Al-Muthanna J. For Agric Sci Print ISSN: 2226-4086 Online ISSN:2572-5149
Vol. 11 , Issue.Supplement 01. 2024
https://muthjas.mu.edu.iq/ http://doi.org/10.52113/mjas04/11.1/24

The Role of Planting Systems and Mowing Height in the Growth, Yield and Quality of Green Forage Traits on the Mineral Content and Nutritional Value of *Moringa oleifera* Lam

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Received on 2/01/2024 Accepted on 20/3/2023 Published on 1/4/2024

Abstract

The field experiment to study, the role of planting systems and the rise of the beast 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 beast after 70 days of planting, Agriculture system exceeded 30X30 cm and cutting level of 15 cm per second mowing per 100 g dry substance in iron content. 14.03 mg in leaves, 13.37 mg in stems, calcium content 1092.70 mg in leaves, 81.53 mg in stems, manganese content 410.35 mg in leaves, 135.07 mg in sycans, 0.07% in ozcal In stems and potassium 1.18% in leaves, 0.49% in stems, protein 21.37% in leaves, 4.86% in stems, kidney carbohydrate 11.37% in leaves, 5.78% in stems, ash 9.97% in leaves, 3.03% in stems, fiber 31.65% in leaves and 13.40% in stems..

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, Morinka leaves are cooked and fed to children, with 100 grams of

their leaves containing A vitamin four times more than the same amount of carrots, And four times the calcium in a glass of milk, and of iron over 100 grams of spinach, It is equivalent to seven times vitamin C in 100 grams of orange and three times potassium in 100 grams of banana. The quality of protein in its leaves compares with the quality of protein in milk and eggs (Fahey, 2005). He 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 pointed out that the high levels of cutting off the soil surface are dense with an increase in its strong regrowth processes. Feed cutting in the first harvest with only leaving the leg base without branches, nutrients for biomass regeneration will be limited due to the lack of additional nutrients in the branches resulting in later death and often fewer rewind plants.

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 Working Methods.

The experiment was carried out in the Shirkat area, which is located on the longitude of 43,253 East and 35,621 North width circle. This included the first factor in vertical tapes and the second factor levels in horizontal tapes. Each pilot unit includes 4 lines and the length of each 3m line. The strip plot included the first factor in vertical tapes and the second factor levels in horizontal tapes Seeds directly in the field according to the random distribution calculates the transactions and gave the planting butterfly irrigation and dated 16/6/2021. The cultivation process was followed by a month after the addition of 200kg hectare fertilizer urea N 46% and all agricultural operations were conducted from weed and control and calculated the crop need. The study factors included two factors: planting 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. It was randomly distributed in vertical tapes, the second factor being the height of the pieces 1-beast at the level of 5cm 2.- Beast at the level of 10cm .3- Beast at the level of 15cm from the soil surface, randomly carried out in horizontal tapes at each repeat, and the iron content of the amalgam was estimated. 100gm-1 and calcium mg content. 100gm-1, estimate manganese content (mg/100g), estimate phosphorus (%), nitrogen percentage, potassium percentage and protein ratio.

Results and Discussion

1. **Quality Iron Content Mg. 100gm-1material dry.**

Table 1 shows a moral difference in the iron content of the leaves with the impact of the second beast planting systems, with the agriculture system exceeding 30 × 30cm with the iron content of 13.9 mg. 100gm-1 With a moral difference compared to the rest of the planting systems, the planting system was 10 × 20cm with the lowest iron content of 12.7mg. 100gm-1 Dry substance. In the stems, the planting systems exceeded 20 × 30cm and 30 × 30cm. The iron content of the stems was 12.57 and 13.23 mg. 100gm-1 Dry stem material and morally different from the rest of the planting systems. The 10 × 20cm planting system recorded the lowest iron content in the stems at 10.23 mg. 100gm-1.

Cutting levels showed a moral difference between the averages of iron content in the leaves in the second beast and the moral cutting level exceeded 15cm in iron content by an average of 13.4mg. 100gm-1**.**

Table (1) Impact of planting systems and mowing hightin iron-mg content. 100gm-1 of dry material for leaves and stems of the second mowing moringa plant

planting systems	stalks			**planting systems**	**leaves**			**planting systems**
	Mowing avarage				Mowing avarage			
	15cm	cm10	cm5		cm15	cm10	cm5	
10.23^{c}	10.96^{c}	10.06^{cd}	9.68^{d}	12.7^{c}	12.78^{fg}	12.74^{fg}	12.68^{g}	cm20×10
11.45^{b}	12.30^{b}	11.00^{c}	11.05^{c}	12.9^{c}	13.12^{e}	12.92^{f}	12.90^{f}	cm20×20

12.57[a]	12.83[ab]	12.68[ab]	12.21[b]	13.4[b]	13.66[c]	13.43[d]	13.27[de]	cm30×20
13.23[a]	13.37[a]	13.22[ab]	13.11[ab]	13.9a	14.03[a]	13.96[ab]	13.82[bc]	cm30×30
	12.36[a]	11.74[a]	11.51[a]	Mowing hight	13.4[a]	13.2[ab]	13.1[b]	Mowing hight

Overlapping planting systems and cutting level had a moral effect on the second beast in leaves and stems, with the highest iron content recorded at 15 cm cutting level and 30 × 30cm planting system averaging 14.03 mg. 100gm-1 The lowest iron content in leaves and stems with the second beast at the planting system was 10 × 20cm and the cutting level was 5cm with an average of 12.68 mg. 100gm-1 and 9.68 mg. 100gm-1 dry material**.**

2. Calcium mg content. 100gm-1 dry material

Table 2 shows a moral difference in the content of calcium in leaves and stems with the second beast, with the cultivation system exceeding 30 × 30cm with the content of calcium in leaves and stems which amounted to 1064.5 mg. 100gm-1 and 79.12 mg. 100gm-1 Dry substance with a moral difference compared to the rest of the planting systems except the planting system (20 × 30 cm) in the first beast. The differences were immoral. The planting system was 10 × 20cm with the lowest calcium content in the leaves and stems with the second beast and averaged 871.95 mg. 100gm-1 and 59.66 mg. 100gm-1gm dry substance respectively.

The cutting level shows a moral difference between the averages of calcium content in the leaves and stems by the second beast and exceeds the cutting level by an average of 15cm by 975.35 mg. 100gm-1 and 71.82 mg. 100gm-1 dry substance and the cutting level 5cm had recorded the lowest calcium content of 943.92 mg. 100gm-1 and 66.51 mg. 100g.

The overlap between the cultivation system and the cutting level had a moral effect on the leaves and stems with the second beast. The cultivation system exceeded 30 × 30cm and the 15cm cutting level with the highest calcium content of 1092.70 mg. 100gm-1 and 81.53 mg. 100gm-1gm dry substance, the lowest calcium content in leaves and stems with

second beast at 10 × 20cm planting system and 5cm cutting level with an average of 864.94 mg. 100gm-1 and 57.84 mg. 100gm-1gm dry substance respectively.

Table (2) Impact of planting systems and mowing hightin calcium mg content. 100g dry material for leaves and stems of the second mowing moringa plant

plantin g system s	Stalks			planting systems	Leaves			planting systems
	Mowing avarage				Mowing avarage			
	15cm	cm10	cm5		cm15	cm10	cm5	
59.66^{d}	61.79^{f}	59.35^{f}	57.84^{f}	871.95^{c}	879.93^{fg}	870.96^{fg}	864.94^{g}	cm20×10
66.13^{c}	70.19^{de}	66.54^{e}	61.67^{f}	903.72^{bc}	917.73^{e}	895.25^{ef}	892.65e^{f}	cm20×20
71.92^{b}	73.79^{cd}	71.97^{cd}	69.99^{de}	976.72^{ab}	1011.07^{c}	963.64^{d}	954.55^{d}	cm30×20
79.12^{a}	81.53^{a}	79.30^{ab}	76.55^{bc}	1064.05^{a}	1092.70^{a}	1061.55^{b}	1037.90^{b}	cm30×30
	71.82^{a}	69.29^{ab}	66.51^{b}	Mowing hight	975.35^{a}	947.85^{b}	943.92^{b}	Mowing hight

3.

4. **The content of manganese mg. 100gm-1 dry material.**

Table 3 shows a moral difference in the content of manganese in leaves and stems with the second beast. The cultivation system exceeds 30 × 30cm by the content of manganese in leaves and stems, which amounted to 410.35 mg. 100gm-1 and 133.77 mg. 100gm-1 With a moral difference compared to the rest of the planting systems other than their immorality compared to the distance (20 × 30cm) in the stems since the differences were immoral, the planting system was 10 × 20cm, which gave the lowest content of manganese in leaves and stems with the second

beast an average of 354.13 mg. 100gm-1 and 96.72 mg. 100gm-1

Cutting levels show a moral effect in the manganese content averages in leaves and stems with the second beast and exceed the cutting level by 15cm by an average of 391.75 mg. 100gm-1 and 118.49 mg. 100gm-1, while the 5cm cut-off level recorded the lowest manganese content of 377.22 mg. 100g-1 and 108.20mg. 100gm-1.

The overlap between the planting system and the cutting level had a moral effect on the leaves and stems with the second beast. The planting system exceeded 30 × 30cm and the cutting level 15cm with the highest manganese content of 419.80mg. 100gm-1 and 135.07 mg. 100gm-1, the lowest content of manganese in leaves and stems with the second beast at the planting system was 10 × 20cm and the cutting level was 5cm was 347.80 mg. 100gm-1 and 91.40 mg. 100gm-1 dry material.

Table (3) Impact of planting systems and mowing hightin manganese mg content. 100g dry material for leaves and stems of the second mowing moringa plant

planting systems	Stalks			planting systems	leaves			planting systems
	Mowing avarage				Mowing avarage			
	15cm	cm10	cm5		cm15	cm10	cm5	
96.72^{c}	100.74^{fg}	95.03^{fg}	91.40^{g}	354.13^{d}	360.37^{ef}	354.23^{fg}	347.80^{g}	**20×10 cm**
106.84^{bc}	115.12^{de}	104.30^{ef}	101.10^{fg}	375.57^{c}	384.66^{d}	372.06^{e}	370.00^{e}	**20×20 cm**
117.70^{ab}	123.04^{bcd}	116.15^{cd}	113.90^{de}	394.96^{b}	402.18^{cb}	394.89^{cd}	387.81^{d}	**30×20 cm**
130.77^{a}	135.07^{a}	130.85^{ab}	126.39^{abc}	410.35^{a}	419.80^{a}	408.00^{b}	403.27^{cb}	**30×30 cm**

	118.49[a]	111.58[ab]	108.20[b]	Moving hight	391.75[a]	382.29[b]	377.22[b]	Mowing hight

5.

6. Percentage of phosphorus%

Table 4 shows a moral difference in the ratio of phosphorus in leaves and stems with the second beast, with the cultivation system exceeding 30 × 30cm with the highest ratio of phosphorus in leaves and stems of 0.09mg. The agriculture system 10 × 20cm had the lowest phosphorus ratio in leaves and stems, which was 0.04% and 0.015%, respectively.

The cutting levels showed a moral difference between the phosphorus content averages in leaves and stems with the second beast and exceeded the cutting level by 15cm by an average of 0.071% and 0.0300%, whereas the cutting level of 5cm had the lowest phosphorus ratio of 0.061% and 0.023%, respectively.

The overlap between the agriculture system and the cutting level has a moral effect in the leaves and stems with the second beast. The planting system exceeded 30 × 30cm and the 15cm cutting level with the highest phosphorus content of 0.098% and 0.042%. The lowest phosphorus content in the leaves and stems with the second beast at the planting system was 10 × 20cm and the height of the pieces was 0.043% and 0.013% respectively.

Table (4) Impact of planting systems and mowing hightin the percentage of phosphorus in dry matter of leaves and stems Maurinca plant II.

planting systems	Stalks			planting systems	Leaves			planting systems
	Mowing avarage				Mowing avarage			
	15cm	cm10	cm5		cm15	cm10	cm5	
0.015[c]	0.018[ef]	0.015[fg]	0.013[g]	0.04[d]	0.051[fgh]	0.048[gh]	0.043[h]	**cm20×10**

0.021^{bc}	0.027^{cd}	0.021^{e}	0.017^{efg}	0.05^{c}	0.060^{efg}	0.055^{eh}	0.054^{eh}	**cm20×20**
0.029^{b}	0.032^{c}	0.029^{cd}	0.026^{d}	0.06^{b}	0.077^{cd}	0.068^{de}	0.064^{def}	**cm30×20**
0.039^{a}	0.042^{a}	0.039^{ab}	0.037^{b}	0.09^{a}	0.098^{a}	0.092^{ab}	0.084^{bc}	**cm30×30**
	0.030^{a}	0.026^{b}	0.023^{b}	Mowing hight	0.071^{a}	0.066^{b}	0.061^{c}	**ارتفاع القطع**

7.

8. Nitrogen Percentage %

Table 5 shows a moral difference in the ratio of nitrogen in leaves and stems with the second beast. The cultivation system exceeds 30 × 30cm by the content of nitrogen in leaves and stems, which was 3.33% and 0.75%, and a moral difference from the rest of the planting systems in which the 10 × 20cm agriculture system recorded the lowest nitrogen content in leaves and stems with the second beast 52.94% and 0.55% respectively.

Cutting levels showed a moral difference in the nitrogen ratio in leaves with the second beast and exceeded the 15cm cutting level by the highest rate of 3.17% compared to the 5cm cutting level which recorded the lowest nitrogen ratio in leaves with 3.07%**.**

Table (5) Impact of planting systems and mowing hightin the percentage of nitrogen of dry matter of leaves and stems of the second mowing moringa plant

plantin g system s	Stalks			planti ng syste ms	Leaves			planting systems
	Mowing avarage				Mowing avarage			
	15cm	cm10	cm5		cm15	cm10	cm5	
0.55^{d}	0.58^{ef}	0.54^{ef}	0.53^{f}	2.94^{c}	2.97^{fg}	2.93^{g}	2.93^{g}	**cm20×10**
0.62^{c}	0.67^{c}	0.62^{d}	$0.57e^{f}$	3.04^{bc}	3.07^{de}	3.03^{def}	3.02^{ef}	**cm20×20**

0.68[b]	0.68[c]	0.69[bc]	0.67[c]	3.17[b]	3.24[c]	3.18[c]	3.10[d]	**cm30×20**
0.75[a]	0.77[a]	0.75[a]	0.73[ab]	3.33[a]	3.42[a]	3.32[b]	3.25[c]	**cm30×30**
	0.67[a]	0.65[a]	0.62[a]	Mowing hight	3.17[a]	3.11[ab]	3.07[b]	Mowing hight

The overlap between the agriculture system and the cutting level has a moral effect on the ratio of nitrogen leaves and stems with the second beast. The agriculture system exceeded 30 × 30cm and the 15cm cutting level with the highest nitrogen ratio of 3.42% and 0.77%, respectively. The lowest nitrogen ratio in the leaves and stems with the second beast at the system was 10 × 20cm and the height of the pieces was 5cm and 2.93% and 0.53% respectively..

9. Percentage of Potassium%

Table 6 shows a moral difference in the percentage of potassium in leaves and stems with the second beast. The agriculture system exceeds 30 × 30cm in the percentage of potassium in leaves and stems was 1.10% and 0.45%, and a moral difference compared to the rest of the planting systems, in which the 10 × 20cm agriculture system recorded the lowest potassium in leaves and stems with the second beast was 0.69% and 0.25% respectively.

The cutting levels showed a moral difference in the percentage of potassium in leaves and stems with the second beast and the cutting level exceeded 15cm by 0.96% and 0.39%, while the cutting level of 5cm with the lowest potassium in leaves and stems with the second beast was 0.83% and 0.32%.

The overlap between the agriculture system and cutting levels had a moral effect on the potassium ratio in leaves and stems with the second beast, as the 30 planting system exceeded the × of 30cm and the 15cm cutting level with the highest potassium ratio of 1.18 and 0.39% and the lowest potassium ratio in leaves and stems with the second beast at the 10 × 20cm and the cutting level of 5cm was 0.65% and 0.22% respectively.

Table (6) Impact of planting systems and mowing hight in percentage of potassium% of dry matter of leaves and stems of the second mowing moringa plant

planting systems	Stalks			planting systems	Leaves			planting systems
	Mowing avarage				Mowing avarage			
	15cm	cm10	cm5		cm15	cm10	cm5	
0.25^{d}	0.29ef	0.24^{f}	0.22f	0.69^{d}	0.73^{fg}	0.70^{gh}	0.65^{h}	**cm20×10**
0.32^{c}	0.37^{bcd}	0.31^{de}	0.28ef	0.81^{c}	0.87^{e}	0.78^{f}	0.77^{f}	**cm20×20**
0.38^{b}	0.42^{abc}	0.39^{bc}	0.35^{cde}	0.98^{b}	1.05^{bc}	0.98^{d}	0.91^{e}	**cm30×20**
0.45^{a}	0.49^{a}	0.44^{ab}	0.42^{abc}	1.10^{a}	1.18^{a}	1.10^{b}	1.02^{cd}	**cm30×30**
	0.39^{a}	0.34^{b}	0.32^{b}	Mowing hight	0.96^{a}	0.89^{ab}	0.83^{b}	**Mowing hight**

10. Percentage of Protein %

Table 7 shows a moral difference in the ratio of protein in the dry substance of leaves and stems in the Maurinca plant with the second beast. The cultivation system exceeds 30 × 30cm the ratio of protein in leaves and stems, which was 20.81% and 4.72% and a moral difference from the rest of the transactions, in which the planting system was 10 × 20cm, the lowest protein in leaves and stems was 18.45% and 3.56%, respectively.

It shows that cutting levels have a moral effect on the protein ratio in the leaves with the second beast, as the cutting level exceeds 15cm by 19.87%, while cutting level 5cm has recorded the lowest protein ratio in the leaves with the second beast, while in the stems the cutting levels did not show a moral effect in the protein ratio in the second beast.

Table (7) Impact of planting systems and mowing hightin the percentage of protein% of dry matter of leaves and stems of the second mowing moringa plant

planting systems	Stalks			planting systems	Leaves			planting systems
	Mowing avarage				Mowing avarage			
	15cm	cm10	cm5		cm15	cm10	cm5	
3.56^{c}	4.16^{ab}	3.26^{c}	3.28^{c}	18.45^{c}	18.61^{ef}	18.36^{f}	18.37^{f}	**cm20×10**
3.96^{bc}	4.22^{ab}	3.58^{bc}	4.08^{ab}	19.05^{bc}	19.24^{d}	18.99^{de}	18.93^{de}	**cm20×20**
4.27^{ab}	4.30^{ab}	4.31^{ab}	4.20^{ab}	19.85^{b}	20.24^{c}	19.93^{c}	19.40^{d}	**cm30×20**
4.72^{a}	4.86^{a}	4.71^{a}	4.60^{a}	20.81^{a}	21.37^{a}	20.75^{b}	20.31b^{c}	**cm30×30**
	4.38^{a}	3.96^{a}	4.04^{a}	Mowing hight	19.87^{a}	19.50^{ab}	19.25^{b}	**Mowing hight**

The overlap between the cultivation system and cutting levels had a moral effect on the protein ratio in leaves and stems with the second beast. The cultivation system exceeded 30 × 30cm and the 15cm cutting level with the highest protein ratio of 21.37% and 4.86%. The lowest protein ratio in leaves and stems with the second beast at the planting system was 10 × 20cm and the 10cm cut level was 18.36% and 3.26% respectively ..

To discuss the results reported in tables (1-7) and that increasing the iron content in dry matter with leaves and stems in planting systems for spaced distances because it leverages the optimal area of absorption of nutrients compared to converging plants and may also be attributed to improved chlorophyll synthesis and enzymes such as catalys and peroxides.

Micronutrient content may increase as a result of increased absorption of phytonutrients, growth standards and quality in morinka plants. These results are consistent with Ponnuswani and Rani (2019) that the highest iron content in the dry material of moringa plants when adopting spaced distances (20 × 40 cm). This is an indication that increased cutting levels contribute to an increase in the content of leaves

from iron because plants are faster to regenerate their growth and less to consume nutrient stocks from roots because they contribute to maintaining part of the branches on the plant.

These are consistent with Pedilla and others (2014) to increase the content of elements for minerals, including iron, by increasing cutting heights. It may be due to an increase in the plant's vital distance and the lack of competition between plants for light and food elements reflected in their increase in plant parts. These results are consistent with Ponnuswania and Rani (2019). However, they differ from Shahzad and others (2015), finding high calcium content in narrow distances (15 × 30cm) at a 30-day interval. The accumulation of dry material for photosynthesis instead of draining what is stored in the roots and leg base at low levels. This is reflected in the calcium content in and increased when adopting the high cutting level.

Padilla and others (2014) have found that the cutting heights have little impact on the content of leaves and stems of calcium and Fadiyimu et al. (2013) found an increase in calcium content in cutting levels of 50cm compared to the impact of cutting levels at 150cm. Increasing the content of manganese by increasing the biospace of plants is to reduce competition for growth determinants, especially those available in limited quantities, including nutrients in the soil. However, Ponnuswania and Rami (2019) found that the highest content of manganese at distance (15 × 10cm) in leaves and stems followed by distance (20 × 40cm), indicating the effect of Ninez conditions in determining the content of Ninews.

The ratio of phosphorus in leaves and stems varies according to elements on this element between competing plants and this may be attributed to the reason for its increase in the ratio of phosphorus in the dry matter of leaves and stems, and is consistent with the results of Ponnuswanai and Rani (2019) Finding that the highest proportion of nutrients in the ideal plant density that were achieved from the impact between planting distances (20 × 40cm) which has caused VP heights in the next beast and this is consistent with Fadiyimal and others (2013) indicating an increase in the proportion of certain nutrients, including phosphorus, when the pieces increase, while Tran and others (2022) They noted that the chemical content was not affected by

the high cutting in the Truchauthere gigantean plant, the availability of the element for plants cultivated with spacing distances is higher than those cultivated with narrow distances where the competition for requirements and growth factor is high and this is consistent with the results obtained by Shahzad and others (2015) They found that the highest nitrogen ratio in the moringa plant is in those plants grown at high distances. We may find high nitrogen ratios in leaves and stems for the second high cutting brush.

Padilla and others (2014) observe a clear impact of cutting levels on the nitrogen ratio. And because plants grown with distances are less competing among themselves for available nutrients, the potassium is higher than those subject to qualitative competition for nutrients, including potassium, It may be caused by the contribution of the remaining biomass when cutting to photosynthesis and the non-drain of stored nutrients in roots and leg base in low cutting and this is consistent with Magda Fadiyimu et al. (2014) in increasing potassium proportion commensurate with increasing cutting level in the moringa plant, while Tran et al. (2022) and that the proportion of potassium in leaves and stems was not affected by the high cutting in the Truchauthere gigantean plant, the representation of nitrogen compounds absorbed by the plant is converted into proteins, so the spaced distances that contributed to the increased percentage of nitrogen in the dry matter of leaves and stems (8, 9) It has been reflected in the protein ratio in it and this is consistent with the Ponnuswanai and Rani Maugda (2019) If they indicate that the ideal plant density which can achieve the best nutritional content, including protein, in distances (20 × 40 cm) compared to the narrow distances adopted in his study.

With the effect of cutting levels, this is consistent with the findings of Alvarado and others (2022), in that low plant density achieved the highest protein ratio, while Padilla and others (2014) indicated that protein ratio was not affected by the impact of cutting levels.

These findings are consistent with those of Ponnuswani and Rani (2019); This is consistent with Fadiyimal and others (2013), Tran and others (2022), this is consistent with the results obtained by Shahzad and others (2015), Padilla and others

(2014), Padilla and others (2014), and this is consistent with the Fadiyimu and others (2014.(

References

Fahey, J. W. (2005). *Moringa oleifera:* Review of medical evidences for its nutritional, therapeutic and prophylactic properties. Part 1.*Trees Life J.*,:1- 5.

Padilla, C., Fraga, N., Scull, I., Tuero, R., and Sarduy, L. (2016). Effect of cut height on indicators of forage production of Moringa oleifera cv. Plain. *Cuban Journal of Agricultural Science, 48*.(4):405-409.

Ponnuswami, V., and Rani, E.A. (2019). Organic leaf production of Moringa (Moringa oleifera Lam.) cv. PKM-1 for higher leaf yield and quality parameters under Ultra High Density planting system.

Fadiyimu, A., Alokan, J.A., Fajemisin, A.A., and Aladesanwa, R.D. (2020). Influence of Cutting Height on Seasonal Composition of Moringa oleifera in the Rainforest Zone of Nigeria.

Tran,T.H;Tu,T.K,and Hien,T.Q.(2022).Determintion of Suitible cutting for green fodder Trichanthera gigantean grown for animal feed Bulgarian journal Agricultural science 28(3):516-520.

Alvarado-Ramírez, E.R., Joaquín-Cancino, S., Estrada- Drouaillet, B., Romero-Treviño, E.M., LLanes-Gil-López, D.I., & Garay Martínez, J.R. (2022). Yield and nutritional value of Moringa oleifera forage at different population densities. Agro Productividad.

Shahzad, M.A.; I. Shahid, and A. Irfan (2014). Evaluating the response of nitrogen application on growth, development and yield of quinoa genotypes. International Journal of Agriculture and Biology. 1560–8530.

Basra, S.M., Nouman, W., Hafeez-ur-Rehman, Usman, M., & Nazli, Z. (2015). Biomass production and nutritional composition of Moringa oleifera under different cutting frequencies and planting spacings. *International Journal of Agriculture and Biology, 17*, 1055-1060.

APHA (American Public Health Association),(2017), Standard Methods for the Examination of Water and Wastewater 23th Edition, 800 I Street, NW, Washington DC, USA.

Wodaje Addis1 and Alemayehu Abebaw, (2017), Determination of heavy metal concentration in soils used for cultivation of Allium sativum L. (garlic) in East Gojjam Zone, Amhara Region, Ethiopia, Addis and Abebaw, Cogent Chemistry (2017), 3: 1419422.

Chapman, H.D. and Pratt, P.F. (1961) Methods of analysis for soils plants and waters. University of California, Los Angeles, 60-61, 150-179.

Component in some Foodstuff. Journal of Food and Dairy Science