

# HOST RELATIONSHIPS OF GALL-INDUCING INSECTS IN COSTA RICA

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# Morpho-species of gall inducers



*Peperomia*



*Inga vera*



# 73% of the gall-inducing insects in Costa Rica are Cecidomyiidae

How many cecidomyiid species  
are there in Costa Rica?

How can we estimate this  
number?



# Proportion of vascular plants harboring arthropod-induced galls in Costa Rica

	No. families: with galls/total	% families with galls	No. spp. with galls/total	% spp. with galls
Ferns	7/28	25	19/1120	2
Gymnosperms	1/3	33	1/10	10
Monocotyledons	9/41	22	50/2570	2
Dicotyledons	116/175	66	769/5300	15

<b>Ferns</b>	<b>Total No. genera/species</b>	<b>No. genera/ species with galls</b>
<b>Aspleniaceae</b>	<b>2/60</b>	<b>1/1</b>
<b>Cyatheaceae</b>	<b>4/44</b>	<b>2/3</b>
<b>Dryopteridaceae</b>	<b>9/43</b>	<b>1/1</b>
<b>Hymenophyllaceae</b>	<b>2/85</b>	<b>1/1</b>
<b>Lomariopsidaceae</b>	<b>3/150</b>	<b>1/2</b>
<b>Polypodiaceae</b>	<b>13/120</b>	<b>4/6</b>
<b>Woodsiaceae</b>	<b>5/61</b>	<b>1/5</b>



<b>Monocotyledons</b>	<b>Total No. genera/ species</b>	<b>No. genera/ species with galls</b>
<b>Araceae</b>	<b>19/238</b>	<b>4/24</b>
<b>Arecaceae</b>	<b>26/98</b>	<b>1/1</b>
<b>Bromeliaceae</b>	<b>17/206</b>	<b>2/2</b>
<b>Commelinaceae</b>	<b>11/34</b>	<b>1/1</b>
<b>Costaceae</b>	<b>2/24</b>	<b>1/3</b>
<b>Cyclanthaceae</b>	<b>9/51</b>	<b>2/3</b>
<b>Orchidaceae</b>	<b>161/1028</b>	<b>8/8</b>
<b>Poaceae</b>	<b>131/448</b>	<b>2/2</b>
<b>Smilacaceae</b>	<b>1/16</b>	<b>1/6</b>



## Families of dicotyledons without galls

Apiaceae <sup>b</sup>	33	Dilleniaceae <sup>a</sup>	16	Oleaceae <sup>b</sup>	4
Aristolochiaceae <sup>ab</sup>	13	Elaeagnaceae <sup>b</sup>	1	Opiliaceae	2
Asclepiadaceae <sup>b</sup>	34	Elatinaceae	1	Orobanchaceae	2
Balanophoraceae	3	Eremolepidaceae	1	Oxalidaceae	12
Balsaminaceae <sup>b</sup>	1	Garryaceae <sup>b</sup>	1	Papaveraceae <sup>b</sup>	2
Basellaceae	2	Gentianaceae	29	Pedaliaceae	1
Berberidaceae	3	Geraniaceae	2	Plantaginaceae	3
Bixaceae	2	Gunneraceae	2	Plumbaginaceae	1
Brassicaceae <sup>b</sup>	16	Hamamelidaceae <sup>b</sup>	2	Polemoniaceae <sup>b</sup>	6
Cabombaceae	2	Hydnoraceae	1	Primulaceae <sup>b</sup>	2
Callitrichaceae	1	Hydrophyllaceae	3	Rafflesiaceae	2
Capparidaceae <sup>b</sup>	30	Krameriaceae	2	Sabiaceae	12
Caricaceae	5	Lentibulariaceae	10	Ticodendraceae	1
Caryophyllaceae <sup>a</sup>	17	Lepidobotryaceae	1	Tovariaceae	1
Ceratophyllaceae	3	Linaceae <sup>b</sup>	1	Trigoniaceae	2
Chenopodiaceae <sup>b</sup>	2	Loasaceae <sup>b</sup>	7	Tropaeolaceae	3
Cistaceae	1	Menyanthaceae	2	Turneraceae <sup>ab</sup>	8
Connaraceae <sup>a</sup>	8	Molluginaceae	1	Valerianaceae	8
Coriariaceae	1	Myricaceae <sup>b</sup>	3	Zygophyllaceae <sup>ab</sup>	3
Crassulaceae	3	Nymphaeaceae	5		



# Cecidomyiidae



*Otopappus* (Asteraceae)



*Acalypha diversifolia*  
(Euphorbiaceae)



*Struthanthus* (Loranthaceae)



*Nectandra membranacea* (Lauraceae)



*Palicourea adusta* (Rubiaceae)



*Psychotria monteverdensis* (Rub.)



*Schlegelia* (Scrophulariaceae)



*Theobroma* (Sterculiaceae)



Gall in domatia of *Cornus* (Cornaceae)



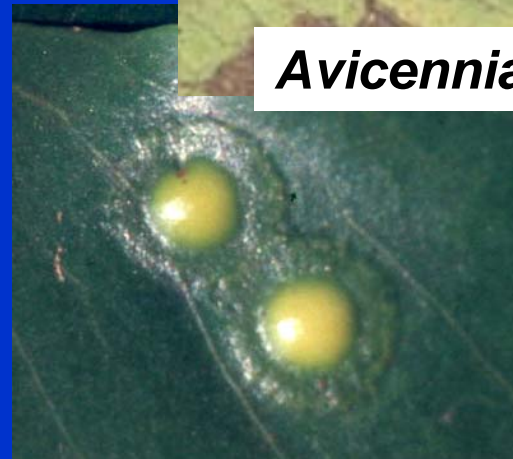
*Picramnia* (Simaroubaceae)



*Cleyera theioides* (Theaceae)



*Avicennia germinans*



## Plants with many cecidomyiid species

Family	Species	No. spp. of Cecidomyiidae
Boraginaceae	<i>Cordia alliodora</i>	4
	<i>C. spinescens</i>	4
Euphorbiaceae	<i>Acalypha diversifolia</i>	4
	<i>Croton schniedianus</i>	4
Fabaceae	<i>Inga leiocalycina</i>	4
	<i>I. oerstediana</i>	8
	<i>I. vera</i>	6
Meliaceae	<i>Guarea bullata</i>	6
	<i>G. glabra</i>	4
	<i>G. rhopalocarpa</i>	6
Nyctaginaceae	<i>Neea psychotrioides</i>	5
Piperaceae	<i>Piper hispidum</i>	4
Sapotaceae	<i>Pouteria reticulata</i>	4

# Tephritidae



*Diplostephium*  
(Asteraceae)

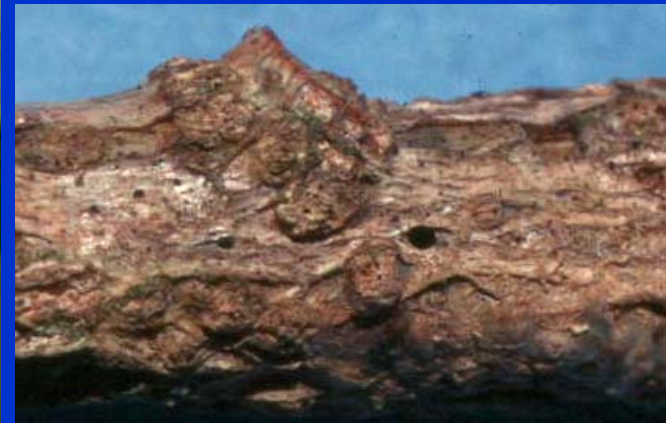
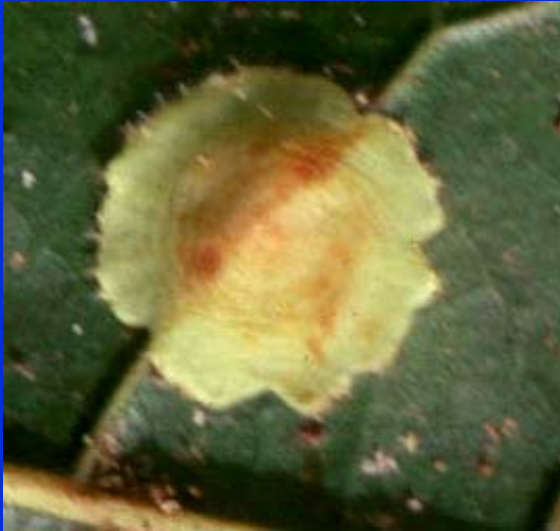


*Buddleja*

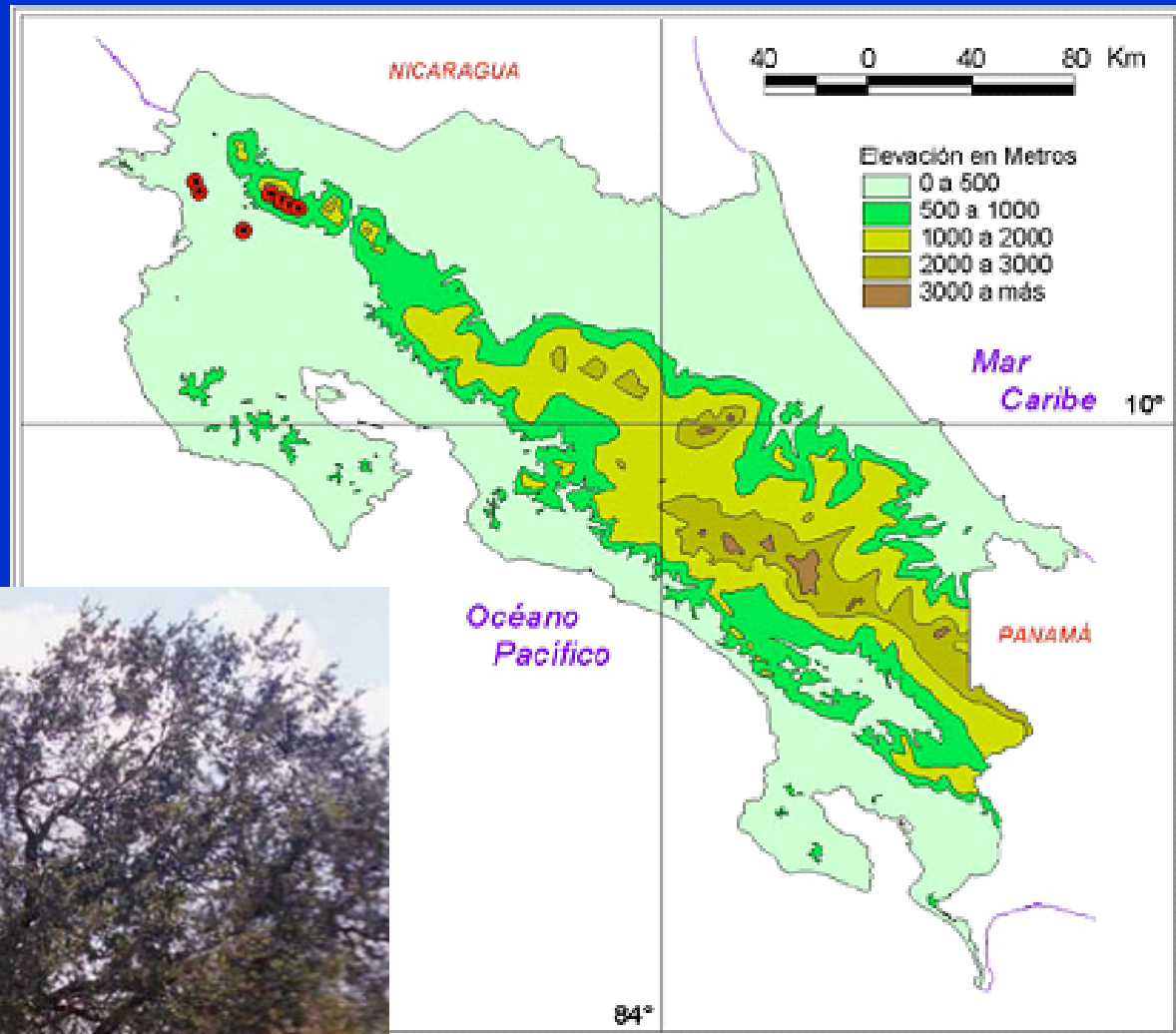


*Citharexylum* (Verbenaceae)

# Cynipidae on *Quercus bumelioides*



# Quercus oleoides



# Braconidae



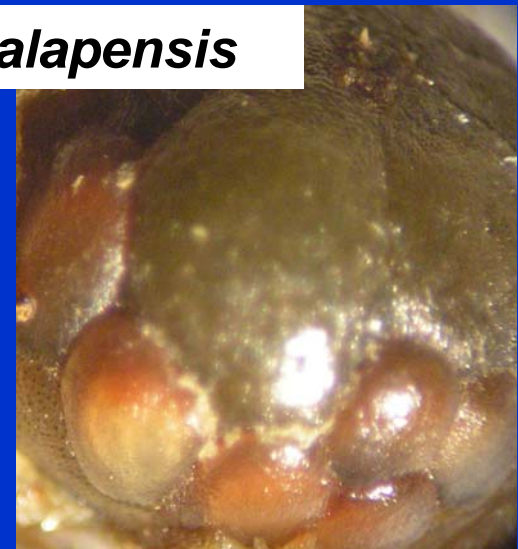
*Monitoriella* on  
*Philodendron*  
(Araceae)



*Labania*  
on *Ficus*

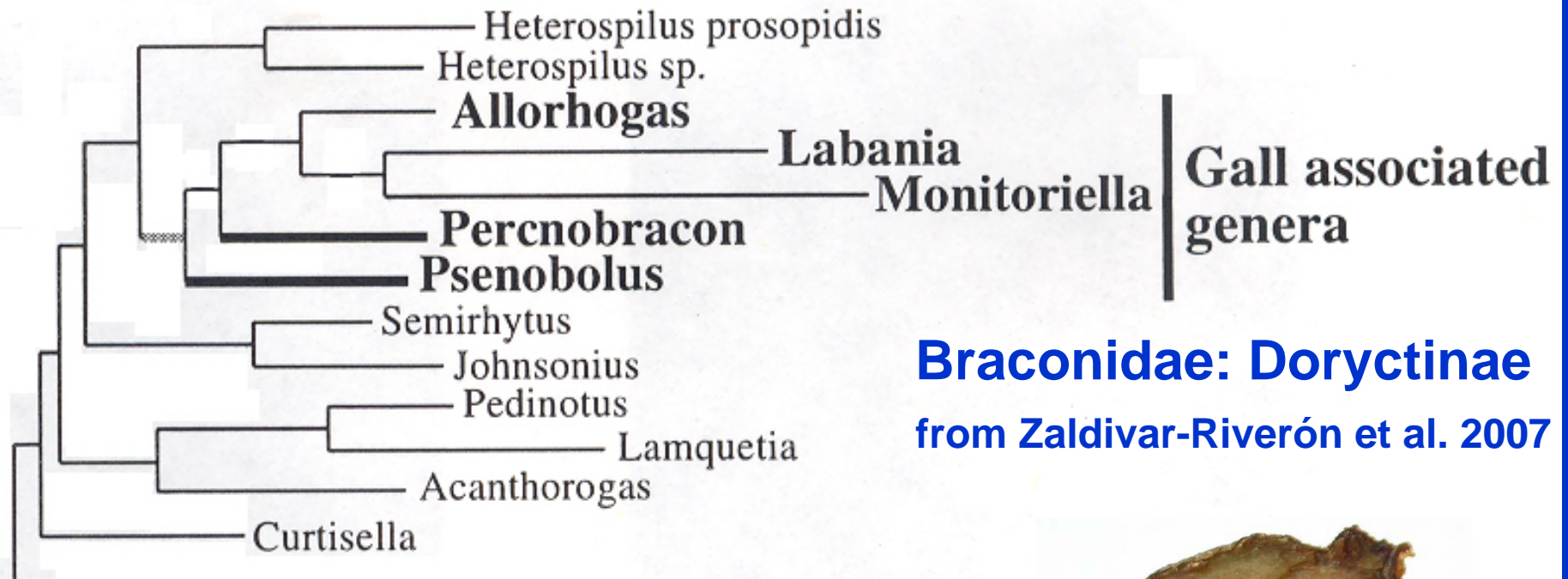


*Conostegia xalapensis*



*Allorhogas* on Fabaceae, Melastomataceae, Rubiaceae





**Braconidae: Doryctinae**  
 from Zaldivar-Riverón et al. 2007



***Psenobolus***  
 In fig syconia  
 and *Mononeuron*  
 galls on fig.



***Mononeuron***: stems of  
*Ficus*. Galls on *Duguetia*  
 (Annonaceae) in Brazil.

# Lepidoptera

<b>FAMILY</b>	<b># SPP.</b>	<b>HOST PLANTS</b>
Nepticulidae	1	<i>Hampea</i> (Malv.)
Gracillariidae	4	<i>Aegiphila</i> (Verben.), <i>Clusia</i> , <i>Pithecoctenium</i> (Bignon.)
Heliodinidae	1	<i>Iresine</i> (Amaranth.)
Glyphipterigidae	1	<i>Hyptis</i> (Lam.)
Momphidae	50	Primarily Melastomataceae; also <i>Croton</i> (Euphorb.), <i>Cuphea</i> (Lythr.), <i>Hoffmannia</i> (Rub.)
Agonoxeniidae	4	Melastomataceae, <i>Ficus</i>
Cosmopterigid.	11	Primarily Myrsinaceae; also <i>Cupania</i> (Sapind.), <i>Guazuma</i> (Stercul.), <i>Lonchocarpus</i> (Fab.)
Sesiidae	4	<i>Coussarea</i> (Rub.), <i>Curcubitaceae</i> , <i>Phaseolus</i> (Fab.)
Tortricidae	4	<i>Ageratina</i> (Aster.), <i>Monnina</i> (Polygal.), <i>Phaseolus</i> , <i>Rubus</i> (Ros.)
Alucitidae	2	Gesneriaceae
Crambidae	2	<i>Ipomoea</i> (Convol.), <i>Podandrogyne</i> (Cappar.)
Thyrididae	2	<i>Hampea</i> , <i>Sida</i> (Malv.)

# Lepidoptera: Momphidae

*Conostegia oerstediana*



*Blakea*



*Monochaetum*



*Centradenia*



*Cuphea* (Lythraceae)



# Coleoptera

<b>FAMILY- # spp.</b>	<b>GENUS</b>	<b>HOST PLANT</b>
Buprestidae-1	<i>Hylaeogena</i>	<i>Tabebuia</i> (Bignoniaceae)
Apionidae-2	undetermined	<i>Aiouea</i> (Laur.), <i>Nissolia</i> (Fabaceae)
Curculionidae-24		
Baridinae	<i>Baris</i>	<i>Bauhinia</i> (Fabaceae)
	<i>Eurhinus</i>	<i>Cissus</i> (Vitaceae)
	<i>Geraeus</i>	<i>Montanoa</i> (Asteraceae)
	<i>Peridenitus</i>	<i>Peperomia</i> (Piperaceae)
	<i>Thanius</i>	<i>Psychotria</i> (Rubiaceae)
Conoderinae	undetermined	<i>Philodendron</i> (Araceae), <i>Ocotea</i> (Lauraceae)
Curculioninae	<i>Camptocheirus</i>	<i>Cinnamomum</i> (Lauraceae)
	<i>Myrmex</i>	<i>Struthanthus</i> (Loranthaceae)
Scolytinae	<i>Scolytodes</i>	<i>Ageratina</i> (Asteraceae)

# Baridinae



*Geraeus* on  
*Montanoa*  
(Asteraceae)



*Eurhinus* on *Cissus* (Vitaceae)

*Thanius biennis*  
on *Psychotria*



*Peridinetus sanguinolentus*  
on *Peperomia* (Piperaceae)



*Hoffmannia*  
(Rubiaceae)



# Gall-forming Psylloidea

\* = plant families with more than one genus of gall-formers

FAMILY	GENUS	HOST PLANTS
Calophyidae	<i>Calophya</i>	<i>Mauria</i> (Anacardiaceae), Rutaceae*
Phacopteronidae	<i>Pseudophacopteron</i>	<i>Protium</i> (Burseraceae)
Psyllidae		
Euphalerinae	<i>Euphalerus</i>	<i>Lonchocarpus</i> (Fabaceae)
Aphalarinae	<i>Gryopsylla</i>	<i>Ilex</i> (Aquifoliaceae)
Aphalaroidinae	<i>Telmapsylla</i>	<i>Avicennia</i> (Avicenniaceae)
Diaphorininae	<i>Tuthillia</i>	<i>Myrcianthes</i> , <i>Calyptranthes</i> (Myrtaceae*)
Triozidae	<i>Kuwayama</i>	<i>Beilschmiedia</i> (Lauraceae*)
	<i>Leuronota</i>	Cunoniaceae, Juglandaceae, Rutaceae*
	<i>Neolithus</i>	Clusiaceae, <i>Sapium</i> (Euphorbiaceae)
	<i>Trichohermes</i>	<i>Pseudolmedia</i> , <i>Sorocea</i> (Moraceae*)
	<i>Triozza</i>	Araliaceae, Clethraceae, Ebenaceae, Lauraceae*, <i>Brosimum</i> (Moraceae*)
	<i>Triozoida</i>	<i>Psidium</i> (Myrtaceae*)

Other hosts: Meliaceae, Sapindaceae, Sapotaceae, Simaroubaceae

# Callophyidae



*Calophya* on *Zanthoxylum*  
(Rutaceae)

# Phacopteronidae



*Pseudophacopteron* on  
*Protium* (Burseraceae)

# Psyllidae



*Euphalerus* on  
*Lonchocarpus* (Fabaceae)



*Telmapsylla* on *Avicennia*  
(Avicenniaceae)



# Trioziidae



*Trioza* on  
*Cinnamomum*  
(Lauraceae)



*Leuronota* on *Weinmannia*  
(Cunoniaceae)



*Neolithus* on *Sapium* (Euphorbiaceae)



*Trichohermes* on  
*Pseudolmedia* (Moraceae)



## Eriococcidae



*Ceiba pentandra* (Bombacaceae)

## Pseudococcidae



*Quadrigallicoccus  
lauracearum* on  
*Aiouea & Nectandra*  
(Lauraceae)

# Thysanoptera



*Sarcaulus brasiliensis* (Sapotaceae)



*Drimys granadensis* (Winteraceae)

Other hosts: Araliaceae, Euphorbiaceae,  
Gesneriaceae, Lauraceae

**A nematode gall on  
Melastomataceae of  
potential use in  
biological control  
(Anguinidae: *Ditylenchus*)**



# CONCLUSIONS

- Fabaceae, Melastomataceae, Moraceae, and Myrtaceae appear to harbor the widest range of gall-inducing insect taxa.
- Certain plants (e.g. *Inga* spp.) harbor higher numbers of cecidomyiid species and it would be interesting to examine these plants in greater detail.
- We are still a long way from being able to estimate the number of cecidomyiid species present in even one small Neotropical country.



**THANK YOU VERY MUCH**