



UNIVERSITI PUTRA MALAYSIA

**EFFECT OF SELECTED ADDITIVES AND γ -IRRADIATION ON THE
PHYSICO-CHEMICAL, MICROBIAL QUALITY AND AROMA
STABILITY OF COLD-STORED ONION PUREE**

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STABILITY OF
COLD-STORED ONION PUREE**



**By
NAVIDEH SADOUGHI**

**Thesis Submitted to the school of Graduate Studies, Universiti Putera
Malaysia, In Fulfilment of the Requirements for Degree of Master of Science**

January 2011

DEDICATIONS

This work is dedicated to my parents and my country.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in
fulfilment of the requirement for the degree of Master of Science

**EFFECT OF SELECTED ADDITIVES AND γ -IRRADIATION ON THE
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January 2011

Chairman: Professor Hasanah Mohd Ghazali, PhD

Faculty: Food Science and Technology

A distinctive characteristic of onion is the presence of alliaceous odor which accounts for its use as food, salad, spice, condiment and medicine. Pureed onion is one of the most suitable food materials as a ready-to-use ingredient. In general, after one week of storage, not only the color of pureed onion changes to brown, but also its odor becomes unpleasant and its microbial content increase to make it unusable. In this study, the effect of different doses of selected additives and γ -irradiation, and their combination on the color, odor, and physico-chemical, and nutritional properties of cold stored onion puree was investigated. The effect on microbial count was also investigated.

Different concentration of ascorbic acid, lactic acid and citric acid significantly affected the total color and physico-chemical properties of onion puree during storage at 4 °C. However, These Selected additives did not have any significant

effect on other organic acids contents and odor. The most important role of these additives is keeping original color and enhancing acidity. Samples with (0.3-1.5%) ascorbic acid and (0.5-0.8%) citric acid keep original color, especially samples with 0.5 and 1% ascorbic acid is extremely near to fresh samples. Using 0.5% ascorbic acid as the best additive is more economical and improves the quality of puree onion and helps to stabilize physico-chemical properties of cold stored onion puree with less browning, and better visual quality than control sample.

γ -Irradiation at different doses (1, 2, 3, 5 and 7) has significant effects on the total color, odor and physico-chemical and microbial properties of cold stored onion puree. The pH, titratable acidity, organic acid and microbial content of onion puree was more stable at different doses of gamma. The most important role of γ -irradiation was a remarkably reduction in microbial count without decreasing in nutritional properties such as organic acids. However, high doses of γ -irradiation had a negative effect on color, flavor and appearance. But low doses of γ -irradiation not only decrease microbial content but also can also keep the original flavor. γ -irradiation at 2 kGy enhances microbial food safety while the original flavor and color is nearer to the control sample as compared to sample that irradiated at 3, 5 and 7 doses.

Combination of these two treatments is most effective in preventing the growth of microbial content and obtaining a product with the origin color and stabilizing physico-chemical properties such as pungency and nutritional properties such as

vitamin C and organic acids of cold stored onion puree. So this combination of treatment can improve shelf life of onion puree for one month at 4°C, 3 weeks at 10 °C or less than 2 weeks at 27 °C.



Abstrak of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

PENGARUH IRADIASI GAMA DAN ADITIF TERPILIH PADA KUALITY FISIKO-KIMIA, MIKROB, DAN KESTABILIAN AROMA TERHADAP STORAN DINGIN PURI BAWANY BESAR

Oleh

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Ciri khas yang terdapat pada bawang merah adalah baunya yang digunakan sebagai makanan, salad, rempah-ratus, bumbu dan ubat-ubatan. Puri bawang adalah salah satu bahan yang paling sesuai sebagai makanan sedia digunakan untuk penggunaan terus. Namun, setelah disimpan selama seminggu, warna bukan sahaja berubah menjadi coklat, malah, baunya juga tidak menyenangkan dan kandungan mikrob juga bertambah untuk menjadikannya tidak dapat digunakan. Dalam kajian ini, pengaruh dos yang berbeza daripada bahan aditif yang dipilih, sinar radiasi gama dan kombinasi keduanya pada warna, bau, karakter fizik dan kimia, sifat gizi puri bawang yang disimpan sejuk dianalisis menggunakan pH meter, refraktometer, makmal Hunter, HPLC, Spcetrofotometer, z-Nose, serta PCA dan PDA untuk mengira mikrob.

Dos-dos yang berbeza dari asid askorbat, asid laktat dan asid sitrik dan radiasi gamma mempengaruhi keseluruhan warna, dan sifat fizikal dan kimia secara signifikansi puri bawang dalam tempoh simpanan pada suhu 4°C. Namun, aditif

yang dipilih ini tidak mempengaruhi secara signifikan pada kandungan asam organik yang lain dan bau. Aditif ini berperan penting dalam menjaga keaslian warna dan meningkatkan keasidannya. Sampel dengan (0.3 – 1.5 %) asam askorbat dan (0.5 – 0.8 %) asam sitrik dapat mengekalkan warna aslinya, terutama sampel dengan 0.5 dan 1.0% asam askorbat sangat menghampiri sampel segar. Penggunaan 0.5% asam askorbat sebagai bahan aditif yang terbaik adalah lebih ekonomis dan meningkatkan kualitas murni bawang dan membantu menstabilkan sifat fisik dan kimia murni bawang yang disimpan sejuk dengan pengurangan warna coklat dan kualitas rupa yang lebih baik daripada sampel kawalan.

Iradiasi gamma pada dos yang berbeza (1, 2, 3, 5 dan 7) mempunyai pengaruh yang signifikan pada jumlah warna, bau dan fizik-kimia dan sifat mikrob pada murni bawang yang disimpan sejuk. Nilai pH, asiditi yang dititratkan, asam organik dan kadungan mikrob murni bawang lebih stabil pada dos gamma yang berbeza. Radiasi gamma berperan penting dalam pengurangan jumlah mikrob tanpa mengganggu sifat gizi seperti vitamin C atau asam organik. Namun demikian, dos yang tinggi dari sinar radiasi gamma mempunyai kesan negatif terhadap warna, rasa dan penampilan. Tapi dos sinar radiasi gamma yang rendah tidak hanya menurunkan kadar mikrob tetapi juga boleh mengekalkan rasa asli. 2 kGy gamma dapat meningkatkan keselamatan makanan daripada mikrob sedangkan rasa dan warna asli makanan lebih hampir kepada sampel kawalan berbanding dengan sampel yang diiradiasi dalam dos 3, 5 dan 7.

Kombinasi dari kedua-dua rawatan adalah yang paling berkesan dalam mencegah pertumbuhan mikrob dan mendapatkan produk dengan mengekalkan keaslian

warna dan menstabilkan sifat fizikal-kimia seperti sifat ketajaman dan gizi seperti vitamin C dan asid organik puri bawang yang disimpan sejuk. Maka, gabungan rawatan ini dapat meningkatkan jangka hayat simpanan puri bawang selama satu bulan pada suhu 4°C, 3 minggu pada suhu 10°C atau kurang dari 2 minggu pada suhu 27°C.



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I certify that a Thesis Examination Committee has met on 17 January 2011 to conduct the final examination of **Navideh Sadoughi** on her thesis entitled “**Effect of γ -irradiation and selected additives on the physico-chemical, microbial and sensory characteristic of cold-stored onion puree**” in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science. Members of Examination Committee were as follows:

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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

NAVIDEH SADOUGHI

Date: 17 January 2011

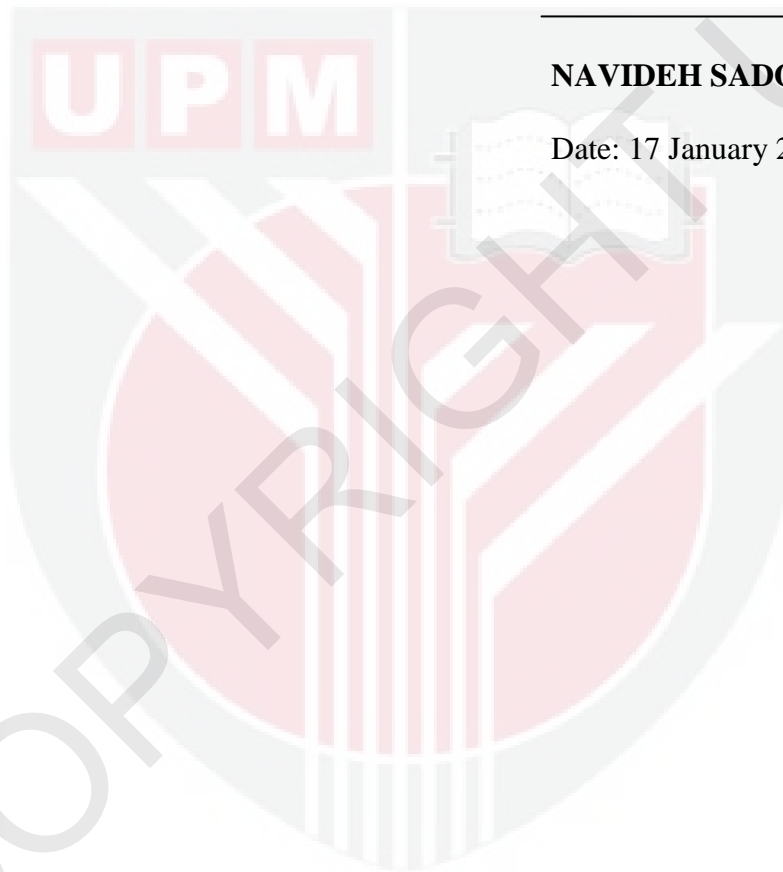


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