Efficacy of different oil cakes on the growth of *Phaseolus aureus*

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ABSTRACT— The present research work aims, to investigate the effect of different oil cakes such as Mustard cake, Groundnut cake, Coconut cake on the growth of green gram plants. Physiochemical characteristics of the oil cakes, shows the presence of essential macronutrients and micronutrients that enhance the soil fertility and plant growth. A field study was conducted and 20 green gram seeds are sown in each pot. After germination, the fermented liquid oil cake fertilizers was added on the 10th day to each pot. The experiment was conducted in triplicates. The growth parameters such as plant height, root length, shoot length, no of leaves was measured at regular intervals. In the present study, the application of mustard cake fertilizer showed better results compared to groundnut cake and coconut cake fertilizer.

Keywords: Mustard cake, Groundnut cake, Coconut cake, Fermented liquid fertilizer.

INTRODUCTION:

There is a large need for agricultural produce by the increasing population, economic development and climate change. To fulfill the food demand, there is an increase in the use of synthetic fertilizers. Consequently, chemical fertilizers have become a vital part of traditional agriculture, providing the major plant nutrients, including Nitrogen, phosphorus and potassium. The extensive use of synthetic fertilizers leads to environmental pollution and soil degradation. In addition, the high costs of these fertilizers demands for an alternative, eco-friendly and safe natural sources of phytonutrients. Fertilizers are the substances used to improve crop growth and yield. The continuous use of inorganic fertilizer will cause damage to physical, chemical and biological properties of soil, thus decreasing the soil fertility[1]. The rampant use of chemical fertilizers contributes largely to the deterioration of the environment, loss of soil fertility, less agricultural productivity and soil degradation [2]. The high cost of inorganic fertilizers and the hazardous environmental consequences make them not only undesirable but also uneconomical and out of reach of the poor farmers [3].

Most of the oil crops such as oil palm, the castor bean and the coconut palm grow in tropical and semitropical areas and the crops such as soybean, flax, and sunflower grow in cool temperate regions. Oil is found in large amounts usually in the seeds and occasionally in the fleshy part of the fruit, as in the olive and the oil palm. The oil percentage in the seeds varies depending on the plant species. The oils are used for cooking and in the manufacture of soap and detergents, in paints and varnishes *etc*. The oil cake is obtained as by-product, after the oil is extracted from the oilseeds. The Mustard, Coconut and Groundnut cake is made from the residual matter obtained after the extraction of the oil.

Edible oil cakes such as sunflower oil cake, canola oil cake, sesame oil cake, mustard oil cake, soy bean cake, palm kernel cake, groundnut oil cake, coconut oil cake, rapeseed oil cake, cotton seed cake, olive oil cake, are derived from sunflower, canola, sesame, mustard, soy bean, palm kernel, ground nut, coconut, rapeseed, cotton and olive [4]. Edible oil cakes such as Groundnut cake, Coconut cake *etc*. are fed to livestock and also used as manure.

Nonedible oil cakes such as pongamia oil cake, jatropha oil cake, sal oil cake, karanja oil cake and babassu are derived from pongamia, jatropha, sal, karanja, and babassu. Non edible oil cakes are only used as manures e.g.: Castor cake, Neem cake, Mahua cake *etc*. The oil cakes vary based on their substrate, quality, storage conditions and methods of oil extraction [5].

MATERIALS AND METHODS:

FERMENTATION OF OIL CAKES:

50 gm each of oil cakes of groundnut, mustard and coconut are soaked in 1 liter of water taken in plastic buckets or earthen pots for 2-3 days. The fermentation process takes place within 2-3 days. Then the fermented liquid fertilizer is added to 9 liters of water and mixed well. The fermented liquid fertilizers are added to the pots in equal proportions on the 10^{th} day. The growth parameters such as plant height, root length, shoot length, no of leaves are measured at the intervals of 5 days.

PROCEDURE:

The experiment was conducted in small sized pots. All the pots are filled with soil. The pots are labeled as C (Control), T1 (Ground nut cake treated), T2(mustard cake treated), and T3(coconut cake treated). In each pot 20 seeds of Green gram was sown 1 inch deep and water was sprayed. After the germination of seeds, on the 10^{th} day, different fermented liquid fertilizer was added in each of the pots. The experiment was conducted in triplicates. The following indicators were analyzed during the study – Date of sowing of the seeds, Date of application of liquid fertilizer and measurement of growth parameters at time intervals.

Fig. 1.Different types of oilcakes

RESULTS AND DISCUSSION:

Table 1:

Tabular form representation of growth parameters such as root length, shoot length, and no. of leaves on the 5th day after application of liquid fermented fertilizer.

S.NO	Growth Parameters	C (Control)	T1(Groundnut)	T2(Mustard)	T3(Coconut)
1.	Root length	2cm	2.4cm	3cm	2cm
2.	Shoot length	16cm	17cm	18.5cm	15cm
3.	No. of leaves	5	6	6	4

Table 2:

Tabular form representation of growth parameters such as root length, shoot length, and no. of leaves on the 10th day after application of liquid fermented fertilizer.

S.NO	Growth Parameters	C(Control)	T1(Groundnut)	T2(Mustard)	T3(Coconut)
1.	Root length	2.7cm	3.5cm	4cm	2.5cm
2.	Shoot length	16.5cm	19cm	20cm	15cm
3.	No. of leaves	8	9	11	7

Fig.2. Growth of Green gram plants, 5 days after application of fermented liquid fertilizer

Fig.3. Growth of Green gram plants 10 days after application of fermented liquid fertilizer

From the Table-1 and Table-2, the results revealed that the mustard cake fertilizer showed better growth of green gram plants compared to groundnut cake and coconut cake fertilizer. The mustard cake fertilizer showed the maximum growth in terms of stem length, root length, number of leaves. The proteins, nutrients, rich in mustard oil cake might have enhanced plant growth. The addition of this type of fertilizers to the plants provides many micronutrients to the plants and increases the nitrogen, potassium and phosphorus content of the soil thus enhancing the crop yields. The ground nut cake and coconut cake are also good source of nutrients. There are similar findings of use of Soybean oil mill effluent and Mustard oil mill effluent on seed germination and seedling growth of Glycine max plants [6]. Similarly

there are reports on the effects of coconut oil cakes on the growth performance of Gima Kalmi [7]. There are reports of castor cake and neem oil combination increasing the pod yield in groundnut [8].

CONCLUSION:

The results concluded that the application of mustard cake fertilizer showed better results in growth of green gram plants compared to the other treatments. Mustard cake is a residue obtained after extraction of oil from mustard seeds. This is used as organic fertilizer. The organic fertilizers will improve the soil texture; enhance water retention, aeration and soil fertility. Therefore, the mustard cake can be used as organic fertilizer to enhance sustainable growth of Green gram.

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