

Growth and Yield Responses of Green Mustard (*Brassica juncea* L.) by using Cow Manure and Nitrogen Levels at Wet Season

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Abstract:- Green mustard is a kind of vegetables that is easy to plant and it has nutrition for our health. The method to use or select varieties is a good technique to yield of green mustard and fertilizer also plays a key role to increase the growth of green mustard. The purpose of this research was to show the method for using cow manure with the levels of nitrogen fertilizer in responding to growth and yield of varieties of green mustard (*Brassica juncea*).

This experiment had two factors such as three varieties of green mustard and cow manure with the three levels of nitrogen fertilizer. Factor number one was the green mustard varieties (*Brassica juncea*): (V1) the pretty mustard, (V2) the black mustard (coss) and (V3) the green - leaf mustard. Factor number two was the use of cow manure of 20 t/ha with three levels of nitrogen fertilizer: (F1) nitrogen fertilizer of 0 Kg/ha, (F2) nitrogen fertilizer of 15 Kg/ha and (F3) nitrogen fertilizer of 30 Kg/ha. The experiment was done by using Randomized Complete Block Design (RCBD) with 4 replications, 9 treatment combinations, which were equal to 36 small plots. It was done at Thmor Sar village, Svay Chrum commune, Svay Chrum district, Svay Rieng province, Cambodia from September to December, 2022.

The results showed that the higher yield of green mustard was the treatment combination of (V3F3) and it provided 8.92 t/ha. So, it could be concluded that the better variety of green mustard was V3 (green - leaf mustard) by using F3 (fertilizer) cow manure of 20 t/ha with nitrogen fertilizer of 30 Kg/ha that it could provide a higher yield (8.92 t/ha).

Keywords:- Green Mustard, Cow Manure, Nitrogen Fertilizer, Yield.

I. INTRODUCTION

The production of green mustard has had a great change in recent year in the world from 1973 to 2022, especially the yield was 852,807.53 t in 2022 (Knoeme, 2022). The estimation of the planted area and the yield of the green mustard in the world during 2018 and 2019 were 36.59 Mha

in which it yielded 72.37 Mt equal to 1980 Kg/ha. Throughout the world, India had 19.80% and 9.80% of the planted area and production (USDA, 2024). The increased yield of green mustard between 2010 and 2011 were 1840 Kg/ha and 2018 and 2019 were 1980 Kg/ha. Whereas the production had increased in 2010 and 2011 in which it yielded 61.64 Mt and in 2018 and 2019 were 72.42 Mt in the last 8 years (ICAR, 2023). The use of nitrogen fertilizer could help green mustard yield to increase of 30% or more than this (Sask Mustard, 2023).

Moreover, nitrogen fertilizer was effective in increasing the growth of vegetable, especially their leaves (Arzad et al., 2017). Cow manure was used as an organic fertilizer to enhance more growth of vegetable that had no bad effect on environment and helped promote and maintain the long - term productivity of agriculture with safety for the consumers (Arzad et al., 2017). The combined use of inorganic and organic fertilizers could increase the productivity of the plants and they also enriched the fertile soil with good quality (Satyanarayana, 2002). Nitrogen fertilizer was also one of the most important factors for growth and increased biomass and seed yield of green mustard (Brennan and Bolland, 2007). The green mustard could absorb effectively only 50% of nitrogen fertilizer. It absorbed nitrogen fertilizer in soil through its roots and provided a supplement for the growth of leaves and seeds for harvesting (Schjoerring et al., 1995). Cow manure fertilizer was considered as compost which had nutrient and high quality of organic matters. The addition of cow manure fertilizer in the soil could increase the quality of organic carbon that could lead to increase action of useful microorganism and maintained the quality of the soil with more organic matters. Cow manure fertilizer helped build up the growth and yield of various plants (Gudugi and Akande, 2013). Generally, the green mustard is a leafy vegetable commonly grown in the tropical region. It forms a high percentage of the daily intake of leafy vegetables (Russell et al., 2006). In Cambodia, the green mustard was grown almost everywhere and in all seasons, especially in the autumn, and eating can also be done according to the preferences of consumers (Department of Agricultural Extension, 2018).

So, this experiment was done in Svay Rieng province, Cambodia. The aim of the research was to study the effects of cow manure with different levels of nitrogen fertilizer on the growth and yield of varieties of the green mustard during the wet season. We hope that this research will have a positive result for the next generation and contribute to the production of the green mustard as well as meet the needs of consumers in Cambodia.

II. MATERIALS AND METHODS

➤ *Experimental Location*

The experiment was started from September to December, 2022. The place was located in Thmor Sar village, Svay Chrum commune, Svay Chrum district, Svay Rieng province, Cambodia. It was done with the system of GPS and its longitude was E 105° 44' 30", latitude was N 11° 06' 29" and altitude was 5 m.

➤ *The Properties of Soil*

There were soils to be experimented such as sand of 48.31%, silt of 16.79% and clay of 34.89%. The soil pH was about 4.15 to 5.84. The characteristic of electrical conductivity of soil is 68.13 $\mu\text{s}/\text{cm}$ to 113.30 $\mu\text{s}/\text{cm}$. The total dissolved salt of soil was 35.05 ppm to 56.08 ppm. The nitrogen of soil was 4.02 ppm to 10.13 ppm. The phosphorus of soil was 4.66 ppm to 11.63 ppm. The potassium of soil was 12.27 ppm to 27.86 ppm.

➤ *Climate*

This experiment was done with the average of temperature of 28.23°C, the average of rain fall of 114.60 mm, the average of relative humidity of 80.71% and the average of wind speed of 2.71 m/sec (Provincial Department of Water Resources and Meteorology, Svay Rieng, 2023).

➤ *Experimental Materials*

There are three varieties of the green mustard (*Brassica juncea*) including *pretty mustard*, (V1) *black mustard (coss)* and (V3) *green - leaf mustard* which were used 20 g/m². The cow manure fertilizer was used 20 t/ha or 2 Kg/m² and three levels of nitrogen fertilizer were used 0 Kg/ha, 15 Kg/ha and 30 Kg/ha.

➤ *Experimental Design*

This experiment was done with 2 factors such as 3 varieties of the green mustard and cow manure with 3 levels of nitrogen fertilizer. The variety factor, *Brassica juncea*, there were 3 varieties of the green mustard, namely (V1) *pretty mustard*, (V2) *black mustard (coss)* and (V3) *green - leaf mustard*. The fertilizer factor, the use of cow manure fertilizer was 20 t/ha with 3 levels of nitrogen fertilizer, namely (F1) nitrogen fertilizer of 0 Kg/ha, (F2) nitrogen fertilizer of 15 Kg/ha and (F3) nitrogen fertilizer of 30 Kg/ha. This experiment was done by using Randomized Complete Block Design (RCBD) with 4 replications and 9 treatment combinations which were equal to 36 small plots, each plot was 1.30 m x 1.30 m and space between plots was 0.80 m. The transplanting space was 20 cm x 20 cm. The number of plants per plot was 36 plants. There were 9 treatment

combinations such as V1F1, V1F2, V1F3, V2F1, V2F2, V2F3, V3F1, V3F2 and V3F3.

➤ *Data Collection*

The data collection of growth and yield of the green mustard was taken on 7, 14, 21 and 28 days after transplanting (DAT). It was selected 10 plants from each small plot by drawing random lottery.

➤ *Statistical Analysis*

It used the inference statistical analysis with ANOVA by using Microsoft Excel.

- In case of AVOVA was significantly different as a result of means of treatments or treatment combinations compared by using LSD (Least Significance Difference) (Gomez and Gomez, 1984).
- In case of AVOVA was not significantly different as a result of means of treatments or treatment combinations compared by using DMRT (Duncan's Multiple Range Test) (Gomez and Gomez, 1984).

III. RESULTS AND DISCUSSION

➤ *The Growth of Green Mustard at 7 DAT*

The analysis of ANOVA of the growth of green mustard at 7 DAT showed that variety factor (A) and fertilizer factor (B) were significant interaction. The plant height, leaf length, leaf width and leaf number of treatment combination of (V3F3) were significantly higher and equal to 12.07 cm, 7.15 cm, 4.27 cm, and 8.29 leaves/plant, respectively. The plant height, leaf length, leaf width and leaf number of treatment combination of (V3F2) were significantly lower and equal to 9.86 cm, 5.76 cm, 3.67 cm and 6.43 leaves/plant, respectively (Table 1).

According to the documentary research of Mr. Nwe and his colleagues in 2019 showed that at variety factor of the 1st treatment (V1) of the leaf - mustard variety, in case it is used fertilizer factor of the 1st treatment (F1) of the cow manure of 10 t/ha with nitrogen fertilizer of 80 Kg/ha or the 1st treatment combination of (V1F1), which provided the mean of plant height of green mustard of 14.08 cm.

However, according to the research of Mr. Malemnganba and Mr. Bajpay in 2019 showed that at variety factor of the 1st treatment (V1) of the green mustard variety, in case it used fertilizer factor of the 2nd treatment (F2) of the cow manure of 10 t/ha with nitrogen fertilizer of 74 Kg/ha or the 2nd treatment combination of (V1F2), which provided the mean of leaf length of green mustard of 8.56 cm when it was compared to the green mustard variety (V1) without using fertilizer in the soil (F0), which gave the mean of leaf length of green mustard of 7.35 cm.

Moreover, according to the research of Mr. Purba and his colleagues in 2021 showed that at variety factor of the 1st treatment (V1) of the green mustard variety, in case it used fertilizer factor of the 2nd treatment (F2) of the cow manure of 20 t/ha with nitrogen fertilizer of 50 Kg/ha or the 2nd treatment combination of (V1F2), which resulted in the mean

of leaf width of green mustard of 4.40 cm when it was compared to the green mustard variety (V1) without using fertilizer in the soil (F0), which gave the mean of leaf width of the green mustard of 4.33 cm.

Furthermore, according to the research of Mr. Ngantung and his colleagues in 2018 showed that at variety factor of the 1st treatment (V1) of the green mustard variety, in case it

is used fertilizer factor of the 2nd treatment (F2) of the farmyard manure of 20 t/ha with nitrogen fertilizer of 200 Kg/ha + KCl₂ of 100 Kg/ha or the 2nd treatment combination of (V1F2), which resulted in the mean of leaf number of green mustard of 8 leaves/plant when it was compared to the green mustard variety (V1) without using fertilizer in the soil (F0), which provided the mean of leaf number of green mustard of 5 leaves/plant.

Table 1 Plant Height, Leaf Length, Leaf Width and Leaf Number of Green Mustard at 7 DAT

Treatment Combination	Plant Height (cm)		Leaf Length (cm)		Leaf Width (cm)		Leaf Number (Leaves/plant)	
V1F1	10.80	bc	6.80	a	4.13	a	7.35	de
V1F2	10.89	bc	6.86	a	4.19	a	7.54	cd
V1F3	11.50	ab	7.08	a	4.26	a	8.24	ab
V2F1	10.02	cd	5.78	b	3.69	b	6.66	f
V2F2	11.27	ab	6.93	a	4.22	a	7.61	bcd
V2F3	11.44	ab	7.01	a	4.24	a	8.04	abc
V3F1	10.19	cd	5.79	b	3.69	b	6.83	ef
V3F2	9.86	d	5.76	b	3.67	b	6.43	f
V3F3	12.07	a	7.15	a	4.27	a	8.29	a
CV (%)	5.81		4.72		2.89		5.83	
F _c (Treatment)	**		**		**		**	
F _c (A)	ns		**		**		*	
F _c (B)	**		**		**		**	
F _c (A x B)	*		**		**		**	
Comparison	LSD _{5%}		LSD _{5%}		LSD _{5%}		LSD _{5%}	

Note: 7 DAT = 7 Days after Transplanting, CV = Coefficient of Variation, A = Variety, B = Fertilizer. ns = not Significant, * = Significant at 5% Level, ** = Significant at 1% Level.

- In Each Column, Means Followed by a Common Letter are not Significantly Different at 5% Level of LSD.

➤ The Growth of Green Mustard at 14 DAT

The analysis of ANOVA of the growth of green mustard at 14 DAT showed that variety factor (A) and fertilizer factor (B) were not significant interaction. For the variety factor, plant height, leaf length, leaf width and leaf number of (V3) were lower and equal to 14.93 cm, 10.83 cm, 7.39 cm and 10.41 leaves/plant, respectively; while those of (V1) were higher and equal to 15.34 cm, 11.55 cm, 7.58 cm and 10.58 leaves/plant, respectively. For the fertilizer factor, plant height, leaf length, leaf width and leaf number of (F1) were lower and equal to 14.66 cm, 10.30 cm, 7.32 cm and 10.21 leaves/plant, respectively; while those of (F3) were higher and equal to 15.89 cm, 12.22 cm, 7.69 cm and 10.86 leaves/plant, respectively (Table 2).

According to the research of Mr. Priadi and Mr. Saskiawan in 2018 showed that the fertilizer factor of the 1st treatment (F1) of the cow manure of 18 t/ha with nitrogen fertilizer of 95 Kg/ha on the variety factor of the 1st treatment (V1) of the green mustard variety provided the mean of plant height of green mustard of 14.44 cm.

On the other hand, according to the research of Mr. Nwe and his colleagues in 2019 showed that the variety factor of the 1st treatment (V1) of the leaf - mustard variety at the fertilizer factor of the 2nd treatment (F2) of the cow manure of 15 t/ha with nitrogen fertilizer of 80 Kg/ha got result in the mean of leaf length of leaf - mustard of 11.85 cm.

However, according to the research of Mr. Priadi and Mr. Saskiawan in 2018 showed that that the fertilizer factor of the 1st treatment (F1) of the cow manure of 18 t/ha with nitrogen fertilizer of 95 Kg/ha on the variety factor of the 1st treatment (V1) of the green mustard variety provided the mean of leaf width of the green mustard of 6.39 cm.

Moreover, according to the research of Mr. Murali and his colleagues in 2018 showed that the variety factor of the 1st treatment (V1) of the green mustard variety at the fertilizer factor of the 3rd treatment (F3) of the farmyard manure of 16 t/ha + compost of 8 t/ha with nitrogen fertilizer of 80 Kg/ha gave the mean of leaf number of the green mustard of 13.36 leaves/plant.

Table 2: Plant height, leaf length, leaf width and leaf number of green mustard at 14 DAT

Treatment Number	Plant Height (cm)		Leaf Length (cm)		Leaf Width (cm)		Leaf Number (Leaves/plant)									
	Variety (A)	Fertilizer (B)	Variety (A)	Fertilizer (B)	Variety (A)	Fertilizer (B)	Variety (A)	Fertilizer (B)								
1	V1	15.34 a	F1	14.66 b	V1	11.55 a	F1	10.30 c	V1	7.58 a	F1	7.32 a	V1	10.58 a	F1	10.21 b
2	V2	15.21 a	F2	14.94 ab	V2	11.25 a	F2	11.12 b	V2	7.50 a	F2	7.47 a	V2	10.46 a	F2	10.38 b
3	V3	14.93 a	F3	15.89 a	V3	10.83 a	F3	12.22 a	V3	7.39 a	F3	7.69 a	V3	10.41 a	F3	10.86 a
CV (%)	8.34		7.89		5.83		5.04									
F _c (Treatment)	ns		**		ns		ns									
F _c (A) & F _c (B)	ns	ns	ns	**	ns	ns	ns	*								
F _c (A x B)	ns		ns		ns		ns									
Comparison	DMRT _{5%}		DMRT _{5%}		DMRT _{5%}		LSD _{5%}									

Note: 14 DAT = 14 days after transplanting, CV = coefficient of variation, A = variety, B = fertilizer.

ns = not significant, * = significant at 5% level, ** = significant at 1% level.

In each column, means followed by a common letter are not significantly different at 5% level of LSD or DMRT.

➤ *The Growth of Green Mustard at 21 DAT*

The analysis of ANOVA of the growth of green mustard at 21 DAT showed that variety factor (A) and fertilizer factor (B) were not significant interaction. For the variety factor, plant height, leaf length, leaf width and leaf number of (V3) were lower and equal to 18.20 cm, 13.91 cm, 9.48 cm and 11.38 leaves/plant, respectively; while those of (V1) were higher and equal to 18.72 cm, 14.33 cm, 9.98 cm and 11.50 leaves/plant, respectively. For fertilizer factor, plant height, leaf length, leaf width and leaf number of (F1) were lower and equal to 16.99cm, 12.86 cm, 9.11 cm and 11.06 leaves/plant, respectively; while those of (F3) were higher and equal to 20.42 cm, 15.89 cm, 10.45 cm and 11.99 leaves/plant, respectively (Table 3).

According to the research of Mr. Andyawati and his colleagues in 2023 showed the fertilizer factor of the 2nd treatment (F2) of the cow manure of 20 t/ha with nitrogen fertilizer of 50 Kg/ha on the variety factor of 1st treatment (V1) of the green mustard variety provided the mean of plant height of green mustard of 33.20 cm.

However, according to the research of Mr. Nwe and his colleagues in 2019 showed the variety factor of the 1st treatment (V1) of the leaf - mustard variety at the fertilizer factor of the 3rd treatment (F3) of the cow manure of 15 t/ha with nitrogen fertilizer of 160 Kg/ha got result in the mean of leaf length of green mustard of 14.48 cm.

Moreover, according to the research of Mr. Heliusiatiningsih and Mr. Widiyatmoyo in 2022 showed that the variety factor of the 1st treatment (V1) of the green mustard variety at the fertilizer factor of the 1st treatment (F1) of the farmyard manure of 19 t/ha with nitrogen fertilizer of 131 Kg/ha provided the mean of leaf width of the green mustard of 10.27 cm.

Furthermore, according to the research of Mr. Purba and his colleagues in 2021 showed that the fertilizer factor of the 2nd treatment (F2) of the cow manure of 20 t/ha with nitrogen fertilizer of 50 Kg/ha on the variety factor of the 1st treatment (V1) of the green mustard variety provided the mean of leaf number of green mustard of 11 leaves/plant.

Table 3: Plant height, leaf length, leaf width and leaf number of green mustard at 21 DAT

Treatment Number	Plant Height (cm)				Leaf Length (cm)				Leaf Width (cm)				Leaf Number (Leaves/plant)			
	Variety (A)		Fertilizer (B)		Variety (A)		Fertilizer (B)		Variety (A)		Fertilizer (B)		Variety (A)		Fertilizer (B)	
1	V1	18.72 a	F1	16.99 b	V1	14.33 a	F1	12.86 b	V1	9.98 a	F1	9.11 b	V1	11.50 a	F1	11.06 b
2	V2	18.30 a	F2	17.81 b	V2	14.23 a	F2	13.72 b	V2	9.76 a	F2	9.67 b	V2	11.47 a	F2	11.30 b
3	V3	18.20 a	F3	20.42 a	V3	13.91 a	F3	15.89 a	V3	9.48 a	F3	10.45 a	V3	11.38 a	F3	11.99 a
CV (%)	8.91				11.63				8.88				5.51			
F _c (Treatment)	**				*				*				ns			
F _c (A) & F _c (B)	ns		ns		ns		**		ns		**		ns		**	
F _c (A x B)	ns				ns				ns				ns			
Comparison	DMRT _{5%}		DMRT _{5%}		DMRT _{5%}		LSD _{5%}		DMRT _{5%}		LSD _{5%}		DMRT _{5%}		LSD _{5%}	

Note: 21 DAT = 21 days after transplanting, CV = coefficient of variation, A = variety, B = fertilizer.

ns = not significant, * = significant at 5% level, ** = significant at 1% level.

In each column, means followed by a common letter are not significantly different at 5% level of LSD or DMRT.

➤ *The Growth of Green Mustard at 28 DAT*

The analysis of ANOVA of the growth of green mustard at 28 DAT showed that variety factor (A) and fertilizer factor (B) were not significant interaction. For the variety factor, except for leaf number of (V1) was equal to 12.90 leaves/plant, which was lower than others. Besides that, the plant height, leaf length and leaf width of (V1) was higher and equal to 21.08 cm, 16.02 cm and 11.40 cm, respectively. For fertilizer factor, plant height, leaf length, leaf width and leaf number of (F1) were lower, and equal to 19.36cm, 14.35 cm, 10.17 cm and 14.16 leaves/plant, respectively; while those of (F3) were higher and equal to 22.67 cm, 17.73 cm, 12.51 cm and 15.43 leaves/plant, respectively (Table 4).

According to the research of Mr. Helilusiatiningsih and Mr. Widiyatmoyo in 2022 showed that the variety factor of the 1st treatment (V1) of the green mustard variety at the fertilizer factor of the 1st treatment (F1) of the farmyard manure of 19 t/ha with nitrogen fertilizer of 131 Kg/ha resulted in the mean of plant height of green mustard of 23.32 cm.

On the other hand, according to the research of Mr. Assefa and his colleagues in 2023 showed that the fertilizer factor of the 3rd treatment (F3) of the compost of 20 t/ha with nitrogen fertilizer 45 Kg/ha on the variety factor of the 1st treatment (V1) of the green mustard variety provided the mean of leaf length of green mustard of 20.80 cm.

On the other side, according to the research of Mr. Helilusiatiningsih and Mr. Widiyatmoyo in 2022 showed that the variety factor of the 1st treatment (V1) of the green mustard variety at the fertilizer factor of the 1st treatment (F1) of the farmyard manure of 19 t/ha with nitrogen fertilizer of 131 Kg/ha resulted in the mean of leaf width of green mustard of 13.73 cm.

Furthermore, according to the research of Mr. Andyawati and his colleagues in 2023 showed that the fertilizer factor of the 2nd treatment (F2) of the cow manure of 20 t/ha with nitrogen fertilizer of 50 Kg/ha on the variety factor of the 1st treatment (V1) of the green mustard variety gave the mean of leaf number of green mustard of 12 leaves/plant.

Table 4: Plant height, leaf length, leaf width and leaf number of green mustard at 28 DAT

Treatment Number	Plant Height (cm)		Leaf Length (cm)		Leaf Width (cm)		Leaf Number (Leaves/plant)									
	Variety (A)	Fertilizer (B)	Variety (A)	Fertilizer (B)	Variety (A)	Fertilizer (B)	Variety (A)	Fertilizer (B)								
1	V1	21.08 a	F1	19.36 a	V1	16.02 a	F1	14.35 b	V1	11.40 a	F1	10.17 b	V1	12.90 a	F1	14.16 a
2	V2	20.93 a	F2	20.09 a	V2	15.93 a	F2	15.64 ab	V2	11.17 a	F2	10.76 b	V2	13.31 a	F2	14.38 a
3	V3	20.12 a	F3	22.67 a	V3	15.78 a	F3	17.73 a	V3	10.88 a	F3	12.51 a	V3	17.80 a	F3	15.43 a
CV (%)	22.19		23.33		9.64		10.08									
F _c (Treatment)	ns		ns		**		ns									
F _c (A) & F _c (B)	ns	ns	ns	ns	ns	**	ns	ns								
F _c (A x B)	ns		ns		ns		ns									
Comparison	DMRT _{5%}	DMRT _{5%}	DMRT _{5%}	DMRT _{5%}	DMRT _{5%}	LSD _{5%}	DMRT _{5%}	DMRT _{5%}								

Note: 28 DAT = 28 days after transplanting, CV = coefficient of variation, A = variety, B = fertilizer.

ns = not significant, ** = significant at 1% level.

In each column, means followed by a common letter are not significantly different at 5% level of LSD or DMRT.

➤ *The Yield of Green Mustard at 28 DAT*

The analysis of ANOVA of the yield of green mustard at 28 DAT showed that variety factor (A) and fertilizer factor (B) were significant interaction. The yield of treatment combination of (V3F3) was significantly higher, which was 8.92 t/ha. On the contrary, the yield of treatment combination of (V3F2) was significantly lower, which was 5.05 t/ha (Table 5).

According to the research of Mr. Malemnganba and Mr. Bajpay in 2019 showed that at variety factor of the 1st treatment (V1) of the green mustard variety, in case it is used fertilizer factor of the 2nd treatment (F2) of the cow manure of 10 t/ha with nitrogen fertilizer of 74 Kg/ha or the 2nd treatment combination of (V1F2), which provided the mean of yield of green mustard of 8.59 t/ha.

Moreover, according to the research of Mr. Sanjay and his colleagues in 2018 showed that at variety factor of the 1st treatment of (V1) of the green mustard variety, in case it is used fertilizer factor of the 2nd treatment (F2) of the farmyard manure of 12 t/ha with nitrogen fertilizer of 240 Kg/ha or the 2nd treatment combination of (V1F2), which gave the mean yield of green mustard of 8.13 t/ha when it was compared to the green mustard variety (V1) without using fertilizer in the soil (F0), which provided the mean of yield of green mustard of 3.45 t/ha.

Table 5: Yield of Green Mustard at 28 DAT

Treatment Combination	Yield of green mustard (t/ha)
V1F1	7.20 bc
V1F2	7.95 ab
V1F3	8.54 ab
V2F1	5.67 d
V2F2	8.17 ab
V2F3	8.31 ab
V3F1	6.09 cd
V3F2	5.05 d
V3F3	8.92 a
CV (%)	14.02
F _c (Treatment)	**
F _c (A)	*
F _c (B)	**
F _c (A x B)	**
Comparison	LSD _{5%}

Note: 28 DAT = 28 days after transplanting,

CV = coefficient of variation, A = variety, B = fertilizer.

* = significant at 5% level, ** = significant at 1% level.

- In each column, means followed by a common letter are not significantly different at 5% level of LSD.

IV. CONCLUSION

The results of the experiment could be concluded that the growth of the green mustard, except of age at 14 DAT, 21 DAT and 28 DAT, the variety factor and fertilizer factor were not significant interaction. The growth of the green mustard at 7 DAT, the variety factor and fertilizer factor were significant interaction. The plant height, leaf length, leaf width and leaf number of the green mustard at 7 DAT of treatment combination of (V3F3), which were significantly higher and equal to 12.07 cm, 7.15 cm, 4.27 cm and 8.29 leaves/plant, respectively; while those of (V3F2), which were significantly lower and equal to 9.86 cm, 5.76 cm, 3.67cm and 6.43 leaves/plant, respectively.

The yield of the green mustard at 28 DAT, the variety factor and fertilizer factor were significant interaction, while treatment combination of (V3F3) by using the green - leaf mustard variety and the cow manure of 20 t/ha with nitrogen fertilizer of 30 Kg/ha resulted in the higher yield, that was 8.92 t/ha.

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