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For quality of life

Inoculum sources of the post-harvest pathogens *Neofabraea* spp. and *Cadophora* spp. in Dutch apple and pear orchards

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Background

Post-harvest diseases of apple and pear cause significant economic losses during long storage. Quiescent infections by fungal pathogens such as *Neofabraea alba*, *N. perennans*, *Cadophora* spp., *Neonectria galligena*, *Phytophthora* spp., *Alternaria* spp., *Fusarium* spp. and *Stemphylium vesicarium* can occur in Dutch orchards and lead to post-harvest fruit rots in storage.

Objective

Knowledge on the occurrence of the different post-harvest diseases and their epidemiology is very limited. The objective of the study was to identify the inoculum sources of main post-harvest pathogens and to gain insight into their population dynamics.

Introduction

- Various necrotic residues and tree parts sampled (Fig. 1): Mummies, cankers, bourses, prunings, fallen leaves of apple or pear, residues of grass leaves, residues of weeds, top soil, and compost
- Samples collected in 10 apple and 10 pear orchards during the growing season 2012 from May until December; 4 replicate plots in each orchard; 3200 samples.
- Species-specific primers and probes developed for *N. alba*, *N. perennans* (Fig. 2), and *Cadophora* spp. (Fig. 3).
- TaqMan-PCR assays used to quantify the amount of pathogen DNA in the environmental samples from the orchards.

Figure 1. Orchard floor with various necrotic tissues as potential source of fruit rot pathogens.
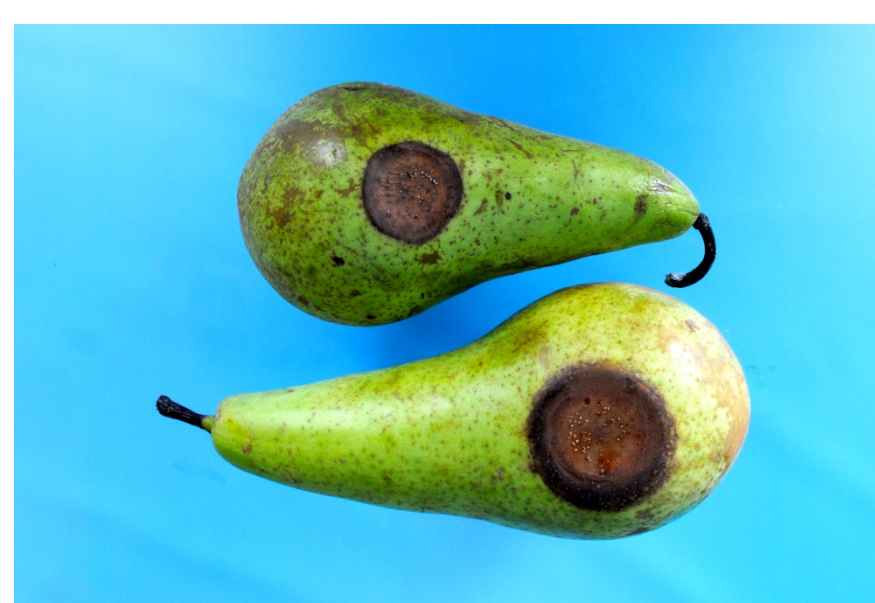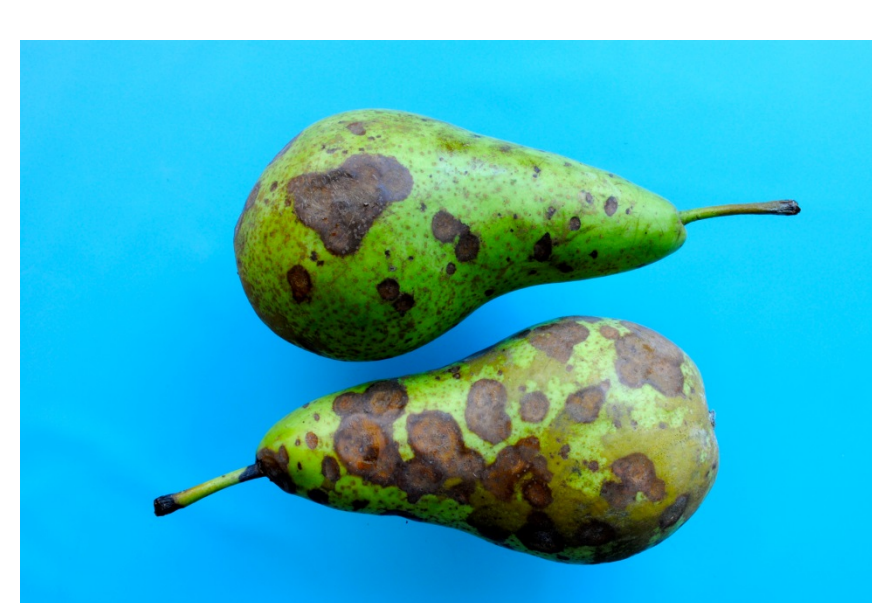
Figure 2. *Neofabraea* damage on pear.

Figure 3. *Cadophora* damage on pear.

Results

- *Neofabraea alba* and *Cadophora* spp. present on various necrotic host and non-host tissues during the season.
- High incidence of both pathogens on necrotic host tissues but also on necrotic leaves weeds and grasses (Fig. 4A,B).
- Highest concentrations of *N. alba* in mummies and cankers of apple and in dead weeds in pear orchards (Fig. 4C).
- Highest concentrations of *Cadophora* spp. in dead host leaves and dead weeds in both apple and pear orchards (Fig. 4D).
- Dynamics of *N. alba* and *Cadophora* spp. populations during the growing season differing significantly between orchards (Fig. 5).
- High variation of both pathogen populations within orchards (Fig. 5).
- *N. perennans* found only occasionally.
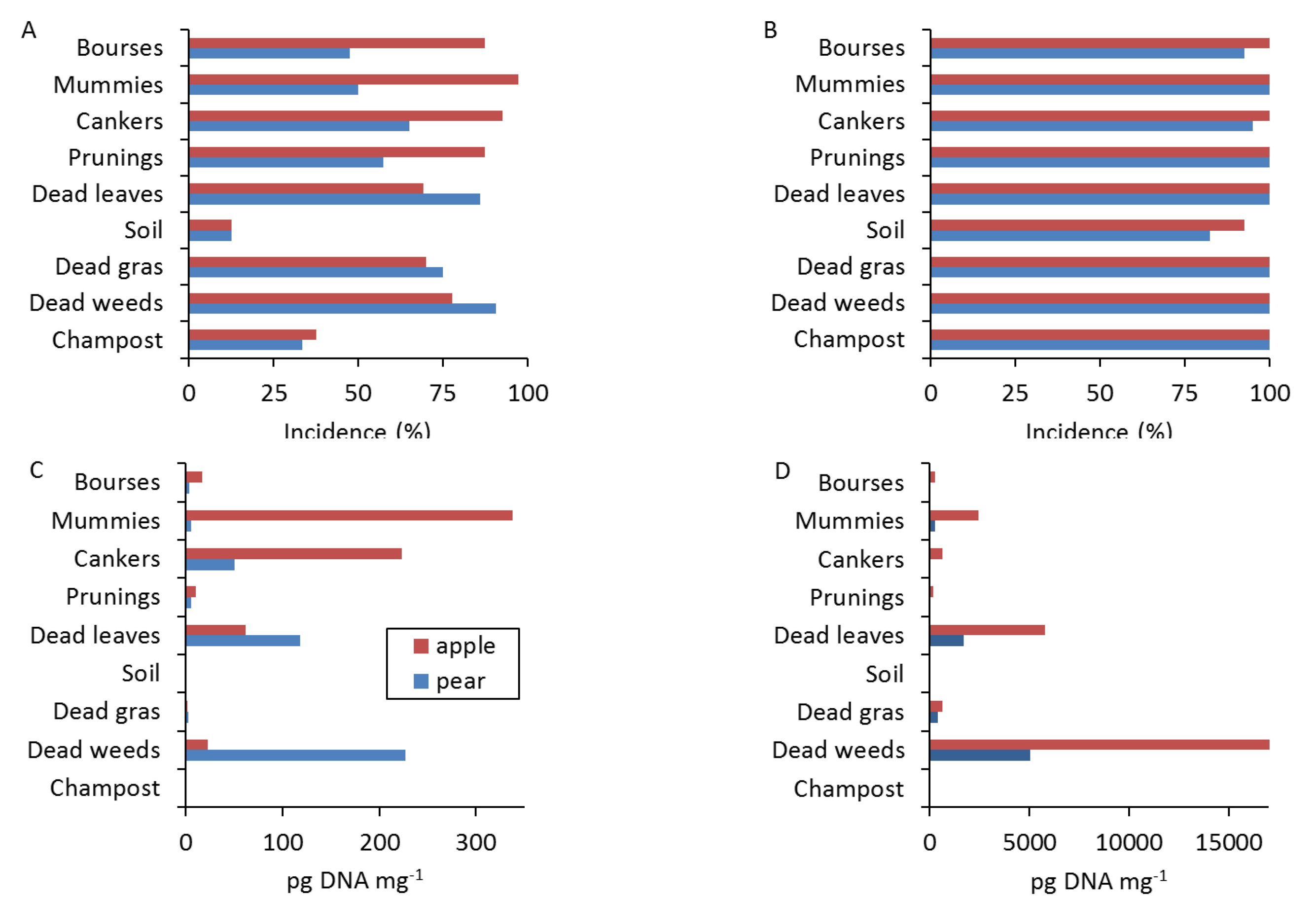
Results

Figure 4. Incidence and concentration of *N. alba* (A,C) and *Cadophora* spp. (B,D) on various potential inoculum sources in May. Means of 10 apple and 10 pear orchards.
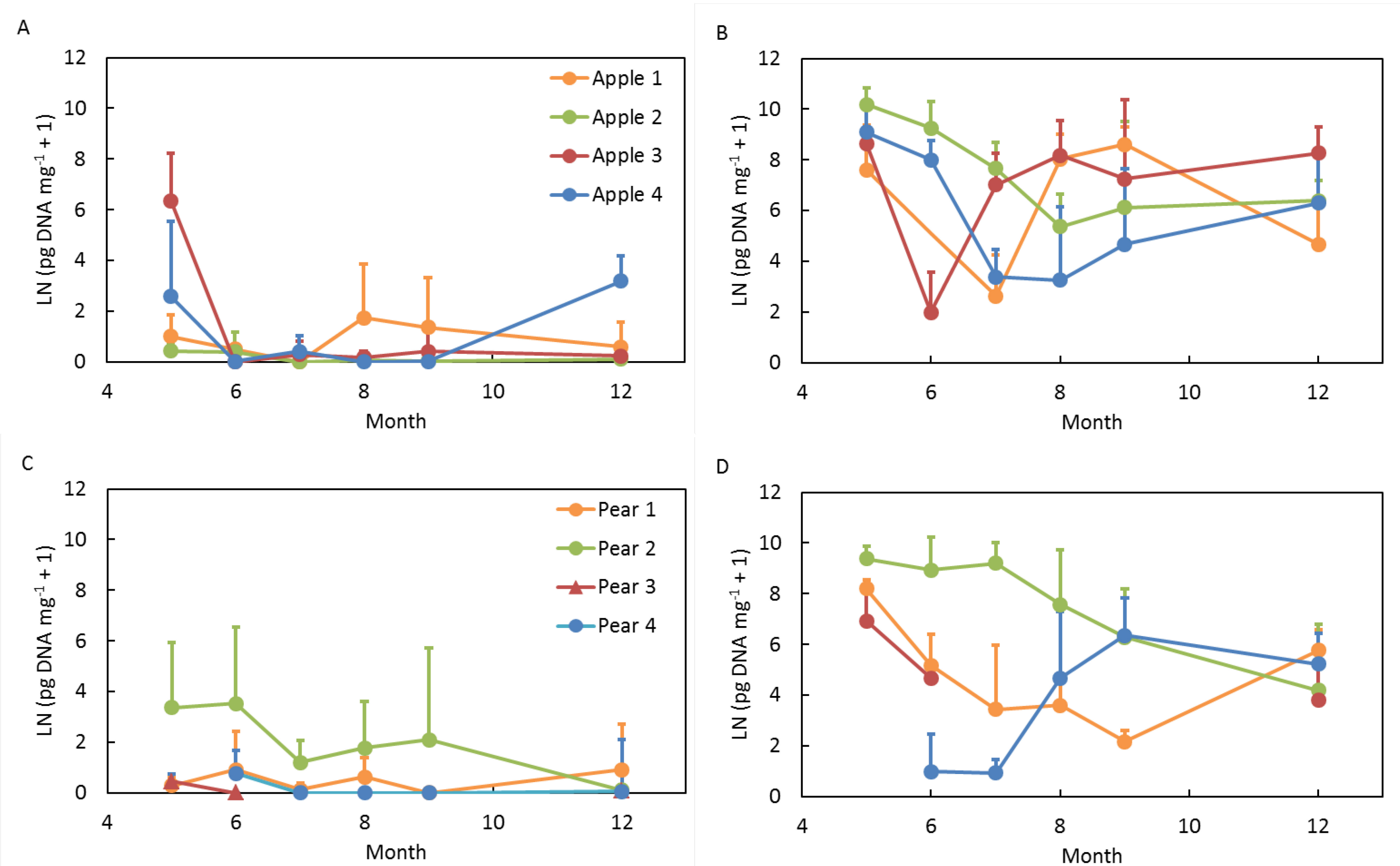

Figure 5. Dynamics of *N. alba* (A,C) and *Cadophora* spp. (B,D) on necrotic weeds on the floor of 4 apple (A,B) and 4 pear orchards (C,D).

Conclusions

- Knowledge on inoculum sources of fruit rot pathogens will be used for the development of sanitation measures and control strategies.
- Knowledge on pathogen populations on inoculum sources can also be used to identify orchards with high risks of fruit rot.
- Identification of the factors causing the observed high variation of pathogen populations within and between orchards will be an important step to understand the epidemiology of fruit rot diseases.

Acknowledgements