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Time of *Sargassum* Tea Application on the Growth and Yield of Garlic

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ABSTRACT: The present farming management uses inorganic fertilizer that include chemical pesticides and chemical fertilizer which damage our natural ecosystems where different living organisms live. Therefore there is an urgent need to have solution to this particular agricultural problem. Hence, this study on time of sargassum tea application (30 DAP, 60 DAP AND 90 DAP) of the growth and yield of garlic conducted from October 17, 2014 to February 13, 2015 at the Citrus Project of DMMMSU-NLUC, Bacnotan La Union. Results revealed that the application of sargassum tea at 80 DAP to garlic produced more yield (6093.75 kg/ha) than those plants subjected to other treatments.

KEYWORDS: chemical pesticides, ecosystems, inorganic fertilizer,organic farming, sargassum tea,

INTRODUCTION

Situation Analysis

Garlic (*Allium sativum* L.), or *bawang,* is an annual herb of the *Amaryllidacea* family. It produces bulb which is surrounded by sheats and composed of a thin bubblets and cloves which capable in forming a new plant. Bubblets are used as food and for medicinal purposes, like cancer. They can also help to clean the pollutants in our body. Garlic also contains antibiotic substance, which inhibits the growth of certain bacteria and fungi (DA, 2013).

Ilocos Region remains to be the consistent supplier of garlic in the country exhibiting a surplus production of about 2.7 thousand metric tons where Ilocos Norte highly contributed in catering the deficit supply of other provinces and non-producing regions. The production trend over the years is declining because of the imported garlic that discouraged the local producers and diverted their production to other cash crops.One of the main issues with garlic production is the high input costs, especially those associated with chemical fertilizers. Organic fertilizers are now being introduced to reduce the cost of productionOrganic farming is a type of agriculture which had been used for thousands of years. The use of organic fertilizers such as vermicompost and seaweeds are advantageous to the plant growth and as a flowering hormone and also a source of plant nutrients. Organic fertilizers can be a solution to the problem on the adverse continues use of chemical fertilizers by providing organic matter content of soil rate (Villanueva, 2011). They can also improve the physical make-up of the soil (Sangatan and Sangatan, 2005).Seaweeds are among the world's most valuable marine resources and are utilized as a raw material in numerous industries as well as food for humans and animals. Research indicates that seaweed extract can boost soil nutrient uptake and provide resistance against fungal, insect, and frost attack. Applying seaweed fertilizer can help increase production because it contains hormones that promote growth, such as gibberellins and auxin. (Sridhar and Rengasamy, 2010).

Seaweed extracts have proven in giving positve results in plants. In the horticultural industry, seaweed extracts are undoubtedly now widely accepted. Some improvements that have been made to fruit, vegetable, and flower crops include increased yields, improved seed germination, increased resistance to certain pests, and increased uptake of soil nutrients. (FAO, 2013).

According to Sridhar and Rengasamy (2011), as cited by Cayat (2014), that seaweeds include significant concentrations of gibberellins, cytokinin, and plant growth regulator.

According to Kourik (2013), as cited by Natan (2014), that small amounts of potassium, phosphorus, and nitrogen can be found in seaweeds. Seaweeds have up to 1.2 percent nitrogen, 0.2 to 1.3 percent phosphorus, and 2.8 to 10 percent potassium on a dry weight basis.The 100% benefits of organic fertilizer sargassum seaweed, as stated by Quingdao (2011), as cited by Calcaligong (2014), can give effective plant recovery from stresses, enhance crop resistance to diseases and promote the plant photosynthesis increase yields and benefit formation of protein and plant cells.

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Horizon (2003) reported that applying liquid seaweed extracts will boost crop yields, make plants more resistant to frost, improve their uptake of inorganic soil constituents, increase their resilience to stress, and decrease fruit storage losses. On fruit, flowers, vegetables, and lawns, it also encourages rapid growth and aids in the prevention of pests and diseases.

Gibberellic acids are naturally occurring plant hormones. Gibberellic acids are used as plant regulators to promote cell elongation and division, which impacts leaves and stems and ultimately impacts fruit development and fruit set. (http://www.epa.gov/oppsrrd1/REDs/factsheets/4110fact.pdf).

Objectives

This study was conducted to find out the best time of applying *sargassum* tea on the growth and yield of garlic.

Time and Place of the Study

The study was conducted from October 17, 2014 to February 13, 2015 at the experimental area of the Don Mariano Marcos Memorial State University, North La Union Campus, Sapilang, Bacnotan, La Union.

DEFINITION OF TERMS

Bulb is a short thickened underground modified leaves with fleshy scale-like leaves that is filled with reserved foods.

Bulblet refers to the numerous small bulbs of garlic which are harvested for human consumption and are used for planting materials.

Bureau of Soil Recommendation (BSR) refers to the amount of commercial fertilizer needed by the crop.

Clove is one section of the bulb of garlic used as planting material.

DAP refers to the days after planting.

Foliar spraying refers to the process used in applying s*argassum* tea on leaf surfaces of garlic.

Inorganic fertilizer refers to the chemical fertilizer applied to garlic.

Organic farming means raising of crops without applying synthetic chemicals like fertilizers and pesticides. Refers to the *sargassum* tea and vermicompost used in the experiment.

***Sargassum* tea** refers to the solution from seaweed soaked in fresh water and applied to garlic.

Yield refers to the weight of garlic bulbs produced in kilograms per hectare.

METHODOLOGY

Research Design

Site selection. A well-drained area of approximately 171 square meters, more or less flat and formerly planted with black, red and white beans and located at the Citrus Project of the DMMMSU-NLUC Bacnotan, La Union was selected as experimental site.

Land Preparation. The area was prepared thoroughly by two times passing of a rotovator. Prior to rotovating, the area was cleared of farm wastes, weeds and stubbles. Raising of beds into 20 cm and furrows were prepared at a distance of 20 cm manually employing shovel, spade and garden fork as the need arose.

Lay out. The area was laid out following the Randomized Complete Block Design (RCBD) in four blocks. Each block was subdivided into four equal plots where the different treatments were randomly allocated. Each plot had a dimension of 2.0 m x 4.0 m. The distance of planting was 10cm between hills and 20 cm between rows. An alley of 50 cm between blocks and plots were provided for convenience in carrying other field and experimental operations like weeding, spraying of *sargassum* tea, gibberellic acid application, fertilization and data gathering.

The different treatments used in the experiment were as follows:

T_1 - Gibberellic acid application 30 DAP only

T_2 - *Sargassum* tea application 30 DAP

T_3 - *Sargassum* tea application 60 DAP

T_4 - *Sargassum* tea application 80 DAP

MATERIALS AND PROCEDURES

Procurement and Collection. Ten kilogram of seed pieces were procured at the Bacnotan Public Market and cloves were separated. Sixty kilogram of seaweeds were collected at Pandan, Bacnotan, La Union. The gibberellic acid (GA_3 10%) was procured at the Agro Service and Sales City of San Fernando, La Union. Twelve sacks of vermicompost were taken at Baroro, Bacnotan La Union and at DMMMSU-NLUC Piggery Project while rice straw was collected at Sapilang, Bacnotan La Union.

Application of Vermicompost. Vermicompost had been reported that vermicompost application can provide a high nutritive fertilizing value and a growth promoter over the conventional compost and thus, improving the fertility of the soil. Broadcasting of vermicompost on furrows was done before planting at the rate of 50 kilogram per plot or five kilograms per row.

Planting Material Preparation. The planting materials were prepared by separating the cloves from one another and each tip of clove was cut using sharp knife and blades. This was done to facilitate the sprouting of the cloves.

Planting. Planting of garlic was done in the morning following the distance of 10 cm between rows and 20 cm between furrows. Cloves were dibbled and pushed into hole with the growing point upward and covered with a thin layer of the soil.

Mulching. Mulching is a process of applying farm waste like rice straw at a thickness of three cm which prevented the growth of weeds, conserved moisture and maintained the cleanliness and orderliness of the experimental area.
Irrigation / Watering. Water is an important factor in crop production. It is an indispensable material in the maintenance of plant's body temperature, act as nutrient carrier, maintenance of cell turgur and act as medium of all biological processes. Besides, water is needed in making the soil nutrients available for root absorbtion. Watering was done after planting which facilitated the early establishment of the planting materials and was repeated every after three days until it reaches 85 days after planting using garden hose.

Weeding. Weeds are plants growing in places where they are not wanted. They compete with the focal crops in terms of nutrients, water, light, carbon dioxide and space. They act as alternate hosts of some important pests. The growth of weeds in the experimental area was managed by hand pulling. It was done when the weeds were still small because large weeds when pulled can disturb the roots of garlic causing stress.

Soil Analysis. A kilogram of composite soil sample was taken from the experimental area prior to land preparation and later submitted to the Soil Laboratory in the City of San Fernando, La Union for standard soil analysis. Collection of the soil sample was done by taking at random following the standard sampling procedures using a shovel and bolo. It was done by making a V-cut from each soil hole. The soil sample was air-dried for seven days prior to submission.

Fertilizer Application. Most of the crop areas are deficient of some nutrients essential for plant growth. Hence, the need to add plant nutrients is of utmost necessity in order to produces necessary soil factors required for normal plant growth and development. In the present study, fertilizer application was done at 30 days and 45 days after planting. An amount of 330.4 grams per plot of urea was dissolve in 64 liters of water divided into two equal volume and sprayed directly to the leaves.

***Sargassum* Tea Preparation** Seaweeds can cause effective plant recovery from stresses, enhance crop resistance to diseases and promote the plant photosynthesis increase yields and enhance formation of protein and plant cells (Quingdao, 2011). Seaweeds were washed with sea water to remove sand and some materials. They were washed further with fresh water to remove the excess salt and air dried for seven days. Thirty kilograms of dried seaweeds were soaked in a drum with 200 liters of fresh water. Then, they were stirred every after two days for 30 days.

***Sargassum* Tea Application**. Two tablespoonfulls of *sargasassum* tea were filtered with cloth before mixing in sixteen liters of water. Application of *sargassum* tea was done following the specified treatments until the leaves dripped with the solution.

Gibberellic Acid Application. Application of gibberellic acid was done to promote plant growth and development and to increase bulb yield (Castaneda, 2009). Tablet of gibberellic acid was dissolved in 50 ml of water before mixing in 16 liters of water. Application of gibberellic acid was done late in the afternoon.

Harvesting and Drying. Harvesting was done when the tops were dried and began to fall over after 110 days. It was done by hand pulling. Sun drying of harvested bulbs was done by hanging them for five days.

DATA GATHERED

The different crop characteristics that were measured and recorded were as follows:
Number of leaves. This was taken by counting the numbers of leaves of the 10 sample plants per plot at 15 DAP, 30 DAP, 60 DAP and 90 DAP.
Plant height (cm).This was taken at 15 DAP, 30 DAP, 60 DAP and 90 DAP by measuring the height at the base to the top of the tallest leaf.
Bulb diameter (cm).This was taken by measuring the diameter of bulbs using vernier caliper.
Weight of bulbs. This was determined by measuring the weight of bulbs in kilograms per plot and converted

Number of cloves per bulb. This was determined by counting the number of cloves produced per bulb.

ANALYSIS OF DATA

The data gathered were analyzed using the Analysis of Variance (ANOVA) in RCBD. The differences between and among treatment means were subjected to DMRT (Duncan's Multiple Range Test).

RESULTS AND DISCUSSION

Mean Height of Garlic

The mean plant height of garlic at 15, 30, 60, and 90 days after planting is presented in Table 1. As can be noted, at 15 DAP, plant height ranged from 25.68 cm (T_4 – *sargassum* tea at 80 DAP) to 31.20 cm (T_2- *sargassum* tea at 30 DAP). At 30 DAP, the mean height ranged from 41.58 cm (T_3- *sargassum* tea at 30 DAP) to 43.63 cm (T_1- Gibberellic acid). At 60 DAP and 90 DAP, the mean plant height ranged from 48.88 cm to 49.38 and 51.55 cm to 51.78 cm respectively.

Table 1. Mean height (cm) of garlic as affected by the time of s*argassum* tea application

Treatment	Mean			
	15 DAP	**30 DAP**	**60 DAP**	**90 DAP**
T_1 - Gibberellic acid 30 DAP	27.69	43.63	49.38	51.78
T_2 - *Sargassum* tea application 30 DAP	31.20	42.83	48.88	51.55
T_3 - *Sargassum* tea application 60 DAP	26.39	41.58	49.10	51.70
T_4 - *Sargassum* tea application 80 DAP	25.68	43.10	49.30	51.57

Analysis of variance (Appendix Tables 1a, 3a, 5a and 7a) disclosed no significant differences. Results imply that the mean height of plants were not significantly influenced by the different time of *sargassum* tea application, indicating that *sargassum* tea does not significantly influence the height of garlic applied at 30,60 and 80 DAP.

Mean Number of Leaves of Garlic

The mean number of leaves of garlic at 15, 30, 60, and 90 days after planting as affected by *sargassum* tea application is shown in Table 2.

Table 2. Mean number of leaves of garlic as affected by the time of *sargassum* tea application

Treatment	Mean			
	15 DAP	**30 DAP**	**60 DAP**	**90 DAP**
T_1 - Gibberellic acid	4.13	7.05	9.23	13.13
T_2 - *Sargassum* tea application 30 DAP	3.73	6.85	9.33	12.90
T_3 - *Sargassum* tea application 60 DAP	3.92	7.15	9.50	13.13
T_4 - *Sargassum* tea application 80 DAP	3.85	7.18	9.18	13.03

At 15 days after planting, the mean number of leaves of garlic ranged from 3.73 (T_2) to 4.13 (T_1), 30 DAP from 6.85 (T_2) to 7.18 (T_4) leaves, 60 DAP ranged from 9. 18 (T_4) to 9.50 (T_3) and 90 DAP from 12.90 (T_2) to 13.13. (T_1 and T_3), respectively. Analysis of variance (Appendix Tables 2a, 4a, 6a, 8a) disclosed insignificant results. The results showed that the mean number of leaves of garlic follows the trend of results in the plant height. Hence, the same reason is applicable.

Mean Bulb Diameter of Garlic (cm) the influence of *sargassum* tea application on mean garlic bulb diameter is shown in Table 3. Harvested bulb from plants applied with s*argassum* tea at 80 DAP produced the biggest (2.37 cm) while those applied with gibberellic acid only had recorded the smallest (1.87 cm).

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Table 3. Mean bulb diameter of garlic (cm) as affected by the time of *sargassum* tea application

Treatment	Mean
T_1 - Gibberellic acid application 30 DAP	1.87_b
T_2 - *Sargassum* tea application 30 DAP	2.29_a
T_3 - *Sargassum* tea application 60 DAP	2.32_a
T_4 - *Sargassum* tea application 80 DAP	2.37_a

**All means followed by the same letter are not significantly different at 0.01 level (DMRT).

Analysis of variance (Appendix Table 9a) showed highly significant results. Comparison of means employing the DMRT revealed that all garlic plants applied with *sargassum* tea have comparable bulb diameter and all were significantly bigger than those applied with gibberellic acid only. The results imply that bulbing of garlic plants are *sargassum* tea responsive. *Seaweed* extract has been shown to induce resistance to frost, fungal, and insect attack and increases nutrients uptake from soil. Seaweed fertilizer application is useful in achieving higher production because it contains growth-promoting hormones like auxin and gibberellins (Sridhar and Rengasamy, 2010).

Mean Weight of Bulb of Garlic

Table 4 shows the mean weight of bulbs of garlic as affected by *sargassum* tea application. Bulbs of garlic applied with *sargassum* tea 60 DAP recorded the heaviest (12.19 g/bulb) or equivalent to 1523.44 kg/ha, while those applied with gibberellic acid had the lightest (6.43 g/bulb) or 804.06 kg/ha.

Table 4. Mean weight of bulb of garlic in as affected by the time of *sargassum* tea application

Treatment	Mean		
	g/bulb	g/plot	Kg/ha
T_1 - Gibberellic acid application 30 DAP	6.43_d	643.25_d	804.06_d
T_2 - *Sargassum* tea application 30 DAP	8.35_c	834.75_c	1043.44_c
T_3 - *Sargassum* tea application 60 DAP	10.23_b	1022.55_b	1278.19_b
T_4 - *Sargassum* tea application 80 DAP	12.19_a	1218.75_a	1523.44_a

**All means followed by the same letter are not significantly different at 0.01 level (DMRT).

Results of the analysis of variance (Appendix Tables 10a, 11a, and 12a) were found highly significant. Mean comparison revealed highly significant differences among and between treatment means. It can be inferred that when *sargassum* tea was applied early (30 DAP and 60 DAP), the bulbs produced were significantly smaller than those applied at 80 DAP. It has been observed that the early application of *sargassum* tea induced the garlic plants in producing bulbs earlier. Once the plants produced bulbs early, the amount of photosynthates that have to be used for furtherance of growth and development had been utilized in bulb formation. According to Mahadeen (2011), the availability of food reserves in large cloves can have a positive effect on crop establishment and increase plant height and leaf number. This was in agreement with results reported by Ahmed *et al.* (2007), Castellanos *et al.* (2004) and Stahlschmidt *et al.* (1997), that due to the availability of food reserves, the young cloves were able to grow and develop rapidly.

Mean Number of Cloves of Garlic per Bulb

Table 5 shows the data on the mean number of cloves of garlic per bulb as affected by seaweed tea application. Garlic applied with *sargassum* at 80 DAP recorded the most number of cloves (12.98) while those garlic applied with *sargassum* at 60 DAP had the lowest number of cloves (8.58).

Table 5. Mean number of cloves of garlic per bulb as affected by the time of *sargassum* tea application

Treatment	Mean
T_1 - Gibberellic acid application 30 DAP	11.42_b
T_2 - *Sargassum* tea application 30 DAP	10.80_b

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T_3 - *Sargassum* tea application 60 DAP	8.58_c
T_4 - *Sargassum* tea application 80 DAP	12.98_a

**All means followed by the same letter are not significantly different at 0.01 level (DMRT).

Analysis of variance revealed highly significant result (Appendix Table 11a). Comparison of means employing the DMRT disclosed that garlic applied with *sargassum* tea 80 DAP recorded significantly (0.01 level) the most number of cloves when compared to other garlic in other treatments. Garlic in T_1 (Gibberellic acid) and T_2 (*sargassum* tea applied at 30 DAP) produced comparable numbers of cloves and significantly more than those in T_3 (*sargassum* tea applied at 60 DAP). The results indicate that application of *sargassum* tea at 80 DAP (T_4) induced the plants to have longer vegetative growth. Hence, bigger bulbs with more cloves had been recorded. The results are in parallel with the statement of Knott and Deanon (1967) that the size of bulb formation is determined by the leaf area which can supply the necessary carbohydrates. It is possible that as the critical day length for bulbing is reached a hormone may be produced in sufficient quantity to inhibit the formation of leaf blades. These bladeless sheaths as well as the sheaths of bladed leaves formed earlier increase in thickness thus forming the bulb.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The time of applying *sargassum* tea on garlic was studied from October 17, 2014 to February 13, 2015 to find out the best time of applying *sargassum* tea on the growth and yield of garlic as well as on the economics of producing garlic. The different treatments were: **T_1 -** Gibberellic acid 30 DAP, **T_2 -** *Sargassum* tea 30 DAP, **T_3 -** *Sargassum* tea 60 DAP, **T4 -** *Sargassum* tea 80 DAP.

Based on the result of the study, analysis of variance disclosed no significant differences on the mean plant height of garlic as affected by *sargassum* tea application.

Plants subjected to different treatments showed no significant differences on the mean number of leaves of garlic as affected by *sargassum* tea application.

However, on the mean bulb diameter of garlic, analysis of variance showed highly significant results.

On the mean weight of bulb of garlic, analysis of variance showed highly significant results.

On the mean number of cloves per bulb of garlic, analysis of variance revealed highly significant results.

CONCLUSIONS

Results of the study disclosed that the number of leaves at 15 DAP, 30 DAP, 60 DAP and 90 DAP including plant height at 15 DAP, 30 DAP, 60 DAP and 90 DAP were not significantly influenced by the different times of application of *sargasssum* tea.However, highly significant results were noted on the weight of bulb, bulb diameter and number of cloves per bulb. Further *sargassum* tea applied at 80 DAP resulted to higher yield than those plants subjected to other treatments.

RECOMMENDATIONS

The application of *sargassum* tea at 80 DAP is recommended for garlic. It is further recommended that studies on the aspects of frequency of application and different concentrations of *sargassum* tea applications be conducted.

REFERENCES

1) AHMED, H.G, and M.D MAGAJI. 2007. Response of Garlic (*Allium sativum* L.) To Irrigation Interval and Clove Size in Semi-Arid, Nigeria. http://scialert.net. Accesed on February 22, 2015 at 9:00am
2) AITKEN, J.B. (1964). Seaweed Products as a Fertilizer and Soil Conditioner for Horticulture Crops. Department of Horticulture; Clemson College, South Carolina. P259
3) ARANCON, NORMAN, 2004. Influenced of Vermicompost on Soil Chemical and Physical Properties in Tomato Field. African Journal of Biotechnology, Vol.7 pp 2377-2401.
4) BOJE, L. D. and Y. B. ANGELES, 2013. Frequency of Spraying Vermitea to Mungbean (Var MRA 9711-10) Under DMMMSU Condition. Unpublished Undergraduate Thesis. DMMMSU-NLUC, Bacnotan La Union. 4p.
5) CALCALIGONG, C.D, and E. B. ABALOS. 2014. Foliar fertilizer as Supplement to Vermicompost on the Growth and Yield of Glutinous Corn (Zea mays L.) Unpublished Undergraduate Thesis, DMMMSU-NLUC, Bacnotan, La Union
6) CAYAT, L.B, and V.M. LIBUNAO, 2014. Influence of Vermicompost and Seaweeds tea on the Growth and Yield of Sweetcorn Intercropped with Cowpea. Unpublished Undergraduate Thesis, DMMMSU-NLUC, Bacnotan, La Union.

7) DUCULAN, A.F. and E. B. ABALOS, 2013. Vermitea as Supplement to Vermicompost for Honey corn Intercropped with Mungbean. Unpublished Undergraduate Thesis. DMMMSU-NLUC Baccnotan, La Union
8) DUGENO, M. 2005. Vermicomposting the Buro-buro experience, Agriculture Magazine, Vol.IX No.1, pp 8-13. January 2005.
9) DEPARTMENT OF AGRICULTURE. Garlic commodity profile (Region 1). Pgs. 1-6
10) GOJAR, J, C. and L. A. ANCHETA. 2014 Rates of Vermicompost Application of Mungbean (Vigna radiate L.) Unpublished Undergraduate Thesis DMMMSU-NLUC, Bacnotan, La Union
11) GUMAPAC, M, M. 2011. Garlic: Expanding what we know and what we should. http://www.bar.gov.ph/chronicle-home/archives-list/62-september-2011-issue/201-garlic-expanding-what-we-know-and-what-we-should. Accessed on February 22, 2015 at 9:00am
12) HORIZON, M. 2003. What are the Benefits of Using Liquid Seaweed Fertilizer?http://mistyhorizon2003.hubpages.com/hub/The-Benefits-of-Using-Liquid-Seaweed-Fertilizer. Accessed on February 22, 2015 at 9:00am
13) MAHADEEN, A. 2011. Influence of Clove Weight on Vegetative Growth and Yield of Garlic (Allium sativum) Grown under Drip Irrigation. http://journals.ju.edu.jo/JJAS/article/viewFile/2282/2185. Accessed on February 22, 2015 at 9:00am
14) NATAN, C.P, and V.M LIBUNAO. 2014. Seaweed Liquid Fertilizer with Vermicast Tea on the Growth and Yield of Yellow Corn Intercropped with Red Beans. Unpublished Undergraduate Thesis DMMMSU-NLUC, Bacnotan, La Union
15) SANGATAN, P, D. and R.L, SANGATA, 2005.Production Guide to Organic Gardening. Technologies and Livelihood Series. Wisemans Books Trading Quezon City.
16) SHAHIDUR, R.M. and M.A, ISLAM. 2004. Effects of Planting Date and Gibberrelic Acid on the Growth and Yield of Garlic. http://198.170.104.138/ajps. Accessed on February 22, 2015 at 9:00am
17) SRIDHAR S. and R. RENGASAMY. 2011. Influence of Seaweed Liquid Fertilizer on Growth and Biochemical Characteristics of *Arachis Hypogea* L. Under Field Trial. Dept. of Botany, Govt. Arts College, University of Madras Tamil Nadu, India. http://journalecobiotechnology.com/article/viewPDFInterstitial/10225/.5950. Accessed on February 24, 2015 at 8:30am
18) SRIDHAR S. and R. RENGASAMY.2010.Studies on the Effect of Seaweed Liquid fertilizer on the flowering plant tagateserecta in the field Trial, http://www.soeagra.com/abr/vol2/5.pdf. Accessed on august 10, 2014.
19) SUSTAINABLE AGRICULTURE TECHNOLOGIES. 2012. (http://www.wormwigmaw.com/vermicompost-organic fertilizer/) Accessed on August 10, 2014.
20) VILLANUEVA, O.D, and E.M. PERA. 2011. Kind of Manure Tea for Tomato (var. Diamante) Production under DMMMSU Condition. Unpublished Undergraduate Thesis DMMMSU-NLUC, Bacnotan, La Union