

## ***Heteropsylla cubana*: impact on feeding systems in southwest Asia and the Pacific**

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### **INTRODUCTION**

In the seventies and early eighties, *Leucaena* became widespread and popular worldwide. Although in some cases the local or common varieties are considered weeds, in many situations it is an important plant with its improved varieties purposefully introduced for varied uses. No other tree legumes had been given as much attention as *Leucaena*. Most feeding trials, reforestation, agroforestry and soil conservation projects made use of or made reference to *Leucaena*. Too much emphasis was placed on *Leucaena* and it was looked on as a panacea species. This bias has now proved inadvisable because the psyllid or jumping lice (*Heteropsylla cubana* Crawford) problem arrived and still persists.

The *Leucaena* psyllid problem has been reviewed by NFTA (1988) and Napompeth (1989). Various authors have reported the extent of the psyllid damage and solutions being offered in different countries and locations.

*Leucaena* psyllids, *Heteropsylla cubana* Crawford, are tiny insects (1-2 mm) in the family *Psyllidae* (*Homoptera*). The eggs are yellow, found primarily on young terminal leaves, and hatch in 2-3 days. Nymphs, which resemble aphids, undergo five instars over 8-9 days. Adults are two to three times the size of the largest nymphal instar. Their reported colour has ranged from green to brown to whitish. They use stout legs to jump before taking flight when disturbed. Females begin laying eggs 1-3 days after becoming adults (NFTA, 1988).

The *Leucaena* psyllid is native to the Caribbean, Mexico and Central and South America. Moving as uninvited passengers on aircraft or in high altitude winds, they arrived in Hawaii in 1984. They were first found in Taiwan in 1985, causing serious damage in 1986 and 1987 (Jiunn-Fuh, 1989) and were reported to be present in Cebu, Philippines in August 1985 (Moog and Sison, 1986). By 1986, they were reported in Australia, the Pacific Islands and Southeast Asia (Thailand, Malaysia, Indonesia, Vietnam). In 1987, they arrived in Sri Lanka, making their way to Burma, China and India in 1988.

#### **DAMAGES CAUSED BY PSYLLIDS**

Damage brought about by the psyllid to established *Leucaena* plantations in different countries is presented in Table 1. Damage ranges from physical effects on the plant by defoliation to indirect, adverse effects on companion crops and reduced biomass for animal feeding, resulting in instability of the production system and financial loss. The socio-economic impact of the infestation is alarming.

#### **IMPACT OF PSYLLID IN THE PHILIPPINES**

The psyllid has affected the more intensive smallholder beef producer, where *Leucaena* is the most valuable component of the animal feeding system. A survey in Malimatoc, a village in the town of Mabini, Batangas province, where cattle raising is the primary enterprise in the villages and with *Leucaena* as the main crop for animal feeding showed the following results (Moog and Sison, 1986).

The foremost problems caused by the infestation were stunted growth and death of plants and feed shortage. The infestation resulted in reduced feed supply so farmers resorted to feeding other plant materials such as banana leaves and trunks, corn stover, coconut fronds, etc. However, with the lower feeding value of these substitute materials, most of the animals became weak and susceptible to diseases. About 74% of farmers reported that their animals became sick and four of them reported death of animals. The majority of the farmers (83.9%) reported loss of profit (Table 2).

TABLE 1. Damage/impact and research concern/control/action taken on psyllid in different countries.

Country	Role/Use of <i>Leucaena</i>	Psyllid Damage/Impact	Research Concern/Control/Action Taken
AUSTRALIA Bray <i>et al.</i> (1989)	Pasture	Production reduced by 50%	Resistant varieties Alternative species Predator Parasites
INDIA Veeresh (1989)	Fodder	Plantation devastated	Natural enemies: Coccinellids, praying mantids, <del>mirids</del> mirids and chrysopids, staphylinid beetle, white muscardine fungus, anthracoid bug
Krishnamurthy <i>et al.</i> (1989)	Fodder/ Alley crop	Fodder yield reduced	Resistant species/cultivars
INDONESIA Malessy (1987)	Fodder	Fodder production decreased Farmers stopped fattening cattle. Reduced cattle sales resulting in reduced local government income	
Mangoendihardjo <i>et al.</i> (1988)	Shade	35 to 50 percent loss in harvest of coffee. Loss in income from sale of <i>Leucaena</i> seed	Spraying with insecticide Use of predator <i>Curinus</i> <i>coeruleus</i>
Oka (1989)	Shade tree Fodder Reforestation Charcoal/firewood green mixture, timber leaf meal, veg.	Economic loss	National Task Force for Psyllid Control was created Released of predator <i>Curinus coeruleus</i>
Oka <i>et al.</i> (1987)		Millions of trees died Hampers reforestation and soil reclamation programmes	Systemic insecticide (monocrotophos); <i>Curinus</i> adults was introduced and being multiplied
Hollenbeck (1987)	Shade Re-greening Feed Fuelwood	Reduced crop (cacao, coffee, black pepper and cardamon) yield and income Less feed resulting to use of low-quality feed materials. Greater soil loss and instabi- lity of water tables to regenerate quickly	Widespectrum insecticide (expensive) Lady bugs ( <i>Curinus coeruleus</i> ) <i>Olla abdominalis</i> Resistant varieties/alternative species
Piggin and Parera (1987)	Soil stabilization Fodder	50% of trees affected Losses in exports of live- stock, coffee, cocoa and vanilla	Cutting and burning both infested and uninfested trees and spraying diagmon and injection of azodrin

TABLE 1. (Continued).

Country	Role/Use of <i>Leucaena</i>	Psyllid Damage/ Impact	Research Concern/ Control/Action Taken
<b>MALAYSIA</b>			
Lim <i>et al.</i> (1989)	Fodder	Trees defoliated	Resistant varieties
<b>PHILIPPINES</b>			
Sanchez (1989)	Fuelwood Fodder Alley crop	50% loss in production Leaf meal production reduced Price of fuelwood rose Farmers became reluctant to plant	Biological studies on psyllid Resistant varieties
De Guzman (1987)	Feed/fodder reforestation Soil conservation Green manure Nurse trees	Mortality of plants reduced animal holding Reduced farmers' income Weakened link between rural people and government	Resistant alternative species
<b>SRI LANKA</b>			
Gunesena <i>et al.</i> (1989)	Fodder Leaf meal Fuelwood Alley crop Shade Compost	Most farmers shifted to <i>Gliricidia</i>	Annual cropping between alleys of <i>Leucaena</i> Pruning and burning of leaves Resistant species
<b>TAIWAN</b>			
Jiunn-Fuh (1989)		Serious damage	Replaced by other tree species Spraying insecticides by airplane Resistant species Natural enemies: -Parasitic wasp -Coccinellids -Bugs -Entomopogous fungi
<b>THAILAND</b>			
Napompeth (1989)	Vegetable Fodder Alley crop Agroforestry	Young shoots disappeared in the market Plantation abandoned, ploughed up and replaced by other crops Farmers could not supply leaves to feed mills	Ecology, evaluation and introduction of natural enemies and entomopathogens, IPM Covering young top shoots
<b>VIETNAM</b>			
Ich and Tru (1989)		Defoliation of trees	Coccinellids as predators
<b>WESTERN SAMOA</b>			
	Weed Cocoa shade	75% of infested plants died	Spraying Demettonte (Perfection) Grow cocoa under coconuts using <u><i>Sesbania grandiflora</i></u> as shade

TABLE 2. Problems encountered by farmers due to ipil-ipil infestation.

Problems	Respondents (31)	
	Frequency	Percent
Stunted/Poor growth of Ipil-Ipil	31	100
Death of Ipil-ipil	31	100
Feed shortage	31	100
Animals became susceptible to diseases/animals got sick	9	29
Thinning of animals	23	74.2
Death of animals	4	12.9
Profit loss	26	83.9

TABLE 3. Animal holdings before and during infestation.

Before Infestation			During Infestation					No. of Animals*
Animal Holding	No. of Farmers	No. of Animals*	<u>Animal Holding/No. of farmers</u>					
			0	1	2	3	4	
8	2	16	1	-	1	-	-	2
7	3	21	-	-	1	-	2	10
6	2	12	-	1	-	-	1	5
5	3	15	-	1	1	1	-	6
4	4	24	1	1	1	-	1	10
3	3	9	-	1	2	-	-	5
2	9	18	2	2	5	-	-	12
1	1	1	-	1	-	-	-	1
0	2	0	1	1	1	-	-	2
<b>TOTAL</b>	<b>31</b>	<b>116</b>						<b>53</b>

\*Animal holding multiplied by number of farmers

The 31 farmer respondents were raising a total of 115 animals before infestation occurred. However, due to the severe damage suffered by *Leucaena*, the number of animals was reduced to 50 percent (Table 3). Three quarters of the respondents reduced the number of animals they raised. One of the two farmers raising 8 head totally stopped raising cattle, while the other reduced it to 4.

#### **Psyllid in Cebu province**

The infestation also affected the feed milling industry which utilized it as a source of xanthophyll and carotene in mixed feeds. Likewise, it also affected the smallholder farmers who grow, harvest and sell the leaves to merchants and feedmills. A survey in Cebu showed the effects of the infestation on the smallholder farms and on the export of pelleted ipil-ipil leaf meal.

Table 4 shows the effects of psyllid infestation among the three ipil-ipil farmers' associations involving 770 members in Cebu. Each association used to harvest 6-8 tonnes of dried ipil-ipil leaves per month. Their ipil-ipil plantations were totally infested and, when the infestation occurred, they reported no harvest. Some farmers who raised cattle stopped raising animals or reduced the number of animals they raised. It was observed that the infestation had also brought down livestock sales and transaction in the nearby livestock market. Dumanjug Cattle Raisers' Association reported that animal holdings of its members were reduced from 495 to 250 head, a reduction of about 50% (similar to the observations in Batangas). In the absence of ipil-ipil, they used banana leaves and trunks, leaves of rain tree (*Samanea saman*) and whatever grasses were available as animal feed.

Annual export of ipil-ipil from 1983 to 1985 ranged from 6,400 to 8,900 tons (Table 5). Although the quantity of exports in 1985 was higher than that of 1984, the amount of ipil-ipil exported went down during the months of October, November and December 1985 when the infestation occurred (Moog and Sison, 1986). Exports from October to November 1985 was only 24% of that for the same months in 1984. No exports were recorded from 1986 to date.

TABLE 4. Effect of psyllid infestation on 3 farmers groups in Cebu, Philippines.

ITEM	CATMON Ipil-ipil Planters Ass'n.	DUMANJUG Cattle Raiser's Association	ALOQUINSAN Ipil-Ipil Planters' Ass'n.
No. of Members	113	557	65
Area (ha) planted to ipil-ipil	113	557	100
Main Use of Ipil-ipil	Firewood	Feeds & Firewood	Feeds & Firewood
% Infestation	100	100	No data available
Date when pest first observed	August 1985	2nd week of October 1985	2nd week of October 1985
Leaf production per month			
Before infestation	6-7 tons	8 tons	6 tons
During infestation	0	0	0
No. of animals fattened			
Before infestation	no available data	495	no available data
During infestation	-do-	250	-do-
Substitute feeds	-do-	Mostly grasses, banana leaves & trunks & other legumes such as <i>Samanea</i> and <i>Gliricidia</i>	-do-

Source: Department of Agriculture, Cebu City

TABLE 5. Export of ipil-ipil, 1983-1986 (tons).

Year	1983	1984	1985
January	594	727	549
February	687	449	103
March	725	549	885
April	965	549	1123
May	892	545	989
June	879	720	1004
July	914	630	669
August	107	627	342
September	798	586	148
October	40	391	142
November	501	347	48
December	723	274	50
TOTAL	8894	6393	8252

Source: Animal Feed Control Division, BAI

## CONCLUSIONS

Too much emphasis has been placed on *Leucaena* and its infestation with *H. cubana* is a catastrophe. The principles of ecology are that the more diverse the community is, the more stable will be. Organized evaluation trials on psyllid-resistant *Leucaena* species and cultivars are in progress but results may not be forthcoming in the short-term. Meanwhile, there is a pressing need to change the reliance on *Leucaena*. The tropics are imbued with numerous tropical fodder legumes like *Sesbania*, *Erythrina* and *Gliricidia* and their potentials should be tapped and enhanced.



## Bibliography

- Bray, R.A., Julien, M.H. and Room P.M.** 1989. *Leucaena* Psyllid in Australia - The Current Position. In: *Leucaena psyllid: problems and management*. Proceedings of an International Workshop held January 16-21, 1989 in Bogor, Indonesia. Napompeth B. and MacDicken, K.G. (eds.) pp. 8-11.
- De Guzman, E.** 1987. Summary report: Status of psyllid infestation in the Philippines. In: Proceedings of a Workshop on *The Biological and Genetic Control Strategies for the Leucaena Psyllid*. NFTA. 7(2): 77-78.
- Gunaseana, H.P.M., Wickramasinghe, I.P. and Hitinayake, H.M.G.S.B.** 1989. Status of management of *Leucaena* psyllid *Heteropsylla cubana* in Sri Lanka. In: *Leucaena psyllid: problems and management*. Proceedings of an International Workshop held January 16-21, 1989 in Bogor, Indonesia. Napompeth B. and MacDicken, K.G. (eds.) pp. 43-44.
- Hollenbeck, L.** 1987. Some economic implications of the psyllid (kutu loncat) infestation on lamtoro (*Leucaena*) in Indonesia. In: Proceedings of a workshop on *The biological and genetic control strategies for the Leucaena psyllid*. 7(2): 66-67
- Ich, B.V. and Tru, D.Q.** 1989. Research on *Heteropsylla cubana* Crawford in Vietnam. In: *Leucaena psyllid: problems and management*. Proceedings of an International Workshop held January 16-21, 1989 in Bogor, Indonesia. Napompeth B. and MacDicken, K.G. (eds.) pp. 54-55.
- Jiunn-Fuh, P.** 1989. *Leucaena* psyllid in Republic of China - A Country Report. In: *Leucaena psyllid: problems and management*. Proceedings of an International Workshop held January 16-21, 1989 in Bogor, Indonesia. Napompeth B. and MacDicken, K.G. (eds.) pp. 12-13.
- Krishnamurthy, K., Munegowda, M.K. and Rajagopal D.** 1989. Outbreak of psyllid, *Heteropsylla cubana* Crawford, on *Leucaena* and its outlook in alley cropping in

- India. In: *Leucaena psyllid: problems and management*. Proceedings of an International Workshop held January 16-21, 1989 in Bogor, Indonesia. Napompeth B. and MacDicken, K.G. (eds.) pp. 17-24.
- Lim, C.S., Tan, C.L. and Wong, C.C.** 1989. Studies on *Leucaena* psyllid in Malaysia. In: *Leucaena psyllid: problems and management*. Proceedings of an International Workshop held January 16-21, 1989 in Bogor, Indonesia. Napompeth B. and MacDicken, K.G. (eds.) pp. 28-39.
- Malessy, C.H.** 1987. Losses caused by *H. cubana* to the cattle industry in Nusa Tenggara Timur, Indonesia. In: Proceedings of a workshop on *The biological and genetic control strategies for the Leucaena psyllid* 7(2): 68.
- Mangoendihardjo, S., Wagiman, F.X., Sulthoni, A. and Subyanto** 1989. Economic impact of *Leucaena* psyllid infestation on estate crops and teak forest. In: *Leucaena psyllid: problems and management*. Proceedings of an International Workshop held January 16-21, 1989 in Bogor, Indonesia. Napompeth B. and MacDicken, K.G. (eds.) pp. 184-188.
- Moog, F.A. and Sison, J.P.** 1986. *Impact of the ipil-ipil psyllid infestation on the animal industry*. Bureau of Animal Industry, Visayas Avenue, Quezon City, Philippines (Mimeographed) 12 pp.
- NFTA.** 1988. *Leucaena* psyllids - A review of the problems and solutions. In: *NFTA Highlights* 2 pp.
- Napompeth, B.** 1989. *Leucaena* psyllid in Thailand - A Country Report. In: *Leucaena psyllid: problems and management*. Proceedings of an International Workshop held January 16-21, 1989 in Bogor, Indonesia. Napompeth B. and MacDicken, K.G. (eds.) pp. 45-53.
- Oka, I.N., Wardoyo, S. and Soehardjan, M.** 1987. *Leucaena* psyllid (*H. cubana* Crawford): A new serious pest of *Leucaena* trees in Indonesia and its control. In: Proceedings of a workshop on *The biological and genetic control strategies for the Leucaena psyllid* 7(2): 69.
- Oka, I.N.** 1989. Progress and Future Activities of the *Leucaena* Psyllid Research Program in Indonesia. In: Proceedings of a workshop on *The biological and genetic control*

- strategies for the Leucaena psyllid* 7(2): 25-27.
- Piggin, C. and Parera, V.** 1987. *Leucaena and Heteropsylla* spp. in Nusa Tenggara Timur. In: Proceedings of a workshop on *The biological and genetic control strategies for the Leucaena psyllid* 7(2): 70.
- Sanchez, F.F.** 1989. *Leucaena psyllid* in the Philippines - a country report. In: *Leucaena psyllid: problems and management*. Proceedings of an International Workshop held January 16-21, 1989 in Bogor, Indonesia. Napompeth B. and MacDicken, K.G. (eds.) pp. 40-42.
- Veeresh, G.K.** 1989. The status of *Leucaena psyllid*, *Heteropsylla cubana* Crawford in India. In: *Leucaena psyllid: problems and management*. Proceedings of an International Workshop held January 16-21, 1989 in Bogor, Indonesia. Napompeth B. and MacDicken, K.G. (eds.) pp. 14-16.