonata, and the second cultivation of Elsanta in the dormant winter phase. In two glasshouses equipped with LED or SON-T assimilation light the harvest period was ongoing. Also the trayfield was shown, on this field PCH produces each autumn the plants that will be used in trials the following production year. The different cultivations were visited and explained by Peter Melis, researcher at the centre.

The ongoing research program at PCH

The Fertinnowa group was informed of the ongoing research in the five newest glasshouse compartments of PCH. The compartments are 300-500 m² large in a glasshouse with a height of 8 metres. In the first compartment Clery was cultivated. The different components of the glasshouse were showed and explained.

FERTINNOWA

Horizon 2020

FERTINNOWA news
ISSUE 1 • January 2016

Also the Green Power flowering LED lamp from Philips was presented as an effective alternative for the incandescent light bulb in stimulating elongation of the strawberry crop early in spring. The use of assimilation light was highlighted for winter production of the june bearer Sonata and several everbearers like Murano and Verity. Both SON-T and LED are successful in high quality strawberry production in January and February and make a year round production in Belgium possible. Especially the use of everbearers enjoyed interest with the prevention of dormancy to keep a vital and generative crop on the tabletops.

Optimal water use and elimination of drain water discharge

PCH collects all of the drain water in several basins and reservoirs. The drain water that is produced in the glasshouses and plastic greenhouses is collected underground in a total capacity of 30m³. This water is filtrated through a slow sand filtration (15m³/day), stocked in a second underground reservoir of 30m³ and finally reused in the production of new fertilization solutions after diluting with rain water (30-60% drain water). The drain water coming from the protected tabletops and the trayfield is collected in a basin of 600m³. This water is not recuperated for strawberry crops, but is fertigated on grassland next to the centre and hereby not discharged in the surrounding creeks. The offset of drain water on grassland is only permitted between 15 February and 15 November in Belgium, so the storage capacity has to be large enough to cover the winter.

The rain water that falls on the roof tops of the different greenhouses is collected in a basin of 10.000m³. This large pond enables the centre to not be reliant on ground water for the use in cooling and fertigating the different cultivations. Together with the reuse of drainwater, PCH can provide in the water need of the different crops and cultivation systems throughout the entire year.

Peter Melis

PCH, Belgium

Field visit 3: Irrigation and fertigation advice in pear orchards

After the afternoon, we visited the company of Johan Bossaerts, a fruit grower in Broechem. He has about 7 ha of apple and 6 ha of pear. Pear production is in recent years greatly expanded in Belgium and the Netherlands. The most important variety is 'Conference'.

Market analyzes point out that there is a really profitable market for pears with a sufficiently large diameter. Since 2006, Soil Service of Belgium in collaboration with PCFruit done intensive research on the effects of irrigation and fertigation on the production, fruit size and fruit quality in Conference.

During the visit, Pieter Janssens (Soil Service of Belgium) and Jef Helsen (PCFruit) gave an explanation about their research. Experiments in the past showed that in three experimental orchards, in some years there was a need for irrigation and at one orchard even each year. When the soil water potential in the summer decreases below -80 kPa, there was loss of production, particularly in the larger size classes. Objects with irrigation gave a big shift in larger fruit size. Not only fruit size, but also fruit quality was found to have a clear advantage with a good fertigation

FERTINNOWA
Horizon 2020

FERTINNOWA news
ISSUE 1 • January 2016

During the experiments, the research team made the following conclusions:

- Loss, due to drought, can reach up to 3 kg per tree (especially loss of high diameter class!)
- Chance of extreme drought: 1 on 5 years and at some fields much frequently
- N-fertilization is necessary, can bring more profit until 3kg per tree, but excess fertigation should be avoided!

As fertigation is in important topic in the culture of pear, PCFruit and Soil Service of Belgium founded the advice box 'PWARO'. This office gives advice to fruit growers in the application of sustainable irrigation and fertigation. Weekly, they give irrigation advice with indication of optimal irrigation dose. The advice on fertigation is based on N and K content in leaf and soil (N and K) in the growers orchards.

Johan is as fruit grower also involved in this advice system and is very satisfied about the results. He is used to start with liquid manure, completed with N-fertigation and foliar fertigation. As there is a lot of variation in evaporation and rainfall between several years, a good advice system is crucial.

An irrigation system cost about 4000-5000 €/ha, but at some locations, there is a return of investment of 2 years!

As irrigation and fertigation is getting well implemented in the culture of pear, now, the research team is doing tests with satellites to trace differences in the orchards and to give more or less water at certain places in the orchard.

Will hopefully be continued!

Elise Vandewoestijne

PCG– Belgium

For more information concerning PWARO, you may contact:

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Pieter Janssens,
Soil Service of Belgium:
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FERTINNOWA

Horizon 2020

FERTINNOWA news
ISSUE 1 • January 2016

Field visit 4: Soilles cultivation of eggplant

Jan, Tom and An Heulens are three siblings who run a family business growing eggplants. They have a work force of 12-25 people, depending on the time of year. In their 8 hectares of greenhouses, the eggplants are grown in a subtropical climate. When the work in the greenhouse is finished for the day, the climate inside the greenhouse is allowed to rise up to 28°C with a humidity of 80-90%, the optimal climate for growing eggplants. In each row 92 plants are planted, which results in a yield of 50-55 kg of eggplants/m². The plants do not receive artificial light, and are therefore planted in December and the first ripe eggplant is harvested in February . The most important pests of eggplants are thrips, whitefly and spider mites.

The young plants are planted in Cultilène's substrate slabs, which are placed on two layers of plastic foil (a white one on top, which is replaced yearly, and a black one under). Water is given by drip irrigation, where during the growing phase the plants receive 100cc of water 2-3 times per day. In the summer, on sunny days, the plants can get up to 100 cc of water every 15 minutes. The EC of the water is 3,5 mS/cm during the growing phase and lowered to 2 mS/cm in the summer.

Under the white plastic foil there is a drain tube that collects the drainwater for reuse. On average an irrigation cycle will result in 20-25% drainwater. The water is recirculated, which means that all of the drainwater is reused. It is therefore disinfected with a high pressure UV filter, with a capacity of 25 m³/h. The collected rainwater, which is stored in_ tanks is also disinfected before use.

In the summer, after a long dry period, sometimes tap water has to be added. This is costly, but the groundwater is too high on iron and bicarbonates and can therefore not be used. The company has a daily stock of water available, in case of a system failure the plants can still be irrigated for at least the next 24h. H_2O_2 is added to prevent the drips from clogging and to keep the crazy roots disease under control.

Marijke Dierickx
Joachim Audenaert

PCS– Belgium

FERTINNOWA
Horizon 2020

FERTINNOWA news
ISSUE 1 • January 2016

Field visit 5: Ornamental plants Meuninck

Dirk Mermans is a fifth generation grower of ornamental plants. In his two hectares of greenhouses he grows a big variety of potted plants, among which are *Spatiphyllum, Monstera, Aspidistra, Hoya, Tetrastigma, Zamioculas*, which are all available in different pot sizes. Some crops grow fast, while others are in the greenhouse for years. For the propogation of his plants, Dirk uses own cuttings, buys cuttings or buys small plants. For heating he uses a cogeneration system, which means he produces both heat and electricity at the same time.

Excess heat is stored in an isolated tank. He has three layers of screens which block too high levels of light in the summer and keep the heat inside in the winter. For cooling in the summer a high pressure mist system is used. Dirk is MPS -A certified, the highest possible rating for environmentally friendly growing. The thoughest part of the job for Dirk is not growing the plants, but selling them. He has a just-in-time system, meaning that he delivers the orders he receives in the morning, in the afternoon of the same day.

Both potted plants in soil (peat or peat + bark) and hydroculture plants are grown (with expanding clay: Argex). Hydroculture plants are often leased instead of sold (mainly to hospitals, offices, swimming pools, public buildings,…), where at regular times someone comes to check on the plants.

There is a huge capacity for collecting rainwater: 4000 m³. For irrigation an 'inversed' ebb/flood system is used, on a concrete floor. This means that at regular intervals the water is drained and replaced by new water, as opposed to the classical system of irrigation where the plants only get water at regular intervals. All the drainwater is reused, but not disinfected. Because of the growing system 120m³ of water are need every hour and no system has the capacity to disinfect this amount of water. Consequently three to four chemical treatments are done per year to prevent diseases. For *Spathiphyllum* only fresh water is used, as they are very susceptibele to root diseases. The other plants receive recirculated water

Marijke Dierickx
Joachim Audenaert

PCS– Belgium

FERTINNOWA
Horizon 2020

FERTINNOWA news

ISSUE 1 • January 2016

Upcomming ervents and meetings:

17th & 18th of May:

Meeting of the executive Board Slovenia.

October 2016

2 days meeting of the General Assembly (Cate, Brittanny France)

Benchmark workshop (CATE, Brittanny, France)

FERTINNOWA's consortium

PROEFSTATION VOOR DE GROENTETEELT

PCS

APREL

PROEFCENTRUM HOOGSTRATEN

TNO innovation for life

PROEFTUIN ZWAAGDIJK

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Horizon 2020