International Strawberry Congress – Antwerp, Belgium 2013

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Strawberries Australia Inc

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Final report

International Strawberry Congress – Antwerp, Belgium 2013

(Horticulture Australia project code BS13700)

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International Strawberry Congress – Antwerp, Belgium 2013

Final report for Horticulture Australia project BS13700

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Purpose of this report:

This project BS13700 aimed to

- establish and build relationships with international experts in the fields of best practice, supply chain management, marketing, and new varieties. This is especially important given the global nature of variety movements and the contracting nature of expertise within the Australian strawberry industry
- assess opportunities for strawberries from Australia to be exported to Asia to fill requirements
- learn about new production methods, supply chain management, changes in variety distributions and the drivers for innovation in these areas
- identify post-harvest management technologies that facilitate high food safety standards and increase the quality of strawberries once they leave farm. This in turn leads to great consumer satisfaction.

Funded by:

Horticulture Australia Pty. Ltd., Strawberries Australia Inc. and the Victorian Strawberry Industry Development Committee.

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Introduction

Key personnel from within the Australian strawberry industry visited Belgium in September 2013 to attend the International Strawberry Congress and see themselves an incredible industry made up almost entirely of co-operative strawberry farmers.

The Congress presented the cutting edge of research throughout Europe and American production regions as well as presenting production trends for the major strawberry productions regions and globally. Belgium alone (which is a ¼ the size of Victoria with a smaller population than Australia) grows more strawberries both in tonnage and plantings than the whole of Australia and there season is only 4 months long. The value of their industry is the same as the total Australian strawberry industry

The Australian industry has a long way to go and we must drive to increase the consumption of our product by the same amount as consumed in Europe, and the USA. The USA industry is worth $4.4 billion per annum.

The tour was an eye-opener for all who attended and they saw for themselves the growth potential and marketing initiatives that the Australian Strawberry Industry should and could use to grow the Australian industry in the years to come

Figure 1. Protected hydroponic strawberry production in Belgium

Cultivation and agronomy

The congress presented a wide array of research into emerging production practices with increased sustainability. The majority of which could be of great use to Australia strawberry growers when the methodology and technology is fully developed. These topics are summarised below:

Improved water use efficiency

Researchers in the United Kingdom, principally England, have been researching the effect of deficit irrigation programs on strawberry plant stress responses, fruit quality attributes and yield. The aim of the research was to determine when soil water availability became an important limiting impacting on fruit yield and quality.

Deficit irrigation programs are used in Australia on a wide range of orchards and vineyards where they have shown great success in improving yields and fruit quality while resulting in significantly lower water use. However, the use of deficit irrigation methods are rarely used in short lived row crops, especially those of high value like strawberries.

The researchers in England were able to reduce, through irrigation scheduling, the water inputs by approximately 80 percent without negatively impacting on Class 1 yields and quality. Following from the research trails, growers have adopted this new information and have been able to reduce their water use by 36 percent while achieving a Class 1 yield increase of 18 percent.

With water for irrigation becoming limiting and more expensive in many of Australia's strawberry production regions, this research may have extremely positive implications for these production regions. These irrigation practices need investigation under Australia conditions as recommendations for irrigation in some growing regions is 15 to 18 kPa, whereas the English research demonstrated that photosynthesis remained unaffected until the soil reached -200 kPa. This provides a large amount of scope for the investigation of deficit irrigation practices in Australia production regions.

Insect Pest Management

Drosophila suzukii

Drosophila suzukii, a damaging Asian vinegar fly, is widespread across the European Union. Successful control centres on the early detection and mass trapping of files early in the season, this when coupled with good farm hygiene can provide acceptable levels of control.

Australia currently is free from *D. suzukii* and it is hoped will remain so, especially if import restrictions remain on host produce from countries where *D. suzukii* is present. However, if circumstances arise where *D. suzukii* is present within Australia control will be very similar to those currently used for Queensland and Mediterranean Fruit Flies. Monitoring traps have shown to reliably detect the presence of *D. suzukii* in a region, with dense mass trapping grids demonstrating the ability to capture large numbers of flies. This when used in conjunction with developing a sterile insect technique for *D. suzukii* may provide the best options for Australia control.

Integrated insect pest management

There were many presentations and discussions had centering on integrated insect pest management and how this is being achieved throughout different countries. However, it was a presentation by Karel Bolckmans & Anna Luczynski, from Koppert Biological Systems, where Victorian strawberry growers were used as a case study for how to manage insect pests of foliage and fruit with the release of predatory species. Australia productions systems currently are at the forefront of integrated insect pest management in strawberry foliage and fruit, predominately due to work being conducted in Victoria with funding from Horticulture Australia Ltd. and the Victorian Strawberry Industry Development Committee.

Figure 2. Bio-control agents enclosed within a pouch at the base of strawberry plants

Fertilisation

The use of nitrogen based fertilisers is becoming more restricted throughout the European Union, with total nitrogen having a fixed ceiling of 225 kg of nitrogen per hectare. These restrictions have resulted in research being conducted into different nitrogen use strategies.

Research in Belgium, conducted on the variety Elsanta, has found that much of the fertilizer applied as a pre-plant in the autumn is lost through leaching and run-off, During this period, uptake was shown to not exceed 15 kg N/ha. Throughout the fruiting period soil covering had more of an impact on yield than the rate of nitrogen applied. It also showed that the removal of nitrogen by fruit was between 15 to 83 kg/ha.

The University of Florida is conducting research into the fertilisation of short-day varieties. The researchers have demonstrated that N rates above 35 kg/ha were not needed to assist with the establishment and early yield of the variety Festival. The second study they conducted found that the two major varieties, Festival and Florida Radiance, had differing responses and requirements for nitrogen, potassium and phosphorus.

This fertilization research particularly that conducted in Florida may have direct relevance to the production of strawberries on Queensland's Sunshine Coast as they grow the same varieties and have a similar climate. Similar research has been conducted in California on day-neutral varieties and is currently being validated and extended into the Victorian production regions.

Yield and production forecasting

Researchers in Belgium have developed a system of using microscopic analysis of flowers buds to determine the to spread of flower emergence, and by extension predict the relative yield distribution throughout the fruiting season.

This methodology has potential for production regions in Australia that are based on short-day type varieties. As the flowers buds on these plants are formed only below a specific day length which generally occurs in the runner grower nurseries or very shortly after planting in these production regions. The spreading potential of these plants is also important as they generally only produce one flush of fruit and more this fruiting period can be extended the lower the risk of market oversupply.

This forecasting methodology needs much more development before becoming a reliable tool, but it has the potential to offer great value to fruit and runner growers alike.

Pathology

Alternative control methods for fungal pathogens

A significant amount of research is being conducted throughout Europe and the Americas on the control of plant pathogens. Due to the nature of agrochemical development of the tightening of use restrictions on such products; therefore, much of the research conducted is on novel methods to control the important fungal pathogens.

The presentations that have to possibility to develop and be of increased use to the Australian strawberry industry have been summarized below.

An innovative way to combine pollination and crop protection

Throughout Europe, especially in protected cropping systems, bees are not only used as a method of pollination but also as a vector to distribute microbial control products. The system developed consists of an innovating hive that forces bees to pass through the microbial control agent as they leave the hive, before passing the agent onto flowers that are pollinated. Grey Mould (B cinerea) and thrips can be controlled by the system which has shown to be as effective as chemical applications.

In Europe this system relies on the use of bumble bees which are not present on mainland Australia, however the species *bombus terrestris* has been established in Tasmania since the early 1990's. There are currently no available supplies of European Bumble Bees in Tasmania or mainland Australia which makes the system not suitable for Australia conditions due to the lack of a suitable vector.

If the system could be modified to utilise a different vector species of bee the possibilities for the using the system in Australian production region for the control of pathogenic fungi and pest insect species are extremely promising.

Figure 3. Biobest bee hive which also acts as a vector system for insect and fungal disease control

Utilising UV light as an alternative measure to control powdery mildew

The regulation of agrochemicals is becoming more stringent throughout many part of the world, particularly Europe; this has led to a reduction in MRL's and also increased awareness of the effects of agrochemicals on the environment.

As a result, researchers have developed a system of exposing field and protected strawberry crops to UV-c radiation with the aim of controlling powdery mildew to an extent similar to fungicidal applications. They demonstrated that UV-c radiation can be as effective as fungicide applications whilst not having a negative effect of plant growth and subsequent yield s and fruit quality. As with many fungicide applications, the exposure the UV-c was more successful when durations and occurrence of exposure was more regular.

The use of these techniques may become increasingly important as strawberry production within Australia moves to protected cropping under tunnel bases systems that are more prone to powdery mildews outbreaks.

The impact of tree extracts on strawberry pathogens

The production of compounds with fungicidal activity by pine (*Pinus sylvestris* L.) and spruce (*Picea abies* L.) has been well documented in scientific research reports. Researchers, in Latvia, have been isolating these compounds and evaluating their efficacy and safety when applied as a fungicide to field grown strawberries.

The research has demonstrated that such extracts do have a ability to control important fungal pathogens of strawberry crops. However, the spectrum of control gained through the application of the extracts was very low and only inhibited B. cinerea, C. acutatum, P. cactorum mycelia growth. The highest effect was shown on B. cinerea, where the reductions in mycelia growth extending out to six days after application.

Using post-harvest dips to prolong shelf life

The use of post-harvest dips within the Australia strawberry industry is not existent. While the practice is used in many other crops, the susceptibility of strawberries to damage by water has significantly reduced the development of such technologies in the strawberry industry.

Researchers is Bangladesh have studied using calcium chloride drips to reduce postharvest decay and fruit breakdown in storage. Strawberries were dipped for 15 minutes and 45°C prior to being storage at 10°C. The research demonstrated that such treatments were able to increase the shelf life of strawberries through reductions in fungal decay and moisture/firmness losses.

The use of postharvest dips in addition to reducing fruit decay has the potential the safeguard against dangerous food borne illnesses. The treating of fruit by postharvest dips has great potential to increase shelf life whilst reducing the potential for food borne pathogens

Breeding and genetics

Traditional Breeding

The proliferation of numerous private breeding programs in Europe has resulted in a more competitive variety landscape. Several European breeding programs presented their latest results at the International Strawberry Congress in Antwerp. East Malling Research (UK) introduced their latest releases: short-day varieties ‘Serenity’ and ‘Malling Centenary’ and everbearing variety ‘Buddy’. The Agricultural Research Council (Italy) presented results on variety trials across multiple growing regions in Italy. German company Hansabred introduced ‘Snow White’, a white-fruited Junebearing cultivar. Pcfruit (Belgium) presented their variety trial results with junebearing varieties. French company Marionnet presented a number of proprietary varieties including ‘Mariguette’ and ‘Magnum’.

Molecular breeding

An interesting study by researchers from Spain focused on characterizing nutritional traits in a diploid strawberry Near Isogenic Lines (NILs) population. They used a diploid population generated by crossing Fragaria vesca × F. bucharica because of their small genome and simpler inheritance. NILs population was genotyped using SSR markers. Progress was made in identifying QTLs for nutritional quality traits such as polyphenol content and sugar composition. This finding needs to be validated in the cultivated octoploid strawberry.

Notes from presentation entitled “Strawberry breeding: past achievements and visions for the future” by keynote speaker David Simpson

Strawberry breeding began in France in the 1760s when the cultivated strawberry Fragaria × ananassa was created from a chance hybridisation between two species, F. virginiana and F. chiloensis. The development of the variety ‘Keen’s Seedling’, released in England in 1821, marked the beginning of true commercial strawberry production in Europe. ‘Keen’s Seedling’ was later used by breeders to develop other important early cultivars, such as French variety ‘Vicomtesse Hericart de Thury’.

Early breeding efforts focused on increasing fruit size and developing perennial plants that could produce a crop for several consecutive seasons. As strawberry production gained in importance worldwide, breeders started focusing on disease resistance, e.g. programs in Scotland and USA focused on red core caused by Phytophthora fragariae.

In recent years, some of the most successful breeding programs in the world include University of California and the Netherlands program (originally Wageningen University).

The latest development in strawberry breeding is the use of molecular markers. Several programs now use marker-assisted selection particularly for disease resistance traits.

Commercialisation and marketing

International Strawberry Congress - General

The Belgium growers have agreed to a fixed amount of plants to grow and have decided not go outside the marketing Company - Veiling Hoogstraten - nor deal with other agents or Supermarkets. They are united and get extremely attractive prices. There is NO overproduction and the prices are obtained by an auction system – and everyone is making money. Belgium (which is a ¼ the size of Victoria with a smaller population than Australia grows more strawberries both in tonnage and plantings than the whole of Australia and there season is only 4 months long. The value of their industry is the same as the total Australian strawberry industry which is a six States operation, 12 months of the year. There has been a 70% increase in metric tonnes in Belgium in the last 10 years, due mainly to its unique and clear marketing operations.

We realised that the Australian industry has a long way to go and we must drive to increase the consumption of our product by the same amount as consumed in Europe, and the USA.

Some interesting statistics where presented at the Congress – there is 4.3M metric tonnes of strawberries grown annually world-wide. Europe is the largest producer with1.435M tonnes grown and growing, whilst there is 1.33 in North America (Canada has reduced in tonnage by 19% over the last 10 years and the USA has increased by 50% in the same period – due mainly to good word of mouth and extensive marketing in Supermarkets and to the correct demographic. 744M tonnes in Asia (with Turkey growing 302M tonnes and China, the growing giant from nothing 10 years ago to over 250M tonnes last year), South Africa 149M tonnes and only 37M tonnes in Australia (which we were told was a 51% increase in the last 10 years, but Egypt has had a huge increase of 247% in the same period and Morocco has an increase of 74%.

The tour was an eye-opener and we saw for ourselves the growth potential and marketing initiatives that the Australian Strawberry Industry should and could use to grow the Australian industry in the years to come.

Figure 4. Value adding of strawberries and purpose designed packaging

Congress Presentation summaries

Are some strawberries healthier than others and can we claim it?

Strawberries are one of the most researched products when it comes to their nutritional status and the health benefits they are able to produce. Strawberry fruits are rich in bioactive compounds, such as phenolic acids, anthocyanin, vitamin C and possess high antioxidant capacity. The levels of such compounds vary markedly between cultivars and across different productions systems and regions.

The claiming of the health benefits of strawberries requires much research and validation of such claims and this is just for strawberries irrespective of variety differences. The ability of new varieties to consistently produce health promoting compounds in standardised production systems is the first step before beginning to claim differing health benefits across varieties.

The practical implication of such claims and subsequent branding has the potential to lead to a segregated marketplace where fruit are purchased and marketed on their claimed health benefit(s).

Extensive planning needs to be conducted before promoting the different health benefits of different varieties, especially in the Australia marketplace where the retail strawberry category is not differentiated by variety, let alone the health benefits of different varieties.

What determines consumers' liking of strawberries

The liking of strawberry varieties is one of the key factors that determines the success or failure of newly developed strawberry varieties. The challenges when evaluating new varieties is to determine the key attributes that are important to the consumer.

Over the past 3 years researchers, in Europe, have conducted tests on over 300 consumers and their preferences and choices when it comes to their liking for new and established strawberry varieties. Unsurprisingly, the acceptance to consumers strongly correlated with taste intensity, sweetness and appreciation of the odour of the fruits, with other attributes being less important. In further testing conducted it became clear that it was more the sweet to sour ratio that influenced consumer liking.

East Malling Research Station

In previous discussions with the senior management at Meiosis Ltd in May 2010, both the Chairman of SAI, Sam Violi and the CEO of SAI, Len O'Connor visited Meiosis to learn how the operation of International agreements, marketing arrangements and sale of plant genes operated.

The two parties discussed forming an agreement and in due course, develop an understanding so as to move forward with new and successful strawberry varieties in the years ahead.

Both parties seemed very interested in joining forces and Meiosis wished to gain commercialisation rights to any successful new strawberry varieties that have or could be developed by the Southern Node Breeding Project (BS11013).

Meiosis had already had agreements with the predecessors of the SAI Breeding Project (AVS Ltd – the commercial arm of the Department of Primary Industries (Vic)) – when the new varieties of Lowanna and Kalinda had been developed and both Meiosis and AVS and HAL had entered into a formal agreement to have the head licence and worldwide marketing rights for UPOV countries, but excluding Australia and New Zealand.

Since the rights to all new varieties developed by the former Breeding Projects under AVS had been transferred to SAI, it seemed essential to gain an agreement that would cover any new varieties that would be developed by the SAI / HAL Project in the foreseeable future.

Expected outcome achievement and implications for the Australia strawberry industry

The outcomes achieved by delegates throughout the symposium, as identified in the project application are detailed below.

1. **Establish and build relationships with international experts in the fields of best practice, supply chain management, marketing, and new varieties. This is especially important given the global nature of variety movements and the contracting nature of expertise within the Australian strawberry industry**

   Throughout the congress and following visit to EMR, the tour group connected with researchers and service providers from throughout. Many of these interactions were new; however, all members of the tour group also built relationships formed at other conferences and events.

   Many of the relationships will be of great use to industry personnel as the production system across Australia changes from field to protected cropping and the future development of hydroponic systems.

2. **assess opportunities for strawberries from Australia to be exported to Asia to fill requirements,**
   The ability of Australia to supply strawberries to the Asian markets will largely rest upon the grower's ability to form co-operative groups where they are able to supply the required quantity along with more importantly the required quality.
   Currently to ability of Australia strawberry produces to supply the Asian marketplace depends on the following factors;
   - import requirements
   - fragmentation of grower community
   - quality and specifications of product grown
   - domestic supply and market saturation

   Until these factors are addressed export of any significant levels of strawberries to the Asian market will remain difficult.

3. **learn about new production methods, supply chain management, changes in variety distributions and the drivers for innovation in these areas,**
   The Congress and associated visits again stressed the importance of the grower community working together in a cooperative or collaborative manner. This method of grower organisation is common throughout Europe and the United States of America, it gives to growers more market presence and allows for some control of supply and therefore can act to regulate oversupply issues.

4. **identify post-harvest management technologies that facilitate high food safety standards and increase the quality of strawberries once they leave farm. This in turn leads to great consumer satisfaction.**
   The greatest factors that increase the food safety and consumer satisfaction towards berries grown in Europe is, not so much to postharvest management, but more so the quality of the field production systems and the quality that is specified by the pack-houses and distributors.

This is because there may be 50+ growers supplying the one distributor, but the quality is uniform and tightly managed by the distributor.

5. **Commercialisation requirements – both legal and contractually.**
   Due to the nature of these discussions they cannot be made public at this point in time.

Information dissemination

Delegates met informally as a group throughout the Congress and visits to EMR to discuss insights and ideas. Each delegate has also provided a written report. These reports will be published by state strawberry bodies in relevant newsletters and be made available, along with this final report, to all Australia strawberry growers. Delegates have acknowledged that information gathered from Congress proceedings and general discussions with delegates from across the world will be presented to gatherings of growers organised by the key bodies in each major production base. The office of the Victorian Strawberry Industry Development Committee's Industry Development Officer will keep a copy of this final report along with Symposium proceedings that will be made available to growers on a short loan basis.

Itinerary

The International Strawberry Congress associated itinerary/program is outlined below

Wed 4th Sept **Parallel sessions 1 – research - cultivation**

- Improving water use efficiency and fruit quality in field-grown strawberry
- The 'Flying Doctors system': an innovative way to combine pollination and crop protection
- Automation Technologies on Strawberry Harvesting and Packaging Operations in Japan
- Supplemental LED Growth Light in Remontant Strawberry at High Latitudes
- Predicting potential and spreading through flower bud analysis of strawberry plants
- Development of Sustainable Nitrogen, Phosphorus and Potassium Fertilization Practices on Strawberry Cultivars in Florida, United States

Parallel sessions 1 - commercialisation

- Sales strategies in different production area
- Panel discussion

Thur 5th Sept **Parallel sessions 2 – research - breeding and genetics**

- A core collection of modified strawberry germplasm as a resource tool for fungi infection and fruit texture studies
- Control of earliness in strawberry: TFL1 is the key
- Using plant traits to estimate production costs and profitability of strawberry genotypes in southeast Queensland
- Characterizing Nutritional Traits in a diploid strawberry NIL population

Parallel sessions 2 – commercialisation - marketing

- Brand awareness & Image survey 2013
- Branding strategies Hoogstraten®

Parallel sessions 3 – research – pathology

- Drosophila suzukii in Switzerland: monitoring and mass trapping
- Characteristics of Xanthomonas fragariae and expression of angular leaf spot in Belgian conditions
- Natural elicitors of plant defence response in strawberry and other crops:
- CATT as a non-chemical pest and nematode control method in Strawberry Mother Planting Stock
- Improving strawberry IPM in California with botanical and microbial pesticides

Parallel sessions 3 – commercialisation - sustainability & supply chain management

- Responsibly Fresh - collectively towards sustainable development
- Needs and Possibilities for Integrated Crop Management of Strawberries
- Residue Analysis: How extensively should a laboratory analyse?
- Supply chain management

Parallel sessions 4 – research – postharvest technology and quality

- Breeding of hypoallergenic strawberry fruit
- Towards an integrated platform for the objective measurement of strawberry quality
- Analysis of lgE binding capacity and stress inducibility of strawberry allergen Fra a 1
- Diversity of metabolite patterns and sensory characters in wild and cultivated strawberries

Fri 6th Sept **Field excursions**

- Veiling Hoogstraten
- A selected group of growers
- Special Fruit
- National Strawberry Research Station Hoogstraten

The itinerary associated with visit the East Malling Research station

Sat 7th Sept	• Travel from Antwerp, Belgium to London
Mon 9th Sept	• To the East Malling Research station for tours and meetings
Tue 10th Sept	• Depart London

Recommendations

The attendance at the International Strawberry Congress and the East Malling Research was extremely valuable for the entire Australian delegation. Many of the delegates had been to symposiums and/or congresses in the past but it was invaluable for keeping industry leaders up-to-date with current best practise, research and development trends, breeding outcomes, as well as maintaining previously established networks. The recommendations below are proposed to maximise the benefit the Australia strawberry industry achieves from participation in the congress.

1. Encourage the development of protected cropping systems, through supporting research into the economics and viability of such systems in all Australia production regions.
2. Facilitate and encourage the development of co-operative and collaborations between strawberry growers, as well as wider berry growers
3. Support research and development into novel and innovating methods of fungal pathogen control
4. Support and encourage research into the use of post-0harvest dips in controlling food borne pathogens
5. Support delegates to build on networks developed during the congress
6. Continue to explore opportunities for the exchange of varieties between Australian breeding programs and those throughout Europe
7. Allocate funding well ahead of time for a wider range of delegates to attend future International Strawberry Symposia

Acknowledgments

- Horticulture Australia Limited for providing matched funding to make this project possible
- The Australian strawberry industry through Strawberries Australia Inc. for providing project administration and voluntary contributions to support the project
- Delegates for giving up their precious time to attend the congress on behalf of all Australia strawberry growers and for writing their reports on the congress and East Malling study tour.

Appendix 1

Key note speakers

- Gaston Opdekamp
  Managing Director of Veiling Hoogstraten
- Josse De Baerdemaeker
  Emeritus Professor at the KU Leuven and Visiting Professor at Kyoto University (Japan)
- Nigel Barlow
  Managing Director of Nigel Barlow Consultancy
- Philippe Appeltans
  Secretary General VBT
- Philippe Binard
  General Delegate of Freshfel Europe
- Jan Engelen
  Sales and Marketing manager of Veiling Hoogstraten
- Ad Klaassen
  Secretary General DPA
- Alberto Garbuglia
  Consultant in business and marketing development
- Chris Christian
  Vice President, Marketing California Strawberry Commission
- Göhkan Yaltir
  Sales and Marketing Manager of Yaltır Tarım
- Hans-Christoph Behr
  Deputy Managing Director of Agrarmarkt Informations-GmbH (AMI)
- Jan van Bergeijk
  Manager of Plus Berries, S.A.T.
- Nick Marsden
  Poupart Imports
- Gaston Opdekamp
  Managing Director of Veiling Hoogstraten
- Josse De Baerdemaeker
  Emeritus Professor at the KU Leuven and Visiting Professor at Kyoto University (Japan)
- David Simpson
  Senior Strawberry Breeder, East Malling Research
- Linda Eatherton
  Partner and Director of Global Food and Nutrition Practice at Ketchum
- Nathalie Bekx
  CEO of Trendhuis
- Véronique Parmentier
  Global Marketing Manager at Zespri
- An Segers
  Senior Director Global Research at MARKET PROBE AGRICULTURE AND ANIMAL HEALTH
- Ann De Craene
  Staff member product-technical matters VBT
- Karel Bolckmans
  Director Global R&D and Production of Koppert BV

- Carine De Clercq
  General Manager of Fytolab
- Richard Beld
  Managing Director at Hellmann Worldwide Logistics
- Bruno Mezzetti
  Full Professor - Director of Department of Agricultural, Food and Environmental Science, Università Politecnica delle Marche
- Tom Zoellner
  Senior Consultant for Market Development at UrbanFarmers Ltd.
- Olivier Dauvers
  Editor at Editions Dauvers
- Peter Ragaert
  Docent food packaging technology at Ghent University
- Daan Vetters
  Just. Innovation Manager at Hessing
- Bernard Lahousse
  MSc, Science Director, Foodpairing.com
- Roger Van Damme
  Michelin-star chef of Het Gebaar in Antwerp

Appendix 2

Poster sessions

Cultivation

1. **Effect of position on the stolon, age and harvest date on uniformity of strawberry cuttings and final plant production.** Dieleman J.A., Clemens S.M.E., Meinen E.
2. **Micropropagation of Elsanta strawberry plants in relation to field production – Walloon expertise (GFW-CRAW).** Geerts P., Farvacque S., Bullen E., Magein H., Watillon B.
3. **Prospects of strawberry cultivation in India.** Pramanick K.K., Kishore D.K., Sharma Y.P., Watpade S.
4. **Comparison of two irrigation management systems in strawberry.** Ancay A., Baroffio C., Michel V.
5. **Influence of K Stress on Plant Growth of Strawberry and Soil-borne Disease under Continuous Cultivation.** Teng-fei F., Zeng-qiang C., Yan-meng B.I., Gei-ling T., Lu-sheng Z.
6. **Evaluation of nursery plants production of strawberry mother plants propagated in vitro and in vivo.** Capocasa F., Balducci F., Diamanti J., Marcellini M., Bernardini D., Navacchi O., Mezzetti B.
7. **Determination of maturity indices of strawberry under subtropical climatic condition of Bangladesh.** Rahman M.M., Rahman M.M.
8. **Effect of two diurnal temperatures during simulated natural chilling of 'Gariguette' strawberry.** Bosc J-P.
9. **Prospects of strawberry cultivation in India.** Pramanick K.K., Kishore D.K., Sharma Y.P., Watpade S.
10. **Changes on quality of fruit and yield of strawberry under supplemental LED lights cultivation.** Choi H., Kwon J., Lee S., Kang N.
11. **Evaluations of Slow Release N Source for strawberry Production.** Guertal E.A.
12. **Effect of pot size and soil media on the growth and yield of strawberry.** Uddin A.S.M.M., Ahmad M.R., Rahman M.M.
13. **Flowering and Fruiting of Ever-bearing and Day-neutral Strawberry Cultivars for Summer Production in Korea.** Yeoung Y.R., Lee Y.H., Nam J., Young D., Kim
14. **Effect of different plant bioregulators on growing of strawberry plugs.** Radkevich D., Obuchovski P.
15. **Use of poly tunnels for the reliability and quality improvement of organically grown strawberries.** van Almsick D., Linnemanstöns L.
16. **Rubis des Jardins, a new strawberry adapted to organic cultivation.** Carmagnat C., Chartier P.
17. **The multiannual effect of using compost in a sandy soil open field strawberry cultivation.** Van Delm T., Melis P., Stoffels K., Vandaele E. Bossaerts G., Baets W.
18. **Vegetated filter basins: a solution for treatment of drainage water from soilless cultures.** Thiery F.
19. **Growth and Yield by Controlled Crowns of the New Ever-bearing Strawberry 'Goha' in Highlands.** Lee J.N., Kim H.J., Kim K.D., Yoo D.L., Im S., Yeoung Y.R.
20. **Strawberry Variety Trial in Sicily.** D'Anna F., Caracciolo G., Moncada A., Baruzzi G., Faedi W.

21. **Strawberry early harvest opportunities in Latvia using FVG high tunnels.** Kalnina I., Strautina S.
22. **Application of animal origin biostimulators in strawberry production.** Bogunović I., Duralija B.
23. **Microbial quantity in continuous cropping strawberry soil.** Bai P-H., Liu Q-Z., Li H-Q., Liu Y-B.
24. **Winter injuries – a problem in the strawberry cultivation.** Zurawicz E., Masny A.
25. **Screening and testing of new ever bearing strawberry varieties and selections.** Boonen M., Trekels H.
26. **Testing different nitrogen (N) strategies to assure a sustainable open field strawberry production.** Boonen M., Bries J.
27. **Healthy fruit in European perspective: EUBerry & EUFruitbreedomics.** Van Kruistum G., Evenhuis B.
28. **Strawberry F1 hybrids in very early greenhouse production with grow light.** Bentvelsen G.C.M., Souillat D.
29. **Recent evolution and trends in the soil fertility of Flemish strawberry fields.** Janssens P., Deckers S., Odeurs W., Elsen A., Vandendriessche H.
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