

Table 1. Mean of daily temperature (°C) during the period of alfalfa growth from 2017 to 2020 years.

Month	Periods	Average temperature (°C)									Sunshine								
		2017/2018			2018/2019			2019/2020			2017/2018			2018/2019			2019/2020		
		Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Sun rise	Sun set	Day length	Sun rise	Sun set	Day length	Sun rise	Sun set	Day length
Oct.	01-10	32.40	19.70	26.18	34.10	21.80	27.46	35.60	21.80	28.44	5:50:30	17:39:30	11:49:00	5:50:30	17:39:48	11:49:18	5:50:30	17:40:00	11:49:30
	11-20	28.80	16.00	22.17	30.60	16.20	23.52	34.60	19.60	26.75	5:55:48	17:28:54	11:33:06	5:55:36	17:29:30	11:33:54	5:55:30	17:29:30	11:34:00
	21-31	34.60	15.00	21.89	31.70	16.40	24.46	29.40	17.20	22.91	6:02:05	17:18:54	11:17:16	6:01:49	17:19:27	11:17:38	6:01:44	17:19:38	11:17:55
Nov.	01-10	25.10	12.70	18.38	28.50	14.40	21.00	29.40	15.00	21.88	6:09:00	17:11:24	11:02:24	6:08:48	17:11:30	11:02:42	6:08:42	17:11:42	11:03:00
	11-20	26.90	11.20	18.57	24.80	12.20	17.97	29.00	15.20	21.48	6:16:18	17:06:06	10:49:48	6:16:00	17:06:06	10:50:06	6:15:54	17:06:06	10:50:12
	21-30	22.10	10.20	15.86	25.30	12.10	17.95	26.00	11.80	18.16	6:23:54	17:03:12	10:39:18	6:23:42	17:03:18	10:39:36	6:23:30	17:03:18	10:39:48
Dec.	01-10	23.00	8.80	15.05	20.90	8.90	14.64	22.40	11.10	16.28	6:31:30	17:03:00	10:31:30	6:31:12	17:02:54	10:31:42	6:31:00	17:02:54	10:31:54
	11-20	23.80	9.60	16.21	21.40	8.50	14.07	21.30	8.40	14.22	6:38:06	17:05:12	10:27:06	6:38:00	17:05:06	10:27:06	6:37:48	17:05:00	10:27:12
	21-31	20.80	9.10	14.49	19.30	7.50	12.91	19.50	5.90	12.44	6:43:38	17:10:00	10:26:22	6:43:27	17:09:55	10:26:27	6:43:22	17:09:49	10:26:27
Jan.	01-10	20.20	7.50	13.24	17.90	5.70	11.33	16.60	5.60	10.61	6:46:48	17:16:48	10:30:00	6:46:48	17:16:42	10:29:54	6:46:42	17:16:30	10:29:48
	11-20	20.30	6.80	13.18	17.50	5.50	10.71	19.30	6.80	13.13	6:47:30	17:24:24	10:36:54	6:47:36	17:24:18	10:36:42	6:47:36	17:24:06	10:36:30
	21-31	18.00	6.40	11.76	21.10	7.00	13.52	18.60	5.40	11.61	6:45:16	17:32:49	10:47:33	6:45:16	17:32:38	10:47:22	6:45:27	17:32:22	10:46:55
Feb.	01-10	28.50	11.10	19.06	23.10	8.20	14.67	19.90	6.50	13.04	6:40:24	17:41:00	11:01:13	6:40:30	17:40:54	11:00:24	6:40:42	17:40:42	11:00:00
	11-20	22.30	11.50	16.64	19.10	7.10	13.20	21.80	8.30	14.81	6:33:30	17:48:18	11:14:48	6:33:42	17:48:12	11:14:30	6:33:54	17:48:00	11:14:06
	21-29	25.90	13.00	19.24	21.80	8.20	15.13	28.40	8.30	15.23	6:25:52	17:54:22	11:28:30	6:26:07	17:54:15	11:28:08	6:25:53	17:54:20	11:28:27
Mar.	01-10	31.80	15.50	23.44	22.40	7.60	14.63	25.50	9.80	18.04	6:17:18	17:59:48	11:42:30	6:17:30	17:59:42	11:42:12	6:16:30	18:00:12	11:43:42
	11-20	28.20	13.10	20.45	23.90	9.70	16.81	24.20	11.30	17.42	6:06:30	18:05:30	11:59:00	6:06:42	18:05:24	11:58:42	6:05:54	18:05:42	11:59:48
	21-31	30.30	15.10	22.25	26.70	12.70	20.05	27.60	13.50	20.76	5:54:49	18:10:44	12:15:55	5:55:11	18:10:44	12:15:33	5:54:22	18:11:16	12:16:55
Apr.	01-10	28.20	13.70	20.24	27.40	12.40	19.17	28.80	14.30	21.58	5:43:18	18:16:30	12:33:12	5:43:30	18:16:06	12:32:36	5:42:42	18:16:30	12:33:48
	11-20	36.30	18.20	27.75	29.00	14.60	21.69	28.20	13.80	21.33	5:32:30	18:21:30	12:49:00	5:32:48	18:21:30	12:48:42	5:32:30	18:21:48	12:49:18
	21-30	31.70	17.00	24.70	32.30	15.40	23.86	32.30	17.40	24.74	5:23:00	18:26:48	13:03:48	5:23:24	18:26:42	13:03:18	5:22:42	18:27:12	13:04:30
May.	01-10	37.70	22.60	29.72	34.00	20.30	26.73	32.90	17.00	25.30	5:14:48	18:32:24	13:17:36	5:15:06	18:32:24	13:17:18	5:14:30	18:32:48	13:18:18
	11-20	35.60	19.80	26.98	36.30	22.00	29.41	39.50	22.40	31.12	5:08:12	18:38:12	13:30:00	5:08:18	18:38:12	13:29:54	5:08:06	18:38:36	13:30:30
	21-31	38.70	24.20	31.73	41.40	24.70	32.96	31.90	19.20	25.42	5:03:27	18:44:05	13:40:38	5:03:38	18:44:00	13:40:22	5:03:22	18:44:16	13:40:55
Jun.	01-10	36.80	19.70	29.27	38.90	24.60	31.34	38.50	22.20	30.34	5:01:12	18:49:18	13:48:06	5:01:12	18:49:12	13:48:00	5:01:06	18:49:24	13:48:18
	11-20	39.10	24.00	31.70	37.70	24.50	31.56	38.10	23.40	30.72	5:01:06	18:53:12	13:52:06	5:01:00	18:53:12	13:52:12	5:01:06	18:53:24	13:52:18
	21-30	38.80	24.70	31.55	39.00	26.20	32.67	37.80	23.60	30.77	5:02:48	18:55:36	13:52:48	5:02:48	18:55:36	13:52:48	5:03:00	18:55:42	13:52:42
Jul.	01-10	37.80	25.10	31.73	38.20	25.20	31.75	38.70	24.30	31.65	5:06:12	18:56:00	13:49:48	5:06:12	18:56:00	13:49:48	5:06:24	18:55:54	13:49:30
	11-20	36.30	24.50	30.67	39.50	26.50	33.15	38.10	23.30	30.40	5:10:36	18:54:12	13:43:36	5:10:30	18:54:18	13:43:48	5:11:00	18:54:06	13:43:06
	21-31	38.80	25.60	31.86	38.00	22.70	31.30	38.00	24.80	31.25	5:16:05	18:50:00	13:33:55	5:15:55	18:50:11	13:34:16	5:16:16	18:49:44	13:33:27
Aug.	01-10	38.00	25.60	32.13	39.10	26.00	32.40	40.60	25.10	32.97	5:21:30	18:43:30	13:22:00	5:21:30	18:43:36	13:22:06	5:22:00	18:43:06	13:21:06
	11-20	37.50	24.60	30.94	29.00	26.40	32.72	37.10	24.70	30.89	5:27:00	18:35:18	13:08:18	5:26:30	18:35:24	13:08:54	5:27:00	18:34:54	13:07:54
	21-31	34.90	25.10	29.95	37.00	24.30	30.90	36.50	21.20	29.86	5:32:06	18:24:30	12:52:24	5:31:44	18:25:33	12:53:49	5:32:16	18:24:55	12:52:38
Sept.	01-10	36.10	23.90	29.79	36.30	21.60	29.92	36.40	23.8	30.22	5:36:48	18:14:00	12:37:12	5:36:42	18:14:12	12:37:30	5:37:00	18:13:18	12:36:18
	11-20	34.40	21.70	27.24	34.10	22.10	28.19	38.00	30.57	21.90	5:41:12	18:02:36	12:21:24	5:41:06	18:02:54	12:21:48	5:41:24	18:02:00	12:20:36
	21-30	35.00	20.80	27.44	33.80	21.50	27.17	37.30	23.50	29.97	5:45:42	17:51:00	12:05:18	5:45:36	17:51:18	12:05:42	5:46:00	17:50:24	12:04:24

Source: Meteorological authority, Assiut, Egypt.

Table 3. Analysis of variance for seed yield and its components of ten alfalfa genotypes under five different sowing dates in 2019 (Exp. I) and 2020 (Exp. II).

Source of variation	d.f	Mean Squares											
		Number of pods/plant		Number of seeds/pod		Number of seeds/plant		Seed yield/ plant (g)		Seed yield (g/m ²)		1000 seed weight	
		Exp. I	Exp. II	Exp. I	Exp. II	Exp. I	Exp. II	Exp. I	Exp. II	Exp. I	Exp. II	Exp. I	Exp. II
Replication	2	12.01	155.76	0.05	0.02	3.33	46.72	0.0002	0.002	55.32	44.80	0.04	0.02
Sowing date (D)	4	9621**	25486**	3.1**	11**	18691**	138284**	0.14**	0.9**	2320**	6981**	0.2*	0.07**
Error (a)	8	60.92	316.13	0.03	0.01	168	567.21	0.002	0.002	210.0	30.41	0.04	0.01
Genotype (G)	9	713.8**	7134**	0.17*	0.41**	1383**	11577**	0.01**	0.1**	173**	495**	0.09	0.09**
Error (b)	18	27.64	104.47	0.05	0.01	169	248.23	0.002	0.002	40.49	11.43	0.04	0.02
G*D	36	830.5*	4486*	0.28*	0.64*	1854**	6108.1*	0.02*	0.04*	316.5	209.1*	0.10	0.07*
Error (c)	72	429.40	2349.3	0.16	0.33	951.4	3351.51	0.01	0.02	223	110	0.08	0.04

*, ** Significant at 0.05 and 0.01 levels of probability, respectively

Table 4. Means of number of pods/plant of the ten alfalfa genotypes under five sowing dates in 2019 (Exp. I) and 2020 (Exp. II).

Years	Sowing date	Genotypes										
		Ismailia1	Population from F.R.S	Nubaria 1	Ramah-1	Kharja population	El-Dahlia population	Farafra population	Balady population	Aswan population	Cuf 101	Mean
2019 (Exp. I)	D1	111.33	50.33	61.67	36.67	37.00	72.33	45.33	58.00	81.67	64.67	61.90
	D2	39.00	48.33	67.00	38.00	61.00	43.00	53.00	29.00	57.33	49.33	48.50
	D3	23.67	33.67	29.33	34.00	16.67	31.33	39.33	30.33	32.00	30.33	30.07
	D4	52.67	50.67	38.00	71.67	80.33	72.67	77.00	43.00	49.67	69.67	60.53
	D5	76.33	70.67	73.67	42.33	96.67	61.67	78.33	74.67	89.67	119.33	78.33
	Mean	60.60	50.73	53.93	44.53	58.33	56.20	58.60	47.00	62.07	66.67	55.87
	LSD 5%,1% for:											
	Sowing date(D)	4.65 ,6.76										
Genotype (G)	4.03,5.53											
2020 (Exp. II)	D1	138.44	176.66	97.78	154.22	182.45	168.89	106.67	128.67	210.56	219.33	158.37
	D2	62.33	54.89	134.11	103.66	172.00	76.67	63.67	192.22	91.00	177.00	112.77
	D3	76.11	106.78	63.89	74.78	83.22	185.11	86.45	50.11	107.56	82.00	91.60
	D4	110.33	80.00	71.78	98.33	125.00	83.33	100.55	68.33	120.00	179.44	103.71
	D5	123.00	194.00	65.33	171.67	127.00	160.33	149.00	199.00	153.67	148.67	149.17
	Mean	102.04	122.47	86.58	120.53	137.93	134.87	101.27	127.67	136.58	161.29	123.12
	LSD 5%,1% for:											
	Sowing date(D)	10.59,15.40										
Genotype (G)	7.84,10.74											

D3= Sowing date at 10th December.
D1, D2 and D3 autumn sowing dates,
D4 and D5 spring sowing dates.

D2= Sowing date at 10th November.
D5= Sowing date at 20th April.

D1= Sowing date at 10th October.
D4=Sowing date at 20th March.

Table 5. Means of number of seeds/pod of the ten alfalfa genotypes under five sowing dates in 2019 (Exp. I) and 2020 (Exp. II).

Years	Sowing date	Genotypes										Mean
		Ismailia1	Population from F.R.S	Nubaria 1	Ramah-1	Kharja population	El-Dahlia population	Farafra population	Balady population	Aswan population	Cuf 101	
2019 (Exp. I)	D1	0.92	1.28	1.30	1.21	0.84	0.98	1.57	1.54	1.40	1.33	1.24
	D2	1.94	1.55	1.85	2.30	2.22	2.01	1.89	2.14	2.13	1.94	2.00
	D3	1.48	1.57	1.12	1.68	1.86	1.48	1.73	2.16	1.43	2.22	1.67
	D4	1.97	1.62	1.75	1.87	1.85	1.25	1.12	1.84	1.62	1.35	1.62
	D5	1.27	1.25	1.70	1.50	1.24	1.44	1.49	1.47	1.67	1.41	1.44
	Mean	1.52	1.45	1.54	1.71	1.60	1.43	1.56	1.83	1.65	1.65	1.59
	LSD 5%,1% for:											
	Sowing date(D)	0.10, 0.15										
Genotype (G)	0.18											
2020 (Exp. II).	D1	0.77	1.23	0.86	1.62	1.55	1.16	1.46	1.49	1.43	1.15	1.27
	D2	2.40	2.47	1.68	1.83	1.83	2.32	2.17	1.46	2.57	1.36	2.01
	D3	0.76	0.77	1.32	1.13	1.00	1.21	1.01	2.29	1.18	0.82	1.15
	D4	0.54	0.76	0.66	0.86	0.51	0.51	0.66	0.61	0.59	0.69	0.64
	D5	0.72	0.47	0.90	0.39	0.67	0.62	0.66	0.64	0.67	0.77	0.65
	Mean	1.04	1.14	1.08	1.17	1.11	1.16	1.19	1.30	1.29	0.96	1.14
	LSD 5%,1% for:											
	Sowing date(D)	0.06,0.08										
Genotype (G)	0.08,0.11											

D3= Sowing date at 10th December.
D1, D2 and D3 autumn sowing dates,
D4 and D5 spring sowing dates.

D2= Sowing date at 10th November.
D5= Sowing date at 20th April.

D1= Sowing date at 10th October.
D4=Sowing date at 20th March.

Table 6. Means of number of seeds/plant of the ten alfalfa genotypes under five sowing dates in 2019 (Exp. I) and 2020 (Exp. II).

Years	Sowing date	Genotypes										Mean
		Ismailia1	Population from F.R.S	Nubaria 1	Ramah-1	Kharja population	El-Dahlia population	Farafra population	Balady population	Aswan population	Cuf 101	
2019 (Exp. I)	D1	102.66	64.31	79.82	44.53	31.43	70.22	70.40	89.42	114.50	86.20	75.35
	D2	75.42	75.20	124.07	87.43	135.26	129.10	100.13	87.41	122.29	95.85	103.22
	D3	34.90	52.77	33.01	57.20	31.25	46.46	68.30	65.71	44.94	66.98	50.15
	D4	103.12	81.70	66.63	133.22	148.38	90.86	86.50	79.40	80.18	93.92	96.39
	D5	97.17	88.43	125.14	63.56	119.15	89.19	115.37	109.49	149.48	167.48	112.47
	Mean	82.66	72.48	85.73	77.19	93.10	85.17	88.14	86.28	102.34	102.08	87.52
	LSD 5%,1% for:											
	Sowing date(D)	7.71,11.22										
Genotype (G)	9.98,13.67											
2020 (Exp. II).	D1	105.79	216.45	83.84	250.77	283.56	195.02	156.38	191.40	301.04	251.83	203.61
	D2	149.55	136.33	225.23	189.48	317.15	177.91	201.56	280.41	232.63	241.01	215.13
	D3	58.52	82.10	83.76	84.62	83.34	223.91	87.81	164.05	126.44	67.16	106.17
	D4	59.42	60.22	47.41	84.54	64.22	42.65	66.51	42.15	71.22	122.45	66.08
	D5	88.42	91.64	58.66	67.48	84.93	98.74	98.37	126.81	103.40	113.67	93.21
	Mean	92.34	117.35	99.78	135.38	166.64	147.65	122.13	160.96	166.94	159.23	136.84
	LSD 5%,1% for:											
	Sowing date(D)	14.18,20.63										
Genotype (G)	12.09,16.56											

D3= Sowing date at 10th December.
D1, D2 and **D3** autumn sowing dates,
D4 and **D5** spring sowing dates.

D2= Sowing date at 10th November.
D5= Sowing date at 20th April.

D1= Sowing date at 10th October.
D4=Sowing date at 20th March.

Table 7. Means of seed yield/plant (g) of the ten alfalfa genotypes under five sowing dates in 2019 (Exp. I) and 2020 (Exp. II).

Years	Sowing date	Genotypes										Mean
		Ismailia1	Population from F.R.S	Nubaria 1	Ramah-1	Kharja population	El-Dahlia population	Farafra population	Balady population	Aswan population	Cuf 101	
2019 (Exp. I)	D1	0.28	0.16	0.24	0.12	0.10	0.21	0.19	0.25	0.31	0.18	0.20
	D2	0.22	0.22	0.35	0.26	0.41	0.35	0.27	0.24	0.33	0.25	0.29
	D3	0.11	0.15	0.09	0.17	0.09	0.14	0.19	0.20	0.14	0.19	0.15
	D4	0.28	0.23	0.19	0.38	0.43	0.28	0.24	0.23	0.23	0.28	0.28
	D5	0.26	0.23	0.36	0.17	0.34	0.23	0.36	0.30	0.43	0.46	0.31
	Mean	0.23	0.20	0.25	0.22	0.27	0.24	0.25	0.24	0.29	0.27	0.25
	LSD 5%,1% for:											
	Sowing date(D)	0.02,0.04										
Genotype (G)	0.04,0.05											
2020 (Exp. II).	D1	0.28	0.55	0.20	0.55	0.73	0.51	0.41	0.48	0.78	0.57	0.51
	D2	0.38	0.34	0.59	0.51	0.85	0.42	0.49	0.77	0.55	0.56	0.55
	D3	0.15	0.22	0.22	0.24	0.20	0.60	0.22	0.43	0.33	0.16	0.28
	D4	0.16	0.16	0.11	0.22	0.18	0.10	0.17	0.10	0.19	0.31	0.17
	D5	0.23	0.22	0.15	0.15	0.20	0.24	0.23	0.31	0.30	0.27	0.23
	Mean	0.24	0.30	0.26	0.33	0.43	0.37	0.30	0.42	0.43	0.37	0.35
	LSD 5%,1% for:											
	Sowing date(D)	0.03,0.04										
Genotype (G)	0.04,0.05											

D3= Sowing date at 10th December.
D1, D2 and D3 autumn sowing dates,
D4 and D5 spring sowing dates.

D2= Sowing date at 10th November.
D5= Sowing date at 20th April.

D1= Sowing date at 10th October.
D4=Sowing date at 20th March.

Table 8. Means seed yield (g/m²) of the ten alfalfa genotypes under five sowing dates in 2019 (Exp. I) and 2020 (Exp. II).

Years	Sowing date	Genotypes										
		Ismailia1	Population from F.R.S	Nubaria 1	Ramah-1	Kharja population	El-Dahlia population	Farafra population	Balady population	Aswan population	Cuf 101	Mean
2019 (Exp. I)	D1	71.14	45.16	58.60	44.64	43.38	54.17	49.08	64.02	73.78	46.02	55.00
	D2	19.15	25.88	54.18	44.77	58.22	49.27	45.25	36.83	46.55	42.24	42.24
	D3	45.41	51.14	36.04	53.39	45.31	45.64	55.03	56.85	46.92	55.53	49.13
	D4	73.45	60.13	57.46	74.35	85.69	65.81	60.82	59.96	59.30	63.64	66.06
	D5	47.42	45.66	56.24	32.77	52.50	45.06	60.10	47.51	60.29	61.73	50.93
	Mean	51.32	45.59	52.50	49.98	57.02	51.99	54.06	53.03	57.37	53.83	52.67
	LSD 5%,1% for:											
	Sowing date(D)	8.63,12.55										
Genotype (G)	4.88,6.69											
2020 (Exp. II)	D1	36.11	51.29	34.52	51.73	65.38	47.33	41.24	45.02	66.68	58.30	49.76
	D2	18.94	17.91	30.12	27.05	35.52	21.05	27.01	32.14	27.87	29.65	26.73
	D3	19.25	27.75	28.50	31.59	21.43	42.11	26.41	41.58	40.24	21.24	30.01
	D4	51.56	51.74	49.28	75.40	66.50	45.56	54.94	42.18	75.15	79.02	59.13
	D5	25.24	24.33	15.49	21.76	23.46	26.14	24.77	31.72	31.47	31.01	25.54
	Mean	30.22	34.60	31.58	41.51	42.46	36.44	34.88	38.53	48.28	43.84	38.23
	LSD 5%,1% for:											
	Sowing date(D)	3.28,4.78										
Genotype (G)	2.59,3.55											

D3= Sowing date at 10th December.
D1, D2 and D3 autumn sowing dates,
D4 and D5 spring sowing dates.

D2= Sowing date at 10th November.
D5= Sowing date at 20th April.

D1= Sowing date at 10th October.
D4=Sowing date at 20th March.

Table 9. Means of number of 1000 seed weight of the ten alfalfa genotypes under five sowing dates in 2019 (Exp. I) and 2020 (Exp. II).

Years	Sowing date	Genotypes										Mean
		Ismailia1	Population from F.R.S	Nubaria 1	Ramah-1	Kharja population	El-Dahlia population	Farafra population	Balady population	Aswan population	Cuf 101	
2019 (Exp. I)	D1	2.80	2.49	2.96	2.65	3.02	2.96	2.70	2.81	2.74	2.03	2.72
	D2	2.91	2.93	2.79	3.00	3.00	2.74	2.65	2.78	2.70	2.60	2.81
	D3	3.01	2.94	2.74	2.90	2.76	2.87	2.75	3.06	3.18	2.80	2.90
	D4	2.69	2.86	2.89	2.82	2.92	3.09	2.76	2.88	2.88	2.94	2.87
	D5	2.65	2.60	2.87	2.85	2.84	2.52	3.08	2.77	2.84	2.76	2.78
	Mean	2.81	2.76	2.85	2.84	2.91	2.84	2.79	2.66	2.87	2.63	2.82
	LSD 5%,1% for:											
	Sowing date(D)	0.12										
Genotype (G)	N.S											
2020 (Exp. II).	D1	2.64	2.51	2.41	2.21	2.56	2.60	2.62	2.53	2.59	2.26	2.49
	D2	2.51	2.52	2.62	2.69	2.69	2.38	2.42	2.76	2.38	2.34	2.53
	D3	2.59	2.65	2.64	2.77	2.45	2.65	2.45	2.61	2.61	2.39	2.58
	D4	2.75	2.64	2.42	2.57	2.76	2.31	2.50	2.45	2.71	2.53	2.56
	D5	2.55	2.42	2.62	2.24	2.29	2.43	2.38	2.50	2.88	2.33	2.47
	Mean	2.61	2.55	2.54	2.50	2.55	2.47	2.47	2.57	2.63	2.37	2.53
	LSD 5%,1% for:											
	Sowing date(D)	0.06,0.08										
Genotype (G)	0.11,0.14											

D3= Sowing date at 10th December. **D2**= Sowing date at 10th November. **D1**= Sowing date at 10th October.
D4=Sowing date at 20th March. **D5**= Sowing date at 20th April. **D1, D2 and D3** autumn sowing dates,
D4 and D5 spring sowing dates.