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

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*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

- 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 of generalists?
Are these caterpillars different in lowlands and in highlands?
<table>
<thead>
<tr>
<th></th>
<th>LOWLANDS, 100 M MADANG</th>
<th>HIGHLANDS, 1600 M SIMBU</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATIVE</td>
<td>P. MACROPIPER (climber)</td>
<td>P. GIBBILIMBUM (shrub)</td>
</tr>
<tr>
<td>ALIEN</td>
<td>P. ADUNCUM (small tree)</td>
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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 gibbonilimum* 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
Species rank

No. of individuals

P. aduncum
P. gibillimbum

Simbu

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 gibillimbum* 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?

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.

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<tr>
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<th><em>P. aduncum</em></th>
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<th><em>P. gibillimbum</em></th>
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<tbody>
<tr>
<td>Madang</td>
<td>Crambidae</td>
<td>Geometridae</td>
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<td></td>
<td><em>Tortricidae</em></td>
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<td>Pyralidae Geometridae</td>
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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.
Acknowledgements:

• Skylab team members of the Sangamanga Environment & Culture Preservation from Mu Village

• Insect collectors: Sanny Bulage, Kua Nilime, Ningal Kiage, Dom M. Nilime, Sine Mala, Stanley Dom and Joshua Stanley

• Scott Miller & Karie Darrow for Lepidoptera taxonomy

• Daniel Stancik & George Weiblen for botanical help

• Darwin Initiative (UK) and National Science Foundation (USA) for funding