

STUDY PURPOSE

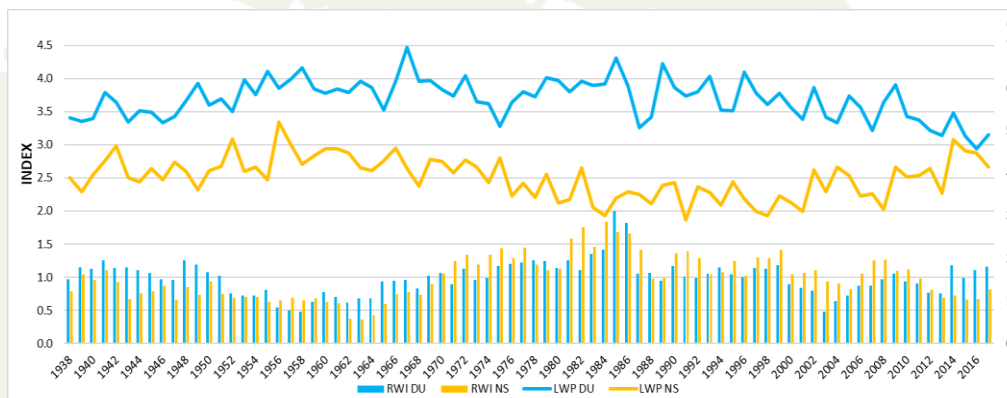
- Evaluate the growth response and adaptive capacity of two Douglas fir (*Pseudotsuga menziesii* var. *menziesii*) populations installed at the end of the 19th century in western Romania - the oldest Douglas fir stands in Romania, designated forest genetic resources (FGR).
- Comparative analysis with Norway spruce, the most widespread coniferous species outside the natural area.

MATERIAL AND METHODS

- 2 Douglas fir stands of high production class, 103 and 130 years, composition: 80% Douglas fir 20% Norway spruce and 50% Douglas fir, 10% Norway spruce, 40% deciduous species, respectively, contrasting site conditions (high and low productivity).
- Studied traits: growth, wood characters, drought parameters (resistance, recovery, resilience and relative resilience) of both Douglas fir and Norway spruce trees.
- The climate-growth relationship was determined over the period 1938 – 2017.
- The potential impact of climate change on Douglas fir in this region by RCP4.5 scenario over: 2021–2050 and 2071–2100.

RESULTS

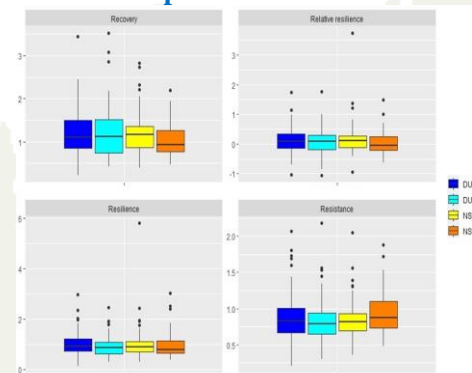
Variation of the ring width index (RWI) and latewood percentage (LWP) of Douglas fir (DU) and Norway spruce (NS) in FGR 2



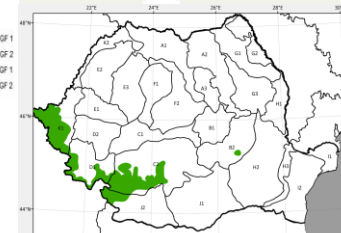
Analysis of variance of drought parameters for Douglas fir and Norway spruce

	Source of variation	DF	Variance (s ²)			
			Resistance	Recovery	Resilience	Rel. resil.
FGR 1	Douglas (DU)	18	0.064	0.252	0.106	0.152
	Norway s. (NS)	15	0.084	0.083	0.360	0.131
	Between species	1	0.027	0.056	0.001	0.035
	Extreme drought DU	5	0.658***	3.130***	1.289***	1.706***
	Extreme drought NS	5	0.120	1.652***	1.414***	1.208***
FGR 2	Douglas (DU)	17	0.045	0.241	0.082	0.132
	Norway s. (NS)	15	0.090	0.116	0.118	0.089
	Between species	1	0.595**	1.454*	0.147*	0.156*
	Extreme drought DU	5	0.638***	3.303***	0.865***	1.947***
	Extreme drought NS	5	0.305**	1.109***	1.977***	1.187***

Variation of drought parameters on species and FGRs



Areas with optimal climatic conditions for Douglas fir in Romania according to RCP 4.5 climate scenario over 2071–2100



CONCLUSIONS

- Douglas fir highlights exceptional growth capacity, overcoming Norway spruce since the early ages. The highest growth performances have been obtained on the low productivity site for local species.
- Considerable differences were found between species regarding response to drought. Douglas fir exhibits high resistance and relative resilience to extreme droughts while Norway spruce displayed higher resilience.
- The developed models show good survivability for Douglas fir in the western part of the country.
- Autumn-winter temperatures play an important role in the adaptation of Douglas fir to site conditions in Romania
- Conservation of the most valuable Douglas fir stands should have priority, since they can be potential seed sources for forest restoration.