

## Full Length Research

# Evaluation of basic quality parameters with in sunflower and saff flower varieties from Holeta, Ethiopia

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Proximate analyses of the sunflower and safflower variety were carried out using AOAC Method and fatty acid profile were analyzed using Gas chromatograph-mass spectrometer. The result showed that Rassian Black were highest percentage of fat (23.9%) and Protein (16.5%). The fatty acid composition Turkana was the highest Linoleic (C18:2) (73.2%) Compared to Oissa (54.3%) and Rassian Black (32.2%). Rassian Black was the highest percentage of long chain mono un saturated fatty acid oleic acid (C18:1) content(56.9%) compared to oissa (31.9%) and Turkana (18.05%).The sunflower and safflower variety with high lenolic and oleic fatty acid and low saturated fatty acids palmitic(C16:0), margaric(C17:0) and stearic(C18:0) appeared to be suitable for edible purpose.

**Keywords:** sunflower, safflower, proximate and fatty acid composition.

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## INTRODUCTION

Lipids and triacylglycerol naturally occur in oils and fats. Their chemical composition contains saturated and unsaturated fatty acids and glycerides. Unsaturated Fatty acids (FAs) are classified as monounsaturated (MUFA) and poly unsaturated (PUFA) fatty acids. Edible oil is an essential nutrient and an important source of energy providing 9 kcal/g. Edible oils are vital constituents of our daily diet, which provide energy, essential fatty Acids and serve as a carrier of fat soluble vitamins. Oils in the diet are available to the body as fatty acids, which are excellent sources of dietary calorie intake. High fat diets enhance the incidence of coronary heart disease (Romon *et al.*, 1995 and Simon *et al.*, 1995).

Nutritionists have recommended vegetable oils as an

important part of a healthy diet due to their high contents of fatty acids (FAs) ( Maehre *et al.*, 2014). However, distribution and content of fatty acids differ in dependence on various plant sources of oils and technology process used for their production. Sun flower and safflower oil is considered premium oil due to its light color, mild flavor and low level of saturated fats (Putnam *et al.*, 1990). The aim of this study was to find out a suitable variety of sun flower and safflower which were released and registered as well as to identify the edible oil seed rich in essential fatty acids to combat malnutrition and to aware edible oil processors factory for the better Variety.

## MATERIALS AND METHODS

Total of Two varieties of sunflowers & one varieties of safflowers (Rassion black, Oissa & Turkana) respectively 1Kg of each varieties were collected from Holeta Agricultural research center.

### Sample preparation

The collected Sample were grinded with ultra centrifugal mill and the Grinded sample were stored in a plastic vial for chemical analysis.

### Crude Fat measurement

3g of dry sample was weighed to within milligrams in an extraction thimble; it was placed in the extraction unit. The flask was connected to hexane containing at 2/3 of total volume to the extractor until 6 hours. When finished, the hexane was evaporated by distillation or in a rota evaporator. The flasks were cooled in a dryer and weigh them to within milligrams.

$\% \text{ oil} = \frac{\text{weight of sample} - \text{weight of residue after extraction}}{\text{Weight of sample}} \times 100$

### Moisture content Measurement

2 g of the grind sunflowers and safflowers sample were weighed out into the crucible, after the crucible has been heated and weighed. Moisture content was determined by oven drying at 105°C. This was removed and cooled in desiccators and then weighed. The moisture content was calculated by the formula:

$\% \text{ Moisture content} = \frac{\text{Weight of sample before drying} - \text{Weight of sample after drying}}{\text{Weight of sample before drying}} \times 100$

### Crude protein measurement

0.25g of sample was digested by adding 10ml of sulfuric acid with selenium mixture as catalyst for 2 hours. After light green color was observed the digest solution was cooled and transferred into 100mls volumetric flask which was made up to mark with distilled water. Micro Kjeldahl distillation apparatus was used to distill 25mls of the prepared digest by the addition of 70 ml 40% sodium hydroxide. The blue color changed to dark brown as distillation proceeded. The released ammonia was condensed and collected into a receiver containing 30mls of boric acid with indicator solution. The condensed ammonia is then back titrated with 0.01M HCl to pink color end point.

$\% \text{ Nitrogen by weight N} = \frac{(R-B) \times N \times 14 \times 100}{1000 \times SW}$

$\% \text{ crude protein} = N \times 6.25$

### Ash Content Measurement

3g of grind sunflowers and safflowers sample were weighed out into the crucible, after the crucible has been heated and weighed and was placed in a temperature controlled furnace at 500°C for about 5hours for proper ashing. The crucible was then cooled in desiccators and immediately weighed.

$\% \text{ Ash} = \frac{\text{wt of ash remaining}}{\text{Wt. of original sample}} \times 100$

### Chromatography

Analysis of FAME was carried out on Gas Chromatograph -Mass spectrophotometer (GC-MS) Agilent Technology model 7820A. The GC was equipped with Mass Spectrometer Detector and stainless steel column, dimension 30 X 0.250m. The column was conditioned at 180°C about 2 hours for attaining thermal stability before use. The operating condition was programmed at oven temperature 150°C (hold time 5min) with increasing rate 8°C/min to 190°C (hold time 0 min), injection temperature at 350°C.

## RESULT AND DISCUSSION

### Proximate and Fatty acid (saturated and unsaturated) composition of sun flower and safflower

The proximate composition of sun flower seed were moisture (4.4%),protein (16.5%),fat (23.9%) , and ash (3.6%) which were the maximum value and for safflower variety the result were protein(9.6%),fat(32.3) and ash(2.2%).The result showed that sunflower seed protein, total mineral and fat were better than safflower variety. The result of determination of fatty acid detected in sunflower and safflower samples compared with the range of standard composition the predominant fatty acid were oleic acid(C<sub>18:1</sub>) for the varieties Russian black(56.9%). From nutritional point of view the presence of oleic acid in diet is very useful it is effective in lowering cholesterol content (Grundy, 1989).

The pre dominant fatty acid is linoleic acid (C<sub>18:2</sub>) for the sunflower variety oissa (54.37%) and the saff flower variety Turkana (73.29%). The important impact of polyunsaturated fatty acids (PUFAs) on human health in the prevention of, particularly, cardiovascular disease, coronary heart disease and cancer; further, inflammatory, hypertension; diabetes type two, renal diseases; and rheumatoid arthritis. Their non-substitutable roles in many biological pathways are crucial (Abedi *et al.*, 2014 and De *et al.*, 2000).

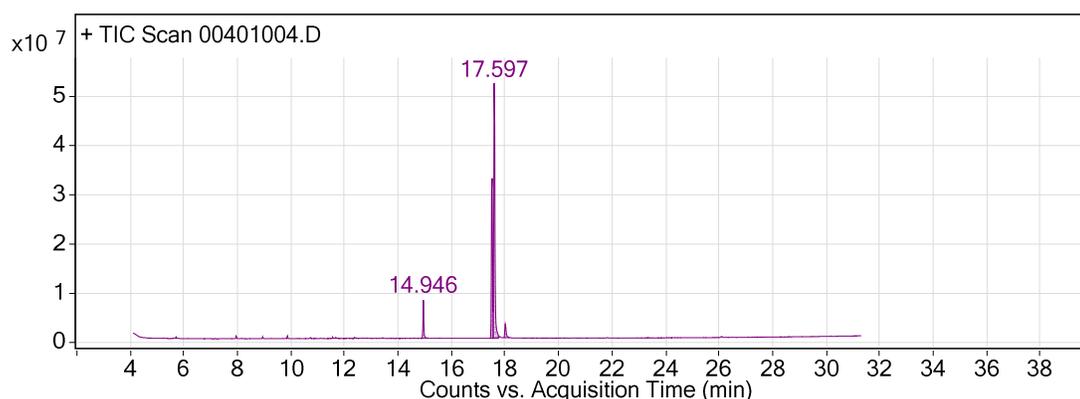
The sun flower Variety Russian black were higher oilic

**Table 1:** Proximate Analysis sunflower and safflower

Variety	%Protein	%Moisture	%Fat	%Ash
Oissa	14.9 ± 0.01 <sup>b</sup>	4.4 ± 0.01 <sup>b</sup>	20.5 ± 0.07 <sup>b</sup>	3.6 ± 0.007 <sup>c</sup>
Rassian black	16.5 ± 0.014 <sup>c</sup>	3.9 ± 0.01 <sup>a</sup>	23.9 ± 0.00 <sup>c</sup>	2.4 ± 0.007 <sup>b</sup>
Turkana	9.6 ± 0.04 <sup>a</sup>	4.7 ± 0.00 <sup>c</sup>	23.8 ± 0.007 <sup>a</sup>	2.2 ± 0.01 <sup>a</sup>

**Table 2:** Fatty acid compositions of two sun flower and one saff flower variety

Fatty acid%	Oissa	Rassian Black	Turkana
Palmitic(C <sub>16:0</sub> )	6.8±0.01 <sup>b</sup>	6.6± 0.07 <sup>a</sup>	6.8±0.00 <sup>b</sup>
Stearic(C <sub>18:0</sub> )	-	4±0.007	-
Oleic(C <sub>18:1</sub> )	31.9±0.007 <sup>b</sup>	56.9±0.00 <sup>c</sup>	18.05±0.04 <sup>a</sup>
Linoleic (C <sub>18:2</sub> )	54.3±0.01 <sup>b</sup>	32.2±0.00 <sup>a</sup>	73.2±0.00 <sup>c</sup>
Margaric(C <sub>17:0</sub> )	6.7±0.07	-	1.8±0.01



Chromatogram 1: Fatty acid profile of the Variety Rassian Black

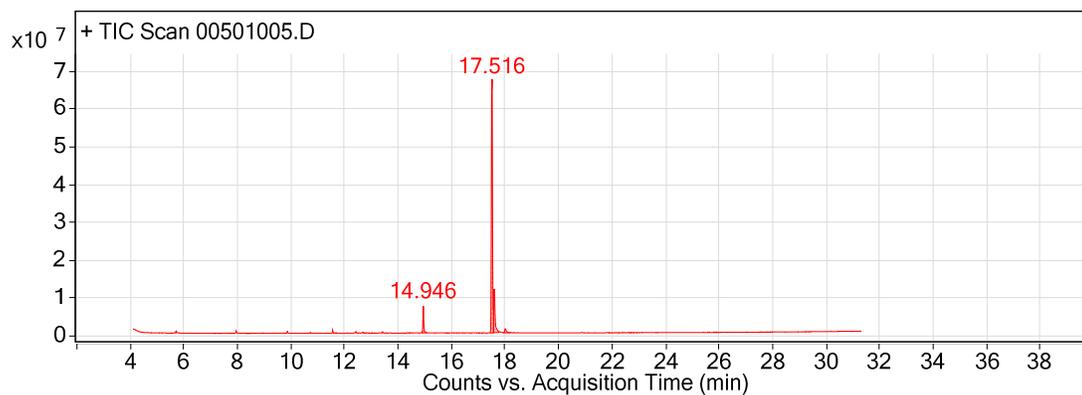
(C<sub>18:1</sub>) (56.99%) content than Oissa (31.96%) where as in lenoleic (C<sub>18:2</sub>) the result is vice versa. The saff flower Variety Turkana was high in linoleic(C<sub>18:2</sub>)(73.3%)were as Palmitic (6.83%) and Margarc were low value(1.86%) content. Among the variety tasted oilic (C<sub>18:1</sub>) and linoleic were higher value compared to palmatic, streaic and margarc acid content.Relative concentration and distribution of fatty acids in dietary fats have been reported to be an important factor in considering nutritional values of lipids as well as the key factor, with proved effects, of lowering the risk of cardiovascular diseases (Misurcova *et al.*,2011).

According to FAO Codex standard (210-1999 ) for sun flower seed oil for edible purpose palmitic(5-7.6%),stearic (2.7-6.5%),oleic(14-39.4%),lenoleic (48.3-74%) and safflower seed oil for edible purpose palmitic(5.3-8%),stearic(1.9-2.9%),oleic(8.4-21.3%) and linoleic(67.8-83.2%).According to the specification palmitic ,stearic,linoleic acid were in the accepted range for edible oil purpose for the sun flower variety. The safflower variety Turkana palmitic, stearic, oleic, linoleic were in the accepted range according to the specification. (See

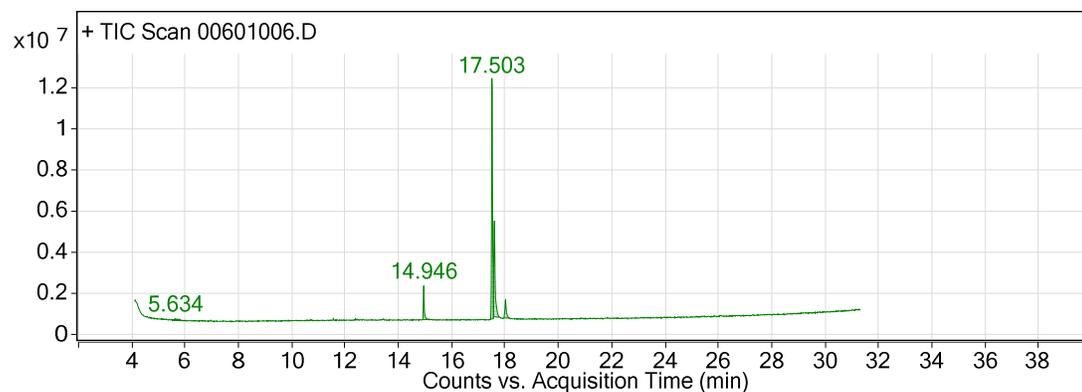
Table 1 and 2, and Figure 1 and 2)

## CONCLUSION

In consideration of proximate Rassian Black were superior on the total percentage of protein ,Oissa were superior on the total percentage of total mineral. On the other hand in respect to the essential fatty acid content among the two sunflower variety and one safflower variety oleic acid were dominant for Rassian black. lenoleic acid were dominant for the safflower variety Turkana.the saturated fatty acid palmitic acid were the dominant for all the sunflower and safflower variety. Over all sunflower and safflower variety which is high in mono and poly un saturated fatty acid is suitable for mass consumption to combat malnutrition. proper attention should be given to identify good variety of sun flower and safflower seed to promote enhanced production and to combat malnutrition.



Chromatogram 2: Fatty acid profile of the Variety Turkana



Chromatogram 3: Fatty acid profile of the Variety Oissa

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