



Influence of Fertilizer on Growth, Yield and Chlorophyll Contents of Ground Nuts

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Abstract:

Groundnut (*Macrotylomageocarpum*) is cultivated in worldwide of which mostly South Africa, US and India is huge amount of cultivated. Groundnut is a type of legume crops and it is mainly grown in tropical and subtropical area. In addition Groundnut is huge amount of cultivated in India because, it has rich oil and protein content and nutrition value. Several minerals and fertilizers are used to increase crop production to increase soil fertility and improve cultivation. Here we use organic (cow manure) and inorganic (NPK 19) fertilizers. In addition some parameters are used such number of leafs, plant height, chlorophyll contents and nitrate reductase. Here are the chlorophyll contents of leaves and NPK 19 fertilizer interaction has been observed. Using NPK 19 fertilizer and cow manure has increased the height of the plant and increased the productivity of the plant.

Key-words: Inorganic, Organic, Fertilizer, Microbiology, Biology.

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Introduction:

Groundnut is most cultivated legume crop in world and it is a type of edible seeds. Groundnut also known as pindar, monkey nut and peanut. It is known by different names in different places of which peanut name is one of them. *Geocarpa* groundnut (*Macrotylomageocarpum*) is one of the legume crops in groundnut. The groundnut crop falls under the taxonomically Fabaceae family and Fabales order. The groundnut legume crop is cultivated in different parts of the world. According to 2016 report about 45 million tons of groundnut is produced all over the world. The groundnut (*Macrotylomageocarpum*) crop is widely grown in US, South Africa and India. It is mainly cultivated in tropical and subtropical regions of India. This crop is very well growing in sandy loam nature soil. It grows well at 26-34°C in hot season and 20-24°C in cold season. Groundnut is in high demand all over the world because of its rich protein and oil content and

because of its nutrition value; it is used as human food. Since, groundnut can retain nitrogen in the air; it uses less N₂ containing fertilizers, which improves soil fertility. Groundnut production is expected to enhance as a result of maximum nutrient absorption. The amount of crop production is less if the area of agricultural land is less and there is not proper supply of nutrient. In addition, fertilizers can also be used when applying nutrients. Deficiency of nutrients is a major cause of crop loss. There are some essential nutrient elements that play an important role in crop growth, production and crop quality and which cause less damage to the environment. There is a positive effect between crop productivity and use of fertilizer. Using fertilizer it has been seen that the amount of crop has increased by about 60%. The fertilizer affects on the structural, chemical and physical character of the soil. As the use of chemical fertilizers increases the production of the crop, the use of more



chemical fertilizers has a detrimental effect on the properties of the soil and the crop yield. Where using organic fertilizers or organic manure does not have any negative effect on soil and crop. Among organic fertilizers, cow manure is one of the most widely used fertilizers which improve soil fertility, increase water holding ability and increases crop production. Several farmers have noticed that

organic fertilizers are used in crop yields are increase but very slow where chemical fertilizers are used to high crop production. So, you need to use a fertilizer that is low cost, easy to use and increases crop production. In this study, we uses organic fertilizer like cow manure and inorganic like NPK 19 chemical fertilizer for yield, Production, physiological properties and growth of groundnut plants.



Fig 1: *Macrotyloma geocarpum*

Materials and Methods:

❖ Sample collection and experiment area:

The sample was collected from Champadanga market, Hooghly, West Bengal and the experiment was conducted in Champadanga agricultural land whose field area will be much more. Everyday weather report is measured and recorded where rainfall is measured from 420-520 nm and temperature is maintained for both seasons and average humidity is 47 to 90%.

❖ Use of materials:

In this experiment we are using different types of materials and samples such as Groundnut seeds (*Macrotyloma geocarpum*), NPK 19 fertilizer, cow manure, nitrate reductase solution and chlorophyll content.

❖ Experimental methods:

Groundnut seeds were cultivated in the 450 m² agricultural field area. The experiment area was partitioned into 39 plots and the every plot size is 3×3 m and 0.6 m gap between every plot. Here

we used two types of fertilizers one NPK 19 fertilizer is a chemical fertilizer and other cow manure is a organic fertilizer for plant treatments. The cow manure has been collected from cow houseof champadanga. Cow manure should be applied 1 to 2 weeks after planting groundnut seed in the ground. The seed needs to be planted between 18×18 cm gap with 2-3 seeds in every hole. Then cow manure was applied at the main plot and NPK 19 fertilizer on other plot.

❖ **Treatments of different types fertilizers:**

Two types of fertilizers have been used to treat the plant, one of which is organic fertilizers (cow manure) and other is inorganic or chemical fertilizer (NPK 19). Cow manure has been applied 1 to 2 weeks after planting the seed with different doses like 0, 6, 12 ton/ha. Where NPK 19 fertilizer should be used twice in 1 to 2 weeks after planting the seed with different doses like 0, 20, 40, 60 and 80 kg/ha.

❖ **Observed parameters:**

The investigated parameters are number of leafs, plant height, chlorophyll levels and activity of the enzyme nitrate reductase. The number of leaves and plant height has been observed at 48 DAP where chlorophyll levels and activity of the enzyme nitrate reductase have been measured at 27 DAP. Thus the parameters are observed through the experiment.

Result and Discussion:

Effect of inorganic and organic fertilizers on plant growth:

❖ **Effect observed in plant height:**

Some significant effects have been observed in plant height using organic and inorganic fertilizers. Where no significant effect was observed between the two treatments by applying organic fertilizer (cow manure), it has been seen that the height of the plant has increased. The different doses of cow manure used increases the maximum plant height by 12ton/ha. However, there is no significance difference between 12ton/ha doses and 6ton/ha doses. It has been seen that the height of the plant has increased even after using 6ton/ha dose. In addition, different types of plant height responses using inorganic fertilizer (NPK 19) has been observed. Maximum plant height has been increased by using 60kg/ha dose of NPK 19 fertilizer and also effects on plant growth. Improvements in plant growth and plant height have been observed using both type organic and inorganic fertilizers. Improvement of plant height through different types of treatment is represented in Table 1. Organic substance of soil has been increased by applying cow manure. The organic substance of the soil improves the structure and properties of the soil and also increase the nutrient level. As a result use of organic substance increases the crop yield and growth, improves soil nutrient contents and physiological properties, increase root growth and plant growth. Some essential nutrient element like Phosphorus (P), Nitrogen (N) and



Potassium (K) also influenced the growth rates of plant. The nitrogen element helps the cells of the apical

meristem to enlarge. Apical meristem helps in shoot growth which affects plant growth.

Cow manure	NPK 19 fertilizer					
	0 kg/ha	20 kg/ha	40 kg/ha	60 kg/ha	80 kg/ha	Mean
0 ton/ha	6.3	7.0	6.6	7.1	7.0	6.80
6 ton/ha	6.5	7.2	7.6	8.8	8.7	7.76
12 ton/ha	8.3	7.0	7.9	8.2	8.1	7.90
Mean	7.03	7.06	7.36	8.03	7.93	-

Table 1: Effect of NPK 19 fertilizer and cow manure on plant height after 6 weeks of planting

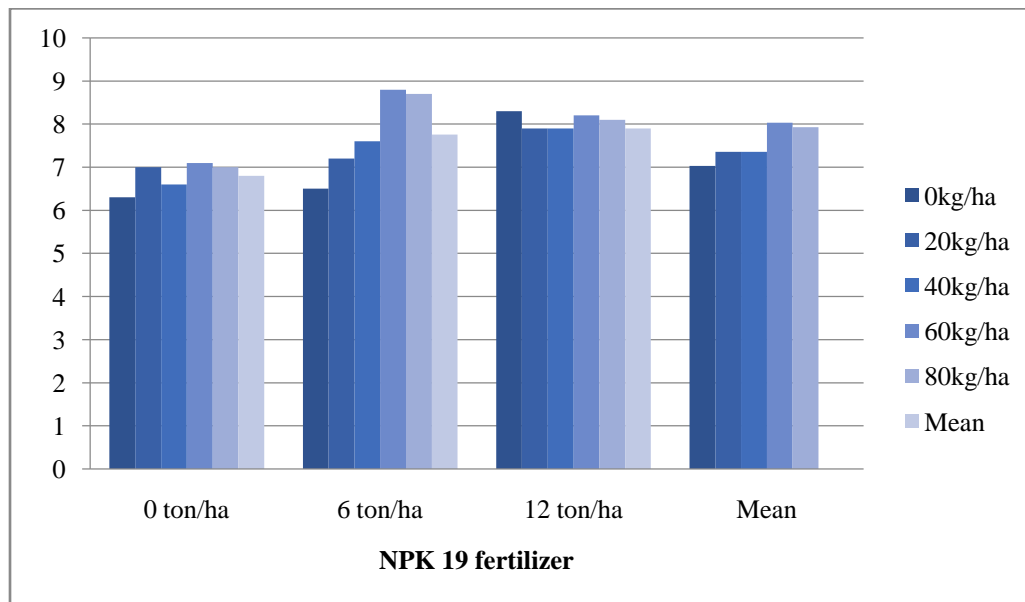


Fig 1: Effect of NPK 19 fertilizer and cow manure on plant height after 6 weeks of planting

❖ **Effects on plant leaves number:**

There is not significant effects have been observed using organic (cow manure) and inorganic (NPK 19) fertilizers on plant leaves number. Similarly, the use of 6ton/ha and 12ton/ha doses have no significant effect on leaves number. The effect of organic fertilizer treatment was shown after 1 to 7 weeks of planting. Generally, cow manure is a organic substance of soil. In the process

mineralization the organic substance released the essential elements which are used in plant development and growth. The mineralization is a long time process. An organic fertilizer (cow manure) also helps leaf formation and increase leaf growth by providing nutrients. So, the nutrient elements have no significant effect on plant leaves number. The effect on plant leaves number is described in Table 2.



Cow manure	NPK 19 fertilizer					
	0 kg/ha	20 kg/ha	40kg/ha	60 kg/ha	80 kg/ha	Mean
0 ton/ha	16	18	16	18	17	17
6 ton/ha	15	16	17	16	15	15.8
12 ton/ha	16	15	15	15	14	15
Mean	15.6	16.3	16	16.3	15.3	-

Table 2:- Effect of NPK 19 fertilizer and cow manure on plant leaves number after 6 weeks of planting

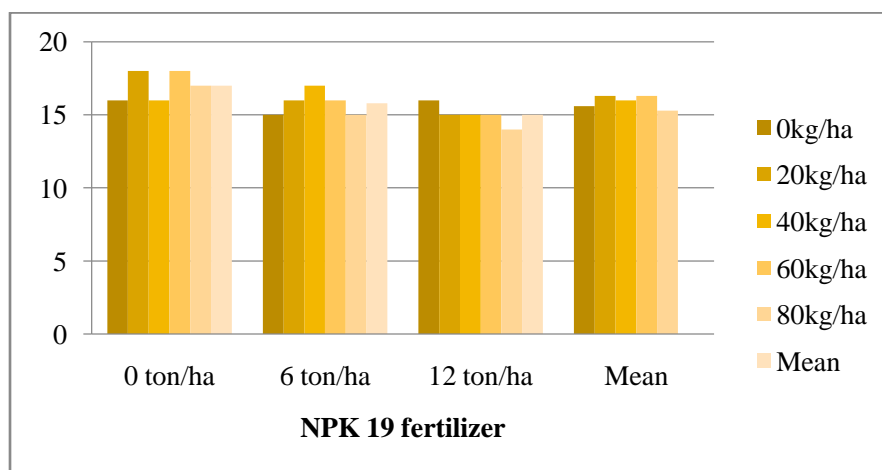


Fig 2: Effect of NPK 19 fertilizer and cow manure on plant leaves number after 6 weeks of planting

Effect of inorganic and organic fertilizers on physiological change of Groundnut plant:

❖ **Activity of nitrate reductase:**

The activity of the enzyme nitrate reductase that assists in the assimilation of N – NO₃⁻. This enzyme plays a major role in plant growth and nitrogen assimilation. There have significant effect of nitrate reductase activity on inorganic and organic fertilizers. But in this experiment there have no significant effect between the treatments. The maximum nitrate reductase activity was obtained using a 6ton/ha cow manure dose. Nitrate reductase activity has been improved by using 6ton/ha dose respectively and the highest average value are 7.76 NO₂ /gm/hour. In addition NPK 19 fertilizer also improves the nitrate reductase

activity. Generally, the maximum nitrate reductase activity was obtained using a 60 kg/ha NPK 19 fertilizer dose. Nitrate reductase activity has been improved by using 60 kg/ha dose respectively and the highest average value is 8.03 NO₂/ gm/hour. If the use of low amount of nitrogen fertilizer that can be suitable for plant growth. So, the low amount of nitrogen fertilizer can also improve plant growth and yield and formation root nodules. If increase the activity and amount of nitrate reductase then increase the ability of nitrate production and synthesis of protein, amino acid and nitrogen assimilation. The activity of nitrate reductase on groundnut plants is represented in Table 3.



Cow manure	NPK 19 fertilizer					
	0 kg/ha	20 kg/ha	40 kg/ha	60 kg/ha	80 kg/ha	Mean
0 ton/ha	2.640	2.999	1.742	2.780	2.352	2.503
6 ton/ha	4.600	4.423	4.390	4.299	3.836	4.309
12 ton/ha	2.812	3.650	3.590	4.400	3.100	3.510
Mean	3.359	3.690	3.240	3.693	3.096	-

Table 3: Effect of NPK 19 fertilizer and cow manure on nitrate reductase activity of Groundnut plants.

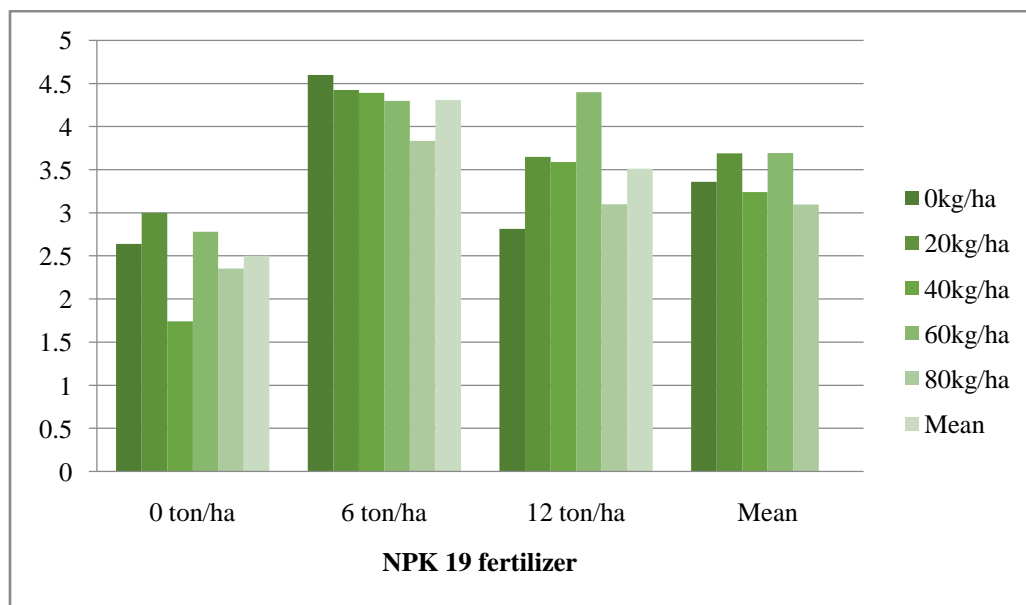


Fig 3: Effect of NPK 19 fertilizer and cow manure on nitrate reductase activity of Groundnut plants

❖ **Effect on chlorophyll content:**

The significant effect have been observed on organic (cow manure) and inorganic (NPK 19) fertilizer on plant leaf chlorophyll content. If cow manure and NPK 19 fertilizer is not applied there were no significant effect on leaf chlorophyll content. The leaf chlorophyll content is decreased was obtained by using a 6ton/ha cow manure dose. The maximum chlorophyll content was observed by using 6ton/ha cow manure dose without NPK 19 fertilizer. But the average value is decrease by using the

6ton/ha cow manure dose. In addition, the lowest chlorophyll content was observed by using 60kg/ha NPK 19 fertilizer doses. Whereas the use of 12 ton/ha cow manure and 80kg/ha NPK 19 fertilizer shows the highest chlorophyll content. The maximum average value was observed by using 12 ton/ha cow manure and the lowest average value was observed without apply cow manure. The effect on chlorophyll content of Groundnut plants is represented in Table 4.



Cow manure	NPK 19 fertilizer					
	0 kg/ha	20 kg/ha	40 kg/ha	60 kg/ha	80 kg/ha	Mean
0 ton/ha	0.470	0.329	0.319	0.343	0.363	0.352
6 ton/ha	0.409	0.232	0.254	0.289	0.275	0.292
12 ton/ha	0.304	0.310	0.340	0.346	0.535	0.367
Mean	0.373	0.290	0.304	0.326	0.392	-

Table 4: Effect of NPK 19 fertilizer and cow manure on chlorophyll content of Groundnut plants

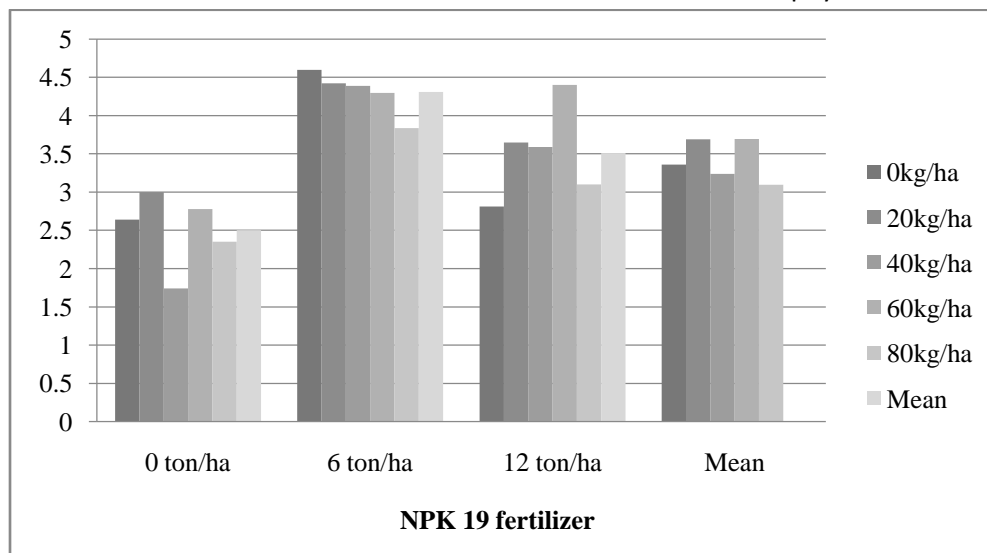


Fig 4: Effect of NPK 19 fertilizer and cow manure on chlorophyll content of Groundnut plants

Conclusion:

In this study we collect the Groundnut (*Macrotyloma geocarpum*) seeds from Champadanga market, West Bengal and also collect the organic and inorganic fertilizer. The present study we focused on how to improve the plant growth by using organic manure and inorganic fertilizer (NPK 19). The use of different doses of NPK 19 fertilizer and cow manure for this experiment. The maximum plant height and number of leaves is increased by the use of cow manure (12 ton/ha) and NPK 19 fertilizer (60kg/ha). Whereas, the maximum chlorophyll content and nitrate reductase is increase by the use of 80kg/ha (NPK 19 fertilizer) and 12 ton/ha (cow manure) fertilizer. Whereas, the maximum chlorophyll content and nitrate reductase is increase by the use of

12 ton/ha cow manure and 80kg/ha NPK 19 fertilizer.

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