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# Population dynamics of *Myzuspersicae* (Sulzer) on intercropping potatoes with other plants on Karo Highland

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**Abstract**. Green peach aphid (*Myzuspersicae*Sulze) represents one of the major pest affecting decreased production which found in different potato fields in Karo highland. Decreasing incurredin two ways : the direct damages that are caused by the insectfeeding on the plants and the indirect damages caused to potato planting materials as a virus vector. There are different methods for controlling green peach aphids, all of them relying inthe use of chemicals and this method makes food production contaminated by pesticide residu. So, using non-chemical methods of cultivation contribute to "ecological" food production. Intercropping is one way of reducing pest insect populations in such vegetable crops.This study was conducted to determine the population dynamics of *Myzuspersicae* (Sulzer) on Intercropping system of potato plant with other vegetables plant on Karo Highland. The host plant was cultivar Granola of potato and the intercropping plant respectively were cabbage, mustard, celery, onions, carrot and bean. The results showed that *M. persicae* was consistently at different densities in different intercropping plant on potato. The aphid was first recorded at three week until planting. The kind of intercroppingcultureplantssignificantly reduced the number of aphid. The lowest number of aphid found respectively inintercroppingpotatoesandmustard, potatoesandonions, andpotatoesandcelery. There was 0.80 aphids / leaf, 1,12aphids/leaf, 1,48 aphids/leaf. At the 2nd observation found the number of aphid was lowest at polyculture potatoes and mustards were 1,68 aphid/leaf, at popatoes and onions were 3,28 aphid/leaf, at popatoes and celery 3,00 aphid/leaf. The number of aphids steadily increased with significant at differencesintercroppingplant till the 3rd observation (9 weeks until planting) respectively where 2,80 aphid/leaf, 3,42 aphid / leaf and 4,20 aphid/leafwere recorded. Observation for natural enemies of *M. persicae*showed that fewnatural enemiesfound in theagro-ecosystem. There are *Episyrphusbalteatus*, *Chrysoperlacarnea*, *Aphidiusmatricarieae* and *Coccinellaseptempunctata.* The population density of all of the natural enemies was highest at polyculture than monoculture of potato. After that, as the population of *M. persicae* started decline, the same trend was followed by all of its natural enemies.

***Key Words*:** Green peach aphid *Myzuspersicae,* intercropping

## Introduction

The green peach-potato aphid *Myzuspersicae*(Sulzer) is a very significant pest of peach, tobacco, vegetables, and flowers. One of theimportantpestsof potatointhe Karo highlands ofNorth Sumatrais *M. persicae*. This insectsfrom the orderof HemipteraandfamilyAphididae, found scattered throughoutthe worldas apestona variety of horticultural plantandas aplantviralvector. In addition that to attacking plants in the field, green peach aphid readily infests vegetables and ornamental plants grown in greenhouses. This allows high levels of survival in areas with inclement weather, and favors ready transport on plant material. When young plants are infested in the greenhouse and then transplanted into the field, fields will not only be inoculated with aphids but insecticide resistance may be introduced. These aphids also can be transported long distances by wind and storms (Capinera, 2011).

*M. persicae*can attack potato plant from young plant, especially high population at young leaves. It caused damaged on young plant tissues, causing water stress, wilting and

reduced growth rate of the plant. Prolonged aphid infestation can cause appreciable reduction in the yield of potato. Early season infestation is particularly damaging to potato, even if the aphids are subsequently removed. This aphid also a vector of viruses, and yYield loses caused by these viruses can be as high as 90% depending on cultivar, infestation and environmental conditions (Saljoqi, 2009).The life cycle of *M. persicae*may be holocyclic or anholocyclic. In temperate regions, where it often exhibits a holocycle (with an annual sexual phase), it alternates between a primary and secondary host. Eggs are laid in winter on the primary woody winter host peach, *Prunuspersica.* The subsequent generations colonize the secondary hosts from various families such as Compositae, Cruciferae and Solanaceae (van Emden *et al*., 1969).

Intercropping is the cultivation of two or more crops atthe same time in the same field. This method is adoptep sustainableagriculture concept which at least use nature as the modelfor designing agricultural systems. Due to the factthat nature integrates her plants and animals intodiverse landscape, a major aim of sustainableagriculture is efficiency and there are no wasteproducts in nature. The practices whichpromote diversity and stability on the farm areenterprise diversification, crop rotation, use of windbreaks, provision of more habitats formicroorganisms, intercropping and integration of cropfarming with livestock production (Reddy *et al* 1992 *in*Ouma and Jeruto. 2010). Studies have shown that multiple cropping has been advantageous in reducing insect pests and disease damage in some areas through diversifying the cropping system by introducing plant species that are nonhosts for certain insects and diseases (Jones, 2007).

Various studiesshowedthatintercropping patternseffectivelyreducepestsinagro-ecosystems. DeSousa(2007) reportedthatthere isreduction inthe incidence of pest attack sarevery significant in the cropping patternof intercropping maize with cotton compared to the monoculture cropping of cornand cotton. According to Ouma & Jeruto (2010) inter cropping pattern in horticultural crops will be increase diversifitas and stability of agricultural ecosystems, increase farmers income, reduce soil erosion and reduce investment pests and plant diseases. Sutrisna, *et al* (2010) reported that intercropping potato and celerycan lower leaf pests Trips by 44 percent and pestaphids *M. persicae* by 55.6 percent in the potato crop. Koestoni and Sastrosiswojo (1985) also found that a declining in attacks potato aphids M. *persicae* on potato crop intercropping with maize and sun flower.

This study aims to determine how the population dynamics of *M.persicae* on intercropping of potato with different plants,s o thatcan be use as a strategy to control the pest.

**Materials and Methods**

This study was conducted at BalaiBenihIndukKentang, Berastagi begin at February 2013 until May 2013. Study arranged by Split Plot Design with three replicates. Main plot are time planting of intercrop plant and sub plot are kind of plant. There are six intercrops plantrespectively were cabbage (P2), celery(P3), mustard (P4), onions (P5), carrot (P6)and bean (P7). As a comparative is monoculture of potato (P1). Each plot was 3 m 5 x m, row to row distance was 75 cm and plant to plant was 30 cm. At the time of sowing, manure were applied at the normal recommended rates, while after one-month urea fertilizer was applied. Other agronomic practices i.e. irrigation, hoeing, weeding and earthing-up were done as necessary. The data of population density of *M. persicae*and its associated natural enemies was recorded from the date of start of initial aphid infestation up to harvest of the crop.

-*Myzuspersicae* Population Estimate

Aphids were counted on three tagged leaves on each plant, one each in the top, middle and lower regions of three randomly selected plants, avoiding the border rows, from each plot. Mean aphid population per leaf was calculated at the end of the season. The data was recorded on the same leaves on weekly basis.

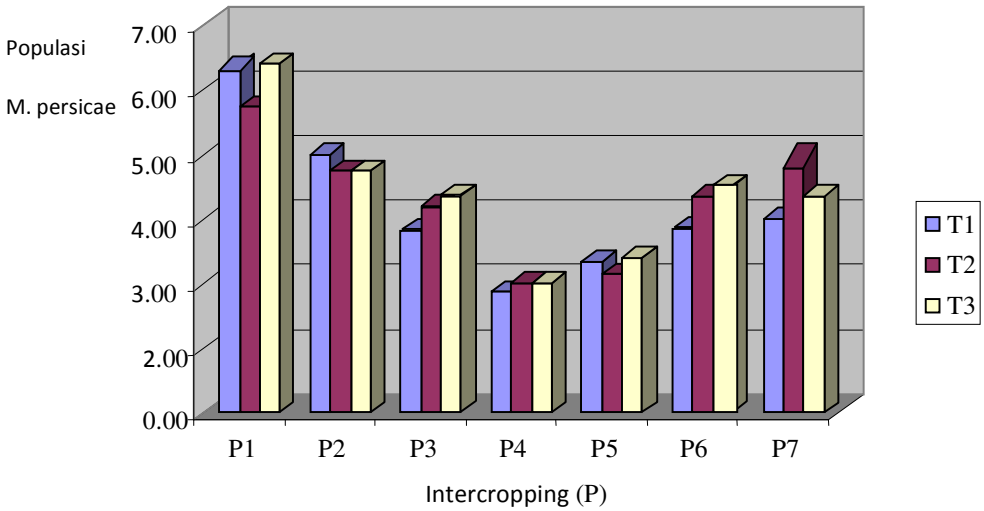
-*Natural Enemies* Population Estimate

Natural enemies population i.e. *C. septempunctata*; *E. balteatus; C. carnea; and braconid wasp, A. matricariae*data (Mummies) was collected per potato plant, by selecting three plants from each replicate.

**Results and Discussion**

Analysis of variance showedthat thetime plantingofintercroppingcrop did not significanlyaffectthe population dinamic of M. persicae and the natural enemies. This is because theparticularpestthat attackspotatoleavesgenerallybegin toattack thepotatocropduringa month after plantingsowhen plantingcropsintercroppingdid notsignificantly affectinvestmentpests inagro-ecosystems.

On the other hand, the population dinamic of M. persicae and the haturalenemiessifnificantly affect by kind of intercropping plant. Population density of *M. persicae*showed significant variations every observation. *M. persicae*remained a consistent pest with different densities throughout the different intercropping crop and planting time




(Fig 1).

Figure1. Population of *M. Persicae* at kinds of intercropping plant on different planting time

Population density of *M. persicae*significantly increased during the first six weeks. *M. persicae*was first recorded at three weeks after planting of potato.

Thekindofintercroppingplantssignificantly reduced the number of aphid. The lowest number of aphid found respectively in inter cropping potatoes and mustard, potatoesandonions, andpotatoesandcelery. There was 0.80 aphids / leaf, 1,12 aphids/leaf, 1,48 aphids/leaf at first observation. At the second observation found the number of aphid

was lowest at intercropping potatoes and mustards were 1,68 aphid/leaf, at popatoes and onions were 3,28 aphid/leaf, at popatoes and celery 3,00 aphid/leaf. The number of aphids steadily increased with significant at differences intercroppingplant till the thirdobservation respectively where 2,80 aphid/leaf, 3,42 aphid / leaf and 4,20 aphid/leaf were recorded (Table 1).

Table 1. Population of *M. persicae* per leaf on different intercropping plant

at 3, 6 and 9 weeks after planting of potato

| **Planting system** | **3 weeks** | **6 weeks** | **9 weeks** |
|---|---|---|---|
| Potato | 3.60d | 5.10d | 6.70d |
| Potato with cabbage | 3.25c | 3.80c | 4.80c |
| Potato with celery | 1.48a | 3.00b | 4.20b |
| Potato with mustard | 0.80a | 1.68a | 2.80a |
| Potato with Onion | 1.12a | 3.28b | 3.42ab |
| Potato with carrot | 1.80b | 3.68bc | 4.30b |
| Potato with bean | 2.10b | 2.90b | 4.68bc |

Note :Analyzing the results with ANOVA and Duncan test at P 5%.

Observation for natural enemies of *M. persicae* showed that fewnatural enemiesfound in theagro-ecosystem. There are *Episyrphusbalteatus*, *Chrysoperlacarnea*, *Aphidiusmatricarieae* and *Coccinellaseptempunctata.* The population density of all of the natural enemies was highest at polyculture than monoculture of potato. After that, as the population of *M. persicae* started decline, the same trend was followed by all of its natural enemies.

**Conclusions**

1. The kind of intercroppingplantssignificantly reduced the number of *M. persicae* on intercropping system.
2. The lowest number of population of M. persicaefoundrespectively inintercroppingpotatoesandmustard, potatoesandonions, andpotatoesandcelery.
3. The number of natural enemies significantly increase at intercropping system. There are *Episyrphusbalteatus*, *Chrysoperlacarnea*, *Aphidiusmatricarieae* and *Coccinellaseptempunctata.*

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