Effectiveness of Pesticides in Controlling Major Pest and Disease of Mangoes in West Nusa Tenggara Province - Indonesia

Baiq Nurul Hidayah, Muji Rahayu, Mujiono, Brian Thistleton, Sohail Qureshi, Ian Baker

***Abstract*—** Mango is a type of tropical fruit which popular among the consumers and have high commercial value. Moreover, this fruit also good for human health as contain lots of vitamins, mineral, and fiber. The largest production area of mangoes in Indonesia is East Java Province, followed by Central Java, West Java and West Nusa Tenggara. In West Nusa Tenggara Province, mangoes mostly cultivated in yards and in mixed gardens with conventional technological approaches. However, low quality of mangoes indicated due to lack of Good Agricultural Practices (GAP). Management study of pre-harvest mangoes in West Nusa Tenggara Province aims to observe effectiveness of some pesticides in controlling pests and diseases and its impact on fruit quality or losses before harvesting. Study focus on controlling major pest and disease of mangoes such as mango leafhopper and anthracnose. The experiment was conducted in the Village of Selengen, Sub District of Kayangan, North Lombok, West Nusa Tenggara Province, Indonesia during flowering season 2010. Research compiled in five treatments and each test was repeated on five trees. Those five treatments were: T1 = Actara 2 gram/5 liter water/tree; T2 = Cypermetrin 5 ml/5 liter water/tree; T3 = Amistar Top 5 ml/5 liter water/tree; T4 = Combination of T1+T2+T3; and T5 = no treatment (control). The result showed that controlling major pest and disease of mangoes by combination of some alternative pesticides could effectively controlling pests and diseases of mango such as mango leafhopper, red banded mango caterpillar, and anthracnose. By combination of all treatments (T4), production of mangoes increase into 161.20 kg/tree compared to control which only 122.40 kg/tree.

***Keywords*—**pest, disease, pesticides, mango, West Nusa Tenggara, Indonesia.

I. Introduction

MANGO is type of tropical fruit which popular among the consumers and have high commercial value. Moreover, this fruit also good for human health as contains lots of vitamins, mineral, and fiber. Horticultural commodity, especially mango, has a good prospect for development in intensive way in large agribusiness or agroindustry. Indonesia is the fourth ranking of mangoes producers in the world but not in the big five of export countries yet [2].

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The largest production area of mangoes in Indonesia is East Java Province, followed by Central Java Province, West Java Province and West Nusa Tenggara [*Indonesian = Nusa Tenggara Barat (NTB)*] Province. Mangoes farming systems in NTB for light skin cultivar (red, yellow, orange, etc.) such as Gedong Gincu, Kensington, etc. not popular yet in farmers level therefore NTB mangoes mostly dominated by green skin mangoes (green mangoes) such as Arumanis and other cultivars namely Manalagi, Madu, Golek, and some local varieties. Mangoes market and trade situation more and more depend on consumer preferences. Domestic consumers more prefer to flavour, while international consumers more prefer high quality product (shape, size, and skin colour) both for fresh and processing fruits. In line with lots of promotion of green mangoes internationally, recently some countries accepted green mangoes. As the supplier of the national mangoes, NTB Province should continue to pursue increased production and better quality for the purpose of the local market as well as export markets.

In NTB, mangoes mostly cultivated in yard and in mixed garden with conventional technological approaches. Low quality due to lack of good agricultural practices especially in controlling pests and diseases of mangoes such as leaf hopper, fruit fly, and red banded mango caterpillar. Pests damaged lead to variation of fruit quality and therefore only small percentage could go for export category. Besides of unapplied of good agricultural practices, problem of harvest and post-harvest also not well manage yet. Mangoes are perishable fruit and therefore could not storage for long time. If it is not manage well, fruits in storage will changes physiologically, physically, chemically and pathogens attach will lead to rotten fruits. These will lead to losses of profit especially when it is selling in long distance.

Management study of pre harvest mangoes in NTB aims to observe affectivity of some controlling method and its impact on fruit quality or losses before harvesting caused by pests and pathogens attacked on part of the plant, flower, and fruit until marketing.

II. Methodology

The study was conducted in the Village of Selengen, Sub District of Kayangan, North Lombok, Nusa Tenggara Barat Province, Indonesia during flowering season 2010. The study aimed to control the main pests and diseases in mango such as mango leafhopper and anthracnose. Research compiled in five

treatments and each test was repeated on five trees. These five treatments were:

T1 = Actara 2 gram /5 liter water / tree
T2 =Cypermetrin 5 ml / 5 liter water / tree
T3 = Amistar Top 5 ml / 5 liter water / tree
T4 = Combination T1+T2+T3
T5 = Control

Time of application:

T1: 4 times spray (1 month before flush, at initiation of flowering, mid flowering, full flowering)
T2: 3 times spray (initiation of flowering, full flowering and two weeks before harvest)
T3: 3 times (early, mid and full flowering)
T4: same as T1, T2 and T3
T5: Control (no spraying)

III. RESULTS AND DISCUSSION

Mango Leafhopper (MLH) *(Idioscopus nitidulus)* is one of the major pests on mangoes in Nusa Tenggara Barat Province, Indonesia. Damage symptoms due to this pest are young leaves crinkled with small lesions on the midribs where the eggs have been inserted. Sap sucking damage is seen on new flush and flowers. Leafhoppers and plant hoppers excrete honeydew which promotes the growth of sooty mould on leaves and flower panicles. Life cycle of the pest will breed all year round but the females lay more eggs and nymphs develop faster during the flowering and fruiting period. While control strategies by reduce population before flowering. Insecticide sprays for thrips, flower caterpillars and seed weevil generally control leafhopper population. Native lacewing larvae and other predators may assist in controlling immature leafhoppers [1].

Actara is a systemic pesticide which strongly controls pests such as mango leafhopper. The results showed that intensive spraying on Arumanis and Gedong Gincu mangoes for 4 times that began one month before the last flush to the last flowering have a significant impact on the mango leafhopper population decline in both the stage and adult nymph (Figure 1 and 2). Seen in the graph that the average populations of mango leafhopper adults are still visible on the stage of 1-3 head/tree and leafhopper populations ranged stadium nymph 1-4 head/tree. But in August to October leafhopper population is not occur, it shows that the reaction of Actara into the entire tree running effectively therefore mango leafhoppers are trying to suck the liquid on the leaves and flower buds dying.

During the observation, it appears that the percentage of fruit drops on the Arumanis mango still high enough that occurs between 2-12 pieces fruit drop/tree in all treatments, but the highest number of fruit drop on Arumanis occurred not due to the presence of pests or diseases, which allegedly because of wind and competition for nutrients. The order of the average number of the largest drop on the mango fruit caused by fruit flies (2.13 fruit drop/tree) and 2 pieces fruit drop/tree due to RBMC.

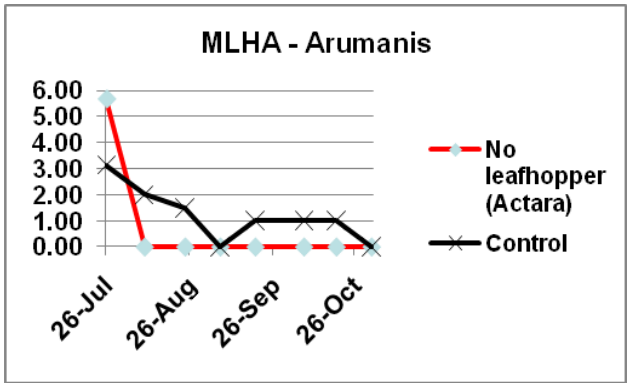

Figure 1. Mango leafhopper adult on mango Arumanis cultivar

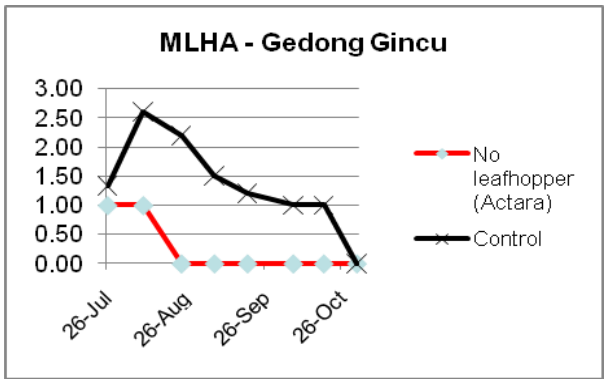

Figure 2. Mango leafhopper adult on Gedong Gincu cultivar

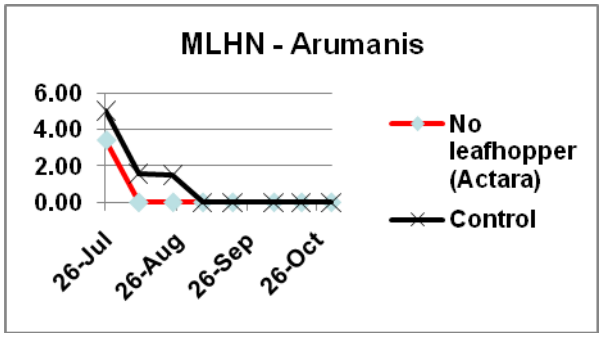

Figure 3. Mango leafhopper nymph on Arumanis cultivar

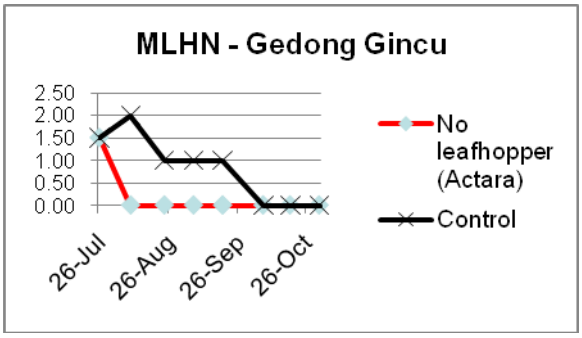

Figure 4. Mango leafhopper nymph on Gedong Gincu cultivar

From whole treatments, it appears that the amount of fruit drop on the control trees seem higher than T1-T4 treatment which is on average of 11-29 pieces fruit drop/tree. In Gedong Gincu also showed a similar, but it appears that the attack appears to be the cause of the second RBMC fruit drop an average 4.8 fruit drop/tree followed by fruit flies by 2.4 fruit drop/tree.

Effect of combination treatment (T1 + T2 + T3) showed the best results in trees that can produce Arumanis mango production of 161.20 kg/tree, while the control tree productivity reached 122.40 kg/tree as shown in figure 5.

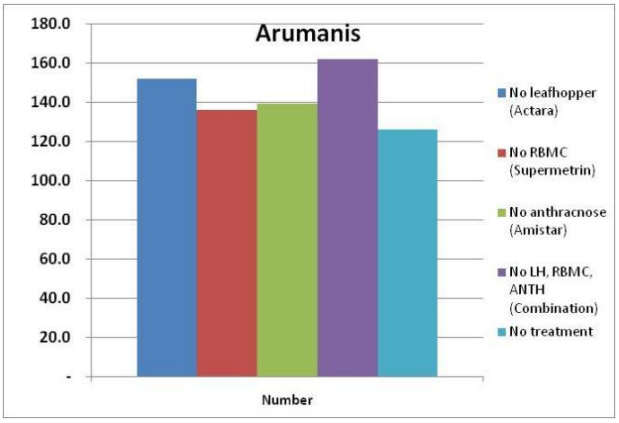

Figure 5. Arumanis mango productivity (kg/tree)

Figure 5 indicated that treatment T4 which is combination of treatment T1, T2, and T3 could produce more mangoes in Arumanis cultivar because less pests and diseases during the flowering time and as a result count highest harvested fruits.

IV. Conclusion

Controlling major pests and diseases on mangoes by combination of some alternative pesticides could effective in controlling major pest and disease of mango such as mango leafhopper and anthracnose which finally lead to increase harvested fruits both for quality and quantity.

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References

[1] Northern Territory Government. 2002. Pests, Diseases, and Disorders of Mangoes in the Northern Territory. An Illustrated Field Guide. First Edition. July, 2002.

[2] Notodimedjo S. 1998. Engineering of mangoes tree to promote flowering. Habitat, Volume 8 (98): 38 – 41.