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Competitiveness Of Sesame And Mung Bean Intercropping With Different Fertilizer Combinations

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Abstract

This experiment was conducted in the fall agricultural season(2020) In the province of Kirkuk , Hawija ghazieh village in the soil of tissues alluvial sand study included workers first factor loading systems (sesame alone) and (mash alone) and (2 mash + line 2 sesame line) and (3 Mash + 3 lines sesame lines) and (2 sesame + 4 Mash lines) The second factor is fertilizer. Levels (0P + 0 N) and (30 P+ 80 N) and (P60+N80) and(P 30+ N160) and (P60 + N 160kg h^{-1}) The experiment was carried out according to a randomized complete block design (RCBD) with three replications. The results obtained from the effect of competition between sesame and mung showed that the ground equivalent ratio) LER for the mung crop Lb Bigger than sesame values La In all loading systems and at all fertilizer levels , the crop efficiency ratio (CPR) Mach is higher than the sesame yield in loading systems and in fertilizer combinations , as indicated by the values of the mobilization factor(RCC) for mash were higher than the values of(RCC) For sesame crop in case of cultivation system (2:2). And for all fertilizer combinations except the fertilizer combination (P30 + N160). If the value of the relative mobilization coefficient was (CR) of sesame is higher than that of mung, and this indicates that mung is more competitive in the loading system, as the values of the ground equivalent factor showed (LEC). It gave a yield advantage for all loading systems whose value ranged(0.25, 0.63)while the value of the competition ratio (CR) high in loading systems (2: 2). And the (3: 3) And at all levels of fertilizer was the value of (CR) greater than one and reached (2.07 , 1.9) respectively, either aggressive evidence (A)It was aggressive to the negative mash except for the treatment of the loading system(2:2) in the fertilizer combination (P30 + N160) which was positive, as for the monetary advantage (MAI) It was positive in all loading systems and fertilizer combinations ,which indicates a crop advantage and cash return in all transactions compared to single cultivation. It is noted that the monetary advantage amounted to (921) thousand dinars per hectare.

Key words: Intercropping, Sesamum, Mung bean, competition system

Introduction

The method of interlacing cultivation or loading IntercroppingIt means the cultivation of two crops on the same land at the same time ,so that each of them benefits from the other accompanying crop .(Willey,1979) As well as the cultivation of essential mixtures of very so as to provide the feed quantity and quality, as well as the appropriate utilization of the land itself where more cultivation of crops in the unit area and in the same year (Qajo, 2014) Interlaced farming is one of the most important economic means used in farming systems to increase the economic yield. (Eskandari , 2012)In a study conducted by Rastg and et al , 2015) for the systems of competition between sesame and mung, where it was found that sesame has a higher competitive ability than mung, so this crop is dominant in the

intercropping system, and sesame has a higher relative contention coefficient and this feature is that sesame had a decisive role in forming an umbrella and the density was(1: 1) is the optimum density for maximum productivity and distance(75 cm between the classes is the best, and the values were (LER) higher than(1) In all transactions compared to monoculture, the values of(LER) for sesame is higher than mish and that the highest percentage reached (1.34) At (1: 1). found all of(Koocheki , et al; 2016) At Ferdowsi University in Mashhad, Iran, when they studied the competition between sesame and mung, they used several competition systems which are (sesame alone) and (march alone) (1:3) And the(2:2) And the (3:1)Where the results showed the superiority of the loading treatment(1:3)Sesame: Not giving the highest ground equivalent value reached(1.15)While the transaction was given(3:1)The lowest value of the ground equivalent amounted to(1.01)In a study conducted by (El-Karamity , et al; 2020) when they studied the competition between maize and summer oil crops (soybean - peanut - sesame) and several levels of mineral and nano fertilizers, where the cultivation of maize + peanuts and the fertilizer level were recorded (75% nano + 25% Mineral nitrogen fertilizer) the highest values of the LER were (1.72) and this confirms that the intercropping system is better than the monoculture, as well as all the loaded treatments gave the highest values of the ground equivalent coefficient. As for the aggressiveness, it was positive in corn and negative in both soybeans and peanuts, meaning that Corn was dominant, and the monetary advantage reached the highest cash return when planting corn and peanuts with 75% nano + 25% mineral fertilizer.(El-Ghobashy , et al; 2020) conducted a field experiment during the agricultural season (2018-2019) to study the effect of competition between cowpea and three types of hybrid maize (SC 168, SC 178 and TWC 321) and four treatments of nitrogen fertilizer (120 kg N / acre in the form of urea 100% metallic and 50% N metal + 50% nano and 75% metallic + 25% nano and 100% nano (the results showed where the treatment of cowpea with maize SC 168 gave the highest values of aggression (0.28 and 0.23) and the total yield) 15865 and 15854 pounds / acre) in the two seasons, as well as to rationalize the use of nitrogen fertilizer. In a study conducted by (Rastg , et al; 2015) for the systems of competition between sesame and mung, where it was found that sesame has a higher competitive ability than mung, so this crop is dominant in the intercropping system, and sesame has a higher relative contention coefficient and this feature is that sesame had a decisive role in forming an umbrella and the density was (1: 1) is the optimum density for maximum productivity and distance75 cm between the classes is the best, and the values were(LER) higher than (1)In all transactions compared to monoculture, the values of) LE (for sesame is higher than mish and that the highest percentage reached (1.34) At (1: 1) .This study aims to evaluate each of the growth and productivity indicators of the local sesame and mung bean crops, and the efficiency of different loading system measures that show the competitive or symbiotic nature between the two crops is also studied

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Materials and Research Methods

This experiment was conducted in the fall agricultural season (2020) in Kirkuk governorate, Hawija district, Ghazieh village, and the study included two factors: the first factor was the intercropping systems (sesame alone) and (mush alone) and (2 mush lines + 2 sesame lines) and (3 mash lines + 3 Sesame Lines (and (2 Sesame + 4 Mash lines) The experiment was carried out according to the Randomized Complete Block Design (RCBD) With three replications, the land was plowed twice by (digger plowed) good plowing and leveling, and the number of experimental units was (75) divided into three replications. According to the scientific recommendations, each experimental unit contains (12 lines), the distance between one line and another (40 cm). The following characteristics were studied

1) -LER (Land Equivalent Ratio)

Land equivalent ratio) LER = (Relative yield of type (A) La +Relative yield of type (B) Lb
La= Yab / Yaa Lb = Yba / Ybb suggest (Willey and Osiru , 1972)

2- Crop Performance Ratio (CPR)

$$CPRa = \frac{Qai}{Pi\ Qsa}$$

$$CPRb = \frac{Qai+Qib}{Pi\ Qsa+Pib\ Qsb}$$ suggested it (Azam and et al ,1990).

3 -Relative Crowding Coefficient (RCC or K)

a- When the loading ratio is 1:1, the equation applies

b- K = Kab * Kba Kab = Yab / Yaa-Yab , Kba = Yba / Ybb-Yba.

c -When the loading ratio differs from 1:1, the equation applies K = Kab * Kba

Kab = Yab * Zba / (Yaa-Yab) Zab , Kba = Yba * Zab / (Ybb- Yba) Zba suggest (De Witgeneral, 1960) and test it (Hallgeneral, 1971).

4 -Land Equivalent Coefficient (LEC)

LEC= La* Lb suggested it (Aditiloye and et al ,1983).

5 -Competitive Ratio (CR)

CRa = La/ Lb * Sb /Sa CRb = Lb /La*Sa/ Sb

6 -Aggressivity index (A)

a- If the loading ratio is 1:1, the following equations apply:

Aab = La- Lb , Aba= Lb - La

b- If the loading ratio differs from 1:1, the following equations apply:

Aab = (Yab / Yaa-Zab) – (Yba / Ybb-Zba)
Aba= (Yba / Ybb-Zba) - (Yab / Yaa-Zab) suggest (McGilchrit , 1965).

7 -Monetary Advantage Index (MAI)

MAI= (Value of Combined Intercrops)*(LER-1)/LER
and suggested it (Willey , 1979)

Results and discussion

1- Land Equivalent Ratio (LER)

Show the results of the table (1) that average values Lb The strawberry yield is greater than the value of La for sesame crop and in all loading systems and at all fertilizer levels , and this means that the use of mung for the land in intercropping was better than sesame, and the values of Lb More than one correct one alone in the loading system (4: 2)Sesame: mashed when the fertilizer was not added, and when it was added(P60 + N160) It was also more than one value LB when farming system(3:3) Sesame: not at the same level of fertilizer(P60 + N160) . This means that all loading systems compared to monoculture are better in using environmental resources for plant growth, i.e. natural resources (light and land) and added to them

(fertilizer and water .(El- karamity and et al ,2020) when he pointed out that the ratio of the terrestrial equivalent(LER) It was higher than one for the yellow corn crop in the fertilization treatments, indicating the importance of its cultivation overlapping with the summer oil crops, and it recorded the highest value when planting corn and peanuts when fertilizing 75 %Nano Fertilizer+ 25 %mineral fertilizer, found(Rastg and et al , 2015) that pointer(LER) higher than one in all intercropping treatments that reflect the priority of loading systems compared to monoculture and that the highest percentage was (1.34)when intercropping(1: 1)Sesame: Mung bean .

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Table (1) It shows the values of the land equivalent of sesame and mung bean crops

Intercropping / fertilization levels	2 sesame lines + 2 mash lines			3 sesame lines + 3 mash lines			2 sesame lines +4 mash lines		
	La	Lb	LER	La	Lb	LER	La	Lb	LER
N0+P0 kg.h $^{-1}$	0.51	0.57	1.08	0.54	0.91	1.45	0.34	1.30	1.64
N80+ P30 kg . h $^{-1}$	0.54	0.82	1.36	0.49	0.73	1.22	0.29	0.87	1.16
N80+ P60 kg . h $^{-1}$	0.55	0.58	1.13	0.51	0.65	1.16	0.35	0.85	1.20
N160+ P30 kg . h $^{-1}$	0.56	0.54	1.14	0.57	0.59	1.16	0.35	0.95	1.30
N160+P60 kg .h $^{-1}$	0.52	0.55	1.07	0.57	1.11	1.68	0.38	1.13	1.51

* La It is the relative yield of sesame * Lb It is the relative yield of mung bean

2 - Crop Efficiency Ratio (CPR)

The results are shown in the table(2) It is observed that the results are almost in agreement with the values of LE Since the value of CPR was the highest in sesame yield (1.36) in the download system(4: 2)Sesame: it is not added when fertilizer is not added compared to other systems, as this feature was in the sesame crop in the two loading systems(3: 3) And the (4: 2)Sesame: as soon as he reached(1.16) And the(1.47)When the fertilizer combination) P60 + N160 . (It is noted that its value decreased compared to the sesame crop, as it was less than one, and this is an indication of the low rate of yield of mash compared to single cultivation when this fertilAizer combination and loading system amounted to (0.81)The foregoing means that the different loading systems are superior to the monoculture in both crops and that this advantage is the result of the different growth yields above and below the ground and the morphological characteristics of the loaded plants, which caused a greater efficiency in the use of plant growth resources. These results are consistent with (Gendy and et al , 2019).

(Table 2) shows the efficiency ratio of sesame and mung bean crops

Intercropping	2 sesame lines + 2 mash lines	3 sesame lines + 3 mash lines	2 sesame lines +4 mash lines

fertilization levels						
	CPRa	CPRb	CPRa	CPRb	CPRa	CPRb
N0+P0 kg.h $^{-1}$	1.03	1.09	1.25	1.31	1.36	1.43
N80+ P30 kg . h $^{-1}$	1.29	1.36	1.14	1.20	1.10	1.15
N80+ P60 kg . h $^{-1}$	1.11	1.17	1.13	1.19	1.18	1.24
N160+ P30 kg . h $^{-1}$	1.08	0.81	1.14	1.20	1.27	1.33
N160+P60 kg .h $^{-1}$	1.05	1.01	1.61	1.69	1.47	1.54

CPRa * Efficiency of the loaded sesame crop CPRa * The efficiency of the loaded mung bean crop

3 - Relative Crowd Factor (RCC)

The table results (3) until evaluated RCC The mung yield was higher than the value of (RCC) For sesame in the case of planting two sesame lines: two mash lines and in all fertilizer combinations except for the fertilizer combination (P30 +N160) The value of the relative mobilization factor of sesame was higher than that of mung, and this indicates that mung is more competitive in this system of loading .As for the download system2 Sesame : 4Mash, the competitive ability of mash was higher than sesame in fertilizer combinations(P30 +N80)And the(P60 +(N80) And the(P30 +N160) While the relative mobilization coefficient values decreased to less than one and were negative when no fertilizer was added and when the fertilizer was treated(P60 +N160) This signal to decreases in livestock rates in these transactions fertilizer at rates, have been found(Rastg , et al ; 2015) that sesame has a higher competitive ability than mung and considered it the dominant in the intercropping system, and pointed out that it has a role in shaping the arrangement of the inter-canopy.

Table (3) shows the relative mobilization coefficient of sesame and mung bean

Intercropping / fertilization levels	2 sesame lines + 2 mash lines			3 sesame lines + 3 mash lines			2 sesame lines +4 mash lines		
	Kab	Kba	RCC	Kab	Kba	RCC	Kab	Kba	RCC
N0+P0 kg.h $^{-1}$	0.70	1.33	1.33	1.22	10.32	12.59	1.25	-2.14	-2.67
N80+ P30 kg . h $^{-1}$	1.20	4.70	4.70	0.96	2.74	2.63	0.84	3.46	2.90
N80+ P60 kg . h $^{-1}$	1.24	1.42	1.42	1.07	1.87	2.00	1.10	3.06	3.36

N160+ P30 kg . h $^{-1}$	1.28	1.19	1.19	1.36	1.48	2.01	1.09	10.83	11.80
N160+P60 kg .h $^{-1}$	1.08	1.27	1.27	1.35	-9.88	-13.33	1.26	-4.22	-5.31

* Kab The coefficient of crowd related to the sesame crop * Kba The crowd factor related to the mung bean crop

* RCC It is the relative mobilization factor of the loading parameters (sesame and mung)

4- Land Equivalent Coefficient (LEC)

It is noted from the values given in the table(4) That all were loading systems have the advantage of crop as ranged values from(0.25) in the download system (4 : 2) Sesame: mashed at the compost level (P30 + N80)While the highest yielding feature was in the loading system(3: 3)Sesame: mash and at the compost level (P60 + N160) reached (0.63)It is noted that the crop advantage was evident when the fertilizer was not added in the two loading systems (3:3) And the(4: 2) Sesame: Yes, and this supports the results (Malezieux , et al ; 2009) That intercropping achieve best use of light energy advantage and be agronomically thanks to the advantage of the growth elements of water and elements of food pictures better integrated and converted into a dry material for crop loaded in the signal that both crops did not suffer from misinformation resulting from Zraathma together .These results are confirmed (Gendy , et al ; 2013) The yield advantage that corresponds to the values of (LER) greater than one resulting from the exploitation of different growth resources above and below the ground and the morphological characteristics of interplants.

Table (4) shows the ground equivalent coefficient of sesame and mung bean crops

Intercropping / fertilization levels	2 sesame lines + 2 mash lines			3 sesame lines + 3 mash lines			2 sesame lines +4 mash lines		
	La	Lb	LEC	La	Lb	LEC	La	Lb	LEC
N0+P0 kg.h $^{-1}$	0.51	0.57	0.29	L a	0.91	0.49	0.34	1.30	0.44
N80+ P30 kg . h $^{-1}$	0.54	0.82	0.44	0.54	0.73	0.35	0.29	0.87	0.25
N80+ P60 kg . h $^{-1}$	0.55	0.58	0.31	0.49	0.65	0.33	0.35	0.85	0.29
N160+ P30 kg . h $^{-1}$	0.56	0.54	0.30	0.51	0.59	0.33	0.35	0.95	0.33
N160+P60 kg .h $^{-1}$	0.52	0.55	0.28	0.57	1.11	0.63	0.38	1.13	0.42

***** La Relative yield of sesame *Lb Relative yield of mash *LEC Ground equivalent coefficient for loading coefficients (sesame and mungbean)

5- Competition Ratio (CR)

Show the results of the table (5) Competitive Ratio Values(CR) of sesame when it was planted intertwined with the mung and it is noted that the values of (CR) were high in loading systems (2: 2) And the (3: 3) Sesame: mash and at all levels of fertilizer for the fertilizer combinations used, and the highest value of (CR) in the download system (2: 2)Sesame: mung bean in the fertilizer blend (P30 + N160) reached the value of CR (2.07) Which indicates the dominance of sesame crop in all these treatments .the value ofCR The sesame crop was less than one, while it was greater than one for the mung crop, which confirms the dominance of the mung crop. It may be due to the effect of the sesame crop in this system from intercropping to the effects of environmental conditions. This is attributed to the effectiveness of nitrogen fixation for the mash and to compensate for the nitrogen needed by the plant. These results are consistent with(El- karamity , et al ; 2020) and with results(Donyavian , et al ; 2018).

Table (5) shows the percentage of competition for sesame and mung bean crops

Intercropping / fertilization levels	2 sesame lines + 2 mash lines		3 sesame lines + 3 mash lines		2 sesame lines +4 mash lines	
	CRa	CRb	CRa	CRb	CRa	CRb
N0+P0 kg.h $^{-1}$	1.78	0.52	1.18	0.84	0.52	1.91
N80+ P30 kg . h $^{-1}$	1.31	0.75	1.34	0.74	0.66	1.50
N80+ P60 kg . h $^{-1}$	1.89	0.77	1.56	0.63	0.75	1.21
N160+ P30 kg . h $^{-1}$	2.07	0.48	1.93	0.51	0.73	1.35
N160+P60 kg .h $^{-1}$	1.89	0.52	1.02	0.97	0.67	1.48

*CR The percentage of competition in the loaded sesame crop * CRb The percentage of competition in the loaded mung crop

6 - Aggressive evidence (A)

The aggressive sesame value when it was implanted various loading systems and under the levels of fertilizer combinations of fertilizer with livestock was negative except for the treatment of sesame in the loading system (2: 2)Sesame: mash in the fertilizer blend (P30 + N160) which was positive .The aggressiveness value of the mung bean crop was positive except for those in which the aggressiveness value of sesame was positive .The highest positive value for aggressiveness in the mash was in the loading system (4: 2)Sesame: mash and in all the above fertilizer combinations ,it was when no fertilizer was added and when it was added(P60 + N160) having reached(0.79 , 0.75) respectively, and these results

indicate that the mung crop is dominant in intercropping and its aggressiveness is less in the farming systems in which it is close and almost has no competition between sesame and mung in the system (2: 2)Sesame: mash, while he notices that in the pattern (4: 2) Sesame: There will be no competition for mash over sesame, and this supports the results(Donyavian , et al ; 2018).

Table (6) shows the evidence of aggressiveness of sesame and mung bean crops

Intercropping / fertilization levels	2 sesame lines+ 2 mash lines		3 sesame lines + 3 mash lines		2 sesame lines +4 mash lines	
	A ab	A ba	A ab	A ba	A ab	A ba
N0+P0 kg.h $^{-1}$	-0.06	0.06	-0.37	0.37	-0.79	0.79
N80+ P30 kg . h $^{-1}$	-0.28	0.28	-0.24	0.24	-0.58	0.58
N80+ P60 kg . h $^{-1}$	-0.03	0.03	-0.14	0.14	-0.60	0.60
N160+ P30 kg . h $^{-1}$	0.02	-0.02	-0.02	0.02	-0.60	0.60
N160+P60 kg .h $^{-1}$	-0.03	0.03	-0.54	0.54	-0.75	0.75

*Aab Aggressive Evidence of Loaded Sesame Crop * Aba Aggressive Evidence of Loaded mung bean

7 -Montary Advantage Index (MAI)

Note that the values of (MAI) It had positive values in loading systems in all fertilizer combinations ,which indicates a crop advantage and cash return in all these transactions compared to single cultivation. It is noted that it gave a monetary advantage amounting to (921)Thousand dinars. hectares in the agricultural system(2: 2) Sesame: Mash .While in the loading system in which the proportion of sesame is low, which was superior compared to its counterparts in the loading systems when the fertilizer combinations (P30 + N80) And the (P60 + N160) in the download system(4:2)Sesame: mung bean which reached(742.04 , 990.54) A thousand dinars .hectares to the competitive ability of cattle and its superiority in the yield, which gave a crop advantage and high profit in it. These results are consistent with(El- karamity , et al ; 2020) .

Table (7) explains the monetary advantage guide for sesame and mung bean

Intercropping / fertilization levels	2 sesame lines+ 2 mash lines	3 sesame lines + 3 mash lines	2 sesame lines +4 mash lines

N0+P0 kg.h $^{-1}$	153.96	721.47	669.87
N80+ P30 kg . h $^{-1}$	921.47	562.50	318.65
N80+ P60 kg . h $^{-1}$	407.60	478.67	499.76
N160+ P30 kg . h $^{-1}$	448.79	525.70	742.04
N160+P60 kg .h $^{-1}$	230.17	203.82	990.54

*crops Loaded in the same area unit

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