ISSN: 0976-3031

Available Online at http://www.recentscientific.com

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 9, Issue, 4(C), pp. 25697-25698, April, 2018

International Journal of Recent Scientific Research

DOI: 10.24327/IJRSR

Research Article

MYCOLOGICAL ANALYSIS AND ANTIMICROBIAL TREATMENT OF FRESH VEGETABLES AND FRUITS

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DOI: http://dx.doi.org/10.24327/ijrsr.2018.0904.1911

ARTICLE INFO

Article History:

Received 8th January, 2018
Received in revised form 21st February, 2018
Accepted 05th March, 2018
Published online 28th April, 2018

Key Words:

Fungal contamination, Mold, Fruits & Vegetables, Disinfectant, India

ABSTRACT

The aim of this study was to evaluate the mycological quality of fruits and vegetables purchased from local market and to analyze the effect of disinfectant treatment. A randomly selected 8 samples of fresh fruits and vegetables from local market of Varanasi, India were used. Unwashed Samples of fruits and vegetable showed molds contamination level of 7.9-9.8 log CFU/g. After 5 days of incubation mold contamination was found between 5.1-7.4 log CFU/g in samples treated with tap water washed and 3.7-5.4 log CFU/g in sample treated with 5% Hydrogen peroxide solution. The present study results suggest that treatment with 5% Hydrogen peroxide can improve the mycological quality of fresh fruits and vegetables.

INTRODUCTION

According to latest National Sample Survey Office (NSSO) survey it was revealed that out of 1000 household in India, vegetable consumption was reported by 983 (rural) and 932 (urban) households whereas fruits are consumed in 608 (rural) and 777 (urban) households (NSSO 2009-10)

The lack of an effective antimicrobial treatment at any step from planting to consumption means that pathogen introduced at any point may be present on the final food product, fresh vegetables and fruits must be washed or treated specifically to minimize microbial load (Luciana *et al*.2009)

Many fruits and vegetables present nearly ideal conditions for the survival and growth of many types of microorganisms. The internal tissues are nutrient rich and many, especially vegetables, have a pH near neutrality. The structure of fruits and vegetables are comprised mainly of the polysaccharides cellulose, hemicellulose, and pectin. Starch is the principal storage polymer. Spoilage microorganisms exploit the host using extracellular lytic enzymes that degrade these polymers to release water and the plant's other intracellular constituents for use as nutrients for their growth. Fungi in particular produce an abundance of extracellular pectinases and hemicellulases that are important factors for fungal spoilage (Miedes & Lorences, 2004).

The aim of this study was to evaluate the mycological quality of fruits and vegetables purchased from local market and to analyze the effect of disinfectant treatment.

MATERIALS AND METHODS

Four fruits (apple, grape, Guava & Black Grapes) and four vegetables (Cauliflower, Tomato, Carrot, Radish) were purchased from the local market of Varanasi for microbial analysis. The study was aimed to compare the decrease in growth of microbial contamination of these fruits and vegetables when washed with simple tap water in comparison when washed with tap water & additionally treated with 5% Hydrogen Peroxide. The sample was divided into two parts. One part was washed with tap water and other part with hydrogen peroxide (5%).

We put the individual sample of fruits and vegetables after washing in flowing tap water for 15 second in 100 ml of tap water in a sterile bag and another group in 5% solution of 100 ml Hydrogen Peroxide for 30 seconds. After that 1 mL of each decimal dilution was placed on plate surface that contained Sabouraud dextrose agar (SDA) and distributed by a sterilized swab. Plates were incubated for 5 days at 25 °C. Colonies were

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counted and expressed as CFU/g. Molds were further purified on SDA for further subculture for microscopic examination and identification

RESULT & DISCUSSION

Samples showed molds contamination level of 7.9-9.8 log CFU/g in unwashed fruits and vegetable sample. Sample showed mould contamination between 5.1-7.4 log CFU/g after 5 days of incubation in tap water washed samples and 3.7-5.4 log CFU/g in sample treated with 5% Hydrogen peroxide solution. Yeasts were the predominant organisms and found in 100% of the samples. The most frequent molds observed in these samples were *Aspergillus, Penicillium,* and *Alternaria* spp.

Percentage increase in fungal population in washed only with tap water sample vs treated with 5% hydrogen peroxide samples are given in the table below:

Sample	Sample washed with tap water only	Sample washed with tap water & treated with 5% Hydrogen Peroxide solution
Apple	60%	15%
Grapes	80%	22%
Guava	60%	17%
Black Grapes	82%	24%
Cauliflower	62%	18%
Tomato	68%	26%
Carrot	64%	19%
Radish	60%	17%

In a similar study Jeddi *et al*. reported yeast and mold counts in most of the vegetable samples, ranging from 5.4-7.6 log CFU/g. Acevedo *et al*. also found molds in the levels of 4.5×10^4CFU/g in salad samples. They reported the frequent presence of *Penicillium*, *Aspergillus,* and *Fusarium*spp.

According to some authors, the high density of mycotoxin-producing molds generally correspond to poor cleaning practices and/or use of unhygienic techniques and contaminated equipment (Lynch *et al* 2009 & Sant *et al*.2011). Luciana *et al* (2009) in their study found that sequential treatment with hydrogen peroxide may be useful for postharvest control of citrus fruit diseases.

CONCLUSION

The study concluded that pretreatment of fresh fruits and vegetable with 5% hydrogen peroxide is preferred over only washing with tap water as hydrogen peroxide makes the consumption of fresh fruits and vegetable, which is eaten raw many times, safe. In the study although the number of samples studied was small due to sampling limitations, we believe this study provides a general overview of the microbiological quality Fresh fruits and vegetables and its treatment with disinfectant.

Microbial quality in fruits and vegetables are affected by various conditions during growth, harvest, preparation, packaging, and distribution that could cause increased contamination. These products must be treated with disinfectant to assure decrease in the level of microorganisms. Hence, these results suggest that measures, including good agricultural practices (GAP), good manufacturing practices (GMP), and Hazard Analysis and Critical Control Points (HACCP), should be implemented to reduce the risk of microbial contamination from farm-to-fork and to assure safe products (Jeddi *et al* 2014).

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How to cite this article:

Divya Tripathi and Anjali.2018, Mycological Analysis And Antimicrobial Treatment of Fresh Vegetables And Fruits. *Int J Recent Sci Res.* 9(4), pp. 25697-25698. DOI: http://dx.doi.org/10.24327/ijrsr.2018.0904.1911

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