Nymphocixia caribbea (Fennah) (Homoptera: Cixiidae) potential candidate as coconut lethal yellowing vector in the Carribean

M. Dollet[1], R. Llauger[2], S. Fabre[1], J. F. Julia[1], C. Gonzalez[2] and J. Cueto[2]

[1]Cirad, TA-A29/F,
34398 Montpellier Cedex 5, France
e-mail: michel.dollet@cirad.fr
[2]IIFT, Ave. 7ma, N° 3005, Miramar,
Ciudad de La Habana, Cuba

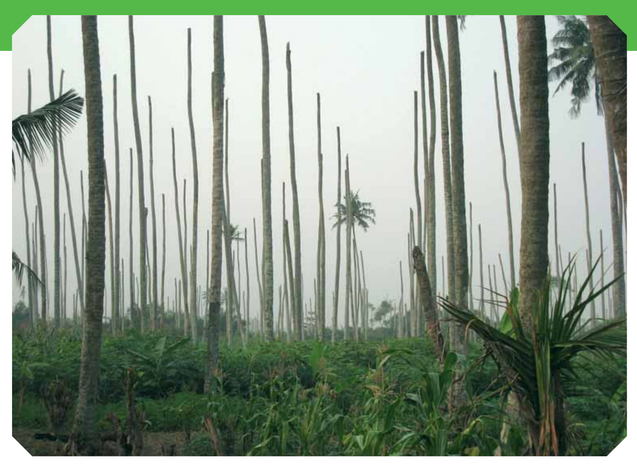


Fig.1 Consequence of CLY in a coconut plantation.

Phytoplasmas are associated with Coconut Lethal Yellowing (CLY), a devastating disease of palms (Fig.1 and 2) in the Caribbean, from Florida to Honduras (actual South West limit) and Nevis (East limit). Only in Florida an insect vector, Myndus (Haplaxius) crudus *(Homoptera: Cixiidae) (Fig.3) was claimed to be the vector of CLY (Howard* et al.*1983). This result was obtained after several years of research.*

However, all attempts to repeat this result in other parts of the Caribbean failed. (Julia et al*. 2008). The aim of this study was to identify other possible candidates in the transmission of CLY in Cuba.*

Fig.2 Advanced stage of CLY.

Fig.3 *Myndus (Haplaxius) crudus* in Florida.

Material and methods

Surveys were done in the province of Granma, on the narrow coast line overlooked by the hills of the Sierra Maestra (Fig.4) where coconut plantations have been severely affected by CLY since the beginning of the 2000s. In 2005 (Llauger *et al.)* we detected the cixiid *Nymphocixia caribbea* (Fennah) in an affected plantation, in the locality of Pilon (Fig.5 and 6).

Between 2006 and 2009 several *N. Caribbea* were screened by direct PCR using Caribbean CLY non ribosomal primers (Harrison *et al.*1994), and/or direct PCR using primers P1/P7 followed by nested-PCR (Harrison *et al.* 2002).

Nymphocixia were tested one by one or by batches of 2 or 3 after DNA extraction.

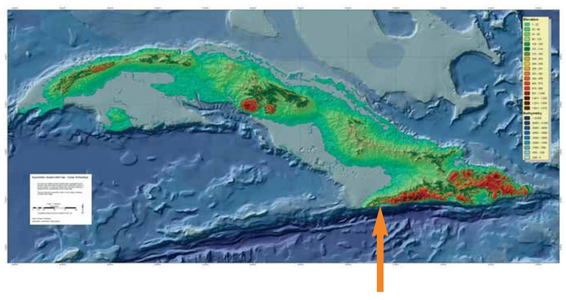
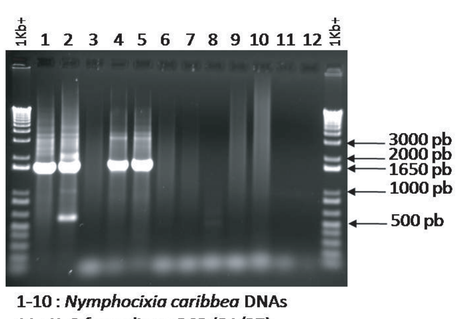


Fig.4 Location of Pilon in the Granma State of Cuba, area located between the sea and the Sierra Maestra.

Fig.5 Coconut plantation with one early stage case of CLY in Pilon. Note the Sierra Maestra in the background.

Fig.6 *Nymphocixia sp.*

Results



1-10 : *Nymphocixia caribbea* DNAs
11 : H_2O from direct PCR (P1/P7)
12 : H_2O Nested PCR

Fig.7 Agarose gel electrophoresis of Nested PCR products obtained from *Nymphocixia caribbea* DNAs.

Amplifications (Fig. 7) were obtained from several batches of insect DNAs: 15 / 91 (16.5%).

Cloning and sequencing showed that sequences obtained from the insects matched the sequences of some phytoplasmas isolated from LY affected palms from Cuba (Llauger and Dollet, not published).

Discussion

It is not because CLY phytoplasmas were found in an insect species that it is for sure the vector of CLY. The detected phytoplasmas could originate in the alimentary bolus of insects feeding on diseased coconuts. However, the lack of success of experimental transmissions with *M. crudus* in several regions of the Caribbean outside Florida, the large quantity of *N. caribbea* found in focuses of CLY in Pilon area, the important number of insects harbouring the LY phytoplasma, are in favour of their involvement in the transmission of the disease, at least in the Granma state of Cuba. Preliminary data (not yet published) showed there are different sub-groups of CLY phytoplasmas in Cuba, different from Florida phytoplasmas. One can think there could be a different vector, especially in such ecosystem like the narrow cost line in Pilon region.

References

Harrison *et al.* 1994. Plant Pathol. 43, 998-1008
Harrison *et al.* 2002. Ann. appl. Biol.141 :183-193
Howard *et al.* 1983. Trop. Agric. 60,168-171
Julia *et al.* 2008. Phytopathol. 98 (8): S199
Llauger *et al.* Phytopathol., 95 (6): S153

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