EFFECT OF UV AND OZONE TREATMENT ON THE MICROBIOLOGICAL PROPERTIES OF MICROGREENS

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Introduction

Microgreens are extremely sensitive plants. Once harvested, their shelf life is limited under appropriate environmental conditions. Due to the fragile leaf surface of the plants, it is not recommended to wash them during the production of the finished product. In light of this, the possibilities to ensure appropriate food safety parameters during processing technology are limited.

Appropriate microbiological parameters of the finished product can only be achieved through perfect preparation and cultivation operations. Based on experience to date, treatments with UV light and ozone influence the development of microbiological parameters in individual foods.

The aim of this work was to investigate how the pre-treatment of seeds with UV light and ozone affects the microbiological condition of the microgreen plant at harvest.

Objective

Investigation the treatment of seeds with UV light and ozone. Microbiological test after harvest. Comparative analysis with the untreated control group.

Materials & Methods

- Raw materials:
  - Red Mizuna seeds (6 x 3g),
  - Radish Red Sango seeds (6 x 6 g)
- Planting medium: Cotton
- Number of samples: 6 samples / species / treatment
- Treatments: UV light and Ozone gas
- UV treatment of seed: before sowing with UV light for 1 hr.
- UV + Ozone treatment: Pre-sowing treatment of seeds with UV light (1 hour) and ozone (cyclic treatment: 10 minutes 4 times a day for a total of 2 days)
- Growing time: Red Mizuna (14 days), Radish Red Sango (10 days)
- Determination of mould number by the horizontal colony counting method
- Horizontal method for the enumeration of microorganisms. Pour plate technique

Results & Discussion

1st Table: Results of Radish Red Sango seeds for determine the Mould number

Sample Nr.	Test parameter	Untreated seeds	UV treated seeds	UV + Ozone treated seeds
1	Mould	$1,4x10^5$	$2,2x10^3$	$2,2x10^3$
2	Mould	$1,3x10^5$	$2,8x10^3$	$2,8x10^3$
3	Mould	$2,9x10^5$	$3,5x10^3$	$3,5x10^3$
4	Mould	$2,0x10^5$	$1,4x10^4$	$1,4x10^4$
5	Mould	$1,4x10^7$	$2,5x10^3$	$2,5x10^3$
6	Mould	$3,0x10^5$	$1,4x10^4$	$1,4x10^4$

2nd Table: Results of Radish Red Sango seeds for determine the Total germ count

Sample Nr.	Test parameter	Untreated seeds	UV treated seeds	UV + Ozone treated seeds
1	Total germ count	$7,6\ x10^7$	$7,6\ x10^7$	$7,6\ x10^7$
2	Total germ count	$4,3\ x10^6$	$4,3\ x10^6$	$4,3\ x10^6$
3	Total germ count	$2,9\ x10^6$	$2,9\ x10^6$	$2,9\ x10^6$
4	Total germ count	$2,0\ x10^5$	$2,0\ x10^5$	$2,0\ x10^5$
5	Total germ count	$1,4\ x10^7$	$1,4\ x10^7$	$1,4\ x10^7$
6	Total germ count	$3,0\ x10^5$	$3,0\ x10^5$	$3,0\ x10^5$

The tests were performed in an accredited laboratory in all cases. Samples were stored under the same conditions. Harvesting and sampling took place on day 10 for Radish Red Sango Microgreen and on day 14 for Mizuna Microgreen. Based on the data in the table, the microbiological parameters changed as a result of the treatment.

3rd Table: Results of Red Mizuna seeds for determine the Mould number

Sample Nr.	Test parameter	Untreated seeds	UV treated seeds	UV + Ozone treated seeds
1	Mould	$2,8x10^4$	$4,2x10^3$	$4,2x10^3$
2	Mould	$1,3x10^4$	$4,0x10^2$	$4,0x10^3$
3	Mould	$2,8x10^5$	$3,5x10^3$	$3,5x10^3$
4	Mould	$4,0x10^4$	$4,2x10^3$	$4,2x10^3$
5	Mould	$3,0x10^4$	$2,5x10^2$	$2,5x10^2$
6	Mould	$3,6x10^4$	$4,4x10^3$	$4,4x10^3$

4th Table: Results of Red Mizuna seeds for determine the Total germ count

Sample Nr.	Test parameter	Untreated seeds	UV treated seeds	UV + Ozone treated seeds
1	Total germ count	$4,6\ x10^7$	$4,6\ x10^7$	$4,6\ x10^7$
2	Total germ count	$5,3\ x10^6$	$5,3\ x10^6$	$5,3\ x10^6$
3	Total germ count	$3,9\ x10^6$	$3,9\ x10^6$	$3,9\ x10^6$
4	Total germ count	3,8 x10	3,8 x10	3,8 x10
5	Total germ count	$4,4\ x10^7$	$4,4\ x10^7$	$4,4\ x10^7$
6	Total germ count	$3,2\ x10^7$	$3,2\ x10^7$	$3,2\ x10^7$

Conclusion

Treatment with UV light for a specified period of time (60 minutes) reduces the number of moulds in the product but does not affect the total number of germs.

The use of ozone generator (cyclic treatment: 10 minutes 4 times a day for a total of 2 days) has no additional effect compared to UV treatment on the microbiological state of the products.

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