Journal Tikrit Univ. For Agri. Sci. Vol. (18) No.(4) – 2018
ISSN-1813-1646

Oil Percent and Unsaturated Fatty Acid Response of Rapeseed Cultivars to Nitrogen and Phosphorus Fertilizers in Two Different Sowing Date

Rozhgar Mustafa Ahmed
Crop Science Department - College of Agricultural Sciences - University of Sulaimani - Sulaimani – Iraq

ABSTRACT

Key words:
Brassica napus, Rapeseed cultivars, Nitrogen and Phosphorus fertilization, Planting dates, Oil percent, Unsaturated fatty acids.
Corresponding author:
Rozhgar M. Ahmed
E-mail:
rozhgar.ahmad@univsul.edu.iq
Received: 1/3/2018
Accepted: 30/4/2018

A field experiment was conducted to evaluate the effect of planting dates (2 Feb. and 27 Feb. /2017) and application of nitrogen and phosphorus fertilization (0 N: 0 P, 60 kg/ha N: 30 kg/ha P and 90 Kg/ha N: 60 kg/ha P to oil percent and unsaturated fatty acid analysis composition of two rapeseed cultivars (Sherally and Dunkild), This factorial experiment was conducted in a Randomized Complete Block Design with three replications. The results demonstrate that late planting date significantly decrease Linolenic acid and Oleic acid. Oil percent and unsaturated fatty acids were significantly responded due to application of nitrogen and phosphorus fertilizer, the treatment 60 N: 30 P produced maximum value for each fatty acids α-Linolenic acid, Linolenic acid and Oleic acid. High content of Linolenic acid and Oleic acid were recorded in Sherally cultivar. The variation amount of oilpercent and unsaturated fatty acid were noticed due to the interaction treatment of planting dates and fertilizers, the maximum amount of unsaturated fatty acids was produced in each interaction between first and second planting date with 60 N: 30 P fertilizer, and the same result were obtained due to the interaction between each cultivars with the 60 N: 30 P fertilizer. Oil percent and α-Linolenic acid produced maximum amount in the interaction between second planting date 27 Feb. and Dunkild cultivar, while the highest amount of Linolenic acid and Oleic acid were noticed in the interaction between first planting date 7 Feb. and Sherally cultivar. The interaction treatment of planting dates, nitrogen and phosphorus fertilizer and cultivars gave significant variation in the amount of oil percent and unsaturated fatty acids composition analysis.

تأثير خلط السماد النيتروجيني والفوسفاتي وموعد الزراعة في بعض الصفات النوعية لمحصول اللفت (*Brassica sp.*)

روزكار مصطفى احمد
قسم العلوم المحاصيل الحقلية/ كلية العلوم الزراعية/ جامعة السليمانية– العراق

الخلاصة

الكلمات المفتاحية:
Brassica napus، اصناف اللفت، التسميد النيتروجين والفوسفور، تاريخ الزرع، على نسبة الزيت و الأحماض الدهنية غير المشبعة.
للمراسلة:
روزكار مصطفى احمد
البريد الالكتروني:
rozhgar.ahmad@univsul.edu.iq
الاستلام: 2018/3/1
القبول: 2018/4/30

أجريت تجربة ميدانية لتقييم تأثير تاريخ الزرع (2 شباط و 27 شباط / 2017) وتطبيق التسميد النيتروجين والفوسفور (0 نيتروجين: 0 فسفور، 60 كغ / هكتار نيتروجين: 30 كغم / هكتار فسفور و 90 كغ / هكتار نيتروجين: 60كغم / هكتار فسفور) على نسبة الزيت و تكوين الأحماض الدهنية غير المشبعة لبذور اللفت صنفي (شيرلي و دونكيلد)، صممت التجربة العاملية وفق تصميم القطاعات العشوائية الكاملة بثلاثة مكررات. وتظهر النتائج أن الزراعة المتأخرة ادت الى انخفاض معنوي في حامض اللينولينيك وحمض الأوليك. أما نسبة الزيت و تكوين الأحماض الدهنية غير المشبعة فقد استجابت بشكل كبير لتطبيق الأسمدة النيتروجينية والفوسفورية، ان معاملة60 نيتروجين : 30 فسفور انتجت قيمة القصوى لكل من الأحماض الدهنية الفا –اللينولينيك و اللينولينيك وحامض الأوليك. وأيضا لوحظ وجود نسبة عالية من حمض اللينولينيك وحمض الأوليك في الصنف الشريلي، وقد لوحظت كمية التباين في نسبة الزيت والأحماض الدهنية غير المشبعة بسبب تداخل بين معاملة مواعيد الزرع والأسمدة، ان اعلى نسبة من الأحماض الدهنية غير المشبعة

سجلت في تفاعل بين كل من موعد الزراعة الأول والثاني مع سماد 60 نيتروجين: 30 فسفور، وتم الحصول على نفس النتيجة بسبب التفاعل بين كل صنف مع الأسمدة 60 نيتروجين: 30 فسفور. بينما ان كمية حامض اللينولينيك وحمض الأوليك سجلت اعلى قيمة في التفاعل بين تاريخ الزراعة الأول 7 شباط وصنف الشيرلي. وأظهر التفاعل بين معاملتي مواعيد الزراعة والنيتروجين والأسمدة الفوسفورية والأصناف اختلافا كبيرا في كمية نسبة الزيت و تكوين الأحماض الدهنية غير المشبعة.

INTRODUCTION

Rapeseed (*Brassica sp.*) takes the second place among vegetable oil crops cultivation after soybean in the world in respect of production (Mortazavian, & Azizi-Nia, 2015). It is belonging to the family Cruciferae, it is cultivated as one of the medicinal food plants in Middle Asia, North Africa and West Europe (Saeidnia & Gohari, 2012). However, for newly introduced crops, it is necessary to assess the appropriate production technology to different environments. Amongst many others, the nutritional requirements of the crop are considered to be the most important factor (Holmes & Ainsley, 1977). Addition of NPK fertilizers increase generally the crop yield as well as nutritional quality, Nitrogen (N) and phosphorus (P) play a vital role in crop yield (Rathke et al., 2005), they increase oil concentration in oil seed crops (Wang, et al., 2008). Nitrogen fertilization increases the seed yield but decreases oil content of seed in rapeseed. However, decreases in oil ratios of seed compensate by increases in the seed yield (Dreccer, et al., 2000; Schuster & Rathke, 2001 and Mert-Turk et al., 2008). With regard to the effects of phosphorus (P) fertilization on canola, reports showed that phosphorus is required in large quantities, especially in meristemic tissues, where cells are rapidly dividing and enlarging (Brady & Weil, 2002). The phosphorus fertilization helps in energy storage, early maturity of crops and root development (Mohanty et al., 2006). Many superior traits of rapeseed such as summer and winter varieties, short growing period, high seed and oil yields, suitability to mechanization and successfully controlling weeds make it a good oil plant (Kolsarici, et al., 1990). Canola yield and quality mostly depend upon the genetic power of the growing varieties and the environmental conditions (Suzer, 2015). Sowing date one of the most important factors that affecting the growth characteristics of plant and yield (Saad eddin, 2000 and Abu-Zaid and Nasr, 1986).

The functional and nutritional values of different vegetable oils are dependent on the nature of the different fatty acids, which are incorporated into the oil triacylglycerols (El-Beltagi & Mohamed, 2010), because of low saturated fatty acid, high monounsaturated fatty acid, moderate polyunsaturated fatty acid content, ideal ω6/ω3 ratio, low acid value, low saponification value and high smoke point rapeseed oil is considered healthy and ideal for cooking (Wanasundara, 2011). Seeds of rapeseed contain higher unsaturated fatty acids than other oil seed plants. Rapeseed oil contain (approximately 80 %) oleic acid which is as nearly higher as olive oil. Besides, seeds of rapeseed contain about 20% linoleic acid which makes its edible oil quality. Its oil is also rich in vit-E, which increase its quality (Bocianowski et al., 2012 and Anonymous, 2015). The seed oil of B. napus is usually used for food and medicinal purposes. In Iranian traditional medicine, the root parts of rapeseed were used for the therapeutic purposes as diuretic, anti-scurvy, anti-inflammatory of bladder and anti-goat (Zargari, 2001). A Besides the seeds were documented to use for treatment of hepatic and kidney colic. Colza seeds are also used in the Eastern folk medicine as bronchial cathartic (Zargari, 2001 and Evans, 1997). The aim of the research showing the range of variation in the oil percent and unsaturated fatty acids content depending upon application of nitrogen and phosphorus fertilization of two rapeseed cultivars, sowing date and their interactions.

MATERIAL AND METHODS

Field site description

This experiment was conducted at the experimental field of Qlyasan Agricultural Research Station, College of Agricultural Sciences, University of Sulaimani (Latitude 35° 34′ 307″ ; N, Longitude 45° 21′ 992″ ; E, 765 MASL), located 2 km North West of Sulaimani city. The experiment contain 3 factors, first: two sowing date (2 Feb. and 27 Feb. /2017), as the second factor three level of fertilizer (0 N: 0 P, 60 kg/ha N: 30 kg/ha P and 90 Kg/ha N : 60 kg/ha P) and the third factor was two plant species of Rapeseed cultivars (Sherally and Dunkild) which introduced by the Sulaimani Agricultural Research Centre, Ministry of Agriculture and Water Resource, Kurdistan Regional Government, Iraq, This factorial experiment conduct in a Randomized Complete Block Design with three replication.

Seed oil determination:

2gm of the harvested seed of each treatment was powdered by electric blender. Digital soxhlet instrument used for oil distillation, with n-hexane solvent (BDH, UK), (Ferreira-Dias, et al., 2003), the oil content calculated as follows:

Oilpercent = [(W2-W1) × 100] / S

W1 = weight of empty flask (g).

W2 = weight of flask and extracted oil (g)

S = weight of sample.

Separation of fatty acids:

Separation of fatty acids was done using High Performance Liquid Chromatography HPLC (College of Agriculture / Salahaddin University- Erbil), on reversed phase C-8 (50×2.6mm ID) column.3µm particle size, mobile phase was acetonitril: tetrahydrofuran: 0.1 percent phosphoric acid (51:37:12v/v), the flow rate 1ml/minute. The eluted peaks were mentioned by UV detector set at 215 nm, and quantitative analyzed by comparing the area of well-known standard with the area of the sample under the same separation condition (Kvasnička, et al., 2003).

$$\text{Conc. of sample µg/ml} = \frac{\text{Area of sample}}{\text{Area of stanard}} \times \text{conce. Of standard} \times \text{dilution factor}$$

Statistical Analysis:

The data were statistically analyzed according to the methods of analysis of variance as a general test; all possible comparisons among the means were carried out by using Least Significant Difference (L.S.D) test at significant levels of 5percent (Al-Rawi, and A. M. Khalafallah, 1980).

RESULTS AND DISCUSSIONS

Analysis of fatty acids from Rapeseed:

Preparative HPLC analysis for the fatty acids fraction samples showed retention times on HPLC chromatograms as listed, in figure (1). These correspond to α-Linoenic (Omega 3), Linoleic (Omega 6) and Oleic (Omega 9), as each compound listed to its correspondent retention time 1.172, 2.417 and 3.265, respectively as each compound listed to its correspondent retention. Figure (1) revealed the resolution of these three unsaturated fatty acids with retention time.

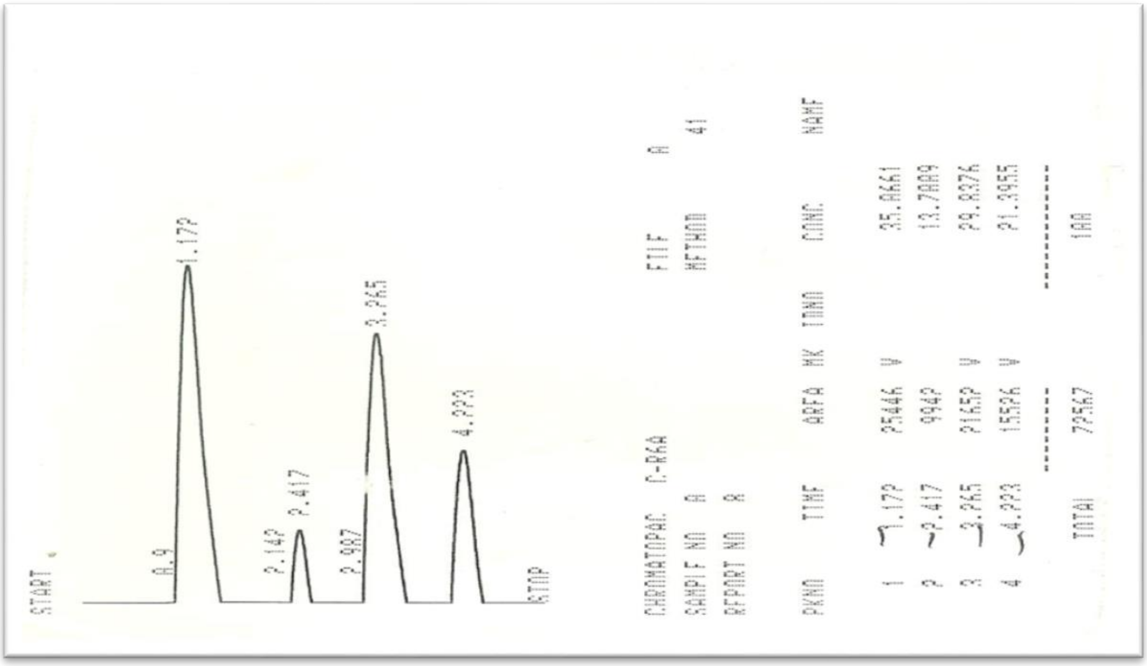

Figure [1]: A chromatogram of Stander detection of unsaturated fatty acids.

Effect of planting dates on oil percent and unsaturated fatty acid composition:

Table 1 and appendix 1 shows the variation composition of unsaturated fatty acid analysis results of two Rapeseed cultivars, while in both planting dates the result were not significant for oil percent, but α-Linolenic acid responded significantly to the second planting date 27 Feb.with the value of 0.180 mg g^{-1}. Linoleic acid and Oleic acid were responded significantly to first planting date 7 Feb. with the value of 0.203 and 0.469 mg g^{-1} respectively. These results were in agreed with (Begna & Angadi, 2016, Sharghi, et al., 2011 and RAD, et al., 2015) who reported that lateness in planting date cause in decreasing in oil yield and fatty acid profile.

Table 1: Means of oil percent and unsaturated fatty acid content of Rapeseed as affected by panting dates

Sowing Dates	Oil percent	α-Linolenic acid (Omega- 3) mg g^{-1}	Linoleic acid (Omega- 6) mg g^{-1}	Oleic acid (Omega- 9) mg g^{-1}
7 Feb.	34.034	0.150	0.203	0.469
27 Feb.	33.695	0.180	0.169	0.425
L.S.D (P≤0.05)	**n.s**	**0.004**	**0.004**	**0.003**
L.S.D (P≤0.01)	**n.s**	**0.005**	**0.005**	**0.004**

Effect of application of fertilizer on oil percent and unsaturated fatty acid composition:

The results in Table 2 and appendix 1 indicate that application of fertilizer has a significant effect on the oil percent and fatty acids composition. 90 N: 60 P treatment pre dominated among other fertilization application for increasing the amount of oil percent with value of 35.917 mg g^{-1}, while no fertilization treatment indicate the minimum amount of oil percent with the value of 31.745 mg g^{-1}. α-Linolenic and Oleic acid responded significantly to fertilization treatment of 60 N: 30 P with the value of 0.213 and 0.587 mg g^{-1} respectively, and no fertilization treatment indicate the minimum amount of oil percent with the value of 0.123 and 0.318 mg g^{-1} respectively. Linoleic acid was significantly responded to 60 N: 30 P treatment with the value of 0.254 mg g^{-1} , while the minimum value with 0.135 mg g^{-1} was recorded by 90 N: 60 P treatment. However nitrogen fertilization decrease the oil content of seed in rapeseed oil (Dreccer, et al., 2000; Schuster &

Rathke, 2001 and Mert-Türk et al., 2008), while the significant response was observed with application of phosphorus to plants. Increasing phosphorus application increased oil percentage and oil yield significantly. These results are in accordance with others who showed that phosphorus deficiency affected the content and quality of rapeseed oil. Malik, et al., (2002) reported that phosphorus significantly increased oil yield of *Brassica napus*, for which reason phosphorus deficiency may become a production constraint in the future. As far as oil content of rapeseed at high levels of phosphorus is concerned, our results are in agreement with previous studies (Lickfett et al., 1999, Motlagh, et al., 2012 and Said-Al Ahl, et al., 2016).

Table 2: Means of oil percent and unsaturated fatty acid content of Rapeseed as affected by application of fertilizer.

Fertilization	Oil percent	α-Linolenic acid (Omega- 3) mg g^{-1}	Linoleic acid (Omega- 6) mg g^{-1}	Oleic acid (Omega- 9) mg g^{-1}
No fertilizer	31.745	0.123	0.169	0.318
60 N: 30 P	33.930	0.213	0.254	0.587
90 N: 60 P	35.917	0.160	0.135	0.436
L.S.D ($P \leq 0.05$)	**0.449**	**0.005**	**0.005**	**0.004**
L.S.D ($P \leq 0.01$)	**0.611**	**0.006**	**0.007**	**0.005**

Effect of rapeseed cultivars on oil percent and unsaturated fatty acid composition:

The result of oil percent and unsaturated fatty acid composition analysis of two rapeseed cultivars are presented in Table 3 and appendix 1, oil percent was determined to be predominant significantly in Dunkild cultivar and its amount was 34.063 percent. While α-Linolenic acid showed no significant differences between to rapeseed cultivars. Linoleic acid and Oleic acid were found in high amount with the 0.193 and 0.464 mg g^{-1} respectively in Sherally cultivar. This variation in amount of Oilpercent and the amount of unsaturated fatty acids in rapeseed cultivars showed their potential for use in future breeding programs and support the finding of (Rabiee, et al., 2004 and El-Beltagi & Mohamed, 2010) who recorded great variation in seed oil contents among different rapeseed cultivars.

Table 3: Means of oil percent and unsaturated fatty acid content of Rapeseed cultivars.

Cultivars	Oil percent	α-Linolenic acid (Omega- 3) mg g^{-1}	Linoleic acid (Omega- 6) mg g^{-1}	Oleic acid (Omega- 9) mg g^{-1}
Sherally	33.665	0.164	0.193	0.464
Dunkild	34.063	0.167	0.179	0.430
L.S.D ($P \leq 0.05$)	**0.367**	**n.s**	**0.004**	**0.003**
L.S.D ($P \leq 0.01$)	**n.s**	**n.s**	**0.005**	**0.004**

Effect of interaction between planting dates and fertilization on oil percent and unsaturated fatty acid composition:

Table 4 and appendix 1 shows the significant variation of oil percent and fatty acid composition analysis due to interaction treatment between application of planting dates and fertilizer. The oil percent was recorded maximum value with 36.213 mg g^{-1} due to the interaction between first planting date 7 Feb. and 90 N: 60 P fertilizer treatment, and the minimum value was recorded by the interaction between first planting date 7 Feb. and no fertilizer treatment with the value of 31.239 mg g^{-1}. The fatty acid α-Linolenic acid responded significantly due to the treatment interaction between second planting date 27 Feb. and 60 N: 30 P fertilizer with the value of 0.262 mg g^{-1}, while minimum value were recorded by the interaction between first planting date 7 Feb. and no fertilizer treatment with the value of 0.091mg g^{-1}. Regarding the Linoleic acid, the highest value was recorded by the interaction between first planting date 7 Feb. and 60 N: 30 P fertilizer treatment with the value of 0.273mg g^{-1}, while the interaction between second planting date 27 Feb. and 90 N: 60 P fertilizer treatment with the value of 0.125 mg g^{-1}gave minimum value. Concerning the fatty acid Oleic acid the maximum value with 0.594 mg $g^{-1}$was recorded by interaction between second planting date 27 Feb. and 60 N: 30 P fertilizer treatment, and the minimum value was recorded by the interaction between second planting date 27 Feb. and no fertilizer treatment with value of 0.267 mg g^{-1}.

Table 4: Means of oil percent and unsaturated fatty acid content of Rapeseed as affected by interaction between application of fertilizer and planting dates.

Sowing dates	Fertilizers	Oil percent	α-Linolenic acid (Omega- 3) mg g^{-1}	Linoleic acid (Omega- 6) mg g^{-1}	Oleic acid (Omega- 9) mg g^{-1}
7 Feb.	No fertilizer	31.239	0.091	0.192	0.368
7 Feb	60 N: 30 P	34.649	0.164	0.273	0.581
7 Feb	90 N: 60 P	36.213	0.195	0.145	0.457
27 Feb.	No fertilizer	32.252	0.154	0.147	0.267
27 Feb.	60 N: 30 P	33.211	0.262	0.234	0.594
27 Feb.	90 N: 60 P	35.621	0.125	0.125	0.415
L.S.D ($P\leq0.05$)		**0.636**	**0.007**	**0.007**	**0.005**
L.S.D ($P\leq0.01$)		**0.864**	**0.009**	**0.009**	**0.007**

Effect of interaction between planting dates and rapeseed cultivars on oil percent and unsaturated fatty acid composition:

The result in table 5 and appendix 1 confirms the significant response of oil percent and fatty acid composition analysis to interaction between planting dates and rapeseed cultivars. Regarding oil percent the interaction treatment between second planting date 27 Feb. and Dunkild cultivar gave maximum value with 34.272 percent, and the minimum value with 33.117 percent were recorded by interaction treatment between first planting date 7 Feb. and Dunkild cultivar. α-Linolenic acid produce maximum value with 0.199 mg g^{-1} due to interaction treatment between second planting date 27 Feb. and Dunkild cultivar, and the minimum value with 0.134 mg g^{-1} were recorded by interaction treatment between second planting date 27 Feb. and Sherally cultivar. Concerning Linoleic acid and Oleic acid the interaction treatment between first planting date 7 Feb. and Sherally cultivar produce maximum value with 0.214 mg g^{-1} and 0.493 mg g^{-1} mg g^{-1} respectively, while the minimum value with 0.166 mg g^{-1} and 0. 415 mg g^{-1} was recorded by interaction treatment between second planting date 27 Feb. and Sherally cultivar, respectively.

Table 5: Means of oil percent and unsaturated fatty acid content of Rapeseed as affected by interaction between planting dates and rapeseed cultivars.

Sowing dates	Cultivars	Oil percent	α-Linolenic acid (Omega- 3) mg g-1	Linoleic acid (Omega- 6) mg g-1	Oleic acid (Omega- 9) mg g-1
7 Feb.	**Sherally**	34.213	0.165	0.214	0.493
7 Feb.	**Dunkild**	33.117	0.162	0.171	0.436
27 Feb.	**Sherally**	33.854	0.134	0.192	0.444
27 Feb.	**Dunkild**	34.272	0.199	0.166	0.415
L.S.D (P≤0.05)		**0.519**	**0.005**	**0.006**	**0.004**
L.S.D (P≤0.01)		**0.705**	**0.007**	**0.008**	**0.006**

Effect of interaction between fertilization and rapeseed cultivars on oil percent and unsaturated fatty acid composition:

Table 6 and appendix 1 showed the significant variation of oil percent and fatty acid composition analysis due to interaction treatment between fertilization application and varieties. Concerning oil percent the maximum value with 36.335 percent was produced by interaction between 60 N: 90 P fertilizer and Sherally cultivar, and the minimum value with 30.764percent were recorded by the interaction between no fertilizer treatment and Sherally cultivar. α-Linolenic acid produced maximum value with 0.244 mg g^{-1} due to interaction between 30 N: 60 P fertilizer and Dunkild cultivar, and the minimum value with 0.114 mg g^{-1} were recorded no fertilizer treatment and Sherally cultivar. Regarding Linoleic acid recorded maximum value with 0.262 mg g^{-1} due to interaction between 30 N: 60 P fertilizer and Sherally cultivar, and the minimum value with 0.134 mg g^{-1} were recorded by the interaction between 60 N: 90 P fertilizer and Dunkild cultivar. Treatment interaction between 30 N: 60 P fertilizer and Sherally cultivar gave maximum value with 0.606 mg g^{-1} of Oleic acid, while the lowest value with 0.316 mg g^{-1} were recorded by the interaction treatment of no fertilizer treatment and Dunkild cultivar.

Table 6: Means of oil percent and unsaturated fatty acid content of Rapeseed as affected by interaction between fertilizers and rapeseed cultivars.

Fertilization	cultivars	Oil percent	α-Linolenic acid (Omega- 3) mg g^{-1}	Linoleic acid (Omega- 6) mg g^{-1}	Oleic acid (Omega- 9) mg g^{-1}
No fertilizer	**Sherally**	30.764	0.114	0.182	0.319
60 N: 30 P	**Sherally**	32.727	0.131	0.157	0.316
90 N: 60 P	**Sherally**	33.897	0.182	0.262	0.606
No fertilizer	**Dunkild**	33.963	0.244	0.246	0.569
60 N: 30 P	**Dunkild**	36.335	0.195	0.135	0.468
90 N: 60 P	**Dunkild**	35.499	0.125	0.134	0.404
L.S.D (P≤0.05)		**0.636**	**0.007**	**0.007**	**0.005**
L.S.D (P≤0.01)		**0.864**	**0.009**	**0.009**	**0.007**

Effect of interaction between planting dates, fertilization and rapeseed cultivars on oil percent and unsaturated fatty acid composition:

The results of table 7 and appendix 1 reveal the effect of interaction between planting dates, fertilizer application and cultivar on oil percent and unsaturated fatty acid composition analysis. Although there were differences in the amount of oil percent due to the interaction treatments but these differences were not statistically significant. Concerning α-Linolenic acid, Linoleic acid and

Oleic acid were responded significantly to the interaction treatments between planting dates, fertilizer application and cultivar. The maximum value with 0.290 mg g^{-1} for α-Linolenic were recorded by the interaction between second planting date 27 Feb., 60 N: 30 P fertilizer and Dunkild cultivar, while the lowest value 0.076 mg g^{-1} were recorded by the interaction between first planting date 7 Feb., no fertilizer and Dunkild cultivar. Regarding the Linoleic acid produced maximum value with 0.297 mg g^{-1} due to the interaction between planting date 7 Feb., 60 N: 30 P fertilizer and Sherally cultivar, and the lowest value 0.120 mg g^{-1} were recorded by the interaction between second planting date 27 Feb., 90 N: 60 P fertilizer and Dunkild cultivar. Oleic acid produced maximum value with 0.650 mg g^{-1} due to the interaction between first planting date 7 Feb., 60 N: 30 P fertilizer and Sherally cultivar, while the lowest value 0.242 mg g^{-1} were recorded by the interaction between second planting date 27 Feb., no fertilizer and Dunkild cultivar.

Table 7: Means of oil percent and unsaturated fatty acid content of Rapeseed as affected by interaction between planting dates, fertilization application and rapeseed cultivars.

Sowing dates	Fertilizer	cultivars	Oil percent	α-Linolenic acid (Omega- 3) mg g^{-1}	Linoleic acid (Omega- 6) mg g^{-1}	Oleic acid (Omega- 9) mg g^{-1}
7 Feb.	**No fertilizer**	**Sherally**	30.639	0.106	0.207	0.347
7 Feb.	**No fertilizer**	**Dunkild**	31.839	0.076	0.177	0.390
7 Feb.	**60 N: 30 P**	**Sherally**	35.142	0.130	0.297	0.650
7 Feb.	**60 N: 30 P**	**Dunkild**	34.157	0.197	0.250	0.511
7 Feb.	**90 N: 60 P**	**Sherally**	36.857	0.260	0.140	0.482
7 Feb.	**90 N: 60 P**	**Dunkild**	35.568	0.130	0.150	0.432
27 Feb.	**No fertilizer**	**Sherally**	30.889	0.122	0.157	0.292
27 Feb.	**No fertilizer**	**Dunkild**	33.615	0.186	0.137	0.242
27 Feb.	**60 N: 30 P**	**Sherally**	32.651	0.233	0.227	0.562
27 Feb.	**60 N: 30 P**	**Dunkild**	33.770	0.290	0.242	0.627
27 Feb.	**90 N: 60 P**	**Sherally**	35.812	0.130	0.130	0.453
27 Feb.	**90 N: 60 P**	**Dunkild**	35.430	0.120	0.120	0.377
L.S.D (P≤0.05)			**n.s**	**0.009**	**0.010**	**0.007**
L.S.D (P≤0.01)			**n.s**	**0.013**	**0.013**	**0.010**

Conclusions: From the results of this study we concluded that early planting date and application of nitrogen and phosphor fertilization of rapeseed will be more suitable for the production of oil percent and the amount of unsaturated fatty acids composition of two rapeseed cultivars (Dunkild and Sherally).

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