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Effect of neem cake and vermicompost on growth and yield parameter of chilli

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Abstract
The present experiment was conducted to assess the growth and yield parameter of chilli by the application of neem cake, vermicompost and pongamia cake under field condition at Main Agricultural Research station University of Agricultural sciences, Raichur during 2014 -2015. The results indicated that crop amended with neem cake (250 kg/ha) and vermicompost (1t/ha) were effective in keeping the growth and yield parameter density in check, being comparable to recommended insecticides. Significantly highest red chilli yield was registered in the crop receiving neem cake at 250 kg/ha (10.42 q/ha). This was followed by vermicompost at 1t/ha (10.12 q/ha). Untreated crop yielded significantly lowest at 6.73 q/ha red chillies**.** The research highlights the utility of organics in managing sucking pests of byadagi chilli that has potential export value.

Keywords: Neem cake, vermicompost, chilli

Introduction
In the recent years, there is a of awareness and preference for organically grown food in the country and therefore organic pest management strategies are need of the hour Babalad *et al*., 2011 [1] and Giraddi *et al*., 2012 [6].

Biofuel production in India at present is being promoted in a big way in order to reduce dependence on fossil fuels and emission of greenhouse gases in the environment. Neem, honge and simaroba are the popular plant species used for biofuel extraction with the production of significant quantities of plant cake, as by products. They are the good source of organic nitrogen and other substances the latter inducing resistance against pest infestations Jinsa *et al*., 2012 [8]. Farmers are encouraged by the government and other agencies to grow these trees in waste lands and field bunds, the seeds of which are procured by biofuel industries on a cost basis. As the biofuel production activity increases, the quantities of plant cakes produced would be significant and therefore there is a scope for use of these cakes in agriculture.

Keeping these points and facts in view, the following objectives were framed for studies on the growth and yield parameter management of chilli in the present investigation.

Materials and method
Growth and yield parameters of chilli at different crop stages as influenced by organics were recorded, as given below.

1. Plant height (cm) at 30, 60, 90 and 120 days after transplanting (DAT)
2. Number of branches/ plant at 30, 60, 90 and 120 DAT
3. Number of fruits/ plant at 40, 60, 90 and 120 DAT

Height of the plant from the base to the tip of the upper most branches was measured and expressed in cm. Number of branches per plant were counted and recorded.

Result and discussion
Plant height of chilli at various growth stages as influenced by organics.

Growth and yield parameters
Plant height
Plant height is key growth parameters that ultimately influence the total growth and output of the growth. At 30 days after transplanting (DAT), the treatment neem cake recorded significantly maximum plant height (27.46 cm) followed by vermicompost (24.70 cm) and pongamia cake (23.83 cm) which were on par with each other (Table 1).

Lowest plant height was recorded in untreated control (21.33 cm).

At 60 days after transplanting (DAT) the treatment neem cake again recorded maximum plant height (38.70 cm) followed by vermicompost (36.77 cm) and were on par with each other. Pongamia cake (34.00 cm) exhibited significant difference over control (26.50 cm).

At 90 DAT impact of neem cake maximum with a plant height (64.07 cm) followed by vermicompost (63.13 cm) and pongamia cake (62.07 cm). Lowest plant height was recorded in untreated control (54.03 cm).

At 120 DAT neem cake (79.46 cm) recorded maximum plant height followed by vermicompost and pongamia cake which were on par with each other (73.57 cm and 70.47 cm). Lowest plant height was recorded in untreated control (62.03 cm).

Table 1: Plant height of chilli at various growth stages as influenced by application of plant cakes and vermicompost

Sl. No.	Treatments	Plant height(cm)			
		30 DAT	60 DAT	90 DAT	120 DAT
1	Pongamia cake @ 250 kg/ha	23.83^{b}	34.00^{b}	62.07^{c}	70.47^{b}
2	Neem cake @ 250 kg/ha	27.46^{a}	38.70^{a}	64.07^{a}	79.46^{a}
3	Vermicompost @ 1 t/ha	24.70^{b}	36.77^{ab}	63.13^{b}	73.57^{b}
4	Control	21.33^{c}	26.50^{c}	54.03^{d}	62.03^{c}
S.Em±		0.59	0.88	1.19	1.55
CD @ 5%		2.04	3.06	4.13	5.38

DAT – Days after transplanting

Mean followed by same letter in a column do not differ significantly by DMRT (P=0.05)

Number of branches per plant

A healthy crop exhibited profuse branching and influenced the yielding potential of the crop. Data on this parameter indicated that at 30 DAT the treatment neem cake and vermicompost recorded maximum number of branches (8.98/plant and 8.87/ plant) respectively, being on par with each other followed by pongamia cake (7.43/ plant) and minimum number of branches were recorded in untreated control (7.07/plant) (Table 2).

At 60 DAT the branches in neem cake (18.23/plant) and vermicompost (17.3/ lant) density were on par with each other. Untreated control recorded minimum branches (15.13).

At 90 DAT neem cake was again significantly superior which the maximum number of branches (26.03/plant) followed by vermicompost (24.07/plant), pongamia cake (23.33/plant) and minimum number of branches were recorded in an control (22.07/ plant).

At 120 DAT neem cake treatment exhibited maximum number of branches (29.00/ plant) followed by vermicompost (26.03/plant), pongamia cake (25.27/plant) and minimum number of branches were recorded in untreated control (24.13/plant).

Number of fruits per plant

The overall yield of the crop was determined by the level of fruit set. At 40 DAT neem cake recorded maximum numbers of fruits (4.93/plant) followed by vermicompost (4.27/plant) and pongamia cake (3.53/plant). Lowest number of fruits was recorded in untreated control (2.93 /plant).

At 60 DAT neem cake and vermicompost recorded maximum numbers of fruits (26.73 and 25.57/plant) followed by pongamia cake (23.73/plant). Lowest number of fruits was recorded in untreated control (22.57/plant) (Table 3).

At 90 DAT again neem cake was significantly superior which recorded maximum numbers of fruits (47.17/plant) followed by vermicompost (33.67/plant), the treatment pongamia cake (31.23/plant) and untreated control recorded lowest fruit set and (30.77/ plant) were on par with each other.

Table 2: Number of branches per plant at various growth stages as influenced by application of plant cakes and vermicompost

Sl. No.	Treatments	Number of branches/ plant			
		30 DAT	60 DAT	90 DAT	120 DAT
1	Pongamia cake @ 250 kg/ha	7.43^{b}	15.61^{b}	23.33^{c}	25.27^{c}
2	Neem cake @ 250 kg/ha	8.97^{a}	18.23^{a}	26.03^{a}	29.00^{a}
3	Vermicompost @ 1 t/ha	8.87^{a}	17.3^{ab}	24.07^{b}	26.03^{b}
4	Control	7.07^{c}	15.13^{b}	22.07^{d}	24.13^{d}
S.Em±		0.05	0.66	0.59	0.59
CD (0.05)		0.17	2.27	2.04	2.04

DAT – Days after transplanting

Mean followed by same letter in a column do not differ significantly by DMRT (P=0.05)

Table 3: Number of fruits per plant at various growth stages as influenced by application of plant cakes and vermicompost

Sl. No.	Treatments	Number of fruits / plant			
		40 DAT	60 DAT	90 DAT	120 DAT
1	Pongamia cake @ 250 kg/ha	3.53^{c}	23.73^{c}	31.23 ^{c}	60.00 ^{c}
2	Neem cake @ 250 kg/ha	4.93^{a}	26.73 ^{a}	47.17 ^{a}	75.13 ^{a}
3	Vermicompost @ 1 t/ha	4.27^{b}	25.57 ^{a}	33.67 ^{b}	65.83 ^{b}
4	Control	2.93^{d}	22.57 ^{d}	30.77 ^{c}	55.13 ^{d}
S.Em±		0.06	0.59	0.68	1.48
CD @ 5%		0.20	02.03	2.34	5.12

DAT – Days after transplanting

Mean followed by same letter in a column do not differ significantly by DMRT (P=0.05)

The efficacy of any treatment in nourishing the plant is evaluated based on the yield realized which is attributed to the growth and yield components such as plant height, number of branches, number of fruits per plant as well as pest activity.

It is clear that, among the organics tested, maximum dry chilli yield of 2.06 quintals per hectare was observed in neem cake applied crop followed by vermicompost (2.06 q/ha). The increase in dry chilli yield was influenced by various yield contributing traits like plant height, a number of branches and fruit yield per plant which was superior in neem cake treatment followed by vermicompost.

The higher yields in the superior treatments namely, neem cake and vermicompost could be mainly attributed to better yield parameters namely, height of the crop (79.46 and 73.57 cm respectively at 120 DAT), number of branches per plant (29.00 and 26.03, respectively at 120 DAT) and number of fruits per plant (75.13 and 65.83 at 120 DAT, respectively) as compared to check (62.03 cm height, 24.13 branches and 55.13 fruits, respectively at 120 DAT).

The yield superiority in plots treated with vermicompost can be compared with the findings of Sashidhara 1999 and Varma and Supare 1997. The better yield obtained in neem cake treated plots is in agreement with the findings of Giraddi *et al* 2003 [7], Giraddi and Smitha 2004 [5] and Varghese and Giraddi 2005 [11] in chilli and Balasubramanian and Muralibhaskaran 2000 and Manu 2005 in cotton.

Vermicompost being known to release plant nutrients in a manner, provide the crop balanced nutrition unlike the chemical fertilizers. This would probably lead to biochemical changes in the plant and make the crop plants relatively more defensive against pest infestation. Bhawalkar and Bhawalkar 1991 and Bhide 1993 opined that crops nourished with vermicompost would be less susceptible to pest and diseases.

Conclusion

From the results obtained in the present investigation following conclusions are made.

Among the organics and cakes, neem cake application to soil resulted in effective suppression of sucking pest infesting chillies, followed by vermicompost application.

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