The Effect of Siam Weed (Chromolaenaodorata L.) on the Diversity of Pest and Natural Enemies in Soybean and Corn Plant Intercropping

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Intercropping systems generally provide a higher yield when combined crop cultivation is done appropriately. Chromolaenaodorata L. has a secondary metabolite that is flavononas, flavonas, khalkones, tannin, aromatic acids and essential oils. The objective is to determine the effect on the development siam weed plant pests and natural enemies of soybean and corn intercropping system. experiment using Randomized Completed Block Design (RCBD) one factor, consist C0 (Corn X Soybean (control); C1 (3 C.odorata X Soybean X corn); C2 (6 C.odorata X Soybean XCorn); C3 (9 C.odorataXSoybean Xcorn); and C4 (12 C.odorata x soybean x Corn, All treatment was repeated three times to obtain 15 combined treatment of the data were analyzed by Analysis of Variance (ANOVA) The results, highest diversity index in C0 2.50, and the diversity index lowest in 2.28, the level of damage to corn plants minimum 3. 03% are in C1, the maximum amount of 79.77 g soybean pod fruit and seed weight of 20.21g maximum at C1. Cob maximum weight of 753.3 g and maximum weight of seeds of 586.7 g everything contained in C1

Keywords: *chromolaenaodorata L., pest, natural enemies, corn, soybean, intercropping*

I. INTRODUCTION

Food plant commodity plays a basic role to meet the domestic need for food, cattle food and industry tending to increase over year as the number of population increases and the food and cattle food industry develops; therefore the function of National Food Tenacity becomes very important and strategic. The food plant commodities whose demand increases continuously are corn and soybean. On the other hand, the intensive development of corn and soybean results in such problems as decreasing production and quality of seed. The constraints in corn and soybean cultivation resulting in low productivity is pest and disease attack as biotic factor (Achmad and Tandiabang, 2001).

In corn and soybean planting, there are some types of pest with important status: seed fly (*Atherigona*sp.), soil worm (*Agrothis*sp.), stem borer of corn (*Ostriniafurnacalis*), armyworm (*Spodopteralitura, Mythimna*sp.), cob borer (*Helicoverpaarmigera*), and grass hopper (*Valanganigricornnis*), and *Hypomecessquamosus*in corn and grasshopper (*Valanganigricornis*), cricket (*Metiochevittaticollis*), *Riptortusliniaris,* and beetle in soybean.

Siam weed (*C. odorata*) belonging to *Asteraceae*family is a pasture weed distributed very widely in Indonesia, with stinging fragrance, not damaged due to pest and disease attack, used as traditional medicine to heal disease or dangerous to human or animal health and used by the community to control pest and disease.Thamrin*et al*., (2007) added that the plant collected can be generally used as medicine, but some plants can be poisonous particularly to skin and some of them has stinging odor. From the result of exploration, there are 122 plant kinds putatively serving as insecticide.

This plant contains secondary metabolite compound. From this isolation of plant, some substances were obtained: alcohol,*flavononas*, *flavones*, *chaconnes*, aromatic acid and essential oil. Essential oil of leave can putatively suppress the growth of some pathogenic fungi including *Pyriculariagrisea*, *Fusariumoxysporum*and*Phytophthoranicotiana*(Sant osh andGouri, 2010).

Pest control can be carried out using habitat manipulation. Habitat manipulation is carried out by planting the plant inside the land or around the planting to improve habitat diversity. Wide plant is an important component of agro-ecosystem, because it can affect positively the biology and dynamics of natural enemies (Asikin and Thamrin 2010). Nicholls (2004) added that wild plant growing around the planting serves not only as shelter and refuge for the natural enemies when the environment condition is incompatible, but also to provide an alternative host and supplemental food for the parasitoid imago such

as pollen and nectar of flowering plant and honey dew produced by homoptera order.

Viewed from its character, Siam weed is potential to be used as intercrop as the attempt of manipulating habitat for the development of natural enemies, but no study has investigated this potency. This research is intended to examine how the comparison is between Siam weed used as intercrop on the development of pest and natural enemies in the habitat of soybean and corn planting. This research aimed to find out the effect of Siam weed as intercrop on the development of pest and natural enemies in soybean and corn plants in intercropping system and to find out the number of Siam weed plants most compatible in corn and soybean intercropping land contributing to its output.

II. MATERIAL AND METHOD

This research was taken place in Gejigan Village, KelurahanGagakSipat, Ngemplak Sub District, Boyolali Regency, Central Java, at 126 m altitude. This research was conducted for 9 months from September 2015 to March 2016. The materials used in this research were soybean seed, corn seed, Siam weed (*C. odorata*), and to prepare compost fertilizer, the instruments used were hoe, watering can, sickle, raffia rope, roll meter, analytic balance, camera and stationeries. The design used in this research was completely group random design with one-factor treatment: Siam weed (*C. odorata*) was intercropped with soybean and corn plant. C0 = Soybean X Corn (control), C1 = 3 *C. odorata* plants X soybean X corn (per compartment), C2 = 6 *C. odorata* plants X soybean X corn (per compartment), C3 = 9 *C. odorata* plants X soybean X corn (per compartment), C4 = 12 *C. odorata* plants X soybean X corn (per compartment); all treatment were conducted in three replication so that 15 treatment combinations were obtained. The population of pest and natural enemies was calculated in corn and soybean plants in all treatments. The observation on the population number of pest and enemy was conducted once in 6 weeks.

Diversity index analysis of pest and natural enemy's insects was conducted using Shannon-Weaver's diversity index formula, shown below.

$$H' = -\sum_{i=1}^{n} P1.ln.P1$$

where:

H' = diversity index of kind
Pi = n_i / N
n_i = the kind individual of-i
N = Total number of all kind individuals Diversity index interval (Shannon-Weiner, 1949)

If :

$H' < 2.3026$ = diversity is small and community stability is low.
$2.3026 < H' < 6.9078$ = Medium diversity and medium community stability
$H' > 6.9078$ = High diversity and high community stability

Notes:

I: Planting damage level
ni : Plant number with the *i*-the score
Vi : Attack score value
N : Number of plants observed
V : Highest score

The score level used is as follow:
0= Healthy
1= Very mild (1-20%)
2= Mild (21-40%)
3= Moderate (41-60%)
4= Severe (61-80%)
5= Very severe (81-100%)

Parameter 1) The number of soybean pods per sample plant was calculated in the end of investigation and after harvest by calculating those in each compartment plant. 2) The soybean seed weight per sample plant was weighed using balance after harvesting time. 3) Corn knob weight per sample plant was weighed using balance after harvesting time. 4) The corn seed weight per sample plant was weighed using balance following with seed weight per plant.

All of data obtained from the result of observation was analyzed using variance analysis (ANOVA) to find out whether or not there is a significant difference between treatments. Further test will conducted in the treatment with significant difference with HSD 5%.

III. RESULT AND DISCUSSION

Siam weed planting in corn and soybean intercropping affects significantly the existence of corn plant pests, *Hypomecessquamosus* and grasshopper, at 6 weeks after planting (**Table 1**). The highest number of *H. squamosus* is 4 occurring in C4 treatment, but it is not different significantly from that in C0 (10) and C3 (10.33); it is because *H.* *squamosus* insect is very resistant to Siam weedleaves' excessive aroma and otherwise, without Siam weed planting; the more is the Siam weed plants intercropped with corn plant, the more supporting is the ecosystem, the higher is the existence of insect, and the higher is the existence of insects C0 (control) because there is no antiseptic to prevent the presence of pest so that the number of pest increases.

Table 1. The average population of pest and natural enemies in corn at 6 weeks after planting

6 WAP		TREATMENT				
		C0	**C1**	**C2**	**C3**	**C4**
PEST	*Hypomecessquamosus*	10 b	4.67 a	9.33 a	10.33 b	14.00 b
	Grasshopper	2 c	0.33 a	1.67 bc	1.00 abc	0.67 ab
NATURAL ENEMIES	**Praying mantis**	1.00 a	2.00 a	0.00 a	0.00 a	2.00 a
	Coccinella	3.00 ab	6.67 c	0.67 a	5.67 bc	0.00 a
	Trichogramma	7.33 a	17.33 b	8.33 a	7.00 a	11.33 ab
	Earwigs	1.00 ab	6.67 c	4.00 bc	3.33 ab	0.67 a

Notes: C0= Corn X Soybean (Control), C1= 3 Siam weed X Corn X Soybean, C2= 6 Siam weed X Corn X Soybean, C3= 9 Siam weed X Corn X Soybean, C4= 12 Siam weed X Corn X Soybean. The number followed with the same letter on the same row shows no significant difference in the test at HSD 5%.

The lowest number of *H. squamosus* is 4.67 occurring in C1 treatment, it occurs because the presence of siam weedplanted in between corn plants affects very significantly, in which its leaves aroma can prevent the insect from going down further compared with other treatment. The chemical compounds (*alkoloid*, *saponin*, *flavonoid* and *tannin*) contained in Siam weed plant play their own roles; alkaloid serves as the protector against pest attack and tannin is antiseptic to prevent the insect pest that will disturb the corresponding plant's life (Djamal, 1990).

The average population in the highest grasshopper is 2 existing in C0, while the lowest one is 0.33 in C1; it is because in C1 treatment (Siam weed planted in between corn plants) releases adequate leaves aroma very effectively so that the grasshopper invasion decreases, as indicated with the chemical substance (tannin) contained in Siam weed plant serving as antiseptic to prevent the pest invasion that will disturb the corresponding plant's life (Djamal, 1990).

The average population natural enemies of corn (*Coccinella, Trichogramma* and Earwigs) affects the corn plant significantly but that of praying mantis does not affect significantly at 6 weeks after planting. The average of all the population of natural enemies of the highest in the treatment of C1 treatment: 6.67 for *Coccinella*, 17,33 for *Trichogramma*, 6.67 for Earwigs and the highest population of praying mantis also occurs in C1 treatment, because the siam weed planting in between corn plants can improve the habitat diversity of natural enemies and provide adequate supplemental food, and C1 has distinctive attraction so that the number of natural enemies increases in this treatment. Wild plant is an important component of agro-ecosystem because it affects positively the biology and dynamics of natural enemies (Asikin and Thamrin, 2010). (Nicholls, 2004) added that wild plant growing around the planting serves not only as shelter and refuge for the natural enemies when the environment condition is incompatible, but also to provide an alternative host and supplemental food for the adult parasitoid imago such as pollen and leave aroma or flower of the plant. The treatment in which the presence of natural enemies is low occurs because inadequate supplement food for insect and the treatment does not attract the natural enemies.

Table 2. The average population of pest and natural enemies in corn at 12 weeks after planting

12 WAP		Treatment				
		C0	**C1**	**C2**	**C3**	**C4**
PEST	*Hypomecessquamosus*	3.67 b	0.00. a	1.67 ab	1.00 a	0.67 a
	Grasshopper	3.33 b	0.33 a	0.67 a	1.3 a	1.33 a
	Armyworm	12.67 b	2.67 a	2.00 a	7.67 ab	8.00 ab
	Cob borer	6.00. b	0.00 a	7.67 b	7.67 b	5. 67 b
NATURAL	**Praying mantis**	0.67 a	2.33 b	0.67 a	0.00 a	0.67 a

| ENEMIES | *Coccinella* | 1.33 a | 3.00 a | 0.33 a | 1.00 a | 1.67 a |
| | Earwigs | 0.33 a | 2.00 a | 0.33 a | 0.67 a | 0.00 a |

Notes: C0= Corn X Soybean (Control), C1= 3 Siam weed X Corn X Soybean, C2= 6 Siam weed X Corn X Soybean, C3= 9 Siam weed X Corn X Soybean, C4= 12 Siam weed X Corn X Soybean. The number followed with the same letter on the same row shows no significant difference in the test at HSD 5%.

Siam weed planting in corn and soybean intercropping affects significantly the presence of corn pests including *H.squamosus*, grasshopper, armyworm and cob borers at the 12 weeks after planting. The average population of all pests highest in the treatment C0: 3.67 for *H. squamosus*, 3.33 for grasshopper, 12.67 for armyworm, and 6 for cob borers. All insects reach the highest number in C0 (control) because in C0 there is no leaves aroma to preclude the presence of pest so that in C0, the pests attack more effectively and average of all pest population low in the treatment of C1 because in this treatment, the siamweed planted in between corn plants affects significantly by releasing leaves aroma inhibiting the presence of insects effectively. This is confirmed by (Thamrin*et al,* 2013) finding that Siam weed contains *Pryrrolizidinealkaloids* that is poisonous and this content results in stinging odor, bitterness, and contains *repellent* and *allelopathy*.The

average population of natural enemies of the corn plants that have a significant effect for Praying mantis, but *Coccinella* and Earwigs did not have significant effect at the 12 weeks after planting.

The average of all the population of natural enemies of the highest in the treatment of C1: 2.33 for Praying mantis, 3.00 for *Coccinella*, and 2 for Earwigs. It occurs because this treatment provides the adequate food for the natural enemies and the Siam weed planting in between corn plants in this treatment can improve the natural enemy invasion because the agro-ecosystem in the land is very supporting. It is confirmed by Thamrin and Asikin (2003), The predator's interestedness in weed because weed has attractive substance *lipid* that is volatile and aromatic and insects are attracted with the fragrance emitted by plant. The fragrance is essentially a volatile chemical substance like alcohol, ether and essential oil.

Table 3.The average population of pest and natural enemies in soybean at 6 weeks after planting

6 WAP		TREATMENT				
		C0	**C1**	**C2**	**C3**	**C4**
PEST	**Grasshopper**	2.00 a	0.67 a	0.67 a	0.67 a	1.33 a
	RiptortusLiniaris	9.33 c	6.33 b	8.67 b	8.00 b	3.33 a
Natural Enemies	*Coccinella*	3.00 ab	5.67 b	2.33 a	3.00 ab	2.67 a
	Trichogramma	7.33 a	12.67 b	8.00 ab	4.00 a	6.00 a
	Praying mantis	0.33 a	2.00 b	0.00 a	0.67 a	0.67 a
	Earwigs	0.33 a	5.00 b	1.33 a	1.33 a	0.67 a

Notes: C0= Corn X Soybean (Control), C1= 3 Siam weedX Corn X Soybean, C2= 6 Siam weed X Corn X Soybean, C3= 9 Siam weed X Corn X Soybean, C4= 12 Siam weed X Corn X Soybean. The number followed with the same letter on the same row shows no significant difference in the test at HSD 5%.

Siam weed planting in corn and soybean intercropping affects significantly the presence of soybean plant's pest, *RiptortusLiniaris*, but does not affect significantly the presence of *grasshopper* at the 6 weeks after planting(**Table 3**). The average population *RiptortusLiniaris* highest is 9.33 occurring in C0, while the lowest one is 3.33 in C4. It is because the ecosystem in C0 is very suitable for *RiptortusLiniaris* insect to look for food so that the average number of this insect is higher than that in other treatment, while the lowest one occurs in C4 treatment because in this treatment, Siam weed is planted in between soybean plants resulting in leaves aroma that can reduce the intensity of *RiptortusLiniaris* insect or the ecosystem in this treatment is not suitable leading to the lower number of population. It is confirmed by (Dantje, 2010) stating that when the organism finds suitable place and can compete with preexisting organisms, the

incoming organism will be able to stay. (Hari, 2010) confirmed this as well suggesting that when the insect is dumped off at a place with suitable climate and living environment where considerable food source and adequate space are available, the insect pest will proliferate uncontrollably.

The presence of grasshopper pest does not affect significantly, but its highest population number of 2 occurs in CO and the lowest one of 0.67 occurs in C1, C2, and C3. It occurs because in C0 Siam weed is not planted in between soybean plants to contribute to the presence of grasshopper so that the presence of pest increases in C0 and decreases in C1, C2 and C3 treatments because in this treatment, the siam weedplanted in between soybean plants can repel the pest through aroma released so that in these three treatments, the number of grasshopper pest is smaller than that in other treatment. It is in line with (Fernia, 2015) finding that repellent plant will protect

the plants adjacent with the fragrances it releases, shape and leaves color or typical flower hated by the pests, so that the pests will keep far away from the main plant.Siam weed planting in corn and soybean intercropping affects significantly the presence of soybean's natural enemies *Coccinella*, *Trichogramma*, Praying mantis and Earwigs when the plant is 6 weeks old after planting. All The natural enemies of the highest average in the treatment of C1: 5.67 for *coccinella*, 12.67 for *trichogramma*, 2.00 for Praying mantis, and 5.00 for EarwigsThe planting of three Siam weedplants in between soybean plants (C1) affects significantly the population of natural enemies, in which the population of natural enemies increases in one treatment, so that the higher the intensity of natural enemies, the lower is the plant damage level, or C1 is very potentially presents the natural enemies attack because they are attracted with fragrance or color to get food and the agro-ecosystem in this treatment is highly supporting so that the number of natural enemies increases. (Nia, 2015) suggested that the more heterogeneous the physical environment, the more complex are its flora and fauna. The findings of other studies show that the increasingly diverse plant can increase the abundance and the diversity of *entomofaga* predator (Paredes*et al*., 2013).

Both *Riptortusliniaris* and *Nezaraviridula* affect C0 (control)at 12 weeks after planting of soybean **(Table 4)** . It is because there is no siam weed planting in between soybean plants so that the average of population of pest in C0 is higher than that in other treatment. The lowest number of Soybean plant's pest, *Riptortusliniaris*and *Nezaraviridula*, occurs in C4 and C1. It is because the Siam weed planted in between soybean plants contains chemical substance repelling the pest effectively, particularly *Riptortusliniaris* in C4, and *nezaraviridula*in C1 treatments. The result of previous studies (Santosh and Gouri, 2010) found that siam weed plant contains *steroid*, *triterpene*, *alkaloid*, *flavonoid*, *tannin*, *diterpene*, *saponin*, *glicoside*, *lactone* and *tannin* constituting antiseptics to prevent the insect pest attack when it disturbs the corresponding plant's life. Grasshopper pest does not affect significantly but its highest population number of 1.67 occurs in C2, C3, and C0 (control) and it is absent in C1 because the siam weed planted in between the soybean plants releases leaves aroma sufficient to prevent the insect from attacking, but grasshopper pest can survive to look for food in all treatment so that the presence of this pest does not affect significantly in all treatments.

Table 4.The average population of pest and natural enemies in soybean at 12 weeks after planting

12 WAP		TREATMENT				
		C0	**C1**	**C2**	**C3**	**C4**
PESTS	**Grasshopper**	1. 67 a	0.00 a	1.67 a	1.67 a	0.33 a
	RiptortusLiniaris	11.00 b	3.00 a	5.00 a	5.00 a	2.67 a
	NezaraViridula	4.00 b	0.00 a	0.67 a	0.33 a	0.33 a
Natural Enemies	*Coccinella*	1.67 a	6.00 b	2.67 ab	2.00 ab	2.00 ab
	Trichogramma	0.00 a	4.00 b	2.33 ab	1.00 ab	1.67 ab
	Praying mantis	0.33 a	1.67 b	0.33 a	0.33 a	0.00 a

Notes: C0= Corn X Soybean (Control), C1= 3 Siam weed X Corn X Soybean, C2= 6 Siam weed X Corn X Soybean, C3= 9 Siam weed X Corn X Soybean, C4= 12 Siam weed X Corn X Soybean. The number followed with the same letter on the same row shows no significant difference in the test at HSD 5%.

All of natural enemies have significant effect in C1, 6.00 for *coccinella,* 4.00 for *trichogramma*, and 1.67 for praying mantis. In C1 treatment the planting of some Siam weed plants in between soybean plants may release leaves aroma sufficient to generate natural enemies, so that there is always an increase in the number of natural enemies in this treatment (Paredes*et al*, 2013). Vegetation planting surrounding the plant can reduce the density of pest population and can increase the predator abundance, and the environment factor in C1 treatment is assumed to be very suitable so that the presence of natural enemies in this treatment always affects significantly. It is confirmed by (Khodijah, 2014) stating that the population of natural enemies will increase when the population density of prey

(pest insect) is available adequately and supported by other factors.

Considering an ecosystem indicated with diversity index**(Table 5)**, it can be found that the higher the diversity index, the more stable is the ecosystem. From the table above, it can be seen that the diversity indexes of all treatment are relatively high, but the highest population number of pest and natural enemies is 2.50 occurring in C0 (control), because no Siam weed planted in between corn and soybean plants so that the pest population increases more than the natural enemies, and in C1, the presence of pest and natural enemies is very low, 2.28, in which the number of corn and soybean plants pest decreases because the presence of Siam weedin between corn and soybean plants not only prevents

the pest insect attack but also generates the natural enemies so that in this treatment, the presence of natural enemies increases more than that of pest, or Siam weed planted in between corn and soybean plants makes the agro-ecosystem very suitable for the natural enemies to shelter. It is in line with (Nia, 2015) stating that the more heterogeneous the physical environment, the more complex are its flora and fauna. The findings of other studies show that the increasingly diverse plant can increase the abundance and the diversity of *entomofaga* predator (Paredes*et al*, 2013).

Table 5. The Diversity index of pest and natural enemies

Treatment	Diversity Index
C0	2.50
C1	2.28
C2	2.44
C3	2.48
C4	2.37

Notes: C0 = Corn X Soybean (Control), C1= 3 Siam weed X Corn X Soybean, C2= 6 Siam weed X Corn X Soybean, C3= 9 Siam weed X Corn X Soybean, C4= 12 Siam weed X Corn X Soybean.

The damage level of corn and soybean plants has significant effect(**Table 6**). The average of lowest damage is 2.22% for soybean and 3.03% for corn in C1 treatment. It occurs because the planting of siam weed in between corn and soybean plant suppresses the presence of pest insect very effectively through the existing leaves aroma and this treatment has attractive substance as well, in the form of *lipid* that is volatile and aromatic, so that many predators are likely attracted to come into it, and this treatment has distinctive attractive substance, that is, the fragrance emitted by Siam weed.

Table 6. The average level of Damage to the Corn and Soybean crops

Treatment	Damage Level of Soybean Plant %	Damage Level of Corn Plant %
C0	5.67 b	6.77 c
C1	2.22 a	3.03 a
C2	5.33 b	4.89 b
C3	6.00 b	5.88 bc
C4	5.77 b	5.89 bc

Notes: C0= Corn X Soybean (Control), C1= 3 Siam weed X Corn X Soybean, C2= 6 Siam weed X Corn X Soybean, C3= 9 Siam weed X Corn X Soybean, C4= 12 Siam weed X Corn X Soybean. The number followed with the same letter on the same row shows no significant difference in the test at HSD 5%.

The highest damage level of soybean is 6.00% occurring in C3 but it is not different significantly from that in other treatments than C1, and the highest damage level of corn plant is 6.77% occurring in C0, because the planting of some Siam weed plants in between corn and soybean plants results in excessive leaves aroma that can generate pest and inhibit the presence of natural enemies, so that the damage level is highest in C2, C3, and C3 treatment. It is in line with (Nia, 2005) finding that the plant producing volatile oil serves as insect repellant or insect attractant.

The average productivity of soybean has significant effect(**Table 7**); the highest number of soybean pods is 79.77 pods and the highest soybean seed weight is 20.21 g, all of which occur in C1. Weed sometimes serves as the pest's shelter but it can also be the host of natural enemies, so the planting of some Siam weed plants in between soybean plants in C1 is very appropriate to inhibit the existence of pest thereby decreases the damage of soybean's pod and seed. (Adrianto T.T and Indarto N, 2004) stated that soybean planting using appropriate intercropping system can avoid the plant from pest attack. The lowest number of soybean pods is 46.66 and that of seed weight is 14.28, both of which occurs in C3 treatment because the planting of Siam weed plant in between corn and soybean plants can provide an appropriate dwelling for the main pest of soybean plant so that in these two treatments, the number of pest increases, so do the damage levels of soybean pods and seed. (Hasibuan*et al*., 1997) suggested that the pod damage is highly affected by the density level of *N. viridula* pest population, the higher the pest population density, the higher is the damage of pods.

Table 7. The average yield of soybean and corn crops

Treatment	The Number of Soybean pods (pod)	Soybean Seed Weight (g)	Cob Weight of Corn (g)	Seed Weight of Corn (g)
C0	59.22 ab	14.84 ab	703.3 a	543.3 a
C1	79.77 b	20.21 c	753.3 a	586.7 a
C2	65.89 ab	16.71 b	746.7 a	583.3 a

C3	46.66 a	14.28 a	713.3 a	563.3 a
C4	61.22 ab	15.81 b	703.3 a	543.3 a

Notes: C0= Corn X Soybean (Control), C1= 3 Siam weed X Corn X Soybean, C2= 6 Siam weed X Corn X Soybean, C3= 9 Siam weed X Corn X Soybean, C4= 12 Siam weed X Corn X Soybean. The number followed with the same letter on the same row shows no significant difference in the test at HSD 5%.

Not all productivities of corn plant affects significantly. But the highest cob weight is 753.3 g and the seed weight is 586.7 g, both of which occurs in C1 because in this treatment, the planting of Siam weed plant in between corn plant result in no competition and its roots also benefit the corn plant so that this treatment always provides the best outcome and otherwise, the excessive treatment of Siam weed plant or no Siam weed plant leads to the decrease in knob weight and seed weight of corn because the more number of Siam weed plants in between corn plants increases the competition for water and mineral so that the treatment of no- Siam weed in between the corn plant decreases the seed weight due to inadequate supplement food material from the root of Siam weed plant that is rich of Nitrogen. (Dody, 2005) said that a plant's growth and productivity are affected by its growth environment condition and one of growth environments important to the plant growth is the availability of mineral and the pest control.

IV. CONCLUSION

The highest diversity index of pest and natural enemies is 2.50 occurring in C0 because there is no fragrance emitted by Siam weed plant so that the presence of pest increases and the lowest one is 2.28 occurring in C1 because C1 has distinctive attractant and the planting of Siam weed plant in between corn and soybean plants makes the agro-ecosystem in C1 treatment very suitable for the natural enemies to shelter, thereby increasing the presence of natural enemies compared with the presence of pest. The planting of corn and soybean in intercropping system with three Siam weed plants results in the minimum damage level of 2.22 % for soybean.

The planting of corn and soybean in intercropping system with three Siam weed plants results in the minimum damage level of 3.03% for corn. The planting of corn and soybean in intercropping system with three Siam weed plants results in the maximum pod number of 79.77 g and the maximum seed weight of 20.21 g for soybean. The planting of corn and soybean in intercropping system with three Siam weed plants results in the maximum knob weight of 753.3 g and the maximum seed weight of 586.7 g for corn.

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