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The Role of Planting Systems and Mowing Height in The Growth Yield and Quality of Green Fodder Traits of Moringa *Moringa oleifera* Lam

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Abstract

The field experiment to study, the role of farming systems and the rise of the mowing in the growth, output and quality of the green fodder qualities of Moringa oleifera Lam, was carried out during the 2021 autumn season in one of the fields of the Sharqat district of Salah Al-Din governorate. The experiment included the study of two important factors: Four transplant distances (10 × 20cm, 20 × 20cm, 20 × 30cm, 30 × 30cm) and three cutting levels. (5 cm, 10 cm and 15 cm), took the first mowing after 70 days of planting, The results showed that the cultivation system exceeded 20 × 20cm and the cutting level was morally 15cm in the plant's height at 191.0cm in the first mowing and 78.50cm in the second mowing. The cultivation system exceeded 30x30cm in the highest branch number per plant at 5cm in the first mowing at 15.50 branches in the first mowing at 14.53cm in the second mowing at 80cm at 7cm Plant-1 agriculture system exceeds 10X20 cm and cutting level of 10 cm in total wet weight of vegetable total of 10.53 kg m2 in First Mowing , 6.83 kg m2 in Second Mowing , wet weight of leaves 4.13 kg m2 in First Mowing , 3.92 kg m2 in Second mowing, 6.22 kg m2 in First Mowing and 1.09 kg kg II Dry leaves 1.32 kg m2 in the first mowing and 0.98 kg m2 in the second mowing also exceed the paper area of 2557.7 cm2. The agriculture system exceeds 20X20 cm and the cut level of 10 cm in the paper area is 2386.9 cm in the second mowing and the cultivation system exceeds 10X20 cm and the cut level is 5 cm in the dry weight of stems 2.05 kg-2 in the first mowing and 0.71 kg-2 in the second mowing ..

Keywords: Moringa, Plant Height, Biomass

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Introduction

Moringa oleifera L. (Moringaceae) is one of the important crops grown for different uses home to Morinka India but planted around the world and naturalized in many locations due to its adoption and high nutritional properties, with 100 grams of papers containing A vitamin four times more than the same amount of carrot, And four times the calcium in a glass of milk, and of iron over 100 grams of spinach, Vitamin C is equivalent to seven times 100 grams of orange and three times of potassium in 100 grams of banana and the quality of protein in its leaves compete with protein quality in milk and eggs (Fahey, 2005). and in other industrial applications, such as water purification with high characteristics and potential to become one of the most economically important crops in the tropics and subtropics, especially in dense agriculture (Armelle de saint Sauveur, 2000), the removal of micronutrient malnutrition among citizens of many African countries through nutrition on his papers published by Lowell Fuglie (2001) The idea of intensive cultivation was launched to produce the largest biomass of the area unit.

Cultivation systems with the resulting plant density depending on the distance between the lines and the interreligious distances between the plants play a vital role in determining the yield and quality of the crops in the area alone. The number of plants ideal for any crop constitutes a significant difference due to the predictability of the environment in which it grows and its genetic nature and suggested that the first cut should be 20 centimetres high from the soil surface and could be replicated after 60 days to produce biomass for animal consumption, with some sources indicating a reduction in the cutting height from 40 centimetres, especially when using high density, including (padilla et al. 2014) While some noted that the high levels of cutting off the soil surface are dense trunks with an increase in its strong regrowth processes.

Given the economic importance of the Morinka plant in several areas and its scarcity of studies in Iraq, if not the first study in which it is cultivated as a fodder crop to obtain biomass in dense cultivation and determine its nutritional value.‘

Materials and methods of work.

The experiment was carried out in the Sharqat area, by tilling the experimental ground with the triple disk plough and then smoothing and settling it for planting in season 2021. It was divided as a factor experiment according to the design of the full random sectors RCBD and the strip plot system. It included on the first factor in vertical tapes and the second factor levels in horizontal tapes Prior to planting, the seeds were planted directly in the field according to the random distribution calculates the transactions and the planter irrigation was given on 16/6/2021. The cultivation process was followed by the addition of 200kg hectare fertilizer urea N 46%. The study factors included two factors: farming systems and combinations of the distance between lines and the distance between plants. 2. Agriculture between lines 20cm and between plants 20cm 3.- Cultivation between lines 30cm and between plants 20cm. 4. Agriculture between 30cm lines and between 30cm plants. They were randomly distributed in vertical tapes and factor II. The cutting height of 1-monster at a level of 5 centimetres 2 .- monster at a level of 10 centimetres 3-monster at a level of 15 centimetres from the soil surface, and randomly carried out in horizontal tapes at each repeat. The first measurements took place on 22/App/2021 after 70 days of seizure and the second measurements took place on 3/December 2021 after 75 days of first insect. The height of the plant (cm), the number of branches and the number of leaves were calculated and the wet weight of the vegetable aggregate, leaves and stems (kg m2), the dry weight of the vegetable aggregate, the dry weight of the leaves, the dry weight of the stems (kg m-2) and the paper area (cm2) were estimated.

Conclusions and discussion

Plant height (cm(

Table 1 shows a moral difference in plant height due to the impact of farming systems in the first mowing . The cultivation systems exceed 20 20 cm and 20 30 cm and recorded a plant height of 187.67 and 187.56 cm respectively and a non-moral difference compared to the farming system 10 20cm. cultivation systems ", while plant rise was not morally affected by the impact of cultivation systems in the second mowing .

The cutting level did not show a moral difference between the plant's height averages in the first mowing , while in the second mowing the cutting levels exceeded 10 and 15 centimetres morally in the plant's height by an average of 70.37 and 72.93 centimetres from the cutting level of 5 centimetres, which recorded the

lowest height of the plant at 61.6 centimetres.

The overlap of farming systems and cutting level had a moral effect in the first and second mowing s and recorded the highest height of the plant at the cutting level of 15 cm in the agriculture system 20 × 20 cm in the first and second mowing s with an average of 191.0 and 78.5 cm The lowest height of the plant in the first mowing in the cultivation system was 30 × 30 cm and at the cutting level of 15 cm was 145.0 cm, In the second mowing it was the lowest height of the plant in the system of cultivation 20 × 30 centimeters and the cutting level of 5cm was 55.0 centimeters.

Table (1) Impact of farming systems and mowing hight in the first and second mowing plant height

Farming Systems	Mowing Hight (Second mowing)			Farming Systems	Mowing Hight (first mowing)		
	15cm	10cm	5cm		15cm	10 cm	
70.50^{a}	71.00^{a-e}	73.50^{abc}	67.00^{b-e}	177.0^{ab}	174.0^{abc}	185.0^{abc}	
72.00^{a}	78.50^{a}	77.50^{ab}	60.00^{ef}	187.67^{a}	191.0^{a}	190.0^{ab}	
64.72^{a}	70.66^{a-e}	68.50^{a-e}	55.00^{f}	187.56^{a}	190.00^{ab}	191.67^{a}	
65.44^{a}	71.66^{a-d}	62.00^{ef}	62.66^{c-f}	155.25^{b}	145.00^{d}	156.67^{cd}	
	72.95^{a}	70.37^{a}	61.16^{b}	Average of Mowing Hight	177.72^{a}	180.83^{a}	

Number of leaves. Plant-1

Table (3) shows moral differences in the number of leaves with the effect of farming systems in the first insect as the cultivation systems (10 × 20 cm) (20 × 20cm) and (20 × 30cm) and recorded the number of plant papers 63.52, 62.44 and 66.57 sheets. Plant-1 are morally different from the system of cultivation 30 × 30cm which gave the lowest 5.5cm leaves.

The number of papers showed a moral difference in the impact of the cutting level in the first insect, where the cutting level exceeded the 10cm, which gave the highest

number of papers, which was 64.26 branches, and the cutting levels 5 and 15cm, recorded the lowest number of papers, which was 59.77 and 58.24 sheets. Plant-1 while the number of leaves was not affected by high cutting in the second gasket.

The overlap between the cultivation system and the cutting level had a moral effect in the first mowing , as the number of leaves was recorded at cutting levels of 10cm and 15cm and farming systems10 × 20cm, 20 × 20cm and 20 × 30cm. With an average of 71.93, 69.50 and 72.50 leaves for the plant, the lowest number of cut-level leaves was 5cm and the 30 cultivation system × 30cm with an average of 56.23 leaves for the plant.

Table (3) Impact of farming systems and monster rise in the number of plant leaves in the first and second insect

Farming Systems	Mowing Hight (second mowing)			farming systems	Mowing Hight (first mowing)			farming systems
	15cm	10cm	5cm		15cm	10cm	5cm	
60.98 a	54.30 e	64.73 bc	63.93 b c	63.52 a	50.13 de	71.93 a	68.50 a b	20×10cm
68.02 a	63.43 bc	76.63 a	64.00 b c	62.44 a	69.50 ab	61.20 b c	56.63 c d	20×20cm
67.75 a	80.83 a	63.70 bc	58.73 c de	66.57 a	69.50 ab	72.50 a	57.73 c d	30×20cm
62.31 a	55.50 de	68.93 b	62.50 b cd	50.50 b	43.83 e	51.43 c de	56.23 c d	30×30cm
	63.51 a	68.50 a	62.29 a	Average of Mowing	58.24 b	64.26 a	59.77 b	Average of Mowing Hight

				Hig ht				

Tabls (4) Total wet weight of total vegetable kg m2

Table 4 shows a moral difference in the total wet weight of the impact of cultivation systems in the first and second mowing s the 10 × 20cm farming system and the record of the highest wet weight of the total of 9.37 kg-2 and 6.34 kg-2 and a moral difference compared to all farming systems, where the 30 × 30cm farming system recorded the lowest wet weight of the vegetable total and 2.06 kg-2 and 1.31kg-2.

The cutting level did not show a moral difference in the total wet weight of the vegetable total in the first and second insect.

The overlap of farming systems and the high level of cutting was moral in the first beard, with the highest wet weight of the vegetable total at the cutting level of 5cm and 10cm 20cm growing system averaging 10.35 kg m2. The lowest wet weight of the vegetable total in the first mowing in the agriculture system was 30 30cm at the cutting level of 15.06kg m2, while the second mowing exceeded 10.0cm 20cm.

Table (4) Impact of farming systems and high monster in total wet weight of total vegetable mowing I and II

Farming Systems	Mowing Hight (second mowing)			farming systems	Mowing Hight (first mowing)			farming systems
	15cm	10cm	5cm		15cm	10cm	5cm	
6.34[a]	6.21[a]	6.83[a]	5.97[a]	9.37[a]	6.62[b]	10.53[a]	10.97[a]	20×10 cm
3.01[b]	2.42[bcd]	3.30[b]	3.32[b]	5.54[b]	6.34[b]	5.48[bc]	4.82[c]	20×20cm

2.20^{bc}	2.87^{b} c	2.30^{b} cd	1.53^{c} d	4.04^{c}	4.73^{c}	4.28^{c} d	3.11^{d} e	30×20cm
1.31^{c}	1.07^{d}	1.65^{c} d	1.22^{d}	2.26^{d}	2.06^{e}	2.42^{e}	2.28^{e}	30×30cm
	3.52^{a}	3.12^{a}	3.01^{a}	Average of Mowing Hight	4.94^{a}	5.68^{a}	5.30^{a}	Average of Mowing Hight

Total dry weight of total vegetable (kg m-2(

Table (7) showed a moral difference in the total dry weight of the vegetable population with the impact of the farming systems in the first and second mowing and exceeds the 10 agriculture system × 20cm and the total dry weight record of the vegetable population 2.74 kg-2 and 1.55 kg-2, which differed morally compared to the rest of the farming systems in which the 30 × 30cm was given the lowest dry weight of the vegetable population of 0.49 kg-2 kg-0.3.

The cutting level did not show a moral effect between the total dry weight averages of the vegetable total in the first and second mowing.

The overlap between farming systems and cutting levels showed a moral effect between the dry weight averages of the vegetable total in the first and second mowing s as farming systems outperformed (10x20) cm at the height of 5 and 10 cm in the first mowing and at the cutting levels of all in the second mowing and was the lowest dry weight of the vegetable total at the wide distances of the 30x30 cm planting system and at the height of the pieces 15 cm.

Table (7) Impact of farming systems and mowing hight in total dry weight of total vegetable first and second beard

Farming Systems	Mowing Hight (second mowing)			farming systems	Mowing Hight (first mowing)			farming systems
	15cm	10cm	5cm		15cm	10cm	5cm	
1.55[a]	1.42[a]	1.67[a]	1.57[a]	2.74[a]	1.92[b]	3.09[a]	3.22[a]	20×10cm
0.73[b]	0.64[bc]	0.77[b]	0.80[b]	1.50[b]	1.72[b]	1.40[bc]	1.37[bc]	20×20cm
0.55[bc]	0.70[b]	0.55[bcd]	0.40[cd]	1.16[bc]	1.32[bc]	1.28[bc]	0.88[cd]	30×20cm
0.33[c]	0.30[d]	0.39[cd]	0.31[d]	0.49[c]	0.46[d]	0.53[d]	0.49[d]	30×30cm
	0.76[a]	0.84[a]	0.77[a]	Average of Mowing Hight	1.36[a]	1.57[a]	1.49[a]	Average of Mowing Hight

Table 10 shows a moral difference in paper area in the impact of farming systems on the first mowing . The farming system exceeds 10 20cm and 20 30cm. Paper area recorded 2152.8 cm and 2051.9 cm. They differed morally from the 30 farming system × 30cm, which recorded the lowest paper area of 1528cm. In the second mowing , the farming system exceeded the 20 × 20cm, which recorded the 1917 .8cm and an immoral difference from the 20 farming system × 30cm s Development ", which was morally different from the 20cm 10 × farming system and which recorded the lowest paper area of 1475. 1cm m2 and 0.14kg m2.

The cutting levels showed a moral difference in the paper area in the first and second mowing and exceeded the cutting level of 10cm and recorded 2069 cm2 and 1893.1cm2 and recorded the cutting level of 5cm with a minimum paper area of 1820.77cm2 and 1485. 1 cm2 respectively.

The overlap of the agriculture system and the level of height of the pieces had a 20 20cm.

moral effect in the first mowing . The largest paper area was recorded at the 10cm cutting level and the planting system 10 20cm. The average paper area in the first mowing was 30 30cm and at the 15cm cutting level was 1322.6 cm. In the second mowing , the agriculture system exceeded

Table (10) Impact of farming systems and mowing hight in the first and second monster paper area

Farming Systems	Mowing Hight (second mowing)			farming systems	Mowing Hight (first mowing)			farming systems
	15cm	10cm	5cm		15cm	10cm	5cm	
1475.1^{b}	1255.1^{f}	1658.4^{d-e}	1511.7^{c-f}	2152.8^{a}	1865.8cd^{e}	2557.7^{a}	2035.0^{cd}	20×10cm
1917.8^{a}	1901.4^{b}	2386.9^{a}	1465.0^{def}	1900.4^{ab}	2132.2^{bc}	1774.1^{de}	1794.9^{cde}	20×20cm
1668.7^{ab}	1873.4^{bc}	1716.3^{b-c}	1416.4^{ef}	2051.9	2019.7^{cd}	2375.3^{ab}	1760.8^{de}	30×20cm
1528.6^{b}	1227.^{f}	1810.9^{bcd}	1547.3^{b-f}	1528.0^{b}	1322.6^{f}	1568.9^{ef}	1692.4^{de}	30×30cm
	1564.4^{ab}	1893.1^{a}	1485.1^{b}	Average of Mowing Hight	1835.09^{b}	2069.00^{a}	1820.77^{b}	Average of Mowing Hight

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To discuss the results reported in tables (1-10), the significant increase in the indicators of vegetation growth may be represented by biomass, which is a reflection of the branches and height of the plant, the number of leaves and their area resulting from the revitalization of the plant's growth. s high densities may result in an increase in the amount of oxygen-derived protein PIN3 a cycle in regulating the transporting and polar modulation of oxygen in surrounding skin cells, as the decrease in R ratio: RF (R ratio of red radiation, the bulk of which is absorbed in the higher layers of the plant and long red RF) increases the genetic expression of this protein and thus increases the quantity and abundance of its positioning in the outer cells resulting in the manufacture of oxins and accumulation of IAA, which produces the increase in the branch's longitudinal growth and length (return and late 2014). These results are consistent with Sutarno, Rosyida (2020),

Santosa and others (2021) who found that the highest height of the plant for morinka was found in farming distance systems that achieve high plant densities while Ramkumarwal Others 2017 found that the highest height of the plant was achieved in farming systems distanced and tended to effectively metabolize, increase its output and increase the capacity of the source There will be more rejuvenated branches to stimulate static shoots to form branches, While it decreased at a height of 15 cm because there were more branches kept on the plant which led to discouraging the renewal of the branches and this is consistent with Lsah et al. (2104), Padilla et al., who indicated that cutting heights had a moral effect on the number of branches and regeneration in the Morinka plant .This is because the competition in sunlight, nutrients, water absorption and the vital area occupied by the plant contributes to an increase in the number of leaves, but it may not contribute to an increase in the surface of the paper for them as a result of these factors. It grows strongly and rapidly and constitutes a larger paper area.

This is what was observed in the first beard (Al Awda et al., 2014) These results are consistent with Shahzad et al. (2016), Ponnaswari and Rani (2019) who found a moral difference in the first gasket but did not differ in subsequent gaskets. The leaves are the ones that will contribute to the rejuvenation of the plant and this is

consistent with Basher and others (2017) in their study on the effect of high cutting on the parts of the biomass of the morinca plant. But the total biomass yield in the unit of space increases due to the effective use of growth factors. The great yield of the unit of space can be obtained when individual plants are severely competed. Especially, differences in plant height, number of branches and number of leaves at the individual plant level in favor of increasing plant density correspond to these results with Shahzad and others (2015). The Bopape and others (2020).

Sutarno and Rosyida (2020) who found that by increasing the plant density of the area unit using agricultural systems for narrow distances, they gave the highest yield of fresh biomass. This is the result of the moral indistinguishment of the average number of leaves of the plant by the effect of the farming systems and the increase in the number of plants in the unit of area resulting in the wet weight of the leaves which is a reflection of the effective use of growth factors from light, water, metal elements and vital space and this is consistent with Sautosa, others 2020.

Abdullah and others (2021) who referred to the wet weight of the leaves in the unit of area did not show a moral difference in the wet weight of the leaves in the first and second beard. This is consistent with Xavier and Carvalho 1996's statement that the height of the pieces does not affect the weight of the leaves. (2017) It is also consistent with the non-impact of cutting level in the wet weight of the vegetable total and the wet weight of the leaves in the area unit . According to the wet weight of the biomass and consistent with that of Bape et al. (2020), Abdullahi et al. (2021), agriculture according to the farming systems that allow the increase of the number of plants in the unit of area to give the highest dry weight to the biomass in order to effectively use the requirements of the growth factors which can reach its great end. These results are consistent with Santosa and others (2021), finding that the dry weight of leaves is morally superior in tight distances compared to the wide distances in farming systems.

This is compatible with other Pedilla results (2014) as they found low dry weight of biomass and dry weight of stems at cutting frequencies of Morinka compared to the first mowing . and these results are consistent with Damtew and others (2011) as they found an increase in the surface area of paper in agriculture with high agricultural density. These results correspond to Bashar and others (2017) who found an increase in the plant's paper area when using a 40cm cutting

height compared to those high levels of pieces adopted and found an increase in the ratio of leaves to stems at this level of cutting.

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