# Tan Spot Development Peculiarities in Latvia

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**Abstract**

Tan spot, caused by *Pyrenophora tritici-repentis* (Died.) Drechs., anamorph *Drechslera tritici-repentis* is one of the most important wheat diseases in the world, especially in the regions of intensive wheat growing. Tan spot had established for the first time in Latvia in 1994. Epidemic of this disease was observed in Latvia in 1998. Development of tan spot were investigated in field experiments at the Research and Training Farm "Peterlauki" of Latvia University of Agriculture in 1998–2001. Level of incidence and severity of tan spot differed depending on varieties and years. Severity of the disease was 16–71% in 1999; 0.1–5% in 2000 and 4–18% in 2001 depending on varieties at the time of ripening. 1999 summer was extremely dry, and development of disease was not observed. Explosion of disease was observed at the second half of June in 2000 and 2001, without reference to varieties. Date of increasing start differed, but in all cases important development was observed after flowering. Rate of increasing of disease was very high, during two weeks severity of disease increased from 0.1 till maximum of severity. Amount and frequency of rainy differed in 2000 and 2001, but increase on disease was very similar, it means, we need more information about favourable conditions for *Drechslera tritici-repentis*. Sexual stage *Pyrenophora tritici-repentis* was observed in Latvia for the first time. Further investigations are necessary, because relationships between meteorological conditions and stages of development are unclear.

**Keywords**: *Drechslera tritici-repentis*; dynamic of disease; overwintering

## INTRODUCTION

Tan spot, caused by *Pyrenophora tritici-repentis* (Died.) Drechs., anamorph *Drechslera tritici-repentis* is one of the most important wheat disease in the world, especially in the regions of intensive wheat growing (WOLF *et al*. 1998). This disease was noticed and identified at the first half of 1990s in Latvia. Spreading of the disease began rapidly with increase of wheat density in crop rotation. Tan spot is the most widespread and most harmful disease of wheat at present in Latvia (BANKINA 2000). Epidemiology of the disease, disease cycle and favourable conditions for development of this pathogen have been investigated all over the world. Strongly association between availability of moisture and infection of tan spot were established. Ascospores and conidia have important role in the development of the disease (FRANCL 1997; WOLF *et al*. 1998). Unfortunately, principles of tan spot spreading and development are unclear in conditions of Latvia. Very important question is overwintering possibilities of pathogen in Latvia.

Determination of diseases, assessment of incidence and severity of diseases is the main task for the present, because integrated diseases management is not possible without precise recognition of causal agents, knowledge about distribution of diseases and dynamics of development. Very important task is to clarify possibilities of overwintering and spreading of *Drechslera tritici-repentis* in conditions of Latvia.

## MATERIALS AND METHODS

Field experiments were carried out at the Research and Training Farm "Peterlauki" of Latvia University of Agriculture in central part of Latvia, during 1998–2002.

All agronomic requirements were noticed in the trials. Seed dressing, herbicides and high doses of nitrogen were used in all trials.

Development of the disease was investigated in untreated plots (25–28 $m^2$ with four replicates) in the trials applying fungicides in different times and dosages.

Development of the diseases was observed on 14 winter wheat varieties from 1998 to 2000. Dynamics of tan spot development was investigated from 1999 on early variety Donskaja polukarlikovaja and from 2000 on late variety Stava.

Assessments were carried out on the upper tree leaves each week from the start of stem elongation to full ripening.

Investigations on *Drechslera tritici-repentis* overwintering were started in 2001. The first task was to demonstrate sexual stage of pathogen in conditions of Latvia. For this aim formation of ascospores was searched on straws of winter wheat after harvesting till autumn of the next year.

Meteorological conditions were measured by automatically meteorological stations in "Peterlauki".

## RESULTS

Tan spot caused by *Drechslera tritici-repentis* (telemorfa *Pyrenophora tritici-repentis*) was noticed in the middle of nineties in Latvia. Epidemic of *Drechslera tritici-repentis* was observed in 1998 in Latvia for the first time. Symptoms of the disease started to emerge at the time of stem elongation and severity of the disease reached 15–71% at the time of milk ripeness depending on variety. The summer of 1999 was extremely dry. Severity of the disease was only 0.5–5% depending on variety. First symptoms were observed at the time of flag leaf emergence flowering, but further development of the disease was not detected. Severity of the disease was about 4–18% depending on varieties in 2000. Development of tan spot was observed at the time of flag leaf emergence, but serious spreading of the disease was noticed only after flowering for early varieties and at the time of heading for late varieties.

Tan spot was the main disease during the whole period of investigations. Septoria leaf blotch, mildew, brown and yellow rusts were insignificant and was not of economical importance.

Level of incidence and severity of tan spot differed depending on varieties and between years. Strong correlation between varieties and severity of the disease was not determined. For clearer understanding of tan spot development peculiarities more detail investigations are needed, including dynamics of the disease development.

Dynamics of tan spot development on the variety Donskaja polukarlikovaja was studied three years (1999–2001). The first symptoms of the disease appeared in different times (commonly at the time of stem elongation); nevertheless further progression was not observed, severity of tan spot did not exceed 1% in the period of time more than five weeks (Figure 1).

Rapid development of the disease started at the same time each year, it was 10–15 June for early variety (time of flowering or later).

Situation was similar with the late variety Stava (Figure 2). Initial stage of tan spot was observed at the time of stem elongation, but severity of tan spot sharply increased only in last third on June (also time of flowering or later).

Rate of increase was very high, with speeding up of the development of the disease. During two weeks severity of the disease increased from 0.1 till maximum in 2000. Increase of the disease severity was more gradual in 2001, when the sharp growth of this disease was observed about five weeks.

Most of researchers describe ascospores as main source of infection (FRANCL 1997). There was shortage

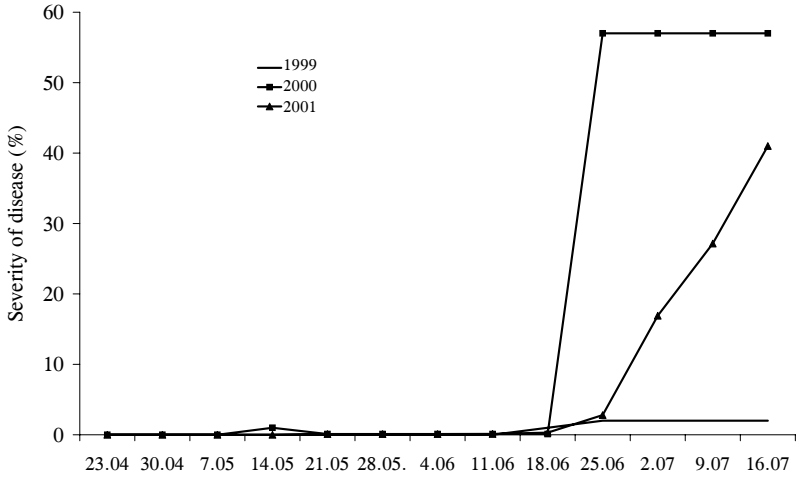


Figure 1. Development of tan spot, early variety Donskaja polukarlikovaja

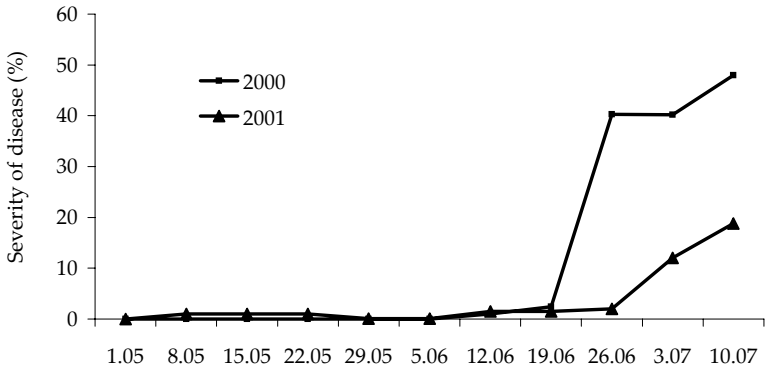


Figure 2. Development of tan spot, late variety Stava

of information about existence of *Pyrenophora tritici-repentis* sexual stage in Latvia as yet. An important task is to clarify peculiarities of tan spot development in Latvia, including entity of *Drechslera tritici-repentis* sexual stage. Pseudotecia was not found on the straw of infected plants directly after harvesting. Dark pseudothecia with matured ascospores were established on the wheat stubble next summer after overwintering (Figure 3). Morphology of ascospores and pseudothecia corresponded to the description (HOSFORD 1972). Sexual stage of *Pyrenophora tritici-repentis* was noticed in Latvia for the first time.

Figure 3. *Pyrenophora tritici-repentis* pseudothecium on overwintering straw

## DISCUSSION

Moment of initial stage of the disease was not dependent from number of rainy days or amount of precipitation. Correlation with meteorological conditions, other factor and first symptoms of tan spot is less evident.

Sharp growth of infection level is difficult to explain. Precipitation did not influence initial stage of the disease, but is important for the following development, however it is difficult to say in which way it happens. Correlation between meteorological conditions of Latvia and development of tan spot is impossible to find in this moment.

Confrontation dynamics of tan spot on two different varieties demonstrates importance of the relations between meteorological conditions and growth stages of plants.

Peculiarities of the development of conidia and ascospores are the main reasons for so different development of tan spot. Following investigations about maturation and liberation of ascospores are necessary, because relationships between meteorological conditions and stages of plant development and also life cycle of tan spot are unclear.

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