Science and Humanities Journal 17: 74-86 (2023)
DOI: 10.47773/shj.1998.171.4

# Horticultural and Yield Performance of Honeydew Melon (*Cucumis melo L. var. Brilliant*) in Response to Vine Pruning and Fruit Setting Position

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## ABSTRACT

The study was conducted to develop doable technologies that will increase quality and productivity of honeydew melon. It aimed to investigate the horticultural and yield performance and evaluate the cost and return analysis of honeydew melon variety "Brilliant". This was laid out in split-plot arranged in randomized complete block design (RCBD) replicated 3 times where four vine pruning techniques and four fruit setting position were main and subplot respectively. Results revealed that vine pruning significantly affects vine length at 30 days after transplanting (DAT). Single vine pruning had longer vine at 30 DAT. Meanwhile, fruit setting position regulated flowering and number of days to harvest. Fruit set at 1$^{st}$ -8$^{th}$ nodes enhanced the early appearance of first female flower and shortened the number of days from transplanting to harvesting while 9$^{th}$ – 16$^{th}$ and 17$^{th}$ and up lengthened the harvesting period by 4 days and 13 days respectively. Meanwhile, vine pruning and fruit setting position significantly affects yield characteristics of honeydew melon. Triple, double, and no pruning with fruit set at 9$^{th}$ – 16$^{th}$ and 17$^{th}$ node got the highest weight of fruit per plant and total weight of fruit per plot. Further, fruit set at 9$^{th}$ – 16$^{th}$ node with triple, double, and no pruning ranked the highest in terms of weight of marketable fruit and gained the highest net return of investment.

*Keywords:* honeydew melon, fruit setting position, node, vine pruning

## INTRODUCTION

Due to the inconsistency of supply throughout the year, honeydew melon normally commands a greater price on the market than other fruits. Honeydew melon costs between PhP140 to 230 a piece in the Philippines depending on the variety (Fruits-price list-Philippines 2021). In the country, honeydew melons are often served in hotels catering high-end market where tourists are staying when they are in the country. Tourism Statistics Report by the Department of Tourism Philippines (2019) revealed that there was an increasing trend of the number of

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tourist arrivals in the country from 3.5 million in 2010 to 8.2 million tourists in 2019 that was before the pandemic started. Koreans and Chinese were the highest among the foreign tourist visiting the country in which these tourists are known to be melon consumers. Thus, honeydew melon is a crop with great potential that will give profit to the Filipino farmers if produced whole year round.

Even though, honeydew melons have potential demands, the country's production is very low. Philippines has only a total of 7.8 tons yearly production with an average of 7.9 tons per hectare compared to China that produces over 16 million metric tons yearly production with an average yield of 33.3 tons per hectare while South Korea has 161,692 tons yearly production and with an average yield of 30.7 tons per hectare (Atlasbig 2018-2020). Vine pruning, and fruit setting techniques are some of the potential solutions for enhancing honeydew melon productivity and fruit quality. Research reveals that vine pruning improves crop development and output. In a cucumber experiment, Hidayatullah et al (2013) discovered that applying pruning as a stress boosted yield by 61 percent when compared to unpruned plants. Furthermore, fruit setting position was shown to have a substantial impact on rock melon fruit output and quality, with two fruits set at 8-14 lateral branches and an average fruit weight of 2.20 kg per fruit (Wen-Chen Wee et al 2018).It is critical to develop novel production strategies such as improved vine pruning and fruit setting position techniques to increase honeydew melon productivity and fruit quality in the country. Thus, the study aimed to evaluate the effects of vine pruning and fruit setting position on the horticultural, yield, and economic returns of honeydew melon variety Brilliant.ield, and economic returns of honeydew melon variety Brilliant.

## MATERIALS AND METHODS

### *Experimental Design and Treatment*

The study was conducted at Barangay Kilim, Baybay City, Leyte in an open- field with an area of 5 m x 60 m. The experiment was laid out in split-plot in Randomized Complete Block Design with main vine pruning as the main plot and fruit setting position as the sub-plot in 3 replications. Main plot treatments were: $VP_0$ – no main vine pruning, $VP_1$- Single Vine Pruning with 1 fruit per fruit setting position, $VP_2$ – Double Vine Pruning with 1 fruit per vine per fruit setting position, $VP_3$ – Triple Vine Pruning with 1 fruit per vine per fruit setting position. The sub-plot included: $FS_0$ – fruits set at any node, $FS_1$ - $1^{st}$ -$8^{th}$ node, $FS_2$ – $9^{th}$ – $16^{th}$ node and $FS_3$ – $17^{th}$ up node.

Vine pruning and fruit setting procedure were done according to the treatments. $VP_0$ – there was no alteration on this treatment. $VP_1$- Single Vine Pruning with 1 fruit. The main vine bore the fruit. Lateral shoots were pruned based on the fruit setting position with 1 fruit maintained per fruit setting position.$VP_2$ – Double Vine Pruning. Two healthy leaves were retained and the main vine was cut letting the axils of the leaves develop two lateral vines with 1 fruit per vine that was maintained.$VP_3$ – Triple Vine Pruning. Three healthy leaves were retained and the main vine was cut letting the axils of the leaves develop three lateral vines, only 1 fruit per vine was maintained. For fruit setting, in $FS_0$ – there was no alteration on this treatment. $FS_1$ - $1^{st}$ - $8^{th}$ node. Fruits were set in the $1^{st}$ – $8^{th}$ node. Fruits, flowers, and lateral shoots were pruned and removed beyond the $8^{th}$ node. $FS_2$ – $9^{th}$ – $16^{th}$

node. Fruits were set in the $9^{th}$ – $16^{th}$ node. Fruits, flowers and lateral shoots, below and above these nodes were pruned and removed. $FS_3$ – $17^{th}$ up node. Fruits were set in the $17^{th}$ up node. Fruits, flowers, and lateral shoots below the $17^{th}$ nodes were pruned and removed. Manual hand pollination was done to ensure pollination and fruit development. It was done by cutting/removing off male flower from the same plant and pollen grains were dusted to the stigma of the female flower at the desired fruit setting position.

### *Cultural Management Practices*

Honeydew melon seeds were sown in 104 cellular seedling trays with 1:1:1 sterilized garden soil: vermicast: carbonized rice hull (CRH) potting medium. The seedlings were placed in a protected structure, regularly watered and checked for insect pest and diseases occurrence. Seedlings were transplanted 14 days after sowing (DAS). Meanwhile, the experimental area was plowed and harrowed twice with 2 weeks interval using hand tractor. Land was thoroughly prepared free from soil clods and weeds. Plots were prepared based on the experimental lay-out. Plastic mulch was installed with holes in 60 cm interval between hills planting distance. It was made in two rows per plot.

Fertilization followed the recommendation from Known You Seed Company, the producer of the honeydew melon Brilliant. Net trellises were installed to provide support to the creeping plant. Bamboo poles were used and culture net attached to a tie wire above to secure the plants. Twine was used to support the fruits during fruiting. Chemical application of insecticides and fungicides was done due to occurrence of pests and diseases. Fruits were harvested when it turned yellow and chicken scratch like appeared on its skin. Harvesting was done in the morning.

### *Data Gathered*

Horticultural and yield parameters of honeydew melon were gathered. Number of days to appearance of first female flower at the fruit setting position, total number of female flowers at the fruit setting position (pruned & maintained), vine length (cm), leaf length (cm), leaf width (cm), at 30 DAT, node number bearing the fruit, number of days to harvest, number of fruits per plant, number of fruits per plant total weight of fruits per plant (kg), average weight of fruits per plant (kg), weight of marketable fruit per plant, weight of non-marketable fruit per plant and yield in 200 $m^2$ area (kg). For the economic return analysis, production cost, gross income, and net income were computed.

### *Statistical Analysis*

Data were subjected to Analysis of variance (ANOVA) to test the significance level and difference among treatment means were determined using Least Significant Difference (LSD) Test at 5% level of significance using IRRI's Statistical Tool for Agricultural Research (STAR) and interaction was further subjected to Statistix software.

## RESULTS AND DISCUSSION

### *Horticultural Characteristics*

Various horticultural parameters were significantly influenced by vine pruning and fruit setting position. Result revealed significant effect of vine pruning on vine length at 30 DAT (cm) of honeydew melon (Table 1). Regardless of fruit setting position, single vine pruning tends to grow longer compared to other pruning techniques. A difference of 22.53cm was recorded between single vine pruning over that of no pruning. The reason was that there was no main vine pruning employed in the single vine thus apical dominance was not altered. This was consistent with the study by Oga and Umekwe (2016), which found that pruned watermelon plants had vines that were 90.14 cm longer than those not pruned. However, there was no significant difference observed on the vine length at harvest (Table 1). Further, there was no significant difference observed in terms of the vine length at harvest (cm), leaf length (cm) and leaf width at 30 DAT (Table 1). As such, fruit setting position significantly affects the number of nodes bearing the fruit. Fruit set at 1$^{st}$ – 8$^{th}$ node settled mostly at the 5$^{th}$ node of the stem while the rest of the treatments was at the higher number of node. Most of the fruits of the 17$^{th}$ node developed fruits at 23$^{rd}$ node which merely apart away from the base of the plant and the end portion.

Table 1. Horticultural characteristics of honeydew melon as influenced by vine pruning and fruit setting position

| TREATMENTS | HORTICULTURAL CHARACTERISTICS | | | | |
|---|---|---|---|---|---|
| | VINE LENGTH AT 30 DAT (cm) | VINE LENGTH AT HARVEST (cm) | LEAF LENGTH AT 30 DAT (cm) | LEAF WIDTH AT 30 DAT (cm) | NODE NUMBER BEARING THE FRUIT |
| **Main Plot (Vine Pruning)** | | | | | |
| VP 0 – No pruning | 127.14b | 190.76 | 13.65 | 13.64 | 15.75 |
| VP 1 – Single vine | 149.67a | 190.75 | 15.89 | 15.57 | 14.59 |
| VP 2 – Double vine | 129.68b | 189.94 | 14.77 | 14.62 | 15.58 |
| VP 3 – Triple vine | 127.58b | 190.00 | 14.69 | 14.26 | 15.75 |
| **Sub - Plot (Fruit Setting Position)** | | | | | |
| FS 0 - Fruit set at any node | 132.79 | 190.15 | 14.54 | 14.16 | 19.00 b |
| FS 1 - 1st – 8th node | 133.52 | 189.96 | 14.62 | 14.57 | 5.08d |
| FS 2 - 9th – 16th node | 134.11 | 190.35 | 15.07 | 14.87 | 14.83 c |
| FS 3 – 17th up node | 133.91 | 191.40 | 14.76 | 14.49 | 23.67 a |
| cv (a) % | 3.20 | 0.96 | 6.75 | 8.90 | 4.42 |
| cv (b) % | 2.21 | 0.64 | 4.40 | 5.20 | 4.91 |

Columns having the same letter(s) are not significantly different at 5% level using least significant difference (LSD) test

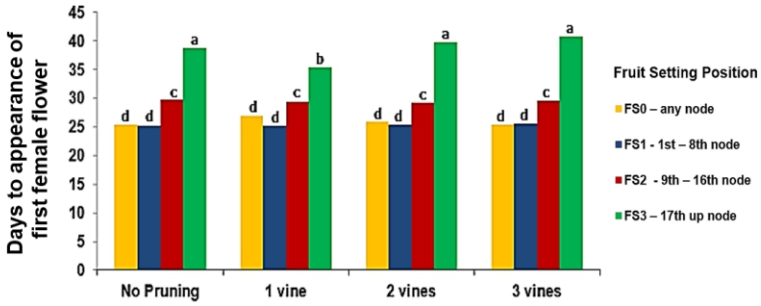



Figure 1. Interaction effect on the number of days in appearance of first female flower at anthesis of honeydew melon in response to vine pruning and fruit setting position

Meanwhile, interaction effect on the appearance of first female flower at anthesis was noted (Figure 1). Regardless of the vine pruning, honeydew melon whose fruits were set at 1$^{st}$ to 8$^{th}$ node and those that were set at any node flowered the earliest compared to those fruits that were set at 9$^{th}$ to 16$^{th}$ node which flowered 4 days after. On the other hand, those that were set on the 17$^{th}$ node flowered last for more than 10 days after those that were set at 1$^{st}$ 8$^{th}$ and at any node except for single vine which flowered earlier even when set at the upper node. The results were consistent with previous research showing that pruning alters flowering patterns, which directly affect fruit growth and fruit quality (Mardhiana et al 2017). According to Saifuddin et al (2010), pruning has been demonstrated to increase stem potential, encourage canopy transpiration, and enhance water status, all of which may influence plant flowering. Vine pruning and fruit setting position had significant effects on the number of female flowers (Figure 2). It was observed that triple and double vine pruning fruit set at 17$^{th}$ up node possessed more female flowers although it was comparable to that of the triple vine set at 9$^{th}$ – 16$^{th}$ node and no vine pruning with fruits set at 17$^{th}$ up node. It was observed that there are fewer number of female flowers that appeared near the basal part of the honeydew melons and more female flowers appeared in the 9$^{th}$ up node wherein female flowers were observed to appear in every two nodes. Meanwhile, single vine and those fruits that were set at 1$^{st}$-8$^{th}$ node regardless of vine pruning had the least and lesser number of female flowers.

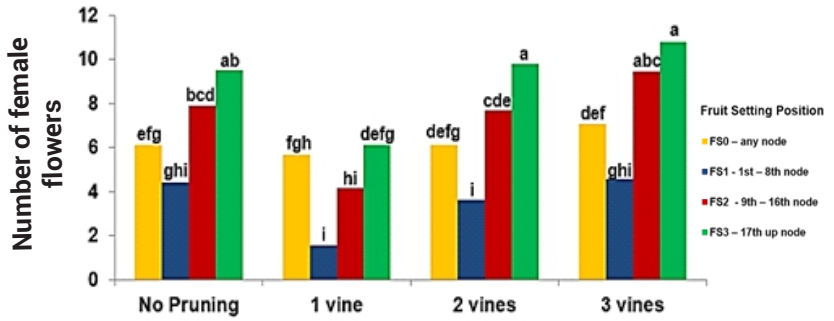



Figure 2. Interaction effect on the number of female flowers of honeydew melon in response to vine pruning and fruit setting position

Number of days from transplanting to harvest was significantly influenced by vine pruning and fruit setting (Figure 3). Fruits that were set at any node and 1st – 8th node were harvested ahead by 4 days and 13 days than the fruits that were set in the 9th – 16th and 17 up node respectively, except for the single vine that was set at 17th up which was harvested ahead by 3 days than that of no pruning, double and triple vine. With these, harvesting can be shortened or lengthened by the type of pruning and fruit setting employed in the honeydew melon. This can help regulate in case there will be oversupply or shortage of honeydew melon in the market. This was in accordance with a study by Kuo-Ming Lee (1999) that found that decapitation on secondary branches and fruit setting at the 5th, 6th, 7th, and 8th nodes of primary branches of plants affected by an overabundance of Hami-gua honeydew melon during a particular time of the year in Taiwan adjusted harvest times, thereby resolving Hami-gua melon overabundance productivity issues over time.

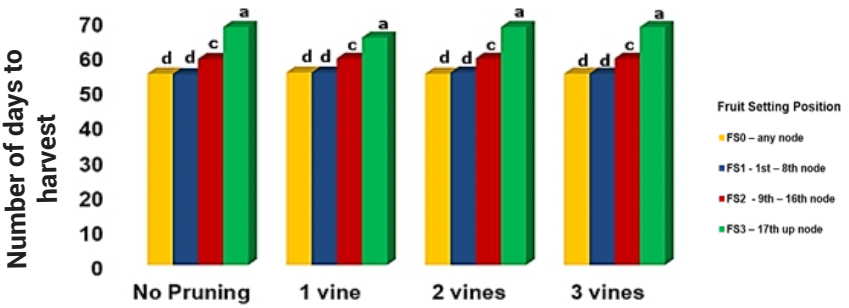
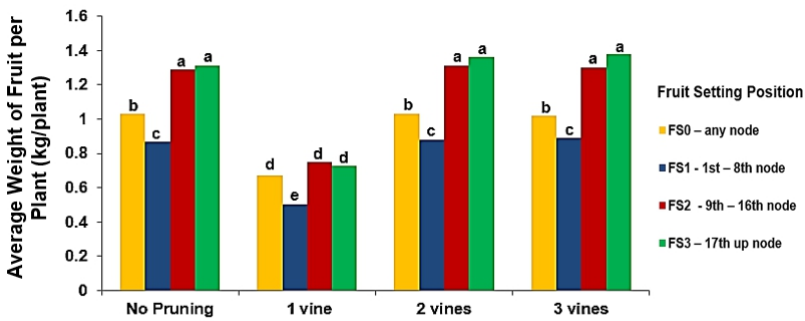



Figure 3. Interaction effect on the number of days to harvest of honeydew melon in response to vine pruning and fruit setting position

## Yield Characteristics

Vine pruning and fruit setting significantly affects different yield parameters. Figure 4 shows interaction on the average weight of fruit per plant as influenced by vine pruning and fruit setting. Single vine got the lightest average weight of fruit per plant particularly those fruits that were set at 1st – 8th node. The heaviest average weight of fruit per plant was observed in plants with triple, double, and no vine pruning with fruits set at 17th up and 9th – 16th node. Meanwhile, average weight of fruit is shown in Figure 5. The lightest weight of fruit was recorded at 1st – 8th node regardless of vine pruning while the heaviest weight of fruit was observed at triple, double, and no pruning with fruit set at 17th and 9th – 16th node. These findings agree with some earlier researches. The size and quality of melon fruit were significantly influenced by where the fruit was set, according to Kamiya (1969). Smaller fruit grew at the lower end of the stems than those at the top end. The best place to set fruit on a vine is between its 9th and 13th nodes. Greater leaf area per fruit and less competition for photosynthates amongst vegetative organs result from plant development with one fruit at a higher fruit set position (15 to 18 nodes), which also promoted the assimilation of nutrients from leaves to fruit and subsequently increases fruit weight (Barni et al 2003). Sung Gil Lee and Woo Sung Lee (1996) found that the fruit on netted melons was heavier, longer, larger in diameter, and thicker the higher the node order of fruit set. The fruit quality of the netted melon improved with greater fruit set position and better netting index. The best fruit on the market was produced and set at the 12th node, one fruit per plant. Two fruits were set per plant, though, which increased the production per plant. This result, however, was in contradiction to Duong's (1999) who claimed that pruning had no impact on fruit length and mean weight. However, in terms of number of fruits, it was only affected by the type of pruning technique employed. Single vine pruning bore lesser fruit compared to other vine pruning techniques (Table 2).




honey dew melon in response to vine pruning and fruit setting position

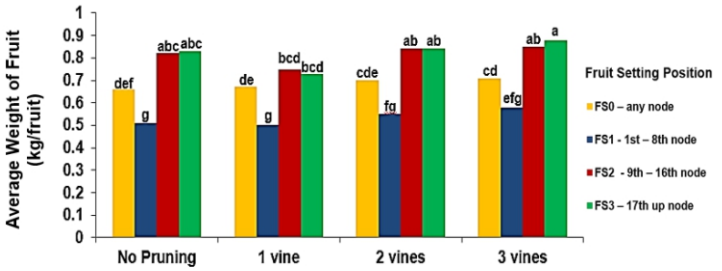



Figure 5. Interaction effect on the average weight of fruit of honeydew melon in response to vine pruning and fruit setting position

Table 2. Number of fruits per plant of honeydew melon in response to vine pruning and fruit setting position under open-field

| TREATMENT | NUMBER OF FRUITS PERPLANT |
|---|---|
| Main Plot (Vine Pruning) | |
| VP0– No pruning | 1.80a |
| VP1– Single vine | 1.04b |
| VP2– Double vine | 1.84a |
| VP3– Triple vine | 1.87a |
| Sub-Plot (Fruit Setting Position) | |
| FS0-Fruit set at any position | 1.66 |
| FS1-1st– 8th node | 1.61 |
| FS2-9th– 16th node | 1.63 |
| FS3– 17th up node | 1.65 |
| cv (a) % | 9.03 |
| cv (b) % | 6.73 |

Columns having the same letter(s) are not significantly different at 5% level using least significant difference (LSD) test

Significant interactions were also observed on the total weight of fruit per plot (kg), total weight of marketable fruit per plot (kg), and total weight of non-marketable fruit per plot (kg). For the total weight of fruit per plot (Figure 6), it was observed that regardless of vine pruning, fruits set at 1$^{st}$ – 8$^{th}$ node produced the lightest total weight fruit per plot. On the other hand, triple, double and no vine pruning with fruits set at 9$^{th}$ -16$^{th}$ and 17$^{th}$ up node got the heaviest total weight of fruits per plot. At these fruit setting positions fruits were bigger and in good shape compared to 1$^{st}$ – 8$^{th}$ node which were usually smaller and deformed in shape. In this study, it shows that honeydew melon still bore good fruit at higher node even beyond 20$^{th}$ node with bigger and perfectly shaped honeydew melon fruits. With these results, it was found out that fruit set at the upper portion of the vine

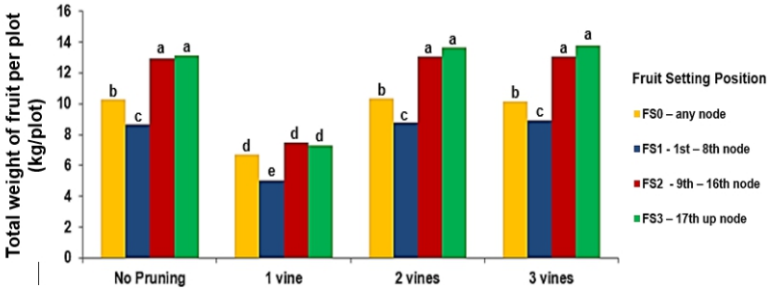



Figure 6. Interaction effect on the total weight of fruit per plot of honeydew melon in response to vine pruning and fruit setting position under

Nonetheless, fruit set at 9th – 16th node obtained the highest weight of marketable fruits with triple, double, and no vine pruning (Figure 7). Although, 17th up node also got the highest total weight of fruits on the same pruning techniques, only those that were set at 9th – 16th node prevailed to ranked 1st in terms of marketable fruits. At these fruit sets, both possessed bigger and perfectly formed fruits, however, fruits set at 17th up node were usually unripe when harvested especially those that were set beyond the 20th node. The reason was that the plant already wilted and died prior to the fruits ripening stage. On the other hand, those that were set between 17th-20th nodes were the marketable ones while those fruits that were set at 9th – 16th node possessed fruits with good quality. These were the reasons why non-marketable fruits were remarkably highest at 17th up node among other treatments under open-field condition (Figure 8).

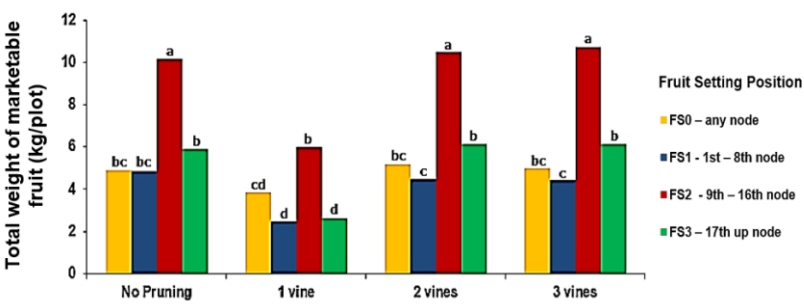



Figure 7. Interaction effect on the total weight of marketable fruit of honeydew melon in response to vine pruning and fruit setting position

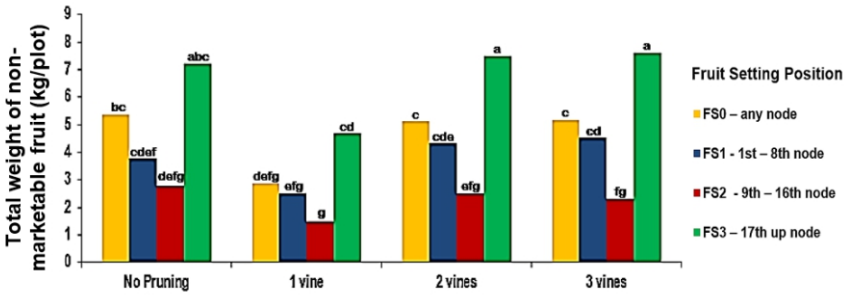



Figure 8. Interaction effect on the total weight of non-marketable fruit of honeydew melon in response to vine pruning and fruit setting position

**Cost and Return Analysis**

Cost and return were significantly affected by vine pruning and fruit setting. Net income of 200 $m^2$ honeydew melon using triple, double, and no pruning with fruits all set at $9^{th}$ – $16^{th}$ node was higher by 82.30%,80.28 and 79.07% respectively compared to no vine pruning with fruits set at any node (Figure 11). This means that honeydew melon pruned and set at these types and levels will eventually give the grower a good profit from the 200 $m^2$ area. This was because greater yield and highest weight of marketable fruits were obtained in these pruning and fruit setting techniques. Single vine pruning, on the contrary, gave negative net returns with fruits set at $1^{st}$ – $8^{th}$ and $17^{th}$ up node. However, a positive net income of 10,728.00 was gained using single vine pruning with fruit set at $9^{th}$ – $16^{th}$ node. This was in conformity with the findings of Fontes and Cecon (2008) on their study on the fruit yield of cantaloupe melon, under greenhouse conditions, as affected by number of fruits and position in the plant that plants with one fruit experienced a drop in commercial productivity (PC) of 21.4 percent in fruits between the $5^{th}$ and $8^{th}$ nodes and 24.9 percent in fruits between the $15^{th}$ and $18^{th}$ nodes when compared to plants with two fruits. A positive net return of more than 10,000.00 per 200 $m^2$ was obtained by double and triple vine pruning with fruits set at $17^{th}$ up node. The rest of the treatments obtained below 10,000.00 net profit.

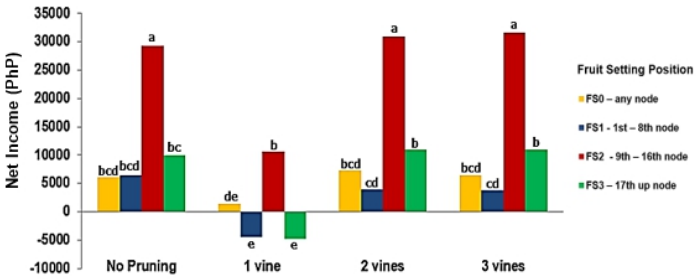



Figure 11. Interaction effect on the net income of 200 $m^2$ of honeydew melon as influenced by vine pruning and fruit setting position

Table 3. Mean gross income (₱) and production cost (₱) of honeydew melon for 200 $m^2$ in response to vine pruning and fruit setting position under open-field

| TREATMENTS | GROSS INCOME (₱) | PRODUCTION COST (₱) | NET RETURN (₱) |
|---|---|---|---|
| VP0- No main vine pruning | | | |
| FS0 - Fruit set at any node | 21852.03 | 15740.87 | 6111.16 |
| FS1 - 1st – 8th node | 21629.80 | 15142.71 | 6487.09 |
| FS2 - 9th – 16th node | 45141.10 | 15939.02 | 29202.08 |
| FS3 – 17th up node | 26222.43 | 16327.91 | 9894.52 |
| VP1- Single vine pruning | | | |
| FS0 - Fruit set at any node | 17170.51 | 15827.90 | 1342.61 |
| FS1 - 1st – 8th node | 11081.57 | 15827.90 | -4746.33 |
| FS2 - 9th – 16th node | 26666.88 | 15939.02 | 10727.86 |
| FS3 – 17th up node | 11703.80 | 16216.80 | -4513 |
| VP2- Double vine pruning | | | |
| FS0 - Fruit set at any node | 23096.48 | 15753.83 | 7342.65 |
| FS1 - 1st – 8th node | 19777.94 | 15772.35 | 4005.59 |
| FS2 - 9th – 16th node | 46933.71 | 15939.02 | 30994.69 |
| FS3 – 17th up node | 27289.11 | 16327.91 | 10961.2 |
| VP3- Triple vine pruning | | | |
| FS0 - Fruit set at any node | 22192.77 | 15753.83 | 6834.94 |
| FS1 - 1st – 8th node | 19600.16 | 15753.83 | 3846.33 |
| FS2 - 9th – 16th node | 47585.57 | 15939.02 | 31646.55 |
| FS3 – 17th up node | 27318.74 | 16327.91 | 10990.83 |

## CONCLUSIONS AND RECOMMENDATIONS

Horticultural and yield performance of honeydew melon "Brilliant" were significantly affected by vine pruning and fruit setting position. Fruit setting position can regulate harvesting period. Fruit set at $1^{st}$-$8^{th}$ and fruit set at any nodes shortened the harvesting time while fruit set at $9^{th}$ – $16^{th}$ and $17^{th}$ up node lengthened the harvesting time. Triple vine, double vine, and no pruning with fruit

set at 9th – 16th node produced the highest fruit yield. The 9th – 16th fruit setting position employed with triple, double, and no pruning gave the highest net return.

Conduct of verification study on vine pruning and fruit setting technique in honeydew melon is recommended to further prove its efficacy. The technology generated from this experiment is recommended to be tested in farmer's field.

**ACKNOWLEDGEMENT**

The author is grateful to the Department of Agriculture-Bureau of Agricultural Research (DA-BAR). She is also grateful to Dr. Rosario A. Salas, Dr. Felix M. Salas, Dr. Arsenio D. Ramos and Dr. Karen Luz P. Yap for their technical support.

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