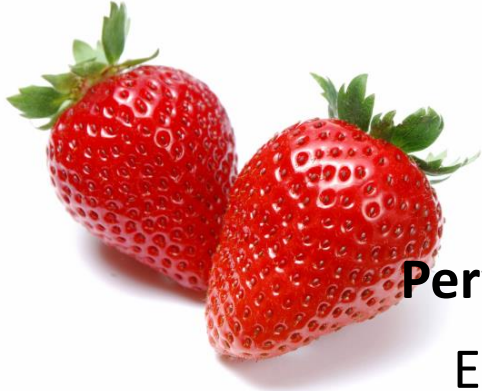


**INNOVATIVE SUSTAINABLE STRATEGIES TO CONTROL  
POSTHARVEST DECAY OF FRESH FRUIT AND VEGETABLES  
AND REDUCE FRUIT LOSS AND WASTE MEETING**

**Thursday, 15 June 2023**

**Espace de l'innovation (amphithéâtre), INRAT, TUNIS**

# **Effect of Postharvest UV-C Applications on Postharvest Decays on Strawberry Fruits**



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## Anthracnose

(*Colletotrichum fragaria*,  
*C. gloeosporioides*,  
*C. acutatum*)



## Grey Mold

(*Botrytis cinerea*)



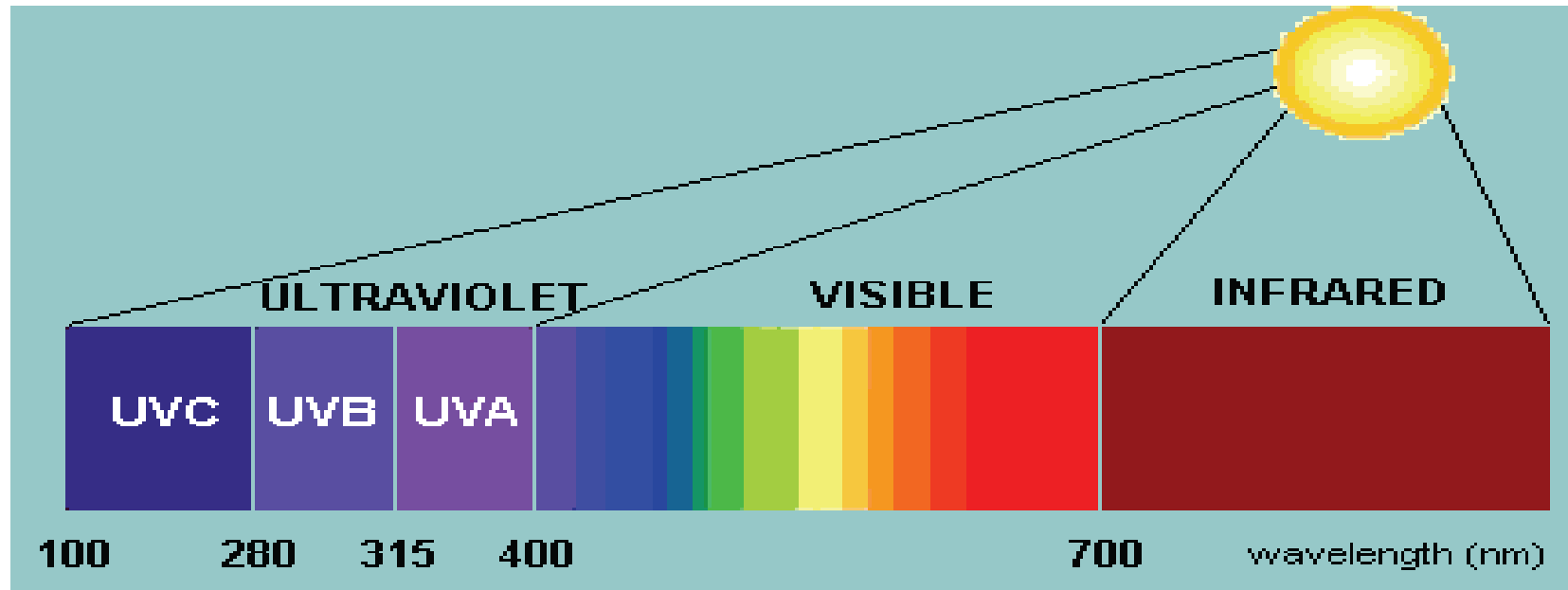
## Rhizopus fruit rot

(*Rhizopus stolonifer*,  
*R. nigricans*)



# UV-C (wavelength 100-280 nm)

- UV-C light has germicidal (Wilson et al, 1997) and hormetic effect (Liu et al, 1993; Stevens et al, 1996; 1998)
- UV-C irradiation was reported to reduce storage rots in many studies



# UV-C light is surface disinfectant

- Air sterilization
- Surface sterilization
- Instrument -equipment disinfection
- Water disinfection



- UV-C light with a wavelength of 254 nm is actually used as surface treatment.
- Because it only penetrates 50-300 nm into the plant tissue.



## UV-C technology to control postharvest diseases of Strawberry fruit-2021

Strawberry fruits of Rubigo variety

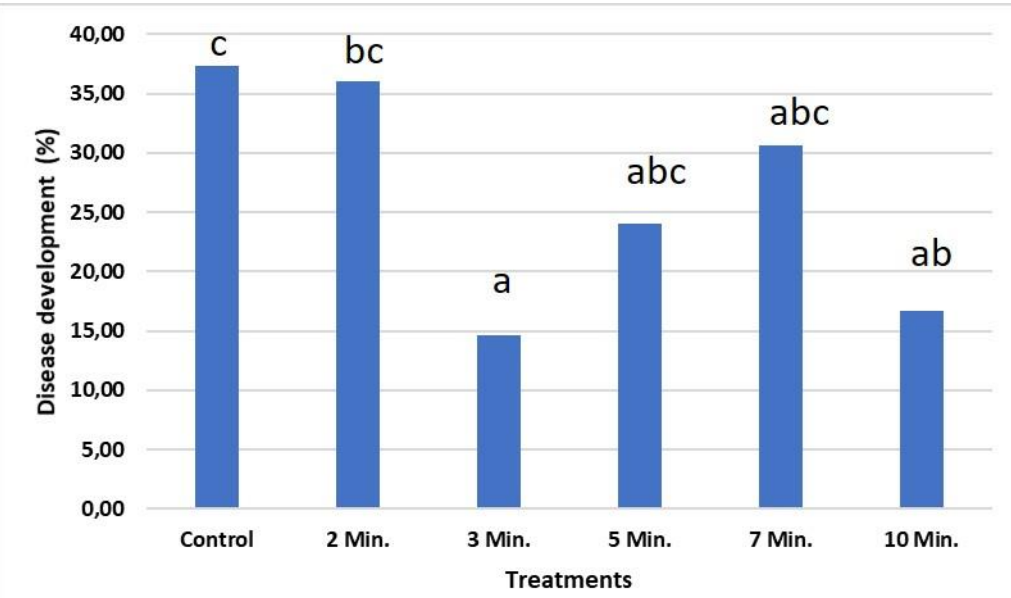


Organic producer from Aydin Nazilli district

- The fruits, which were exposed to UV-C light at different times, were packed in chalets and kept for 10 days in cold storage conditions at 0°C and 90% humidity.
- The fruits were kept 10 cm under the light in the cabinet with a 30 Watt 0.36 A UV-C light source at 254 nm wavelength.
- At the end of the 10th day, the development of rot and quality analyses of the fruits were carried out.
- Fruit were not inoculated.



No.	Treatments	UV-C doses measured from a height of 10 cm in the cabinet (kJ/m2)*
1	Control	-
2	UV-C 2 min.	3,10
3	UV-C 3 min.	3,11
4	UV-C 5 min.	3,21
5	UV-C 7 min.	3,23
6	UV-C 10 min.	3,38



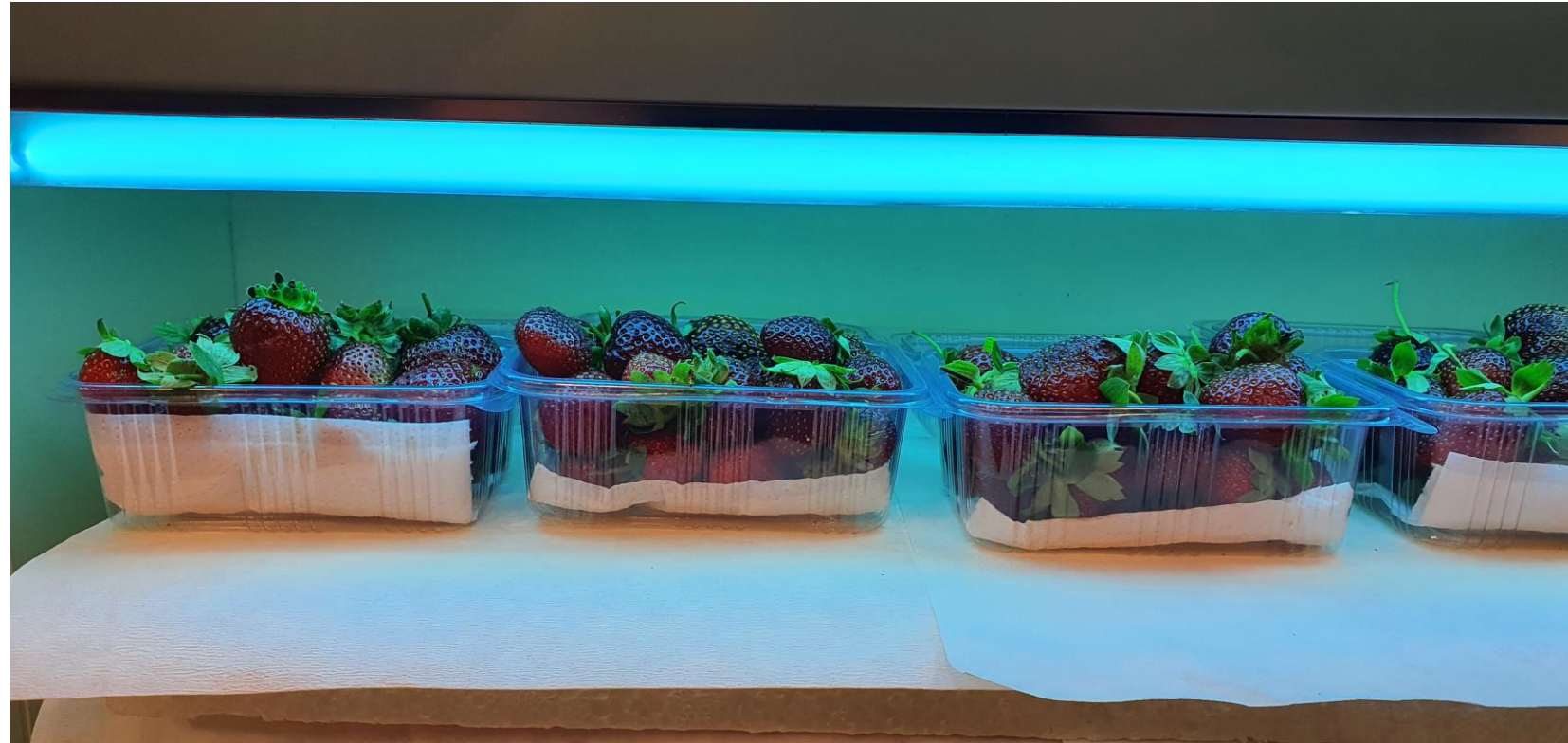
\*Duncan P=0.05

Effects of UV-C light application at different doses and times on the decay development on strawberry fruits.



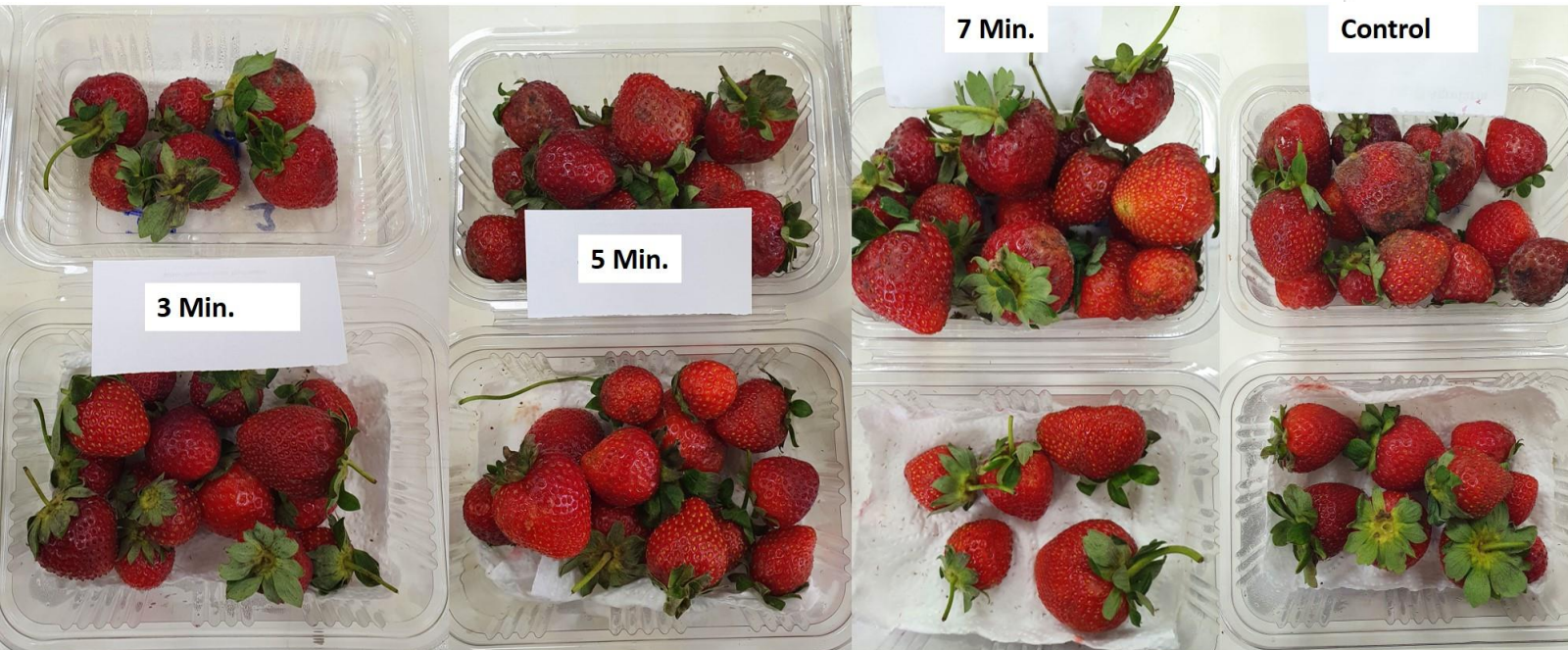
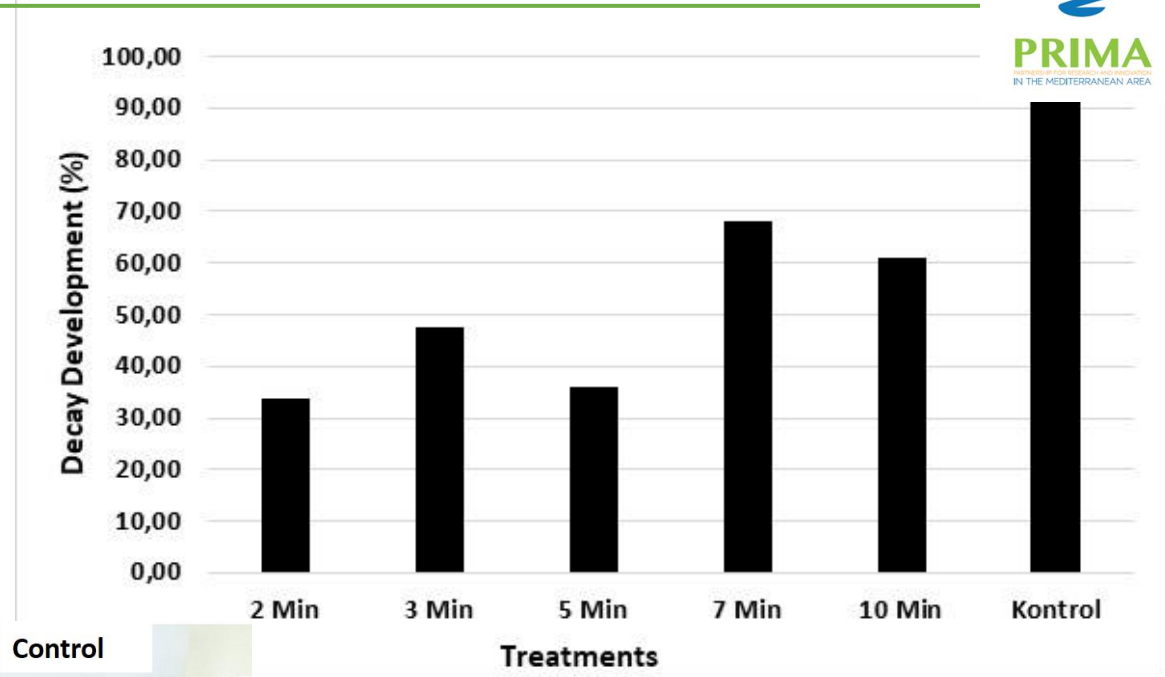


## UV-C tests on Strawberry fruit- 2022



## SECOND YEAR RESULTS

Effects of UV-C light application at different doses and times on the decay development on strawberry fruits.



**Control**



**3,11 kJ/m2**



**3,21 kJ/m2**



**3,23 kJ/m2**





- The effect of post-harvest UV-C light applications on water-soluble dry matter, TA amount and pH value of strawberry fruits did not show significant differences.



## The action of mechanisms

- Stimulation of defence mechanisms (hormetic)
  - Surface sterilization
  - Lethal effect (germicidal)
- UV-C treatment applied during postharvest to control fruit decay has been shown to improve the **fruit quality**.
  - Delaying fruit ripening
  - As a result of UV-C light application, maturation is delayed and other quality characteristics are improved.

- Nigro et al., 2000, they found UV-C doses at 0.50 and 1.00 kJ m<sup>-2</sup> significantly reduced grey mold incidence both artificial inoculations and natural infections on strawberry fruit. They have determined also PAL activity 12 h after irradiation on these doses.

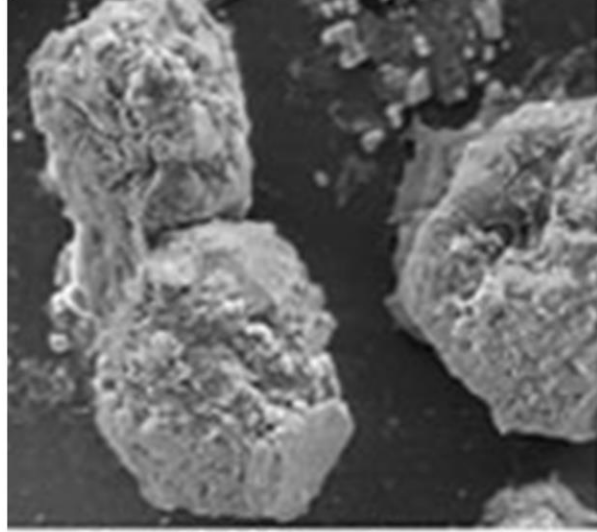


- Several studies have been suggested the stimulating defense mechanisms of plants against pathogens (Huang et al. 2017; Poiroux-Gonord et al. 2010).
- It reduce cell wall degradation on fruit and vegetables (Pombo et al. 2009).
- UV-C light stimulates structural resistance mechanisms. It increases the activity of PAL (phenylalanine ammonium lyase), phytoalexin (scoporon and scopoletin) and peroxidase enzymes in the fruit surface.

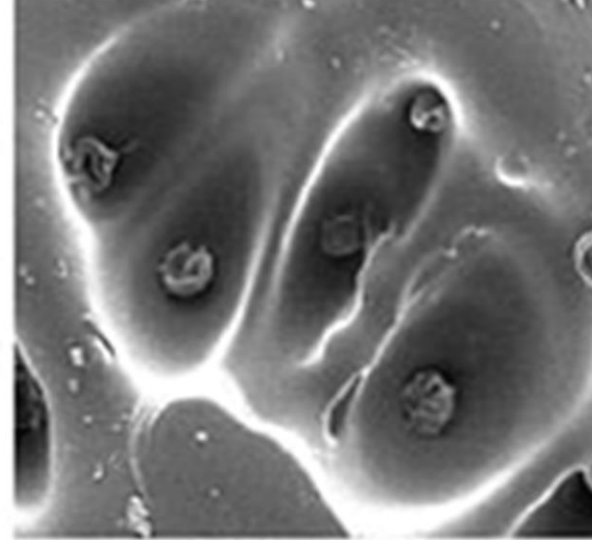


Control

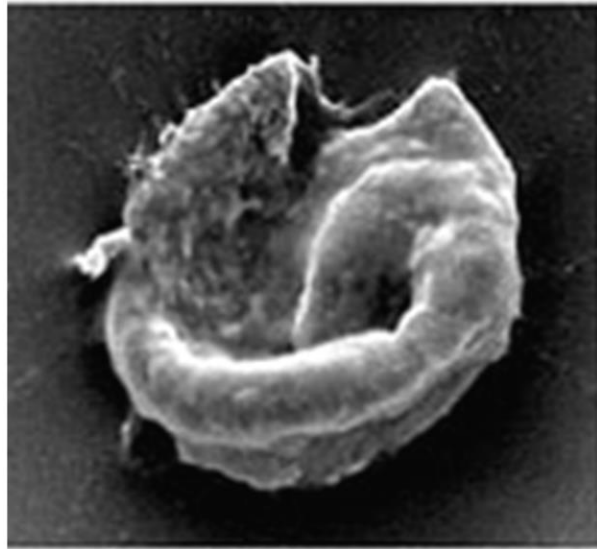
33 kw/cm<sup>3</sup>



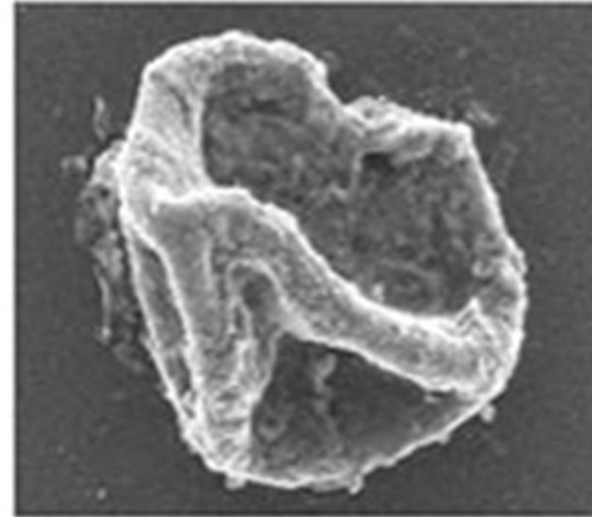
5A: x 10.000 >--- 1 μm ---<



5B: x 2.000 >---- 10 μm ----<



5C: x 10.000 >-----1 μm-----<



5D: x 20.000 >-----1 μm-----<

33 kw/cm<sup>3</sup>

5 kw/cm<sup>3</sup>

*Aspergillus niger* spores

## As a result,

- UV-C is a good surface sterilant.
- It eliminates pathogens on the fruit surface.
- **In order to all surface of the fruit to be sterilized, a well-rotating system is required.**
- It has no significant effect on latent infections in the fruit.
- **UV-C lamps should be behind protective barriers to protect users.**



# Thank you!

