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Research Article

The Effects of Iron Application Foliarly at Different Times and Amounts on Agricultural Characteristics in Some Peanut Varieties

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ABSTRACT

This study aimed to determine the effects of treated iron doses on agricultural characteristics by applying foliar in some peanut varieties (NC-7 and Sultan). It was conducted at different times (flowering period and pod formation period) and doses (control, 400 kg da $^{-1}$, 500 kg da $^{-1}$, 600 kg da^{-1}) in the farmer's field in the Göçmenler district in the Hardallık village of Kadirli, Osmaniye, in April and September of 2020. The study was arranged in a "Split-Split Plots Experiment Desing" with three replications, and varieties to the main parcels, treatment time to the sub-parcels, iron doses to the sub-sub-parcels, were treated. In the study, variety, dose, variety x dose, time x dose, variety x time x dose interactions were statistically important in pod yield. In terms of number of pod per plant, 100 pod weight, 100 seed weight; variety x dose, time x dose, variety x time x dose interactions are important, however in the seed ratio, these interactions turned out to be statistically insignificant except variety. According to the results obtained, the highest pod yield was obtained as 521.1 kg da^{-1} from treatments of Sultan varieties in terms of varieties; it was obtained as 544.5 kg da $^{-1}$ from pod formation period and 400 kg da $^{-1}$ dose in terms of variety x time interaction and it was obtained as 512.6 kg da $^{-1}$ from 400 kg da^{-1}treatment in terms of dose. As a result; for both periods to achieve high pod yield in peanut cultivation, 400 kg da $^{-1}$ iron dose treatment and Sultan variety in Osmaniye conditions can be recommended.

1. Introduction

Although iron is the most abundant nutrient element in the soil, iron deficiency is an important nutritional problem in agricultural areas, especially in areas where calcareous peanuts are grown (Sing, 2004; Sing et al., 2003). Although the total amount of iron in the soil is high, to the effect of the limestone and HCO_3 in the soil, the amount of iron useful for the plant decreases. Therefore iron deficiency in plants is observed more often and commonly (Lindsay and Schwab, 1982). It is estimated that between 30 % and 50 % of the planted areas in the world have iron deficiency (Çakmak, 2002). It has been determined that this situation is not different in soils in agricultural areas in Turkey and has reached 27 % (Eyüpoğlu et al., 1995). The microelement deficiency of plant cultivation and the iron deficiency is widely seen in soil with high limestone and low organic material (Zengin and Gezgin, 2013). Iron deficiency caused by limestone reduces the chlorophyll content in the young leaves of plants and causes chlorosis (Marschner, 1995; Bashir et al., 2013).

In the world, the planting area of peanuts in 2019 was 29.596.969 hectare, and the production of 48.756.790 tons was actualized. Such countries as China, India, Nigeria, USA are leading regarding the production of peanuts. Its production is widespread in countries such as Sudan, Myanmar, Senegal. In our country, in the area of 42.218 hectare, 169.328 tons of production were actualized in the production season of 2019 and the pod yield per decare was recorded as 401 kg (Anonymous,2021a). Besides Adana and Osmaniye are the most peanut producing provinces, peanuts being also produced in our provinces such as Antalya, Aydın, Kahramanmaraş, Mersin, Hatay (Anonymous, 2021b).

Selection of varieties and treated cultural practices are among the factors that will directly affect the productivity obtained from the unit of area (Arıoğlu et al., 2016). The effectiveness of iron is different according to the species and varieties of plants, even it is different in

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the lower varieties of the same variety. It is known that peanuts and fruit trees are prone and sensitive to iron deficiency (Rombolà and Tagliavini, 2006; Pestana et al., 2012).

In order to increase the yield and quality of peanuts taken per unit area, iron deficiencies must be eliminated by using proper ferrous fertilizer as of the bearing of of the cultivated soil characteristics (limestone, soil reaction and organic matter etc.). Sing (2004) reported that the use of iron sulfate is ineffective in eliminating iron deficiency in soils with limestone, alkaline reaction and low organic matter. For this reason, Fe-EDDHA is used to aid in eliminating the iron deficiency of the plant (Pestana et al., 2003). In addition to its ability to retain iron in calcareous and alkaline soils, Fe-EDDHA can be more effective in eliminating iron deficiency in the plants by binding Fe in plant roots (Lucena, 2003; Rodríguez-Lucena et al., 2010).

This study aimed to determine the effects of treated iron doses on agricultural characteristics by applying foliar in some peanut varieties (NC-7 and Sultan) often used in Osmaniye conditions.

2. Materials and Methods

This study was carried out in the farmer's field conditions in the Göçmenler district in the Hardallık village of Kadirli, Osmaniye, in 2020. The soil in which the field trial was established had a neutral reaction (pH=6.87), excessive calcareous (25.8 %), a moderate level of organic matter (2.38 %), a level of salt that could not cause problems in plant development (390 μS cm^{-1}) and a clayed tin (CL) structure. Phytosanitary contents such as: Ca (5921 mg kg^{-1}), Mg (555 mg kg^{-1}) and Cu (2.21 mg kg^{-1}) were excessive, while the phytosanitary contents were in sufficient quantities, such as P (31.33 mg kg^{-1}), B (1.43 mg kg^{-1}), Zn (1.06 mg kg^{-1}) and Mn (8.80 mg $kg^{-1)}$ and K (137 mg kg^{-1}) level was intermediate, Fe (1.93 mg kg^{-1}) level was low.

Considering the peanut cultivation period, the average temperature of the trial area changed between 18.1 and 28.6°C in 2020 and 18.3 to 29.1°C in the long years average. The total rainfall was 115.6 mm in 2020 and 123.7 mm on the long-year average during the trial period.However, due to insufficient total rainfall, the water required was met by irrigation.

The study was arranged in a "Split-Split Plots Experiment Desing" with three replications. The most cultivated "NC-7 and Sultan" peanut varieties were used in the area, and both varieties were included in the Virginia group and were in the horizontal-semi form. The NC-7 variety was a variety of US origin, BATEM registered it in 1991. As for the Sultan variety, it was registered by the Field Crops of the Faculty of Agriculture of Cukurova University (Irmak et al, 2012; Arioglu et al., 2016). In the trial, as the chemical base fertilizer prior to planting, 15 kg da^{-1} 12-12-12+% 23 SO_3+% 10 organic matter and orgamineral fertilizer, 15 kg da $^{-1}$ 9-21-0 + Zn + 5% SO_3 + 1% Zn + 15% organic matter + 10% humic and fulvic acid were treated by mixing them into the soil. With the planting, 3 kg $^{-1}$ was treated from the 16-40-0 + 5% SO_3 + 2% Zn + 2% Mg contained fertilizer and on the date of 1 July 2020 ammonium sulfate (21 % N) 25 kg da $^{-1}$ was treated as the top fertilizer. It was treated with Fe EDDHA (6 % Fe) during the 50 % flowering period (3 July 2020) and pod formation period (19 August 2020) periods as it provides 400 g da $^{-1}$, 500 g da $^{-1}$ and 600 g da $^{-1}$ pure Fe at the trial (Kur et al., 2018).

After the silage corn harvest, the tillage was deep-processed with a plow in the fall and abandoned for the winter. Afterward, the soil was slightly processed with a cultivator again in April; then, it was harrowed and made ready for the planting. Each trial parcel was formed from four rows with a width of 2.8 m and a length of 3.0 m. The area of each parcel was arranged as 8.4 m^2 and there were 1-meter gaps between the parcels and the replications. In the trial, each parcel was arranged to be 4 rows; these rows specified the marker plantation were manually carried out with 12 cm over these rows and 70 cm among the rows on 12 April 2020.Weed control was carried out both mechanically and with herbicides. Disinfestation was carried out twice for leafworm, aphid and leaf spot disease. It was harvested by manually on 27 September 2020. After the edge effects of the parcels were discarded, 0.5 m was removed from both sides of the middle two rows and the remaining 2 m was harvested manually.

Their pod yields were recorded by weighing each parcel separately and their pod yields per decare were determined by calculating. Other data was determined in plants that will represent each parcel after the pods have been dried as; the number of pod per plant (piece), 100 pod weights (g), 100 seed weights (g), seed ratio (%).

The data was analyzed using technique of analysis of variance (JUMP) and treatment means were separated by Least Significant Differences (LSD) at 1 % probability level by using MSTAT-C as described by Nissen (1989).

3. Results and Discussion

Average values, groups and Lsd values regarding the number of pod per plant (quantity), 100 pod weight (g), 100 seed weight (g), pod yield (kg da^{-1}), seed ratio (%) were given in Table 2 and Table 3. The analysis of variance considering these characteristics is given in Table 1.

As could be seen from the examination of Table 2, the differences between the variety, VxD, TxD, VxTxD in terms of the number of pod per plant were found to be statistically significant at the 1% significance level, and the lowest number of pod was NC-7 variety with 21.8 $plants^{-1}$, the highest number of pod was Sultan variety with 26.4 $plants^{-1}$. According to the treatment times, doses and VxT interactions, no statistical level difference was obtained between the values. In VxD interactions, the lowest number of pod was the NC-7 variety with 20.2 $plants^{-1}$ and 21.6 $plants^{-1}$except for D_3 of the

NC-7 variety. The highest number of pod was obtained from D_2 treatment of the ile Sultan variety with 28.4 plants^{-1}. In TxD interactions, the highest pod yield was determined as 25.8 plants^{-1} with T_2xD_2 interaction and the lowest pod yield was determined as 22.8 plants^{-1} with T_1xD_2 interaction. When looking at the VxTxD interactions, the lowest number of pod was obtained as 18.8 plants^{-1} from $V_1xT_1xD_2$ interaction while the highest number of pod was recorded as 30.0 plants^{-1} from the interaction of $V_2xT_2xD_2$. Our research was in harmony with the findings of many studies as increasing Fe doses increases the number of pod per plant (Guvercin, 2009; Kur et al., 2018).

Table 1
Results of variance analysis of the agricultural characteristics in the study conducted in 2020

Source of Variation	df	Means square				
		The number of pod per plant (quantity)	100 pod weight (g)	100 seed weight (g)	Pod yield (kg da^{-1})	Seed ratio (%)
Replication	2	2.2	29.3	2.7	1903.1	0.9
Variety (V)	1	245.7**	141.5*	1.5	74481.8*	194.8*
Error-1	2	0.5	5.5	4.0	2110.5	10.3
Time (T)	1	6.6	1.1	3.1	294.0	0.6
V x T	1	0.3	24.9	1.0	1732.8	1.2
Error-2	2	8.0	19.7	3.8	298.5	8.4
Doses (D)	3	6.4	24.7	1.5	8051.7**	0.4
V x D	3	26.1**	264.1**	9.7**	9042.2**	2.0
T X D	3	8.6*	115.3**	12.1**	8948.7**	4.0
V x T x D	3	15.8**	97.9**	6.2*	8541.5**	4.5
Error-3	26	2.4	24.9	1.7	895.6	3.1

*P < 0.05, **P < 0.01

Regarding 100 pod weight, differences between treatments regarding V, V x T, T x D, V x T x D interactions were determined as statistically significant at a significance level of 1% (Table 1). When looking at the variety averages, the highest 100 pod weight was NC-7 variety with 197.4 g, while the lowest 100 pod weight was obtained from Sultan variety with 194.0 g. According to the treatment times, doses and VxT interactions, no statistical level difference was obtained between the values. In VxD interactions, the lowest 100 pod weight was determined in the V_2xD_0 interaction with 186.8 g. The highest 100 pod weight were obtained as 200.5 g and 200.2 g respectively from V_1xD_0, V_2xD_3 interactions. In TxD interactions, the highest 100 pod weight was determined as 201.8 g in T_2xD_2 interaction, the lowest 100 pod weight were determined as 192.2 g and 192.6 g respectively in T_1xD_2 and T_2xD_0 interactions. When looking at the VxTxD interactions, the lowest 100 pod weight was obtained as 186.5 g from $V_2xT_1xD_0$interaction while the highest 100 pod weight was recorded as 206.2 g from $V_2xT_1xD_3$ interaction (Table 2). Güvercin (2009) reported that NC-7 variety obtained the highest 100 pod weights in Fe_2 treatments (202 g) in the first year, and NC-7 variety was detected with 166 g in the same dose. When looking at the varieties in general, the dose of Fe_1 was found to be lower than the treatments of Fe_0 and Fe_2 in the study. However, taking the NC-7 variety into account, the findings of this study of the 100 pod weight increases in Fe doses according to the control were similar to our study.

In terms of the 100 seed weight, the differences between the values in the V x D, T x D interactions were statistically significant at 1 % significance level, and in the V x T x D interaction, the differences between values were statistically significant at 5 % significance level. According to the varieties, treatment times, doses and VxT interactions, no difference was obtained at the statistical level between the values (Table 1). In VxD interactions, the lowest 100 seed weight was detected as 85.7 g in the interaction of V_2xD_0.The highest 100 seed weight was obtained as 88.3 g and 88.2 g respectively from the interactions of V_1xD_0 and V_2xD_3. In TxD interactions, the highest 100 seed weight were determined as 88.3 g, 88.0 g, 88.0 g, 87.4 g respectively from T_1xD_1, T_2xD_2, T_1xD_3 and T_2xD_0; the lowest 100 seed weight was determined as 85.2 g in the interaction of T_2xD_1. When looking at the VxTxD interactions, the lowest 100 seed weight was obtained as 84.9 g and 85.0 g, respectively from $V_2xT_1xD_0$ and $V_2xT_2xD_1$ interactions while the highest 100 seed weight was recorded as 89.9 g in the interaction of $V_2xT_1xD_3$ (Table 2). In the studies conducted, they reported that increasing Fe doses increased the 100 seed weight. Our study was within limits determined by the researchers (Irmak et al., 2012; Boydak et al., 2019).

Table 2
Average values for agricultural characteristics of Fe applications applied at different times and doses in peanuts-1

		The Number of Pod Per Plant (quantity)				
		Fe Dozları				
Variety (V)	Time (T)	D_0 Kontrol	D_1 400kg da^{-1}	D_2 500 kg da^{-1}	D_3 600 kg da^{-1}	Mean
V_1	Flowering (T_1)	21.4 fgh	23.7 cdef	18.8 h	22.5 defg	21.6
	Pod formation (T_2)	21.8 efgh	19.5 gh	21.6 efgh	25.8 bcd	22.2
Mean		21.6 d	21.6 d	20.2 d	24.2 c	21.8 b[1]
V_2	Flowering (T_1)	25.0 bcde	25.7 bcd	26.9 abc	26.2 bc	26.0
	Pod formation (T_2)	24.4 cdef	28.0 ab	30.0 a	25.0 bcde	26.9
Mean		24.7 bc	26.9 ab	28.4 a	25.6 bc	26.4a
T x D	Flowering (T_1)	23.2 cd	24.7 abc	22.8 d	24.4abcd	23.8
	Pod formation (T_2)	23.1 cd	23.7 bcd	25.8 a	25.4 ab	24.5
Mean		23.2	24.2	24.3	24.9	
LSD $_{VXD\ (0.01)}$: 2.48; LSD $_{TXD\ (0.05)}$:1.83; LSD $_{VXTXD\ (0.01)}$:3.51						
		100 Pod Weight (g)				
		Fe Dozları				
Variety (V)	Time (T)	D_0 Kontrol	D_1 400kg da^{-1}	D_2 500 kg da^{-1}	D_3 600 kg da^{-1}	Mean
V_1	Flowering (T_1)	202.7 ab	200.8 abc	194.3 bcde	188.2 de	196.5
	Pod formation (T_2)	198.3 abcd	198.2 abcd	201.2 abc	195.3 abcde	198.3
Mean		200.5 a	199.5 ab	197.8 ab	191.8 bc	197.4 a
V_2	Flowering (T_1)	186.5 e	195.2 abcde	190.2 cde	206.2 a	194.5
	Pod formation (T_2)	187.0 de	190.0 cde	202.3 ab	194.2 bcde	193.4
Mean		186.8 c	192.6 abc	196.2 ab	200.2 a	194.0 b
T x D	Flowering (T_1)	194.6 ab	198.0 ab	192.2 b	197.2 ab	195.6
	Pod formation (T_2)	192.6 b	194.1 ab	201.8 a	194.8 ab	195.9
Mean		193.6	196.0	197.0	196.0	
LSD $_{VXD\ (0.01)}$: 8.01; LSD $_{TXD\ (0.01)}$: 8.01; LSD $_{VXTXD\ (0.01)}$: 11.33						
		100 Seed Weight (g)				
		Fe Dozları				
Variety (V)	Time (T)	D_0 Kontrol	D_1 400kg da^{-1}	D_2 500 kg da^{-1}	D_3 600 kg da^{-1}	Mean
V_1	Flowering (T_1)	88.3 abc	89.1 ab	86.1 def	86.2 cdef	87.4
	Pod formation (T_2)	88.3 abc	85.3 ef	87.7 bcd	87.6 bcd	87.2
Mean		88.3 a	87.2 ab	86.9 ab	86.9 ab	87.3
V_2	Flowering (T_1)	84.9 f	87.6 bcd	87.2 bcde	89.9 a	87.7
	Pod formation (T_2)	86.4 cdef	85.0 f	88.3 abc	86.6 cdef	86.9
Mean		85.7 b	86.3 ab	87.7 ab	88.2 a	87.3
T x D	Flowering (T_1)	86.6 ab	88.3 a	86.7 ab	88.0 a	87.5
	Pod formation (T_2)	87.4 a	85.2 b	88.0 a	87.1 ab	87.1
Mean		87.0	86.8	87.3	87.6	
LSD $_{VXD\ (0.01)}$: 2.90; LSD $_{TXD\ (0.01)}$: 2.90; LSD $_{VXTXD\ (0.05)}$: 2.19						

1: There are no statistical differences between means with the same letters. V_1: NC-7; V_2: Sultan

Table 3
Average values for agricultural characteristics of Fe applications applied at different times and doses in peanuts-2

		Pod Yield (kg da^{-1})				
		Fe Dozları				
Variety (V)	Time (T)	D_0 Kontrol	D_1 400kg da^{-1}	D_2 500 kg da^{-1}	D_3 600 kg da^{-1}	Mean
V_1	Flowering (T_1)	419.0 fg	523.3 abc	330.9 h	462.1 cdefg	433.9
	Pod formation (T_2)	438.6 efg	397.9 gh	452.8 defg	514.0 abcd	450.8
Mean		428.8 de	460.6 cd	391.9 e	488.1 bc	442.3 b
V_2	Flowering (T_1)	487.9 bcde	565.7 a	521.7 abc	523.4 abc	524.7
	Pod formation (T_2)	493.2 bcde	563.6 a	538.6 ab	475.0 bcdef	517.6
Mean		490.5 bc	564.7 a	530.1 ab	499.2 bc	521.1 a
T x D	Flowering (T_1)	453.5 bc	544.5 a	426.3 c	492.8 b	479.3
	Pod formation (T_2)	465.9 bc	480.7 b	495.7 b	494.5 b	484.2
Mean		459.7 b	512.6 a	461.0 b	493.6 ab	
LSD $_{D\ (0.01)}$: 33.95; LSD $_{VXD\ (0.01)}$: 48.01; LSD $_{TXD\ (0.01)}$: 48.01; LSD $_{VXTXD\ (0.01)}$:67.90						
		Seed Ratio (%)				
		Fe Dozları				
Variety (V)	Time (T)	D_0 Kontrol	D_1 400kg da^{-1}	D_2 500 kg da^{-1}	D_3 600 kg da^{-1}	Mean
V_1	Flowering (T_1)	76.4	76.1	76.0	75.2	75.9
	Pod formation (T_2)	77.5	76.0	75.7	76.8	76.5
Mean		77.0	76.1	75.9	76.0	76.2a[1]
V_2	Flowering (T_1)	71.8	73.3	71.3	72.5	72.2
	Pod formation (T_2)	71.9	70.5	73.9	72.3	72.1
Mean		71.8	71.9	72.6	72.4	72.2 b
T x D	Flowering (T_1)	74.1	74.7	73.7	73.9	74.1
	Pod formation (T_2)	74.7	73.2	74.8	74.5	74.3
Mean		74.4	74.0	74.3	74.2	

1: There are no statistical differences between means with the same letters.

It determined that the differences between varieties in terms of pod yield were statistically significant at 5 % significance level, and the differences between the pod yield in terms of V x D, T x D, V x T x D interactions were statistically significant at 1 % significance level (Table 1). When the varieties were examined, the highest pod yield was recorded in the Sultan variety with 521.1 kg da^{-1} and the lowest pod yield was recorded from the NC-7 variety with 442.3 kg da^{-1}. Statistical significance could not be determined between the values obtained in terms of treatment times and VxT interactions. When the doses were examined, the highest pod yield was recorded in the D_1 dose with 512.6 kg da^{-1} and the lowest pod yield was recorded as 459.7 kg da^{-1} and 461.0 kg da^{-1} in the doses of D_0 and D_1 respectively. In VxD interactions, the lowest pod yield was obtained as 391.9 kg da^{-1} in the interactions of V_1xD_2 and the highest pod yield was obtained as 564.7 kg da^{-1} in V_2xD_1interaction. In TxD interactions, the highest pod yield was determined as 544.5 kg da^{-1} in T_1xD_1 and the lowest pod yield was determined as 426.3 kg da^{-1} in T_1xD_2. When looking at VxTxD interactions, the lowest pod yield as 330.9 kg/da in $V_1xT_1xD_2$, while the highest pod yield was recorded as 565.7 kg da^{-1} and 563.6 kg da^{-1}, respectively in the interactions of $V_2xT_1xD_2$, $V_2xT_1xD_2$ (Table 3).

In many previous studies, it was noted that Fe treatments increase pod yield. Irmak et al. (2012) used NC-7 and ÇOM varieties were materials in their Fe treatments from soil and leaves in the peanut study conducted in 2006-2007. In the study, Fe treatments were conducted in the doses of 0, 10, 20, 40 kg ha^{-1} from the soil and after twenty days, they were conducted in the doses of 0.1, 2.3 kg ha^{-1} from the leaf. In the NC-7 variety, they obtained the highest pod yield in 10 kg ha^{-1} Fe dose (484.8 kg da^{-1}) treated from the soil, and a significant increase was recorded according to the control (441.7 kg da^{-1}). Also, the same increase was recorded in the ÇOM variety. In foliar fertilization, the highest pod yield was carried out in 2 kg ha^{-1} Fe dose in the ÇOM variety (603.0 kg da^{-1}). In the study, it was found that pod yield and 100 seed weight increased significantly with increasing Fe doses, but the doses were ineffective in ratio of protein and oil.

The study was conducted to determine the effects of Fe treatments in different periods and doses (10 different combinations and periods) on yield and quality components in the NC-7 varieties in Kahramanmaraş conditions in 2018 year by Kür et al. (2018). These researchers reported that pod yield increased in increasing Fe doses. The highest pod yield was determined 300 kg da^{-1} flowering period + 300 kg da $^{-1}$ pod formation period (420.7 kg da^{-1}) and a significant increase occurred according to control (360.6 kg da^{-1}). the lowest pod yield was found 500 kg da^{-1} pod formation period (314.8 kg da^{-1}) and 200 kg da^{-1} flowering period + 200 kg da^{-1} pod formation period (317.5 kg da^{-1}).

The study was carried out to determine the effects of different quantities of Fe (0, 1, 2, 4 kg da^{-1}) and Zn (0, 1, 2, 4 kg da^{-1}) doses on yield and yield components of NC-7 variety in 2017 by Boydak et al. (2019). The researchers stated that pod yield increased significantly according to control. The lowest pod yield was determined at the control and the Fe dose of 1 kg da^{-1} (377.1 and 385.1 kg da^{-1} respectively), while the highest pod yield was recorded at the Fe dose of 4 kg da^{-1} (547.4 kg da^{-1}). The data obtained from the studies were in harmony with our research related to pod yield.

For the seed ratio, the differences between the values in terms of varieties were statistically significant at the significance level of 5% (Table 1). The highest seed ratio was found in the NC-7 variety with 76.2 %, and the lowest seed ratio was found in the Sultan variety with 72.2 % (Table 3). Pod yield per decare has a positive and important relationship with the number of pod per plant and seed ratio (Arioglu et al., 2016). High seed ratio is one of the reasons for preference of institutions that purchase peanuts because it increases product efficiency. According to the variety and environmental conditions, it can also vary between 60 % and 80 % (Arioglu, 2007).

The study was conducted to determine the yield and quality parameters of 6 different types of peanuts in Niğde conditions in 2014 by Aytekin and Caliskan (2016). The researchers reported that the highest seed ratio was recorded in the NC-7 variety with 70.1 %.

Kurt et al. (2016) reported that the seed ratio in NC-7 variety was recorded as 71.45 % and the Sultan variety was recorded as 59.61 % in Cukurova conditions between the years of 2013 and 2014.

Kur et al. (2018) stated that statistical significance was not determined between averages of the seed ratio, the number of pod per plant (quantity), 100 pod weight, the oil and the protein ratios. However, they reported that the number of pod per plant values between treatments at the same doses was statistically significant. Our study was in harmony with the seed ratio values of these studies

4. Coclusion

This study was conducted in the Osmaniye conditions, it was found that the interactions between variety, dose, variety x dose, time x dose, variety x time x dose interactions were statistically important regarding the pod yield. The number of pod per plant, 100 pod weight, 100 seed weight; varietyxdose, timexdose, varietyxtimexdose interactions were important. However, the seed ratio regarding these interactions was statistically insignificant. The highest pod yield was obtained from the Sultan variety with 521.1 kg da^{-1} in terms of varieties, it was obtained from the pod formation period and 400 kg da^{-1} dose with 544.5 kg da^{-1} in terms of varietyxtime interactions, and it was obtained from 400 kg da^{-1} treatment with 512.6 kg da^{-1}. in terms of dose. In conclusion, the Fe treatments were the significant influence for high pod yield and yield components in the cultivation of peanuts. However, there was no doubt that

multi-year studies in different locations, treatment times, doses, and treated varieties can achieve more precise and ultimate results.

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