

**Caterpillars feeding on *Piper aduncum* (Piperaceae)  
an alien tree in Papua New Guinea  
at high and low elevations.**



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*Piper aduncum* secondary forest



Native *Macaranga* secondary forest

***Piper aduncum*: Small tree from South America**

- Introduced to PNG after the Second World War
- Spreading fast in the lowlands during past 30 years
- Coming to the Highlands, up to 2000 m, during past 10 years
- Replacing natural secondary forests with *Macaranga*
- *Piper aduncum* forest is not good for making gardens



# PIPER

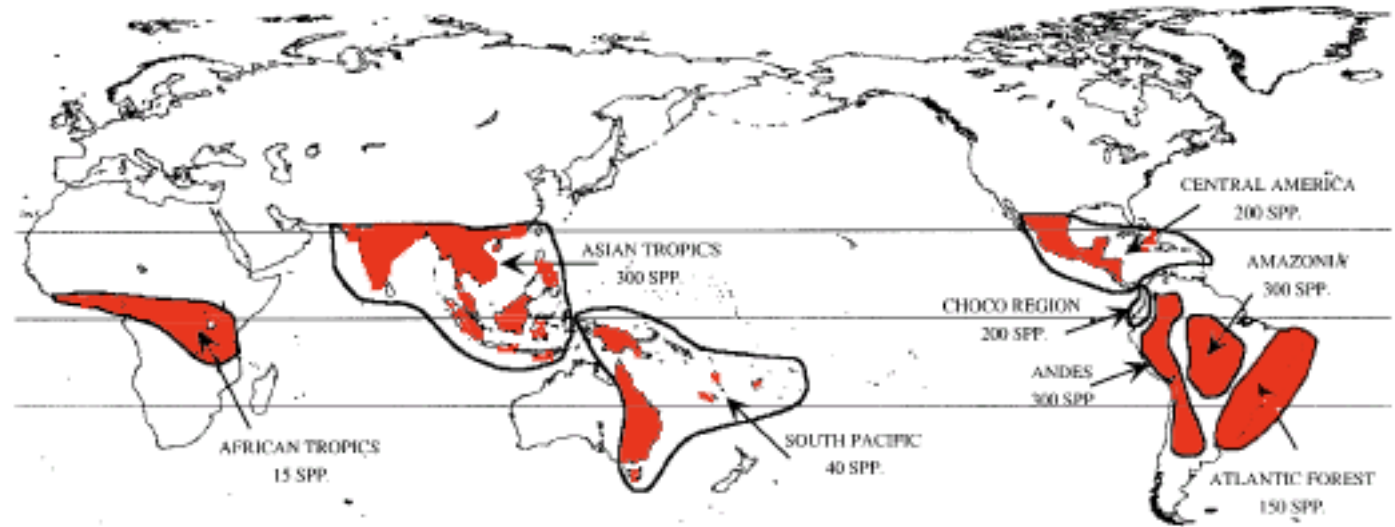


Fig. 1. Geographic distribution of the genus *Piper*. Species numbers are estimates for each of the centers of diversity of the group, thus regionally widespread taxa may be represented more than once.

- Found in all tropical areas
- Most species rich in South America
- Climbers, shrubs or trees

In Papua New Guinea, most important species are:

*Piper betel* - daka - good for chewing

*Piper methysticum* - kava - good for drinking

*Piper aduncum* - alien tree from South America,



## Aims of the study:





What caterpillars are feeding on alien tree *Piper aduncum* in PNG?

Are they the same species as those feeding on native *Piper* species?

Are they specialists or generalists?

Are these caterpillars different in lowlands and in highlands?



	LOWLANDS, 100 M MADANG	HIGHLANDS, 1600 M SIMBU
NATIVE	P. MACROPIPER (climber) 	P. GIBBILIMBUM (shrub) 
ALIEN	P. ADUNCUM (small tree) 	P. ADUNCUM (small tree) 



## METHODS:

1. Collecting caterpillars
2. Rearing caterpillars
3. Mounting and labelling adult specimens
4. Photographing caterpillars and adults
5. Databasing of specimen information
6. Identification of specimens  
(with Smithsonian Institute)
7. Data analysis





*Craspedosis ovalis*, Geometridae

most common species on the native *Piper macropiper* in Madang represents 92% of all its caterpillars

does not feed on *Piper aduncum*



*Herpetogramma* sp. nr. *licarsisalis*, Crambidae

most common species on the alien *Piper aduncum* in Madang

represents 50% of all its caterpillars

probably a native species, but not found on any native host from the 90 species we studied





**Three most common species feeding on  
the native *Piper gibbilimum* in Simbu**

*Udea* sp. nr. *gigantea*, Pyralidae, *Piper*  
specialist not feeding on *Piper aduncum*

? sp., Pyralidae, *Piper* specialist.  
not feeding on *Piper aduncum*

*Craspedosis* sp., Geometridae, *Piper*  
specialist not feeding on *P. aduncum*





**Three most common species feeding on  
the alien *Piper aduncum* in Simbu**



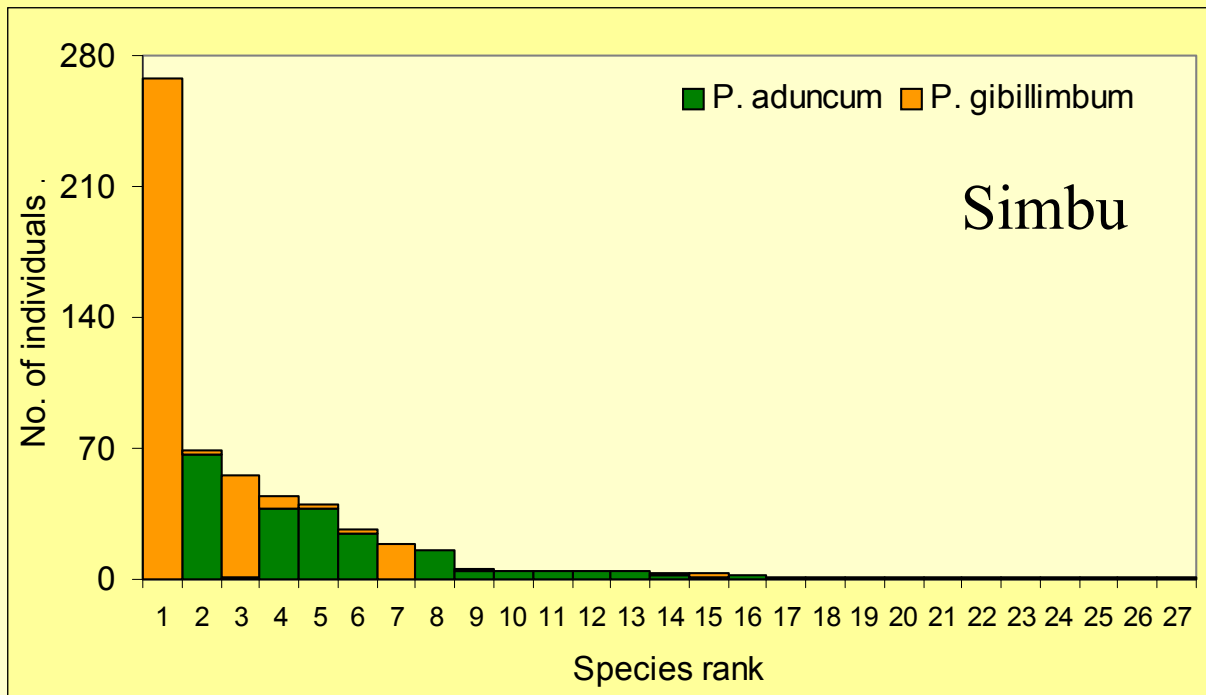
*Adoxophyes* sp., Tortricidae, generalist



*Adoxophyes* sp., Tortricidae, generalist

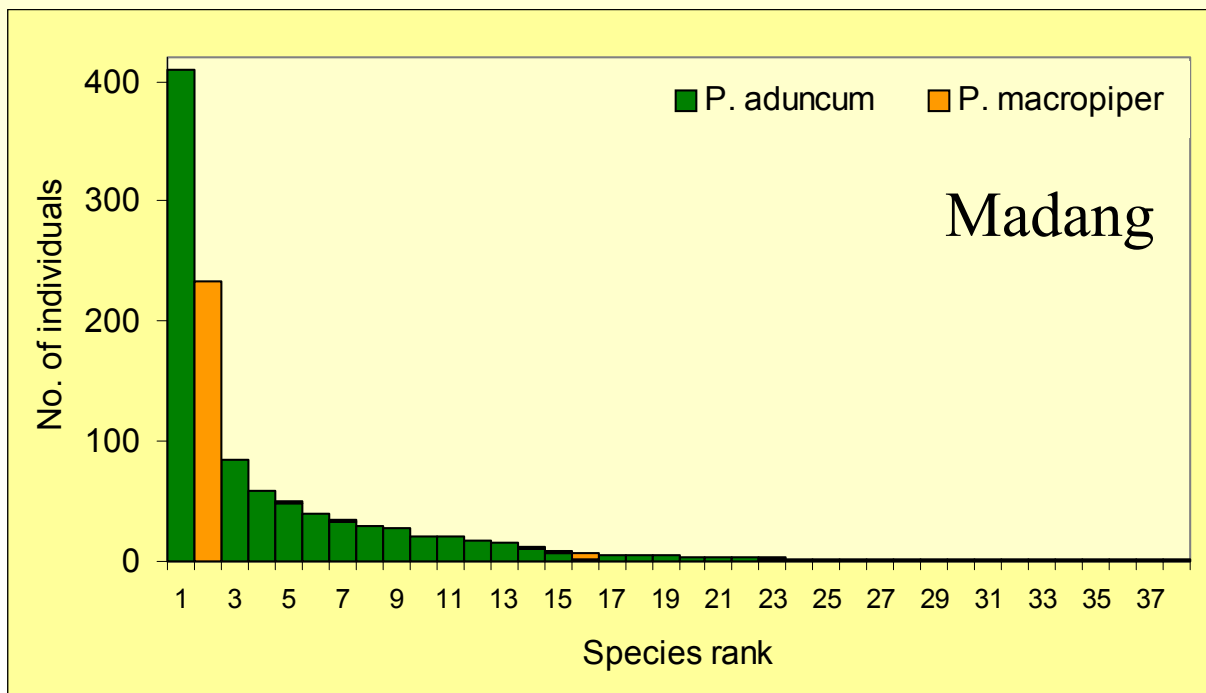


*Adoxophyes* sp., Tortricidae, generalist



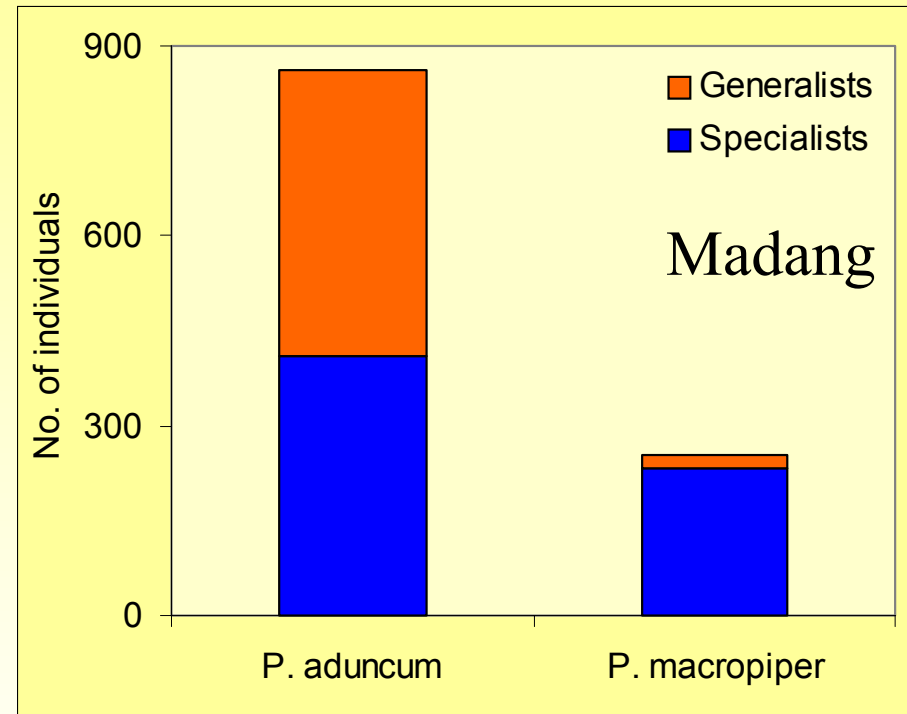
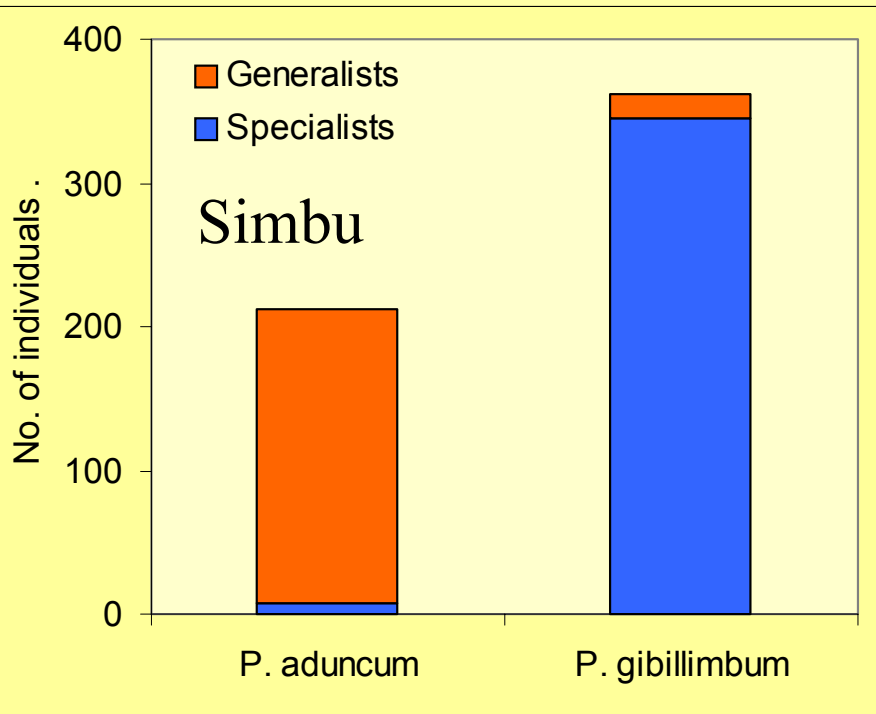
Trees from the same genus often share the same herbivore species.

Is it true also for *Piper aduncum* and native *Piper* species?



**No.** All caterpillar species clearly preferred either *Piper aduncum* or the native *Piper*, but were never common on both of them.

Alien trees are often colonised only by generalist herbivores.  
Is it true also for *Piper aduncum* in PNG?

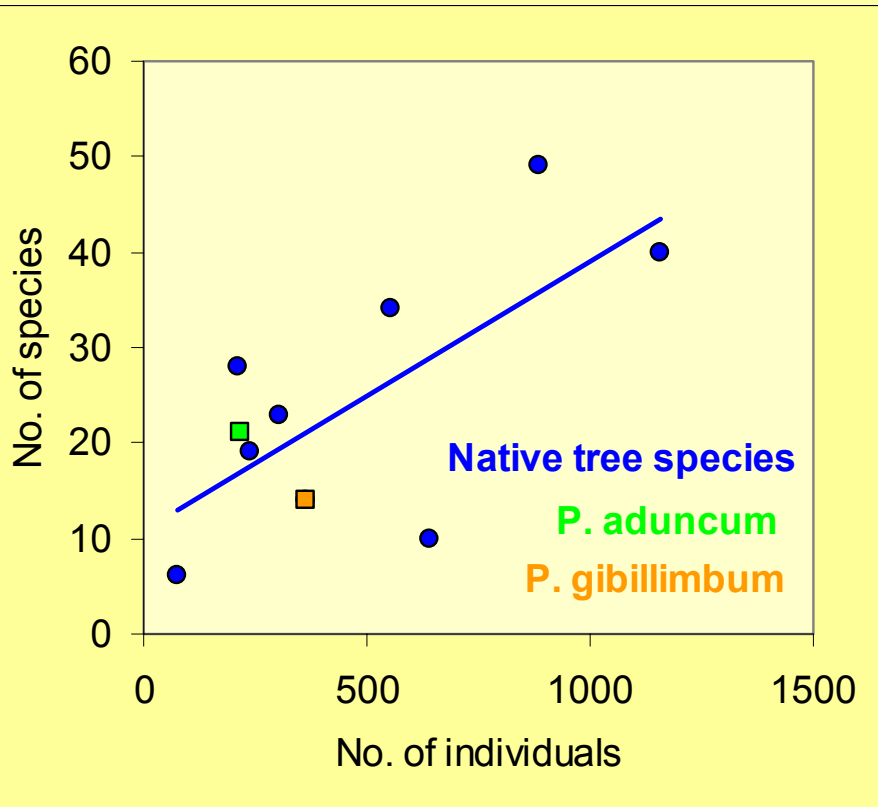


**Yes**, *Piper aduncum* was colonised only by generalists in Simbu, while native *Piper gibillimum* was colonised mostly by specialists. However, in Madang, we found also one common species feeding on *P. aduncum* but not on any native plant we studied.

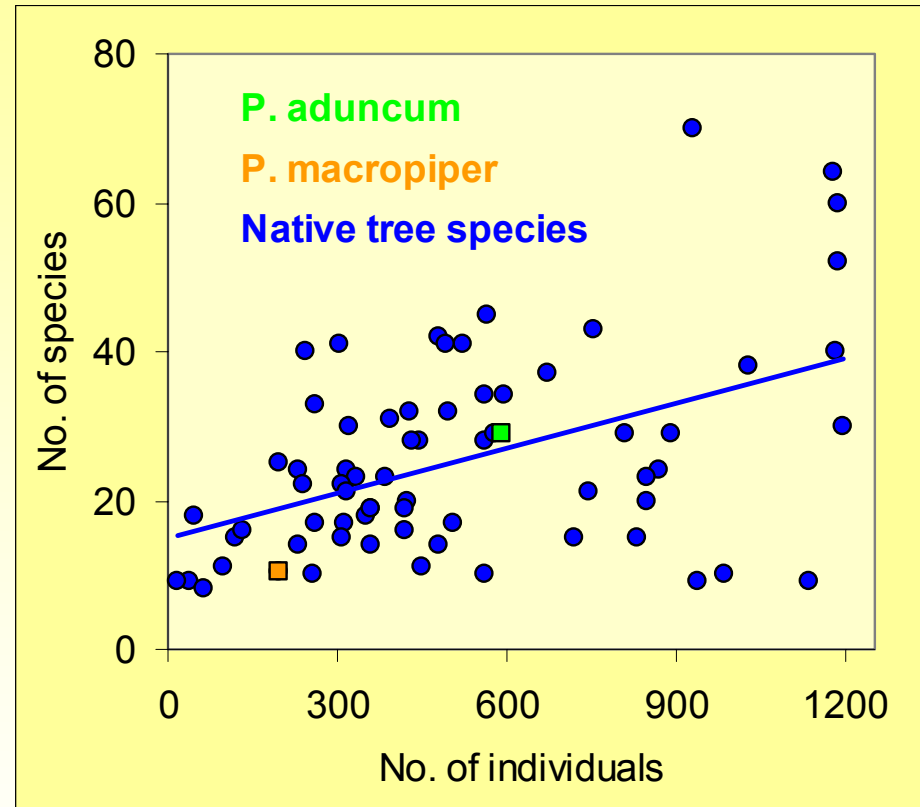


Alien trees have often fewer herbivore species than native trees.  
Is it true also for *Piper aduncum* in PNG?

Simbu



Madang



**No**, *Piper aduncum* hosted more species of caterpillars than native *Piper* species and also similar number of species as native trees, both in Simbu and Madang

Are there any differences in caterpillar species feeding on *Piper aduncum* in the lowlands and in the highlands?

**Yes.** Only one species (*Adoxophyes* sp.) was the same in both areas and even the most important families were different between lowlands and highlands.

	<i>P. aduncum</i>	<i>P. macropiper</i>	<i>P. gibillimum</i>
Madang	Crambidae <b>Tortricidae</b>	<b>Geometridae</b>	
Simbu	<b>Tortricidae</b>		Pyralidae <b>Geometridae</b>

## CONCLUSIONS

- Alien tree *Piper aduncum* has become one of the most common species in some PNG lowland secondary forests and is presently spreading also to the Highlands.
- It was colonised by caterpillar communities different from those feeding on native *Piper* species.
- These communities are as species-rich as the communities on native trees. However, they are dominated by generalist species
- *Piper aduncum* is colonised by very different communities in the lowland and in the highland areas.
- According to experience of farmers in Madang, *Piper aduncum* decreases soil fertility. The current practice of purposefully planting this species in the Highlands should be abandoned.



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