

Response of Different Rates of Biofuel Waste Based on Chilli Yield and Soil Fertility

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Abstract

In present study experiments were conducted to know the effect and suitable rate of de oiled neem seed cake on growth of Chilli plant, where deoiled neem cake was the biodiesel waste used. Chilli crop was export to various treatments by changing the application rate of neem cake with four replications in randomized block design. Neem seed cake was applied at the onset flowering. Instead of applying the neem cake directly, its granular are mixed with the soil. To produced granular, small granular machine of capacity 5kg was designed. The results revealed that application of neem cake at the rate of 180 g/plant significantly enhance the chilli productivity and morphological parameters.it also indicates that deoiled neem seed cake greater potential of being used as organic fertilizer.

Keywords- Deoiled neem cake, Organic granules , Chilli ,Soil fertility

1. INTRODUCTION

Adequate plant nutrients are required for healthy plant growth and crop yield. Provide sufficient nutrients to plants former rely on fertilizer. The fertilizer application mainly depends on types of soil nature of crop nature of fertilizer Application of organic fertilizer, chemical fertilizers and bio fertilizers their own merits and demerits in the contest of nutrient supply crop growth etc.[1] enormous use of chemical fertilizers and pesticides have influence on soil health and productivity of crop.

It is important to govern the organic matter of soil several research have been carried to evolve organic fertilizer alternative.The organic manures use are profitable in several ways, they provide see a necessary nutrients to plants, meliorates soil structure, biological activities and water holding capacity of soil. This manures can be of plant origin, animal origin or composed of material from both plants and animals origin. Oil cake, plant residues, green manure are of the plant origin. neem cake, castor cake karanj Cake etc. are some example of non-edible oil seed cake (material left after oil extraction) which are used as organic manures[4].

Many preceding research have shown that different type of bio waste can be used as fertilizer to sustain soil fertility and to get better yield. Also some of them act as a fungicide and insecticides [2][3].

The neem (*Azadirachta indica*) cake when mixed with soil lowers soil alkalinity, nitrogen losses, reforms organic matter in the soil, provides essential nutrients to plant, improves yield on longer terms. Importantly it is biodegradable and ecofriendly. Various research have showed that along with fertilizer property neem cake acts as pests and insect controller. Various parts of neem tree like seeds, flower, bark, leaf etc. can be used in good agriculture practice Neem cake directly mix with soil or it can be admixed with urea, Farm Yard Manure(FYM) and seaweed etc. for better results. Because Neem cake decompose slowly, it doesn't supplies the nutrients immediately [5].

Chilli is one among the most major common commercial crop for grow in India.it is used as a specie of all over the world and it is also known as a Bell pepper, sweet paper etc. the nutrient management plays an important role on Chilli lead. Hence to nourish the soil and increase productivity, local readily available organic fertilizer as to be used when compare with chemical fertilizers.

2. OBJECTIVES

- To study the nutrient potential of neem cake.
- To find out the effect of inorganic fertilifer and Neem cake on Chilli lead and their growth parameter.
- To determine effect of neem cake on soil properties.

3. MATERIALS AND METHODS

The pot culture experiment was done to know the response of neem seed cake and inorganic fertilizers on growth yield of chilli. The investigation was done during the rabi season of year 2019.

The chilli seeds of variety KHPH 1213 were used. It is hybrid variety seeding which was raised on a nursery bed. It was prepared in normal soil with FYM. At the time of flowering is around about 30 to 35 days age, plants were transplanted to the prepared pots. Each pot was filling with 6 kg of soil collected from farmer field. Then it was mixed with different rate of de-oiled Neem cake of granular.

To produce granular fertilizer a small 5kg granulator machine was designed. Input of granulator machine was powdered neem cake. The experiment was conducted in randomized block design pots with 6 treatments as indicated in table 3.1 below with 4 replication plots for each treatment.

Table 3.1: Six Treatments

Treatment	Compositions
T1	FYM+ Inorganic
T2	FYM+120 g Neem Seed Cake
T3	FYM+180 g Neem Seed Cake
T4	FYM+240 g Neem Seed Cake
T5	FYM+300 g Neem Seed Cake
T6	FYM+360 g Neem Seed Cake

Here Inorganic fertilizer was used DPA, urea and MOP for NPK neem seed cake granular were applied to each plants in grams which indicates the percentage by weight. Hence 60 grams neem cake means 1%, 120g means 2% by weight etc. Usually a chilli plant reaches and flowering stage around 35 days age. This was the reason for translating into the treated plots at 35 days.

Granular Machine

The process of agglomeration of a powder mixture which results in enlargement of the particles is known as granulator, which is necessary for production of soiled agglomeration. This agglomeration process is used in various industries to produce pellets fertilizer. Pharmaceutical tablets and capsules, chemical grains, livestock feed granules, etc. [11].

In order to makes bio waste as fertilizer with the objective of enhancing soil quality humans use fertilizer machines to produce organic pellets, organics granular fertilizer etc. Providing plant nutrients was the main concern of their organic granular fertilizer

Benefits organic granular fertilizers are:

- Granular fertilizer are dry hence easy to handle and apply it to soil
- Dry granular can be stored easily
- Nutrients leaching from the soil will be reduced

In this study, a single granulator setup as in fig.3.1 was designed for granular need fertilizer production. This setup had a control unit with fixed jaw. Before granulating, de-oiled need cakes we're grounded to powder, then by adding small amount of water granules are produced as shown in fig.3.2 Produced granules are dried and stored. The capacity of granulator setup was

5 kg and diameter of neem cake granules was 3-5mm.

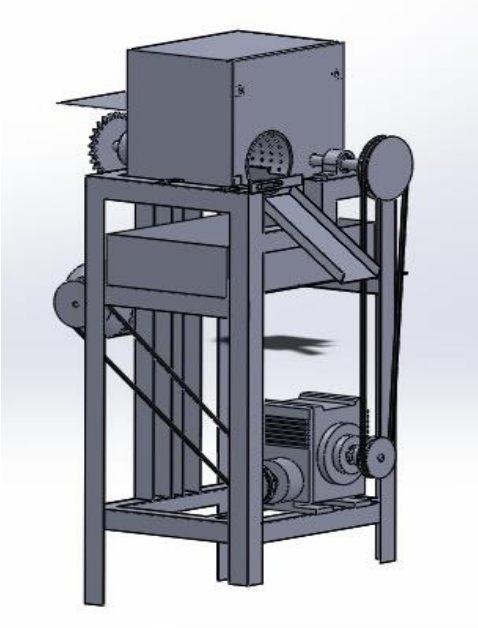


Fig.3.1 Neem cake Granular machine



Fig.3.2 Granules

4. RESULTS AND DISCUSSION

4.1. Soil analysis

Soil sample were collected from pots before and after the investigation to analysis the response of neem seed cake application on fertility of soil by concentrating on the major nutrients and organic matter. Table 4.1 and Table 4.2 show the chemical analysis of soil before and after the experiment with respect to Treatment 4 respectively. Soil was sandy loam in texture.

Table 4.1: Chemical analysis of soil before experiment (of T4)

Parameters	Result
Available Nitrogen (kg/ha)	297
Available Phosphorus (kg/ha)	28
Available Potassium (kg/ha)	263
Texture of Soil	Sandy Loam
PH	7.02
EC (dSm-1)	0.10
Organic carbon C (%)	0.45
Sulphur (ppm)	14
Zinc	1.09
Boron	0.10
Iron	2.38
Manganite	2.62
copper	1.13

Table 4.2: Chemical analysis of soil after experiment (of T4)

Parameters	Result
Available Nitrogen (kg/ha-1)	392
Available Phosphorus (kg/ha-1)	48
Available Potassium (kg/ha-1)	369
Texture of Soil	Sandy Loam
PH	7.23
EC (dSm-1)	014
Organic carbon C (%)	0.50
Sulphur (ppm)	14.75
Zinc	1.8
Boron	0.19
Iron	2.83
Manganite	3.01
copper	1.89

Similar soil fertility increase was observed in all treatment including treatment T1 (control) but highest organic carbon increase was seen in T4. Table 4.1 and table 4.2 also indicate marginal improvement in available N P K with application of neem seed cake. Similar enhanced soil fertility status with neem cake application was noticed by B C Shivakumar et.al and Oyinolola et.al and K R Krishnaraj et.al.

4.2. Neem seed cake analysis

The results of chemical analysis of neem seed cake used was summarized in the Table 4.3. It showed that the neem cake used in the study has 4.96 % N, 1.57% P, 1.31% K, 0.53% Ca, and 1.126% Mg, hence neem seed cake acts as a good source of nutrients for plants.

Table 4.3: Chemical analysis of neem seed cake

Properties	Result %
Total N	4.96
Total P	1.57
Total K	1.31
Calcium	0.53
Magnesium	1.126

4.3 Morphological parameters

The various morphological parameters were measured and tabulated in Table 4.4. Length of plant and chilli were measured in cm Scale weight of chilli was measured in single pan balance. Treatment 1 Plants were considered as control plants.

Table 4.4: Effect of Neem seed cake on Growth parameters of chilli

Sl. No.	Growth Parameters	T1	T2	T3	T4	T5	T6
1	Average plant height	85	88	95	104	99	90
2	Average number of Flowers	88	84	87	100	93	85
3	Average length of Chillies	7.6	7.9	8.4	9.0	8.6	8.0
4	Average Weight of Chillies	0.66	0.67	0.73	0.85	0.80	0.70
5	Average number of Green chillies Per picking	13	14	16	19	17	15

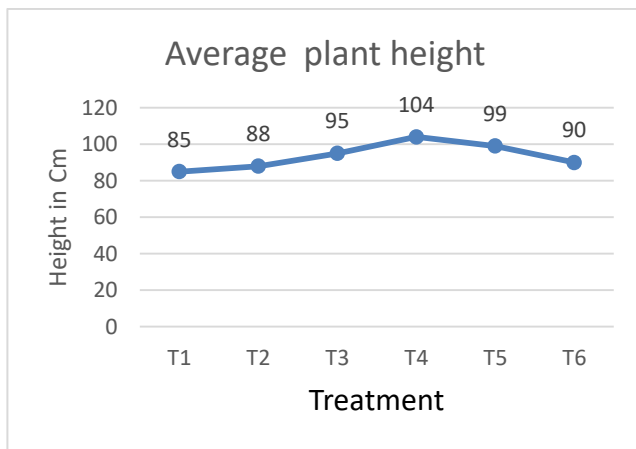


Fig. 4.1 Treatment v/s Height

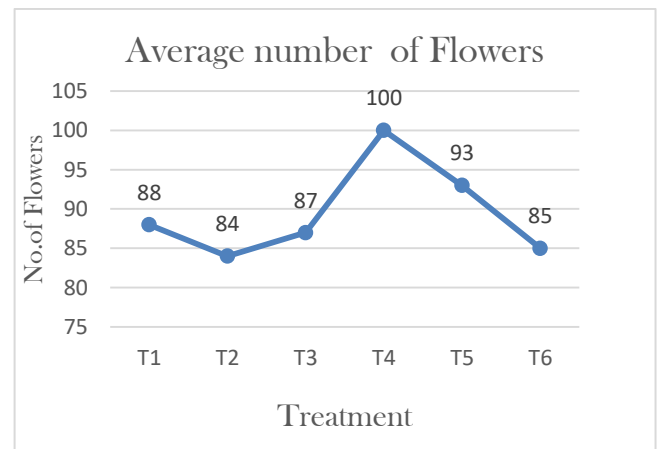


Fig. 4.2 Treatment v/s No. of flower

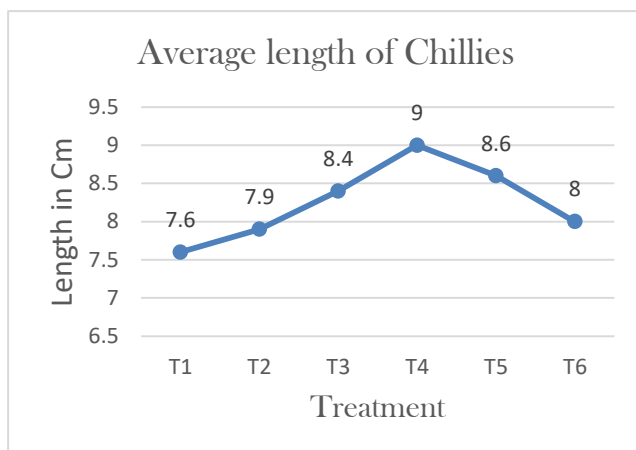


Fig. 4.3 Treatment v/s Length

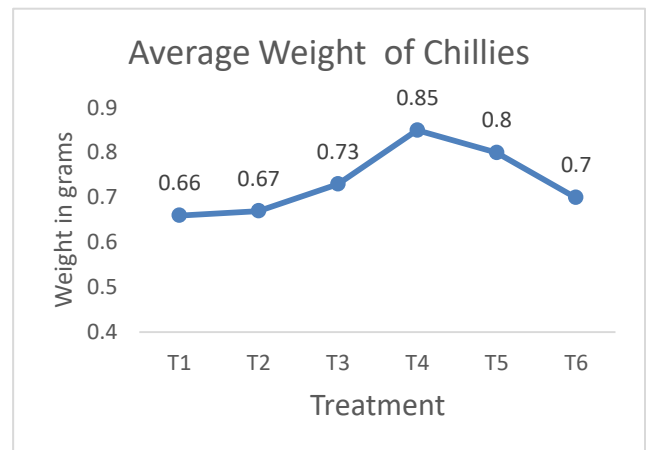


Fig. 4.4 Treatment v/s Weight

Recorded chilli growth and yield growth data is shown in Table 4.4, it indicates that application of 180g of neem cake (or) 3% of neem cake to the soil i.e. treatment T4 has heights, no. of flowers, fruits along with maximum Plants height over various other treatments including controls. There was no much difference observed between T1 and T2, but average numbers of

flowers were more in T1 as show in Fig.4.2 and less number of flower falls was observed in T2.

Compared to T3, T4, T5, treatment T6 resulted in less yield as show in Fig.4.4 and Fig.4.5 due to existence of higher dose of neem cake which may develop toxicity to plant. Identical results were reported by many researchers when different combinations of inorganic fertilizer, organic fertilizer and FYM were used.

Mudiganti Ram Krishna Rao et.al has shown in their work how vermicomposting and panchagavya combination increased plant height to 106 cm with average Chilli length of 11 cm. In the present study 104cm average height was observed with T4 as shown in Fig.4.1, 9cm average length of chilli was observed with T4 as shown in Fig.4.3.

S Chaturvedi et.al have used the deoiled jatropaha cake as organic fertilizer for tomato crops by varying the dosage at the time of flowering. High yield were observed with 2% to 3 % Jatorpha cake at 60 days transplant. In the present study, 3 to 4 % of Neem cake resulted in better field for chilli crop. K R Krishraj et al. used Neem cake amended with trichoderma viridi and pseudomonas fluoresces species for tomato crop. Increased plant height and yield was observed in all treatments.

From the about discussion, it is evident that use of deoiled Neem cake at approximate proportions in soil has productive influence on chilli yield and soil fertility status.

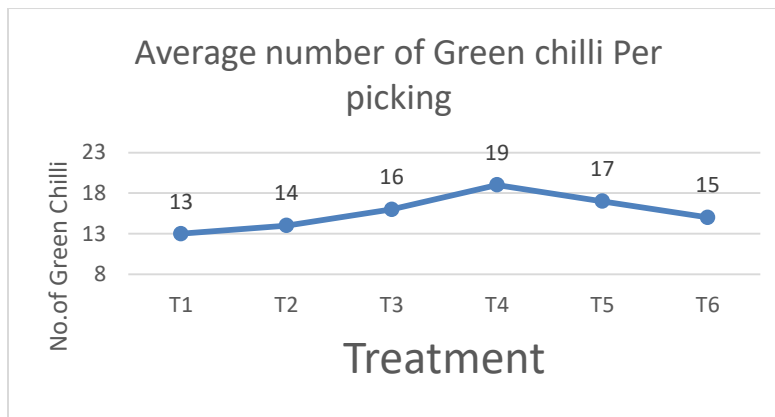


Fig. 4.5 Treatment v/s No. of Green Chilli

5. Conclusion

This study concludes that, the deoiled neem seed cake has some necessary nutrients for chilli plant growth and yield. Adding 3 to 4% (by weight) or 240g neem cake to soil provides comparatively improved chilli yield, crop growth relative to control. Soil analysis revealed that soil fertility status was improved by Applying neem cake as granular organic fertilizer hence it can be recommended to use replacement for chemical fertilizer. However in present pot culture experiment have been conducted by using medium fertility soil of type sandy loam to know the clearly response of varying rate of neem seed cake, field experiment has to be conducted for various soil type.

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International Conference on Recent Trends in Science & Technology-2021 (ICRTST - 2021)**Organised by: ATME College of Engineering, Mysuru, INDIA**

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