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Integrated nutrient management on honeydew melon (*Cucumis melo*)

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Abstract

A study on Honeydew melon using integrated nutrient management was conducted at the experimental area of the Institute of Agricultural Technology, Isabela State University, Cauayan City from January to April 28, 2018. Specifically, it aimed to: Determine the performance of honeydew melon applied with different treatments, and assess which combination of treatments obtains a highest return on investment. The study was laid out in a Randomized Complete Block Design with three equal replications. The treatments were as follows: T_1– FR- Based on soil analysis, T_2 – 20% FR + Vermiwash + Foliar Fertilizer, T_3 – 40% FR + Vermiwash + Foliar Fertilizer, T_4 – 60% FR + Vermiwash + Foliar Fertilizer, T_5 – 80% FR + Vermiwash + Foliar Fertilizer, and T_6 – 100% FR + Vermiwash + Foliar Fertilizer. Based from the results of the study the longest vines at harvesting were obtained at T_6 – 100% FR + Vermiwash + Foliar Fertilizer and T_5 – 80% FR + Vermiwash + Foliar Fertilizer. Application 100% FR + Vermiwash + Foliar Fertilizer produced the heaviest weight of fruits and weight of fruits per sampling area and thicker fruit flesh. In terms of fruit diameter, sugar content, texture and aroma of the Honeydew melon the application of T_6 – 100% FR + Vermiwash + Foliar Fertilizer and T_1– FR- Based on soil analysis obtained the highest mean values.

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Introduction

Honeydew melons are members of the Cucurbits family which includes pumpkins, zucchini, cucumbers, summer squash and winter squash. Being closely related, melons have similar growth requirements, however they will not cross pollinate with cucumbers, squash or pumpkins. Melons quality is a function of the sugar content of the fruit. High sugar content is achieved by avoiding all stress during the growing season. Stress comes from foliar diseases, insect pests, weeds, poor nutrition, and excesses or lack of water.

The introduction of chemicals in farming got many delirious at the sight of what they could accomplish. Yields exploded. At the start, the soil was healthy. Any damage brought about by chemical fertilizers was hardly noticeable. Pests had not developed resistance to the chemicals. The technology spread across the world as it was considered the revolution in agriculture. Flash forward to today and many people are marveling at organic farming again. This is after learning that conventional farming methods come with a host of problems including health related diseases like cancer, pollution, degradation of soil and water, and impact on domestic animals.

Organic farming is a technique, which involves cultivation of plants and rearing of animals in natural ways. This process involves the use of biological materials, avoiding synthetic substances to maintain soil fertility and ecological balance thereby minimizing pollution and wastage. In other words, organic farming is a farming method that involves growing and nurturing crops without the use of synthetic based fertilizers and pesticides.

Foliar Sprays are a part of plant growing practices. Worm worked soils have burrows formed by the earthworms. Bacteria richly inhabit these burrows, also called as the drilospheres. Water passing through these passages washes the nutrients from these burrows to the roots to be absorbed by the plants. This principle is applied in the preparation of vermiwash. Vermiwash is a very good foliar spray. The vermiwash also contains enzymes and secretions of earthworms and would stimulate the growth and yield of crops. Zambare *et al.* (2008) conclude that vermiwash contains various enzymes cocktail of protease, amylase urease and phosphatase and also microbial study of vermiwash found that nitrogen fixing bacteria like Azotobacter sp.,Agrobacterium sp., and Rhizobium sp. And some phosphate solubilizing bacteria.

Foliar spray, although not a substitute for healthy soil, can be beneficial when a plant is suffering from certain nutrient deficiencies. Foliar plant spray involves applying fertilizer directly to a plant's leaves as opposed to putting it in the soil. Foliar feeding is similar to humans putting an aspirin under their tongue; the aspirin is more readily absorbed into the body than it would be if it were swallowed. A plant takes nutrients through the leaf much quicker than it does through the root and stem.

The objective of the study is to determine the performance of Honeydew melon using integrated nutrient management approach.

Materials and methods

A study was conducted at the experimental area of the Institute of Agricultural Technology, Isabele State University, Cauayan City on January to April 2018. The experimental design was randomized complete block design (RCBD) with three replications. The Honeydew melon seedling was raised using styrocup and combination of soil media. Pre-germinated seedlings of 15 days old were transplanted in a plot size of four (4) rows, five (5) meters long with a plant spacing of 1 x 1 meter. Different combination of treatments (T_1- FR based on soil analysis, T_2- 20% + FR Vermiwash + Foliar Fertilizer, T_3 – 40% FR + Vermiwash + Foliar Fertilizer, T_4 – 60% FR + Vermiwash + Foliar Fertilizer, T_5 – 80% FR + Vermiwash + Foliar Fertilizer, T_6 – 100% FR + Vermiwash + Foliar Fertilizer were evaluated using transplanted Honeydew melon seedlings (Gladial F1).

Weeds on the experimental plots were controlled throughout the conduct of the study. Soil samples were taken randomly in an area to use as basis in the amount of nutrients needed per treatment.

Data on length of vines, weight of fruit, fruit diameter, thickness of flesh, sugar content, texture of the fruit, aroma, weight of fruits per sampling were taken and calculated. All the date gathered were subjected to statistical analysis using the Statistical Tool for Agricultural Research (STAR). ANOVA results showed significant differences of variables between treatments, the Tukeys Honest Significant Difference (HSD) was used to compare between treatment means.

Results and Discussion

Length of the Vines

The length of vines as affected by integrated nutrient management obtained significant result. The application of FR + Vermiwash + Foliar Fertilizer and 80% FR + Vermiwash + Foliar Fertilizer obtained the longest vine followed by T1, T4, T3, and T2 respectively with a mean value of 2.41, 2.31,1.92, and 1.83cm.

Table 1. Length of vines at harvesting as affected by Integrated Nutrient Management (cm).

Weight of Fruits

Significant result was obtained on the weight of Honeydew melon as shown in Table 2. Heaviest fruit was obtained on the application of 100% FR + Vermiwash + Foliar Fertilizer (T_6) with a mean value of 1.98 kg followed by T_1, T_5, T_4, T_3, and T_2, respectively with a value of 1.78, 1.39, 1.30, 1.06, and 0.86.

Fruit Diameter

Significant result was obtained among the different combination of treatments Treatment 6 obtained the thickest fruit diameter with a mean value of 14.18cm comparable to Treatment 1 obtained a value of 13.50cm and it is also comparable to Treatment 5 got a mean value of 12.85cm comparable also to Treatment 4. However, treatment 3, and 2 obtained the lowest value in terms of fruit diameter with a mean value of 11.32, and 10.63cm.

Thickness of Flesh.

Significant differences were observed among the different treatments used. The application of 100% FR + Vermiwash + Foliar Fertilizer (T_6) obtained the thickest fruit flesh with a value of 4.65cm followed by treatment 1 and 5 got a value of 3.25cm, and 3.05cm treatment 4 obtained 2.38cm however treatment 3 and 4 obtained the lowest value with 1.70cm and 1.62cm.

Sugar Content

The sugar content of Honeydew melon as affected by the application of integrated nutrient management showed significant result (Table 5). T_6 – 100% FR + Vermiwash + Foliar Fertilizer and T_1– FR- Based on soil analysis obtained the highest in terms of sugar content followed by T_5 – 80% FR + Vermiwash + Foliar Fertilizer obtained a mean value of 9.60. T_3 – 40% FR + Vermiwash + Foliar Fertilizer and T_2 – 20% FR + Vermiwash + Foliar Fertilizer got a lowest value in terms of sugar content.

Aroma of Honeydew melon

Aroma of Honeydew Melon Fruit as affected by integrated nutrient management. The result of the sensory evaluation with respect to the aroma of the honeydew melon as affected by integrated nutrient management on Honeydew melon obtained a mean value of 5.81 that falls on the seven-point Hedonic Scale Acceptability Rating “like very much”

Weight of Fruits per Sampling Area (kg/6 Square Meters)

The weight of fruits as affected by integrated nutrient management on Honeydew melon obtained a significant result. The treatments applied with T_6 – 100% FR + Vermiwash + Foliar Fertilizer got the heaviest in terms of weight per sampling area followed by T_1– FR- Based on soil analysis with a mean value of 21.32 kg. T_5 – 80% FR + Vermiwash + Foliar Fertilizer and T_4 – 60% FR + Vermiwash + Foliar Fertilizer are comparable with each other however T_3 – 40% FR + Vermiwash + Foliar Fertilizer and T_2 – 20% FR + Vermiwash + Foliar Fertilizer obtained the lowest value in terms of weight per sampling area with a mean value of 12.68 kg and 10.36 kg respectively.

Review of literature

Role of Beneficial Microorganisms on Plant Growth and Development

The responsible use indigenous microorganisms to get economic, social and environmental benefits inherently attractive and determines spectacular evolution of research from traditional technologies to modern techniques to provide an efficient way to protect environment and new methods of environmental monitoring (Cai *et al.,* 2013).

Benefits derived from Vermiwash as Fertilizer

Vermiwash is a liquid that is collected after the passage of water through a column of worm action and is very useful as foliar spray. It is a collection of excretory products and mucus secretion of earthworms along with micronutrients from the soil organic molecules. These are transported to the leaf, shoot and other parts of the plants in the natural ecosystem. Vermiwash, if collected properly, is a clear and transparent, pale yellow coloured fluid. Vermiwash can be produced by allowing water to percolate through the tunnels made by the earthworms on the coconut leaf and cow dung substrates kept in aplastic barrel.

Effects of Vermiwash on Vegetables

Vermiwash will be obtained by culturing earthworms (*Eudrilus eugeniae*) on organic substrates (65% pre-composted crop wastes and 35% animal manure) in an equipment specially fabricated as described by Giraddi (2001)

Vermiwash exhibited growth promoting effects on the exomorphological characters such as plant height, length and diameter of internode, number of leaves, leaf surface area, root length, wet and dry weight of the shoot and root (Elumalai *et al*., 2013).

Effect of vermiwash on the growth and development of leaves and stem of cucumber plants (Samadhiya *et al*., 2013).

Quality Attributes of Fresh Fruits

Fruit is comprised of our primary attributes, 1) thickness of the flesh, 2) flavor (taste and aroma, 3) texture and 4) sugar content. These attributes have been defined, and may be evaluated as either sensory or instrumental measurements, or preferably combination of the two. Sensory measurements are generally more useful in the development of new products and determining product standards while instrumental methods are superior in measuring quality on a routine basis (Shewfelt, 2013).

Conclusion and recommendation

Field study was carried out to evaluate the performance of Honeydew melon on integrated nutrient management at the experimental area of the Institute of Agricultural Technology, Isabela State University, Cauayan Campus, Cauayan City Isabela laid out following the Randomized Complete Block Design with three replication. The results of the study were summarized as follows:

Result showed that the length of vines at harvesting the treatment applied T_6 - 100% FR + Vermiwash + Foliar Fertilizer obtained the longest vine. In terms the different parameters like weight of fruits, thickness of flesh, fruit diameter, weight of fruit per sampling area, sugar content, aroma, and texture result showed that the application of integrated nutrient management on Honeydew melon can improve and enhance not only on the yield but also on the another aspect like the parameters mentioned.

Based from the results of the study,

1. The length of vines at harvesting can affect the different combination of treatment.
2. The weight of fruits, thickness of flesh, fruit diameter, weight of fruit per sampling area, sugar content, aroma, and texture enhanced the application of integrated nutrient management.

Based from the foregoing results, the application of integrated nutrient management is recommended because it improved the fruit yield of the honeydew melon.

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