# THE INFLUENCE OF LOCALITY AND VARIETY ON THE VERTICAL STRATIFICATION OF AIR TEMPERATURE IN THE WINTER OILSEED RAPE STAND

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***The vertical stratification of air temperature in stand was determined in four developmental stages of winter oilseed rape (I – stem elongation to inflorescence emergence, II – flowering, III – development of fruit, IV – ripening) in the year 2014. The microclimatic data were obtained at the field trial station of the Mendel University in Brno in Žabčice and OSEVA Development and Research Ltd., Workplace Opava station, the Czech Republic. The oilseed rape stand microclimate differed significantly from surrounding environment. The temperature was usually lower in the ground level and higher in effective height in the oilseed rape stand. These differences were dependent on oilseed rape vegetation stage and the course of air temperature in the particular locality, they were much pronounced during the light part of day and reached maximum around 2 pm GMT+1.***

***Keywords: rape, microclimate, temperature***

## INTRODUCTION

Winter oilseed rape (*Brassica napus* subsp. *napus*) is very important and widely grown crop in the Czech Republic. The area of this species is increasing constantly and that is why the danger of pathogen infection is growing. The great amount of fungicides is used to control disease progress. According to principles of integrated pest management, pesticides should be used in inevitable cases under conditions favourable for pathogens development. The methods of prediction of pathogen occurrence are used for these purposes. These procedures are based on knowledge of pathogen biology, especially on their demands for both air and soil temperature and humidity. In our previous papers (Pokorný et al. 2012, Krčmářová et al. 2014a, Krčmářová et al. 2014b) we described this topic more widely in respect to biology of pathogen *Sclerotinia sclerotiorum*. The stratification of temperatures in winter rape stand is described and discussed, also. These measurements were taken in one locality and on winter rape variety, only. The different architecture of crop stand can have impact on disease development not only it influences spore dispersion (Ferrandino, 2008), but it can change the microclimate of the stand (Calonnec et al. 2013, Tivoli et al. 2013). The different course of weather on particular locality affects microclimate, too. For these reasons we have decided to widen our experiments to other locality and variety

## MATERIALS AND METHODS

### Experimental localities, plant stands

The microclimatic data were obtained at the field trial stations of the Mendel University in Brno in Žabčice municipality (GPS Loc: 49°1'18.658"N, 16°36'56.003"E) and Oseva Development and Research, working place Opava (Loc. 49°55'21.096"N, 17°53'10.272") in the year 2014. Two varieties, Sherpa and PX 104 were sown on locality Žabčice, the first one on locality Opava, only.

### Air temperature and humidity measurement

Data recording for winter rape was conducted by means of a mobile climatological station equipped by digital temperature sensors (Dallas semiconductor, DS18B20 type) placed in the radiation shield. The sensors were positioned at three levels (on the ground, at the effective height and at 2 meters above the ground) in order to cover the whole vertical profile. Sensors positioned at the effective height were moved up as the crop was growing. The effective canopy height corresponds to approximately 90 % of the actual canopy height.

### Data analysis

The spring vegetation period of winter rape was divided in four stages: I – from spring regeneration to inflorescence emergence; II – flowering; III – development of fruits; IV – ripening. Values from the above the ground vertical profiles were evaluated by the method of triangulation with linear interpolation and graphically displayed in the form of temperature isotherms by the Surfer ver. 8.03 (Golden Software, Inc.) program.

## RESULTS

As can be seen from Fig. 1, the stratification of air temperature in winter oilseed rape stand was significantly influenced by developmental stage and variety of this crop. The locality had impact, too. These differences reached their maximum in the light part of day at about 2 pm GMT+1, the highest temperature was measured at active height of winter oilseed rape stand, and they were about 1 °C higher in comparison with temperature in 2 m, usually. In this height (2 m), temperature was higher about 2 °C in locality Žabčice during the first two stages; they were almost the same on both localities in stage III. The higher temperatures by 1 °C were reached in stage IV in locality Opava at time 2 pm GMT+1. In stage I the differences between active height and ground temperature reached 2 °C in PX104 in Žabčice and Sherpa variety in Opava. The canopy of variety Sherpa in Žabčice was not closed at this time, so it reacts as bare soil (Mužíková et al. 2013), the temperature reached the highest level on the ground. In stage II and III the most pronounced differences were found out in variety PX104 in Žabčice and reached 6 °C and 3 °C respectively. During these stages air temperature was about 1 °C to 2 °C lower in the ground in comparison with active height in canopy of Sherpa variety on both localities. The same findings were found out for both varieties and localities in stage IV.

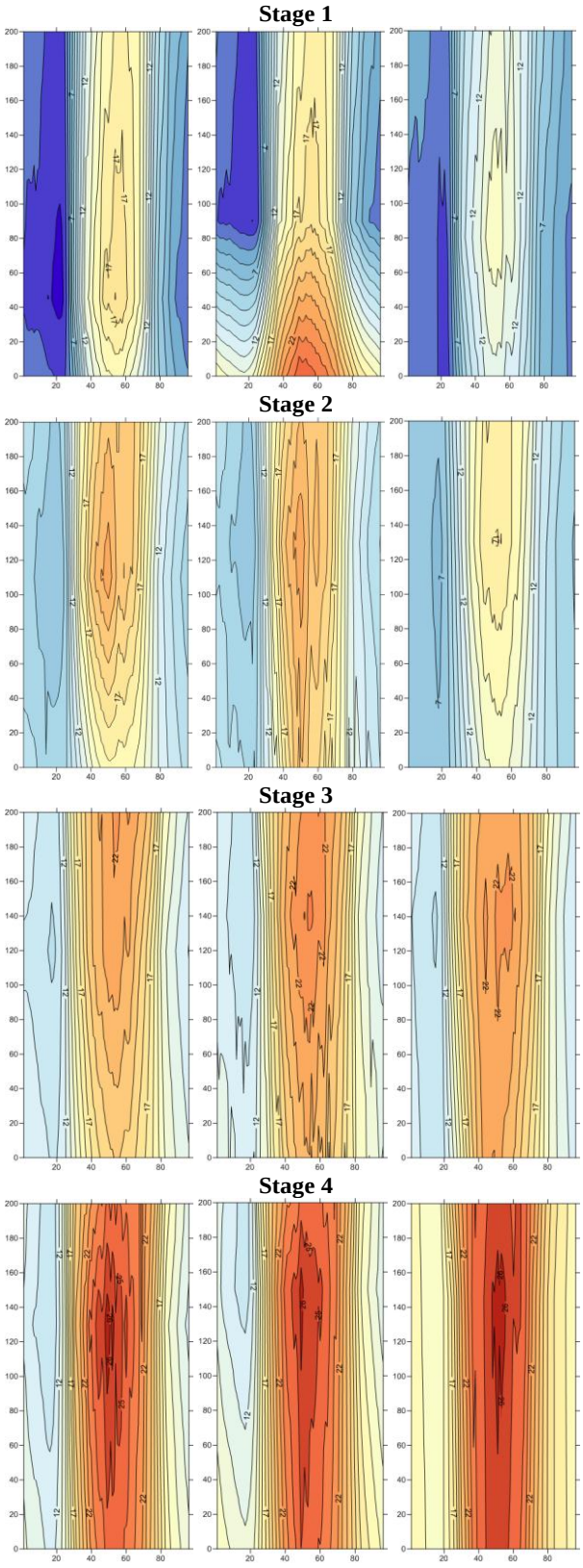


Fig. 1. Mean values of air temperature in vertical profile of winter oilseed rape stand in particular stages (from the left – PX 104), Žabčice; Sherpa, Žabčice; Sherpa, Opava

On the contrary, the lowest temperature was determined in the same height in the night at 5 am.

## CONCLUSION

The distinct effect of winter oilseed rape variety and locality on air temperature stratification in stand of this crop was found out in year 2014. We can generalize, the highest differences of temperature in various level of winter oilseed rape were found out for PX104 in locality Žabčice. This variety is semi-dwarf type. In comparison with Sherpa variety, it is lower and more ramified, so it constitutes more closed and dense canopy and this architecture influence rape stand microclimate more substantially. This fact should be considered in preparation of models of plant growth and prediction of pathogen infection in oilseed rape stand.

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## LITERATURE

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