USING HONEY-BEE PROPLISE AS A NATURAL ANTIOXIDANT FOR SUNFLOWER OIL

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Abstract

Honey-Bee proplise was obtained form the Agricultural Faculty farm at Fayom-Egypt, as a natural product, it was extracted by Ethyl alcohol (96%). Crude proposlise and propolise ethanol extract at levels of 100, 200, 300 ppm were tested as a natural antioxidant for sunflower oil compared to the synthetic antioxidant, butylated hydroxy toluene (BHT). The oven stability test of sunflower oil showed that propolise as a natural antioxidant product prevented rancidity of sunflower oil for an estimated period of six months at level 0.02 gm/100 ml (200 ppm) compared to Butylated hydroxy toluene at 0.03 gm/100 ml (300 ppm) level.

INTRODUCTION

Consumers all over the world are becoming increasingly conscious of the nutritional value and the safety of their foods and their ingredients.

At the same time, there is an increased preference for natural foods and food ingredients which are generally believed to be safer, healthier and less hazards than foods containing artificial food additives.

Proplise is a natural bee product, the main components of proplise are flavones, flavonoles and flavonenes. Honey bees collect this product from the resins and secretions of buds in deciduous trees and some herbs around the apiary (Cizmerik *et al.*, 1978). Bees use proplise for tightening the hives, polishing of the combe cell walls and proplization of small animals or of dead insects found on the bottom of the hive, so their corpses do not decay (Ghisalberti, 1979).

Recently, much attention has been focused concerning the antioxidant value of proplise, not only for certain branches of food but also for medicine and biology, (Ushkalova & Murykhnich, 1978).

The efficiency of crude proplise or its extract as a natural antioxidant, instead of the synthetic ones, (Butylated hydroxy anistiol) BHA, enables frozen fish to keep its quality 2-3 times longer (Altovieva & UShkalova, 1971). The antioxidant activity of proplise was investigated in stabilizing the oleic and pork melted fat (Ushkalova & Murykhnich, 1978), and by Dessoqki *et al.*, (1980) during frozen storage of meat and in the lard and lime or rape seed oil by kaczmarek and Snela, (1982).

The present study was carried out to evaluate the efficiency of Egyptian proplise obtained from El-Fayom as a natural antioxidant substances for sunflower seed oil.

MATERIALS AND METHODS

a- Proplise samples and their extracts :

To collect the samples of honeybee gum, or proplise, the methods of Mizis, (1978) and Muszynska *et al.*, (1983) were followed.

A known weight of proplise sample was stirred and soaked in 100 ml, ethanol (96%) for 4 days at room temperature (25°C). The mixture was shacked 15 min. 5 times daily, then filtered and the proplise extract was transferred quantitatively was prepared.

Fresh refined sunflower seed oil was obtained from Sila edible oil Co.S.A.E. Koum Oshiem Fayoum.

To 100 ml of sunflower oil 0.01, 0.02, 0.03 gm/100 ml of BHT, crude and extracted proplise were added. These samples were tested every two days at 63°C as oven test according the method of Coks and Reds, (1966) who reported that one day at 63oC is equal to one month at 25°C. Refractive index, and acid value and peroxide value were determined according to AOAC (1984).

RESULTS AND DISCUSSION

Data presented in Table 1 show the effect of Butylated hydroxy toluene (BHT) and crude and extracted proplise on the Refractive Index of Sunflower oil, there were slight increases in refractive index in all treatment after 8 days of storage, and the heighest increase ocured when using extracted proplise at 0.02mg/100ml

Table 1. Refractive Index of sunflower oil (BHT, Crude proplise & extracted proplise)

Time/Day	Zero	2			4			6			8		
added antioxidant level g./100ml		A	B	C	A	B	C	A	B	C	A	B	C
Control	1.4710	1.4710	1.4710	1.4710	1.4713	1.4713	1.4713	1.4715	1.4715	1.4715	1.4712	1.4721	1.4712
0.01	1.4710	1.4710	1.4715	1.4726	1.4712	1.4718	1.4722	1.4711	1.4730	1.4726	1.4714	1.4720	1.4732
0.02	1.4710	1.4708	1.4721	1.4722	1.4712	1.4723	1.4719	1.4718	1.4725	1.4718	1.4713	1.4724	1.4729
0.03	1.4710	1.4724	1.4716	1.4714	1.4726	1.4720	1.4721	1.4721	1.4726	1.4718	1.4726	1.4722	1.4716

A = BHT + sumflower oil

B = Crude proplise + sunflower oil

C = Extracted prolise + sunflower oil

* One day at 63^{o}C = one month at 25^{o}C.

(1.4729) was used, followed by (1.4726) for 0.03mg/100ml BHT and (1.4724) for the crude proplise at 0.02 mg/100ml. Table 2 presents the acid value of Sunflower oil during the storage period and results show that there was a slight decrease in acid value after 4 days of strorage at 63°C for the control and treatment A (BHT + Sunflower) while noticable increase at the same period in treatment B and C. After 6 days of storage the acid value of all treatment ranged from 4.70 to 5.83, less than the control which was 6.25. After eight days of storage, the acid value of all samples decreased and ranged from 0.42 to 0.74 this may be due to the activity of lipase enzyme in the begining of storage period and reached to maximum value at six days of storage. At the end of storage periode no noticable effect of lipase and the decrease of acid value due to the activity of lipoxygenase which increased peroxide value.

Results in Table 3 show that the peroxide value increased during the storage period, so Butylated hydroxy toluene (BHT) and crude proplise could be used at levels of 0.03/100ml respectively for six months. From previous data, it can be concluded that crude proplise could be used as natural antioxiant to prevent rancidity of Sunflower oil for six months at levels 0.02 gm/100 ml as (BHT). Ushkalova and Murykhnick (1978) found that adding of proplise extracts increased the stability of oleic acid and melted pork fat. El-Ebzary (1978) reported that the oxidation reaction of lipids in frozen meat was clearly reduced when soaking in proplise extract was carried out and no changes in flavor occurred.

The effect of proplise may be attributed to the flavonoid contents, Ushkalova and Murykhnick (1978) found that the antioxidant efficiency of the some flavonoids of proplise in melted pork fat slowed down in step with the decrease of concentration. According to the above mentioned results it could be concluded that proplise as a natural bee product, has an antioxidant activity due to their contents of flavonoids and phenolic substsnces. Therefore, it is superior to BHT which has been elucidated through biological experiments on rats that it cause changes in rat thyroids, stimulation of DNA synthesis and induction of enzymes, Wurtzen *et al.* (1986), together with its antioxyidant effect.

Table 2. Acid value of sunflower oil + (BHT, Crude proplise & extracted proplise).

Time/Day	Zero	2			4			6			8		
added antioxidant level g./100ml		A	B	C	A	B	C	A	B	C	A	B	C
Control	0.27	0.27	0.27	0.27	0.16	0.16	0.16	6.25	6.25	6.25	0.74	0.74	0.74
0.01	0.27	0.26	0.25	0.13	0.14	4.86	4.68	5.83	4.86	5.09	0.50	0.57	0.53
0.02	0.27	0.225	0.28	0.34	0.14	5.48	5.35	5.8	4.82	4.87	0.43	0.40	0.42
0.03	0.27	0.23	0.35	0.35	0.14	5.61	5.11	4.7	5.34	4.78	0.42	0.65	0.52

A = BHT + sumflower oil

B = Crude proplise + sunflower oil

C = Extracted prolise + sunflower oil

Table 3. Peroxide value of sunflower oil + (BHT, Crude proplise & extracted proplise).

Time/Day	Zero	2			4			6			8		
added antioxidant level g./100ml		A	B	C	A	B	C	A	B	C	A	B	C
Control	1.31	5.52	5.52	5.52	29.48	29.48	29.48	50.61	50.61	50.61	64.12	64.12	64.12
0.01	1.31	6.44	5.02	10.43	18.77	26.31	28.37	27.54	34.82	37.63	48.92	46.31	50.49
0.02	1.31	4.82	4.81	11.02	12.64	6.20	19.17	22.36	14.11	28.86	36.72	32.78	42.88
0.03	1.31	3.02	4.48	6.89	8.51	10.11	13.46	14.16	20.46	21.23	20.22	28.53	30.22

A = BHT + sumflower oil
B = Crude proplise + sunflower oil
C = Extracted prolise + sunflower oil

Fig.1. Peroxide value of sunflower oil + BHT, crude proplise and extracted proplise during 8 days of storage on 63°C.

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استخدام البروبوليس كمنتج طبيعى لنحل العسل كمضاد للأكسدة لزيت عباد الشمس

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حديثا يفضل استخدام المواد الحافظة الطبيعية بدلاً من المواد الحافظة الصناعية لما لها من أضرار على الصحة. ومن المنتجات التى لها خاصية المواد الحافظة لإحتوائها على الفلافونات التى تعتبر مضادة للأكسدة مادة صمغ العسل (البروبوليس) التى يجمعها النحل من براعم الأزهار. وقد أجريت هذه الدراسة لمعرفة الى أى مدى يمكن حفظ زيت عباد الشمس وتم الحصول على مادة البروبوليس من منحل كلية الزراعة بالفيوم - جامعة القاهرة. وقد تم استخدام المستخلص الايثانولى بتركيز ١٠٠ ، ٢٠٠ ، ٣٠٠ جزء فى المليون وتم مقارنة المادة الحافظة الصناعية (BHT) مع المستخلص الايثانولى والبروبوليس الخام بنفس تركيز المستخلص الإيثانولى. وقد وجد انه يمكن مقاومة التزنخ الذى يحدث لزيت عباد الشمس باستخدام البروبوليس الخام بتركيز ٠,٠٢ جرام / ١٠٠مل زيت (٢٠٠ جزء فى المليون) لمدة ٦ شهور بالمقارنة ب (BHT) مضاد الأكسدة الصناعى بتركيز ٠,٠٣ جرام / ١٠٠مل زيت عباد الشمس (٣٠٠ جزء فى المليون).