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Impact of Various Organic Media on Germination and Growth of Selected Fruit Vegetables

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Abstract

Organic farming is commonly regarded as a system for improving vegetable quality. Organic farming can be considered as a system providing good conditions to improve the vegetable quality. Nevertheless there are many possibilities to ameliorate the methods of cultivation and storage of organic crops to obtain better production and qualitative results. The aim of work was to analyze the effects of the organic methods namely Cow dung manure, Goat manure, Pseudomonas and Coconut peat with a control, on the seed germination and growth parameters of three selected fruit vegetables such as *Abelmosches esculentus, Solanum melongena and Capsicum annum*. During the growing period *Solanum melongena* L. shows early flowering and fruit setting in Goat manure treated soil compared to other treatments. *Abelmosches esculentus* (L) Moench. Shows maximum performance in Cow dung manure, Goat manure and Coco peat. Capsicum annum L. yields maximum in Goat manure and Coco peat in all aspects. It showed highest results in growth parameters when cultivated in Goat manure while quality and quantity of fruits were better in Coconut peat. So Goat manure and Coco peat are suitable organic media for *Capsicum annum* L. The present investigation concludes that Cow dung, Goat manure and Coco peat are the best organic manure for the chosen fruit vegetables. From an overall view it can be concluded that all organic manure are good enough and they yield better results for different plants differently.

Keyword: organic fertilizers; okra; chilly; brinjal; growth; germination; yield

Introduction

Organic farming is beneficial for natural resources and the environment. Organic farming is a system that favors maximum use of organic materials and microbial fertilizers to improve soil health and to increase yield. Organic farming has a long history but show a recent and rapid rise (Behera et al., 2012).Many scientists at different levels have elaborated the concept of organic farming but according to (Lampkin.,1990) Organic farming is a production system which avoids or largely excludes the use of synthetic compounded fertilizers, pesticides, growth regulators and livestock feed additives. In 1943, Howard published the book An Agricultural Testament, in which he described a concept that was to become central to organic farming—the importance of utilizing available waste materials to build and maintain soil fertility and humus content (Heckman.,2005).The relevance and need for an eco-friendly alternative farming system arose from the ill effects of the chemical farming practices adopted worldwide

during the second half of the last century. The methods of farming evolved and adopted by our forefathers for centuries were less injurious to the environment. Modern organic farming was developed as a response to the environmental harm caused by the use of chemical pesticides and synthetic fertilizers in conventional farming and it has numerous ecological benefits. One of the major objective of this work is to bring about the advantages and disadvantages of organic farming which were proved scientifically through various studies.

Materials and methods

The study was conducted at the study site Manjeri, 11° 7' 0" North, 76° 7' 0" East at Malappuram district and seeds are collected from nearby nursery. 30 seeds of *S. Melongena* and *C. annum* and 20 seeds of *A. esculentus* were moistened and sown in 7"×7 " grow bags filled with soil and are mixed with organic manures. There are 5 treatments including Cow dung, Pseudomonas biofertilizers, Coco peat, Goat manure and control (without fertilizer). Control and four treatments were maintained in 4 repeats. In this experiment, the parameters such as plant height (cm), germination percentage & index, number of leaves, internodal length, fruit length, no.of fruits & flowers were measured manually. The fresh and dry weight of fruits were taken using weighing scale and area of leaves calculated using 1 square centimeter grid graph paper. In addition, germination of seeds in the second germination is also noted. The average for each result was calculated and the data was recorded.

Results and Discussion

***Germination Percentage (%)*:** The germination percentage is low in Abelmosches among all treatments. It shows a maximum percentage in coco peat with soil (15 %) and a minimum of 5 % in goat manure mixed with soil. This findings are comparable with those of Bharadwaj, 2014. *Capsicum annum* give better results than *Abelmosches esculentus.* It responded more to the bio fertilizer *Pseudomonas fluorescence,* applied as liquid in normal soil. Pseudomonas enhances the seed germination which give a germination percentage of 50 %. *Solanum melongena* yield a high germination percentage of seeds when compared to Abelmosches and Capsicum. The value of seed germination ranges from 30-65 % with a good percentage in cow dung manure mixed with soil and this findings are reporting first time.

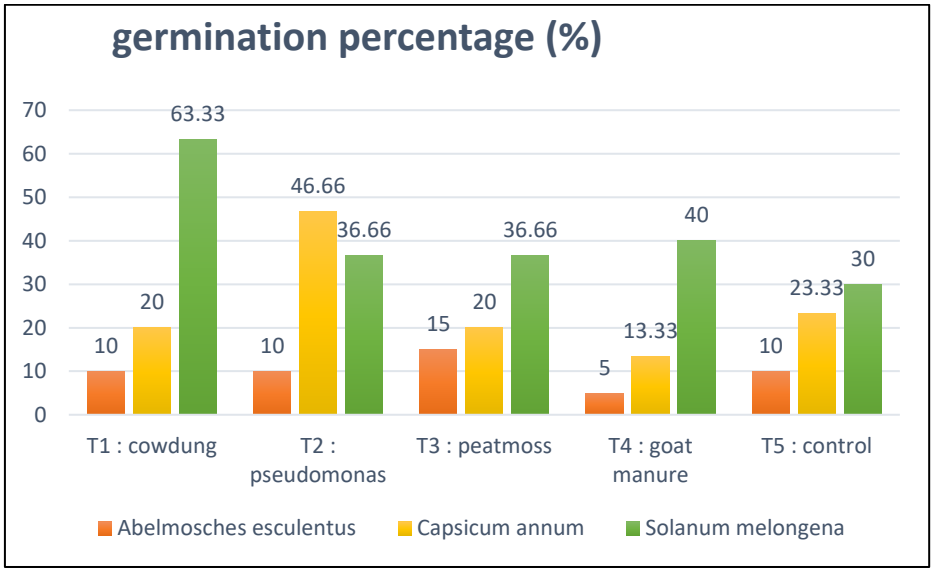

Figure 1: seed germination percentage (%)

Germination index: Analyzing the results each vegetable variously responded to each treatment. As a comparison among selected vegetables, Brinjal yield better results in germination index. Among the all five treatments the germination index found to be high in cow dung manure treated Brinjal crop (4.22). *Capsicum annum* shows a higher value in Pseudomonas treatment (1.92) and lower value in the soil treated with goat manure (0.50). In the case of *Abelmosches esculentus* germination index is less than one in all treatments with a higher value of 0.65 in Coco peat treatment and a lower value of 0.20 in Goat manure.

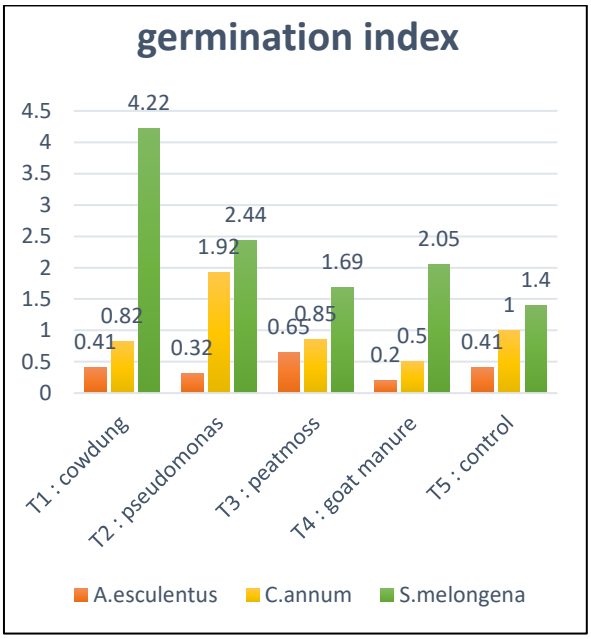

Figure 2: germination index

Germination period: Germination period varies from 1 to 3 days in Abelmosches with a high germination period of 3 in Pseudomonas treatment (table 3). Capsicum show 1 day of germination period in all treatments. On the other hand Brinjal shows much higher emergence ranging from 2 to 4 days. This is first time reporting such results for this combination of manures.

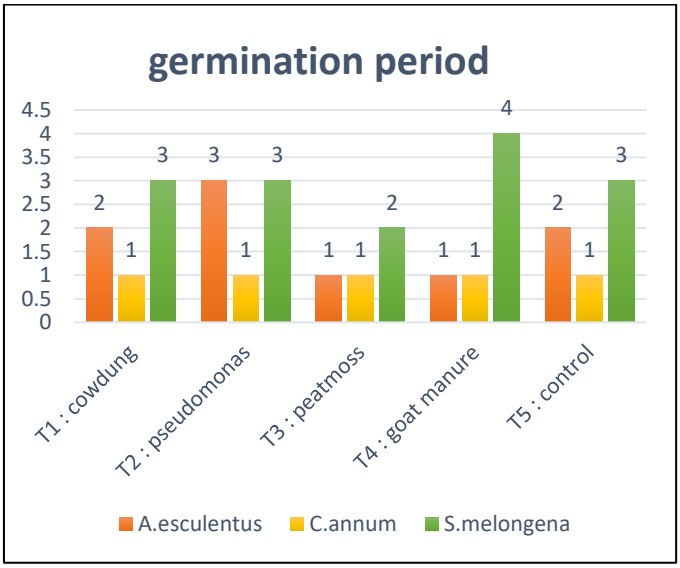

Figure 3: germination period (no.of days)

***Plant height (cm)*:** Abelmosches attained a height of 54 cm in Pseudomonas treatment and a comparative height is reached in cow dung manure (53.5 cm) and lowest growth found in Coco peat treatment (30.8 cm). Almost in all treatments Capsicum attained growth in the range of 40 to 50 cm with an exception of 34.75 cm in Cow dung manure which recorded as the lowest growth. Similar to that of Abelmosches, *Solanum melongena* shows a highest growth in Cow dung manure (42.45 cm). (Baidoo et al., 2017) also observed similar findings. While it is recorded with a lowest growth in Coconut peat manure (24.5 cm).

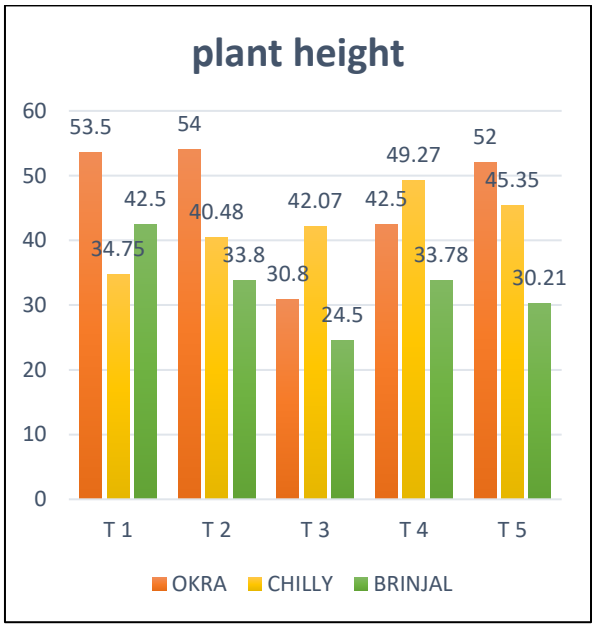

Figure 4: plant height (cm)

Number of leaves: The number of leaves in *Abelmosches esculentus* (L.) Moench. A high value of 10 is reported in Coco peat treatment. Such comparable findings are reported from (Kumarasinghe et al., 2015). A lower value of 7 in both Cow dung and Goat manure treatments (table 5). Usually *Capsicum annum* L. have small leaves which produced in large number compared to other vegetables. The number of leaves varies from higher in Goat manure (34) to lower in Pseudomonas treatment (21). *Solanum melongena* L. have large-width leaves which are usually low in number per plant. There is an increase in the number of leaves in Pseudomonas treatment compared to all other treatments (9 leaves in Pseudomonas). All the other treatments namely Cow dung, Coco peat, Goat manure and control, there are 4 to 7 leaves per plant. This findings are in accordance with Ullah et al., 2008.

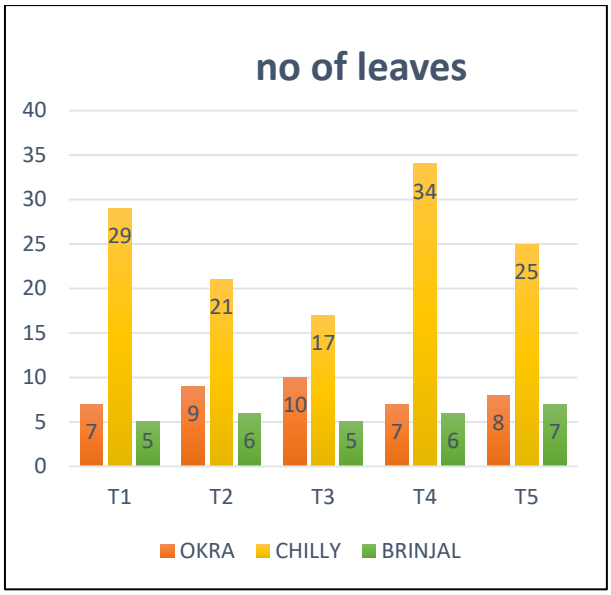

Figure 5: number of leaves

Leaf area index (cm ²): The leaf area index was found to be high in Control treatment in *Abelmosches esculentus* (71 cm $^{2)}$. The lowest value of leaf area index was reported in Coco peat (32.5 cm ^{2}).In *Capsicum annum,* treatments of Cow dung and Control showed high leaf area index (15cm ^{2} and 13cm ^{2}). But a low value of 5 and 4 cm ^{2} in Pseudomonas and Goat manure treatments respectively. *S. melongena* have large broad leaves. The leaf area index was reported to high in Cow dung manure (153 cm ^{2}). It showed lower value of 96.5 cm $^{2)}$ in Coconut peat. The results from leaf area index for the selected vegetables are reporting for the first time.

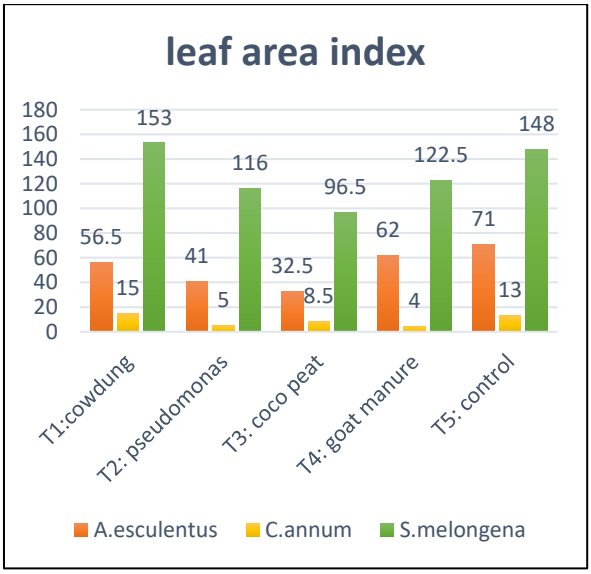

Figure 6: area of leaves

Inter node length (cm): it is the portion of stem between two nodes. Increased internode length reflects increased plant height. Analyzing table 8, the effect of treatments in terms of internodal length was similar in all plants and treatments. Internodal length of Abelmosches recorded from 5.5 cm in Pseudomonas to 3.2 cm in Cow dung manure. In Capsicum, values are almost nearly between 2 and 2.5 cm with a lower

value in Cow dung manure (1.2 cm). An increase in the length of internode was noted in Brinjal treated with control (3.6 cm). In contrast treatments with organic manures yield lower results compared to control (2.4-2.8 cm). This results are first time reporting.

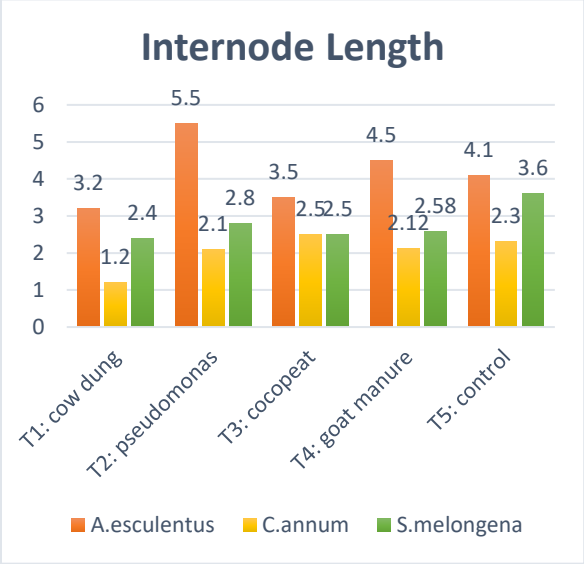

Figure 7: internode length

Number of flowers per plant: Not all flower buds blooms to flowers. Flowering depend upon on the environmental conditions of plant. In the case of Brinjal and Chilly, buds fall off on adverse conditions such as high temperature, inadequate irrigation and certain biotic factors. 100 % of all buds become flowers in Okra plants treated with Pseudomonas, Coco peat and Control. In the remaining treatments it is near to 100 %.Capsicum shows some difference in which all buds became flowers only in Coco peat treatment (16). In Brinjal 100 % of all buds become flowers when treated with Cow dung, Pseudomonas and Goat manure. This findings are reporting for the first time for this combinations of manures.

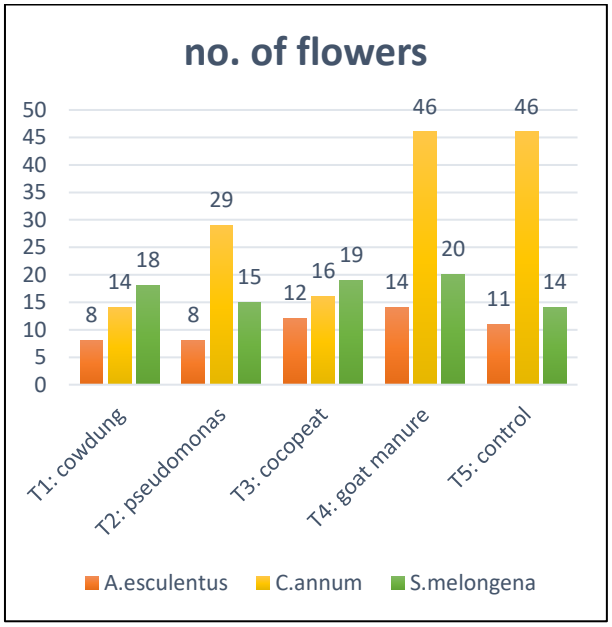

Figure 8: number of flowers

***Number of fruits*:** Due to negative factors such as temperature, inadequate pollination, absence of pollinators, immature fall of flowers caused reduced yield at the time of fruit harvest. Yet obtained fruits were healthy and better sized. It can be found that almost all treatments yield same number of fruits in Okra irrespective of number of flower buds. The number fruits recorded were high in Goat manure (9).On the other hand Chilly yield much better than Okra. It produced a highest number of fruits in Goat manure and Pseudomonas treatment (15 in each) and a lowest number in Coco peat treatment (7).In Brinjal the number of fruits recorded were high in Goat manure(16) and a less number in Pseudomonas(9). Most of the studies reveals that the number of fruits were recorded high for cow dung and poultry manures. As an exception this study showed new findings.

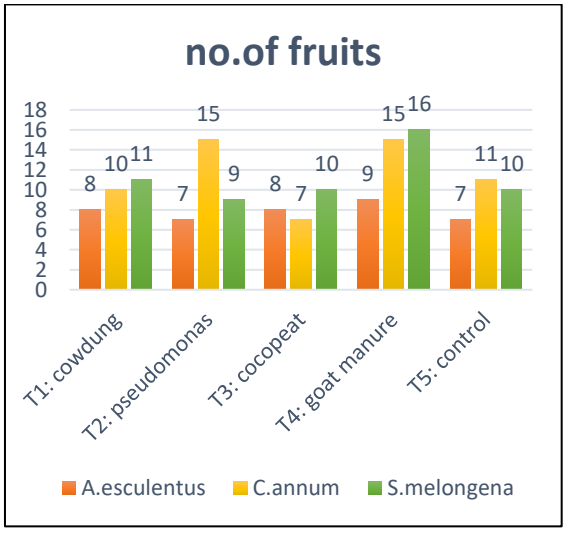

Figure 9: number of fruits

Fruit length (cm): The longest fruit length of 13.1 cm is recorded in Abelmosches treated with Cow dung. While the shortest record from Coco peat treatment (10.5 cm). In Capsicum, it shows more or less same fruit length in Cow dung, Pseudomonas and Control (4.05cm, 4.5 cm and 3.9 cm respectively). While a highest length if recorded from Coco peat and Goat manure (9cm and 7.2 cm respectively). Brinjal recorded highest fruit length (10 cm) in Goat manure similar in that of number of flowers and buds. Such results are likely to report for the first time. (Islam et al., 1997) reported that the length of individual fruit was increased with the increase of application of nitrogen levels.

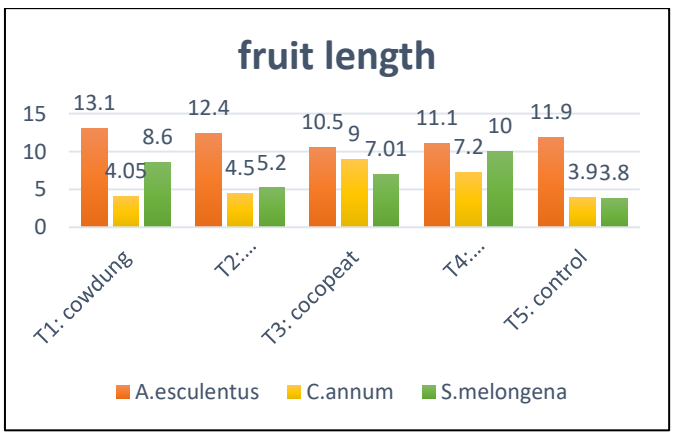

Figure 10: fruit length (cm)

Fruit setting rate (%): It is the rate of blossoms which end up forming fruits. It is calculated to evaluate how much flowers produce fruits. From all five treatments, Cow dung treated Okra plants recorded 100 % of fruit setting rate, which means all formed flowers pollinated to form pods. The fruit setting rate in *Capsicum annum* found to be high in the treatment of Cow dung (71.42 %), similar to that in *A. esculentus.* In *Solanum melongena,* it is reported highest value from Goat manure (80 %) and a lowest of 52.63 % in Coconut pea.

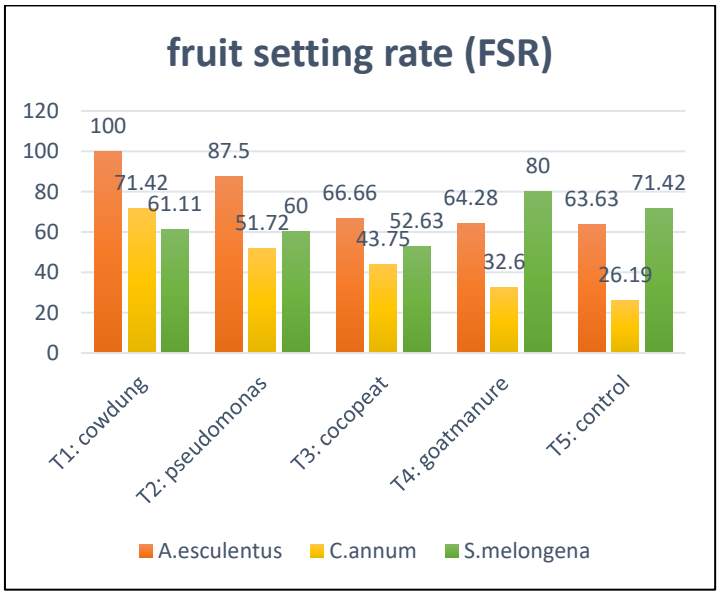

Figure 11: fruit setting rate (%)

Fresh weight of fruit (gm): Cow dung manure and Goat manure increased the fresh weight of fruits in Abelmosches *esculentus* (6.1 gm and 5.2 gm respectively). This findings related to (Sanni, 2016). Fresh weight of fruit of Capsicum ranged from high in Control (4 gm) to a minimum of 2.9 gm in Pseudomonas. Brinjal have large fleshy fruit since water constitute 90 % of fruit composition. Among all treatments, Goat manure yield fruits with much larger fruits of weight 145.7 gm. The results from Chilly and Brinjal were reported to be first for this type of manure combinations.

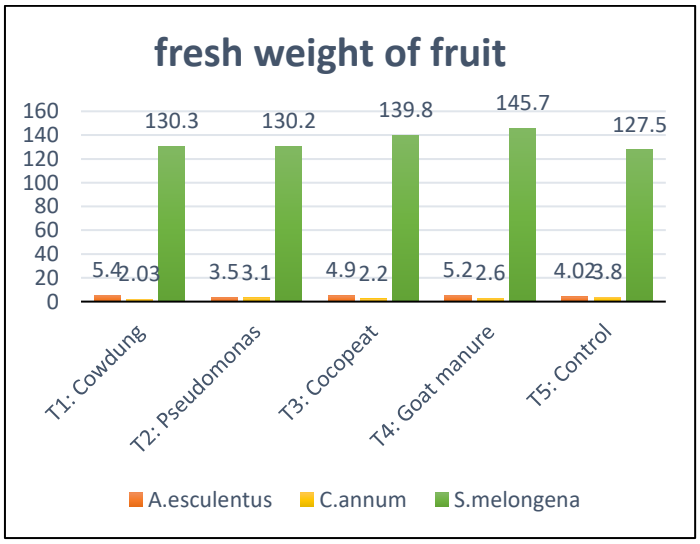

Figure 12: fresh weight of fruit (gm)

Dry weight of fruits (gm): Dry weight is the actual weight of fruit after removing all traces of water contents from it. In Abelmosches the values of fruits dry weight ranged from 3.23gm in Goat manure treatment to 1.82gm in Pseudomonas treatment. In Capsicum, all the values of dry weight are less than one gram except in Control which is recorded as the highest (1.02gm).While in *Solanum melongena*, the highest value of dry weight is recorded from the treatment Goat manure (14.13). In Brinjal, 90-91 % of their fruit is composed of water. This findings appeared to be reported for the first time.

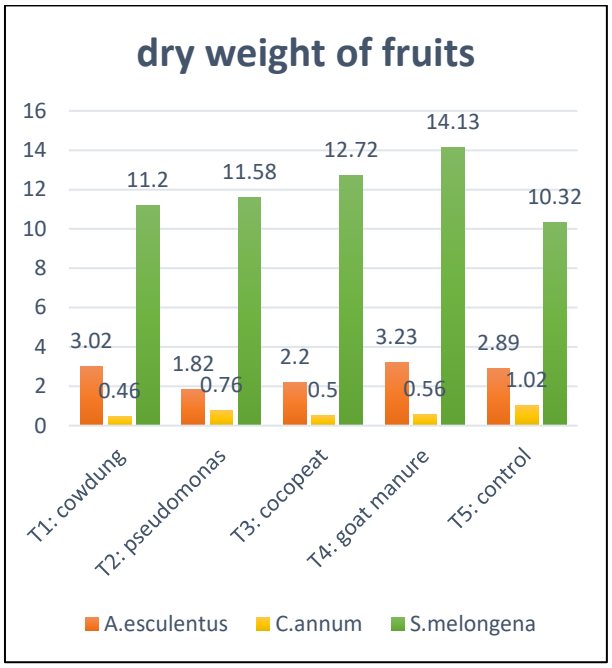

Figure 13: dry weight of fruits (gm)

Seed germination in second generation (%): It is done to check how much the seeds collected from the plants which grown in treatments, are viable and able to germinate the second generation. Organic farming become success only when its results are maintained and improved in the successive generations. When analyzing the results it can be find that seed germination in organic manures are much improved in the second generation than the first generation. An outstanding result were given by *Abelmosches esculentus* (L.) Moench. In which percentage of seed germination is above from this range with a maximum percentage of 94.11 in control. In the case of *Capsicum annum* L. percentage of seed germination get improved in the three treatments namely Pseudomonas, Coco peat and Goat manure shows a germination percentage above 50 %.*Solanum melongena* L. is the only vegetable that show good germination percentage in both generations. More than 30 % of all seeds germinated in all treatments. Since this parameter is not frequently studied these results are considered to be reporting first time.

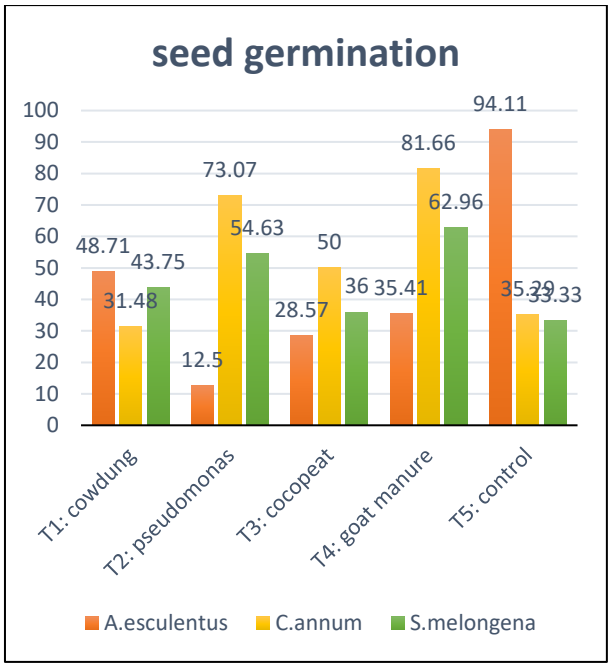

Figure 14: seed germination in second generation

Conclusion

Based on the finding of this study, it may be recommended that, the use of organic manure in crop production is desirable as it had variable impacts on the growth and yield of crops. From an over view it can be concluded that all organic media are good and give different excellent results for different plants. But when taking each plant individually results from one treatment shows better results over the other. *Abelmosches esculentus* (L) Munch. Shows maximum performance in Cow dung manure, Goat manure and Coco peat. It yields maximum in parameters such as plant height, number of fruits and fruit length in Cow dung. *Capsicum annum* L. yields maximum in Goat manure and Coco peat in all aspects. It showed highest results in growth parameters when cultivated in Goat manure while quality and quantity of fruits were better in Coconut peat. When coming to the case of *Solanum melongena* L. it shows better results in Goat manure and Cow dung. During the growing period *Solanum melongena* L. shows early flowering and fruit setting in Goat manure treated soil compared to other treatments. The use of organic manure will improve soil organic matter status, nutrient availability and good crop yield as well as ensures stability of soil structure. The organic manure is cheap, more easily accessible and available. It is a good alternative to chemical fertilizer and has sustainability effects on soil (Fagwalawa and Yahaya, 2016). It also preserve the qualities of mother plants in the next generation and the fact is that second generation are much better than their parents by having better seed germination and rapid flowering and fruitening. Even though organic farming is eco-friendly and healthy, its yield is less when compared to chemical fertilizers. And it is time consuming process and the plants are more prone to the attack of pests and diseases. But there are several natural ways to avoid such situations. It should be noted that only proper irrigation and correct application of organic manure can give better results. So the awareness programs are needed for the people through the organizations to promote organic farming of vegetables. It is concluded that organic fertilizer as the sole source of nutrients can give yields that are higher or comparable to inorganic fertilizer.

References

1. Baidoo PK, Mochiah MB, Asare D, Sefah AA. The role of soil amendments on population of insect pests, growth parameters and yield of eggplant, *Solanum melongena* (L) Moench. Sustainable Agriculture Research. 2018; 7(1): 7-13.
2. Behera KK, Alam A Vats S et al (2012). Organic farming history and techniques. In: Agro ecology and Strategies for Climate Change. Springer Netherlands, pp. 287-328.
3. Bharadwaj R.L., 2014. Effect of growing media on seed germination and seedling growth of papaya cv. 'Red lady'. Afr.J.Plant Sci. 8(4): 178-184.
4. Fagwalawa, L. D. & Yahaya, S. M. (2016). Effect of organic manure on the growth and yield of okra. Imperial J. Interdiscipl. Res. 2(3): 130-133.
5. Heckman J. A history of organic farming: transitions from Sir Albert Howard's War in the Soil to USDA National Organic Program. Renewable Agric Food Syst 2006; 21: 143-150.
6. Howard, A. 1943. An Agricultural Testament. Oxford University Press, New York.
7. Islam M A, Farooque A M, Siddiqua A and Siddique A (1997). Effect of planting patterns and different nitrogen levels on yield and quality of tomatoes. Bangladesh J Agril Sci., 24: 9-10.
8. Kumarasinghe, H.K.M.S., S. Subasinghe and D. Ransimala. 2015. Effect of cocopeat particle size for the optimum growth of nursery plant of greenhouse vegetables. Trop. Agric. Res. Ext. 18(1): 51-57.
9. Lampkin N. (1990) Organic farming. Farming press book IPSWICH
10. Sanni K.O. (2016). Effect of compost, cow dung and NPK 15-15-15 fertilizer on growth and yield performance of Amaranth (*Amaranthus hybridus).* International journal of Advances in Scientific Research, 2(03), 76-82.