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# Efficacy of Organic Manure Application on Cucumber Varieties for Morphological Study

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# A B S T R A C T

Cucumber is one of the most important vegetables being grown and consumed in various Asian countries, including Pakistan. In current study, the experiment was conducted at Vegetable Seed Farm (VSF), Agriculture Research Institute, Quetta during 2020-21 under randomized complete block design (RCBD) with six treatments. Treatment 1 ( $T_1$ ) was Control, which has no organic manure, while other organic manure different doses set from 4 kg to 20 kg per 400 m<sup>2</sup> were applied from treatment 2 (T<sub>2</sub>) to treatment 6 (T<sub>6</sub>) by increasing 4 kg in each treatment. The results showed that cucumber crop in treatment 6 exhibited significant results for all studied traits, with 16.49 (cm) plant height, 23.92 (cm) leaf length, 2.41 (cm) plant width, 17.94 number of branches, 52.41 fruit length (cm), 15.27 (cm) fruit diameter, 31.63 (g) fruit weight, 14.45 number of fruits plant<sup>1</sup> and 9.06 kg yield plant<sup>1</sup>. Which was effective as compared to others and control. Among the tested cucumber varieties, there was a very minute difference observed for all measured traits, however, variety Kargil performed superior for all yielding components with 14.91 (cm) plant height, 18.47 (cm) leaf length, 1.88 (cm) plant width, 13.59 number of branches, 49.62 days to flowering, 71.88 days to fruit set, 16.75 (cm) fruit length, 12.54 (cm) fruit diameter, 27.95 (g) fruit weight, 12.77 number of fruits plant<sup>1</sup> and 7.59 kg yield plant<sup>1</sup>. On the other hand, the variety Kheera Local (check) showed the lowest performance for maximum traits, including 14.25 (cm) plant height, 16.41 (cm) leaf length, 1.68 (cm) plant width, 11.95 number of branches, 48.52 fruit length (cm), 11.50 (cm) fruit diameter, 26.54 (g) fruit weight, 12.12 number of fruits plant<sup>1</sup> and 7.02 kg yield plant<sup>1</sup>. From the present study, it is concluded that the application of organic manure with maximum dose (T6) significantly improved the growth and yield related traits of cucumber crop. On the other hand, the variety 'Kargil' showed high performance and was found to be one of the most productive cultivars as compared to other varieties in terms of studied parameters.

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#### INTRODUCTION

The cucumber (*Cucumis sativus* L.) belongs to Cucurbitaceae family and is one of the most widely used

vegetables in term salad and freshly consume. It is evident from pre pre-historic record that cucumber was cultivated by the ancient man about 5,000 years ago (Mallick, 2022). In the continent of Asia, cucumber is ranked in 4<sup>th</sup> position after tomato, cabbage, and onion. In Western Europe, it's on 2<sup>nd</sup> just after tomato. However, in Pakistan, cucumber is a seasonal and off-season vegetable being grown throughout the year mostly under a tunnel farming system and also in open field conditions (Bist *et al.*, 2020). Therefore, it is being used in various dishes to refresh the taste because of its versatility so it is most popular and has high water content (Brezeanu *et al.*, 2019).

Eco-friendly practices for growing agricultural food produce are the most demanded item all over the world, hence, sustainable food is being produced in many countries, keeping in view the fact organic manure is being used to improve the crop yield by protecting the environment and soil health also promoted (Ugwu & Suru, 2021). Therefore, organic farming is gaining the attention of the farmers for better performance of the crop and enhancing the soil fertility as well (Xanthopoulou *et al.*, 2022).

Poultry manure, compost, animal dung, plant residuals, green manure, and vermicompost are naturally rich sources of essential nutrients and organic manure (OM) that support plant vigor (Adekiya *et al.*, 2020). These organic materials improve the soil texture and structure for a long period and provide essential nutrients to the crop (Wasil *et al.*, 2022). In addition, these also enhance the water retention capacity and support beneficial soil microbial organisms (Chew *et al.*, 2019). Moreover, organic manure reduces the environmentally hazardous effects as compared to chemical fertilizers because these have minimum leaching potential (Wako, 2021).

Plant Breeders are developing new cucumber cultivars selecting high-potential cucumbers through and screening and identifying the promising elite lines to fulfill the market demand (Glenn et al., 2017). Organic manures are being used for safe agro-environmental practices and for producing high-yielding cucumber varieties and other agricultural products (Ebert, 2020; Hu et al., 2021). Organic manure is used for comparing the performance of various cucumber cultivars while keeping in view the yield, quality, and growth of vegetable crops viz., cucumber cultivars to make the sustainable cucumber available to the farming community to get better yield and apply the required quantity of organic manure (Rizwan et al., 2017; Leoni et al., 2019; Łaźny et al., 2021).

Poultry manure & farmyard manure (FYM) both are famous for being high organic nutrient sources to be used not only for improving soil health but also for the sustainable production of cucumber (Mahmood et al., 2017; Ye et al., 2020). It helps in soil prevention from deterioration and maintains the fertility status of soil by increasing penetrability levels. FYM contains nutrients that are required by plants during their growth cycle in high concentration i.e., macronutrients and micronutrients especially in critical stages like root establishment, flowering, and fruiting setting (Qureshi et al., 2014). Organic manure improves soil structure by adding micro and macronutrients and improving the retention capacity of the soil, it also helps in soil aeration which results in better water filtration in soil and ultimately enhances the crop yield (Baweja et al., 2019). Consumer demand is to be fulfilled by growing cucumber in fertile soil so that the nutritional quality and taste of cucumber is to be maintained. Farmyard manure has been used for centuries to improve soil fertility and meet crop nutrient requirements, making it a soil conditioner. The use of farmyard manure activates soil microbial biomass and improves nutrient recycling, potentially leading to better cropping systems (Basak et al., 2020). Therefore, farmyard manure (FYM) is necessary to be added to improve soil fertility and to produce cucumber with a consumable taste (Marliah et al., 2020). Biotic and abiotic tolerance, distinct growth, and different fruiting pattern is the quality of cucumber varieties if their cultivation range is characterized after cultivation in a place where management of organic nutrients was done (Park et al., 2021; Zhang et al., 2022). Keeping in view the significance of organic manure on the sustainability of soil health and plant growth, the present study was planned to evaluate the various varieties of cucumber for morphological traits while applying the various concentrations of organic matter.

#### MATERIALS AND METHODS

TA field experiment was conducted to determine the effect of organic manure on the morphological attributes of various cucumber varieties at the Directorate of Vegetable Seed (VSF) Saryab Road Quetta. The present research was laid in a Randomized Complete Block Design (RCBD) with five locally available cultivars followed by six treatments along with three replications of each variety. The detailed information of treatments regarding organic manure is given in Table 1.

Treatments	Doses of Manure
T1 (Control)	No organic manure was added
$T_2$	organic manure application @ 4kg per 400 m <sup>2</sup>
T <sub>3</sub>	organic manure application @ 8kg per 400 m <sup>2</sup>
$T_4$	organic manure application @ 12kg per 400 m <sup>2</sup>
<b>T</b> 5	organic manure application @ 16kg per 400 m <sup>2</sup>
T <sub>6</sub>	organic manure application @ 20kg per 400 m <sup>2</sup>

Table 1. Treatment details with specific doses of organic manure.

The following data was collected for comparison among treatments. The data on vegetative parameters such as plant height (cm), leaf length (cm), plant width (m<sup>2</sup>), and No. of branches was taken. Also, data on yield parameters including fruit length (cm), fruit diameter (cm), fruit weight (g), No. of fruits per plant and yield per plant (kg) was recorded.

#### Statistical analysis

The data was processed statistically through Statistix Ver. 8.1 Software and LSD was calculated by previously described methods (Gomez and Gomez, 1984).

# RESULTS

#### Plant height (cm)

The plant height of cucumber varieties Kheera Local (check), HCU-40, Akkbar, EGS-12, and Kargil treated

with different organic manure applications. The result indicated that the effect of varieties by different organic manure applications was found significant at a level of (P<0.05). The results presented in Table 2, the maximum plant height (16.49 cm) was measured when the crop was treated with 20kg organic manure (T<sub>6</sub>), followed by treatment 5, T<sub>4</sub>, T<sub>3</sub>, and T<sub>2</sub> with an average plant height of 15.74 cm, 15.00 cm, 14.24 cm, 13.49 cm, 13.19 respectively. The minimum plant height with an average 12.46 cm was observed in control (T<sub>1</sub>) (no organic manure was applied. The variety Kargil showed the maximum plant height (14.91 cm), followed by EGS-12 (14.72 cm), Akkbar (14.55 cm), HCU-40 (14.40 cm), while the minimum plant height (14.25 cm) was observed in the Kheera Local (check) variety.

Table 2 Plant height (	(cm) of	cucumber varieties	as influenced h	v different an	nlications of	organic manure
Table 2. Flant height	UIII) UI	cucumber varieties	as minuenceu D	y unierent ap	plications of	organic manure.

Treatmonte		Varie	eties			
Treatments	Kheera Local (check)	HCU-40	Akbar	EGS-12	Kargil	Mean
T <sub>1</sub> (Control)	12.08	12.23	12.39	12.63	13.00	12.46 F
<b>T</b> 2	13.19	13.34	13.49	13.64	13.79	13.49 E
T <sub>3</sub>	13.94	14.09	14.24	14.39	14.54	14.24 D
T4	14.69	14.84	14.99	15.14	15.29	15.00 C
$T_5$	15.44	15.59	15.74	15.89	16.04	15.74 B
Τ <sub>6</sub>	16.19	16.34	16.49	16.64	16.79	16.49 A
Mean	14.25 E	14.40 D	14.55 C	14.72 B	14.91 A	

#### Leaf length (cm)

Leaf length of cucumber varieties Kheera Local (check), HCU-40, Akkbar, EGS-12, and Kargil treated with different organic manure applications. Result indicates the effect of varieties by different organic manure applications was significant at a level of (P<0.05). As per results given in Table. 3, the maximum leaf length (23.92 cm) was observed when the cropin treatment 6, followed by T5, T4, T3, and T2 with an average leaf

length of 21.32 cm, 18.72 cm, 16.12 cm, 13.52 cm, respectively. Minimum leaf length with an average 11.04 cm was observed with control T1 (no organic manure application). Variety Kargil showed the maximum leaf length (18.47 cm), followed by EGS-12 (17.93 cm), Akkbar (17.45 cm), HCU-40 (16.93 cm), while the minimum leaf length (16.41 cm) was observed in the Kheera Local (check) variety.

Troatmonte		Var	ieties			
Treatments	Kheera Local (check)	HCU-40	Akbar	EGS-12	Kargil	Mean
T <sub>1</sub> (Control)	10.07	10.61	11.13	11.42	12.00	11.04 F
T <sub>2</sub>	12.48	13.00	13.52	14.04	14.56	13.52 E
<b>T</b> <sub>3</sub>	15.08	15.60	16.12	16.64	17.16	16.12 D
$T_4$	17.68	18.20	18.72	19.24	19.76	18.72 C
<b>T</b> <sub>5</sub>	20.28	20.80	21.32	21.84	22.36	21.32 B
<b>T</b> <sub>6</sub>	22.88	23.40	23.92	24.44	24.96	23.92 A
Mean	16.41 E	16.93 D	17.45 C	17.93 B	18.47 A	

Table 3. Leaf length (cm) of cucumber varieties influenced by different applications of organic manure.

# Plant width (m<sup>2</sup>)

The plant width of cucumber varieties Kheera Local (check), HCU-40, Akkbar, EGS-12, and Kargil treated with different organic manure applications. The result indicates that the effect of varieties by different organic manure applications was significant at a level of (P<0.05). Conferring to the results presented in Table. 4, the maximum plant width (2.41 m<sup>2</sup>) was observed in treatment 6, followed by T5, T4, T3 and T2 with an

average plant width of 2.16 m<sup>2</sup>, 1.91 m<sup>2</sup>, 1.66 m<sup>2</sup>, 1.40 m<sup>2</sup>, respectively. The minimum plant width with an average 1.14 m<sup>2</sup> was observed with control T1 (no organic manure application. The variety Kargil showed the maximum plant width (1.88 m<sup>2</sup>), followed by EGS-12 (1.83 m<sup>2</sup>), Akbar (1.78 m<sup>2</sup>), HCU-40 (1.73 m<sup>2</sup>), while the minimum plant width (1.68 m<sup>2</sup>) was observed in the Kheera Local (check) variety.

Table 4. Plant width (m<sup>2</sup>) of cucumber varieties influenced by different applications of organic manure.

Treatmonte		Var	rieties			
Treatments	Kheera Local (check)	HCU-40	Akkbar	EGS-12	Kargil	Mean
T1 (Control)	1.04	1.09	1.14	1.19	1.24	1.14 F
T <sub>2</sub>	1.29	1.34	1.40	1.46	1.51	1.40 E
$T_3$	1.56	1.61	1.66	1.71	1.76	1.66 D
$T_4$	1.81	1.86	1.91	1.96	2.01	1.91 C
<b>T</b> 5	2.06	2.11	2.16	2.21	2.26	2.16 B
Τ <sub>6</sub>	2.31	2.36	2.41	2.46	2.50	2.41 A
Mean	1.68 E	1.73 D	1.78 C	1.83 B	1.88 A	

# Number of branches

Number of branches of cucumber varieties Kheera Local (check), HCU-40, Akbar, EGS-12, and Kargil treated with different organic manure. Result indicates that the effect of varieties by different organic manure applications was significant at level of (P<0.05). According to results presented in Table. 5, Maximum number of branches (17.94) was observed in crop with treatment 6, followed by T5, T4, T3, and T2 with an average number of

branches of 15.84, 13.74, 11.73, and 9.73, respectively. Minimum number of branches with an average of 7.65 was observed with control T1 (no organic manure application. Variety Kargil showed the maximum number of branches (13.59), followed by EGS-12 (13.18), Akbar (12.75), HCU-40 (12.38), while the minimum number of branches (11.95) was observed in the Kheera Local (check) variety.

Table 5. Number of branches of cucumber varieties influenced by different applications of organic manure.

Treatments		Vari	eties			
	Kheera Local (check)	HCU-40	Akkbar	EGS-12	Kargil	Mean
T1 (Control)	6.83	7.24	7.66	8.09	8.44	7.65 F
T <sub>2</sub>	8.89	9.31	9.73	10.15	10.57	9.73 E

Τ3	11.00	11.50	11.61	12.06	12.48	11.73 D
$T_4$	12.90	13.32	13.74	14.16	14.58	13.74 C
<b>T</b> 5	15.00	15.42	15.84	16.26	16.68	15.84 B
T <sub>6</sub>	17.10	17.52	17.94	18.36	18.78	17.94 A
Mean	11.95 E	12.38 D	12.75 C	13.18 B	13.59 A	

#### Fruit length (cm)

Fruit length of cucumber varieties Kheera Local (check), HCU-40, Akbar, EGS-12, and Kargil treated with different organic manure applications. Result indicates that the effect of varieties by different organic manure applications was significant at a level of (P<0.05). Results shown in Table 6, the maximum fruit length (19.06 cm) was observed in crop with treatment 6 followed by T5, T4, T3, and T2 with an average fruit

length of 17.96 cm, 16.86 cm, 15.76 cm, and 14.66 cm, respectively. Minimum fruit length with an average 13.49 cm was observed with control T1 (no organic manure application. Variety Kargil showed the maximum fruit length (16.75 cm), followed by EGS-12 (16.53 cm), Akbar (16.31 cm), HCU-40 (16.09 cm), while the minimum fruit length (15.81 cm) was observed in the Kheera Local (check) variety.

Table 6. Fruit length (cm) of cucumber vari	ties influenced by different	t applications of organic manure.
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Treatmonte		Var	ieties			
Treatments	Kheera Local (check)	HCU-40	Akbar	EGS-12	Kargil	Mean
T <sub>1</sub> (Control)	12.79	13.34	13.56	13.78	14.00	13.49 F
T <sub>2</sub>	14.22	14.44	14.66	14.88	15.10	14.66 E
T <sub>3</sub>	15.32	15.54	15.76	15.98	16.20	15.76 D
Τ4	16.42	16.64	16.86	17.08	17.30	16.86 C
<b>T</b> 5	17.52	17.74	17.96	18.18	18.40	17.96 B
Τ <sub>6</sub>	18.62	18.84	19.06	19.28	19.50	19.06 A
Mean	15.81 E	16.09 D	16.31 C	16.53 B	16.75 A	

# Fruit diameter (cm)

Fruit diameter of cucumber varieties Kheera Local (check), HCU-40, Akbar, EGS-12, and Kargil treated with different organic manure applications. Result indicates that the effect of varieties by different organic manure applications was significant at a level of (P<0.05). Table 7 shows that the maximum fruit diameter (15.27 cm) was observed in the crop with treatment 6 followed by T5, T4, T3, and T2 with an average fruit diameter of

13.97 cm, 12.67 cm, 11.37 cm, and 10.07 cm, respectively. Minimum fruit diameter with an average 8.76 cm was observed with control (no organic manure application. Variety Kargil showed the maximum fruit diameter (12.54 cm), followed by EGS-12 (12.28 cm), Akbar (12.02 cm), HCU-40 (11.76 cm), while the minimum fruit diameter (11.50 cm) was observed in the Kheera Local (check) variety.

Table 7. Fruit diameter (cm) of cucumber varieties influence	enced by differen	t applications o	of organic manure.
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Troatmonts		Vari	eties			
Treatments	Kheera Local (check)	HCU-40	Akbar	EGS-12	Kargil	Mean
T1 (Control)	8.24	8.49	8.76	9.02	9.28	8.76 F
T <sub>2</sub>	9.54	9.81	10.07	10.33	10.59	10.07 E
T <sub>3</sub>	10.85	11.11	11.37	11.63	11.89	11.37 D
Τ4	12.15	12.41	12.67	12.93	13.19	12.67 C
<b>T</b> 5	13.45	13.71	13.97	14.23	14.49	13.97 B
T <sub>6</sub>	14.75	15.01	15.27	15.53	15.79	15.27 A
Mean	11.51 E	11.77 D	12.03 C	12.29 B	12.55 A	

# Fruit weight (g)

Fruit weight of cucumber varieties Kheera Local (check), HCU-40, Akbar, EGS-12, and Kargil treated with different organic manure applications. Result indicates that the effect of varieties by different organic manure applications was significant at a level of (P<0.05). As per Table 8, results showed that maximum fruit weight (31.63 g) was observed in the crop treated with treatment 6, followed by T5, T4, T3, and T2 with an

average fruit weight of 29.88 g, 28.13 g, 26.38 g, 24.63 g, respectively. The minimum fruit weight with an average of 8.76 g was observed with control T1 (no organic manure application). Variety Kargil showed the maximum fruit weight (27.95 g), followed by EGS-12 (27.60 g), Akkbar (27.25 g), HCU-40 (26.90 g), while the minimum fruit weight (26.54 g) was observed in the Kheera Local (check) variety.

Treatments	Varieties					
	Kheera Local (check)	HCU-40	Akkbar	EGS-12	Kargil	Mean
T1 (Control)	22.14	22.50	22.85	23.23	23.58	22.87 F
T <sub>2</sub>	23.93	24.28	24.63	24.98	25.33	24.64 E
<b>T</b> <sub>3</sub>	25.68	26.03	26.38	26.73	27.08	26.39 D
Τ4	27.43	27.78	28.13	28.48	28.83	28.14 C
T5	29.18	29.53	29.88	30.23	30.58	29.87 B
<b>T</b> <sub>6</sub>	30.93	31.28	31.63	31.99	32.34	31.62 A
Mean	26.55 E	26.91 D	27.25 C	27.60 B	27.95 A	

#### Number of fruits plant<sup>-1</sup>

The number of fruits plant<sup>-1</sup> of cucumber varieties Kheera Local (check), HCU-40, Akkbar, EGS-12, and Kargil treated with different organic manure applications. Result indicates that the effect of varieties by different organic manure applications was significant at a level of (P<0.05). Table 9 results indicate that the maximum number of fruits plant<sup>-1</sup> (14.45) was observed in the crop with treatment 6 followed by T5, T4, T3, and T2 with an average number of fruits plant<sup>-1</sup> of 13.65, 12.85, 12.05, 11.25, respectively. Minimum number of fruits plant<sup>-1</sup> with an average of 10.44 was observed with control T1 (no organic manure application. The variety Kargil showed the maximum number of fruits plant<sup>-1</sup> (12.77), followed by EGS-12 (12.61), Akbar (12.44), HCU-40 (12.28), while the minimum number of fruits plant<sup>-1</sup> (12.12) was observed in the Kheera Local (check) variety.

Table 9. Number of fruits plant<sup>-1</sup> of cucumber varieties influenced by different applications of organic manure.

Treatments	Varieties					
	Kheera Local (check)	HCU-40	Akkbar	EGS-12	Kargil	Mean
T1 (Control)	10.12	10.27	10.43	10.61	10.77	10.44 F
T <sub>2</sub>	10.93	11.09	11.25	11.41	11.57	11.25 E
<b>T</b> 3	11.73	11.89	12.05	12.21	12.37	12.05 D
$T_4$	12.53	12.69	12.85	13.01	13.17	12.85 C
<b>T</b> 5	13.33	13.49	13.65	13.81	13.97	13.65 B
T <sub>6</sub>	14.13	14.29	14.45	14.61	14.77	14.45 A
Mean	12.13 E	12.27 D	12.45 C	12.62 B	12.78 A	

# Yield plant<sup>-1</sup> (kg)

The yield plant<sup>-1</sup> (kg) of cucumber varieties Kheera Local (check), HCU-40, Akkbar, EGS-12, and Kargil treated with different organic manure applications. The result indicates that the effect of varieties by different organic

manure applications was significant at a level of (P<0.05). Table 10 results indicate that the maximum yield plant<sup>-1</sup> (9.06 kg) was observed in crop with treatment 6 followed by T5, T4, T3, and T2 with an average yield plant<sup>-1</sup> of 8.36 kg, 7.66 kg, 6.96 kg, 6.26 kg,

respectively. The minimum yield plant<sup>-1</sup> with an average of 5.55 kg was observed with control (no organic manure application. The variety Kargil showed the maximum yield plant<sup>-1</sup> (7.59 kg), followed by EGS-12

(7.45 kg), Akbar (7.31 kg), HCU-40 (7.17 kg), while the minimum yield plant<sup>-1</sup> (7.02 kg) was observed in the Kheera Local (check) variety.

Treatmonte	Varieties					
Treatments	Kheera Local (check)	HCU-40	Akbar	EGS-12	Kargil	Mean
T1 (Control)	5.24	5.41	5.56	5.70	5.84	5.55 F
$T_2$	5.98	6.12	6.26	6.40	6.54	6.26 E
$T_3$	6.68	6.82	6.96	7.10	7.24	6.96 D
$T_4$	7.38	7.52	7.66	7.80	7.94	7.66 C
<b>T</b> 5	8.08	8.22	8.36	8.50	8.64	8.36 B
<b>T</b> <sub>6</sub>	8.78	8.92	9.06	9.20	9.34	9.06 A
Mean	7.02 E	7.18 D	7.31 C	7.4 B	7.59 A	

Table 10. Yield plant<sup>-1</sup> (kg) of cucumber varieties influenced by different applications of organic manure.

# DISCUSSION

Breeders are continuously developing different cucumber cultivars by evaluating and selecting high potential cucumbers through screening by employing conventional breeding procedures. Organic manures are being used for safe environmental conditions and producing high yielding cucumber and other agricultural products (Glenn et al., 2017; Ebert, 2020; Hu et al., 2021). It is concluded from the present study that the treatment (T<sub>6</sub>) of organic manure @ 20kg per 400 m<sup>2</sup> significantly improved the cucumber growth as well as yield characteristics as compared to the control  $(T_1)$ , where no manure was added to the soil. The same results were taken into account for soil analysis where the experiment was carried out, soil fertility was analyzed, and criteria for growing the cucumber and fertility classes of soil (Ibedu et al., 2015).

The area where the same crop was grown continuously for many years and found as low fertility due to the mono-cropping pattern. Doses of mushroom substrate and poultry manure were applied to the experimental area, resulting in improved soil fertility at 6 WAP and soil fertility enrichment. However, our findings follow the previous study, as confirmed by the outcomes of Poswal and Akpal (2012). Green manure, crop residues, and poultry manure have been reported to be important organic amendments for enriching the soil with nutrients and improving plant growth in terms of height and other parameters. Garg and Bahla (2008) found that poultry manure is an important source of macronutrients like N and P when compared to other organic fertilizers. Due to the high concentration of phosphorus and nitrogen in poultry manure, it was found to be a significant source of improving cucumber leaf formation and growth under field conditions (Ridge, 2012).

In cucumber, the vegetative growth can be increased due to the availability of phosphorus in poultry manure, which ultimately increases photosynthetic activity in the cucumber vegetable promotes vegetative growth, and helps in establishing the vigours rooting system of plant (Hochmuth et al., 1993; Opara and Asiegbu, 1996; Ajari et al., 2003; John et al., 2004; Rayeswari et al., 2007). Previously, several experiments were conducted to determine the effect of organic manure with different doses on cucumber varieties to estimate the impact of OM on plant growth, quality, and yield. The goal of the study is to find the most effective dose of organic matter, find the better-quality variety of cucumber for farmers, and recommend the sustainable production of cucumber (Rizwan et al., 2017; Leoni et al., 2019; Łaźny et al., 2021). Farmyard manure and poultry manure play a vital role in improving soil health for sustainable crop production and enriching the soil (Mahmood et al., 2017). They prevent soil deterioration and maintain its fertility status. Farmyard manure contains macro & micronutrients (Qureshi et al., 2014). OM improves soil structure for long term and provides essential nutrients to the crop and enriches the soil, In addition, it also enhances the water retention capacity and it contains significant micro & macronutrients. It enriches the soil (Baweja et al., 2019).

Consumer demand is to be fulfilled by growing cucumber in fertile soil so that the taste of cucumber is

maintained so, FYM is necessarily added to improve the fertility in the soil and to produce cucumber with consumable taste in fertile soil infertile soil resulting in bitter fruits (Marliah et al., 2020). However, the use of farmyard manure also activates soil microbial biomass in the soil and improves the nutrient recycling system by slowly releasing nutrients and also which may result in better cropping systems (Basak et al., 2020). Moreover, the environmental burden is also reduced by organic manure because there will be minimum leaching (Ye et al., 2020; Wasil et al., 2022). Biotic and abiotic tolerance, distinct growth, and different fruiting pattern is the quality of cucumber varieties if their cultivation range is characterized after cultivation in a place where management of organic nutrients was done, interaction of cucumber optimum production with organic manure application was checked, and diagnosed their performance in nutrient-rich soil (Park et al., 2021; Zhang et al., 2022).

# CONCLUSION

In current study, it was concluded that treatment 6 ( $T_6$ ) with maximum doses of organic manure significantly improved the cucumber plant growth and yielding traits when compared with control ( $T_1$ ) and other concentrations of treatments. Among the tested cucumber varieties, 'Kargil' was found to be a superior variety under the agro-climatic condition of Quetta, Balochistan.

# **CONFLICT OF INTEREST**

All authors have declared that there is no conflict of interest regarding publication of this article.

# **AUTHOR CONTRIBUTIONS**

The writing of this article was assisted and helped by all Authors.

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