

**Is an IPM approach feasible to control Lygus in crop commodities?**  
**International Symposium: Ecology and Management of Lygus Plant Bugs**  
**Summary notes**  
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Lygus plant bugs cause economic damage to a wide variety of agricultural crops. In North America, the tarnished plant bug, *Lygus lineolaris* (Palisot) and the western tarnished plant bug *L. hesperus* Knight are the primary pest species. Other species, *L. borealis* (Kelton), *L. elisus* (Van Duzee), *L. keltoni* Schwartz and *L. shulli* Knight, are secondary pests in some regions. In Europe, *Lygus rugulipennis* Poppius is the major pest species while *L. praetensis* (L.) is also present. Scientists from Europe and North America met in Ottawa January 30 to February 3, 2005 to present original data and discuss best practices for managing this pest group.

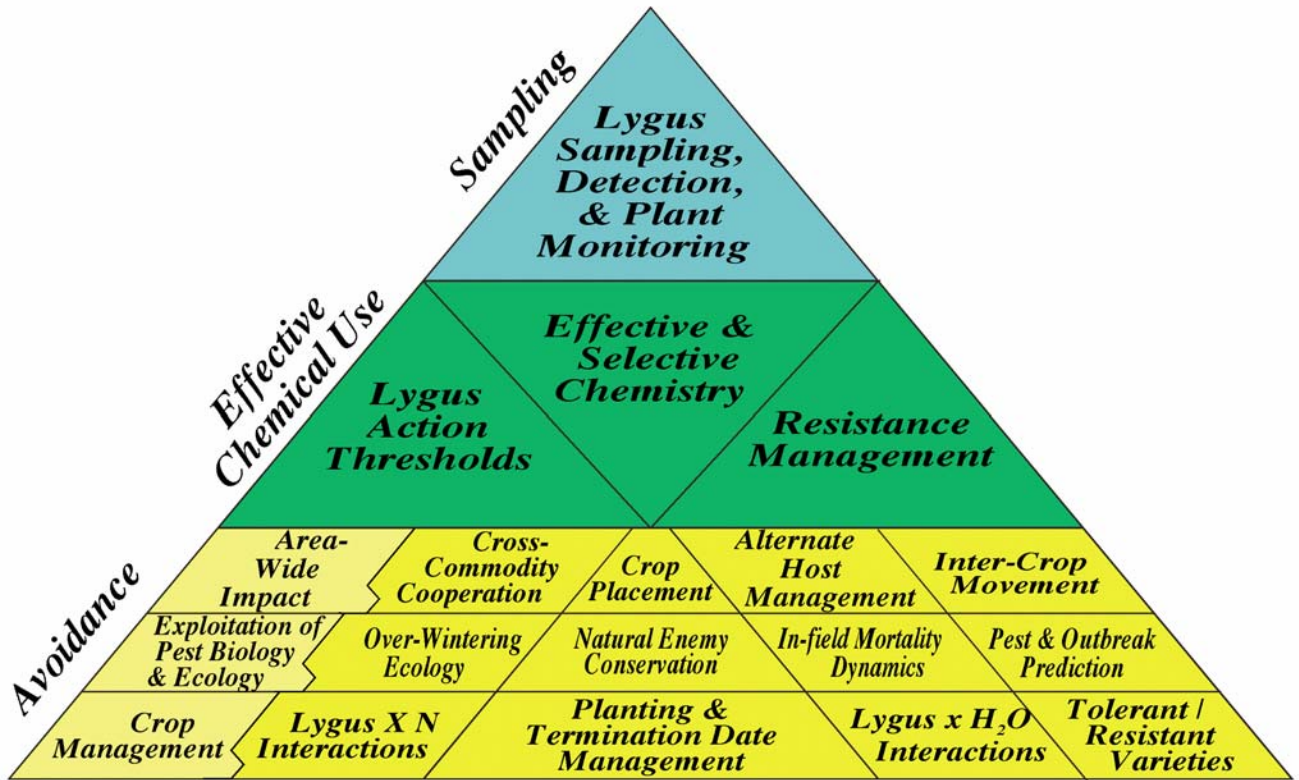
Sixty oral and poster presentations were made on topics relating to: *Economic Importance of Lygus in Crop Commodities; Lygus Community Ecology; Lygus Biology & Cultural Controls for Lygus Management; Host Plant Resistance and Insecticide Efficacy; Systematics/Taxonomy of Lygus and Biological Control Agents; Biology/Ecology of Biological Control Agents; Host Specificity of Biological Control Agents; Release, Post-release Evaluation and Monitoring of Biological Control Agents*. A discussion session followed the presentations with the aim to summarize the status of knowledge on Lygus in the various commodities.

Lygus are pests in berry, field and greenhouse crops, orchards, and greenhouses. Crops affected and damage levels vary from region to region, and while industry supports IPM funding is not universally available to support these programs (Table 1). Cotton is perhaps the most important crop affected and most of the knowledge about Lygus spp. is derived from this system. For other crops such as lentils, Lygus problems are just emerging. While recognition of Lygus spp. as a pest is widely accepted, there is relatively little documentation of economic losses. Industry support of IPM varies and in orchard and grape other pests can be of greater importance.

**Table 1.** Commodities affected, pest status, economic impact and potential industry support for *Lygus* plant bug research and IPM implementation.

<b>Commodity</b>	<b>Pest Status</b>	<b>Economic Impact</b>	<b>Industry support for IPM</b>
Apples, peaches	Occasional	1-5% damage >10% peaches (Italy)	Yes, no \$\$\$ as is a lower priority than other pests
Buckwheat	Yes	12-78% crop yield losses	Yes, \$\$\$ available
Canola	Yes	Yes	Yes, \$\$\$ available
Cotton	Yes	1-3 sprays (6-10 in south) \$100M/yr in US cotton belt	Yes, \$\$\$ available
Grain Sorghum	Yes (Texas)	1-2 sprays required	Yes, \$\$\$ available
Grapes	Sporadic (Quebec)	?	Yes, no \$\$\$ as is a low priority
Field beans	Yes	1-2 sprays required	Yes, \$\$\$ available
Field vegetables (celery, tomatoes)	Yes	1 spray required	No, no \$\$\$
Floriculture	Sporadic (Ontario)	?	No, no \$\$\$
Lettuce	Yes	Periodic sprays required	Yes, \$\$\$ available
Greenhouse vegetables (cucumber, peppers)	Yes		Yes, \$\$\$ available
Pulse crops (lentils, chick peas)	Currently sporadic but important in future (lentils)	?	No, no \$\$\$
Seed alfalfa	Yes	CA: 2-4 sprays required	Yes (Pacific NW), \$\$\$ available
Strawberries (+ other berry crops)	Yes, major	1-4 sprays required	Yes, \$\$\$ available (minor in Canada) BC?
Sugarbeets	Yes	3-4 sprays required	?, ?
Sunflowers	Yes	sometimes	No, \$\$\$ available

Management of *Lygus* plant bugs becomes increasingly complex as the process progresses from population sampling to use of pesticides to sustainable techniques which can be represented in a pyramid (Figure 1). The pyramid is based on three major components, sampling, chemical use and biologically based strategies to reduce the threats and impacts of *Lygus* spp.



**Figure 1.** Pyramidal approach to management of *Lygus* plant bugs (P. Ellsworth, University of Arizona).

Sampling methods, damage assessment and plant monitoring have been developed for only a few commodities (Table 2) and even these are not as complete as would be preferred.

**Table 2.** Status of methods for sampling insects, damage assessment and plant monitoring.

<b>Commodity</b>	<b>Bugs</b>	<b>Damage</b>	<b>Plants</b>
Apples	No, Yes (Italy)	No	Yes
Buckwheat	Yes	Not yet available	Yes
Canola	Yes	Yes	Yes
Cotton	Yes	Yes	Yes.
Grapes	Yes	Yes (Switzerland & Italy)	Yes ( <i>A. spinolae</i> )
Greenhouse vegetables (Peppers, celery, cucumbers)	celery?	celery?	celery?
Seed alfalfa	western U.S., Canada	No	Yes
Strawberries	western U.S., east of the Mississippi		

Knowledge of economic thresholds, available pesticides and pesticide resistance management is variable (Table 3.). Economic thresholds are known for several high value commodities, e.g. canola, cotton and some greenhouse vegetable crops; for commodities where damage assessment methods have not been developed, economic thresholds are not worked out. Pesticides registered for use against Lygus bugs are available for a select number of crops and resistance management programs are almost unknown.

**Table 3.** Status of knowledge of economic thresholds, pesticides available and work on resistance management.

<b>Commodity</b>	<b>Economic Damage Threshold</b>	<b>Pesticides</b>	<b>Resistance Management</b>
Apples	required	Yes (any spray?)	not a focus
Buckwheat	Working	Pyrethroids	none
Canola	Yes	Pyrethroid or chlorpyrifos	none
Cotton	Yes, needs in S.	Acephate or oxamyl, no selective	Unknown, limited
Grapes	unknown	None	none
Greenhouse vegetables (Peppers, celery, cucumbers)	Yes	Effective, but not selective	unknown
Seed alfalfa	5/sweep	Yes	some work
Strawberries	East of the Mississippi, California	Pyrethroid rotated with endosulfan	unknown

The issues associated with avoiding damage by *Lygus* bugs are many (Figure 1) and are interlinked. Among the few areas that have been studied, the use of natural enemies, particularly parasitoids of the nymph stages, has been most extensively pursued. The taxonomic knowledge of *Peristenus* spp., like that of host *Lygus* spp. is well-developed, although phylogenetic relationships remain to be clarified and there is still much to be done on the biology and conservation of these species. The same cannot be said for the egg parasitoids (*Anaphes* spp.).

Most of the 'Avoidance' components are based on a good understanding of the pest species biology, something that is still poorly known despite good progress in several research areas. Tools are being developed to assess area-wide impacts and inter-crop movements, but to be truly valuable we must know more about dispersal behaviour, overwintering biology and habitat utilization by *Lygus* spp. This knowledge will also provide the basis for predicting outbreaks. Based on the final discussion, session a set of priorities was developed.

#### **Research Needs:**

- 1) Economic impacts of *Lygus* spp. on a broad scale are needed to justify scientific and producer investments;
- 2) Population dynamics and movements of *Lygus* pest spp. - life table studies, dispersal, movement on a large-scale, landscape level;
- 3) Overwintering ecology of *Lygus* spp. and parasitoids;
- 4) Population dynamics for crop placement – ecological engineering to promote and conserve natural enemies;
- 5) Population dynamics of *Lygus* spp., non-target hosts and natural enemies in conservation habitats;
- 6) Resistant crop varieties.

#### **Follow-up Actions**

- 1) Write a sentinel egg parasitoid collecting protocol (Livy Williams & John Huber).
- 2) Planning for 2<sup>nd</sup> International Symposium to begin January 2007 (Kim Hoelmer & Peter Ellsworth [USA], Birgitta Raemert & Luciana Tavella [Europe] Peter Mason & Dave Gillespie [Canada])