ARTICLE

Incidence of insect pests on *Hibiscus rosa sinensis* L. germaplasm in the plant nursery

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ABSTRACT

This study was undertaken to document the prevalent insect pest fauna on 119 *Hibiscus* germplasm causing considerable damage to mature plants. The *Hibiscus* breeding populations were maintained in the IPB Nursery. The presence of insect pests was taken during the dry seasons of February 2014 and January 2015 among each entry. The results showed a high percent incidence of flea beetle, mealybugs, and soft scale insects. The mean percentage incidence of the insects ranged from 20-80% among foreign released varieties, IPB released varieties, IPB experimental hybrids and local accessions. Other occasional pests that should also be monitored are the leafhopper, aphids, and tussock moth. During the observation period, a high incidence of insect pests was observed during January 2015 dry season. This study emphasized the importance of familiarity with the important insect pests of *Hibiscus* for field scouting to determine pest populations and their well-timed control.

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KEYWORDS

flea beetle, mealybugs, soft scale insect

INRODUCTION

The *Hibiscus rosa-sinensis* L., more popularly known as 'gumamela' or rosemallow is a large flowering shrub that grows to about 5m tall. It belongs to the Family Malvaceae and is a native of China. It is one of the most widely cultivated flowering plants in tropical and sub-tropical places including Asia and specifically, the Philippines (Magdalita et al., 2010). The plant is not only used for landscaping but more recently, the five-petal type *Hibiscus* is known for its wide range of ethnomedicinal values (Kumar and Singh, 2012). The flowers are used as astringent (facial cleanser) and contain substantial quantities of flavonoids and proanthocyanidins, which are good antioxidants, antipyretic (fever-reducing), analgesic (pain-relieving), and spasmolytic (spasm-inhibiting) agents (Rummel, 2005). The red flowers are purgative, anti-dysmenorrheal, and may sometimes be an abortifacient (Ragasa and Rufino, 2011). An infusion of the flowers is used as an expectorant in bronchitis and gonorrhea and as a refrigerant drink against fevers and a demulcent for coughs. The dark red petals in the form of mucilaginous infusion are used to treat ardor urinae, strangury, cystitis, and other irritable conditions of the genital-urinary tract. Paste from the flower buds is applied as a poultice to boils, cancerous swellings, and mumps (Quisumbing, 1978; Ong and Kim, 2014).

The roots contain a mucilage that is soothing on the mucous membranes of the digestive and respiratory tracts (Sharma and Sultana, 2004). The other compounds that have been isolated from *Hibiscus* are quercetin, hentriacontane, calcium oxalate, thiamine, riboflavin, niacin, and ascorbic acid (Rummel, 2005; Pekamwar *et al.,* 2013). *Hibiscus* also contains acidic polysaccharides that stimulate specialized skin cells, modulate immunity, and presumably promote wound healing. Furthermore, it contains a high concentration (15 to 30%) of simple organic acids such as citric and malic acids (Rummel, 2005). They are essential ingredients in the manufacture of herbal shampoo and oil for the cosmetic industry, and the preparation of special beverages like the *Hibiscus* herbal tea.

The Institute of Plant Breeding, College of Agriculture & Food Science, University of the Philippines Los Baños (IPB, CAFS-UPLB) developed several *Hibiscus* hybrids that are now commercially grown country-wide as landscape materials (Pimentel, 1999; Magdalita *et al*., 2009). Different popular series of *Hibiscus* hybrids include the 'Centennial', 'Millenium', 'Celebrity Star', 'Oblation', 'Women in Science', 'Women in Public Service' and Women in the Arts', 'Women Saints' and institutions named after them (Magdalita and Pimentel, 2010; Magdalita *et al.,* 2011). Other *Hibiscus* hybrids were also named after former Commission on Higher Education Chair Patricia B. Licuanan in 2014; UP Manila Chancellor Carmencita David-Padilla in 2015, and National Academy of Science and Technology (NAST) Academician Evelyn Mae T. Mendoza in the same year. In 2019, additional *Hibiscus* hybrids were named after Atty. Gabriela Roldan-Concepcion, wife of UP President Danilo Concepcion, and Mrs. Mariquit B. de la Peña, wife of Department of Science and Technology (DOST) Secretary Fortunato B. de la Peña.

These *Hibiscus* germplasm collections are currently being maintained in the IPB Ornamental Section Nursery. These germplasm materials are commonly attacked by several destructive sucking and chewing insect pests. The occurrence of an infestation can be seasonal or year-round. Insect management is attained through cultural control methods like pruning and sanitation, but most often, the use of chemical control is used by growers. Like economically important food crops, the identification of insect-resistant cultivars is the central component of an effective Insect Pest Management (IPM) (Herm, 2002) as the use of resistant variety is eco-friendly and sustainable. At the time of the COVID-19 pandemic in the country, different ornamental plants including *Hibiscus* are being raised by hobbyists and growers that provide an additional source of income. This study aimed to identify the dominant insect pests attacking different entries of *Hibiscus rosa-sinensis* L., in the nursery based on percentage incidence and provide common feeding damage symptoms that can be associated with the insect pests.

MATERIALS AND METHODS

Hibiscus rosa-sinensis L. Germplasm Collection in the IPB Nursery

A total of 119 entries consisting of foreign released varieties (26), IPB experimental hybrids (66), IPB-released varieties (20), and local collections (7) maintained in the IPB Ornamental Section Nursery were observed for the incidence of insect pests during dry months of 2014 and 2015 (**Table 1**).

Monitoring of Insect Pest Incidence

Five sample plants per entry were observed for the presence of insect pests and their associated feeding damage symptoms on different plant parts (stem, flower bud, leaf, shoot, petiole) were described. The incidence of insect pests was determined by its presence or absence among five sample plants and recorded separately. Representative samples of each specimen were collected, placed in a glass vial with 70% ethyl alcohol, and brought to the IPB Entomology Laboratory for species identification.

Table 1: *Hibiscus* germplasm evaluated for insect pest incidence. IPB 2015.

Hibiscus Germplasm	Number of Entries Evaluated
1. Foreign released varieties	**26**
2. IPB experimental hybrids	**66**
3. IPB released varieties	**20**
4. Local collections	**7**
TOTAL	**119**

Morphological Identification of Selected Insect Pests of *Hibiscus rosa-sinensis* L.

Taxonomic reference literature (Ben-dov, 1994; Miller, 1999; Ebert and Cartwright, 1997) was sought for preliminary identification and species identification was confirmed by insect taxonomists.

Duration and Location of the Study

This study was done during the dry seasons of February 2014 and January 2015 at the IPB-Nursery of Ornamental Crops Section, College of Agriculture and Food Science, University of the Philippines Los Baños.

Statistical Analysis

Descriptive statistics were used in describing, interpreting, and analyzing the data generated for the dry seasons of 2014 and 2015. The germplasm was grouped into types: foreign released varieties, IPB released varieties, IPB experimental hybrids, and local collections. For each group, the percentage incidence of insect pests was monitored among entries.

RESULTS AND DISCUSSION

Breeding of *Hibiscus rosa-sinensis* L.

Breeders have been selecting and breeding for substantial genetic diversity using local and foreign germplasm collections of *Hibiscus.* There are several objectives in developing a novel variety of *Hibiscus*. This includes (1) brightly colored and double whorl flower types; (2) small and variegated leaves, (3) profuse flowering; (4) vigorous growth with strong root system; (5) new flower color; (6) large flower size; (7) dwarf variety; (8) resistance to drought; and (9) resistance to insect pests and diseases. Successful hybridization is done within the species or in between species (=interspecific hybridization). Hobbyists and gardeners propagate *Hibiscus* more commonly used cuttings or grafted/marcotting to create new *Hibiscus* flowers. At IPB, ornamental crops such as *Hibiscus* are one of the commodity crops with the active breeding program. There are about 57 IPB-released varieties since 1995.

Incidence of Important Insect Pests among Germplasm of *Hibiscus rosa-sinensis*

From dry seasons of February 2014 and January to February 2015, a total of 119 *Hibiscus* foreign and IPB released varieties, IPB experimental hybrids, and local accessions maintained at the IPB Ornamental Crop Section were observed for the presence of dominant insect pests and their associated feeding damage symptoms. The dominant insect pests observed were mealybugs, scale insects, and flea beetle (**Table 2, Appendix**

Table 1). The dominant insect pests observed were mealybugs, scale insects, and flea beetle. Damages from these pests may

Table 2: Percentage incidence of dominant insect pests among *Hibiscus*. IPB, Hibiscus Breeding Nursery, 2014-2015.

Observation period	Descriptive Statistics	% Incidence[1] of insect pest per germplasm type											
		Foreign released varieties			IPB-released varieties			IPB Experimental Hybrids			Local accessions		
		Flea beetle	Mealy bugs	Scale insect	Flea beetle	Mealy bugs	Scale insect	Flea beetle	Mealy bugs	Scale insect	Flea beetle	Mealy bugs	Scale insect
February 2014	Mean+SE	37.69± 1.52	34.62± 1.45	41.54± 1.78	27.06± 1.52	27.53± 1.36	32.12± 1.75	28.18± 0.80	25.76± 0.60	26.67± 0.80	40.00± 2.76	48.57± 2.66	45.71± 3.22
	Range	20-60	20-60	20-60	20-60	20-60	20-60	20-80	20-60	20-80	20-60	20-60	20-80
January 2015	Mean+SE	40.77+ 1.75	47.69± 1.49	47.69± 1.65	30.44+ 1.38	35.95± 2.08	38.76± 1.77	29.70± 0.78	30.91± 0.89	34.00± 0.98	48.57± 3.61	40.00± 3.90	42.86± 3.22
	Range	20-80	20-80	20-80	20-60	20-80	20-80	20-60	20-60	20-80	20-80	20-80	20-60

[1] Mean of 5 plants per entry was observed for the presence of insect pests during February 2014 and January 2015.

Appendix Table 1: List of entries of observed for incidence of important insect pests among *Hibiscus rosa-sinensis* L. during dry months of February 2014 and January 2015. IPB, Hibiscus Breeding Nursery, 2014-2015.

Plant No.	Coded Entries	Mean % Incidence per Entry					
		February 2014			January 2015		
		Flea beetle	Mealybugs	Scale insect	Flea beetle	Mealybugs	Scale insect
A. Foreign released varieties							
1	Adorable	0	60	60	60	60	60
2	American Legend	60	40	80	60	40	60
3	Belle DuJour	60	60	60	60	60	60
4	Bold Winds	40	40	60	40	80	40
5	Cely Hermosa	60	40	60	60	60	60
6	Circle Mine	40	60	60	60	40	60
7	City Slicker	40	20	60	60	60	60
8	Coloring Book	40	60	60	80	60	80
9	Coloring Book 2	60	40	40	40	60	80
10	CoulepCon	60	60	60	60	40	20
11	Cristy My Darling	60	40	60	40	40	60
12	Cross Fire	60	60	40	40	60	60
13	Gleen Galen	20	20	20	20	20	20
14	Gold Rain	20	20	20	20	20	20
15	Lion on Winter	20	20	20	20	20	20
16	Mount Shiesta	20	20	20	20	40	60
17	Pink Crème	20	20	20	20	40	60
18	Poom-poom	40	20	20	20	20	20
19	Red Amber	20	20	20	40	40	40
20	Sparkle Round	20	20	20	20	80	60
21	Tahitian Princess	20	20	20	20	40	60
22	Tahitian Tauei	20	20	20	20	40	40
23	Twirl LIBH	20	20	20	20	60	20
24	Vermillion Queen	40	40	60	80	60	40
25	Wagon Wheel	40	40	40	40	60	40
26	Whipped Cream	20	20	60	40	40	40
	Mean	**37.69**	**34.62**	**41.54**	**40.77**	**47.69**	**47.69**
	Range	**20-60**	**20-60**	**20-80**	**20-80**	**20-80**	**20-80**
B. IPB experimental hybrids							

1	(22 x DT) x Che-che	20	40	20	20	20	20
2	(22 x DT) x LH	20	60	60	20	20	20
3	(22 x DT) x MC	20	20	80	20	20	20
4	(57 x 15) x DP	20	20	20	20	20	20
5	(ABA x LL x EFA)	80	20	60	60	40	60
6	(CGC x BGB) x (MDM) x ABA	20	20	20	20	20	20
7	(CV x NB) x MDM	20	20	20	20	20	60
8	(GC x FMD) x ABA	20	20	20	20	20	40
9	(LL X EFA x GC) x LH	20	20	20	20	20	20
10	(LL X EFA) x GC x MC	20	20	20	20	20	20
11	(LL x EFA) x GC) x DT	20	20	20	20	20	20
12	(LL x GC) x Acc. 106	60	20	20	20	20	20
13	(LL x MS) x ABA	40	40	60	60	60	60
14	(LL x MS) x GC x DT	40	60	40	60	60	60
15	(LL x MS) x N1	40	40	20	20	40	40
16	(LL x NS) x CL	20	40	20	60	60	40
17	(MC x TO) X 106	20	20	20	20	20	20
18	(ML x HP) x ABA	40	40	40	40	40	60
19	(Pink x MIL) x EFA	40	40	40	40	60	60
20	(PSO x 173) x CL	40	40	20	40	60	20
21	(PSO x 173) x GC	20	40	40	40	60	60
22	(PSO x LL) x (LL x MS)	20	20	20	20	20	20
23	157 PSO x Acc 133	60	20	80	40	60	20
24	173 x NN x 30 GC	20	20	20	20	20	20
47	GT x 98	20	20	20	20	20	40
48	LL x (PSO x MBC)	20	20	20	20	60	80
49	LL x ALD x ABA	20	20	20	20	60	20
50	LL x DT	20	20	20	20	20	40
51	LL x EFA	40	20	20	20	20	20
52	LL x GC	20	20	20	20	20	40
53	LL x H2 x (GT x (LL x MS)	20	20	20	40	20	20
54	LL x MS	20	20	20	20	40	40
55	LL x PSO	20	20	20	40	40	60
56	LL x T. Taui	40	20	20	20	20	20
57	LL x TR	40	20	20	40	60	60
58	Marcela x LL	20	20	20	20	20	20
59	MC x BGB	20	20	20	20	20	60
60	MC x NTG	20	20	20	20	20	60
61	MS x GC	20	20	20	20	20	20
62	NTC x GR	20	20	20	20	20	40
63	NTC x LL	20	20	20	40	20	20
64	NV x GC	20	20	20	40	20	60
65	Red x ABA	20	20	20	40	20	20
66	TS x NG	20	20	20	40	20	20
	Mean	**28.18**	**25.76**	**26.67**	**29.70**	**30.91**	**34.00**
	Range	**20-80**	**20-60**	**20-80**	**20-60**	**20-60**	**20-80**
C. IPB-released varieties							
1	Betty Go-Belmonte	40	40	20	40	20	40
2	Helena T. Benitez	40	20	40	40	40	40

3	Che-che Lazaro	60	20	60	20	20	20
4	Cynthia Villar	20	20	20	20	20	20
5	Domini Torrevillas (DT)	20	20	20	20	20	20
6	Emerita De Guzman	20	20	20	20	40	60
7	Estrella F Alabastro	20	20	20	20	40	20
8	Emerlinda Roman	20	20	20	20	20	40
9	Goria	20	20	20	20	20	20
10	Helen Valmayor	20	20	20	40	60	40
11	Ledivinia Cariño	20	20	20	20	20	20
12	Loren Legarda	20	40	60	40	20	40
13	Mercedes B.Concepcion (MBC)	20	40	40	20	80	40
14	Maria Rosario Montejo	40	20	20	20	20	40
15	Ningning	20	20	40	20	80	60
16	Nova Star	20	40	60	40	60	60
17	Perla Santos-Ocampo	20	20	20	20	40	60
18	Pia Cayetano	20	20	20	40	20	40
19	Solita Camara-Besa	60	60	60	60	60	80
20	St. Bridget College	60	60	60	60	40	60
	Mean	**27.06**	**27.53**	**32.12**	**30.44**	**35.95**	**38.76**
	Range	**20-60**	**20-60**	**20-60**	**20-60**	**20-80**	**20-80**
D. Local collections							
1	Acc. 230	40	40	40	60	60	60
2	Acc. 236	40	40	40	20	20	20
3	Acc. 27	60	60	80	80	80	60
4	Acc. 91	20	60	20	20	20	20
5	BCII#1	40	60	60	60	40	60
6	BCII#2	60	60	40	60	40	60
7	BCII#3	20	20	40	40	20	20
	Mean	**40**	**49**	**46**	**49**	**40**	**43**
	Range	**20-60**	**20-60**	**20-80**	**20-80**	**20-80**	**20-60**

result in poor and stunted growth of the plants. Insect pests that are occasionally present were the cotton stainer, aphids, leafhopper, and tussock moth caterpillar. When left undisturbed, these occasional insect pests may increase in number and can inflict economic damage to the crop.

Important Insect Pests of *Hibiscus*

The *Hibiscus* germplasm does not escape the feeding damage of important insect pests. Insect pests became economically important when they cause injuries on plant parts useful to man. One needs to be familiar with the insect pest and should regularly be observed for the expression of feeding damage symptoms on the plant. Correct identification of the insect pests and associated feeding damage symptoms are basic information in insect monitoring and are necessary for proper application and timing of appropriate control strategies. Two-year monitoring revealed that there were more insect pests (flea beetle, mealybugs, and scale insects) present in January 2015 compared to those in February 2014 (**Figure 1**). Although, the range of mean percent incidence in both years were similar (20-80%), the mean per group was relatively higher during January 2015.

The commonly-occurring sucking insect pests of *Hibiscus* are the following:

1. Mealybugs. The mealybug, *Phenacoccus* sp. (Hemiptera: Pseudococcidae) (**Figure 2**) is commonly attacking *Hibiscus* (Miller, 1999). *Phenacoccus sp.* is widespread in the tropical and subtropical regions of Asia, Africa, and Australia (Chong *et al.,* 2008). These are soft-bodied, slow-moving, or sedentary insects, forming colonies with wingless forms attached to the young buds, young stems, and abaxial leaf surface of *Hibiscus.* At high infestation, feeding results in malformation of shoot apex and leaves, enhancing the growth of sooty mold, and lowering crop yield. The toxic saliva excreted by feeding mealybugs results in leaf curling and shortened internodes termed 'bunchy top' which often makes chemical control difficult.

Infested growing points become stunted and swollen. A white waxy material covers themselves and their eggs with it like an armor that protects them from normal pesticide sprays. As the plant dies back, the mealybugs migrate to healthy tissue, so the colonies migrate from shoot tips to twigs then to branches, and finally down the trunk. The mealybugs themselves are in general readily visible, though sometimes hidden in the swollen growth. Honeydew or excess plant sugars excreted onto the leaves became the food for black sooty mold which grows in it and discolors the leaves and reduces photosynthesis. Regular observation of the plants for the presence of mealybugs is necessary. During inspection of the plant, squashing of the body of mealybugs is recommended especially when their number is still low. Pruning of infested twigs and burying on the pit is done while appropriate contact insecticides are applied when the numbers reach the economic threshold level.

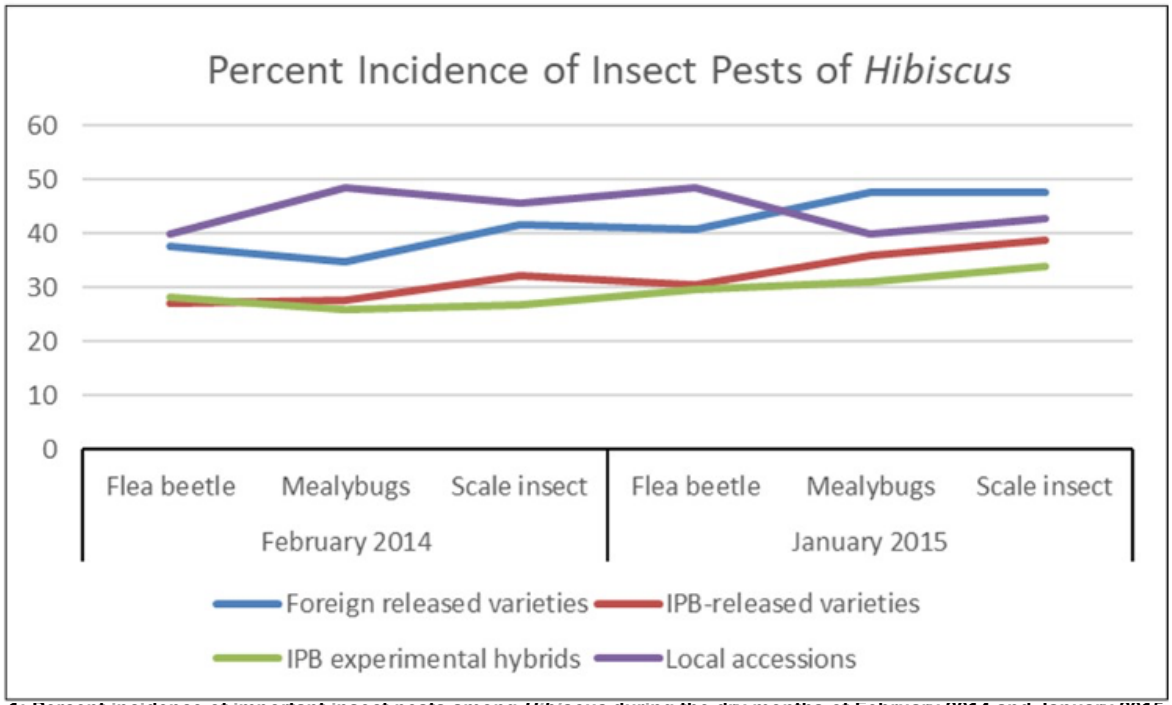
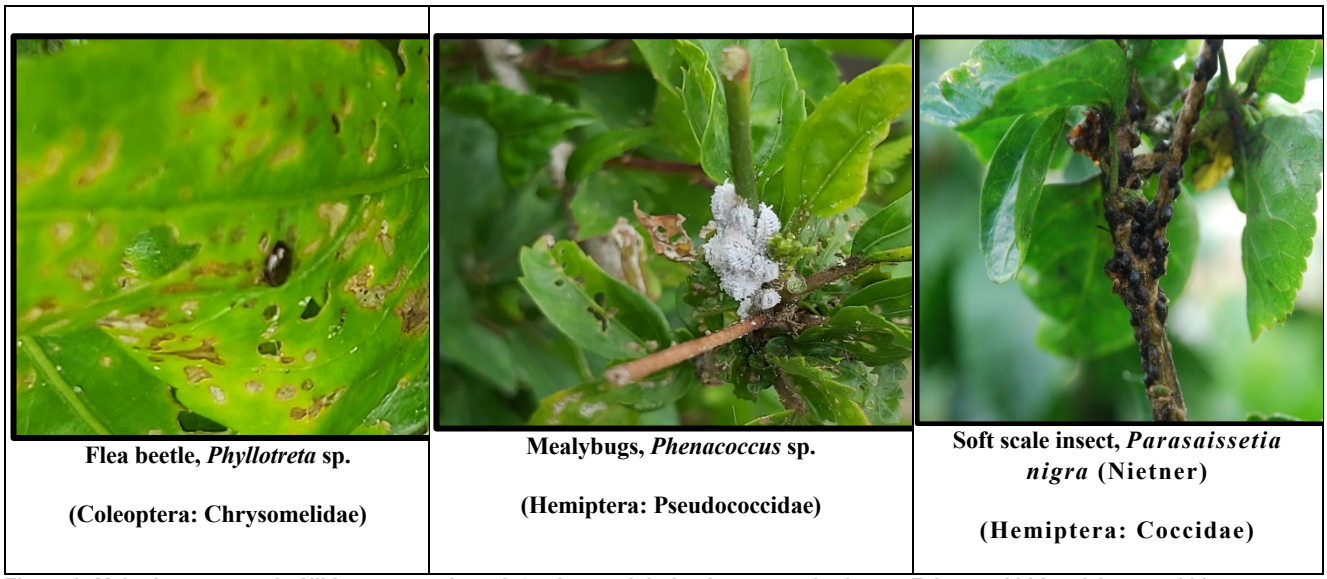


Figure 1: Percent incidence of important insect pests among *Hibiscus* during the dry months of February 2014 and January 2015.



Flea beetle, *Phyllotreta* sp.

(Coleoptera: Chrysomelidae)

Mealybugs, *Phenacoccus* sp.

(Hemiptera: Pseudococcidae)

Soft scale insect, *Parasaissetia nigra* (Nietner)

(Hemiptera: Coccidae)

Figure 2: Major insect pests in *Hibiscus rosa-sinensis* L. observed during insect monitoring on February 2014 and January 2015.

2. Black soft scale insects, *Parasaissetia nigra* (Nietner) (**Figure 2**). Scale insects are notorious insect pests of perennial crops such as woody ornamentals like *Hibiscus*, fruit and nut trees, and indoor plants that thrive in warm, dry environments. Scale insects generally target the undersides of leaves and around leaf joints and branches. Soft scale insect is small, ovoid, and flat, with a protective hard waxy scale cover concealed under a scaly covering that is free from the body, formed by waxy secretions and the shed skins of its immature stages (Miller and Davidson, 2005; Smith-Pardo *et al*., 2012).

Damage due to feeding of an individual scale is small. However, when large populations are left unchecked, yellowing, defoliation, and loss in plant vigor, and ultimately to the death of the plant. They feed by sucking sap from leaves, stems, and trunks causing yellowing or chlorotic areas on the leaves. Scale insects are difficult to control when they become adults. Since they cannot fly, the spread is dependent on the crawlers (immature stage) aided by man, birds, other animals, and wind currents. If left unchecked, an infested host may become so weak that it dies. A combination of pruning and chemical spray is needed to prevent the spread of scale insects.

3. Flea beetle, *Phyllotreta* sp. (**Figure 2**) are small, metallic black leaf beetles belonging to Family Chrysomelidae. The adult beetles feed gregariously and voraciously mostly in the upper surface of the leaves, and their feeding produces shot holes in the leaves that caused the severely affected leaves to shrivel and turn brown. Larvae or grubs feed on the roots of the plant. Flea beetles are known to be polyphagous to solanaceous and crucifers. These beetles are difficult to control that use of systemic insecticides are used as the last resort.

Aphids, *Aphis gossypii* (Glover)

(Hemiptera:Aphididae)

Leafhopper, *Empoasca* sp.

(Hemiptera: Cicadellidae)

Tussock caterpillar, *Orygia* sp.

(Lepidoptera: Lymantriidae)

Figure 3: Minor insect pests of *Hibiscus rosa-sinensis* L. observed during insect monitoring on February 2014 and January 2015

Figure 4: Predatory coccinellid beetle (encircled), *Menochilus sexmaculatus* Fabr. searching for soft-bodied insects for food.

Minor Insect Pests of *Hibiscus*

1. Leafhopper, *Empoasca sp.* (Figure 3). The leafhopper is a polyphagous phloem-feeder sucking the leaf sap of cotton, *Hibiscus*, eggplant, and okra. Leafhopper nymphs and adults inject a toxin as it feeds so the leaves may develop yellow or brown edge burn at the margin known as 'hopper burn' which results in complete drying-up the leaves of plants. Leafhoppers are elongated, slender insects with bristle-like antennae; the wings of adults are held roof-like over the body, and they often hop when disturbed. Leafhoppers have five nymphal instars, and this is completed within one to four weeks depending on the temperature when reared on eggplant (Srinivasan, 2009). Leafhoppers are often managed through the application of contact insecticides.

2. Aphids, *Aphis gossypii* Glover (Figure 3) is a cosmopolitan and extremely polyphagous sucking insect that is an important vector of plant virus diseases (Margaritopoulos *et al.*, 2006). Aphids are small, rounded, or pear-shaped, soft-bodied, most with a pair of tube-like cornicles on the posterior of the abdomen.

These insects appear in colonies and both the adults and youngs damage the crop by sucking the plant sap of young, succulent tissues of leaves, buds, and flowers causing yellowing, curling, and drying-up resulting to stunted growth of the plant. Females can reproduce without mating, giving birth to young (= immatures). Under favorable environmental conditions, aphids are wingless but produce winged forms in crowded or poor conditions and are easily blown by the wind to other plants. Damage is direct through feeding which can kill the host, but also productivity is reduced long before plant death (Andrews and Kitten 1989). Damage is indirect through contamination with aphid honeydew and by transmitting viral pathogens. Honeydew excretion on the leaves produces sooty molds that reduce the rate of photosynthesis by blocking sunlight (Ebert and Cartwright, 1997). Aphids are a good food choice for predatory coccinellid beetles (**Figure 4**) that also commonly found in *Hibiscus* especially if the application of insecticide is only minimal. When the number of aphids increased, the use of contact insecticides is deemed appropriate.

3. Tussock moth caterpillar, *Orygia* sp. (**Figure 3**) belongs to Family Lymantriidae has distinctive alternating bristles and haired projections. The urticating hairs that are often hidden among longer and softer hairs can cause painful reactions to humans if they are exposed to the skin. The larval caterpillar feeds on the leaves of *Hibiscus* causing irregularly shaped holes on the leaf epidermis. Caterpillars are not difficult to find among the plant the picking of the larvae and squashing the body are

most often employed or placing the collected larvae in a container with diesel will cause death.

Recommended Management Strategies to Control Insect Pests in *Hibiscus rosa-sinensis* L.

At present, there is now a new paradigm shift as interest on environmental protection and human safety pervade. An active breeding program in the Ornamental Breeding Section at IPB recognizes the importance of ornamental crop's aesthetic traits combined with commercially acceptable high to moderate levels of resistance to important insect pests and diseases.

Regular monitoring of insect pests is a prerequisite before effective control strategies are applied. When sucking insect pests occur in low numbers, spraying of organic insecticides like neem oil can be done. But when the insects are observed to be present in all parts of the plant, then it is important that synthetic insecticides can be used. It is highly advised that the judicious use of synthetic insecticides with varying modes of action is recommended to delay the development of resistance to the insecticide (IRAC, 2020).

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

At this time of the Covid-19 pandemic, Filipinos recognized the importance of plants whether as food crops or ornamentals crops as these plants promote human's healthy state of mind and well-being. Among the ornamental crops, *Hibiscus* has been grown for its unique floral traits. One hundred nineteen *Hibiscus* germplasm consisting of foreign released varieties, IPB released varieties, IPB experimental hybrids, and local accessions maintained at IPB Ornamental Crop Section Nursery were observed during dry seasons of 2014 and 2015. During these dry months, the most important insect pests observed were the flea beetle, *Phyllotreta* sp., mealybugs, *Phenacoccus* sp., and soft scale insects, *Paraissetia nigra*. These insect pests occur in high numbers during January 2015 compared to February 2014. Mean percentage incidence ranged from 20-80% among the groups. Because of the nature of the pests, they are difficult to control when they remain unchecked even with the use of insecticides. Other occasional pests observed were aphids, *Aphis gossypii*, leafhopper, *Empoasca* sp., and tussock moth, *Orygia* sp.

It is important to check regularly the presence of these pests so as not to reach an economic injury level. A combination of cultural, mechanical, and chemical controls can manage the population of these insect pests below an economic injury level.

An in-depth investigation of the reaction to the insect feeding damage among entries should be pursued to determine if there will be inherent resistance expressed (antixenosis, antibiosis, tolerance).

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