

ESTIMATION YIELD AND YIELD COMPONENTS OF PROMISING CHICKPEA GENOTYPES UNDER DIFFERENT LEVELS OF CHALLENGE HERBICIDE

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ABSTRACT

Afield experiment was carried out in sandy clay loam during winter season 2020-2021 at the field of Agricultural Research Center, Duhok. Two promising chickpea genotypes (FLipo7-223C and FLipo7-245C) using in this study derived from crosses per formed at international center for Agricultural research in Dry Areas (ICARDA). Four levels of challenge herbicide use 0, 0.5, 1.5 L ha⁻¹). The experimental units were laid out in randomize complete block design in three replicates. The results indicated that the Flip 07-245 c chickpea genotype was superior in first pod height (29.5 cm), main and secondary branch per plant (4.383 and 6.808), 100 seed weight (40.409), number of nodules per plant (84.83), number of pods per plant (42.67) and total seed yield (267.89), while the best challenge herbicide was 1.5 l ha⁻¹ because the dose gave the lowest value 8.5, broad leaved weed and 2.33 for narrow leaved weed, there for the seed yield increase with the increase the rate of challenge herbicide. The seed yield correlated positive and significantly with first pod height (0.35), number of nodules per plant 0.828, number of pods per plant (0.537), number of main branchy (0.774) and secondary branches per plant (0.683), while negative significantly with number of broad leaved weed (-0.675) and plant height (-0.705).

KEY WORD: chick pea, challenge, yield omponents.

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is one of the most popular grain pulses in many region world. The seed of chick pea are a good source of carbohydrates and protein, which together constitute about 80 % of the total seed dry weight to human nutrition (Shivch and Drakar and Raj, 2018). The weed is the major cause of low seed chick pea, so that the cleaning of weed increased the seed yield of chickpea by 107%. and the first four to six week after planting were the most critical stage for crop weed competition (Ahlawat *et.al.*, 1981). Better management practices and the speeding type cultivars grow very vigorously and cover the ground surface chickpea production is expected to continue increase (Ahmadi *et.al.*, 2013), also one of the main reasons for low seed yield is weed interference with chickpea reduces seeding dry weight (Mohammadi *et.al.*, 2005), so that, the highest chickpea production and easy harvesting requires careful attention to weed interference and the use of appropriate

management methods to remove or reduce the interference (Mousavi *et.al.*, 2007) Knott and Halila., 1988 indicated that the chickpea yield reduction has been reported to be up to 90% due to the presence of broad and narrow leaf weeds. Early growth of weeds reduced chickpea seed yield to close competition for light, moisture and nutrient, the chickpea above ground positively correlated with the competitive balance index especially in the early stage and with the chickpea plant (Mozhgan *et.al.*, 2020) therefore there is a need for cultivars of chickpea to have the most ability to compete with weed Chickpea cultivars are differ in competition to weeds and its depend on the fast variety growth and plant height ,and also the ability of the variety to take nutrients from the soil to obtain a strong plant. Herbicide play is one of the most imported in weed management because of their efficiency and cost – effectiveness (Mckay *et. al.*, 2002). Datta *et.al.*, 2007 indicated that herbicides that statistically control the weed of chickpea fields a high cost to the farmers, moreover herbicide that effective to controlling

the weed spectrum in one chickpea production. Several researchers' workers on used the chemical herbicides for weed control in chickpea plant and finding that their interaction effect on growth and development of weed and chickpea crop (Kochar et.al., 2009, Taran et.al., 2009, Raj et.al., 2010 and Shivchan drakar and Raj, 2018) The objective of this study to estimate the yield and yield components of promising chickpea under different levels of challenge herbicide.

MATERIALS AND METHODS

Two promising chickpea genotypes FLipo7-223C and FLipo7- 245C) used in this experiment derived from crosses performed at international center for Agricultural Research in the Dry Areas (ICARDA), The experiment conducted at the field of Agricultural (Research Center , Duhok during the crop season 2020-2021. Four

level of challenge herbicide use (0 , 0.5 , 1.0 and 1.5 L/ha⁻¹) , the experimental units were laid out randomize complete bloke design with three replications , the experiment units consist of four rows with four meter length , inter-row spacing was 0.40 m and plant to plant 0.20 m .The land of experiment fertilization by 20,20,20, N.P.K was applied before planting between the rows , the seed rate was 150k ha⁻¹ and the sowing date was 25/11/2020, the four levels challenge herbicide were applied when the plants were at the three to five – node stage .The data were recorded randomly from ten plants on number of nodules per plants , plant height cm ,number of main branches ,number of pods per plant, days to 50 %.flowering and seed yield .Randomize block design using Minitab analysis program,2017 and Duncans Multiple Range Test(DMRT)was used to estimation the superiority of treatment means.

Tabl(1): Soil properties and rain fall in season 2020-2021

Soil	Unit	Depth (0-30 cm)	Month	Rain fall mm
PH	Ds-m-1	7.97	11/2020	25-1
Ec	Mg -kg-1	0.45	12/2020	40-5
Available N	Mg -kg -1	105.95	01/2021	83-0
Available P	g-kg-1	4.84	02/2021	19-20
O.M		17.4	03/2021	40-8
Soil texture		Silt clay	04/2021	2-0
			Mean	35-10

RESULTS AND DISCUSSION

Analysis of variance for chickpea genotypes traits under different challenge herbicide was presented in Table 2. The results indicated that, the chickpea genotypes significant affected on number of narrow leafed weed, first pod height, number of branches per plant, number of nodules per plant and total yield. For herbicide

all traits exhibited significant a effected except first pod height, while the interaction between chickpea genotypes and challenge herbicide levels effect significantly on all studied traits except plant height, first pod height and number main branches per plant. The current observation are in confirmation with finding of Knott and Halila ,1988; Mckay *etal.*, 2002; Rajetal.,2010 and Mozghan *etal.*,2020)

Table (2): Analysis of variance for chickpea genotypes studied characters under different challenge herbicide levels.

S.O.V.	df	Ms									
		Characters									
		No. of broad leafed	No. of narrow leafed	Plant height (cm)	First pod height (cm)	No. of main branches per plant	No. of secondary branches per plant	No. of pods per plant	No. of nodules per plant	100 seed weight (g)	Total yield (g)
Replications	2	4.88	2.54	2.66	11.37	0.02	0.03	20.55	14.62	4.52	49.0
Genotypes (G)	1	0.17	**160.16	12.04	*54.00	**1.35	0.001	9.00	**1426.04	0.01	**51155.4
Herbicide (h)	3	**1714.11	**141.16	**104.15	13.88	**5.47	**15.52	**933.90	**1029.38	**79.52	**15457.9
G x h	3	*14.94	**15.61	3.15	7.44	0.09	**2.31	*39.40	**114.82	**10.57	**2381.37
Error	14	3.21	1.44	3.90	6.08	0.11	0.15	8.64	15.48	1.47	63.3
Total	23										

*significant at 0.05 levels.

**significant at 0.01 level

Table 3 indicated the broad and narrow leafed weeds with different weed control method. The results indicated that the highest broad leafed weed (24.08) by FLipo7-223C, while the maximum number of broad leafed weed 47.67 by no application herbicide. For the interaction between chickpea genotypes and challenge herbicide, the highest value (49.67) was noted by FLipo7-245C at no herbicide application, for the narrow leafed weed, the maximum value 10.0 was record by FLipo7-245 C while no application herbicide obtained the highest value 13.33. Concerning the interaction between

chickpea and challenge herbicide the maximum value 17.33 was obtained by Flip 07- 245 C at no herbicide application. From the results in the same table the chickpea genotypes were differ in effected by narrow and broad leafed weed, also the all challenge herbicide levels exhibited significantly effect on weed when increasing the rate of herbicide. The challenge herbicide at different rate (0.5 to 1.5 L ha⁻¹) were found to be efficient in decreasing weed competition with the crop. Our result are greatly similar to the finding of Taran *et.al.*, 2009 and Shivch *et.al.*, 2018

Table (3): Effect of chickpea genotypes, challenge level and their interaction on number of broad and narrow level weeds.

Genotypes	Broad leafed weeds					Narrow leafed weeds				
	Challenge levels l/ha ⁻¹					Challenge levels l/ha ⁻¹				
	0.0	0.5	1.0	1.5	Mean	0.0	0.5	1.0	1.5	Mean
FLipo7-223C	45.67	23.67	18.67	8.67	24.08	9.33	5.33	3.00	1.67	4.83
	B	c	d	f	A	c	d	e	E	B
FLipo7-245C	49.67	23.0	14.67	8.33	23.92	17.33	13.0	6.67	3.00	10.00
	A	c	e	f	B	a	0 b	d	E	A
Mean	47.67	23.33	16.50	8.50		13.33	9.17	4.83	2.33	
	A	b	C	d		a	b	c	D	

Means that do not share letter are significantly different.

Effect of chickpea genotypes, challenge herbicide levels and their interaction in plant height and first pod height was presented in table 4. From the perusal of the data it was observed that minimum plant height 48.75 cm was recorded by FLipo7-245C and followed by the minimum value 50.17 was noted by FLipo7-223C. The challenge herbicide levels, the maximum plant height was observed at control treatment 54.83cm followed by 50.67cm was recorded by 0.5 L ha⁻¹. Concerning for the effect of challenge herbicide levels and chickpea genotypes, also the FLipo7-223C was recorded the maximum plant height (55.67cm) at zero application of challenge herbicide. The lowest plant height treated plots was might be due to the fact that herbicide greatly reduced the weed infestation but affect the plant by reducing the plant height. The current results are also in line

with the previous work of Emeanky *et.al.*, 2010 and Mozghan *et.al.*, 2020, who reported that the plant height reduced by zero herbicide application. The mean value regarding first pod height showed that the maximum first pod high (29.5cm) was recorded for FLipo7-245C, while the effect of challenge herbicide levels the higher first pod height was obtained by 0.5 L h and the value was 30.17 cm. For the interaction between challenge herbicide and chickpea genotypes, the results in table 4 revealed that the maximum first pod height was found in combination FLipo7-245C and 0.5 L ha⁻¹. from the result, pre-emergence herbicide are more effective on broad and narrow leafed weed .the results are also in conformity with those of Hassan and Khan 2007, who also reported that herbicides significantly reduce the weed.

Table(4): Effect of chickpea genotypes, challenge herbicide level and their interaction in plant height and first pod height.

Genotype	Plant height					First pod height cm				
	Challenge levels l/ha ⁻¹					Challenge levels l/ha ⁻¹				
	0.0	0.5	1.0	1.5	mean	0.0	0.5	1.0	1.5	Mean
FLipo7-223C	55.67 a	50.67 bc	46.33 d	48.00 cd	50.17 a	26.67 b	27.33 B	24.67 B	27.33 B	26.5 b
FLipo7-245C	54.00 Ab	50.67 bc	45.67 d	44.67 d	48.00 b	28.00 b	33.00 A	28.67 b	28.33 B	29.5 a
Mean	54.48 A	50.67 b	46.00 c	46.33 c		27.33 ab	30.17 A	26.67 b	27.83 Ab	

Means that do not share letters are significantly different

The statistical analysis data in Table 5 revalued that, the maximum main branches(4.383)was recorded by FLipo7-245 C while challenge herbicide adversely affect the main branches per plant, the highest value (5.15) was exhibited at 1.5 L ha⁻¹. Here as the lowest main branches per plant 2.867 was observed in treatment control, on the other hand maximum value of main branches per plant (5.533) at the combination of FLipo7-245 C and 1.5 L ha⁻¹. Concerning of the secondary branches per plant, the results in the same table showed that the maximum value (6.808) was recorded by FLipo7-245C and the maximum value for the same trait (8.633) was observed at 1.5 L ha⁻¹ while the interaction between chickpea genotypes and challenge herbicide levels, the combination was FLipo7-245C with 1.5 L/ ha⁻¹, and recorded value 9.3367. From the results in the main and secondary branch per plant as a

result of effective weed management of the growing weed in the chickpea crop. The challenge herbicide was found efficient in decreasing weed competition with the crop and resulted high main and secondary branches per plant. The results are also in conformity with those of Shivch *et.al.*, 2018 and Mozghan *et. al.*, 2020).

Table (5): Effect of chickpea genotypes, challenge herbicide level and their interaction in main and secondary branches per plant.

Genotype	Main branches per plant					Secondary branches per plant				
	Challenge levels l/ha^{-1}					Challenge levels l/ha^{-1}				
	0.0	0.5	1.0	1.5	Mean	0.0	0.5	1.0	1.5	Mean
FLipo7-223C	2.567 e	3.967 b c	4.333 b c	4.767 B	3.908 b	5.50 e	6.333 d	7-433 b c	7.9 00 b	6.7 92 b
FLipo7-245C	3.167 d	4.267 b c	4.567 B	5.533 A	4.383 a	4.033 f	6.767 cd	7-067 c	9.3 67 a	6.8 08 a
Mean	2.867 c	4.117 b	4.450 B	5.150 A		4.767 d	6.55 c	7-25 b	8.6 33 a	

Generally, in legume plants, number of nodules per plant is considered as an index for accessing the fixation of nitrogen, therefore, it plays fundamental role in the growth and development of legume in our crop plant. Under the current investigation all the tested challenge herbicide depicted variable results in term of number of nodules per plant. The data in table 6 exhibited that the maximum 84.83 was recorded by FLipo7-245C genotypes, while the maximum value for the same trait (91.17) counted by 1.5 L ha^{-1} application. For interaction between chickpea genotypes and challenge herbicide, the maximum value (93.67) was observed in FLipo7-245C and 1.5 l/ha^{-1} . In the similar

studies (Kahan *et. al.*, 2011 and Raj *et. al.*, 2010) reported that higher dose of challenge herbicide suppressed the growth of root nodules bacterium. For number of pods per plant, the results in table6 exhibited that the maximum number pod plant 28.17 was observed in FLipo7-245C and the maximum pod per plant were 44.17 was counted by 1.5 L ha^{-1} application, while the interaction between chickpea genotypes and challenge herbicide, the highest value (42.67) was obtained in combination of FLipo7-245C and 1.5 L ha^{-1} herbicide application. These results were agreement with Ijaz *et.al.*, 2018 and Ahmadi *et. al.*, 2013.

Table (6): Effect of chickpea genotypes, challenge herbicide level and their interaction in number of pods and nodules per plant.

Genotype	Number nodules per plant					Number pods per plant				
	Challenge levels L/ha^{-1}					Challenge levels L/ha^{-1}				
	0.0	0.5	1.0	1.5	Mean	0.0	0.5	1.0	1.5	Mean
FLipo7-223C	14.9 e	20.0 de	37.0 B	45.67 a	29.39 a	48.0 e	64.67 d	76.33 C	88.67 Ab	69.42 B
FLipo7-245C	17.33 e	23.33 e	29.33 C	42.67 a	28.17 a	72.33 c	85.33 b	88.0 Ab	93.67 A	84.83 A
Mean	16.12 d	21.67 c	33.17 B	44.17 a		60.17 d	75.0 c	82.17 B	91.17 A	

Means that do not share letter are significantly different.

The data regarding the 100seed weight table 7 showed that significant different herbicide treated plots maximum 100seed weigh (34.65 g) was record in FLipo7-245C and also the maximum value (38.919) was observed in 1.5 L ha^{-1} while the nitration between chickpea genotypes and herbicide levels, the maximum l/ha^{-1} challenge herbicide application .for the interaction, the highest value(332.3g)was obtained by combination FLipo7-245C and 1.5 L

value (40.40g) was obtained in combination FLipo7-245C and 1.5 l/ha^{-1} of challenge. The analysis data cocering the total grain yield. The same table exhibited maximum seed yield 267.89 was showed in FLipo7-245C and the highest value 271.5gwas achieved in 1.5 l/ha^{-1} , while the lowest value (13 8.0g) was observed in FLipo7-223C and zero herbicide application .From the result in Table7, challenge

herbicide was effective for controlling , the weed spectrum in chickpea production .Also the choices post- emergence effective in controlling weeds at early stage of seedling growth, similar

findings were also reported in chickpea Mochgan *etal.*,2020 and Ijaz *etal.*,2018.

Table (7):- Effect of chickpea genotypes, challenge herbicide level and their interaction in 100 seed weight and total seed yield.

Genotype	100 seed weight(g)					Total seed yield				
	Challenge levels L/ ha ⁻¹					Challenge levels L/ha ⁻¹				
	0.0	0.5	1.0	1.5	Mean	0.0	0.5	1.0	1.5	Mean
FLipo7-223C	31.9e	33.89 de	35.19cd	37.43b	34.6a	138.0g	157.9f	195.1e	210.7d	175.4b
FLipo7-245C	28.72 f	33.06e	36.44bc	40.4a	34.65a	171.5f	266.6c	300.5b	332.3a	267.8a
Mean	30.31d	33.47c	35.81b	38.91a		154.8d	212.2c	247.8b	271.5a	

Means that do not share a letter are significantly different.

The correlation coefficient estimated for the nine variable are showed in Table 8. Negative and positive high significantly correlation were recorded between seed yield number of broad leafed weed (- 0.675), plant height (-0.705), first pod height (0.350), number of nodule per plant (0.828), number of pods per plant (0.537), number of main branches per plant (0.774) and secondary branches per plant (0.683), while the 100 seed weight exhibited significant and non-significant correlated with some traits. this trait showed negative significant with number of broad and narrow leafed weeds, plant height with

values – 0.890, -0.774 and -0.768 respectively, while the 100seed weight showed positive and significant effect with number of nodule per plant number of pods per plant and main secondary branches per plant and recorded (0.628,0.803,0.816, and 0.910 respectively. Plant height gave positive correlated with broad leaf 0.836 and narrow leaved weed 0.599. the difference in the correlation coefficient between different characteristics reported by different authors in chickpea may be due to difference in genetic variability and environmental condition (Ahmed *etal.* , 2016 ; Banik *etal.*, 2017 and Agrawal *etal.*, 2018).

Table(8):- Simple correlation coefficient between yield and studied characters.

	No. of broad leaves	No. of narrow leaves	Plant height	1 st pod height	No. of nodules per plant	No. of pods per plant	No. of pods per plant	No. of secondary branches	Seed yield
No. narrow leaves	**0.775								
Plant height	**0.836	**0.599							
1st pod height	-0.026	*0.384	-0.067						
No. of nodules per plant	** -0.755	-0.278	**	- 0.236					
No. of pods per plant	** -0.834	** -0.735	**	- -0.211	** 0.750				
Main branches	** -0.892	** -0.735	**	- 0.069	** 0.844	** 0.797			
Secondary branches	** -0.908	** -0.791	**	- -0.017	**0.650	** 0.835	** 0.823		
Seed yield	** -0.675	-0.229	**	- *0.350	** 0.828	** 0.537	** 0.774	** 0.683	
100 seed weight	** -0.890	** -0.774	**	- -0.113	** 0.628	** 0.803	**0.816	** 0.910	**0.669

CONCLUSION

Challenge herbicide is important for improving chickpea production and the challenge herbicide in this study is the most reduce broad and narrow leafed weed. The yield of FLipo7-245C increasing in yield and some yield components, the reason may be due to the effectiveness of challenge herbicide in eliminating the weed in experiment. For recommendation from this study are that replicated the experiment in different location or different seasons.

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هه لسه نگاندا به رهه می و پیکهاتین وی بو دوو جورین نوکی دبن ئاستین جیاواز قرکین جانج

پوخته

هه لسه نگاندا به رهه می و پیکهاتین وی بو دوو توخمین سه رکه فتی یین نوکی دبن ئاستین جیاواز یین قرکین جانج. ئە ڤه کولینه هاته ئە نجامدان دئاخه کا تیکه لوک ژبو وه زوی زڤستانی لسا 2021-2020 بکارئینا قرکری جانج ل زه ڤیین ریفه به ریا ڤه کولینین چاندنی ل دهوک. دوو توخمین سه رکه فتی یین نوکی هاته بکارئینان (FLipo7-245C, FLipo7-223C) ئە وین هاتینه بده سته ئینان ژ ریکخواوا ایکاردا، چار ئاستین جیاوازی قرکری جانج (0, 0.5, 1.0, 1.5 لتر/هکتار). ئە ڤه کولینه هاته دیزاین کرن بدیزاین کهرتین هه رهه می یین دروست و سی جارکی. ئە نجامین ڤه کولین دیارکر توخمی (FLipo7-223C) سالوخته تین ئیکه م کلنک (29.5 سم) و چه ڤین سه ره می و نه سه ره می دروهه کی (4.383, 6.808) و کیشا 100 دندکا (40.40 گم) و ژمارا نودلین به کتریای و به رهه می توڤی (267.8 گم)، دمه کیدا ئاستین جیاواز یین قرکری جانج کارئین جیاواز هه بو لسه ئاستی (1.5 لتر/هکتار) کو کیمترین ژمارا به لگین فرهه (8.5) و کیمترین ژمارا به لگا (2.33)، و هاته تیبینی کرن کو به رهه می یی بلند بو دگهل بلندی ریزا قرکری دیشاندایه کا کارئیکرنا قرکری لسه ده غه لی. سه بارهت په یوه ندیا به رهه می دگهل سالوخته تین دی دیاربوو په یوه ندیه کا پوزه تیڤ و به رچاڤه دگهل بلندایا رووه کی (0.35) و ژمارا نودلین به کتریایی دروهه کیدا (0.828) و ژمارا که لیکا دروهه کیدا (0.537) و چه ڤین سه ره می (0.77) و نه سه ره می (0.683) د دمه کیدا په یوه ندیا سالوخته تین دیتر دگهل به رهه می یا نیگه تیڤ بو و دبه رچاڤ بو دگهل پیکهاتین به رهه می (0.675) دگهل ژمارا ده غه لین فرهه و بلندایا رووه کی (0.705).

تقدير الحاصل و مكوناته لصفین واعدده من الحمص تحت مستويات مختلفه من مبيد جانج

الخلاصة

تقدير الحاصل و مكوناته فی ترکیبین وراثین متفوقین من الحمص مكونات تحت مستويات مختلفه من مبيد جانج طبقت التجربة فی تربة طينية مزيجية للموسم الشتوی لعام 2021-2020 باستخدام مبيد جانج فی محطه البحوث الزراعيه فی دهوك. استخدام ترکیبین وراثین متفوقین من الحمص (FLipo7-245C, FLipo7-223C) التي تم الحصول عليها من ايكاردا كما استخدمت اربعة مستويات من مبيد جانج هي 0 و 0.5 و 1.0 و 1.5 لتر/هكتار المعاملات فی تجربة عاملية و بتصميم القطاعات العشوائيه الكامله و بثلاثه مكررات اظهرت النتائج التركيبی الوراثة FLipo7-223C فی الصفات اول قرنة (29.5 سم) و الفروع الرئيسيه و الثانويه فی النبات 6.808 و 4.383 و وزن 100 بذرة (40.40 غرام) و عدد العقد البکتریه و حاصل البذور (267.8 غرام) بينما اظهرت المستويات المختلفه من مبيد Challenge تأثيرات مختلفه و كان أفقها المستوى 1.5 لتر/هكتار حيث اعطى اقل عدد الاوراقیه العریضه (8.5) و اقل عدد من الاوراقه الرقميه (2.33) و يلاحظ ایضا ان الحاصل قد ازداد بزیارة تركیز المبيد من دلیل عن تاثیر المبيد عن الادغال أما بالنسبه للارتباط بین الحاصل و بعض الصفات فقد الحاصل ارتباط محتوي و موجب مع ارتفاع اول قرنه (0.35) و عدد العقد البکتریه فی النبات 0.828 و عدد القرناات فی النبات 0.537 و عدد الفروع الرئيسيه (0.774) و عدد الفروع الثانويه 0.683 فی حين كان ارتباط الصفات الاخری مع الحاصل سالباً و مقویاً مكانت محته (-0.675) مع عدد الادغال عریضه و -0.705 مع ارتفاع النبات

الكلمات الدالة: حمص Challenge- الحاصل و مكوناته