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Chaure Sahil Nitin
Department of Agriculture,
Vivekananda Global University,
Jaipur, Rajasthan, India

Dr. Pravesh Kumar Sharma
Department of Agriculture,
Vivekananda Global University,
Jaipur, Rajasthan, India

Influence of foliar spray of cow urine and vermi-wash on growth and yield attributes of taramira (*Eruca sativa* Mill.)

Chaure Sahil Nitin and Dr. Pravesh Kumar Sharma

Abstract

Organic farming is the most viable alternative to traditional farming technique. Vermi-wash and cow urine has plant nutrients, vitamins, plant growth promoting elements. The present research experiment was undertaken in Randomised block design to evaluate the effect of cow urine and vermin-wash on growth and yield attributes. There were ten treatments all were applied as foliar on crop at different stage. Among all treatments Cow urine spray at 10% + Vermi-wash spray at 10% was recorded higher Plant height and Branches per plant and Seed yield compare to other treatments.

Keywords: Cow urine, foliar spray, taramira and vermiwash

Introduction

Taramira (*Eruca sativa* Mill.) is an important winter season oilseed crop of the family *Brassicaceae*. Taramira has desirable traits particularly resistance to powdery mildew that can be transferred to *Brassica campestris* and *Brassica juncea* both of which are important crops (Sastry, 2003) [5]. Taramira is a herbaceous annual, 2 to 4 feet tall and is a common cold weather oilseed crop of the drier areas of north-west India where it is commonly grown mixed with gram and barley. The oil content in taramira ranges from 31.6 to 41.31% which is affected by manuring, irrigation and disease management (Yadav *et al.*, 2017) [8]. Cow urine under livestock based integrated farming system has a great potential for use as a bio-fertilizer in crop production, both as soil application and foliar spray and it needs to be studied under existing climatic condition. Vermiwash as a vermicompost extract is a collection of secretion materials and extracts of earthworms combined with micronutrients and organic molecules of the soil, which is very useful for plant growth and is used as a foliar application on the plant shoot (Zambare *et al.*, 2008) [9].

Material and Methods

To evaluate the effect of various treatments combinations, observation on plant growth parameters, yield attributes, quality and other aspects were recorded.

Growth parameters

Plant stand per metre row length, Plant height and Branches per plant were observed:

The number of plants per metre row length was counted from randomly selected five locations in each plot at 30 DAS of the crop. The mean plant population was worked out and recorded as plants per metre row length whereas Plant height five plants were measured at 30, 60, 90 DAS and at harvest from the base of the plant to the top of the main shoot by metre scale and their mean was expressed as plant height (cm).

Dry matter accumulation gm/plant

Periodical changes in dry matter accumulation were recorded by uprooting of five plants from each plot at 30, 60, 90 DAS and at harvest stages. The five plants from each plot were cut from the ground level (excluding the root portion) for the periodical observations. The harvested plant were air dried first and then in an oven at 60°C to constant weight. Total dry weight of plants was averaged to record dry matter in g/plant.

Yield attributes and yield

Number of siliqua per plant and number of seeds per siliqua: Number of siliqua of five

Corresponding Author:
Chaure Sahil Nitin
Department of Agriculture,
Vivekananda Global University,
Jaipur, Rajasthan, India

randomly selected plants was counted and their mean was computed to express as number of siliqua per plant. Seeds siliqua per recorded at harvest by counting the number of seeds of ten randomly selected siliqua from five tagged plants of each plot and average was worked out.

Seed yield: After threshing and winnowing, the clean seeds obtained from the produce of individual plot were weighed and weight was recorded as seed yield kg/plot. Later, this was converted into kg/ha/.

Biological yield: The whole plants cut from 1.5'' height and the harvested material from net area of each plot was thoroughly sun dried. After drying, the produce of individual net plot was weighed with the help of a spring balance and recorded in kg/plot. Later this was converted into kg/ha.

Harvest index: The harvest index was calculated by using following formula and expressed as percentage (Singh and Stoskoof, 1971) [6].

$$\text{Harvest index (\%)} = \frac{\text{Economic yield}}{\text{Biological yield}} \times 100$$

Results and discussion

Effect of foliar spray of cow urine and vermi-wash on growth attributes:

The present study revealed that the foliar spray of cow urine and vermiwash at definite concentration leads to improve in various parameters of the plant likewise growth and yield

attributes.

Plant population (m-1 row length): Data revealed that the effect of foliar spray of cow urine and vermi-wash on plant population m-1 row length at 20 DAS of taramira was found significant. It was observed that the growth attributing characters of taramira improved probably due to better supply of nutrients through foliar application of cow urine and vermi-wash at higher rates. Besides this the different enzymes and hormones present in cow urine and vermi-wash are also responsible for the better growth of plant (Vora *et al.* (2019) [7].

Plant height (cm): The foliar spray of cow urine and vermi-wash having beneficial effects on cell elongation and cell division that increase photosynthesis activity resulted plant spread. Data revealed that the foliar spray of cow urine and vermi-wash significantly increases the plant height of taramira at all the growth stages except 30 DAS. The foliar application of cow urine at 10% + vermi-wash at 10% (T₉) recorded highest plant height at 60, 90 DAS at harvest which was significantly higher as compared to T₀, T₁, T₂, T₃, T₄ and T₅ and remained at par with all other remaining treatments. Cow urine and vermi-wash contains almost all the nutrients required for plants growth and development. Therefore, more availability of nitrogen at higher rates of cow urine and vermi-wash application has favoured greater protein synthesis and thereby higher photosynthesis. Pavitra *et al.* (2021) [3] revealed that foliar application of 10% cow urine-based derivatives at tillering stage recorded maximum values of plant height in rice. Data presented in table 1.0.

Table 1: Effect of foliar spray of cow urine and vermi-wash on plant height of taramira

S. No.	Treatments	30 DAS	60 DAS	90 DAS	Harvest
1.	Control	12.50	48.59	73.93	77.63
2.	Water spray	12.61	49.75	75.32	78.92
3.	Cow urine spray at 5%	12.75	60.48	89.46	92.84
4.	Cow urine spray at 10%	13.32	62.18	92.94	95.18
5.	Vermi-wash spray at 5%	13.06	61.52	90.62	93.51
6.	Vermi-wash spray at 10%	12.92	62.84	94.42	96.72
7.	Cow urine spray at 5% + Vermi-wash spray at 5%	13.47	72.59	108.59	110.78
8.	Cow urine spray at 5% + Vermi-wash spray at 10%	13.75	73.44	110.32	112.83
9.	Cow urine spray at 10% + Vermi-wash spray at 5%	13.69	74.12	111.38	114.33
10.	Cow urine spray at 10% + Vermi-wash spray at 10%	14.70	74.93	112.56	116.03
	SEm+	0.70	3.17	4.52	4.59
	CD (P = 0.05)	2.08	9.43	13.43	13.65

Number of branches per plant: The plant height influenced significantly by foliar spray of cow urine and vermi-wash significantly increases the number of branches plant⁻¹ of taramira at harvest. The foliar application of cow urine at 10% + vermi-wash at 10% (T₉) recorded highest number of branches plant⁻¹ at harvest of taramira which was significantly higher as compared to T₀, T₁, T₂, T₃, T₄ and T₅. Similarly, Machhar *et al.* (2021) [2] revealed that foliar spray of vermin-wash (10%) at pre flowering and pod formation stage found superior for plant height and number of branches/plant of black gram. Data presented in table 2.0.

Effect of foliar spray of cow urine and vermi-wash on yield attributes and yields

Number of siliquae plant⁻¹: Data stated that the total

number of siliqua/plant of taramira significantly increased due to foliar spray of cow urine and vermi-wash as compared to control and water spray. The highest number of siliqua plant⁻¹ of taramira was recorded with the foliar application of cow urine at 10% + vermi-wash at 10% (T₉) which was significantly higher as compared to T₀, T₁, T₂, T₃, T₄ and T₅ and remained at par with all other remaining treatments. The number of siliqua plant⁻¹ of taramira increases due to foliar application of cow urine at 10% + vermi-wash at 10% (T₉) in the tune of 46.01, 43.26, 22.51, 20.10, 20.97 and 18.23%, respectively as compared to treatment T₀, T₁, T₂, T₃, T₄ and T₅.

Table 2: Effect of foliar spray of cow urine and vermi-wash on number of branches of taramira

S. No.	Treatments	Number of branches plant ⁻¹
1.	Control	6.71
2.	Water spray	6.77
3.	Cow urine spray at 5%	7.66
4.	Cow urine spray at 10%	7.79
5.	Vermi-wash spray at 5%	7.71
6.	Vermi-wash spray at 10%	7.84
7.	Cow urine spray at 5% + Vermi-wash spray at 5%	8.70
8.	Cow urine spray at 5% + Vermi-wash spray at 10%	8.74
9.	Cow urine spray at 10% + Vermi-wash spray at 5%	8.81
10.	Cow urine spray at 10% + Vermi-wash spray at 10%	8.88
SEm+		0.28
CD (P = 0.05)		0.83

Number of seeds siliqua⁻¹: data indicated that the foliar spray of cow urine and vermi-wash brings significant cause on number of seeds siliqua⁻¹ of taramira. The foliar application of cow urine at 10% + vermi-wash at 10% (T₉) recorded significantly higher number of seeds siliqua⁻¹ of taramira which was significantly higher as compared to T₀, T₁, T₂, T₃,

T₄ and T₅ and remained statistically at par with all other remaining treatments. Vermiwash contains growth hormones like auxine, cytokinine etc and cow urine also contains mixture of hormones, enzymes, minerals etc which results that more number of seed per siliqua. The results are found similar with Jadhav *et al.* 2014 [1]. Data presented in table 3.0.

Table 3: Effect of foliar spray of cow urine and vermi-wash on Number of siliquae plant⁻¹ or Number of seeds siliqua⁻¹

S. No.	Treatments	Number of siliqua plant ⁻¹	Number of seeds siliqua ⁻¹
1.	Control	79.81	12.67
2.	Water spray	81.34	12.78
3.	Cow urine spray at 5%	95.12	14.53
4.	Cow urine spray at 10%	97.03	14.71
5.	Vermi-wash spray at 5%	96.33	14.58
6.	Vermi-wash spray at 10%	98.56	14.76
7.	Cow urine spray at 5% + Vermi-wash spray at 5%	112.76	16.58
8.	Cow urine spray at 5% + Vermi-wash spray at 10%	113.98	16.72
9.	Cow urine spray at 10% + Vermi-wash spray at 5%	115.09	16.79
10.	Cow urine spray at 10% + Vermi-wash spray at 10%	116.53	16.87
SEm+		4.45	0.57
CD (P = 0.05)		13.22	1.69

Seed yield (kg ha⁻¹): The higher seed yield is function of luxurious growth, dry matter, yield attributes and physiological characters. Data revealed that the foliar spray of cow urine and vermi-wash brings significant differences in seed yield of taramira as compared to control and water spray. Among the different treatments, the foliar application of cow urine at 10% + vermi-wash at 10% (T₉) recorded significantly higher seed yield (1409 kg ha⁻¹) of taramira which was significantly higher as compared to control, water spray, foliar

application of cow urine at 5%, foliar application of cow urine at 10%, foliar application of vermi-wash spray at 5% and foliar application of vermi-wash spray at 10% and remained statistically at par with all other remaining treatments. Similarly found by Sadhukhan *et al.* (2019) [4] that foliar spray of cow urine at 100% concentration recorded the highest number of grains panicles⁻¹, panicle length, grain yield and straw yield of rice. Data presented in table 4.0.

Table 4: Effect of foliar spray of cow urine and vermi-wash on yields and of taramira

S. No.	Treatments	Seed	Biological	Harvest index (%)
1.	Control	986	3296	29.98
2.	Water spray	1011	3387	29.90
3.	Cow urine spray at 5%	1155	3877	29.82
4.	Cow urine spray at 10%	1197	4019	29.83
5.	Vermi-wash spray at 5%	1178	3954	29.76
6.	Vermi-wash spray at 10%	1209	4096	29.53
7.	Cow urine spray at 5% + Vermi-wash spray at 5%	1359	4600	29.57
8.	Cow urine spray at 5% + Vermi-wash spray at 10%	1378	4667	29.57
9.	Cow urine spray at 10% + Vermi-wash spray at 5%	1391	4738	29.35
10.	Cow urine spray at 10% + Vermi-wash spray at 10%	1409	4810	29.25
SEm+		45	135	0.92
CD (P = 0.05)		135	402	2.73

Biological yield (kg ha⁻¹): effect of foliar spray of cow urine and vermi-wash on biological yield of taramira was found statistically significant. The highest biological yield (4810 kg ha⁻¹) of taramira was recorded with foliar application of cow urine at 10% + vermi-wash at 10% (T₉) which was significantly higher as compared to control, water spray, foliar application of cow urine at 5%, foliar application of cow urine at 10%, foliar application of vermi-wash spray at 5% and foliar application of vermi-wash spray at 10% and remained statistically at par with all other remaining treatments. However, the lowest biological yield (3296 kg ha⁻¹) of taramira was recorded in control treatment.

Harvest index (%): The experimental findings pertaining to harvest index of taramira data clearly indicated that foliar spray of cow urine and vermin-wash did not bring any significant change on harvest index of taramira and a uniform value for harvest index of taramira was recorded under all the treatments.

Conclusion

From present study it is clear that foliar spray of treatment i.e foliar application of cow urine at 10% + vermi-wash at 10% is most effective to achieve maximum growth and yield attributes. Therefore efficient use of cow urine and vermi-wash provides a better alternative to the synthetic chemicals which are cause potential danger to the farmers or costly also.

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