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Influence of Sowing Dates on Growth and Yield Attributes of Linseed (Linum Usitatissimum L.), Varieties in Horo Guduru District, Western Ethiopia

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***Abstract:** A field experiment was conducted at Harato and Gitilo sites during the 2019/20 and 2020/21 years. This study aimed to determine the effects of sowing dates on seed yield attributes of linseed (Linum usitatissimum L.) varieties and to identify the effect of linseed varieties on growth and yield attributes at both sites and seasons. The three varieties and one local cultivar of linseed were sown on June 1st, 10th, 20th, and 30th in both sites and seasons. The experiment was laid out in a randomized complete block design, with three replications. Yield attributes were collected and analyzed by using SAS software (9.4 versions). The yield components of dry biomass and seed yield were significantly influenced by the interaction effect of sowing and linseed varieties. The highest seed yields were obtained from June 1st and 10th sowing on Kuma, Berene, and Belay varieties at both sites and seasons. Minimum seed yield was recorded from local cultivars at late sowing dates. The improved varieties were better in responding to early sowing dates, which might imply their greater resource use efficiency than the local cultivar. In general, this study has shown that sowing linseed in early June at both sites was the optimum time, and future research might look into what happens if sowing a few days before June first.*

***Keyword:** Linseed Varieties, Planting Dates, Oil Content, Yield Component.*

1. INTRODUCTION

Linseed (Linum usitatissimum L.) is one of the edible oil crops categorized as a member of the genus Linum within the linseed family. Southern Europe, the Near East, and Central Asia are the origins of oilseed [1]. Linseed is the main focus of multiple interests within the field of diet and wellness due to the high potential for health advantages [2]. Ethiopia is considered

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to be the second center of diversity [3, 4]. The crop was used for many purposes, such as a source of food [5], feed, oil, medicine, industrial raw material, and export commodity [6, 7].
Sowing dates significantly influenced growth parameters, yield components, and oil yield due to the variability of weather conditions [8]. The appropriate sowing date is significant since it ensures good seed germination, the timely appearance of seedlings, and the optimum development of their root systems [9]. Early sowing dates had a significant effect on plant height, number of branches per plant, straw yield, and seed yield, but did not affect thousand seed weight or oil content [10]. In contrarily [8] showed that seed yield and oil content were reduced due to the drought effect in late planting.
Improved linseed had better productivity and standard oil content than local genotypes [8]. However, their genetic potential is affected due to variations in agroecology, poor soil fertility, and poor crop management practices [6]. Linseed accounts for about 13% of Ethiopian oilseed production, but its export contribution to the global market is negligible [10]. Ethiopia had 79,044.51 ha-1 of linseed area coverage, with a total production of 882,096.51 quintals and a yield of 11.16 quintals per hectare [10].
In the study area, the area coverage of linseed was 26,413 ha-1, and the production was 0.12 t ha -1, which is very low compared to the other regions [11]. The agroecology of Horo Guduru Wollega Zone is very suitable for linseed production. Still, farmers in the study area face different challenges like inappropriate agronomic practices, a lack of improved seeds, an inappropriate sowing date, a suboptimal seeding rate, and the nonuse of chemical fertilizers. Therefore, this study aims to fill some of the gaps that exist in the study areas by setting out the following objectives:

1.1. Objective
Specific objectives:
1. To determine the effect of sowing dates on growth and yield components at both sites and seasons;
2. To assess the effect of sowing dates and varieties on growth seed yield attributes at two sites.

2. MATERIALS AND METHODS

2.1. Description of Study Sites
The experiment was conducted in Horo Guduru Wollega Zone, Jimma Geneti, and Horo districts during 2019/20 and 2020/21, respectively, and both districts are found in Oromia National Regional State, in western Ethiopia. Harato is located in Jimma Geneti Woreda at an elevation of 2300 meters above sea level (9° 27' 30" N - 9° 30' 0" latitude and 37° 7' 30" E - 37° 10' 0" east longitude), whereas Gitilo is located in Horo Woreda at altitude of 2723 m.a.s.l. (9° 32’ 30" N, 9° 35’ 0" N) and 37° 2’ 30" E- 37° 5’ 0" longitudes) at 2857 m.a.s.l. The mean annual rainfall of the study sites is 2,100 mm (Gitilo) and 2,211 mm (Harato), respectively. Besides, the mean annual minimum temperature is 17°c at Gitilo and 22°$_C$ at Harato. The mean annual maximum temperature is 20°c and 24°$_C$ at Gitilo and Harato study sites, respectively. The soil textural class of the study sites has a light clay textural class [12].

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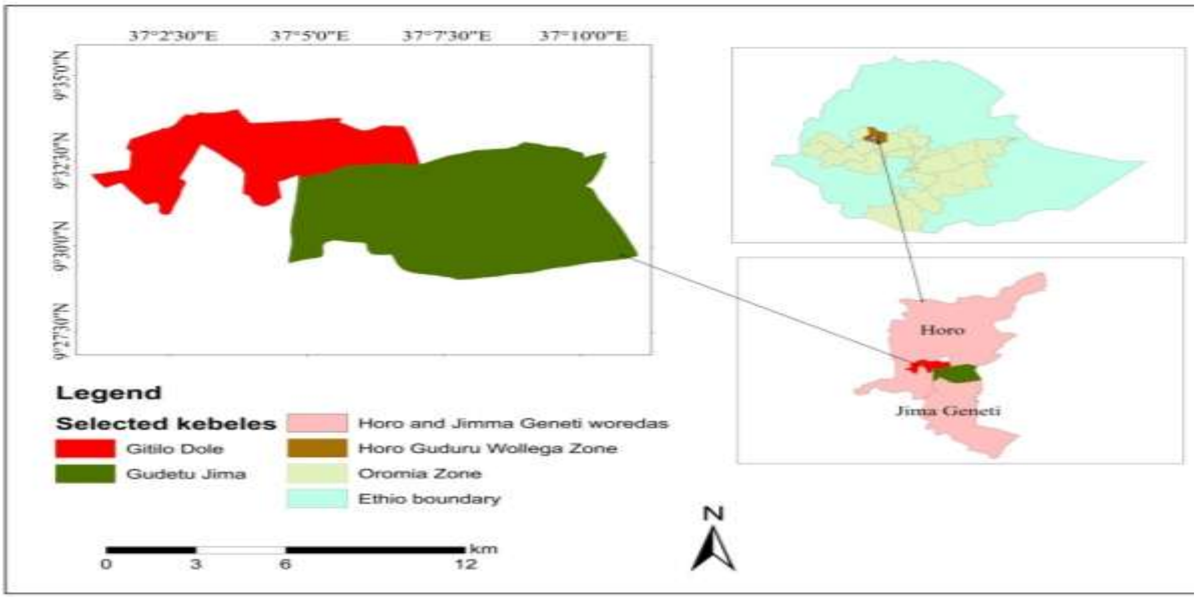

Figure 1. Map of the study sites

2.2. Experimental Materials

Three commercial linseed varieties (Belay, Berene and Kuma) and one local cultivar were used as experimental materials. All linseed adapt well at altitude ranges of 2000-2800 masl. The mean temperature and rainfall requirement of the plant was ranges 15.5-30°c and greater than 800 mm, respectively. Improved seed were optimum in seed yield and oil content, while local cultivar was fast maturity date, low in seed yield and oil contents at both sites.

2.3. Treatments and Experimental Design

The experiment consisted of sixteen treatments with four sowing dates (1 June, 10 June, 20 June, and 30 June), and four linseed varieties. The field experiment was laid out as a randomized complete block design with three replications. The studies were conducted at both sites in 2019/20 and 2020/21, respectively. Seeds were sown in 3 m length and 1.6 m width with 20 cm inter-row spacing and 1 m and 0.5 m spaces between blocks and plots, respectively.

The gross plot size was 3 m x 0.20 m x 8 rows = 4.8 m^2, and the net harvest was 2.24 m^2 (2.8 m x 4 rows x 0.20 m = 2.24 m^2). From the central four rows, data were collected for statistical analyses and interpretations.

2.4. Experimental Procedure

The experimental field was plowed two to three times by using oxen-drawn local plows, starting from May to June, during both cropping seasons. 30 kg ha^{-1} seeds were drilled in 20 cm rows at ten-day intervals in mid June at both sites and seasons. Linseed was highly susceptible to weeds during the early seedling stage, so that hand weeding was performed twice, at 30 and 60 days after sowing. All other management practices were done uniformly.

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When the capsules turned brown, the plant had reached physiological maturity and harvested by human labor.

2.5. Data Collection

Data were collected from the net plot area based on various parameters. At the full maturity stage, ten plants were taken randomly from each net plot area to estimate plant height (cm), number of primary branches per plant, number of capsules per plant, seed in capsule, 1000-seed weight (g), seed yield, and biological yield.

2.6. Data Analysis

The collected data were subjected to the statistical procedures for the analysis of variance (ANOVA) [13] in SAS version 9.4 software. Before combining across seasons, data was test for homogeneity of error variance. Whenever ANOVA declares the presence of a significant difference, treatment means were compared for the presence of a significant difference at a 0.05% probability level using the Duncan's multiple range test (DMRT) methods.

3. RESULTS AND DISCUSSION

Seed yield

The analysis of variance on seed yield showed that highly significant ($P< 0.01$) influenced by the main effect of sowing dates, varieties, sites, and years (Table 1). Furthermore, the interaction of sowing dates by varieties significantly ($p< 0.05$) influenced seed yield.

The average minimum of 1481.5 kg ha^{-1} and maximum of 1833.84 kg ha^{-1} seed yield was obtained from the June 30 and June 1 sowing at different sites and seasons (Table 2). This reaction could be due to sowing dates, the genetic constitution of the varieties, the environment, and interaction. Early sowing dates gave a higher seed yield; due to ample resources, plants uniformly emerge, grow, and complete their life cycle before the occurrence of high temperatures.

As a result, the first and tenth sowing dates were unanimously identified as optimal at both sites and years. The present result agreed with [15, 16] and showed that the seed yield of linseed crops differed across cropping seasons and study site. Similarly [14] noticed that maximum seed yield was registered at early sowing dates, and the yield increased by 434.35 kg ha^{-1}. In agreement with [17–19] found that high seed yields was record at early sowing. Contrary to these findings, [20] reported that the 1st week of November had a significantly higher seed yield of 1272 kg ha^{-1} which increased by 6.35 and 11.19 percent over the 4th and 3rd weeks of October, respectively.

As indicated in Table 2, linseed varieties gave variable seed yields at various sowing. Most improved varieties produced more seed than local cultivars, possibly due to more extensive environmental adaptation and high resource use, but local cultivar was short in root length this may cause low resource use, complete their life cycle earlier, and result in low seed yield. In general, delayed sowing reduced the seed yields of linseed varieties; this might be due to

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high temperatures during the reproductive stage, which cause pollen sterility, small seed size, and lighter seed weight. In line with this study [21-24], delayed sowing reduced the seed set and yield of linseed genotypes. In contrast, [25] noticed that genotypes had no significant influence on seed yield.

Table 1. Mean squire of seed yield, dry biomass, harvest index capsule per plant, seed per plant, and thousand seed weight

Source	**Degree**	**Seed yield**	**Dry biomass**	**Harvest**	**Capsules**	**Seeds**	**Thousand**
	free dome	Kg ha^{-1}	Kg ha^{-1}	Index %	Plant^{-1}	Capsules^{-1}	Weight (g)
Years	1	165622**	2514832.7**	5.1ns	606.8**	0.6ns	0.3*
Sites	1	193415.7**	5622.2ns	81.4**	15.9ns	0.5ns	0.1ns
Replication	2	57877.3**	306319.6*	4.3ns	163.1**	0.1ns	1.6**
Sowing date	3	1342257.8**	13170262.1**	3.3ns	696.7**	30.5**	5.1**
Varieties	3	198089.6**	5626783.7**	37.5**	167.0**	1.0*	51.9**
Rep (S)	2	10621.0ns	287545*	9.9*	559.6**	1.0ns	0.1ns
Yr x S	1	9677.3ns	126639.4*	0.8ns	225.4*	5.2**	1.9**
Sd x Yr	3	18327.9*	259684.1*	2.4ns	42.6ns	0.6*	0.1*
Sd x S	3	8409.4ns	262041*	19.2**	39.9ns	0.5*	0.2*
Sd xYr x S	3	13052.9*	204858.1*	1.0ns	25.3ns	0.9*	0.1*
Var x Yr	3	1121.9ns	30768.6ns	2.1ns	13.6ns	0.2ns	0.6ns
Var x S	3	85.8ns	180055*	8.7*	3.7ns	0.2ns	0.0ns
Var xYr x S	3	502.9ns	1205623*	4.8ns	10.1ns	0.0ns	0.0ns
Sd x Var	9	8445.9*	115623*	1.1ns	3.8ns	0.1ns	0.0ns
Sd x Var x Yr	9	1042.8ns	28074.5ns	1.1ns	4.4ns	0.0ns	0.0ns
Sd x Var x S	9	665.8ns	9184.6ns	1.2ns	1.0ns	0.0ns	0.0ns
Sd x Va x Yr xS	9	1824.3ns	43420.4ns	1.3ns	11.9ns	0.1ns	0.0ns
Error	124	4144.1	36466.9	1.7	18.02	0.2	0.04
Total	191	2814128.2	26965575.1	210.3	1731.6	136.9	184.8

NS= non significant, *= significant at 0.05, **= significant at p=0.01 probability, Var= Varieties, S= Sites, Yr=Year, Sd= Sowing dates

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Table 2. Summarized effect of sowing by sites by years and sowing dates by varieties on seed yield at two sites in 2019/2021 and 2020/2021 seasons

			Sowing date			
Sites	**Years**	1st June	10th June	20th June	30th June	**Mean**
Harato	2019/20	1864.89f	1843.75f	1621.30d	1458.06ab	1697.50
	2020/21	1838.08f	1852.52f	1719.19e	1556.19cd	1741.49
Gitilo	2019/20	1797.51f	1723.70e	1525.28ab	1430.81a	1619.33
	2020/21	1834.89f	1831.60f	1621.82d	1480.73ab	1692.26
Mean		1833.84	1812.89	1621.75	1481.5	1687.65
DMRT (0.05)	70.84	CV%=5.21				
Varieties			**Sowing date**			
Belay		1843.2e	1855.49e	1649.18c	1497.77b	1711.41
Berene		1856.83e	1871.3e	1641.65c	1498.48b	1717.07
Kuma		1883.3e	1857.11e	1673.16c	1505.58b	1729.79
Local cultivar		1752.01d	1667.67c	1523.82b	1423.96a	1591.87
Mean		1833.84	1812.89	1621.95	1481.45	1687.54
DMRT (0.05)=65.92		CV%=4.8				

Mean within column followed by the same letters are non significant difference at (p 0.05), DMRT=Duncan Multiple Range Test, CV%= Coefficient of variation

Number of capsules per plant

The analysis of variance on the number of capsules per plant was highly significantly ($P < 0.01$) influenced by years, sowing dates, and varieties (Table 1). The maximum (40.26) and minimum (36.74) number of capsules per plant were counted in the 2019/20 and 2020/21 seasons, respectively (Figure 3a). This variation could be attributed to optimal daily temperature and soil moisture receipt during the growth period. During the second cropping season, the time of rainfall set was delayed from its regular schedule. [26], who reported that the maximum number of capsules per plant was influenced by the cropping seasons.

Regarding the study site, a maximum of 38.9 and minimum of 38.3 capsules per plant were recorded at the Harato and Gitilo sites, respectively (Figure 3b). This could be due to the adequate amount of radiant energy, and rainfall received during the growth stage may help capsule formation at the Harato site. While plants grown at cool temperatures did not receive sufficient light energy, photosynthesis did not occur properly. The present results agreed with [27].

At the June 10th sowing date the plant received ideal soil moisture and light energy for uniform seedlings to emerge and reached physiological maturity before high temperature as a result maximum of 43.27 capsules per plant was registered (Figure 3c). [28] reported that a maximum of 74.08 capsules per plant were obtained on March 3 sowing, and a minimum of

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50.95 capsules per plant was obtained on May 18 sowing date. Similarly, [31] found that the highest capsules per plant were obtained on March 5, sowing, and the lowest values were obtained on May 4 and April 18. Delayed sowing reduced the number of capsules per plant, possibly due to the temperature effect on pollination and the shortage of growth resources. In addition, [32] found that sowing a linseed crop on November 18 provided the most capsules per plant (76.1, 74.3, and 68.4). The present result is harmonized with [29, 30, 33, 34].

Statistically, there was no significant difference between improved varieties (Kuma, Berene, and Belay) of linseed on the number of capsules per plant (Fig 3d). This might be due to fewer primary branches. But local cultivar was superior in the number of capsules per plant to improved varieties due to genotypic constitution. [35], who reported that the linseed genotypes were significantly different in capsules per plant due to genetic constitution, plant density, and environmental factors. In contrast to these findings [36], it was noticed that linseed genotypes had no significant influence on the number of capsules.

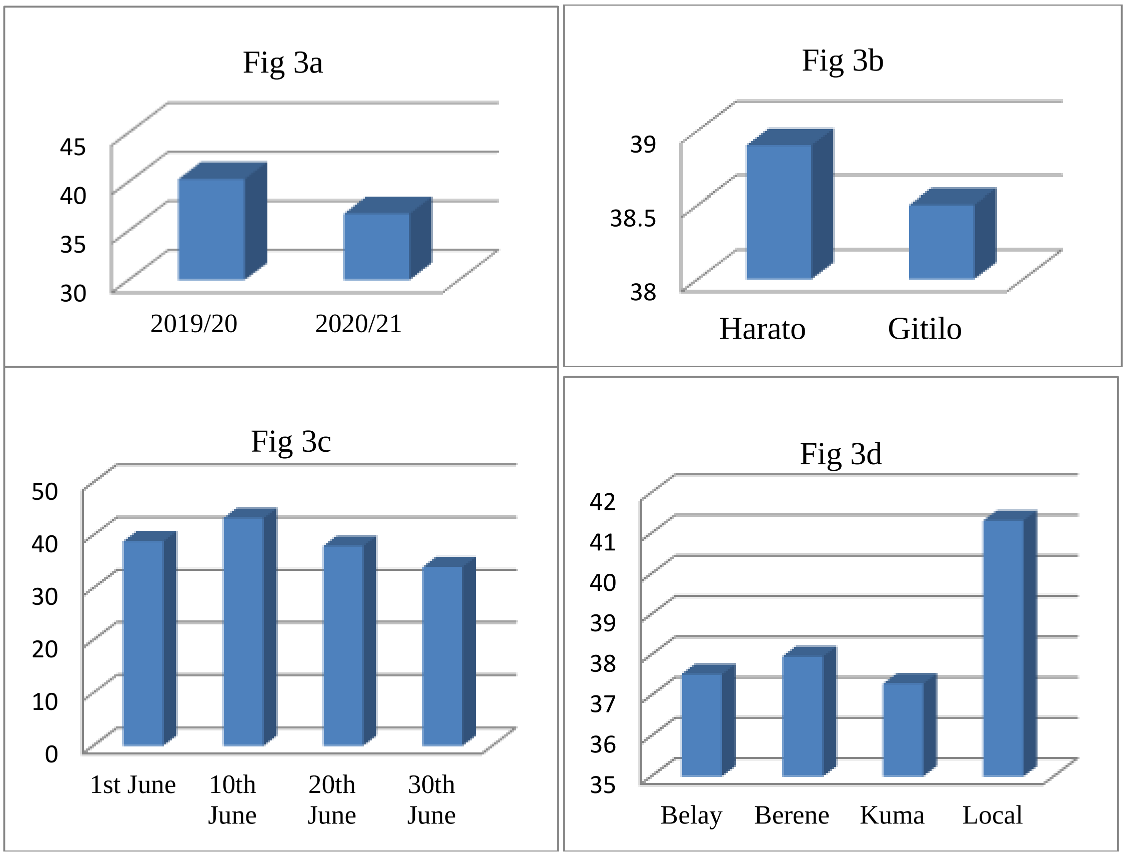

Figure 3. The main effect of years, sites, sowing dates and varieties on number of capsules per plant

Number of seeds per capsule

The number of seeds per capsule was significantly (P< 0.05) influenced by the interaction of sowing dates by site by year (Table 1). Statistically, the number of seeds per capsule varied

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on the Harato site at different years. In the 2019/20 cropping season, the weather conditions at the Harato site were more favorable for growth and seed yield parameters (Figure 4). [37], [22] reported that the number of seeds per capsule was affected by the cropping season.
The average minimum 7.56 and maximum 9.29 seeds per capsule were counted on June 30th and 10th sowing dates, at both sites and years, respectively (Figure 4). This difference might be due to the high-temperature effect on pollination, seed development and the long photoperiod during capsule formation [6]. Similarly, [28] discovered that sowing on November 18 obtained more seeds per capsule (8.2, 7.7, and 7.6) than sowing on December 14. In agreement with these findings, [29] found that the maximum number of seeds per capsule were counted at the early sowing of castor beans. The current result was agreed upon with [31], [38].
While, in late sowing date the number of seeds per capsule was reduced due to the negative effect of high temperature on seed formation as a result shriveling, and smaller seed size at both environments. Late seeding may shorten the plant's life cycle, which leads to a smaller number of capsules per plant and a shorter seed filling period [39].

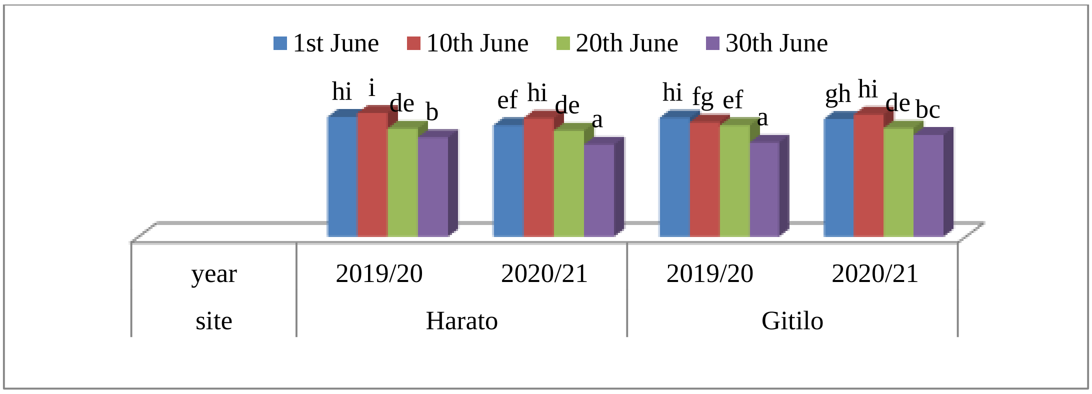

Figure 4. Interaction effect of sowing date by sites by years on seeds per capsule

Thousand seed weight (g)

Thousand seed weight was significantly ($p< 0.05$) influenced by the interaction of sowing dates by sites by years (Table 1). The average minimum 5.43 g and maximum 6.16 g seed weight were recorded at the June 30th and 1st sowing date at both sites and years, respectively (Figure 5). The Gitilo site is cool temperature; the plant received adequate moisture during the reproductive stage, delaying maturity and resulting in a high seed weight. The seed weight of the linseed crop decreased at the late sowing date due to drought effect. The current result is in agreement with [40], who found that the cropping season and agro-ecology had a significant effect on the thousand seed weight of nine linseed genotypes. In contrast, [41] and [28] found that sowing date had no effect on thousand seed weight.

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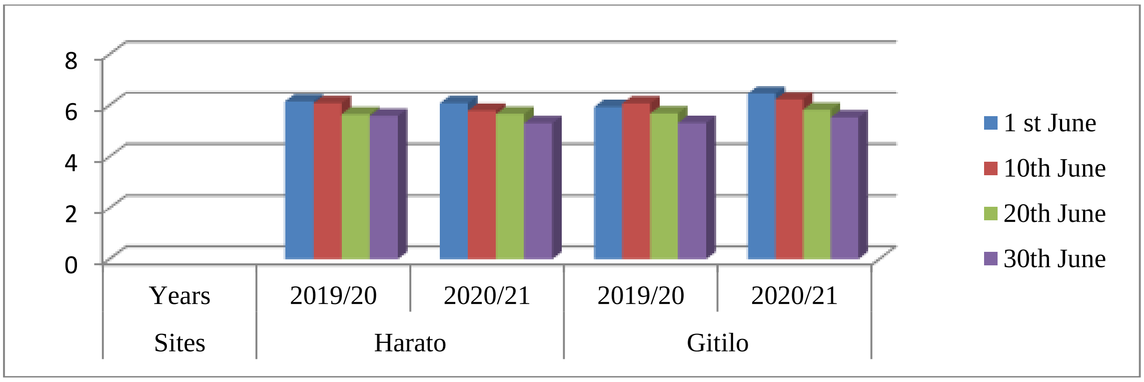

Figure 5. Interaction of sites by years by sowing dates on thousand seed weight of linseed

Aboveground dry biomass (kg ha^{-1})

The analysis of variance revealed that sowing dates, varieties, and years had a highly significant ($p < 0.01$) effect on dry biomass yield. In addition, it was significantly ($p< 0.05$) influenced by the interaction of sowing dates by varieties (Table 1).

Statistically, the dry biomass yield of improved seed was no significant difference at the 1st and 10th sowing date. Due to an ample amount of growth resources received at the early sowing, the plants have elongated height and reduced weed infestation, and as a result, produce more branches per plant and seed weight. But biomass yield was reduced due to the temperature effect on the late sowing date. The current findings agree with [23], who noticed that delayed sowing reduced the dry-matter accumulation at all phases. [28] found that flax genotypes significantly differ in growth and yield component at late sowing.

In generally improved seeds were superior in dry biomass yield than local cultivars due to larger morphological structure, taller, and more branches per plant. The current result agreed with [38], [42], and [43]; improved varieties had high dry biomass yields. Contrary to this result, [36] reported that the dry biomass of linseed was not significantly affected by sowing dates and genotypes.

Table 3. Summarized effect of sowing dates and linseed varieties on Dry biomass yield at two sites in 2019/20 and 2020/21 season

	Linseed varieties				
	Belay	Berene	Kuma	Local cultivar	**Mean**
Sowing date 1st June	5884.01^{e}	5927.19^{e}	5997.73^{e}	5311.97^{c}	5780.23
10th June	5957.49^{e}	5996.6^{e}	6014.29^{e}	5159.48^{c}	5781.97
20th June	5392.80^{cd}	5367.54^{cd}	5580.35^{d}	4631.36^{b}	5243.01
30th June	4762.53^{b}	4782.96^{b}	4841.83^{b}	4353.23^{a}	4685.14
Mean	5499.21	5518.57	5608.55	4864.01	5372.58
DMRT (0.05)=214.7	CV%=4.96				

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Mean within column followed by the same letters are non significant difference at (p 0.05), DMRT= Duncan Multiple Range Test, CV%= Coefficient of variation

3.2.7. Harvest index (%)

The analysis of variance showed that the harvest index was significantly influenced by the interaction effects of varieties by sites. Adequate light energy during the growth period made plants taller and more primary branches per plant at the Harato site (Figure 6a). While the lowest harvest index was registered on the 20th and 30th of June sowing on the Gitilo site, this may be due to cool temperature at sowing, the seedling having poorly emerged, and fewer primary branches. High plant density per square meter and the availability of nitrogen fertilizers affected the harvest index of linseed. Similarly, [44] obtained a maximum harvest index of 43.44% at 200 plants per meter square.

The local cultivar is superior in harvest index to improved varieties at both sites (Figure 6b). This is due to compacted canopy strictures; the plants quickly absorb light energy. The mean values of linseed varieties varied at different sites due to the plant's specific environmental requirements. While the improved varieties were erected and had longer inflorescences length, therefore, the plant had less chance to absorb light energy at both sites. Statistically, there is no significant difference in harvest index for local cultivars at both study sites. Moisture stress declines linseed growth by enhancing the plant's senesce period and affecting the harvest index, oil content, and oil yield [44].

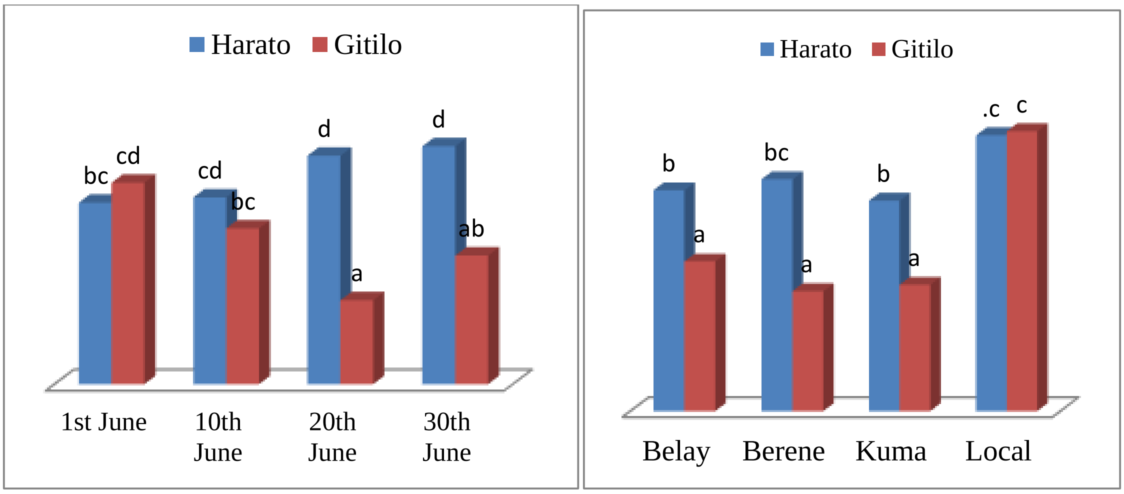

Figure 6a and b. Interaction effect of sowing dates by sites and varieties by sites on harvest index

4. CONCLUSION AND RECOMMENDATION

The interaction effect of sowing dates and linseed varieties significantly influenced seed yield. The maximum seed yields and yield components recorded at early sowing dates with the improved seed at both seasons and sites. Among the improved varieties, Kuma had the highest seed yield, followed by Berene and Belay, but a local seed had the lowest seed yield

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at both the cropping season and site. Therefore, improved varieties and early sowing dates of June 1st and 10th can be recommended for both study sites and similar agro-ecologies.

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Conflict of interest: No conflict of interest.
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Research row data

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	sowing dates jou												
yer	loc	rep	sd	var	ph	pbp	inf	ncpp	nsc	thou	dbm	seed yielc	straw yielc
1	1	1	1	1	93.6	11.2	32.9	36.8	9.4	6.35	5885.9	1793.7	1793.7
1	1	1	1	2	95.9	11.7	33.8	37.5	9.6	6.39	5962.1	1804.7	1804.7
1	1	1	1	3	96.7	13.6	34.7	38.6	9.2	6.87	6032.8	1879.4	1879.4
1	1	1	1	4	67.9	12.2	27.3	39.3	9.4	4.56	5648.4	1762.2	1762.2
1	1	1	2	1	92.6	12.4	42.4	41.6	10	6.89	5989.3	1868.9	1868.9
1	1	1	2	2	93.3	12.7	45.8	44.7	10	6.72	6099.7	1898.5	1898.5
1	1	1	2	3	94.9	10.6	47.5	43.8	9.8	6.79	6165.1	1903.8	1903.8
1	1	1	2	4	62.1	11.4	32.9	47.9	10	4.23	5783.9	1784.5	1784.5
1	1	1	3	1	82.5	10.2	39.7	39.4	8.4	6.07	5475.9	1698.6	1698.6
1	1	1	3	2	83.6	10.4	38.6	38.8	8.2	6.11	5584.7	1682.8	1682.8
1	1	1	3	3	86.4	9.2	41.4	38.6	8	6.43	5997.3	1749.2	1749.2
1	1	1	3	4	58.9	10.9	26.3	42.2	8.6	4.13	4871.9	1576.3	1576.3
1	1	1	4	1	78.6	10.7	30.4	33.9	7.8	6.12	4463.6	1473.9	1473.9
1	1	1	4	2	79.3	9.6	32.7	34.7	8.2	6.08	4531.8	1484.7	1484.7
1	1	1	4	3	80.3	9.2	33.3	32.5	7.4	6.34	4631.5	1497.3	1497.3
1	1	1	4	4	55.4	9.8	24.5	37.5	7.6	3.83	4127.4	1397.6	1397.6
1	1	2	1	1	89.5	12.7	36.5	40.4	9.6	6.65	5947.3	1847.1	1847.1
1	1	2	1	2	88.3	12.9	39.5	42.3	9.8	6.81	5969.7	1853.8	1853.8
1	1	2	1	3	89.8	10.6	40.5	40.8	9.6	6.72	5998.6	1885.3	1885.3
1	1	2	1	4	67.5	13.3	29.9	44.8	10	5.37	5352.8	1743.8	1743.8
1	1	2	2	1	84.2	10.5	43.2	46.8	10	6.21	6158.9	1998.4	1998.4
1	1	2	2	2	85.4	14.5	42.3	48.2	10	6.35	6198.6	1999.9	1999.9
1	1	2	2	3	86.8	12.4	44.9	45.8	9.4	7.11	5874.7	1714.7	1714.7
1	1	2	2	4	62.7	12.6	33.4	52.6	10	5.09	5767.3	1642.8	1642.8
1	1	2	3	1	79.5	10.3	36.5	39.4	8.6	6.31	5144.1	1642.9	1642.9
1	1	2	3	2	77.9	10.5	37.5	40.8	8.6	6.21	4652.9	1673.7	1673.7
1	1	2	3	3	78.4	9.6	38.6	38.5	8.5	6.29	4769.5	1685.3	1685.3
1	1	2	3	4	57.8	10.9	28.1	47.9	8.4	4.33	4236.4	1539.6	1539.6
1	1	2	4	1	70.4	8.7	29.2	34.4	7.4	6.31	4323.6	1483.7	1483.7
1	1	2	4	2	70.3	8.8	29.8	35.7	7.8	6.27	4221.5	1489.8	1489.8
1	1	2	4	3	71.8	8.6	30.6	28.6	7.4	6.54	4436.7	1493.1	1493.1
1	1	2	4	4	52.5	9.8	23.7	36.8	7.8	4.15	4267.5	1407.3	1407.3
1	1	3	1	1	92.3	13.2	35.8	32.9	9	6.47	5975.7	1952.6	1952.6
1	1	3	1	2	92.5	13.6	36.7	32.8	9	6.49	6064.6	1985.7	1985.7
1	1	3	1	3	93.7	12.5	38.3	30.6	8	6.75	6120.5	2002.5	2002.5
1	1	3	1	4	65.5	14.3	27.3	38.7	9	4.35	5637.8	1867.9	1867.9
1	1	3	2	1	86.4	14.5	41.4	36.2	8.8	6.41	5837.9	1867.6	1867.6
1	1	3	2	2	86.3	14.4	43.6	37.9	9.4	6.23	5763.8	1874.1	1874.1
1	1	3	2	3	87.3	12.9	46.2	33.4	8.6	6.73	5975.1	1882.2	1882.2
1	1	3	2	4	59.2	15.8	33.1	36.9	9	4.15	4831.7	1689.6	1689.6
1	1	3	3	1	80.4	10.7	37.4	35.8	8	5.97	4897.7	1569.8	1569.8
1	1	3	3	2	81.4	10.9	38.5	37.4	8.4	6.07	4971.4	1571.9	1571.9
1	1	3	3	3	82.1	9.6	42.9	37.6	8	6.12	5006.8	1593.1	1593.1
1	1	3	3	4	55.4	11.9	30.8	38.7	8.8	3.81	4248.9	1472.4	1472.4
1	1	3	4	1	76.8	7.7	32.6	39.8	7.8	5.87	4536.6	1473.7	1473.7
1	1	3	4	2	77.6	7.9	33.6	36.8	7.8	5.93	4612.7	1492.1	1492.1
1	1	3	4	3	78.9	7.8	36.9	35.7	7.6	6.04	4707.2	1497.8	1497.8
1	1	3	4	4	54.5	9.7	27.9	35.6	7.8	3.63	4098.3	1305.7	1305.7
1	2	1	1	1	78.9	14.5	31.6	42.5	9.4	6.17	5879.3	1843.2	1843.2
1	2	1	1	2	78.9	15.9	32.9	39.8	9.5	6.26	5869.9	1846.8	1846.8
1	2	1	1	3	80.5	12.7	33.7	39.5	9.2	6.32	5921.4	1885.5	1885.5
1	2	1	1	4	61.4	17.9	24.2	48.8	9.6	4.16	4968.9	1765.6	1765.6
1	2	1	2	1	73.2	15.4	34.7	52.6	9.2	6.08	5743.2	1679.5	1679.5
1	2	1	2	2	73.7	15.4	35.9	49.6	9.2	6.24	5762.3	1742.8	1742.8
1	2	1	2	3	73.1	14.2	37.5	46.7	9.1	6.32	5699.8	1752.2	1752.2
1	2	1	2	4	58.7	17.5	28.3	54.2	9.4	4.13	4356.6	1559.5	1559.5
1	2	1	3	1	68.6	11.8	33.4	45.8	8.8	6.27	5371.2	1597.3	1597.3
1	2	1	3	2	69.3	12.5	34.2	46.7	8.6	6.31	5455.7	1599.8	1599.8
1	2	1	3	3	69.9	11.7	36.3	48.8	8.2	6.33	5654.4	1607.7	1607.7
1	2	1	3	4	53.2	12.4	25.7	49.3	8.8	4.17	4128.6	1427.8	1427.8
1	2	1	4	1	61.6	10.6	27.3	39.5	7.2	5.49	4378.3	1478.6	1478.6
1	2	1	4	2	63.2	10.7	31.1	40.6	7.6	5.68	4544.2	1485.5	1485.5
1	2	1	4	3	63.2	9.8	30.8	43.3	7.6	5.95	4623.1	1489.9	1489.9
1	2	1	4	4	48.7	11.9	24.5	46.2	8.2	4.05	4098.7	1367.9	1367.9
1	2	2	1	1	87.5	15.5	33.4	38.6	8.8	6.67	5785.8	1843.8	1843.8
1	2	2	1	2	87.7	16.9	35.9	38.7	9.2	6.78	5818.3	1837.6	1837.6
1	2	2	1	3	89.4	15.3	35.3	36.6	8.4	7.43	5923.1	1845.2	1845.2
1	2	2	1	4	62.5	16.4	27.7	40.8	8.8	4.87	4997.4	1689.5	1689.5
1	2	2	2	1	83.8	16.6	38.9	46.8	8.4	6.43	5981.5	1863.5	1863.5
1	2	2	2	2	84.1	16.9	39.5	50.8	8.6	6.41	5892.9	1842.3	1842.3
1	2	2	2	3	85.3	15.5	41.1	48.1	8.2	6.54	5985.4	1875.7	1875.7
1	2	2	2	4	60.2	16.8	29.3	60.6	8.8	4.21	4657.2	1589.4	1589.4
1	2	2	3	1	78.9	11.4	26.9	39.8	8.6	6.31	5217.6	1572.1	1572.1
1	2	2	3	2	79.5	12.7	28.3	40.2	8.8	6.25	5318.8	1583.3	1583.3
1	2	2	3	3	78.3	11.3	28.2	37.8	8.6	6.32	5415.4	1587.7	1587.7
1	2	2	3	4	57.2	13.5	23.8	48.3	8.8	4.02	4521.6	1419.5	1419.5
1	2	2	4	1	73.4	9.6	24.8	32.7	7.4	5.69	4735.3	1462.2	1462.2
1	2	2	4	2	74.7	9.8	24.8	34.4	7.6	5.78	4813.1	1408.6	1408.6
1	2	2	4	3	73.8	8.9	22.8	31.5	7.2	5.96	4914.7	1427.9	1427.9
1	2	2	4	4	53.5	9.6	20.3	36.7	8.2	3.98	4393.6	1406.8	1406.8
1	2	3	1	1	86.4	11.5	27.5	42.5	9.4	6.29	5684.1	1784.5	1784.5
1	2	3	1	2	87.7	12.4	26.6	39.7	9.7	6.54	5793.5	1799.4	1799.4
1	2	3	1	3	88.6	11.9	27.4	36.8	9.2	6.72	5901.7	1807.3	1807.3
1	2	3	1	4	61.6	13.7	20.7	49.2	9.4	4.73	4550.6	1621.7	1621.7
1	2	3	2	1	81.2	12.8	32.6	44.6	8.8	6.23	5958.3	1742.8	1742.8
1	2	3	2	2	80.9	12.8	34.7	41.9	9.2	6.31	5986.6	1759.9	1759.9
1	2	3	2	3	81.8	11.7	35.7	39.7	8.4	6.23	5878.4	1694.1	1694.1
1	2	3	2	4	58.7	10.6	26.8	45.9	9.2	4.44	4873.7	1582.7	1582.7
1	2	3	3	1	78.9	8.7	27.7	32.8	8.4	5.89	5397.5	1492.7	1492.7
1	2	3	3	2	78.7	8.9	28.2	35.9	8.8	5.93	5701.3	1490.5	1490.5
1	2	3	3	3	79.3	8.1	29.5	38.3	8.6	6.07	5713.6	1497.4	1497.4
1	2	3	3	4	55.6	8.8	25.6	36.5	8.6	4.06	4481.7	1427.5	1427.5
1	2	3	4	1	73.6	6.8	24.5	28.6	6.4	5.52	4596.4	1404.8	1404.8
1	2	3	4	2	74.1	6.3	23.7	26.4	6.6	5.69	4667.3	1418.9	1418.9

