

# Optical based fungal disease (powdery mildew and gray mold) management: Potentials and limitations





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## **Optical radiation**

Part of the electromagnetic radiation



### **Optical environment describtion/characterization**



## **Plant – optical radiation – fungal interactions**







Effect of UV (wavelengths, doses) on infection process of Oidium neolycopersici on tomato leaf disk (48 hai)

# Effect of red light on powdery mildew



# Effect of red light on powdery mildew





# Effect of red and blue light on powdery mildew



# Effect of red and blue light on growth



100 Blue

75 Blue + 25 Red 50 Blue + 50 Red

25 Blue + 75 Red

100 Red

#### Selection and combination of Wavelengths - dose



Assessment

### Wavelength and dose dependent UV effect on plant growth



#### Effect of lapse time between night-time UV treatment and subsequent blue light

#### Tomato mildew

- > Two different UV treatments
  - 1. No UV (dark)
  - 2. 254 nm UV for 30 seconds with an irradiance of  $8 \pm 0.2 \,\mu mol/m^2/s$
- > Dark period before blue light
  - 1. 0 h
  - 2. 2 h
  - 3. 4 h
  - 4. 6 h
  - 5. 8 h
- > Blue irradiance  $50 \mu mol/m^2/s$  for 2 h
- > Germination was assessed 24 h after inoculation



Assessment

# **Limitations- Direct exposure**



#### Effect of day length on mycelial growth (3 DAE)



#### Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Botrytis Isolate	7	655.1	93.58	4.48	0.000
Daylenght (h)	4	436.4	109.10	5.22	0.001
Replicate	3	152.2	50.72	2.43	0.069
Botrytis Isolate*Daylenght (h)	28	1243.0	44.39	2.12	0.003
Error	117	2444.4	20.89		
Total	159	9796.8			



Fig. Effect of isolates and day length on colony growth (3 DAE)

### Effect of nighttime UV (every night) on colony growth-severity



Three days after exposure

One week after exposure

## **Spectral sensitivity- application strategy**



## **Practical applicatio - Automation - Canopy sensing**









## **Integrated management**

 Integrated disease management with limited chemical pesticides are the best practise for better disease management

