GSC Advanced Research and Reviews

eISSN: 2582-4597 CODEN (USA): GARRC2

Cross Ref DOI: 10.30574/gscarr

Journal homepage: https://gsconlinepress.com/journals/gscarr/

(REVIEW ARTICLE)

Check for updates

A review: Effect of planting distances on some sunflower cultivar's quality

Shathar Abdulhamza. Alaamer [1], Salih Kadhum. Alwan Alsharifi [2,*] and Naim Shtewy [3]

[1] *Department of Plant Production Techniquse, Kufa Technical Institute, University of Al-Furat Al-Awsat Technical, Iraq.*
[2] *Department of Agricultural Machinery, University of Al-Qasim Green, Iraq.*
[3] *Department of Field Crop, University of Al-Qasim Green, Iraq.*

GSC Advanced Research and Reviews, 2022, 12(03), 153–160

Publication history: Received on 11 August 2022; revised on 19 September 2022; accepted on 21 September 2022

Article DOI: https://doi.org/10.30574/gscarr.2022.12.3.0244

Abstract

The influence of planting distances (PD) on growth of sunflower (*Helianthus annuus* L) yield, for two cultivars of Euroflor (EU) and Peredovick (PE), were tested at three PD of 20, 25 and 30 cm. The experiments were conducted in a factorial experiment under complete randomized design with three replications. The results showed that the EU cultivar was significantly better than the PE in all studied conditions. The RL, RDFW, PDFW, SD,LA,Sl and BY , 22.524 cm , 149.635g, 182,091g 36.70 mm, 7776 cm^2, 19.91mm and 7.215 t.ha-1, the treatment of PD of 30 cm was significantly superior to the levels of 20 and 25 cm in all studied conditions.

Keywords: Sunflower; Planting distances (PD); Euroflor (EU) and Peredovick (PE); Drip irrigation system

1. Introduction

Sunflower crop has become one of the most important oil crops, after the development and genetic improvement that took place in its productivity and the oil content of its seeds (raising the oil percentage) and its adaptation and suitability [1],[2] Before 2003, there was great interest from the Agriculture Ministry in planting strategic crops such as wheat, rice, corn and sunflower, at that time, the Iraqi farmer was receiving support from the Ministry in all growth stages for the crop, but nowadays, the productivity of these crops has decreased, as researchers we seek to use the modern scientific method to raise the production level, and encourage farmers to exploit their lands with the least capabilities with highest profit[3], [4]. The seeds contain 39-49% good edible oil of light-yellow color, and the oil percentage in some improved varieties may reach more than 50%, sunflower oil contains essential fatty acids necessary for the growth and functions of the body, most of which are unsaturated fats that lower cholesterol in the blood [5], [6]. In addition, sunflower seeds contain about 30% digestible protein by more than 90%, and when peeled, the protein content is about 40%, and its nutritional value depends on the efficiency of removing the shell and extracting the oil, as increasing the percentage of the shell reduces the value of the gain as animal feed, the dry heads can be ground (after separating the seeds) and used in animal feed [7], [8]. Preparing the soil to make it a suitable environment for germination and this is done by preparing a good cradle suitable for germination and spreading roots ease, this means that the soil surface is loose and fragile free of lumps, weeds and remnants of the previous crop, this is done by deep good plowing of the soil with a depth of at least 20-25 cm, the ground crawls and is well leveled, and then split the field with distances according to the work method [9], [10], [11]. The study of [12], [13], [14], showed that increasing the cultivation distances has a moral effect, during increasing all growth characteristics of the crop, and this is reflected in increasing its productivity and improving its quality. Increasing planting distances and cultivar choose was cause increases the seed output [15], [16]. [17] Plant spacing significantly affected most estimated characters with the highest yield [18], [19]. Showed in a study carried out on sunflower plants that there was a significant swell in plant height, stem diameter, leaf area and leaf area index, when good growth characteristics are available, it includes fertile soil with good drainage, chemical and

* Corresponding author: Salih K. Alwan Alsharifi
Department of Agricultural Machinery, University of Al-Qasim Green, Iraq.

organic fertilizers according to the need for plant, and control materials throughout the growing season for sunflower plants [20], [21]. The purpose of the study was to evaluate the plant sunflower productivity for Euroflor (EU) and Peredovick (PE) cultivars at different planting distances.

2. Material and methods

The experiments were done at three levels of planting distances at levels of 20* 75, 25* 75 and 30* 75 cm (Fig.1). The Euroflor (EU) and Peredovick (PE) cultivars was selected for the experiments. This study was designed in the Alhashemia area, of the Directorate of Babylon Agriculture, In this study the four cylinders a New Holland 66s -80tractor with a horsepower of 80 hp was use with mold board plow on depth of 22- 25 cm to soil stir and provide smooth soil for growth seed, chemical fertilizers were added (DAB type), at a rate of 400 kg.ha-1, then the field was divided according to the planting distances planned in the experiment, after which the seeds were planted using the planting machine (Blanter type) [22]. drip irrigation system was used in this experiment, according to the method used by [23]. The planting operations during growing season are hoeing operations, after a month from the germination stage, adding fertilizers in two batches during the germination stage, while the second batch is in the flowering stage. Irrigation interval, was 8 irrigations during growing season ,weed control, by in flames on two batches during the germination and flowering stage . The root length (RL) , root dry and fresh weight (RDFW), plant dry and fresh weight (PDFW), stem diameter (SD), Leaf area (LA), seed length (SL) and biological yield (BY), were calculated for each running test

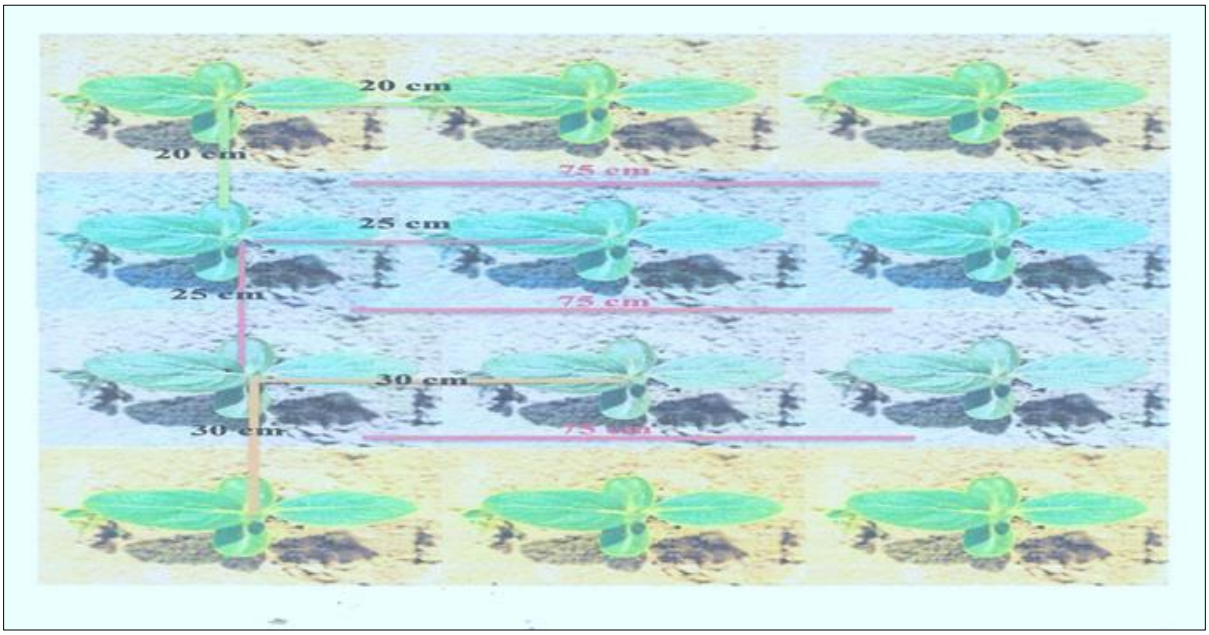

Figure 1 Planting distances

2.1. Soil texture

All soil properties (soil density and porosity) were calculated, during the plant growing season, as random samples were taken for several locations in the experimental field after a month of germination, two months of germination , the end of the season ,according to the methods used by [14], [22], the equations below were used to calculate it. [24] [25].

$$W_{=\frac{W_w}{W_s}\times 100} \text{ ..... (1)}$$

Where: W is soil humidity ratio (%), W_w is mass wet soil(kg), W_s is mass dry soil.**(**kg**)**

$$P_{b=\frac{M_S}{V_T}} \text{ ..... (2)}$$

Where: P_b: (mg. m^{-3}), M_S: (mg), V_T: total volume (m^3).

$$T_{SP=\left(1-\frac{P_b}{P_S}\right)\times 100} \text{ ..... (3)}$$

Where: T_{SP}: (%), P_b: (mg.m^{-3}), P_S : partial density (2.65 mg.m^{-3}). [26]

Table 1 Chemical and physical analysis of soil particles

Depth	**Texture %**			
0-25 (cm)	**Clay**	**Silt**	**Sand**	
	43	27	30	Silt Clay loam
	Soil physical properties			
	Pb (Mg m^{-3})	**TSP (%)**	**SPR (Kpa)**	
	1.32	50.18	1672.13	
	1.33	49.81	1645.08	
	136	48.67	1701.45	
VA	1.34	49.55	1756.32	
0-25	**Soil chemical properties**			
	E.C (ds\ cm^3)	**HP**		
	1.51	6.64		
	Soluble cation meq\I			
	Na	**K**	**Ca+Mg**	
	11.22	13.35	56.12	
	O.C (%)	CEC Meq\100 g)	CaCo3 (%)	O.M (%)
	0.55	32.81	4	0.64

2.2. The Crop and Its Attributes

2.2.1. Root Length

It was calculated according to [4, 10]

2.2.2. RDFW

2.2.3. PDFW

2.2.4. Stem Diameter (cm): Calculated using the (Vernier machine. [6]

2.2.5. Leaf area (cm^2): It was calculated according to the method used by [27] .

$$LA = \sum SWFRL \times 0.04$$

Where;

The sum of the squares of the width of the fifth roll leaf × 4.04

2.2.6. Seed length (mm): Calculated using (Vernier machine) [16, 17]

2.2.7. Biological Yield

$$B_{Y=Rp\times PD}$$

Where:

B_Y; Biological yield (t.ha^{-1}),
RP; Dry plant weight (kg),
PD; Plant density.ha^{-1}. [28].

Figure 2 Field experiment

The obtained results were analysed in the field according to the method approved by Alsahoeke, and Creama [29], Oehlert [30].

3. Results and discussion

3.1. Plant traits and roots

Table (2) shows PD had a more impact on plant traits and roots. As the PD of 30 cm registered the higher means 23.012 cm, 151.524 g, and 183.069g, as compared to PD of 20 cm, that a prominent dwindling in the plant and roots properties during the growing season were 20.082 cm ,145.688 g and177.124 g for RL , PDFW and RDFW. When the distance between plants is increased, plants' competition in obtaining the nutrients necessary for growth, decrease in the weeds growth and jungles harmful to the plant decreases, the ease of carrying out crop service operations, including hoeing, adding fertilizers, and controlling, using agricultural machinery. [4], [5]. All plant traits and roots increased with EU cultivar and scored the higher results 22.524 cm,149.635g and 182.091 g, as compared with PE cultivar which gave the lower results20.317 cm, 146.590 g and 177.798g, respectively, [10], [13]. The interaction among EU cultivar and the PD of 30 cm was the best (24.406 cm, 154.136 g and 186.003 g). The levels of the plant traits and roots at various conditions are shown in Figure 3 for both Cu and PD.

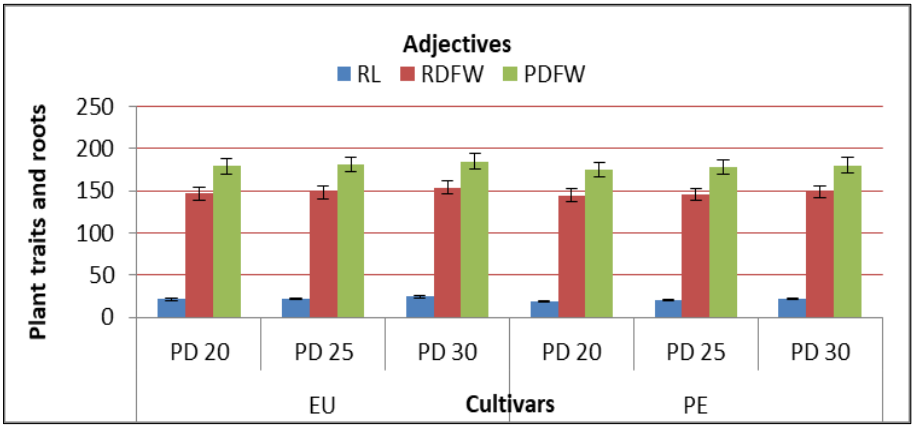

Figure 3 Influence of PD and Cu on plant traits and roots

Table 2 Influence of PD and Cu on plant traits and roots

Cultivars	PD cm	RL	RDFW	PDFW
EU	20	21.041	146.562	179.021
	25	22.126	148.208	181.248
	30	24.406	154.136	186.003
PE	20	19.124	144.815	175.228
	25	20.209	146.042	178.047
	30	21.618	148.913	180.121
Cu	EU	22.524	149.635	182.091
	PE	20.317	146.590	177.798
PD	20	20.082	145.688	177.124
	25	21.168	147.125	179.648
	30	23.012	151.524	183.062
LSD=0.05	Cu	1.208	1.391	1.421
	PD	1.416	1.566	1.615
	Cu*PD	2.065	2.204	2.622

3.2. Plant traits and productivity

Table (3) shows PD had a more impact on plant traits and productivity SD,LA, SL and BY . the EU cultivar registered the higher means 36.70 mm, 7776 cm^2, 19.91 mm and 7.215 $t.ha^{-1}$, as compared to PE cultivar, that a prominent dwindling in the plant traits and productivity were 31.30 mm ,6259 cm^2, 18.34 mm and6.181$t.ha^{-1}$ for SD, LA, SL and BY. The reason for this is due to the nature of the variety in its suitability to climatic conditions and its tolerance of dry seasons during the growth stages [2], [8]. All plant traits and productivity increased with PD of 30 cm and registered the higher results 38.28 mm, 9681 cm^2, 21.23mm and 7.504 $t.ha^{-1}$ respectively, as compared with PD of 20 cm and PD of 25 cm they registered the lowest results in this study, When the distance between plants is increased, plants' competition in obtaining the nutrients necessary for growth decrease, in the weeds growth and jungles harmful to the plant decreases, the ease of carrying out crop service operations, including hoeing, adding fertilizers, and controlling using agricultural machinery. [6], [27] The interaction among EU cultivar and the PD of 30 cm was the best (41.73mm,10591 cm^2, 22.56 mm and 8.013$t.ha^{-1}$). The levels of the plant traits and productivity at various conditions are shown in Figure 4 for both Cu and PD.

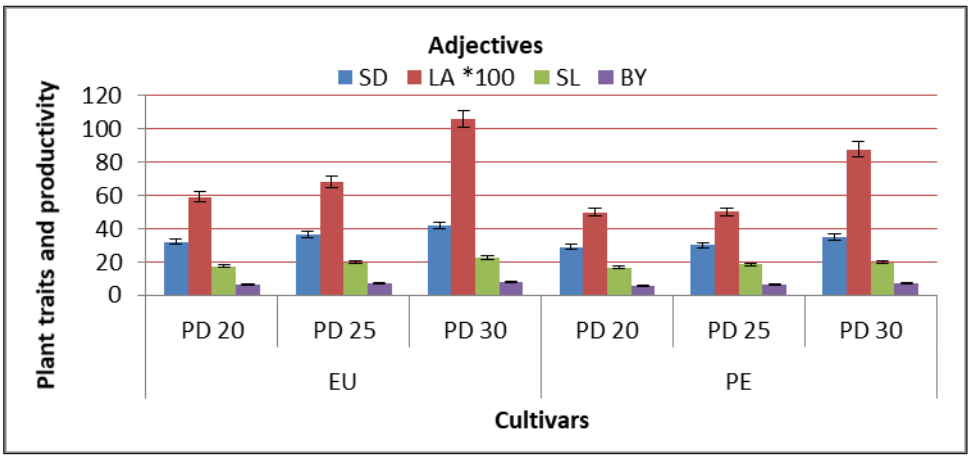

Figure 4 Influence of PD and Cu on plant traits and productivity

Table 3 Influence of PD and Cu on plant traits and productivity

Cultivars	PD cm	SD mm	LA cm^2	SL mm	BY $t.ha^{-1}$
EU	20	32.11	5922	17.33	6.429
	25	36.26	6817	19.81	7.204
	30	41.73	10591	22.56	8.013
PE	20	28.91	4995	16.72	5.408
	25	30.18	5012	18.43	6.141
	30	34.82	8771	19.88	6.996
Cu	EU	36.70	7776	19.91	7.215
	PE	31.30	6259	18.34	6.181
PD	20	30.51	5458	17.02	5.918
	25	32.22	5914	19.12	6.673
	30	38.28	9681	21.23	7.504
LSD=0.05	Cu	1.242	8.043	1.421	0.44
	PD	1.843	9.184	1.617	0.52
	Cu*PD	2.174	10.261	2.013	1.93

4. Conclusion

There were significant differences between the treatment of planting distance at a level of 30 cm it gave the best results compared to the two treatments 20 and 25 cm and this is good economically. EU cultivar was superior than the PE cultivar in most of the studied traits.

Compliance with ethical standards

Acknowledgments

Thanks and appreciation to everyone who contributed to this article.

Author Contributions

SKA and NSH: proposed the research and finalizing the manuscript, data collection, SH and NSH analysis and drafted the manuscript. All authors provided critical feedback and helped to shape the manuscript.

Disclosure of conflict of interest

The authors declare no conflicts of interest.

References

[1] S.k.Al Sharifi,. The effect of two types of plows at different depths and speeds in the performance of mechanical unit and some physical soil properties. Journal of University of Babylon, 2009, vol 17, no1, pp; 182-205.

[2] S.A. Alaamer, S K. A. Alsharifi , N. Shtewy. Wheat parameters under influence of the depths and cultivation machinery,Third International Scientific Conference of Agriculture, Environment and Sustainable Development. Al-Qadisiyyah,Iraq. IOPConf. Series: Earth and EnvironmentalScience. 2022, Vol.1060,no.1.pp;012131.

[3] S.K. Alsharifi. Affecting on threshing machine types, grain moisture content and cylinder speeds for maize, Cadiz variety Agricultural Engineering International: CIGR Journal, 2018, vol20 no.3,pp: 233–244.

[4] S.K. Alsharifi, A.A.Ghali, and I.J. Hamzah (2021a). A study some growth characteristics for maize, Bohooth 106 variety under affecting mechanical for machine (moldboard plow type). In IOP Conference Series: Earth and Environmental Science, 2021a, (Vol. 735, No. 1, p. 012007).

[5] M.Y.Alsharifi, S.K. ALsharifi and A.A. Maryam . A study some rice growth properties under impact practical speed and tillage depth .Euphrates Journal of Agriculture Science 2020.Vol.12,no1pp: 110- 121.

[6] K. Iqbal, A. Al-Hassani, and H. A. M. Al-Mughair. The Effect Of planting distances And different fertilizer combinations on some growth traits of sunflower crop (Helianthus AnnuusL.). Nat. Volatiles & Essent. Oils, 2021. vol. 8, no. 4, pp; 2288-2298,

[7] M. Awais, A. Wajid; A. Ahmad; M. F. Saleem; M.U. Bashir; U. Saeed; J. Hussain and M. Habib- ur Rahma. Nitrogen Fertilization and Narrow Plant Spacing Stimulate Sunflower Productivity. Turk J. Field Crops, 2015 vol,20,no.1,PP: 99-108.

[8] N.Al-Zubaidi, and H.M.A. Al-Awsi. The effect of humic acid and chelated iron on the yield of my sunflower cultivar (Helianthus annuusL.). Diyala Journal of Agricultural Sciences. 2017, Vol 9, no 1.pp: 238-228.

[9] S.K.Alsharifi, N. Shtewy, and T.H Al-Janabi,. The effect of sowing methods on the growth characteristics of wheat in Alhashmeia, Iraq. Asia Life Sciences,2020a, vol10, no.4, pp; 675-685.

[10] N.Shtewy, I.J.Ibrahim, andS.K. Salih,. Effect of mechanical properties on some growth characteristics for wheat crop. Plant Archives, 2020a, vol20,no.1, pp; 3141-3148 .

[11] S.A.Alaamer, S.K. Alsharifi, and N. Shtewy,. Effect of sowing methods on wheat cultivar (IBBA 99). International Agricultural Engineering Journal. 2021a, vol30,no 2,PP;1-8.

[12] S.k.Alsharifi, and S.H. Ameen, .Study some performance indicators and soil physical properties for wheat Zagros variety. Euphrates Journal of Agriculture Science, 2018, vol10,no.4.pp; 23-35.

[13] N.Shtewy, and S.K. Al-Sharifi,. Effect of sowing methods, sowing depth and sowing distances on some characteristics of growth and wheat yield. Asia Life Sciences, 2020b, vol.10,no.5.pp; 775-781.

[14] M.S.Al-Jezaaria, S.K. Alsharifi, and S.A Alaamer. Evaluation of innovative planting methods on rice cultivar (Amber shamiya). International Agricultural Engineering Journal. 2021, vol30,no.3.pp:9-18.

[15] A.A.Bajehbaj, N. Qasimov, N. and M.Yarina. Effects of drought and potassium on physiological and morphological traits of some cultivars of sunflower. Journal of Food, Agriculture & Environment, 2009, vol7,no.(3&4)pp:448-451.

[16] A.A.Ghali, S.K. Alsharifi, and I.J. Hamzah,. A study the effect of planting machine (type Adwhit) on potato specification, Bintje cultivar. Plant Archives, 2020, vol20, no.2.pp: 981-989.

[17] A.Alaamer. and S.K. Alsharifi. Effect of sowing methods on wheat variety (IBBA 99).International Agricultural Engineering Journal, 2021b, vol,30,no.3.pp;1-8.

[18] A.M.Abdou, K.M. Abd El-Latif, R.M.F. Farrag, and K.M.R.Yousef, K. M. R. Response of sunflower yield and water relations to sowing dates and irrigation scheduling under middle Egypt condition. Adv. Appl. Sci. Res.2011, Vol 2 no.3.pp;141-150.

[19] S.A.Alaamer, and S.K. Alsharifi. Effect of mechanical properties on some growth characteristics for maize, SYN5018 variety. Plant Archives. 2020, vol20.no.2.pp; 1150-1155.

[20] B.H.Abdullah,. Response of growth and yields of three sunflower genotypes (*Helianthus annuus* L.) to arrangement system of plants in farm. Anbar Journal of Agricultural Sciences, 2008, vol 6, no. 1.pp;49-73.

[21] A.A.Ahmed, and A.J.H. Al-Tamimi. Effect of humic acid and anti-transpiration agents on the growth and yield of sunflower under water stress conditions. Iraqi Journal of Soil Sciences.2020, vol 20, no.1.pp;157-170

[22] S.K.Alsharifi , N. Shtewy and .A.Alaamer "Affecting mechanical on some growth properties for corn ,MAHA cultivar. Third International Scientific Conference of Agriculture, Environment and Sustainable Development. Al-Qadisiyyah, Iraq. IOP Conf. Series: Earth and Environmental Science2021b,vol.735,1.pp;012009.

[23] M. Y.Alsharifi1, H A. Atab, and S K. A. Alsharifi. Response of corn at different levels of nitrogen fertilizer and cultivation distances. Third International Scientific Conference of Agriculture, Environment and Sustainable Development. Al-Qadisiyyah, Iraq. IOP Conf. Series: Earth and Environmental Science 2022, vol.1060.1.pp; 012134.

[24] W. Hu, M.A. Shao and B.C..Si Seasonal changes in surface bulk density and saturated hydraulic conductivity of natural landscapes. European Journal of Soil Science2012, vol 63 no.6.pp:820- 830. https://doi:10.1111/j.1365-2389.2012.01479.x. 2012

[25] S. K. Al-Sharifi, I.J. Hamzah, and M.Y. Alsharifi. Study some performance indicators, soil physical properties and growth characteristics for wheat AlNOOR variety. Fayoum Journal. Agriculture. Res, & Dev., 2020b, Vol 34.no.1.pp; 448-463.

[26] S.K. Alsharifi, A.Ghali,and N. Shtewy. Effect practical speed an tillage depth on some soil physical properties and growth characteristics for maize SYN5018 variety. Fayoum J. Agric. Res,&Dev.,2020 vol34, no. 1(B).pp;464-480.

[27] H. M. Hardan, and M.M. Al-Sahouki. Estimating the leaf area of a sunflower plant by adopting one turn and the relationship of the result to the diameter of the disc. Journal of Agricultural Sciences. 2014, Vol 45, no 5. pp:47-39.

[28] N. Shtewy, S. K. Al-Sharifi, and S.A. Alaamer,. Affecting of sowing depth and seed size on some growth characteristics for wheat, Alnoor variety. Asia Life Sciences, 2020c, vol10,no.4.pp; 687- 696.

[29] M. M. Alsahoeke, and M. Creama. 1990. Applications of design and analysis of experiment. Baghdad University, College of Agriculture, Ministry of Education and Scientific Research. Pp. 49-88.1990.

[30] G. W. Oehlert,. A first course in design and analysis of experiments. Design- Expert is a registered trademark of Stat-Ease, Inc. Library of Congress Cataloging-in-Publication Data. University of Minnesota. P 2010, p: 85-189.