Publications

Department publications

Interactions between fungal plant pathogens on leaves. Especially simultaneous development of *Rhynchosporium secalis* and *Drechslera teres* on barley

Jeanette Hyldal Vollmer

Ph.D. degree, Royal Veterinary and Agricultural University, Denmark.

Risø National Laboratory, ISBN 87-550-3496-9, November 2005, 108 p.

Risø-PhD-20(EN) (1 Mb)
Electronic format only

Abstract

Plant diseases caused by fungi are major potential threats to yield in both organic and conventional cereal production, and generally several species of pathogenic fungi are found together on the same plants in the field. This PhD thesis concludes, that interaction between different foliar fungal species may influence total disease levels and often via negative effects. This implies that less disease is observed where several diseases occur together, relative to where they occur individually. Such interaction effects have often been ignored in the past, as plant diseases are traditionally studied as independent events. The thesis provides an important review of available literature, considering the theoretical background for analyzing foliar disease interactions as well as previously published data studies. Difficulties in istinguishing different types of competition are emphasized. The thesis considers the barley diseases scald (*Rhynchosporium secalis*) and net blotch (*Drechslera teres*).

Scald and net blotch in a barley crop.

Scald and net blotch in a barley crop.
Photo: Hans O. Pinnschmidt

Aiming to understand how diseases interact in the field, it is concluded that increased focus should be placed on considering the dynamics of plant growth along with epidemiological development. This is pointed out by observations of antagonism between scald and net blotch on individual leaves and via a simulation model. The model shows, that difference in pathogen dispersal rate between leaf layers of the plant is important for competitive outcome from two species. Detailed disease observations on individual leaves does not, though, give a better description of yield loss from disease, relative to plot assessment, where disease severities are determined as averages over the crop. The work presented in the PhD thesis is relevant to all who work with foliar pathogens. Optimal disease control and plant breeding is based on knowledge of factors determining disease development and hence interactions between simultaneously developing pathogens must be considered.