The Nearctic leafhopper *Scaphoideus titanus* was accidentally introduced in Europe during the 20th century and expanded almost throughout the continent in about 60 years. *S. titanus* is the vector of Flavescence dorée phytoplasma (FDP), the causal agent of the most important grapevine yellow disease in European vineyards. FD poses an extreme threat to European viticulture and is recognized as a quarantine disease because of its epidemiology and because of severe FDP pathogenicity to several important European grapevine cultivars.

**Objectives:**
1) Better understand the colonization history of *S. titanus* in Europe: single or multiple introductions
2) Evaluate the evolution of this species in the new European habitat

**Material, Methods and Results:**

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10 Native American *S. titanus* populations sampled in 2004 on four different Vitis sp. (*Vitis vinifera*, *V. labrusca*, *V. aestivalis* and *V. riparia*)

19 European *S. titanus* populations (from France, Italy, Switzerland, Portugal and Romania) sampled between 2004 and 2005 on *V. vinifera*

**I. Analysis of 7 Microsatellite data:**

- Invasive European populations showed much lower levels of genetic diversity than American populations

<table>
<thead>
<tr>
<th></th>
<th>America</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total alleles</td>
<td>132</td>
<td>99</td>
</tr>
<tr>
<td>Private alleles</td>
<td>53</td>
<td>16</td>
</tr>
<tr>
<td>Expected heterozygosity</td>
<td>0.752</td>
<td>0.639</td>
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<tr>
<td><em>F</em>&lt;sub&gt;ST&lt;/sub&gt;</td>
<td>0.234 - 0.402</td>
<td>0.129 - 0.440</td>
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<tr>
<td><em>F</em>&lt;sub&gt;IS&lt;/sub&gt;</td>
<td>0.042</td>
<td>0.03</td>
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<tr>
<td>Isolation by distance</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

- Long-distance gene flows occur between European populations

**II. Analysis with mitochondrial cytochrome oxidase II**

- Phylogeographic structure is detected in American populations whereas European populations exhibit both lower differentiation and absence of phylogeographic structure
- One main haplotype widespread in Europe
- European invasive haplotypes were not found in our American sampling

**Conclusions:**

1) We have the evidence of the recent bottlenecks in European *S. titanus* populations.
2) Most European populations could originate from a main invasion event, with may be additional introduction as endemic mitotype were found in Switzerland.
3) Regional and/or host plant related differentiation occurs in *S. titanus* native populations.
4) After the initial establishment of *S. titanus* populations, the commercial exchanges of grapevine canes and grafts carrying eggs could have played an important role in the insect dispersal across European vineyards.