



URBAN ROOF TOP GARDENING USING *LUFFA CYLINDRICA* (CUCURBITACEAE) AT UDM ERMITA, MANILA, PHILIPPINES

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Article Received on 21/08/2020

Article Revised on 11/09/2020

Article Accepted on 01/10/2020

ABSTRACT

This research is an output of Science Technology and Society (STS) subject, which is a General Education subject taken during the first year level of the College and Arts and Sciences students. Under this course subject, there was a topic called environmental awareness, where students were taught to plant on an open space like the roof top of Universidad de Manila to make it greener and at the same time to grow vegetable for food. Students come from underprivileged family. Most of the students are from the depressed areas of Tondo, Manila. The community is populated with residence who are receiving below standardized salary. The subject guided them to be aware of their surroundings, and on how it can be useful to them. Thus, they were taught to hone and develop their skill to grow, harvest and prepare vegetables for their families. Student were encouraged to use the vacant lots or even small spaces at the vicinity of their community that can be converted into a green space. At the end of this experiment students learned to improve their nutritional health and develop their environmental appreciation. **The purpose of the study** was to test the possibility *Luffa cylindrica* (Patola) in a recyclable Styrofoam with the garden soil will be possible. The **experimental design method** was used. The controlled variable was *Luffa cylindrica* seed grown on the same type of container with loam soil from June to October 2019. **Conclusion:** The possibility of growing the *Luffa cylindrica* (L) generated 28 % possible with the 60 cm average length of the fruit using loam soil.

KEYWORDS: STS, UDM, *Luffa cylindrica*.

INTRODUCTION

In such an urban city like in UDM, Mehan Garden, Ermita, Manila, it is unlikely to initiate gardening project for the benefit of their students due to scarcity of land. However, students were taught about responsibility, cooperation, teamwork and immersed them in the concepts of organic gardening and sustainable living as integrated in the subject course.^[1]

The roof top was the area where the plants were housed. There were no shady parts thus, the plants are directly under the sun or the rain when the weather changes.

There were two classes or sections who participated in this study. They are students who are taking up Bachelor of Arts in Communication under the College of Arts and Sciences. They were divided into five groups each section. These students planted (Patola) *Luffa cylindrica* (Linn.) M.

J. Roem. (Cucurbitaceae). Styrofoam was used to hold the garden soil and planted seeds. They watered them regularly according to their class schedule of twice a week in a full sun. After four to seven days, emergence of multiple pollen tubes was observed.

There were challenges observed and documented with the presence of ants that pester on stems and leaves of *Luffa cylindrica*. *Luffa cylindrica* leaves measured as 7-20 cm across and has 3 lobes, flowers were light yellow in color.

The Patola fruits that grows at approximately 60 cm in length are oblong or cylindrical in shape, smooth and contain many seeds. The fruit turns into brown when matured on the vine. It develops to a sponge – like structure called loofah that was used for a natural body scrub.^[2]

Luffa grows in tropical and temperate areas as long as there is a growing season on the average of four months. It is a heat loving species of plant, average temperature is between 23-27 degrees Celsius.^[3]

They need favorable rainfall in the range 1,200 – 2,000 mm, but tolerates 300 – 3,000 mm. They bear fruits in a position of a full sun. *Luffa cylindrica* successfully grow in a poor soil, but productively grown in a well-drained soil with a high content of organic matter. They prefer a Ph of 5.5 – 6.5 (Alkaline) but sometimes can tolerate an acidic soil with the Ph 4.3 (Acidic)^[4] **The purpose of the**

study is test the possibility of growing *Luffa cylindrica* (Patola) in a recyclable Styrofoam with the loam soil.

MATERIAL AND METHODS

This study used experimental designed. A controlled observation was used to compare the growth of *Luffa cylindrica* in a loam soil and in clay soil. The observation period covered up to 4 to 5 months' until it grows fruits. The measurements of leaves and fruits were compared, as well as the Ph of soil and the presence of pest on the plants as the natural enemies.



Figure 1: Study Site.

Figure 1: (A) The area of study is on top of the building of the medical clinic of UDM with the coordinate of 14.591587, 120.981126 (google earth) It is an open rooftop without shades or cover. (B.) The Styrofoam

containing the loam soil with the *Luffa cylindrica* (Linn.) M. J. Roem. (Cucurbitaceae). It also presents the young vine as it creeps along the wire wall prepared by the students.

RESULT

Table 1: Tabulated data of *Luffa cylindrica*.

Groups	No of flowers	Percent	No. of fruits	Percent
BAC 11 grp 1	2	8.33	1	9.09
BAC 11 grp 2	3	12.50	1	9.09
BAC 11 grp 3	2	8.33	0	0.00
BAC 11 grp 4	1	4.17	0	0.00
BAC 11 grp 5	1	4.17	0	0.00
BAC 12 grp 1	4	16.67	2	18.18
BAC 12 grp 2	3	12.50	1	9.09
BAC 12 grp 3	3	12.50	3	27.27
BAC 12 grp 4	3	12.50	2	18.18
BAC 12 grp 5	2	8.33	1	9.09
Total	24	100.00	11	100.00

Table 1. shows comparative data of two sections who used clay soil and loam soil on their plants. BAC section 11 used the clay soil while BAC 12 used the loam soil. They data presented the frequency of the number of

flowers and the numbers of fruits observed among the plants between two different types of soil. The pie graph below presents also the observed flowers growth between the two types of soil.

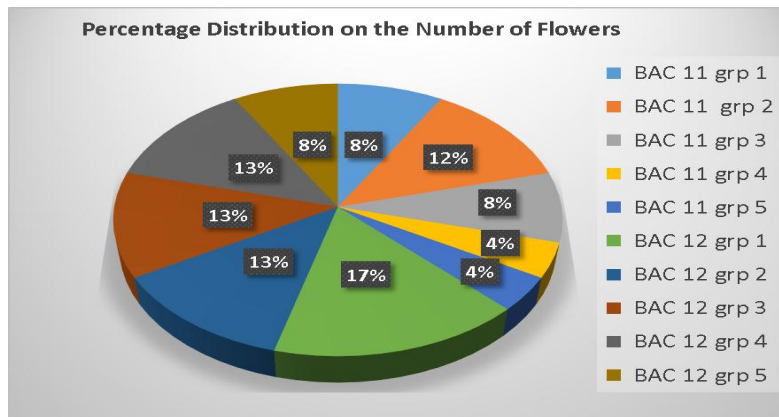


Figure 2. Percentage Distribution on the Number of Flowers.

Figure 2. shows the frequency distribution of the survival rate of *Luffa cylindrica* in in two types of soil. The BAC 11 section used **Clay soil** while the BAC 12 used **loam soil**. It has been noted that among the five groups of students who used Clay soil, only group 2 recorded a 12% growth of flowers compared with the rest of the group. However, most of those students who used loam soil registered higher flower growth. The

highest of which is 17% compared with 12% only of those who used clay soil. Although, group 1 of those who used clay soil and group 5 of those who used loam soil showed and equal percentage of flower growth of 8% only. Consequently, those who used loam soil on their plant recorded higher flower growth compared with those who used clay soil.

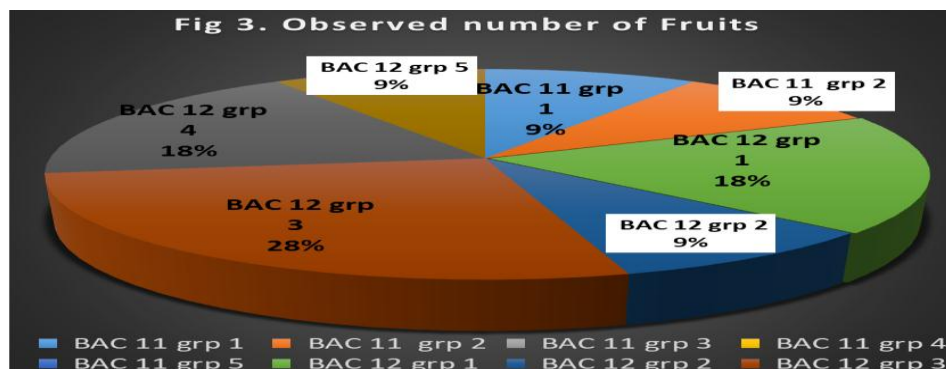


Figure 3: Presents the *Luffa cylindrica* fruits, survival rate using loam soil inside the Styrofoam. Noticeable however was the group 3,4, and 5 of those who used clay soil recorded no fruit at all, while group 1 and 2, yielded at least 1 fruit each or 9% only. Accordingly, those who used loam soil yielded more fruits for BAC 12-group 1, 18%; group 2, 9%; group 3, 28%; group 4, 18% and group 5, 9%.

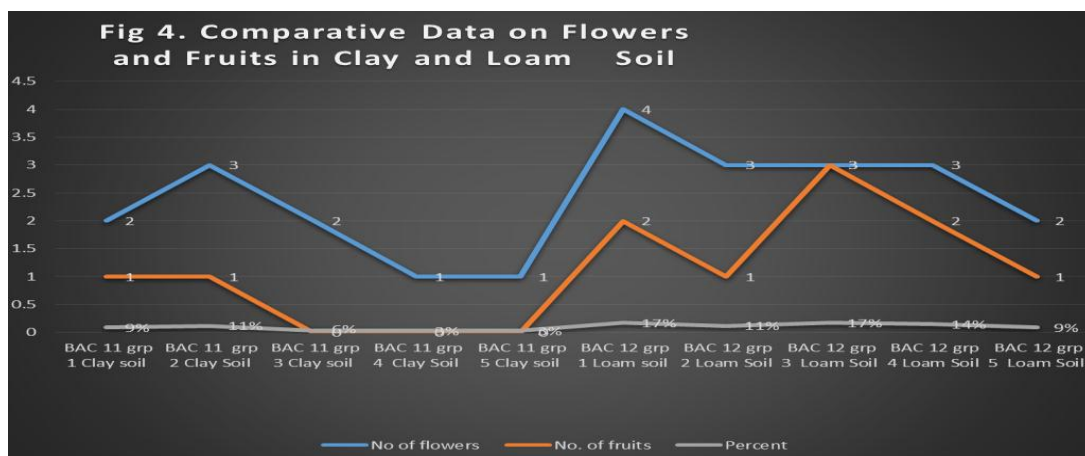


Figure 4: Loam Soil VS Clay Soil, shows that *Luffa cylindrica* has a greater possibility to grow in loam soil even it was exposed at the roof top garden of UDM, Ermita Manila. The loam soil show higher number of number of flowers, which registered a 17% growth compared with the plant in clay soil. Even at the initial recording of the observation, more flowers and more fruits were recorded on loam soil compared with clay soil.

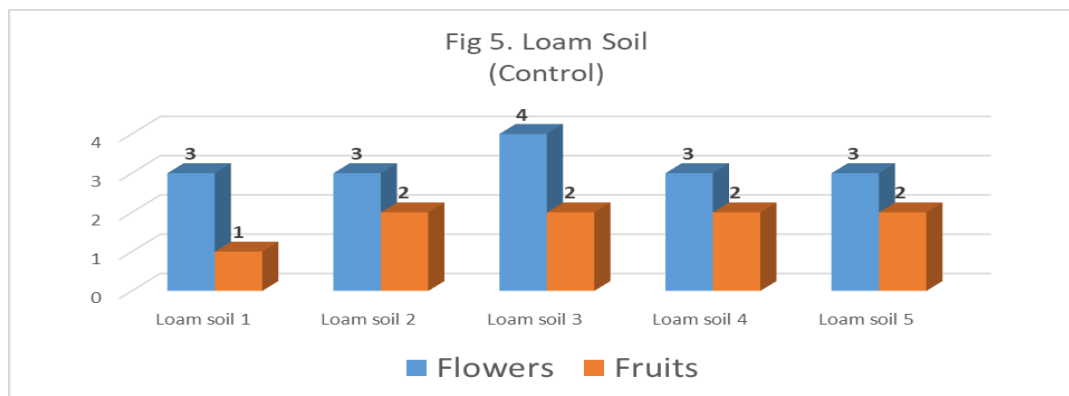


Figure 5: Presents the *Luffa cylindrica* (Control) group. It shows that among the five group who used the loam soil, group 3 yielded more flowers but has the same number of fruits yielded with groups, 2, 4 and 5. Students in group three managed the plant well as they visit the garden even during their break time.



Figure 6: Students of Science and technology from Universidad de Manila (UDM) planted seeds of *Luffa cylindrica* fruits, using loam soil inside the Styrofoam. Students learned that there is no limit to where to grow vegetables specially in urban city of Manila. They learned the values of appreciation, having an urban green space at UDM and in their congested city of Manila. It provided staple food and made the are clean, greener and cooler since it trapped carbon dioxide.

This learning experience has been carried out in their own communities as a continuation of the project. This was taught in Science and Technology course subject, that any form of recyclable material can be utilized for urban gardening. Plastic bottle, old tires, old jeans, can

hold loam soil to grown plants. They can hang it in the window, or placed at the roof top of their houses, just like in UDM. A small space at the roof top building was used for urban gardening.

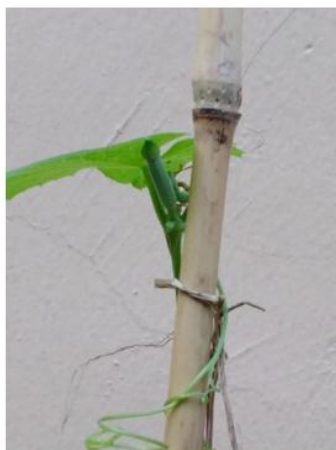


Figure 7: Morphological structure of *Luffa cylindrica*: a leaf measured 7-20 cm across having 3 lobes, Flowers are light yellow in color, fruits grow approximately 60 cm. *Nacua et al 2020*.

DISCUSSION

Luffa is common in the Philippines and it is a common vegetable viand, cooked as swamp soup by the Filipinos. Immature fruit is used as vegetable whereas the mature sponges are used for cleaning utensils and in the bathroom. Fresh juice of the leaf is used for healing wounds and also used as primer in door and windows by Nepalese farmers.^[5]

Growing Luffa in the roof top garden planted in the Styrofoam is a great challenge. Limited soil produces limited height of plants and reduce size of the fruits. Including the natural enemies, the tribe on the leaves and flowers. Species of Diptera and Coleoptera feeds on leaves and stem. Insects belonging to seven orders recorded were either phytophagous viz., Diptera, Coleoptera, Lepidoptera, Hemiptera and Orthoptera or predatory viz., Coleoptera, Hemiptera and Dictyoptera or were pollinating the crop viz., Hymenoptera. Amongst the pests, melon weevil (*Acythopeus curvirostris citrulli*).^[6]

Mostly Ants thrive on leaves, stem, flowers of luffa at the roof top garden of UDM, Ermita Manila Philippines. These are common reasons why BAC 11 has a poor harvest of luffa fruits. BAC 11 group 4 produced 18% of survival rate, unlike the BAC 12 group 3 produced 28% survival rate of harvest Luffa see figure 3. The same observation here by the other researchers. Ants are the prominent visitors of the nectaries of *L. cylindrica* in which these glands are distributed all over, bracts, bracteoles, calyces and leaves.^[7] Despite the presence of natural enemies, the result output has generated a successful harvest, compared it to the control loam soil that was grown inside the greenhouse garden, size of the fruits average to 40 to 70 cm in 4 months. Considering this is an output of Science and Technology subject under General Education department, Freshmen learned in the class that pot planting in the roof top garden were indeed possible. It does not need a huge land to yield vegetables for table food. Science and Technology students learned in in the classroom at UDM and ensure they carried it out in their respected communities. And help their parents to cultivate vegetable plants in a plastic water container to alleviate expenses of buying vegetables in the market for a staple food. This became a sustainable project for the STS students of UDM.

CONCLUSION

The possibility of growing the *Luffa cylindrica* (L) generated 28 % possible with the 60 cm average length of the fruit using loam soil.

ACKNOWLEDGEMENT

The researcher would like to thank the UDM administration for allowing us to use the roof top garden to conduct the experiment, Also the participation of BAC 11 and BAC 12 of the Department of Communication of

the College of Arts and Sciences for their valuable support.

Also to CHED for funding the research project.

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