UNIVERSITY OF COPENHAGEN

Climatic conditions related to recent outbreaks of Neonectria neomacrospora on Abies spp. in Europe and USA

Talgø, V.; Eikemo, H.; Thomsen, Iben Margrete; Chastagner, G.A.; Pettersson, M.; Nielsen, Knud Nor; Perez-Sierra, A.

Publication date:
2017

Document version
Peer reviewed version

Citation for published version (APA):
Talgø, V., Eikemo, H., Thomsen, I. M., Chastagner, G. A., Pettersson, M., Nielsen, K. N., & Perez-Sierra, A. (2017). *Climatic conditions related to recent outbreaks of Neonectria neomacrospora on Abies spp. in Europe and USA*. Poster session presented at Invasive forest pathogens & implications for biology & policy, Niagara Falls, Ontario, Canada.

Download date: 08. apr.. 2020

Climatic conditions related to recent outbreaks of *Neonectria neomacrospora* on *Abies* spp. in Europe and USA

NIBIO
NORWEGIAN INSTITUTE OF BIOECONOMY RESEARCH

Venche Talgø[1], Håvard Eikemo[1], Iben M. Thomsen[2], Gary A. Chastagner[3], Martin Pettersson[4], Knud Nor Nielsen[2] & Ana Perez-Sierra[5]

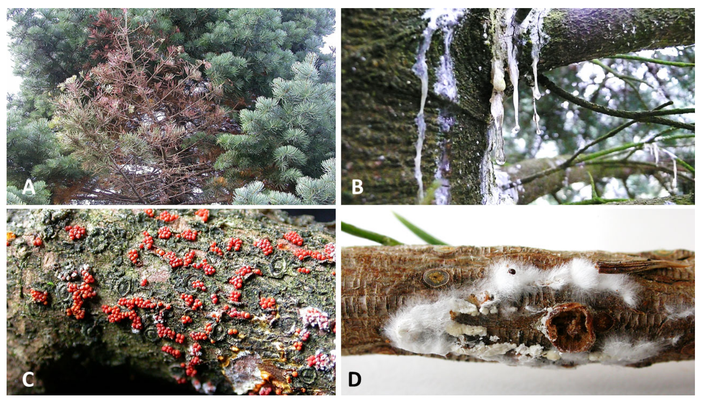


Figure 1. Symptoms and signs of *Neonectria neomacrospora*; dieback of white fir (*Abies concolor*) (**A**), resin flow on Nordmann fir (*A. nordmanniana*) (**B**), and perithecia (**C**) and mycelial growth (**D**) on subalpine fir (*A. lasiocarpa*). Photos: Venche Talgø

Neonectria canker

Neonectria canker caused by the fungus *Neonectria neomacrospora* (Fig. 1 and 2) has become a severe disease on true fir (*Abies* spp.) in Scandinavia, UK and isolated locations in western USA. The conidia are splash dispersed and may cause local infections within the same tree or neighbouring trees during wet periods. The ascospores are airborne and capable of spreading the fungus over longer distances. The conidial stages of the fungus have been known for over 100 years, but no epidemics like those we have experienced during recent years were reported. Here we present climatic data (temperature and monthly accumulated precipitation) for the last 25 years from five countries where *N. neomacrospora* (*N. n.*) is causing damage, two location per country (blue dots in Fig. 3 and 4 and temperature and precipitation in Fig. 5-14).

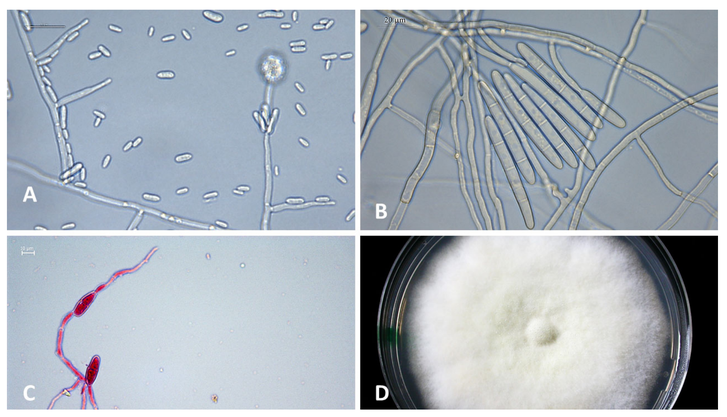


Figure 2. Micro conidia (**A**), macro conidia (**B**), germinating ascospores (**C**), and a culture (**D**) of *Neonectria neomacrospora*. Photos: Jafar Razzaghian (A, B) and Venche Talgø (C, D)

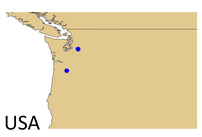


Figure 3.
North-western USA

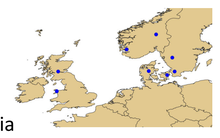


Figure 4.
UK and Scandinavia

Denmark

In 2011, *N. n.* was found for the first time in Denmark on subalpine fir (*A. lasiocarpa*) in a severely affected provenance trial. Later, it was found on different fir species in Danish Christmas tree fields, forest stands, seed orchards, and ornamental plantings where it had caused epidemics and great losses. It was also found on Danish fir seeds and in nurseries (Talgø and Thomsen, unpubl. data; Skulasson 2016; Nielsen et al. 2017).

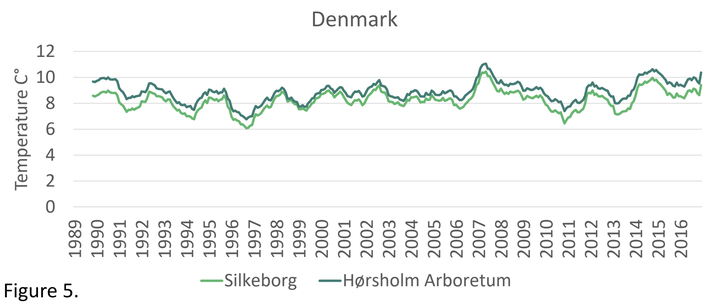


Figure 5.

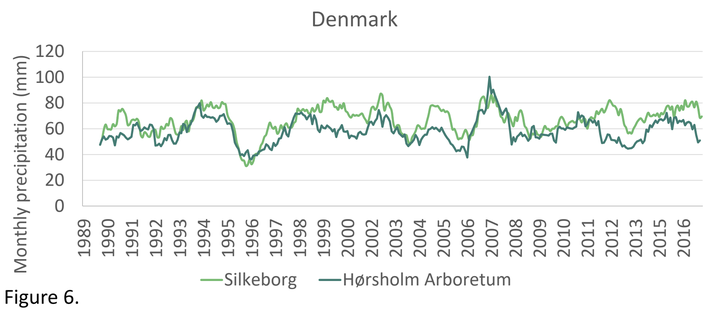


Figure 6.

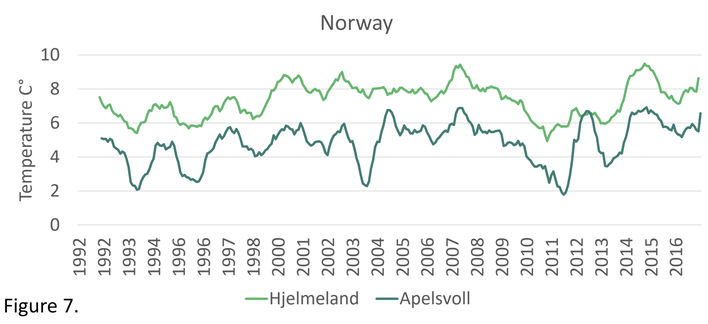


Figure 7.

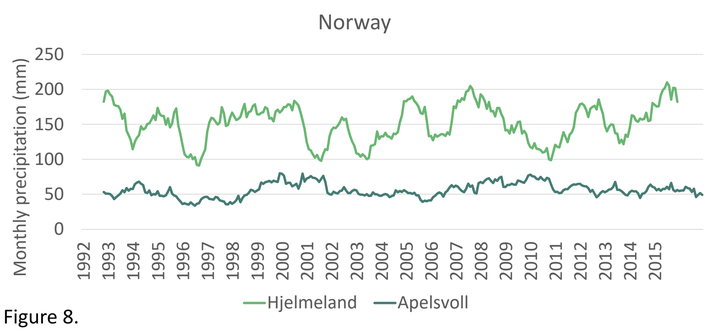


Figure 8.

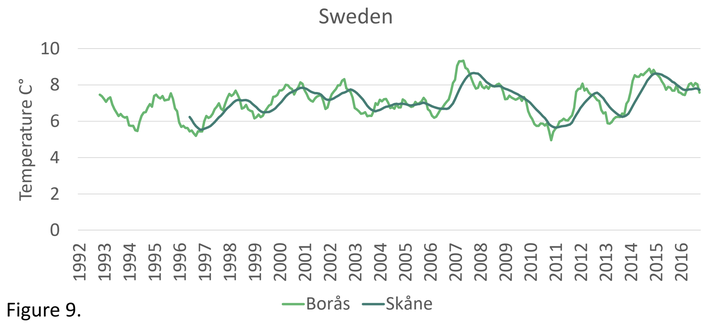


Figure 9.

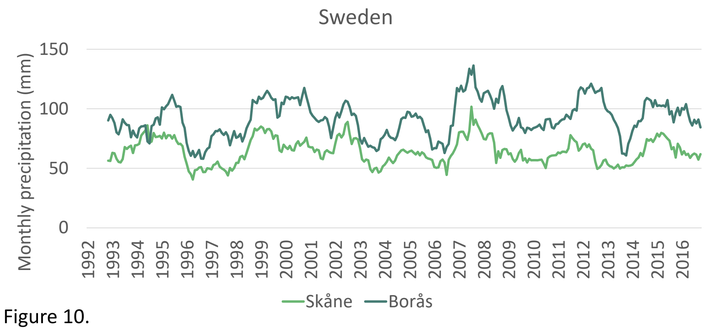


Figure 10.

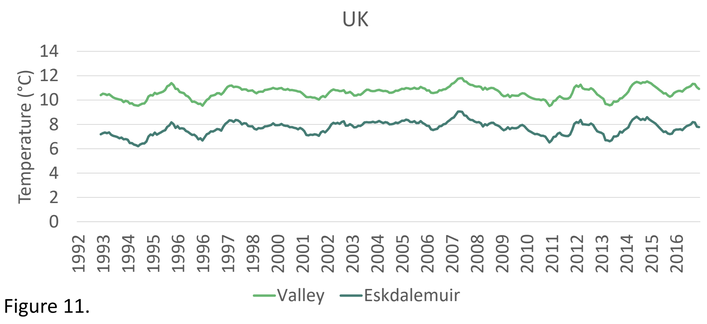


Figure 11.

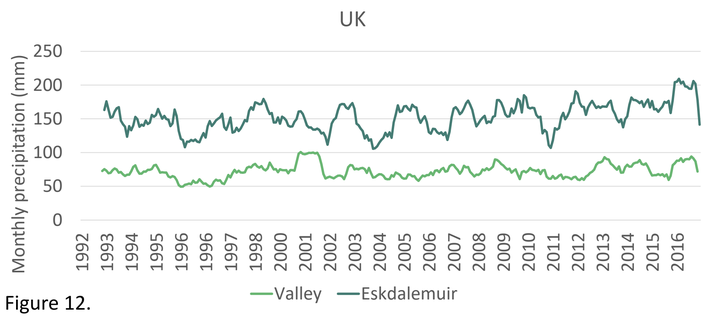


Figure 12.

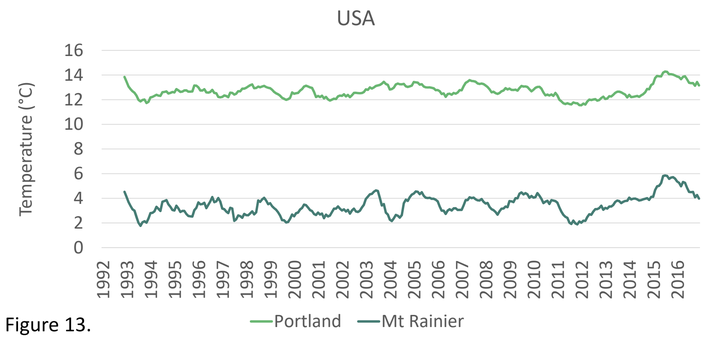


Figure 13.

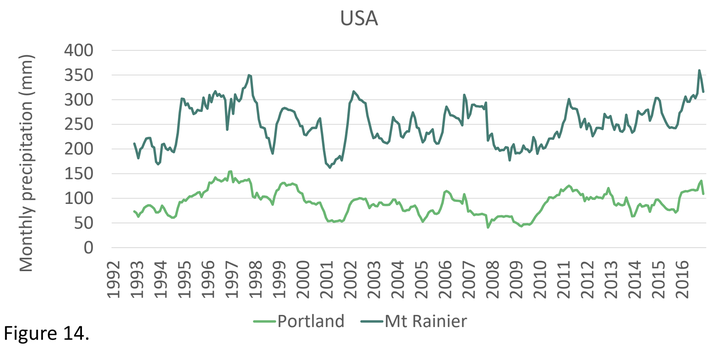


Figure 14.

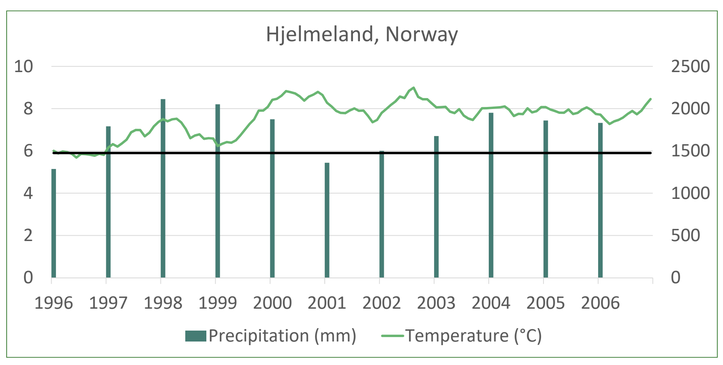


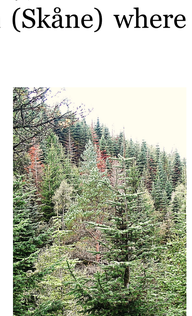
Figure 15. The black, horizontal line shows the 30-year normal precipitation (scale for temperature to the left and precipitation to the right).

Sweden

In 2015, a disease survey was carried out at 21 Swedish Christmas tree farms to get an overview of damaging agents. *N. n.* was isolated from dead shoots of Nordmann fir (*A. nordmanniana*) on two farms (Borås). The fungus had not been reported from Sweden before (Pettersson et al. 2016).

UK

In 2016, *N. n.* was isolated from noble fir (*A. procera*) in a badly damaged forest stand in Valley, Wales (left and right). No *N. n.* was found in Eskdalemuir. (Perez et al., unpubl. data).



Photos: Ana Perez-Sierra

USA

In 2013, a survey for *N. n.* was carried out in the Pacific Northwest (Oregon, Washington and Idaho) on fir species. Typical symptoms and signs were found on sixteen hosts in western Washington and Oregon (Chastagner et al., unpubl. data).

Conclusion

Since we do not know the exact starting points of the *N. n.* epidemics, it is hard to determine what impact precipitation and temperature has on disease development. The best documentation we have, is from Norway (Fig. 7, 8 and 15) where the photos in Fig. 16 were taken. During a 10 year span starting in 1996 (Fig. 15), precipitation was above normal from 1997-2000, and the temperature increased, two factors that may have triggered the epidemic. In some locations, such as southern Sweden, lack of inoculum may be limiting disease development. In January 2017, we visited a noble fir stand of 12 ha in southern Sweden (Skåne) where no symptoms of *N. n.* were found.

Figure 16. Subalpine fir (*Abies lasiocarpa*) in a remote forest stand in Breilandslia, Hjelmeland, Norway. The trees were planted in 1967. In 1997 they were completely healthy (left), but in 2007 trees were dead and dying from *Neonectria neomacrospora* (right). Photos: Terje Pundsnes

***Pettersson**, M., Frampton, J., Rönnberg, J. & Talgø, V. 2016. Neonectria Canker Found on Spruce and Fir in Swedish Christmas Tree Plantations. Plant Health Progress17:202-205 (http://dx.doi.org/10.1094/PHP-BR-16-0017).*

***Robak,** H., 1951. Noen iagttagelser til belysning av forholdet mellom klimatiske skader og soppangrep på nåletrær. Meddr Vestland. forstl. ForsStn 8: 1-43. (In Norwegian).*

***Skulason**, B., Hansen, O.K., Thomsen, I.M., Talgø, V. & Nielsen, U.B. 2017. Damage by Neonectria neomacrospora and Adelges piceae in provenance trials of subalpine fir (Abies lasiocarpa) in Denmark. Forest Pathology. DOI: 10.1111/efp.12326.*

***Nielsen**, U.B., Xu, J., Nielsen, K.N., Talgø, V., Hansen, O.K. & Thomsen, I. M. 2017. Species variation in susceptibility to the fungus Neonectria neomacrospora in the genus Abies. Scandinavian Journal of Forest Research DOI:10.1080/02827581.2017.1287300.*

nibio.no

PO Box 115, N-1431 Ås, Norway
+47 406 04 100

[1]Norwegian Institute of Bioeconomy Research (NIBIO), P. O. Box 115, N-1431 Ås, Norway
[2]Department of Geosciences and Nature Management, University of Copenhagen, Denmark
[3]Washington State University, Puyallup Research and Extension Center, 2606 West Pioneer, Puyallup, WA 98371-4998, USA
[4]Southern Swedish Forest Research Centre, Swedish University of Agricultural Sciences, P. O. Box 49, SE-23053 Alnarp, Sweden
[5]Forest Research, Alice Holt Lodge, Farnham, Surrey GU10 4LH, UK