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PHOTOPERIODIC INDUCTION OF FLOWERING IN SUGARCANE

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ABSTRACT

Twenty-two sugarcane genotypes were subjected to either 30 or 60 photo-inductive days at a constant 12.5 hrs daylength then followed by decreasing daylength at a rate of 30 sec./day until reach to 11.5 hrs daylength to investigate their flowering performance.

Results of individual and combined analysis of variance over two inductive cycles revealed significant differences among genotypes for duration of pre-flag leaf stage, duration of flag leaf stage, duration of emergence stage, minimum days to flower, maximum days to flower, duration of flowering period and percent of total flowered plants.The difference between inductive cycles was significant for all characters except for duration of panicle emergence and duration of flowering period.The genotypes × inductive cycles interactions were significant for all studied characters.

The twenty-two sugarcane genotypes under study were classified into four groups. The first included ten genotypes; NCO 310, G 99-165, F146, F161, CP57-614, EH94-181-1, Ph 7115, CP34-38, CP31-294 and BO 60, that responded to 30 and 60 inductive cycles, therefore the number of inductive cycles required to complete flower induction of these genotypes probably ranged between 30 and 60 inductive cycles.The second group consisted of two genotypes; EH 94-119-72 and ROC 1, that flowered only under 30 inductive cycles therefore 30 inductive cycles was the optimum treatment for these two genotypes.The twelve genotypes that responded and reached to complete flowering under 30 day cycles, could be considered as easy to flower genotypes.The third group included five genotypes; BO 55, G 95-21,Crystallina, CP 67-412 and G 98-24 that flowered only under 60 inductive cycles which indicate that 60 inductive cycles could be considered the optimum treatment for these genotypes. The fourth group included five genotypes; CP 44-101,CP 70-1517,CO 301, GT 54-9 and G 68-88, that did not show any response neither under 30 nor under 60 inductive cycles which indicates that these genotypes are shy to flower or need more inductive cycles to induce flowering. Therefore, the twenty two evaluated sugarcane genotypes varied considerably among themselves in their response to flowering under the used photoperiod inductive cycles.

INTRODUCTION

Attempts on photoperiodic induction of flowering of commercial varieties of sugarcane was unsuccessful until Chilton and Moreland (1954) reported that the photoperiodic induction of seven early flowering varieties by gradually decreasing day length.The lack of progress first was largely because sugarcane breeders depended on natural flowering and made little effort to explore the physiology of flowering in the plant.

As in many other species of the Gramineae, it is reported that sugarcane has a juvenile phase in which stalks that are too young cannot be induced to flower even if exposed to proper photoperiod treatment . Initiation of

flowering in sugarcane begins only when it attains the minimum vegetative stage of ripeness to flower.There is common observation that stalks of most commercial varieties must have 2-4 well mature occurrence internodes above the ground at the time when photo-induction occurs (Mangelsdorf,1957 and Clements and Awada , 1965). Coleman (1965) observed that fifteen inductive nights were necessary for maximum flowering, and no flowering occurred when less than 10 inductive nights were used. With less than 15 inductive nights less flowering stimulus were produced which resulted in a primordium partly developed or reverted to vegetative conditions . James and Miller (1971) reported that delaying flowering dates can be achieved by increasing the number of inductive cycles than those required for completion of flower induction . Paliatseas (1971) studied the minimum time required for flower initiation in nine hybrid varieties of sugarcane under Louisiana conditions , he found that a minimum of 45-55 inductive days were required for initiation of easy flowering varieties , while 60 to 70 days were required for reluctant flowering varieties. Mohamed (1996) subjected two of easy-medium to flower cultivars to 30 or 37 cycles (12.5 hrs) and two medium-hard to flower cultivars to 46 or 55 cycles (12.5 hrs) that followed by decreasing day length at rates of 30 and 60 sec. .He found that each cultivar required an optimum number of inductive cycles for its flowering induction. Percent of total flowered plants was highly significantly affected by cultivars , inductive cycles and their interaction . The use of 30 sec .decline rate was better than 60 sec .in increasing flowering percentage ,flowering duration and mean pollen rate. Rizk *et al.* . (2002) stated that under different photoperiodic treatments each genotype has an optimum number of photo-inductive cycles for its induction. Masri (2004) Subjected twenty sugarcane genotypes to different artificial photo-inductive cycles,i.e,45,60,75 and 105 constant day lengths (12hr,30min.) followed by declining day length at a rat of 60 sec./day until reached 11.30 hr. as well as under natural conditions as control . He found that all genotypes were induced to complete flowering , although their responses differed under different photo-inductive cycles.Delaying flowering dates could be achieved by increasing the number of inductive cycles than those required for completition of flower induction, therefore, proven crosses can be made between synchronized flowering parents .The objective of this work was to study the flowering performance of twenty- two sugar cane genotypes subjected to two photo-inductive treatments.

MATERIALS AND METHODS

An experiment was carried out at Sugar Crop Research Institute breeding facilities (30° 02 N), Agriculture Research Center (ARC), Giza, Egypt, during 2003/2004 seasons. Photoperiod rooms of the Louisiana type were used to provide the potted canes with the scheduled photo-inductive cycles. Four single-eye cuttings from each of twenty two sugarcane genotypes (Table1) were planted in 40 liter plastic pot on 15 th of September, 2003. All pots were filled with the prepared soil 3:1 mixture of clay and sand up to 1st upper inch, making about 15 kg as recommended by Viveros and Cassalett (1990). During growing time the potted plants received recommended cultural practices to maintain full active growth. The previously

described pots were divided into two similar groups, and each group was arranged in a Randomized Complete block design with two replicates. Each group was placed on a two separate carts to facilitate moving pots inside and outside the photoperiod rooms. Each group received specific photo-inductive treatment, where the first group received constant photoperiod of 12:30 day light hours for 30 days from 22nd of June to 21th of July, while the second group received constant photoperiod of 12.30 day light hours for 60 days from 22rd of June to 20th of August . Therefore , as previously described constant 12.30 day light hours was used for each specific photoperiod cycle .Thereafter, the photo-inductive cycles was followed by declining day length at a rate of 30 sec./day until reached 11.30 hours. The treatments ended in 17th of November for the first group while it ended in 17th of December for the second group.

Table 1: Source country of sugarcane genotypes exposed to 30 and 60 photo-inductive cycles:

NO	Genotypes	Source	NO	Genotype	Source
1	GT 54-9	Egypt	12	BOT 55	Indonesia
2	G 68-88	Egypt	13	BOT 60	Indonesia
3	G 95-21	Egypt	14	Ph 7115	Philippine
4	G 98-24	Egypt	15	ROC 1	Taiwan
5	G 99-165	Egypt	16	CO 301	India
6	EH 94-181-1	Egypt	17	CP 31-294	U.S.A
7	EH 94-119-72	Egypt	18	CP 34-38	U.S.A
8	NCO 310	South Africa	19	CP 44-101	U.S.A
9	F 146	Taiwan	20	CP 57-614	U.S.A
10	F 161	Taiwan	21	CP 67-412	U.S.A
11	Crystallina	New Ghana	22	CP 70-1517	U.S.A

The following measurements were recorded

1- Duration of Pre flag leaf stage: This stage was calculated as a number of days from the start of photoperiod treatment until stopping formation of new leaves and beginning of the flag leaf formation and emergence.

2- Duration of flag leaf stage:was calculated as a number of days from the beginning of flag leaf formation to as soon as the emergence of the inflorescence. Form flag leaf sheath accuried.

3-Duration of emergence stage :was calculated from the starting of emergence of the inflorescence from flag leaf until its full extension completed.

4- Minimum days to flower:the number of days from the beginning of photoperiod treatment until flowering of the first stalk. Per pot appeared

5- Maximum days to flower:the number of days of the beginning of photoperiod treatment until flowering of last stalk. Per pot was appeared

6- Duration of flowering period :(maximum days to flower minus minimum days to flower) plus one.

7- Percent of total flowered plants:(number of flowered plant / number of plants/pots) × 100.

Statistical analysis :

An individual analysis of variance for each photo-inductive treatment as well as a combined analysis for both inductive treatments were connected according to Snedecor and Cochran (1967). The percentage values for total flowered stalks, flowered stalks at first day flowered stalks at last day flowered stalks at last day were transformed to the corresponding angle values in degrees (ARC-Sine) according to Evwin *et al.* (1966). For comparison between means LSD at 5% level of probability according to Waller and Duncan (1969) was used.

RESULTS AND DISCUSSION

Individual end combined analysis of variance (Tables, 2 and 3) over two inductive cycles revealed significant differences among genotypes for all measured characters. The difference between inductive cycles was significant for all characters except for duration of panicle emergence and duration of flowering period.The genotype × inductive cycles interaction was significant for all studied characters.

The twenty-two sugarcane genotypes under study were classified according to their flowering behaviour into four groups. The first group included ten genotypes; NCO 310, G 99-165, F146, F161, CP57-614, EH94-181-1, Ph 7115, CP34-38, CP31-294 and BO 60, that responded to 30 and 60 inductive cycles, therefore the number of inductive cycles required to complete flower induction of these genotypes probably ranged between 30 and 60 inductive cycles.The second group consisted of two genotypes; EH 94-119-72 and ROC 1, that flowered under 30 inductive cycles only therefore 30 inductive cycles was the optimum treatment for these two genotypes.The third group included five genotypes; BO 55, G 95-21,Crystallina, CP 67-412 and G 98-24, that flowered only under 60 inductive cycles which indicate that 60 inductive cycles could be considered the optimum treatment for these genotypes. The fourth group included five genotypes; CP 44-101,CP 70-1517,CO 301, GT 54-9 and G 68-88, that did not show any response neither under 30 nor under 60 inductive cycles Therefore, the twenty two evaluated sugarcane genotypes varied considerably among themselves in their response to flowering under the used photoperiod inductive cycles.

The twelve genotypes that responded and reached to complete flowering under 30 days cycles, could be considered as easy to flower genotypes. Pallatseas (1971) reported that a minimum of 45-55 inductive days were required for initiation of easy flowering varieties. Genotypes that flowered under 60 inductive cycles could be considered as medium to flower. On the other hand, genotypes that flowered either under 30 or under 60 inductive cycles could be considered as easy-medium to flower genotypes. The genotypes that didn't show any response under both photo-inductive treatments may be considered as hard to flower and need more inductive days than 60.

Table 2 : Analysis of variance for the studied traits under 30 and 60 photo-inductive cycles.

S.O.V	d.f	Duration of						Minimum		Maximum		Duration of flowering period		% of total flowered plants	
		Pre flag leaf stage		flag leaf stage		Emergence		Days to flower							
		30	60	30	60	30	60	30	60	30	60	30	60	30	60
Replication	1	29	31	2	0.1	6	0.2	111	0.3	2	23	36	29	0.1	0.1
Genotype	21	7147**	8182**	138**	136**	64**	38**	8488**	9779**	9879**	10979**	120**	144**	2686**	2712**
Error	21	40	54	9	13	6	2	19	15	169	13	38	26	30	81

Table 3 : Combined analysis of variance over the two inductive cycles for the studied traits

S.O.V	d.f	Duration of			Minimum	Maximum	Duration of flowering period	% of total flowered plants
		Pre flag leaf stage	Pre flag leaf stage	Emergence	Days to flower			
Inductive cycle(I)	1	23694.73**	331.31**	1.78	18213.14**	21204.5**	127.86	3127.33**
Error	2	30.28	1.24	3.39	55.86	103.68	19.27	0.02
Genotype (G)	21	7206.18**	182.14**	73.84**	10219.39**	12041.33**	227.73**	4383.36**
G× I	21	8123.19**	93.10**	28.89**	8047.92**	8286.71**	47.09**	1015.77**
Error	42	47.55	10.81	4.42	17.52	27.59	29.51	55.50

Duration of pre-flag leaf stage :

Data in Table 4 indicated that under 30 inductive cycles, the duration of pre flag leaf stage varied from as minimum as 74.5 days for BO 60 to as 150 day for ROC 1 . While under 60 cycles it ranged between 78 days for F 146. to 171.25 days for G 98-24. Average mean duration of this stage under 60 cycles (93.98) was significantly higher than that recorded under 30 cycles (61.16). This indicates that exposing plants of those genotypes to 60 inductive cycles caused a delay in start of the development of flag leaf. James and Miller (1971). Koshkin and Moralez (1980) stated that increasing the photoperiodic treatment delayed flowering.Regarding sugarcane genotypes that responded to both photo-inductive treatments, results indicated that duration of pre-flag leaf stage of NCO 310 and G99-165 under 30 and 60 inductive cycles was the same. This simply means that the optimum inductive cycles of these two genotypes ranged between 30 and 60 inductive cycles. While 60 seems to be the optimum for F146 and Ph 7115 because the duration of that stage was decreased from 82.75 days to 78 days for F146 genotype and from 102 to 94 days for Ph 7115 genotype. However, the reduction was insignificant. On the other hand, 30 cycles probably was the optimum for F 161, CP 57-614, EH 94-181-1, CP 34-38, CP 31-294, and BO 60 genotypes since using 30 inductive cycles decreased the duration of this stage than with 60 cycles.

Duration of flag leaf stage :

Data shown in Table 4 revealed that under 30 inductive cycles, the smallest duration of this stage was recorded by the genotype NCO 310 (4.25 days), while the widest duration was recorded by the genotype CP 34-38 (31.5 days) and the other genotypes fell in between. Under 60 cycles this duration ranged from 9.25 days for G 98-24 to 22.5 days for EH 94-181-1. However, the average mean of this stage under 60 cycles (10.86 days) was significantly higher than that recorded under 30 inductive cycles (6.98 days). Within the genotype group that flowered under both photo-inductive treatments, the duration of this stage under 60 cycles for eight genotypes, i.e., NCO 310, F 146, F 161, CP 57-614, EH 94-181-1, Ph 7115, CP 31-294 and BO 60 were increased by 13.5, 10.5, 6.0, 2.0, 5.5, 1.75, 4.0 and 4.12 respectively,While for two genotypes G 99-165 and CP 34-38 this duration were decreased by 4.5 and 17 compared to 30 inductive cycles in the same order.

Duration of emergence stage :

Data in Table 4 revealed that under 30 inductive cycles the duration of this stage ranged from 4.5 days for EH 94-119-72 to 13.5 days for CP 57-614, while within the genotype group that responded to 60 cycles the duration of this stage ranged between 3.25 days for NCO 310 to 14.5 days for CP 34-38. Mean duration of this stage under 30 inductive cycles was nearly similar to that recorded under 60 inductive cycles, since it was 5.72 and 5.43 days, respectively. With respect to genotypes that responded to both inductive cycles, it seems that 60 cycles decreased duration of this stage for all responded genotypes except for CP 34-38 genotype, since it needed to 14.5 days to reach the full emergence compared to 30 cycles that decreased the

period to 10.5 days under 30 cycles. However, the difference was insignificant.

Table 4: Duration of different flowering stages affected by two photo inductive cycles.

No	Genotypes	Duration of pre flag leaf stage		Duration of flag leaf stage		Duration of emergence	
		30	60	30	60	30	60
1	NCO 310	109.5	109.25	4.25	17.75	9	3.25
2	G 99-165	125.5	125.5	16.5	12	9.5	8.5
3	F 146	82.75	78	9.5	20	10.25	8.25
4	F 161	138	145	7.5	13.5	10.5	7.5
5	CP 57-614	97	102	16.5	18.5	13.5	10.5
6	EH94-181-1	96.5	109	17	22.5	10	6.5
7	Ph 7115	102	94	9.5	11.25	16	6.75
8	CP 34-38	99	129.5	31.5	14.5	10.5	14.5
9	CP 31-294	129.25	139	7.5	11.5	11	9
10	BO 60	74.5	89.5	13.38	17.5	11	7.25
11	EH94-119-72	141.5	-	10	-	4.5	-
12	ROC 1	150	-	10.5	-	10	-
13	BO 55	-	144.5	-	21	-	8
14	G 95-21	-	158.5	-	16.5	-	11
15	Crystallina	-	160	-	19.5	-	7
16	CP 67-412	-	141.5	-	13.75	-	5.5
17	G 98-24	-	171.25	-	9.25	-	6
18	CP 44-101	-	-	-	-	-	-
19	CP 70-1517	-	-	-	-	-	-
20	CO 301	-	-	-	-	-	-
21	GT 54-9	-	-	-	-	-	-
22	G 68-88	-	171	-	-	-	-
Mean		61.16	93.98	6.98	10.86	5.72	5.43
LSD at .05 genotypes		10.95	7.39	5.09	6.18	4.46	2.50
G ×I		13.92		6.64		4.24	

Data recorded on the three previous stages revealed that each one of the responded genotypes has its own characteristic with respect to duration of pre flag leaf stage , duration of flag leaf stage, and emergence stage. Moreover each genotype has an optimum number of inductive cycles for its flowering induction. These results are in agreement with those obtained by Rizk *et al.*. (2002) and Masri (2004).The time elapsed from induction to full emergence among the responded genotypes was mainly due to the difference in their time of floral initiation that varied from 74.5 days from the beginning of treatment for the genotype BO 60 that reached to the full emergence on September 26th to 150 days for the genotype ROC 1 that reached to the full emergence on December 7th by using 30 inductive cycles. While under 60 photo- inductive days time of floral initiation ranged from the beginning of the treatment for the genotype F146 that reached to the full emergence on October 4th to 171.3 days for the genotype G 98-24 that reached to the full emergence on December 23th. These results are supported by Singh (1977) who observed that floral initiation occurred 20-25 days later in late than in early season flowering varieties. It could be concluded from these results that differences among genotypes in their

flowering response under the two photo-inductive treatments are of a major importance for the success in synchronizing flowering and consequently improving the chances for making more crosses among different genotypes. For example the genotypes F161 and EH 94-119-72 that were induced to complete flowering under 30 photo-inductive days on November 23th were synchronized in their flowering date with genotypes, CP 34-38, CP 31-294 and CP 67-412 that were induced to complete flowering under 60 photo-inductive days on November 25th, 26th and 27th, respectively.Therefore, the breeding stocks must be examined to define such response for better utilization of these materials in breeding programs.

Minimum and maximum days to flower as well as duration of flowering period :

The response of the tested genotypes are given in Table 5.Under 30-photo-inductive days, the lowest minimum days to flower was 80.5 days for BO 60, while its maximum days was 107 days.The highest minimum number of days was 160.5 recorded by ROC 1. It is worthy to mention that the minimum and maximum days to flower took the same figure (160.5 days) because only one plant / pot in each replicate was induced to complete flowering. The other genotypes fell in between these two genotypes.Under 60 cycles the lowest minimum days was 97.5 recorded by F146, with a maximum 98 days and mean days 97.75, while the highest minimum number of days was 180 recorded by G 98-24. Again minimum and maximum days to flower took the same figure. However, minimum, maximum days to flower over all tasted genotypes under 60 inductive cycles were significantly higher than that recorded under 30 inductive cycles. Minimum and maximum days required to flower of most genotypes that induced to complete flowering under both photo-inductive treatments varied considerably from one treatment to the other. For instance, NCO 310 responded to both 30 and 60 photo-inductive cycles, but minimum, maximum days to flower differed from treatment to another, Since it was 112.5 and 116 days, under 30 inductive cycles, while it was 124 and 130 days, in the same order, under 60 inductive cycles. Six genotypes, F 161, CP 57-614, EH 94-181-1, CP 34-38, CP 31-294 and BO 60 followed the same manner as NCO 310. It is evident from the results that 60 photo-inductive cycles were longer than the number of inductive cycles required for the induction of these genotypes since it resulted in increasing average days to flower, hence delaying flowering date. Therefore, delaying flowering dates can be achieved by increasing the number of inductive cycles than those required for completion of flower induction. These results were supported by results obtained by James and Miller (1971), Mohamed (1996) and Masri (2004).Duration of flowering as shown in Table 5, represents the period from full emergence of the tassel of the first plant until full emergence of the tassel of the last plant of given genotype. Under 30 photo-inductive days, this period varied from as low as only one day for genotypes F161 and ROC1 in which only one plant / pot was induced to complete flowering in each replicate to 27.5 days for genotype BO 60. Under 60 photo-inductive days, duration of flowering again varied from one day for genotypes G 95-21, Crystallina and G 98-24 to 24.5 days for

genotype CP 34-38. Therefore under both photo-inductive treatments plants belonging to BO 60 and CP 34-38 genotypes recorded the longest duration of flowering, indicating the possibility of these genotypes to be used in making a wide range of crosses.

Percentage of total flowered plants:

Results in Table 5 indicated that Under 30 inductive cycles, 12 out of 22 sugarcane genotypes reached to the full flowering stage. Accordingly, the percentage of flowering genotypes amounted to 54%. The responded genotypes could be classified into three categories concerning percentage of total flowered plants of each genotype, the first included 6 genotypes, i. e., NCO 310, F 146, EH 94-181-1, CP 34-38, CP 31-294 and BO 60 which showed flowering percentage over 75%.The second included 2 genotypes, i. e., CP 57-614 and EH 94-119-72 showing flowering percentage between 50 and 75%, while the third one included 4 genotypes, i. e., G 99-165, F146, Ph 7115 and ROC 1 that had less than 50% flowering.While under 60 inductive cycles 15 out of 22 genotypes were induced to complete flowering, which amounted to 68%. Results also, indicated that eight genotypes, i. e., NCO 310, F 146, F 161, CP 57-614, , EH 94-181-1, Ph 7115, BO 60 and CP 67-412 showed flowering percentage over 75%. Five genotypes; G 99-165, CP 34-38, CP 31-294, BO 55 and G 98-24 had flowering percentage between 50 and 75% and two genotypes, i.e., G 95-21 and Crystallina had flowering percentage less than 50%. It widely known that flowering percentage is a genetic character highly responsive to the environment conditions.Stevenson (1965) reported that differences between varieties in extent and percentage of flowering in a particular environment is heritable.

Under both 30 to 60 photo-inductive days, 10 of 22 genotypes were induced to complete flowering, therefore the percentage of flowering genotypes amounted to 45%. The percentage of total flowered plants for some of these responded genotypes varied considerably from one treatment to another. While 60 inductive cycles seems to be the optimum treatment for G 99-165, F 161, CP 57-614 and Ph 7115 genotypes since it resulted in 50, 87.5 , 100 and 100% flowering, respectively, compared to 30 inductive cycles which resulted in 25, 25, 75 and 37.5% flowering, respectively. In contrary 30 inductive cycles seems to be the optimum treatment for CP 34-38 and CP 31-294 genotypes since it resulted in 87.5 and 100% flowering, respectively, compared to 60 inductive cycles which resulted in 62.5 and 75% flowering, respectively. The significance of determining the percentage of total flowered plants for a given genotypes is related to making crosses, because it is expected that crossing between the heavily flowering genotypes may yield large number of seedlings

In general, the results indicated that sugarcane genotypes differed in the time interval between the beginning of photoperiodic treatment and the beginning of booting to appear. Also each genotype requires an optimum number of inductive cycles to have maximum flowering percentage with earlier and longer duration of flowering. It also, seemed that late flowering genotypes and / or non-flowering genotypes took longer time than early flowering genotypes. Accordingly, in order to obtain successful induction of flowering for late and non-flowering genotypes by photoperiodic treatment,

the inductive days has to be long enough. These conclusions are in harmony with those reported by Lee *et al.* (1968),and Mohamed (1996).

Table 5: Flowering behaviour of twenty two sugarcane genotypes subjected to two photo inductive cycles.

NO	Genotypes	Minimum days to flower		Maximum days to flower		Duration of flowering period		% of total flowered plants	
		30	60	30	60	30	60	30	60
1	NCO 310	112.5	124	116	130	4.5	7	100	100
2	G 99-165	142	140	146.5	145.5	5.5	6.5	25	50
3	F 146	90	97.5	100	98	11	1.5	100	100
4	F 161	143.5	151.5	143.5	159	1	8.5	25	87.5
5	CP 57-614	107.5	137	125.5	157	19	21	75	75
6	EH94-181-1	112.5	130.5	116	149	4.5	19.5	100	100
7	Ph 7115	113	112.5	114.5	116.5	2.5	5	37.5	100
8	CP 34-38	130.5	142.5	146	166	16.5	24.5	87.5	62.5
9	CP 31-294	133.5	151	143.5	162	11	12	100	100
10	BO 60	80.5	100	107	122	27.5	23	100	100
11	EH94-119-72	151.5	-	152.5	-	2	-	50	-
12	ROC 1	160.5	-	160.5	-	1	-	25	-
13	BO 55	-	151.5	-	162	-	11.5	-	62.5
14	G 95-21	-	159.5	-	159.5	-	1	-	25
15	Crystallina	-	179.5	-	179.5	-	1	-	25
16	CP 67-412	-	152	-	162	-	11	-	100
17	G 98-24	-	180	-	180	-	1	-	62.5
18	CP 44-101	-	-	-	-	-	-	-	-
19	CP 70-1517	-	-	-	-	-	-	-	-
20	CO 301	-	-	-	-	-	-	-	-
21	GT 54-9	-	-	-	-	-	-	-	-
22	G 68-88	-	-	-	-	-	-	-	-
Mean		67.16	95.86	71.43	102.18	4.82	7.00	38.07	52.27
LSD at .05 genotypes		7.56	6.82	22.38	6.40	10.68	8.80	9.46	15.48
G×I		8.45		10.60		10.96		15.03	

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استخدام الدفع الضوئي لإزهار قصب السكر

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***معهد بحوث المحاصيل السكريه-مركز البحوث الزراعيه-الجيزة-مصر**

تم تعريض عدد ٢٢ تركيب وراثي من قصب السكرلمعاملتين من دورات الدفع الضوئي- ٣٠,٦٠ يوم (١٢,٣٠ ساعة إضاءة) ثم تلي ذلك تناقص طول النهار بمعدل ٣٠ ثانيه / يوم حتى وصل طول اليوم إلى ١١,٣٠ ساعة وكان الهدف هو دراسة سلوكها للتزهير.

أظهر التحليل الفردي لكل من المعاملتين اختلافات معنوية بين التراكيب الوراثيه في كل من مرحلة ما قبل ظهور ورقة العلم ومرحلة ظهور ورقة العلم وفترة انبثاق النوره واقل عدد أيام لازمه للتزهير وأقصى عدد أيام لازمه للتزهير ومدة التزهير والنسبه المئوية الكلية للتزهير بينما أظهر التحليل المشترك وجود اختلافات معنوية بين دورات الدفع الضوئي لكل الصفات فيما عدا فترة انبثاق النوره وكذلك مدة التزهير. و كان التفاعل بين التراكيب الوراثيه مع دورات الدفع معنويا لكل الصفات تحت الدراسة.

تم تقسيم التراكيب الوراثيه تبعا لاستجابتها لمعاملات الدفع الضوئي إلى أربع مجموعات:

١-المجموعة الأولى استجابت لمعاملتي ٣٠. ٦٠ دوره دفع ضوئي وشملت عشرة تراكيب وراثية هي NCO 310, G 99-165, F146, F161, CP57-614, EH94-181-1, Ph 7115, CP34- 38, CP31-294, BO 60 ومن المحتمل أن فترة الدفع المناسبة لهذه التراكيب ا تتراوح مابين ٣٠، ٦٠ دوره.

٢- المجموعة الثانية استجابة فقط للمعاملة ٣٠ دون الاستجابة للمعاملة ٦٠ وشملت تركيبتان وراثيتان هما EH 94-119-72 , ROC1 وبالتالي فان المعاملة ٣٠ مناسبة لهذه التراكيب الوراثيه وان الاثنى عشر تركيب وراثي التي استجابت للمعاملة ٣٠ تعتبر سهلة التزهير.

٣- المجموعة الثالثة استجابت للمعاملة ٦٠ فقط وشملت خمسة تراكيب وراثية هي BO55, G95-21, Crystallina, CP 67-412, G98-24 حيث تعتبر الدوره ٦٠ مناسبة لها وأن ٣٠ غير كافيه لدفع النباتات للتزهير ، أما

٤- المجموعة الرابعه فقد اشتملت على خمسة تراكيب وراثية هي CP 44-101,CP 70-1517,CO 301, GT 54-9 , G 68-88 لم تظهر اى استجابة لاى من المعاملتين وبالتالي فإنها تعتبر صعبة التزهير وتحتاج الى عدد اكبر من دورات الدفع الضوئي.