NATIONAL SOFT FRUIT CONFERENCE and TRADE SHOW 2010

IN ASSOCIATION WITH

IRISH SOFT FRUIT GROWERS' ASSOCIATION

and

BORD BIA

Contents

Foreword

Welcome to the 2010 Teagasc Soft Fruit Conference, held in association with the Irish Soft Fruit Growers' Association (ISFGA) and Bord Bia.

Protected strawberry production is now the mainstay of the soft fruit industry in Ireland. Large capital investments have been made by growers in protective cropping, including both glasshouse and tunnel structures. The main objective is the extension of the fruit season and the production of very high quality fruit, which is demanded by today's consumer. The industry now produces at least 7,500 tonnes of fresh strawberries per year, worth an estimated €34 million. While the Dutch cultivar 'Elsanta' is the most popular cultivar grown, a number of other new cultivars also have some market share.

The Irish industry, as a whole, is technically advanced and is continually making big strides to keep up with modern methods and new advances in crop husbandry. Although there are always major challenges to deal with, the future is very promising for forward looking, progressive soft fruit growers.

Thank you for your participation and I hope you have an informative and enjoyable day.

Eamonn Kehoe and Dermot Callaghan

Teagasc

Dr Eamonn Kehoe, Teagasc, Johnstown Castle, Co.Wexford and Kinsealy Research Centre, Malahide Rd, Dublin 17. Tel. 05391-42622; Email:eamonn.kehoe@teagasc.ie (Research and Advisory)

Dermot Callaghan, Teagasc Kildalton College, Piltown, Co.Kilkenny. Tel. 051-644552; Email: dermot.callaghan@teagasc.ie (Advisory)

Exhibitors and Sponsors

Bord Bia, Clanwilliam Court, Lower Mount Street, Dublin 2.Contact Mr.Michal Slawski. Tel: 01 6685155 - Fax: 01 6687521 Web: www.bordbia.ie.

Clonbrin Peat Products Ltd., Rathangan, Co. Kildare

Contact Pat and Noel Cunningham. Tel: 045 524571 - Fax: 045 524772

Deker Horticultural Suppliers Ltd., Tullyard, Trim, Co.Meath.

Contact Mr.Derek Warren. Tel: 046 9431422. Fax: 046 9437692. Email: contact_us@dekerthort.ie www.dekerhort.ie

Irritec Ltd., Unit 22, Turvey Business Park, Turvey Avenue, Donabate, Co.Dublin. Contact Mr.Paul Kunkles. Tel: 01 8404033 - Fax: 01 8405337 Email: sales@irritec.ie

JMC Packaging Ltd. 116 Clonmore Road, Dungannon, Co.Tyrone, BT71 6HX. Contact Mr.Tom Dolan. Tel: 028 38851413. Fax: 028 38851224.

Keelings Ltd. Roslin, St Margarets, Co.Dublin. Contact Mr.David Keeling. www.keelings.com

Nemos Horticultural Ltd. Conatct Dr. Abdul Al-Amidi or Mr.Ciaran Walsh. Tel: 086-8256302. Email: info@nemo.ie www.nemo.ie

National Agrochemical Distributors, Blakes Cross, Lusk, Co.Dublin.

Contact Mr.Colm Matthews Tel: 01 843-7808 Fax: 01 843-7909 Email Colmm@nadirl.com. Web: www.nad.ie.

The Whelehan Group - Crop Protection Division, 3 Northern Cross Business Park, Finglas, Dublin 11. Tel 01 8068600 Fax: 01 8362271 Email: CropProtection@tpwhelehan.ie Web: www.whelehan.ie

Confirmed exhibitors at time of print.

Strawberries and Other Soft Fruits

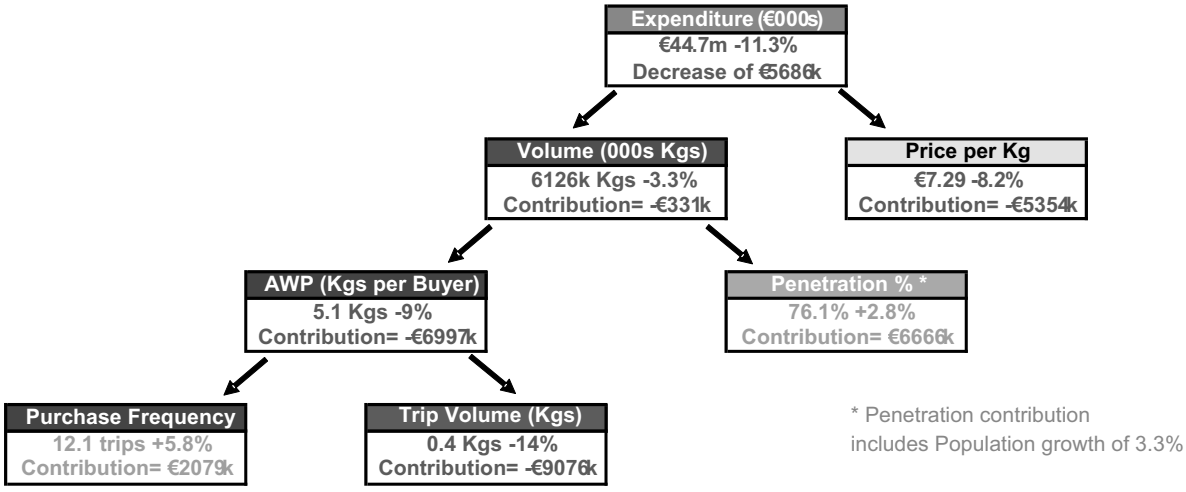
Michal Slawski, Bord Bia Horticulture

Retail market review

It has been a challenging year for strawberries and while the volume of sales has remained fairly constant, there has been an 11% drop in the retail value of the market. There are a number of reasons for this including the deteriorating state of the economy and less disposable income for consumers. From a retail point of view, price promotion is a proven method of attracting consumers, and this is reflected in the 8% drop in the average price per kg, mirroring the high level of promotion taking place. These promotions have had the positive effect of drawing more consumers into the category, with nearly a 3 % increase in penetration. Consumers in turn are tending to shop more often, but to buy smaller quantities each time they shop.

Strawberries

	52 w/e 25 Jan 09	52 w/e 24 Jan 10	Actual Change	% Change
Expenditure (€000s)	50346	44660	-5686	-11.3
Volume (000s Kgs)	6337	6126	-211	-3.3
Penetration %	74.01	76.12	2.11	2.8
Purchase Frequency	11.42	12.08	0.66	5.8
AWP (Spend per Buyer)	44.49	37.16	-7.33	-16.5
AWP (Kgs per Buyer)	5.60	5.10	-0.50	-9.0
Trip Spend	3.90	3.08	-0.82	-21.1
Trip Volume (Kgs)	0.49	0.42	-0.07	-14.0
Price per Kg	7.95	7.29	-0.65	-8.2



Other berries

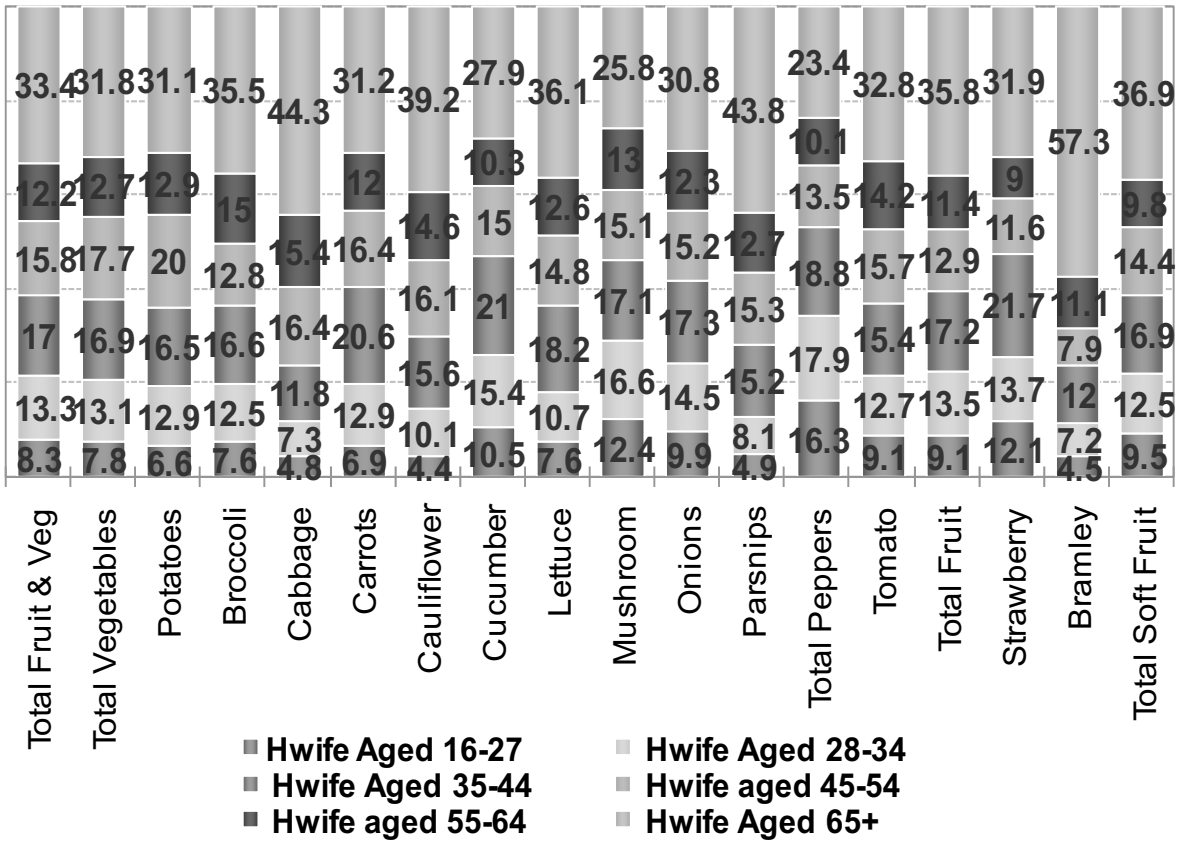
Other berries include blueberries, raspberries, currants, and gooseberries. There has been increasing demand for other berries, also on the back of price promotion in the retail sector, with a large increase in retail sales; expenditure is up 54% and volume up 75%, while average price per kg has come down by 12%. There are also a large number of new consumers coming into the category with a 21% increase in penetration. The largest single berry in this category is now blueberries with a value of €18.5 million, followed by raspberries.

Other Berries

	52 w/e 25 Jan 09	52 w/e 24 Jan 10	Actual Change	% Change
Expenditure (€000s)	20977	32271	11295	53.8
Volume (000s Kgs)	1316	2304	988	75.0
Penetration %	43.07	52.16	9.08	21.1
Purchase Frequency	8.68	11.48	2.80	32.3
AWP (Spend per Buyer)	31.85	39.18	7.34	23.0
AWP (Kgs per Buyer)	2.00	2.80	0.80	40.0
Trip Spend	3.67	3.41	-0.26	-7.0
Trip Volume (Kgs)	0.23	0.24	0.01	5.8
Price per Kg	15.93	14.00	-1.93	-12.1

Consumer profile

The biggest consumer group for strawberries is housewives in the 65+ age group. The groups under-consuming are the 45 – 64 year old category. Younger consumers are over indexing but deserve to be concentrated on so that the market for strawberries continues to grow.



National Strawberry Week 2010

National Strawberry Week takes place from the 7 - 14 June, and celebrates the start of the main strawberry season. It is jointly funded by Bord Bia and the Irish Soft Growers' Association and consists of a mixture of different activities to highlight the taste, health and versatility of strawberries.

The main objective of the promotion is to increase the demand for strawberries through:

1. Interesting recipe suggestions
2. Informing consumers about the health benefits of strawberries
3. The consumption of strawberries not just as a dessert but also at other times of the day e.g., breakfast, lunch etc.

This promotion takes place every year; last year's activities were very well received and covered widely in local and national media and contributed to increased sales in early June.

The Irish fresh fruit industry is an important part of the horticultural sector with fresh Irish strawberries being produced on more than 100 farms nationwide with a farm-gate value of over €30 million.

This promotion will be extensively signposted leading up to the 7 June and will involve celebrity chef Catherine Fulvio. Catherine has created three signature strawberry dishes which will be used in the promotion, on in-store material and on the website. Radio, press and TV competitions will include Ireland AM, the RTE guide and the Irish Farmers' Journal, the Strawberry Alarm Clock, and the Will Leahy show. Schools will also be involved in the activities.

Members of the public can get involved through the online competition on the Best in Season website, further details of this will be available closer to the time on the website. Finally, the National Strawberry Week logo will be used on packaging for the week of the promotion and there are plans for an in-store leaflet in selected retail outlets.

The Use of Beneficial Nematodes and Other Biological Methods are the Future for the Soft Fruit Growers in Ireland

Dr Abdul Al-Amidi

Nemos Horticultural Ltd.

Abstract:

This presentation reports on recent developments in the use of nematodes in the Irish context. It presents the thesis that the over-se of synthetic chemical pesticides while producing ample supplies of cheap crops in and out of season, has now created a crisis in the food industry.

The negative effects on human health and soil, and the serious issues of resistance problems means that many Irish growers have now switched to the use of beneficial nematoids and other biological control agents as a more modern, cost effective and sustainable alternative.

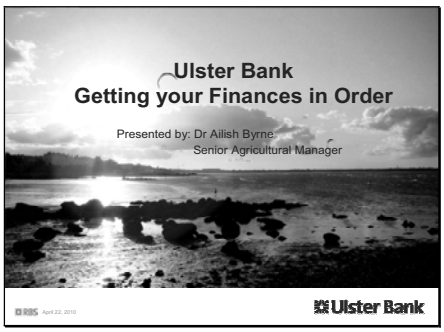
The presentation outlines the development of beneficial nematodes in biological pest control. It has long been understood that nematodes are specific to their target pests. Their use in this context has made the single nematode species application a very expensive option for the grower. The development of SuperNemos, which are capable of controlling a wide range of insect pest species in a single application, offers a tested and proven cost effective, environmentally appropriate successor to the outdated synthetic chemical approach. The analysis of the effectiveness of the SuperNemos *vis a vis* other single nematode species is included in the presentation.

It reports on recent successes in trials and applications in the soft fruit sector.

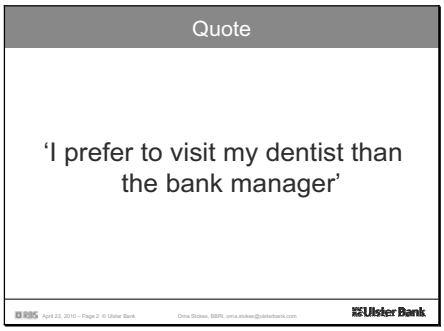
Getting your Finance in Order

Dr Ailish Byrne, Senior Agribusiness Manager, Ulster Bank

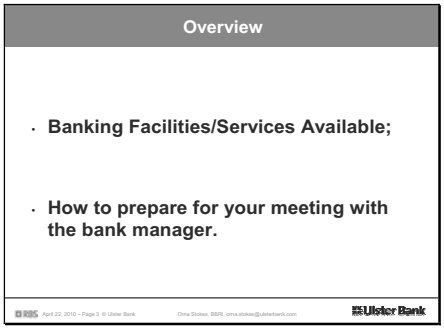
Slide 1



Slide 2



Slide 3



Slide 4

Slide 5

Farm Lending

- Ulster Bank will lend for most legitimate purposes
  (subject to credit checks and repayment capacity of the person borrowing.)

  - provides O/D's and Loans (short, medium and long-term)

- Loan Period
  - Will reflect the type of investment
  - Moratoria on principal repayments available where appropriate

Orna Stokes, BBR, orna.stokes@ulsterbank.com

Slide 6

Bank Finance

- **Short-term:** To facilitate the day to day operations of the business
  - Business Overdraft
  - Business Loan/Stocking Loan
  - Business Credit Cards
- **Medium-term:** up to 7 years, usually for plant & equipment, buildings
  - Business Term Loan
  - Leasing
  - Hire Purchase
- **Long-term:** Up to 20 years, fixed assets including land
  - Bank loan

Key – match financial products to the business need

Orna Stokes, BBR, orna.stokes@ulsterbank.com

Slide 7

Bank Services

- **Dedicated Relationship Managers;**
- **On-site Visits;**
- **Direct Telephone contact point;**
- **Internet/Telephone banking.**

Slide 8

Slide 9

1. Farm Business Plan

Three Strategic Questions:

- Where are you now?
- Where do you want to be?
- How will you get there?

Slide 10

1. Farm Business Plan

Key Areas:

- Detail existing business & experience
- Time schedule of planned developments
- Detailed & realistic costings/budgets for each stage of development
- Demonstrate repayment capacity

Slide 11

1. Farm Business Plan

- Be honest
- Be specific
- Understand exactly what is detailed in your plan

Slide 12

2. Up to Date Farm Accounts

Farm accounts for year end 31.12.09:

Net Profit	€40,000	
Depreciation	€12,000	
Interest paid	€16,000	
Net Contribution from new investment	€15,000	
Non-Recurring Legal Costs	€ 8,000	
		€91,000
Less Living Expenses from Farm		€30,000
Available to Service Existing and Proposed Borrowings		**€61,000**
Total Borrowings €200,000 over 20 yrs. @ 6.0%	€17,500	
Margin		**€43,500**

Slide 13

3. Bank Statements

Indicate:

- How financial affairs are managed
- If limit on the account is adequate
- If borrowings are properly structured
- The profitability of the business

Slide 14

4. Security

- Must be valuable, saleable and assignable
- In farming usually land
- Loans usually up to 70% of value of security

Slide 15

5. Borrower Contribution (Equity)

- In farming, existing business very often represents the borrower contribution
- In a stand alone investment typically the bank expects 30% contribution

Slide 16

Use of Outside Professional Advice

Ulster Bank happy to see farmers using their adviser, consultant, accountant to help prepare/present their application

However the bank lends to you - so

Make sure you are in control

Slide 17

Summary - Bank Requirements

1. Business Plan
2. Up to Date Farm Accounts
3. Bank Statements
4. Security
5. Borrower Contribution
5. Outside Professional Advice

Make sure you are in control

Slide 18

When Difficulties Arise

1. Seek outside or professional advice;
2. Give all the facts;
3. Prepare a cash-flow budget;
4. Stay in touch with the bank;
5. Extend payment terms – Interest-Only;
6. Provide additional working capital

Slide 19

Ulster Bank European Investment Fund

The EIB has made €100m available to Ulster Bank and UB will pass the funding advantage to our customers.

- Funding advantage will reduce the customer's cost of borrowing
- Minimum loan: €30,000 for a minimum term of 2 years
- EIB pricing benefit will last for 5 years.

What qualifies

- Development of land already owned, from which to trade
- Purchase of other tangible assets, such as plant, machinery and equipment
- Purchase of commercial property from which to trade (except farmland)

What does not qualify

- Demand Loan & Revolving Loan Facilities
- Refinancing of existing borrowing

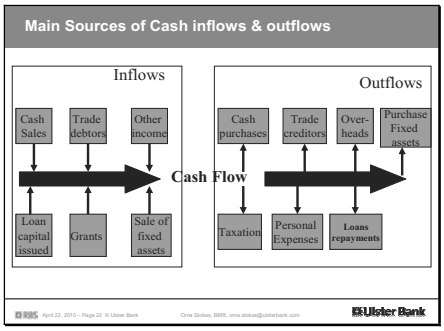
Slide 20

Conclusion

- Ulster Bank is a one stop shop for all your banking needs;
- Experienced Agri advisors along with dedicated relationship managers;
- Ulster Bank Agricultural Products and services are designed to meet farmers needs.

Slide 21

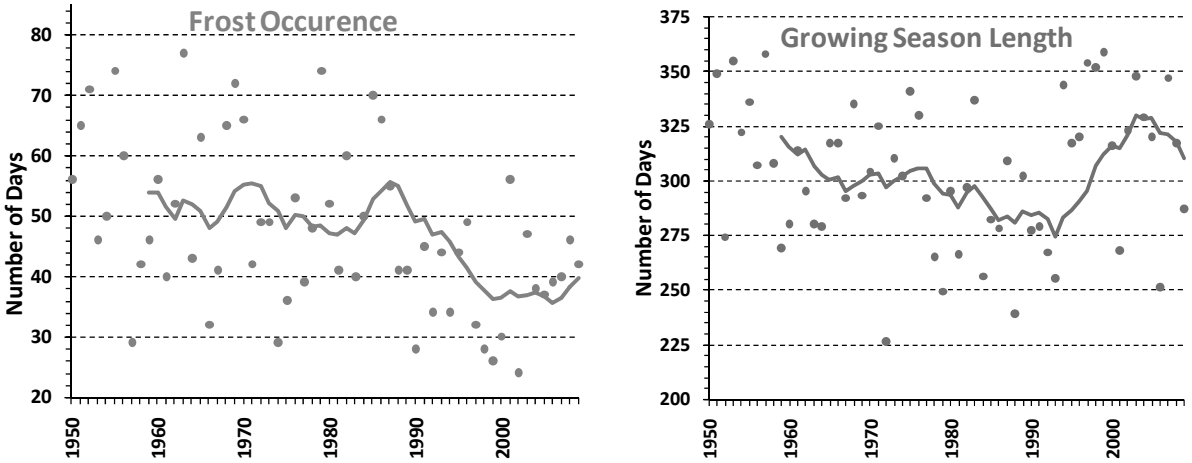
Slide 22


Main Sources of Cash inflows & outflows
Inflows
Cash Sales
Trade debtors
Other income
Loan capital issued
Grants
Sale of fixed assets
Cash Flow
Outflows
Cash purchases
Trade creditors
Over-heads
Purchase Fixed assets
Taxation
Personal Expenses
Loans repayments
RBS
Ulster Bank

Climate Change in Ireland and the Impact on Soft Fruit Production

Dr. Sarah O'Reilly, Agricultural Meteorologist, Met Éireann

Met Éireann monitor the Irish Climate through a network of weather observing stations. Weather data is quality controlled and archived in the National Climatological Archive maintained by Met Éireann. Analysis of this archive allows changes in Ireland's climate to be accurately detected. In general, a warming trend has been seen in Ireland over recent decades, accompanied by a reduction in frosts and a lengthening of the growing season.



The above graphs show the number of days per year with frost and the growing season (number of days when temperature >5^{o}C) at Met Eireann's station in Mullingar. Data is shown from 1950 to 2008 inclusive, along with a ten year moving average.

Predicting future weather conditions is not a straightforward exercise and projecting future climate conditions presents science with a considerable challenge. Scientists are developing methods to allow the modelling of average weather conditions decades into the future. Through C4I (Community Climate Consortium for Ireland), the ENSEMBLES project and most recently the EC-Earth project, Met Éireann is involved in this international effort.

There is significant uncertainty about Ireland's future climate but models do clearly signal a rise in temperatures. Indications are that, compared to the period 1961-1990, average annual temperatures in Ireland will have risen by 0.5-1.5^{o}C by the middle of this century and by 1.5-3.0^{o}C by 2100.

Although average conditions have become milder in recent decades significant variability in weather conditions from day to day and year to year continues to be a feature of our climate. Such variability will also be a feature of our future climate.

Useful links:
www.met.ie
www.metoffice.gov.uk/climatechange/

A Review of the Latest Worldwide Strawberry Research

Dr Eamonn Kehoe, Teagasc

Slide 1

Slide 2

Slide 3

Slide 4

Sonata & Figaro

Slide 5

Chilling Requirement of the Strawberry cv. 'Sonata' & 'Figaro'

- P.Lieten- Fragaria Holland BV.
- Sonata- 1575 chill units optimum!! For yield and vegetative development
- Figaro much lower chilling requirement
- Highest yield – 1093 units and quality superior at 1254 units.
- Excessive chilling led Figaro to be too vigorous & yield decreased & delayed

Slide 6

Manipulation of the production pattern of everbearing cultivars by Defoliation Treatments

- A. Whitehouse, A Johnson & D.Simpson
- Effect of defoliating plants on production pattern of 'Flamenco'.
- Plants mowed off with strimmer on 3 dates
- All leaf & flower removed, crown left.
- Total yield remained unaffected
- Plants must be defoliated before second half of July
- Peak production occurred 2 weeks later

Slide 7

Second Experiment

- Three defoliation compared on four everbearers
- Flamenco,Everest,Malling Opal & Pearl
- No effect on Class I yield of Flamenco but yields of others significantly reduced.
- Clear everbearers respond differently to defoliation treatments
- Response will vary between seasons due to different weather patterns
- Could be used as a tool for avoiding periods of high temperatures that can reduce flowering in everbearer cultivars.

Slide 8

Long-Day Flowering Response of Everbearing Strawberries

- Anita Sonsteby, NIAER,Norway.
- Strawberry cv.classified into Everbearing or June bearing types
- Literature on control of flowering of everbearers is inconsistent
- Study looked at the effect of photoperiod & temperature on the control of flowering in several everbearers
- Everest, Flamenco, Elan,Ridder,Rita,Rondo.
- LD+ 9°C; LD+ 15°C and 21°C ; LD+ 27°C.
- Flowering was highly significantly increased by LD & High temperature

Slide 9

Long-Day Flowering Response of Everbearing Strawberries

- Everbearer strawberry cultivars of the older European type or modern Californian are:
- Qualitative LD plants at high temperature (27°C)
- Quantitative LD plants at intermediate temperatures (15 and 21°C)

Slide 10

Crop Production

Slide 11

Quality & Performance of Strawberry Tray Plants in High Latitude Conditions

- S Karhu MTT Agrifood Research Finland
- Carbohydrate concentration higher in crowns and roots of tray plants v waiting bed plants
- Leaf removal prior to cold storage enhanced cropping potential of waiting bed plants
- Planted into black v white mulch
- Carbo content reduced greater where black mulch used but yield not affected

Slide 12

Crop Protection

Slide 13

Controlling Grey Mould in Strawberry Cultivation using DSS

- B. Evenhuis & J. Wilms APR Wageningen
- Grey mould is a major disease
- Reduction of pesticide use is major aim of Dutch Government
- Implementation of a DSS to achieve this goal
- Predicted weather data is used
- Under low disease pressure DSS BoWas 62% better than fungicides & 50% less used
- BoWas under disease pressure still performed better

Slide 14

Evaluation of an Empirical Model for the Control of Strawberry Powdery Mildew

- Soil grown, tunnels, Camarosa, Ventana, Marina.
- C.Blanco *et al*, IFAPA, Seville,Spain
- Efficiency of DSS for p mildew tested
- Two DSS systems compared
- 20% reduction in fungicide over 3 years
- Application of 'chemical' fungicides reduced by 42% compared to standard IPM

Slide 15

Influence of Heat Spread System on Malformation of 'Elsanta' strawberries in Spring

- Els Desmet, National Research Centre for Strawberries,Meerle,Belgium
- Malformation of 'Elsanta' in spring cultivation in a heated glasshouse subject to different speculations
- Insufficient pollination? Shortage of cold units? Reduced development of stamens?
- Two systems of heat spread tested
- Warm water pipes and warm air tubes tested
- Warm air tubes = reduction of malformed fruits, increase in production of 21% and improved plant vigour!

Slide 16

Slide 17

Strawberry Complex Protection against Fungal Diseases & Two Spotted Spider Mite using Strobilurin Fungicides

- **B.Meszka *et al*, RIPF, Skierniewice,Poland**
- **New Strobilurins (Signum & Zato)**
- **Three experiments- using Senga Sengana, Elsanta and Marmolada**
- **Both very good at controlling *Botrytis* and P.Mildew**
- **Signum also helped to reduce levels of Two Spotted Spider Mite**

Slide 18

Industry Development

Slide 19

Strawberry Industry in China

- Shuping Yin, Beijing & Kirk Larson California USA
- 84,300 hectares & 1.96 million tonnes (2005)
- Open field & protected culture
- Protected culture harvest Nov-May
- Open field culture harvest April-June
- Fresh market- Japanese cultivars while US and European cultivars used for processing
- Nearly all processed strawberries exported.
- Poor plant quality, inefficient systems, lack of education, poor post harvest & quality control etc.

Slide 20

Nurseries

Slide 21

Optimisation of Nitrogen Fertilisation Prior to and during Flowering Process on Performance of 'Elsanta'.

- Els Desmet, National Research Centre for Strawberries,Meerle,Belgium
- Influenced period of flower initiation & subsequent development
- Reducing N prior to the flowering process advanced flower initiation
- Increasing N in September increased fruit number and yield
- Optimum yield with total N of 120 and 135 kg/ha
- 30 kg/ha at start, 60 kg/ha in September and 30 kg/ha N in October

Slide 22

Foliar Application of Calcium & Boron Influences Physiological Disorders, Fruit Yield & Quality of Strawberry

- **R. Singh *et al* Abohar India.**
- **Pre-harvest foliar application of Ca & B**
- **$CaCl_2$ x 5 times from petal fall**
- **B as Boric acid x 3 times from at start of flowering and then 15 day intervals**
- **B reduced fruit malformation significantly**
- **20% more marketable fruit with the Ca & B treatment combined**
- **Fruit receiving Ca or Ca & B were also firmer, had lower TSS, higher acidity and vitamin C.**

Slide 23

Developing a Breeding Strategy for Improved Performance in Programmed Cropping Systems

- **Adam Whitehouse *et al*, EMR, Kent, UK.**
- **With 60-day production only 'Elsanta' consistently performs well in this system**
- **Other cultivars are very unpredictable**
- **e.g. Emily & Symphony are not adapted for 60 day cropping and will not produce an acceptable yield**
- **Breeders will test a range of germplasm to see which perform well in a 60-day system**
- **Investigate the inheritance of traits related to 60-day performance**
- **Three lines EM1119,EM1159,EM1281 were identified as good parents.**

Slide 24

Post Harvest & Quality

Slide 25

Effect of Water Deficit Irrigation on Strawberry Fruit Quality

- Leon Terry *et al* Cranfield University, UK.
- Growers under pressure to justify that their water abstraction in justified and env. sustainable
- DI can reduce berry size and yield
- Study showed it did effect berry size
- Dry matter was increased
- Higher levels of Abscisic acid (ABA)
- Glucose and fructose levels
- Total Phenolics 1.4 times higher V control
- Premium price for 'healthfulness' product?

Slide 26

Effect of IPM & Organic Cropping Systems on Strawberry Health Components & Quality.

- S.Magnani et al, Forli, Italy
- Three year study using Italian cultivars 'Alba','Onda' and 'Queen Elisa'.
- Cesena area of the Po Valley
- Organic system showed lower yield
- Higher sugar content and antioxidant compounds

Slide 27

Foliar Application of Calcium & Boron Influences Physiological Disorders, Fruit Yield & Quality of Strawberry

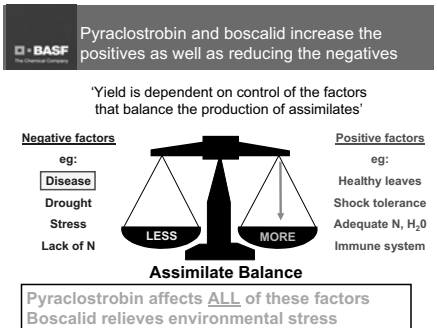
- R. Singh *et al* Abohar India.
- Pre-harvest foliar application of Ca & B
- $CaCl_2$ x 5 times from petal fall
- B as Boric acid x 3 times from at start of flowering and then 15 day intervals
- B reduced fruit malformation significantly
- 20% more marketable fruit with the Ca & B treatment combined
- Fruit receiving Ca or Ca & B were also firmer, had lower TSS, higher acidity and vitamin C.

BASF Top and Soft Fruit Products: Properties and Mode of Action. How we can use these to Achieve more Effective Crop Protection

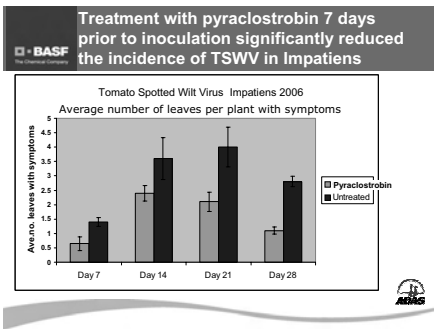
Simon Townsend, BASF, UK

Slide 1

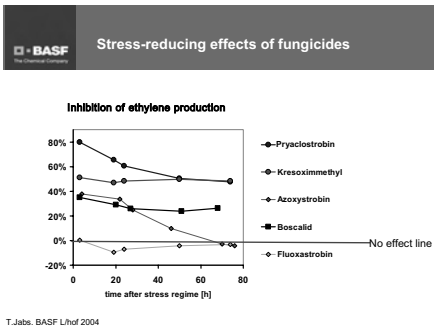
Slide 2



Slide 3

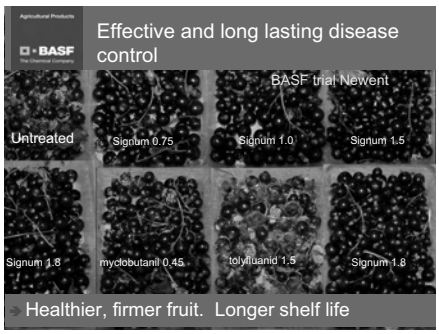


Slide 4

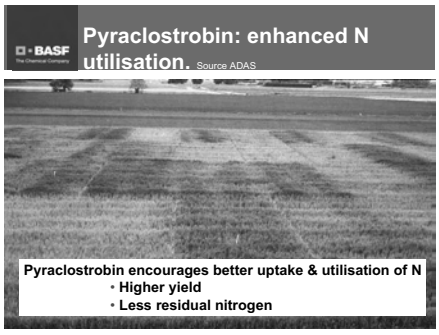


T.Jabs. BASF L/hof 2004

Slide 5

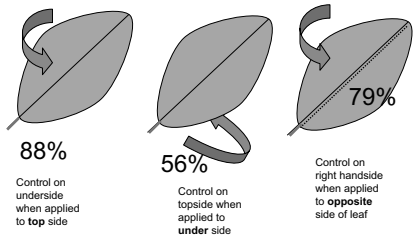


Slide 6



Slide 7

Translaminar activity of pyrimethanil



Control on underside when applied to **top** side

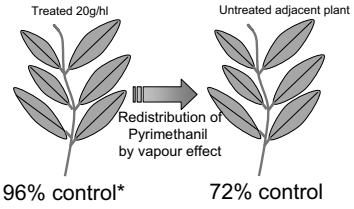
Control on topside when applied to **under** side

Control on right handside when applied to **opposite** side of leaf

Source:Pyrimethanil Biological Dossier

Slide 8

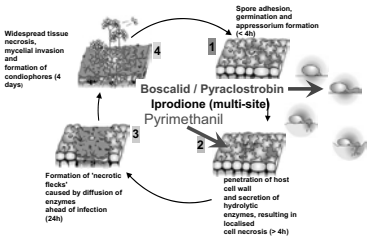
Vapour effect of pyrimethanil on adjacent untreated plants



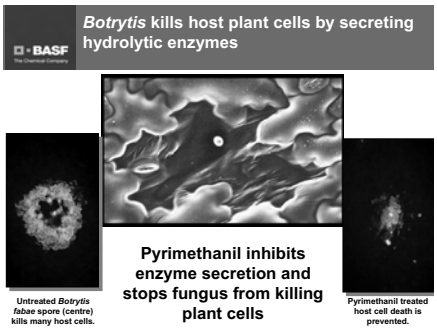
Glasshouse trial, Untreated control 30% Botrytis in infected leaves

Slide 9

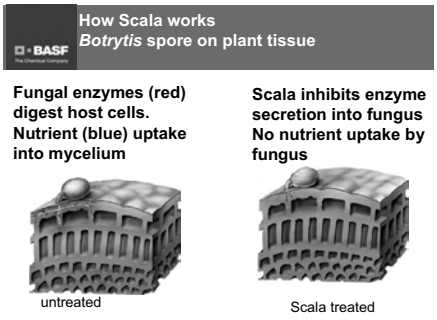
Key stages in the natural infection process of *Botrytis spp.* Where the fungicides work



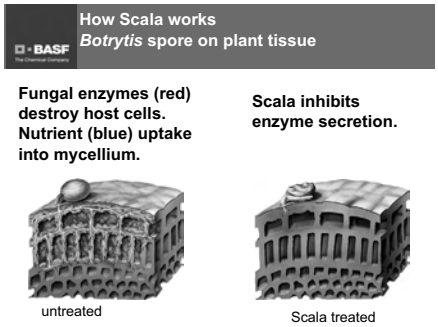
Slide 10



Slide 11



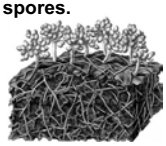
Slide 12



Slide 13

How Scala works
Botrytis spore on plant tissue

Fungus destroys plant cells and produces millions of spores.



untreated

Scala destroys fungus.

Scala treated

Slide 14

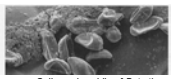
Signum®

Slide 15

Signum
Preventative Action

- Signum works as a preventative treatment against fungal disease.
- When applied at the beginning of the fungal life cycle, disease development is prevented by the inhibition of spore germination or growth of the germination tube.

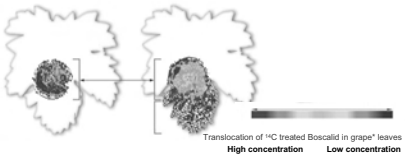
Untreated conidia of *Botrytis cinerea* on the leaf surface



Collapsed conidia of *Botrytis cinerea* after treatment with Boscalid on the leaf surface

Slide 16

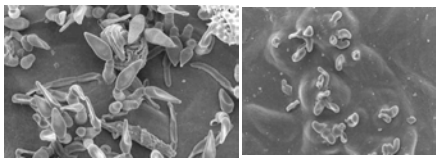
Boscalid - Activity



Protectant activity
Locally systemic with acropetal movement
Translaminar activity

Slide 17

Venturia inaequalis (Apple scab) – spore formation



Untreated 5 weeks after infection

No sporulation at 28 days after pyraclostrobin treatment

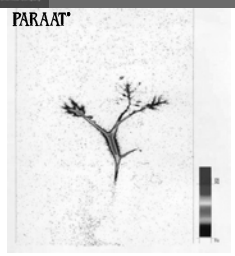
Slide 18

Crown Rot *Phytophthora cactorum*

PARAAT®

Slide 19

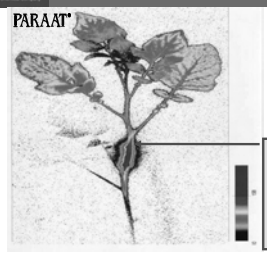
Properties of dimethomorph
Locally systemic activity



C_{14} dimethomorph distribution 1.5 hours after application onto the stem of a potato plant.

Slide 20

Properties of dimethomorph
Locally systemic activity



C_{14} dimethomorph distribution 5 days after application onto the stem of a potato plant.

Point of application

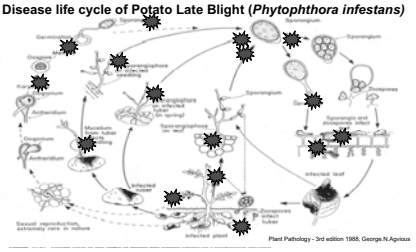
Contact surface retention, translaminar movement and transpiration stream movement into new growth

Slide 21

Properties of dimethomorph
mode of activity

PARAAT®

Disease life cycle of Potato Late Blight (*Phytophthora infestans*)



Plant Pathology - 3rd edition 1988, George.N.Agrious

Slide 22

Dimethomorph Best Advice for crown rot control production / waiting beds

- Apply immediately after planting
- Overhead spraying is the most effective method
- To maximise root uptake
  - Use high water volumes
  - **Irrigate after application – most important**
  - **Or organise rain!**
- Use dimethomorph preventatively
- Dose: 3 kg of product/ha per application

Slide 23

BASF Crop Protection in soft fruit

PARAAT®

Masai®

STOMP

Stroby® WG

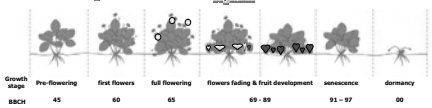
Royral

SCALA

Signum

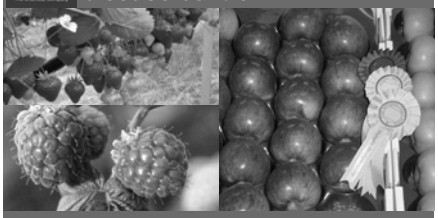
SCALA

Signum



Slide 24

Effective and long lasting disease control



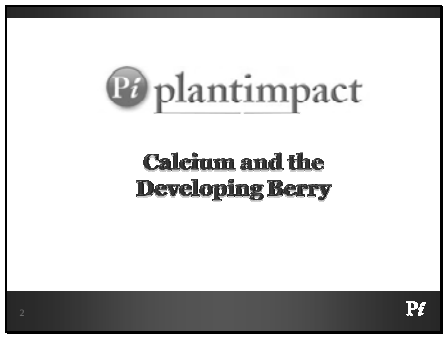
- Increased marketable yield
- Healthier, firmer fruit. Longer shelf life

Calcium and the Developing Berry

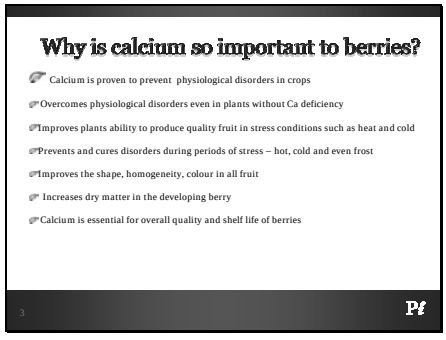
Mark Horner, Plant Impact plc.

Slide 1

Slide 2



Slide 3



Slide 4

Why do plants need calcium?

- Cellular integrity and cell wall strength.
- Cell division and new cell formations.
- Cellular pressure control to prevent over expansion
- Stress relief & protection against stress induced oxidative toxins.

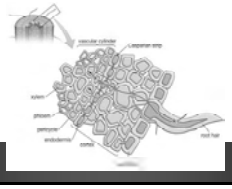
imbalances in distribution of calcium within the plant are created and exaggerated by agronomic practice (fertilisation), climate, and stress!

4

Slide 5

Calcium Uptake?

- Root available calcium
- Calcium is a Ca++ cation which is difficult for plants to access
- pH plays a large role in its availability
- Once taken up by the by the root it has to pass through the Casparian strip

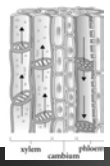


5

Slide 6

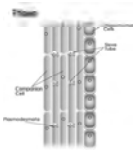
Calcium Movement

- Once through the Caspian strip Calcium enter the vascular bundle via the Xylem
- Calcium moves due to transpiration pull and cohesive tension



Once at the top of the xylem vessel Ca does something very different to all other nutrients

It Goes Cellular!



6

Slide 7

Cellular Calcium Movment

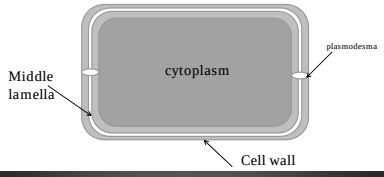
- Calcium is be taken to the leaf where it enters cells via the
- **Calcium auxin transport pump**
- Metabolic Ca or calcium pectate.
- Movement is then determined by plant processes such as growth, water loss, cell division and to area of higher auxin content.
- Once new cells formed, calcium pectate primarily used for stress relief

7

Slide 8

Calcium Cellular movement

- Apoplastic movement through the plasmodesma into the pectin layer of the cell wall



8

Slide 9

Combat of stress at cellular level

Ammonia and Ethylene production

9

Slide 10

Cellular collapse through lack of calcium

10

Slide 11

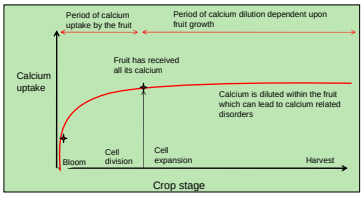
Calcium and Transpiration

- Calcium in most feeding systems is targeted around 120-150ppm
- Provided by water or nutrient supplement
- Transpiration (evapo-transpiration) is key to uptake
- To cool or poor light levels reduce transpiration and calcium reinforcement slow
- To hot and transpiration changes to only pull water for cooling purposes and calcium reinforcement stops
- It is then necessary to use targeted calcium in the form of foliar sprays

11

Slide 12

Calcium and Timing



12