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Evaluation of Some Introduced Canola (*Brassica napus* L.) Varieties under Different Nitrogen Fertilizer Levels in Newly Reclaimed Sandy Soil

T.A. Elewa, B.B. Mekki, B. A. Bakry and M.F. El-Kramany

Department of Field Crops Research, National Research Centre, Dokki, Giza, Egypt

Abstract: Two field experiments were carried out at the Research and Production Station of the National Research Centre, Nubaria District, Beheira Governorate, Egypt during the two successive winter seasons 2011/2012 and 2012/2013. The aim of the study was to evaluate the growth, yield and seed quality of three introduced canola (*Brassica napus* L.) varieties (HE You 46, HE You 56 and Wan You 25) under different levels of nitrogen fertilizer (0, 45 and 60 kg/faddan, one faddan= 0.42ha) in newly reclaimed sandy soil. The results showed that the variety Wan You 25 surpassed the other two varieties in plant height, number of leaves, branches and also dry matter accumulation/plant at 90 days after planting (DAP). Application of nitrogen fertilization at the highest rate (60kgN/faddan) significantly increased plant height, number of leaves and branches/plant, as well as, dry weight/plant at 90 DAP. The best increment in plant height, number of leaves, branches and dry weight/plant was shown with all canola varieties as received more nitrogen fertilizer rates. The greatest increase in seed yield (kg/faddan) was obtained by Wan You 25 variety with 60kg N/faddan. The determination of lipid profile indicated that HE You 46 variety contained the highest values of Palmitic, Oleic and Linoleic acids, while HE You 56 variety had the highest values of Stearic, Behenic and Erucic acids. Wan You 25 variety scored the best values for Arachidic and Linolenic acids. Canola plants which received 45 kg N rate contained the highest Arachidic, Behenic, Linoleic and Erucic acids values, while Palmitic and Oleic acids values were the highest when the plants were fertilized with 60 kg N rate. On the other hand, zero N rate showed the most increment in Stearic and Linolenic acids.

Key words: Canola varieties · Fatty acids · Growth · Nitrogen fertilizer · Sandy soil · Seed yield

INTRODUCTION

In Egypt, there is a great shortage in edible oils and high amounts are imported from abroad. The government policy to meet the increasing demands of oils is to rely on winter canola crops. Canola (*Brassica napus and Brassica campestris* L.) is the major edible canola crop. It is grown in more than 120 countries around the world. Canola seeds are not only a rich source of oil (30-45%), but also a source of good quality protein (25%). Canola (*Brassica napus* L.) is the third most important source of oil crops in the world after soybean and palm oil. There are agricultural opportunities to increase canola production and the expansion of canola in Egypt has been dramatic. Among many of others, the effects of agricultural practices on quality of oil crops are considered to be most important. Triglyceride analysis have become very important in recent years since health conscious consumers are concerned with minimizing their dietary intake of saturated fats to reduce the risk of heart disease. The positive relationship among number of pods, seeds/pod and 1000-seed weight with seeds/plant and quality of some canola genotypes was reported by Sharaan and Ghallab [1] and Mekki [2-4]. The oil content

Corresponding Author: Dr. B.B. Mekki, Field Crops Research Department, National Research Centre, Dokki, Giza, Egypt.

of the seed varies from 30-45% depending on the species, the variety and climatic conditions under which it is grown. *B. napus* has been known as a rich source of oil with a low content of saturated fatty acids (5-7%) and a high content of polyunsaturated fatty acids with about 7-10% α-linolenic and 17-21% linoleic acids. It is therefore considered as very healthy edible oil [5]. The improvement of seed quality is one of the most important objectives in *Brassica* breeding for satisfying future edible oil requirements [6].The level of erucic acid in rapeseed oil has an important bearing on nutritional and industrial acceptability of the oil. During the past decade, one major goal in oilseed rape quality breeding has been to increase oleic acid at the expense of polyunsaturated fatty acids linoleic and linolenic [7], who indicated that the seed oil modern canola cultivars contains ˜ 60 % oleic (C18:1), 20 % linoleic (C18:2), 10 % linolenic (C18:3) and small amounts of palmitic (C 16:0, 4%) and stearic (C 18:0, 2%).

During the past decade, one major goal in oilseed rape quality breeding has been to increase oleic acid at the expense of polyunsaturated fatty acids linoleic and linolenic. Recently, low free erucic acid varieties are called now canola. Nitrogen is a major limiting element of the plant growth because of its vulnerability to losses. Nitrogen is closely linked to control the vegetative growth of plant and hence determine the fate of reproductive cycle. An adequate nitrogen supply not only encourages leaf development, it can materially assist in retaining leaves in active photosynthesis over this period and thus assist in the development of flowers and young pods [8]. Nitrogen increases yield by influencing a variety of growth parameters such as branches per plant, buds per plant and by producing more vigorous growth as reflected by increase in stem length, number of flowering branches, total plant weight, seeds per pod [9], number and weight of pods and seeds per plant [10,11]. Jackson [12] found that the relationship between total plant yield and N reflects the tendency of canola to exhibit an indeterminate growth habit when nutrients and water were essentially unlimited. Who obtained optimal oil yield in the same range as seed yield, even though a negative relationship exists between oil content and increased N levels. Starner *et al*. [13] reported the effects of N levels on canola oil yield were not significant but there was a trend towards increasing seed yield for N level up to 100 kg ha N. Nitrogen applications usually decreases oil and increase protein contents of rapeseed [14]. In Egypt, it is revealed that canola (spring types) could be grown successfully in the winter season. The cultivated area by canola in Egypt is relatively small in this decade. This is due to the strong competition between canola and other strategic winter season crops such as wheat and Egyptian clover on the limited arable land in Nile valley and Delta.

Therefore, the aim of this study was to evaluate the growth, yield and seed quality of some introduced canola varieties under different nitrogen fertilizers in newly reclaimed sandy soil in Egypt.

MATERIALS AND METHODS

Two field experiments were carried out at the Agricultural Experimental Station of the National Research Center, Nubaria District, Beheira Governorate, Egypt during the two successive winter seasons 2011/2012 and 2012/2013 to evaluate the growth, yield and seed quality of some introduce canola (*Brassica napus* L.) varieties under different levels of nitrogen fertilizer in newly reclaimed sandy soil. The experimental design was split-plot with four replications. The main plots were devoted to the three tested canola varieties which introduced from Anhui Academy of Agricultural Sciences, China (HE You 46, HE You 56 and Wan You 25), while nitrogen fertilizer levels (without N application, 45 and 60 kg N /faddan, one faddan= 0.42ha) occupied in the sub plots, respectively. The experimental unit area was 10.5 m^2 consisting of ten rows (3.5 m long and 30 cm apart). Seeds were sown at the rate of 3 kg/faddan in November 20th in both seasons. The preceding crop was maize in the two successive seasons. The experimental soil texture was sandy, pH 8.43, E.C 0.22 dSm^{-1}, OM 0.92%, $CaCO_3$ 5.85%, total N 392 ppm and available P 8.5 ppm. Phosphorus and Potassium fertilizers were added before sowing at the rate of 200 and 100 kg/faddan in the form of calcium super phosphate (15.5% P_2O_5) and potassium sulphate (48-50% K_2O), respectively. Nitrogen fertilizer in the form of ammonium nitrate (33.5% N) was added in two equal doses, the 1st at 21 days after planting (DAP) and the 2nd at 45 DAP. Weeds were controlled manually at 21and 35 DAP in both seasons. A sample of five guarded plants was taken at random from the 2nd row of each plot at 90 DAP in both seasons. Just after sampling, plants were taken immediately from experimental plots to laboratory. Each plant was divided into stem and leaves. The plant organs were dried separately in the electrical air-draft oven at 70°C until constant weight for determination of whole dry weight per plant. The growth characters were estimated as follows: plant height (cm), number of branches/plant, number of green leaves/ plant and dry weight/ plant (g). At harvest time, plants of two square meters from each plot were harvested to determine the seed yield (kg/faddan), the oil yield (kg/faddan) was also calculated. At the same time a random sample of ten plants from each plot was taken to determine some yield attributes, number of pods/plant, number of seeds/pod, seed yield/plant (g), 1000-seed weight (g). Crude oil percentage in the seeds (2nd season only) was determined according to A.O.C.S. [15] using Soxhlet apparatus and petroleum ether 40-60°C as a solvent. Fatty acids composition of oil was also determined by using Gas Liquid Chromatography; the methyl esters were prepared according to Stahl [16] using Benzene: Methanol: Sulphuric acid (conc.) as a ratio of 10:86:4.

Statistical Analysis: The analysis of variance procedure of split-plot design according to Snedecor and Cochran [17] was used and the combined analysis of the results of the two season were applied according to Steel and Torrie[18] and the treatments means were compared using LSD test at 5% of probability.

RESULTS AND DISCUSSION

Growth Characters:

Effect of Canola Varieties: Data presented in Table 1 indicated that the differences among the three varieties of the studied characters i.e. plant height, number of leaves and dry weight/plant, as well as number of branches/plant were significant at 90 DAP. Wan You 25 variety surpassed the other two varieties (HE You 46 and HE You 56) in plant height, number of branches, number of leaves and dry matter accumulation/plant at 90 DAS. The differences among the three varieties might be attributed to their genetic constitution [19]. El-Saidi *et al.* [20], who studied the differences between three varieties of *Brassica napus* in respect to growth characters, they reported that AD 201 variety was taller and has more racemes/plant than Wester and Brutor varieties. Similar results were reported by Mekki and El-Kholy [21] and Singh *et al.* [22].

Effect of Nitrogen Fertilizer Levels: Data in Table 1 also indicated that plant height significantly increased with increasing nitrogen rates up to 60 kg N/faddan at 90 DAP compared to unfertilized plants. The increase in plant height may be ascribed to the functional rate of nitrogen in the whole plant. The chief function of N is all multiplication, cell elongation, tissue differentiation with adequate supply of N, the plants grown taller [23]. Other studies reported that nitrogen application increased plant height with 90 kg N /faddan [24], or 120 kg N/ha [25, 26]. Data in Table 1 also cleared that number of leaves at 90 DAP as well as number of branches/plant were significantly increased with increasing N up to higher level. Similar results were reported by Bali *et al.* [27]. Each additional N dose significantly increased number of leaves and branches/plant [28-30]. Also, they reported that number of branches/plant increased by increasing N application. Dry weight/plant was also gradually increased by increasing nitrogen rates from 0 to 45 and/or 60 kg N/faddan at 90 DAP. The highest value of dry matter production (28.74 g) was observed when 60 kg N/faddan was applied, while the lowest (22.92 g) was produced with unfertilized plants (Table 1). Such increase in dry matter production reflect the need of nitrogen by rapeseed for its growth and development and might be due to its role in causing accelerated photosynthetic rate and this lead to more production of carbohydrates [31]. These results are in harmony with the findings of Ahmadi and Bahrani [11], Shukla and Kumar [32] and Singh and Meena [33]. Jackson [12] found that the relationship between total plant yield and N reflects the tendency of canola to exhibit an indeterminate growth habit when nutrients and water were essentially unlimited.

Table 1: Effect of canola varieties and nitrogen levels on some growth characters at 90 DAP (combined analysis of 2011/2012 and 2012/2013 seasons).

Treatments		Plant height (cm)	No. of branches/plant	No. of leaves/plant	Dry weight/plant (g)
Varieties	HE You 46	115.91	9.56	10.83	25.49
	HE You 56	119.09	6.76	10.57	23.26
	Wan You 25	131.45	10.78	11.80	28.85
LSD 0.05	--	1.04	0.11	0.13	2.23
N-levels kg/faddan	Zero	111.64	7.76	10.00	22.92
	45	121.65	9.11	10.94	25.95
	60	132.61	10.21	12.25	28.74
LSD 0.05	--	1.21	0.13	0.18	0.34

Table 2: Effect of the interaction between nitrogen fertilizers levels and canola varieties on some growth characters at 90 DAP (combined analysis of 2011/2012 and 2012/2013 seasons).

Varieties	N-levels (kg/faddan*)	Plant height (cm)	No. of branches /plant	No. of leaves/plant	Dry weight/plant (g)
HE You 46	0	104.26	8.15	9.76	22.08
	45	116.18	9.89	10.77	25.79
	60	125.64	10.65	11.94	28.59
HE You 56	0	110.87	5.96	9.68	20.96
	45	117.77	6.75	10.40	23.34
	60	128.62	7.57	11.62	25.49
Wan You 25	0	119.79	9.16	10.57	25.72
	45	131.01	10.71	11.64	28.70
	60	143.57	12.47	13.19	32.12
LSD 0.05	--	2.10	0.31	0.26	0.58

Table 3: Effect of canola varieties and nitrogen fertilizers levels on yield and yield components (combined analysis of 2011/2012 and 2012/2013 seasons).

Treatments		Number of pods/ plant	Number of seeds/pod	Seed yield/plant (g)	1000-seed weight (g)	Seed yield (kg/faddan*)	Oil %	Oil yield (kg/faddan)
Varieties	HE You 46	232.56	20.31	15.69	3.40	822.21	42.69	351.02
	HE You 56	226.23	19.98	15.67	3.39	685.70	41.05	281.48
	Wan You 25	232.61	20.46	16.60	3.48	895.73	40.55	363.22
LSD 0.05	--	N.S	0.42	0.79	N.S	27.95	--	12.07
N-levels (kg/faddan)	0	228.86	20.11	15.49	3.37	638.86	40.79	260.59
	45	230.64	20.21	15.98	3.38	825.80	41.56	343.20
	60	231.90	20.43	16.49	3.53	939.14	41.94	393.88
LSD 0.05	--	1.32	1.32	0.10	N.S	13.0	--	23.14

*One faddan = 0.42 ha

Effect of the Interaction Between Nitrogen Fertilizer Levels and Canola Varieties: The interaction between canola varieties x nitrogen fertilizer levels was significant on plant height, number of branches/plant, number of leaves /plant and dry weight/plant at 90 DAP (Table 2). Wan You 25 variety showed more response as N rates increased up to 60 kg/faddan and produced the tallest plants (143.57 cm), highest number of branches/plant (12.47), number of leaves/plant (13.19) and dry weight/plant (32.12 g) in comparison with the other two varieties HE You 56 and HE You 46 or control plants at 90 DAP. Similar results were reported by Hassan and El-Hakeem [24], Taha [30], Joshi *et al.* [34] and Patel [35].

Yield and Yield Components:

Effect of Canola Varieties: Canola varieties showed differences in their yield and yield components. The differences were true for seed numbers/pod, seed yield/plant, seed and oil yields (kg/faddan), while number of pods/plant and 1000-seed weight were not significantly affected by the studied varieties (Table 3). However, Wan You 25 variety showed an increase in all these traits, except in oil percentage, the HE You 25 produced the highest oil yield (363.22 kg), while the lowest (281.48 kg) was obtained with HE You 56 (Table 3). Such reduction in oil yield of HE You 46 mainly due to the reduction in seed yield. In spite of the slight increase in 1000 seeds weight of HE You 46 variety than HE You 56 or Wan You 25 varieties, the differences were insignificant. HE You 56 and Wan You 25 recorded almost nearly the same weight of 1000 seeds. Seed yield (kg/faddan) was significantly affected by canola varieties and the variations among the three varieties were significant. Wan You 25 surpassed the other two varieties and recorded 30.63% and 8.97% increases in seed yield compared with HE You 56 and HE You 46 varieties, respectively (Table 3). The superiority of Wan You 25 variety followed by HE You 46 variety may be due to their high values in growth parameters (Tables 1 and 2). Data in Table 3 cleared that oil percentage showed an increase with HE You 46 and reduced with Wan You 25. However, the oil yield was significantly different among the three varieties and HE You 56 variety had the lowest oil yield (kg) compared to other two varieties. The reduction in oil yield of HE You 56 variety mainly due to the reduction in seed yield, while Wan You 25 variety had the highest oil yield due to the increase in their seed yield (Table 3). These results are in accordance those reported by Mekki [4], Sana *et al.* [36] and Zhang *et al.* [37], who pointed out the seed yield of various canola varieties was significantly different among them. Also, El-Kholy *et al.* [26] and El-Habasha and Abdel Salam [38] reported that there are significant differences among canola varieties on the seed yield. Similar results were reported by Mekki and El-Kholy [21]. El- Kholy *et al.* [26] found that Serw-4 variety gave the highest seed yield followed by Serw-6 and Pactol, which gave the lowest oil yields. The present results are also in agreement with those obtained by Mekki [3], Ahmad *et al.* [39] and Keshta and Leilah [40].

Effect of Nitrogen Fertilizer Levels: It is obvious from results in Table 3 that nitrogen application rates had a significant effect on some canola yield and yield and its components such as number of pods/plant, number of seeds /pod, while 1000-seed weight showed no significant response to N rates. Application of 60 kg N/faddan produced the highest number of pods per plant and seeds per pod with a significant difference compared to unfertilized plants. Such increases in number of pods and seeds per pod may be due to the increases in some plant growth such as number of branches and dry matter accumulation under the same fertilizer treatments (Table 1). Nitrogen increases yield by influencing a variety of growth parameters such as branches per plant, buds per plant and by producing more vigorous growth as reflected by increase in stem length, number of flowering branches, total plant weight, seeds per pod [9], number and weight of pods and seeds per plant [10,11]. These results are in harmony with those reported by Dubey and Khan [31], Khanpara *et al.* [41] and Singh *et al.* [42]. Seed yield/plant significantly affected by N rates, the unfertilized treatment recorded the lowest value (15.49g) followed by 45 kg N rate (15.98 g), while the highest (16.49g) was obtained by increasing nitrogen rate up to 60 kg/faddan. Such increases in seed yield per plant with high N rate mainly attributed to the increase N fertilizer up to 60 kg/faddan resulted in an increase in plant height, number of green leaves, number of branches and dry matter accumulation, which reflected to increase the seeds per plant. Regarding 1000 seeds weight, the obtained data in Table 3 indicated that, there are no significant differences due to nitrogen application. The results cleared that increasing nitrogen rate from 0 to 45 and/or 60 kg/faddan slightly increased 1000 seeds weight, without significant differences. These results are in agreement with those reported by Singh *et al.* [42] and Hocking *et al.* [43]. Data presented in Table 3 indicated that the seed and oil yields were significantly and gradually increase with increasing nitrogen levels up to 60 kg/faddan. Such increases estimated by 47.00 and 51.22% over the unfertilized treatment, respectively. Such increases in seed yield may be due to the adequate supply of photosynthates for formation of branches, siliquae and development of seeds. So many studies were showed that nitrogen increased the oil yield by increasing the grain yield Narang and Gill [44] showed that although much nitrogen consumption maybe causes to reduce the grain oil percentage but increasing the grain yield by increasing the pods arise reduction and cause to increase the oil yield. Jackson [12] showed that the oil yield and nitrogen relation by together in linear equation and said that, the highest amount of oil yield in desirable grain yield was obtained in 180-220 kgha^{-1} nitrogen fertilizer level. In no nitrogen fertilizer condition, there was obtained the lowest oil yield and by increasing nitrogen fertilizer yield the oil yield was increased. Similar findings have been reported by Hassan and El-Hakeem [24], Hassan [45], Hammad and El-Shebiny [46] and Ali and Hassan [47].

Effect of the Interaction Between Nitrogen Fertilizer Levels and Canola Varieties: The effect of interaction between nitrogen fertilizer levels and canola varieties was significant on number of pods, seed yield/plant and seed and oil yields per faddan, while seeds/pod and 1000 seeds weight were not significantly affected and are not shown (Table 4). Number of pods/plant increased by increasing nitrogen fertilizer up to 45 kg N/faddan with HE You 46 variety, but HE You 56 showed an increase in pods/plant with unfertilized and 60 kg N rate, while in Wan You 25 variety showed a decrease in pods/plant with all N rates. The highest value of pods number (239.33) was recorded with HE You 56 canola variety without N fertilization, while application of 45 kg N rate to the same variety decreased pods/plant to 221.32 (Table 4). Hassan and El-Hakeem [24] reported that increasing nitrogen rates from 30 to 60 kg/faddan, significantly increased 1000-seed weight and number of pods per plant for Cresor, Liraspa and Orpal cultivars. They attributed such increase to the stimulative effect of nitrogen fertilizer on yield through its effects on the photosynthetic surface rate and the length period of the vegetative growth of the plant [45, 48, 49]. The highest seed yield/plant (17.04) was recorded with HE You 46 variety received 60 kg N rate; while the lowest seed yield/plant (14.79) was obtained from HE You 56 plants with 45 kg N rate (Table 4). Data in Table 4 also indicated that N application at high rate (60 kg/faddan) resulted in an increase of seed and oil yields with three canola varieties. However, Wan You 25 produced the

Table 4: Effect of the interaction between nitrogen fertilizers levels and canola varieties on yield and yield components (combined analysis of 2011/2012 and 2012/2013 seasons).

Varieties	N-levels (kg/faddan)	Number of pods/plant	Seed yield/plant (g)	Seed yield (kg/faddan)	Oil %	Oil yield (kg/faddan)
HE You 46	0	225.58	16.03	628.65	41.96	263.78
	45	237.90	16.73	874.44	42.79	374.17
	60	234.34	17.04	963.53	43.33	417.50
HE You 56	0	239.33	16.55	538.83	40.12	216.18
	45	221.32	14.79	689.08	41.91	288.79
	60	237.03	15.66	829.69	41.11	341.09
Wan You 25	0	227.01	16.88	749.10	40.29	301.81
	45	227.36	14.95	913.89	39.99	365.46
	60	224.32	15.22	1024.21	41.37	423.72
LSD 0.05	--	2.10	1.44	11.20	--	40.43

Table 5: Effect of canola varieties and nitrogen fertilizer levels on some fatty acids composition of canola in 2012/2013 seasons.

Treatments		Saturated fatty acids % Palmitic (16=0)	Stearic (18=0)	Arachidic (20=0)	Behenic (22=0)	Unsaturated fatty acids % Oleic (18=1)	Linoleic (18=2)	Linolenic (18=3)	Erucic (22=1)
Varieties	HE You 46	4.61	0.72	1.18	1.16	62.36	23.02	6.52	0.31
	HE You 56	3.97	0.75	1.57	1.18	61.67	22.45	7.31	1.11
	Wan You 25	4.21	0.66	1.64	1.06	61.84	21.56	8.45	0.61
Mean	--	4.26	0.71	1.49	1.14	61.96	22.34	7.43	0.67
N-levels kg/faddan	0	4.23	0.83	1.52	1.07	61.38	22.28	8.22	0.48
	45	4.15	0.68	1.70	1.21	61.95	22.65	6.82	0.86
	60	4.42	0.62	1.28	1.12	62.55	22.11	7.23	0.68
Mean	--	4.27	0.71	1.50	1.13	61.96	22.35	7.42	0.67

highest seed and oil yields (1024.21 and 423.67 kg, respectively), while HE You 56 produced the lowest (538.83 and 216.20 kg, respectively). The increase in oil yield with increasing N rates up to 60 kg/faddan may be attributed to the increase in seed yield and oil percentage under the same conditions of N rates. Narang and Gill [44] showed that although much nitrogen consumption maybe causes to reduce the grain oil percentage but increasing the grain yield by increasing the pods a rise reduction and cause to increase the oil yield. Similar observations were also reported by Mousavian *et al.* [50].

Fatty Acids Composition:

Effect of Canola Varieties: Data in presented in Table 5 show slight differences in saturated fatty acids content among canola varieties. HE You 46 variety contained more amount of Palmitic acid (4.61%) followed by Wan You 25 variety (4.21%), whereas, HE You 56 produced higher values for Stearic (0.75%) and Behenic acids (1.18%) followed by HE You 46 variety (1.16%). Wan You 25 was ranked the first which contained more amount of Arachidic acid followed by, HE You 5 6 variety. These results are in line with those obtained by Mekki [4] and El-Kholy and Mekki [21], they reported that canola varieties were different in their oil contents and its fatty acids. Although the low level of Palmitic acid and other saturated fatty acids (less than 5%) in canola oil is considered to be nutritionally desirable. In this concern that, McCartney *et al.* [51] reported that the majority of the variation in Palmitic (C16:0) due to the genotype main effect.

Canola variety slightly differed in their content of the unsaturated fatty acids (Table 5), HE You 46 variety contained more amount of Oleic (62.36%) and Linoleic (23.02%) acids followed by Wan You 25 for Oleic and HE You 56 for Linoleic. On the other hand, Wan You 25 showed high increment in Linolenic acid followed by HE You 56 variety and lower in HE You 46 variety. The highest Erucic acid (1.11%) was obtained with HE You 56, while the HE You 46 produced the lowest Erucic acid (0.31). The increase in Erucic acid content in HE You 56 variety may be due to the decrease in Oleic acid (61.67%) content. Davik and Heneen [52] stated that the concentrations of Oleic and Erucic acids were negatively correlated and a high Oleic acid concentration (>50%) was always associated with a low Erucic acid concentration (<4%). Getient *et al.* [53], Raney *et al.*[54] and Getient *et al.* [55] stated that the Erucic acid contents of seed oil of the high Erucic acid cultivars Dodolla and S-67 were 35.7 and 35.4%, respectively and that of the zero Erucic acid line C90-14 was 0.1%. The Oleic, Linoleic and Linolenic acids contents of the two high Erucic acid cultivars were similar and averaged 7.2%, 18.9% and 24.0%, respectively. The Oleic, Linoleic and Linolenic acids contents of C90-14 were higher than those of Doddolla and S-67. Similar findings were reported by Mekki [4] and El-Beltagi and Mohamed [56].

Effect of Nitrogen Fertilizer Levels: All saturated fatty acids were slightly affected by N fertilizer rate application (Table 5). Palmitic acid showed slight increase (4.42) when fertilized with 60 kg N rate followed by zero N rate (4.23%), Stearic acid increased as N rate decreased till zero rate. The highest increment in Arachidic acid content was recorded with 45 kg N rate followed by zero N rate (1.70 and 1.52%, respectively), while the highest Behenic acid content was recorded by 45 kg N application rate followed by 60 kg N rate (1.21 and 1.07%, respectively). Similar observations were obtained by Joshi *et al*. [57], they reported that the Stearic acid was decreased from 0.97% at 90 kg N/ha, while the unfertilized treatment gave maximum output of Stearic acid (1.11%). Oleic acid was slightly increased with high N rate (60 kg/faddan), while Linolenic acid was gradually decreased as N rate increased up higher N rate (Table 5). Erucic acid recorded higher increment (0.86) with 45kg N rate, while the lowest (0.48) was obtained with unfertilized plants. These results are similar to those obtained by Ibrahim *et al.* [48] and Mekki [58]. On contrast, Joshi *et al.* [57] stated that Oleic acid was not influenced by N fertilizer application fatty acids composition of oil was not affected by N fertilization [59], while Ogunlela *et al.* [60] found that N nutrition influenced fatty acid composition to a limited extent.

CONCLUSION

It could be concluded that the exotic canola varieties can be grown successfully in newly reclaimed sandy soil in winter season in Egypt. The growth, yield and quality of introduced some canola varieties were increased under different nitrogen levels. Application of nitrogen fertilizer up to 60 kg/faddan increased seed and oil yields as well as the other yield attributes with all canola varieties. Oil percentage was slightly affected, while the saturated and unsaturated fatty acids were different among the three canola varieties and nitrogen levels.

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