

Study the Effect of Gamma Radiation on Antioxidant of Irradiated Food

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ABSTRACT: This work investigate mainly the effect of gamma radiation on the Tea plant . firstly the antioxidant of plant pigments as carotene was extracted by heating method , different parameters were studied as solvent extraction , contact time and weight of plant .. It can be concluded that the optimum conditions for extraction of these pigments as the following, 2gm Tea plant, reaction time was 45 min and the extracted solvent was 85% . The Tea plant was irradiated at different doses of gamma radiation at (10,20,40 Gy), the structure of carotene was investigated using infrared spectroscopy . The IR spectrum investigated that gamma radiation at dose(10,20) Gy there is no effect on the Tea plant.

KEY WORDS: Irradiated food, Gamma radiation

I. INTRODUCTION

Storage of tea using gamma rays sometimes effect on the structure of antioxidant . In addition, radiation treatments of food can kill and sterile insects as well as they can prevent reproduction of food-born parasites. However, the effect of the irradiation of gamma rays on the antioxidant of plants has not been deeply investigated yet Ganapathi, etal., 2008 (1) . Moreover, changes may be happened on the structure of carotene. Therefore, the aim of this work is to investigate the change on the structure of carotene at different dose of gamma radiation. The effect of irradiation on the structure of carotene was determine by using infrared spectroscopy.

II. EXPERIMENTAL

Irradiation Samples: The samples of Tea, was divided into three lots , each one was irradiated by gamma ray at different doses (10 , 20 , 40 Gy), using a Co-60 gamma irradiator (100 kCi point source AECL, IR-79,MDS Nordion International Co.Ltd., Ottawa, ON, Canada) with a dose rate of 2.5 KGy/h at room temperature. The absorbed dose was verified with a ceric cerous dosimeter (Bruker Instruments, Rheinstetten, Germany) with a dose uniformity of 1,05 (Dmax\Dmin).

Factors effect on the separation of carotene

Effect of different weight of plant:

1. Different weights of plant were obtained (0.1 , 0.5, 1 , 2 , 3 , 4 , 5 gm)
2. 10 ml of the solvent (85% acetone) was added to the leaves of planets
3. worming the leaves of tea for 30 minutes
4. Carefully the liquid was decanted into a small beaker after filtration using normal filter paper.

Effect of different solvents:

1. 2gm from plant was weighted
2. 10 ml of different solvent were used (30% acetone , 85% acetone , 70% petroleum ether , 70% ethanol)
3. worming the leaves of tea for 30 minutes.
4. Carefully the liquid was filtered

Effect of different time:

1. 2 gm from each plant was weighted.
2. 10 ml of solvent (85% acetone) was added .
3. worming the leaves of tea at different time (1 , 5 , 10 , 15 , 30 , 45 , 60 m)
4. Carefully the liquid was decanted into a small beaker.

The quantitative analysis of this extracted pigments was calculated by measuring the absorbance Spectrum of carotene, using Spectrophotometer according to the following method:

Measuring the Absorption Spectrum of antioxidant according to Waje et al.,2008 ⁽²⁾

1. The spectrophotometer has been turned on and warmed up for at least 10 to 15 minutes.
2. Carefully a “blank” covet three-quarters was filled with the same solvent used with the carotene being studied.
3. The blank covet was removed and the carotene covet was inserted.
3. The sample compartment was closed and the absorbance was recorded

5. Finally the concentration of carotene was calculated according to the following equation.

$$\text{Carotene} = \frac{A_{480} \times V}{(1000 \times W)}$$

V: volume of solution

W: weight of plant

A: absorbance

III. RESULTS AND DISCUSSION

1-Factors influence the extraction of carotene from tea plant using heating method.

Table (1) :Effect of different solvents using heating method for carotene extraction

different solvent	Concentration of carotene gm/ml
30% acetone	1.0900
85% acetone	2.154
70% petroleum Ether	0.240
70% Ethanol	0.654

Table (2) :Effect of different time using heating method For carotene extraction

Different time,min.	Concentration of carotene gm/ml
1 m	0.026
5 m	0.067

10 m	0.256
15 m	2.652
30 m	1.945
45 m	1.098
60 m	0.070

Table (3) :Effect of different weights using heating method for carotene extraction

different weights of the plants, gm	Concentration of carotene gm/ml
0.1	0.153
0.5	0.654
1	0.912
2	2.238
3	1.629
4	0.874
5	0.210

In conclusion the optimum conditions for extraction of carotene from tea plant using heating method are as the following, the weight of plant was 2 gm and the reaction time was 15 min Murcia,M.A et al., 2008 (3). and the suitable solvent of extraction was 85% acetone. European, EC. 2006(4).

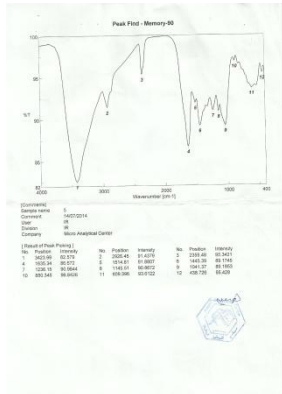
-biological activity of irradiated different samples of tea represent in table no. (4)

Table (4): biological activity of irradiated different samples of irradiated tea

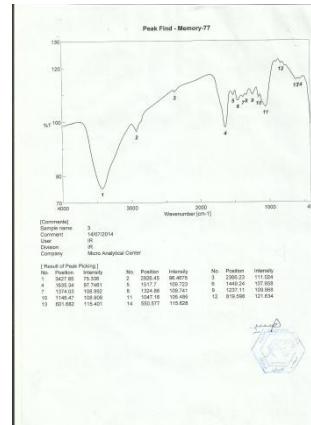
Sample	Inhibition Zone diameter (mm)\mg Sample)			
	Bacillus subtilis (G+)	Escherichia coli (G-)	Pseudomonas aeruginosa (G-)	Staphylococcus aureus (G+)
T ₀	5.61	4.87	7.85	2.13
T ₁₀	3.44	4.12	5.21	1.07
T ₂₀	0.0	0.0	0.0	0.0
T ₄₀	0.0	0.0	0.0	0.0

G: Gram reaction

It can be concluded that the irradiated sample at (20 , 40) don't have any biological activity on the tested microorganisms



Fig(1): IR spectrum of carotene for Tea after irradiation by (0, 10, 20) KGy



Fig(2): IR spectrum of carotene for Tea after irradiation by 40KGy.

As represent in Figures (1) the effect of gamma radiation using doses (10, 20) on the structure of carotene the same effect, . As indicated in Fig (2) represent that after radiation by 40 Gy the structure of carotene was completely changed KHattak, KF., 2009(5).

IV. CONCLUSION

It can be concluded that the irradiation of tea at dose 10, 20 Gy don't effect on the structure of carotene. On the other wise at (40 Gy) there are different effects of radiation on the structure of carotene Noes, C. 2009(6) . Finally we can concluded that, for irradiated Tea by gamma radiation to protect it from bacteria to using it for long time, we must irradiated it by 20 KGy (KHatt, aketal., 2009) .

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