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Vincent Lesieur, Marie-Anne Auger-Rozenberg, Geraldine Roux-Morabito,  
Alain Roques

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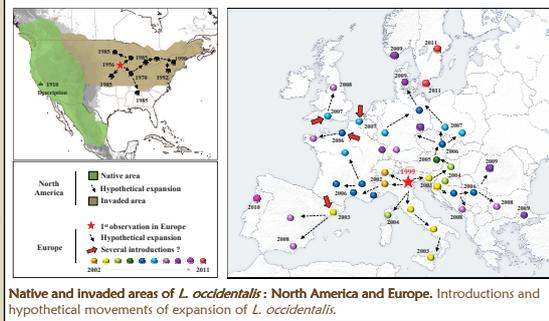
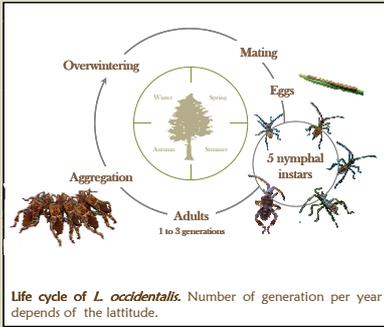
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# Impact of the Western conifer seed bug, *Leptoglossus occidentalis* on major European conifers: example of *Pinus nigra*

V. Lesieur, M.A. Auger-Rozenberg., G. Roux-Morabito & A. Roques

INRA - Centre de recherche d'Orléans, Unité de Zoologie Forestière, 2163 Avenue de la Pomme de Pin - CS 40001 Ardon, 45075 ORLEANS Cedex 2, FRANCE

The Western conifer seed bug, *Leptoglossus occidentalis* Heidemann (Heteroptera, Coreidae) is a native insect of Western North America and was introduced in Europe at the end of 1990s. Since its introduction, this species has colonized very quickly a large part of the continent. Considering as an important pest of conifer seeds in its native range, this polyphagous pest is known to feed on several conifer species with a clear reference for Pinaceae. In invaded area, host range is still unclear even if the bug was observed on several European conifer species. Adults and Immature conifer seed bugs feed on individual seeds in developing and mature cones. Feeding causes reduction of seed fertility and conelet abortion. This insect appears to be a potential serious threat for both natural regeneration of native conifer forests and seed crops in seed orchards.



### Objectives :

- to develop a specific damage category of seed bug
- to test seed germination potential for each damage category
- to compare the effect of feeding by different life stages and sex of seed bugs
- to assess the impact of *L. occidentalis* in French seed orchards

## 1. Development of a specific damage category of seed bugs on *Pinus nigra*

**Materials & Methods**

Seeds were X-rayed to ensure they were full

Seeds were exposed to seed bugs  
Experiment was run at 20°C, 60% RH and 16L:8D photoregime

Seeds were extracted and X-rayed

Seeds were categorized according to the level of damage disclosed by the radiographs :

- Full (no apparent damage)
- Light (damage  $\leq 1/4$ )
- Moderate ( $1/4 \leq$  damage  $\leq 1/2$ )
- Important ( $1/2 \leq$  damage  $\leq 3/4$ )
- Severe (damage  $\geq 3/4$ )

**Results**

**Damage categories**

	RX	Internal state
<b>Full</b> (no apparent damage)		
<b>Light</b> (damage $\leq 1/4$ )		
<b>Moderate</b> ( $1/4 \leq$ damage $\leq 1/2$ )		
<b>Important</b> ( $1/2 \leq$ damage $\leq 3/4$ )		
<b>Severe</b> (damage $\geq 3/4$ )		

**Radiography showed a depletion of seed storage reserves**

⇒ Radiography is a reliable tool to distinguish damaged seeds

## 2. Seed germination potential for each damage category

**Materials & Methods**

Seeds were X-rayed and categorized according to the level of damage disclosed by the radiographs :

- Full (no apparent damage)
- Light (damage  $\leq 1/4$ )
- Moderate ( $1/4 \leq$  damage  $\leq 1/2$ )
- Important ( $1/2 \leq$  damage  $\leq 3/4$ )
- Severe (damage  $\geq 3/4$ )

Seeds were spread in clear plastic Petri dishes on moist blotting paper and incubated for 30 days at 20°C, 60% RH and 16L:8D photoregime

Seeds were considered germinated when the radicle had grown at least 2 mm

**Results**

**Percentage of germination**

Damage  $\leq 1/4$  : percentage of germination reduced by 7  
Damage  $\geq 1/2$  : germination very closed to 0

**Seeds damaged by bugs presented a clear reduction of the amount of reserves**

⇒ The germination percentage was significantly affected by *L. occidentalis* feeding even when damage is light ( $\leq 1/4$ ).

## 3. Effect of feeding by different life stages and sex of seed bugs on *Pinus nigra*

**Materials & Methods**

10 trees

5 treatments / tree:

- Male (early June)
- Virgin female (early June)
- Mated female (end of June)
- Nymph (July)
- Control

1 insect / cone for a 2-wk period (excepted for the « nymph » treatment where 3 nymphs were used)

Cones were harvested (September)

Seeds were extracted and X-rayed

Seeds were categorized according to the level of damage disclosed by the radiographs

**Results**

**Full**

**Empty**

**Partially fed upon**

**Feeding by *L. occidentalis* reduced significantly the number of full seeds per cone ⇒ production of viable seeds was very low**

⇒ No difference detected in the damage caused by nymphs, females and males

## 4. Impact of *L. occidentalis* in French seed orchards.

**Materials & Methods**

Survey of 2 plots situated in southwestern France  
30 to 50 cones collected / plot

Cones were harvested (September)

Seeds were extracted and X-rayed

Seeds were categorized as :

- Full
- Empty
- Damaged

Proportion of seeds damaged was calculated as:

$$\frac{\text{Seeds damaged}}{(\text{Full seeds} + \text{Seeds damaged})} \times 100$$

**Results**

**Seed crop production**

More full seeds were produced in 2011  
Proportion of seeds damaged > 10 % for both years.

**Seed orchards of *Pinus nigra* seems to be affected by *L. occidentalis***