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6. SUMMARY AND CONCLUSION

This investigation was carried out on seeds of some sesame varieties namely: Toshka 1, Shandaweel 3 and Giza 32 in an attempt to study the following points:

1- Gross chemical composition and amino acid composition of different sesame seed varieties.

2- Physico-chemical properties of crude oil extracted from sesame seeds.

3- Comparative studies on lipid fractions of total and neutral lipids by thin layer chromatography.

4- Fatty acids composition and unsaponifiable matters of oils extracted from sesame seed varieties by gas liquid chromatography.

5- Effect of roasting of sesame seeds at 180°C for 30 minutes on the stability of extracted oils.

6- Evaluate the utilization of sesame oil as a source of natural antioxidants.

7- Antioxidative effect of isolated natural antioxidants on the oxidative stability of sunflower oil during heating up to 18 hours, as well as storage at ambient temperature for 8 weeks.

The results could be summarized in the following points:

1- All studied sesame seed varieties contained high oil content, ranged from 50.99% to 54.23%.

2- Values of fiber content were 7.65%, 8.08% and 8.64%; meanwhile, ash content were 4.68%, 4.35% and 3.74%; whereas,

carbohydrates were 14.14%, 11.14% and 11.68% in Toshka, Shandaweel 3 and Giza 32; respectively.

3- All essential amino acids were present in sesame seed varieties, and their values were 26.73, 27.42 and 26.57 g/100 g protein, for Toshka 1, Shandaweel 3 and Giza 32; respectively.

4- Lysine was the first limiting amino acid in the studied seeds. Meanwhile, the second limiting amino acid in sesame seeds protein was leucine.

5- Stability of oils measured by rancimat at 100°C showed that Shandaweel 3 seed oils was higher stability compared with Giza 32 and Toshka 1 seed oils.

6- Natural antioxidant content (crude lignan) was higher in Shandaweel 3 sesame oil (2.89%), compared to Giza 32 (2.43%) and Toshka 1 (2.67%), sesame oils.

7- The neutral lipids represented 96.24%, 96.25% and 95.73% of total lilpids in Toshka 1, Shandaweel 3 and Giza 32 sesame seed oils; respectively.

8- Phospholipids and glycolipids recorded (1.93% and 1.14%), (2.01% and 0.76%) and (2.36% and 1.02%) of total lipids of Toshka 1, Shandaweel 3 and Giza 32 sesame seed oils; respectively.

9- Using TLC technique, total lipids were fractionated into seven fractions for all studied samples. Triglycerides recorded the major percentage of the total lipids in all studied samples.

10- TLC separation revealed that the neutral lipids contained six fractions. Triglycerides constituted the major component of the neutral lipids.

11- GLC chromatograms showed that all studied samples were characterized by the presence of higher levels of unsaturated fatty acids than the saturated ones.

12- The predominant fatty acids in all studied samples were oleic ($C_{18:1}$), linoleic ($C_{18:2}$) and palmitic ($C_{16:0}$) in descending order. Thus, studied samples could be considered good sources of the essential fatty acid (linoleic acid).

13- Unsaponifiable matters of sesame oil were fractionated by GLC technique. It consisted mainly of hydrocarbons and sterols. β-sitosterol and stigmasterol were the major sterol components in all studied oil samples.

14- Acid value, peroxide value, TBA value, conjugated diene and triene and total sterols were gradually increased. Meanwhile, iodine value and total hydrocarbons were decreased as affected by roasting of sesame seeds at 180°C for 30 minutes.

15- The acid value of sunflower oil was increased during heating up to 9 hours and then decreased. The oil samples treated with antioxidants had the least amount of free fatty acids, after heating up to 9 hours, which was due to a very low degree of hydrolysis in oils as affected by addition of antioxidants.

16- Tabulated data showed that heating of oil substantially reduced the iodine values, as affected by oxidation in the total unsaturated content of the oil.

17- The antioxidants effectively reduced the oxidation rate in the oil, as detected by increases in iodine values as compared with control samples.

18- As heating time increased, peroxide values increased up to 9 hours, and then decreased. The peroxide values were also less in sunflower oil treated with antioxidants, which was an indication that antioxidants decreases the oxidation of sunflower oil.

19- The addition of antioxidants to sunflower oil was very effective since the TBA values after 18 hours of heating were significantly less than the values of the oil without antioxidants.

20- Conjugated diene and triene formation in oil samples increased with heating time up to 18 hours. Blending of sunflower oil with antioxidants, resulted in a significant decrease in conjugated diene and triene values, compared with control samples.

21- A gradual increase in acid value occurred during storage of oils at ambient temperatures. This increment was more pronounced in oils without antioxidants than those containing natural antioxidants.

22- The iodine value decreased gradually in both oils during storage. The rate of decrement in oils without antioxidants was higher than that in oils after adding natural antioxidants.

23- The peroxide value in the stored samples tended to increase reaching a maximal value, then began to decrease. Generally, the rate of peroxide formation in the samples contained natural antioxidants were lower than that of control sample during storage.

24- Increases in TBA values were higher in control sample compared to sunflower oil contained natural antioxidants.

25- Conjugated diene and triene contents of sunflower oils increased gradually as the storage time increased.

The data revealed that sunflower oil containing natural antioxidants had a much greater oxidative stability than oils without antioxidants.

In general it could be concluded that:

1- The antioxidants are suitable in their function for increasing oxidative stability at ambient temperature only.

2- The higher efficiency of the natural antioxidants could be due to the stability of these natural antioxidants during storage.

3- Addition of natural antioxidants could increase shelf-life of oils. In addition, natural antioxidants are safe and impart health benefits to the consumer.

4- The higher values of sterols in roasted sesame seed oil unsaponifiables are of great interest because they might add to the stability of oils.

In general, it could be concluded that the sterol components were found to have an antipolymerization effect which could protect oils from oxidation during prolonged heating at high temperatures.