



The FL300 Fixture

In combination with vegetables



Fionia
Lighting

A part of
SENOMATIC

This presentation includes

- Background
- Applications
- Possible approaches to LED for vegetable growers

All rights reserved. www.fionialighting.com



Fionia Lighting

A part of SENMATIC

FL300 Fixture

- Top-light LED fixture
- High output power
- Homogenous light distribution
- Dynamic spectrum
- No hazardous components



All rights reserved. www.fionialighting.com



Fionia Lighting

A part of SENMATIC


FL300 Fixture

First top-light LED product on the market.

Features:

- Lower electricity consumption
- Modulation of light
- Homogenous distribution of light
- Long lifetime


All rights reserved. www.fionialighting.com




Fionia Lighting A part of SENMATIC

Background – FL300

Examples of non vegetable sites using the FL300:



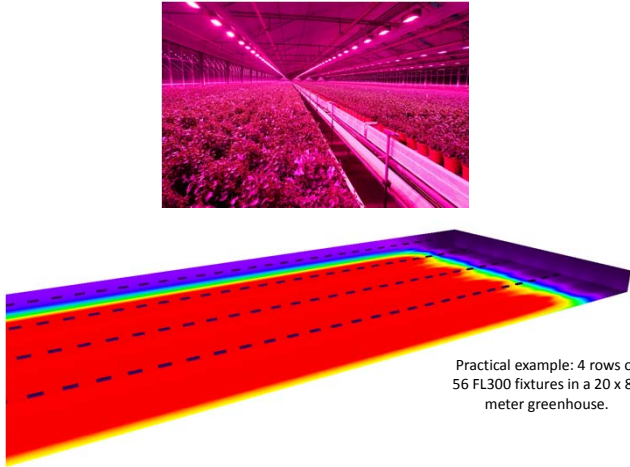
All rights reserved. www.fionialighting.com



Fionia Lighting A part of SENMATIC

Background – FL300

How the optical lens works in practical:



Practical example: 4 rows of 56 FL300 fixtures in a 20 x 80 meter greenhouse.

All rights reserved. www.fionialighting.com







Background – FL300

How the intelligent light control works in practical:




All rights reserved. www.fionialighting.com







Background – FL300



How the intelligent light control works in practical:

Why intelligent light control:

- Light Sum management
- Light intensity management
- Spectral influences on crop
- Growing different plants





All rights reserved. www.fionialighting.com









Applications in leafy green and fruit:

Apart from our own practical experiments and research done by independent trial stations and universities we have done the following large scale trials on vegetables/fruit/herbs:


	Tomato, Mads Petersen
	Basil and Salat, Swedeponic
	Strawberry, S&A
	Strawberry, Donaldsons Farm

All rights reserved. www.fionialighting.com



Applications in leafy green and fruit:

	Tomato, Mads Petersen
---	-----------------------

80 m2 trial with 14 FL300 fixtures (2009 version)

Comparison trial with 1.000 watts HPS system

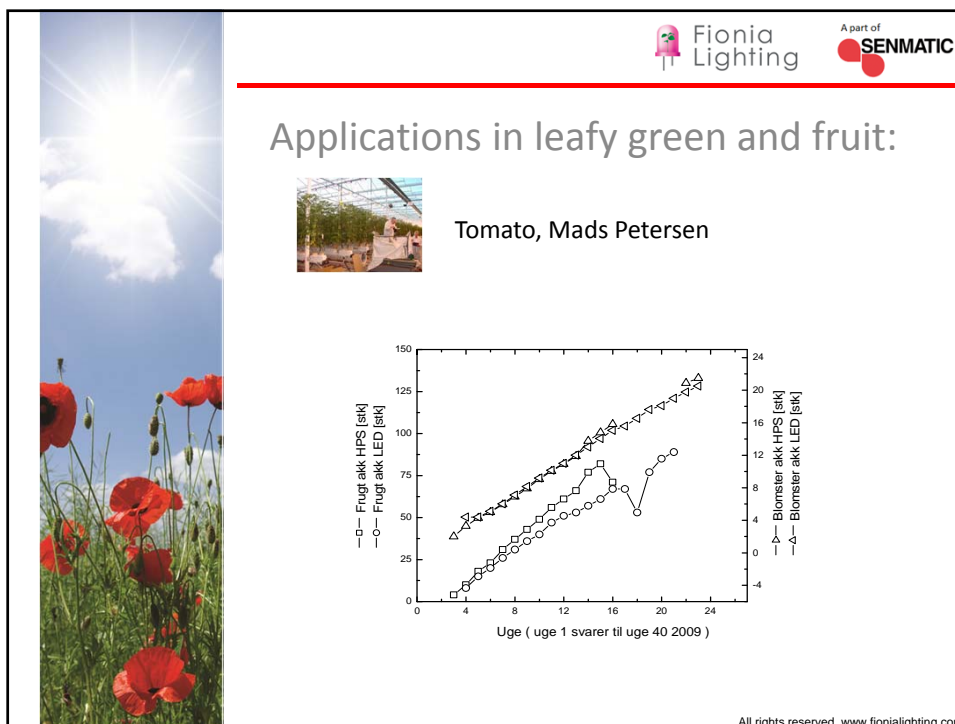
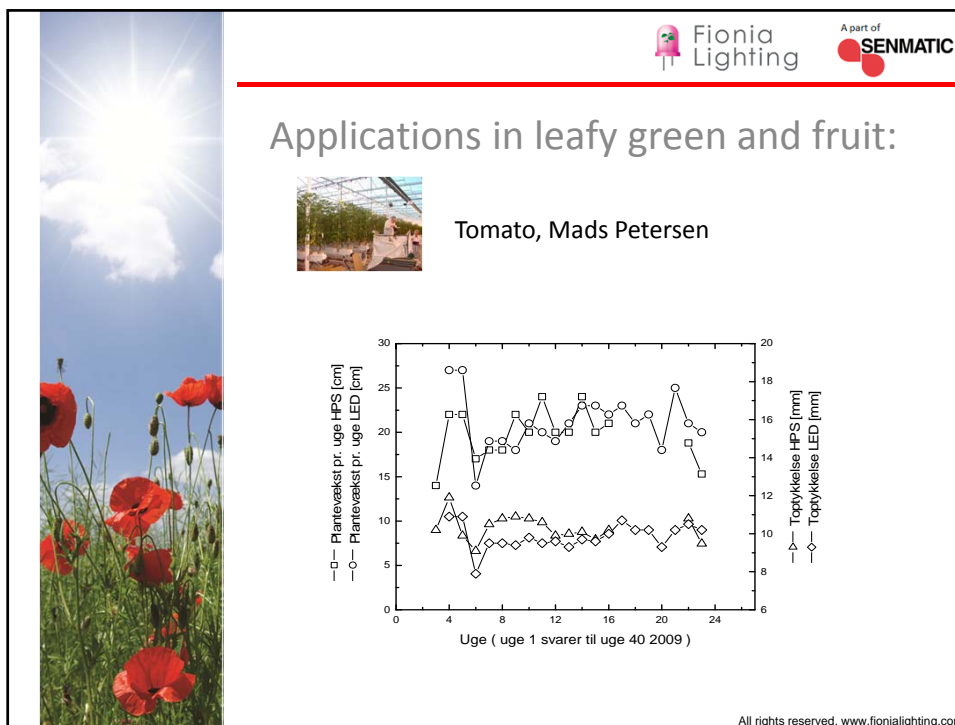
Plusses:


- Knowledge on vegetable production with LED
- Understanding Leaf temperature in context with LED

Minuses:

- Low leaf temperature

All rights reserved. www.fionialighting.com





Applications in leafy green and fruit:



Tomato, Mads Petersen

Conclusions from this 2010 trial:

We needed a more efficient fixture with intelligent control!

We needed more research on leaf temperature and spectral distribution.



Applications in leafy green and fruit:




Basil and Salat, Swedeponic





500 m² trial with 92 FL300 fixtures (2013 version)


Comparison trial with 600 watts HPS system

All rights reserved. www.fionialighting.com




Applications in leafy green and fruit:




Basil and Salat, Swedeponic



Anthocyanin response accomplished without sun or UV.


No published results





Overall:


The LED trial area produced high quality plants which were more compact than the HPS competition.

All rights reserved. www.fionialighting.com



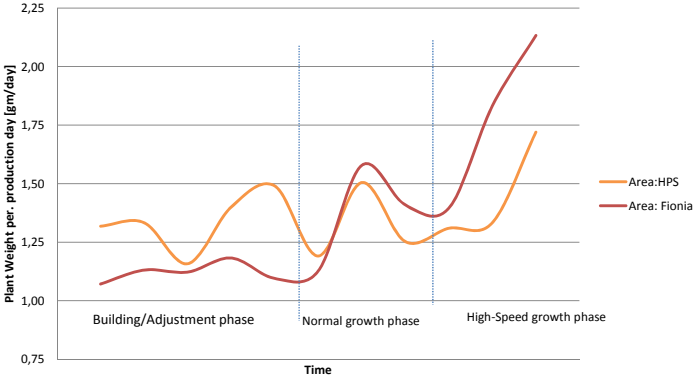



Applications in leafy green and fruit:



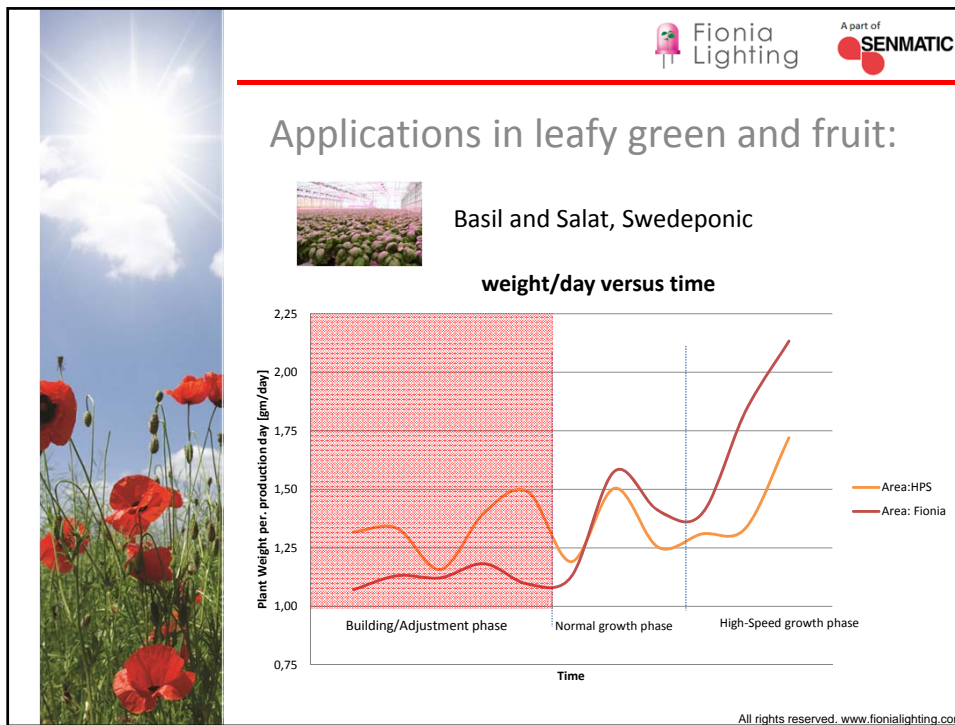
Basil and Salat, Swedeponic

weight/day versus time



Phase	Time Point	Area: HPS (gm/day)	Area: Fionia (gm/day)
Building/Adjustment phase	Start	~1.35	~1.10
	End	~1.50	~1.15
Normal growth phase	Start	~1.20	~1.10
	End	~1.50	~1.60
High-Speed growth phase	Start	~1.25	~1.35
	End	~1.70	~2.10

All rights reserved. www.fionialighting.com








Applications in leafy green and fruit:




Strawberry, S&A





200m² trial with 36 FL300 fixtures (2013 version)


Comparison trial with 600 watts HPS system





Applications in leafy green and fruit:





Strawberry, S&A

Conclusions:


- It is possible to grow good quality strawberry under LED light during the winter.
- More flowers in December than under Sunlight in Juli
- Possible to grow under high light level to increase fruit production (250 $\mu\text{mol}/\text{m}^2/\text{s}$)
- BRIX levels increased from 2 degrees. From 6-8/9.
- Harvest increased 50 % compared to HPS

All rights reserved. www.fionialighting.com






Applications in leafy green and fruit:




Strawberry, Donaldsons Farm


700 m2 trial with 58 FL300 fixtures (2013 version)



Comparison trial with 600 watts HPS

Focus:
Improve quality parameters such as BRIX and reduced wet bruising with 50 % electricity saving

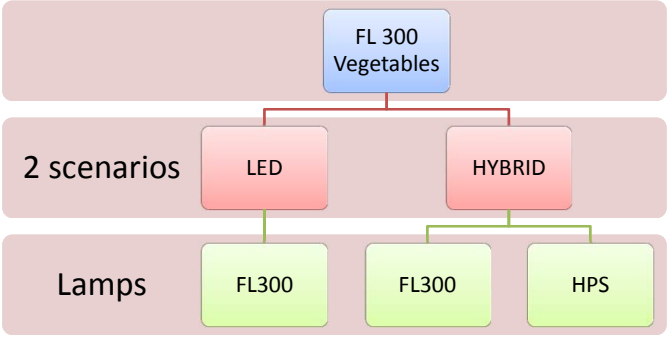


All rights reserved. www.fionialighting.com




Our approach for the 2014/2015 season





```

graph TD
    A[FL 300 Vegetables] --> B[LED]
    A --> C[HYBRID]
    B --> D[FL300]
    C --> E[FL300]
    C --> F[HPS]
    
```

All rights reserved. www.fionialighting.com




Our approach for the 2014/2015 season



2014/2015 Season	FL 300 Vegetables		
2 scenarios	LED	HYBRID	
Lamps	FL300	FL300	HPS

Small units of 50-200 m2 equipped solely with LED lighting between 150 and 300 $\mu\text{mol}/\text{m}^2/\text{s}$

- Requires a big effort from grower to control climate according to plant responses.
- Leaf temperature very important
- Direct comparison between existing HPS installation and the LED technology.
- For customers planning to replace HPS installation in the near future.

All rights reserved. www.fionialighting.com




Our approach for the 2014/2015 season


2014/2015 Season	FL 300 Vegetables		
2 scenarios	LED	HYBRID	
Lamps	FL300	FL300	HPS

Small areas of 50-500 m2 equipped with LED lighting between 50 and 100 $\mu\text{mol}/\text{m}^2/\text{s}$ together with existing light installation

- Since we are adding light to an existing installation the climate control means are less than scenario A.
- No drop in leaf temperature
- Direct comparison between existing HPS installation and a hybrid installation.
- For customers who wants a cheap upgrade possibility to current HPS technology.

All rights reserved. www.fionialighting.com




 Fionia
Lighting

A part of
SENOMATIC

Final words

If you want to know more about our LED solutions or our controller please contact us.


Thanks for your attention.

 Fionia
Lighting

Thomas Rubæk

A part of
SENOMATIC

Morten Hjorth



Olle Magnusson

All rights reserved. www.fionialighting.com