

# EFFECT OF PIONEER SPECIES ON MICROCLIMATE AND GROWTH OF PLANTED SILVER FIR SEEDLINGS

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## INTRODUCTION

Silver birch (*Betula pendula* Roth.) or aspen (*Populus tremula* L.) are fast-growing pioneer species, considered as a perfect nurse crops species. Their shelter improve site for shade tolerant target species as silver fir (*Abies alba* Mill.) which are otherwise difficult to establish on clearings. Here we describe physiology of growth of silver fir seedlings planted in gaps and under the shelter of silver birch or aspen stands.

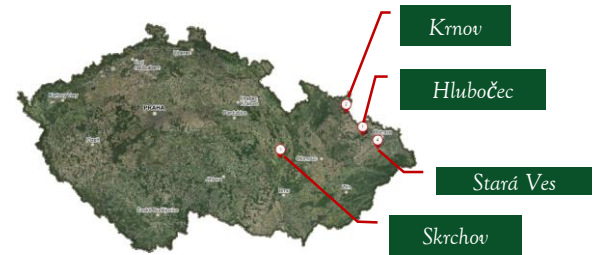


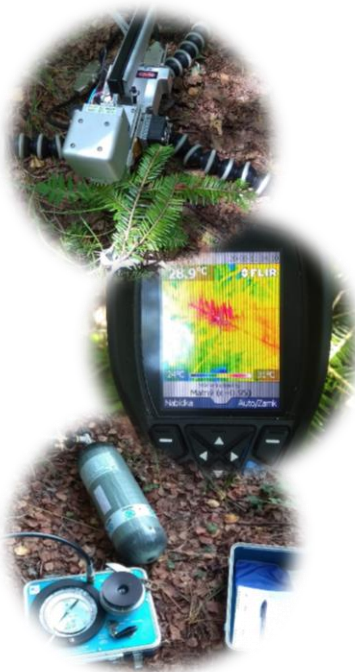
Fig. 1 Localization of research plots

Tab. 1 Basic characteristics of research plots

Location	Treatment	Age of stands			Stand density		LAI
		birch/ aspen	silver fir	N (ks <sup>-1</sup> ha <sup>-1</sup> )	G (m <sup>2</sup> ha <sup>-1</sup> )		
Hlubočec	gap	-	5	0	0	0	
	under birch	18	-	2,800	12,62	2,9	
Krnov	gap	-	6	0	0	0	
	under birch	6	-	2,500	-	5,0	
Skrchov	gap	-	5	0	0	0	
	under birch	27	-	1050	18,0	N/A	
Stará Ves	gap	-	5	2,900	10,15	0	
	under birch	13	-	0	0	3,0	

## MATERIAL AND METHODS

Four experimental sites were monitored with this research: Hlubočec, Krnov, Skrchov and Stará Ves (Fig. 1, Tab. 1). Scholander pressure chamber (PMS 1500D, PMS Instrument Company, USA) was used to measure predawn and midday water potential ( $\Psi$ ) of silver fir shoots on nine seedlings. Photosynthetic light response curves were captured during the sunny day under non-drought conditions during year 2020 using infrared gas analyzer Li-6800 (LI-COR Inc., Lincoln, Nebraska, USA) on ten silver fir seedlings.



## RESULTS

Birch stand positively affected  $\Psi$  of silver fir seedlings in the midday but it limited water availability during extreme drought stress. When soil water was plentiful, no differences were found between fir seedlings in gaps and under birch or aspen stands. However, during dry periods  $\Psi$  under the birch was lower than in the gap (Fig. 2, 3). Saturated rates of photosynthesis ( $A_{sat}$ ) and light compensation point of silver fir under nurse crops were usually lower than in gaps (Fig. 4). However, silver fir under sparse aspen stand showed similar values of  $A_{sat}$  like silver fir in the gap.

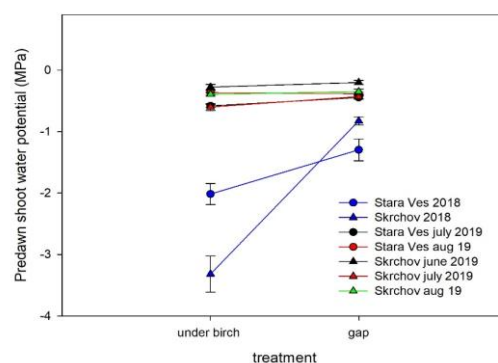


Fig. 2 Predawn of silver fir seedlings in the gap, under birch and under aspen on all four experimental sites

## CONCLUSIONS

Gap regeneration provided fir seedlings with better water availability under drought conditions, but seedlings were more stressed by midday sunlight. At the same time, the highest assimilation rates were found in gaps and under the sparse canopy. Our research points out the importance of maintaining optimal stand density of nurse crops.

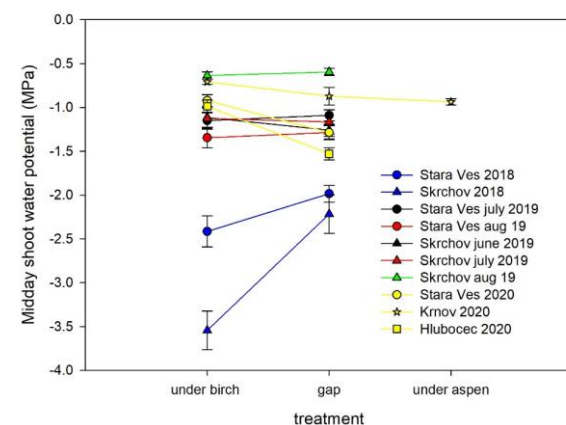


Fig. 3 Midday  $\Psi$  of silver fir seedlings in the gap, under birch and under aspen on all four experimental sites

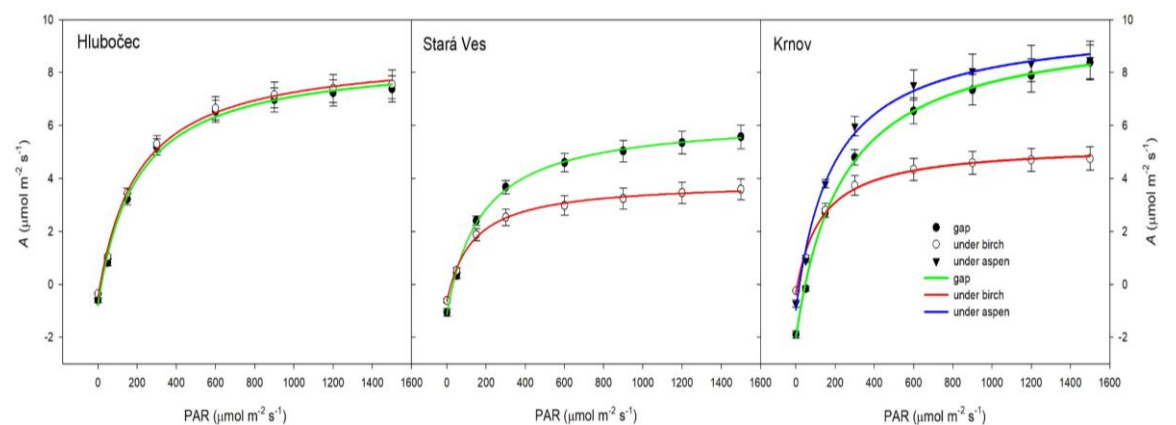


Fig. 4: Light response curves of silver fir seedlings in the gap, under birch and under aspen on experimental sites

## ACKNOWLEDGEMENT

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