

# SOIL MOISTURE AND WATER QUALITY MONITORING IN *Quercetum petraea* STANDS

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## Introduction

- In Serbia climate zones vegetation types are represented by typical association of *Quercetum frainetto-cerris*

- Some recent studies have pointed out more frequent and severe drought in the territory of Serbia and in other parts of the Balkan peninsula

- Extreme climate events such as spring temperature fluctuations and summer drought will increase in frequency and duration

- In combination with a raised mean temperature, climate extremes will negatively affect trees and increase their susceptibility to secondary damage through pests and pathogens

## Materials and methods

- Research was conducted in the associations *Quercetum frainetto-cerris*
- Data on microclimate indicators were collected during a period from 2009 to 2013 (temperature, relative humidity)
- Climatological data are analyzed on the basis of annual report of Republic Hydrometeorological Service of Serbia (from 2009 to 2013)
- Soil moisture content (% mass) was determined on 10, 30 and 50 cm of soil depth



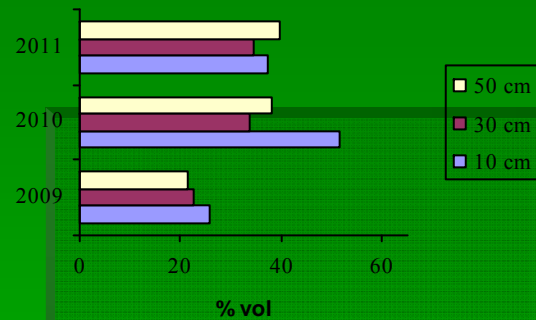
### Mean montly temperature in *Quercus frainetto-cerris* forests

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2009	0,5	2,3	7,1	13,6	17,2	20,4	22,2	22,3	18,8	12,2	9,6	3,3
2010	-0,2	3,1	7,6	12,4	15,8	19,0	21,2	21,7	16,0	12,3	8,8	0,5
2011	1,3	0,8	7,2	12,4	16,3	20,6	21,6	23,2	20,9	11,7	3,8	4,2
2012	0,7	-3,9	9,2	13,0	15,9	21,9	25,1	25,1	20,7	14,9	9,4	0,3
2013	1,4	1,4	3,6	9,7	13,7	18,1	22,8	23,7	16,9	18,1	9,0	2,1

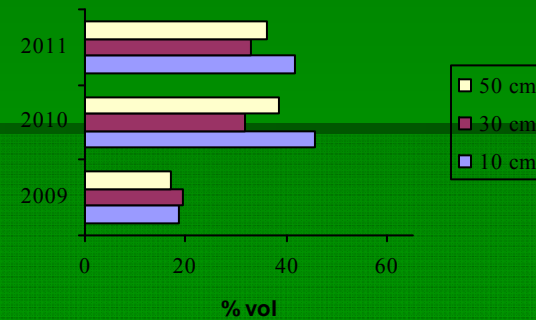
### Mean montly relative humidity in *Quercus frainetto-cerris* forests

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2009	90,2	85,2	70,0	72,5	79,5	80,1	70,4	69,5	68,8	83,6	81,1	93,1
2010	93,2	85,1	71,4	72,0	81,9	88,8	85,0	79,2	81,4	96,1	75,5	89,5
2011	89,9	88,0	87,0	83,6	71,5	75,7	73,0	63,3	66,8	85,1	88,0	88,8
2012	91,3	87,2	58,5	71,6	79,0	70,7	60,6	48,6	58,5	85,0	86,2	87,2
2013	76,1	78,0	72,5	66,4	69,9	73,8	57,7	59,9	67,9	71,0	84,2	86,8

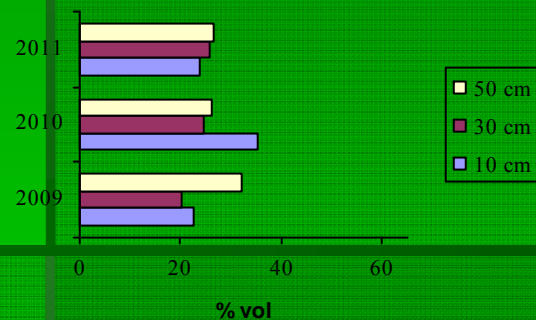
Volumetric soil moisture content (%) - April



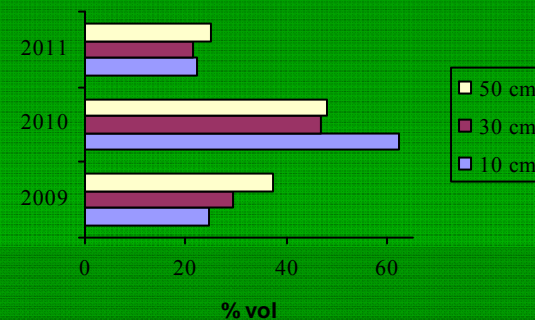
Volumetric soil moisture content (%) - July



Volumetric soil moisture content (%) - August



Volumetric soil moisture content (%) - November



	pH	Alkalinity	Conductivity	Mg	K	Ca	P-PO <sub>4</sub> <sup>3-</sup>	N-NH <sub>4</sub> <sup>+</sup>	N-NO <sub>3</sub> <sup>-</sup>	S-SO <sub>4</sub> <sup>2-</sup>
				285,2 nm	766,5 nm	422,7 nm				
		μmol/l	μS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	[mg/l]	mg/l
Autumn 2009/ Spring 2010	7.06	29.025	494.1	1.235	1.272	42.606	3.346	0.776	0.445	46.363
Autumn 2010/ Spring 2011	6.80	15.674	328.0	4.990	1.940	24.760	2.965	0.877	1.500	20.680

Soil solution pH was weakly acidic to neutral. Conductivity varied in the range of 15.674 to 29.025 μmol/l. Magnesium concentration in soil solution was between 1.235 and 4.990 mg/l, and the calcium from 24.760 to 42,606 mg/l.



## Conclusion

- Increasing annual air temperature is registered throughout the entire territory of Serbia
- Mean annual air temperature for period 1961-1990 in Kragujevac was higher in June (for more than  $1^{\circ}\text{C}$ ), and in July and August (for more than  $2^{\circ}\text{C}$ ). The largest decrease of precipitation (to the period 1960-91) was recorded in July. The water deficit was in July, August and September
- The period in year with the most prominent extremes are July, August and September. In the period of research the greatest anomaly to period 1961-1990 was recorded in July and August of 2012 and in September 2011 and 2012
- Long periods of drought led to relatively uniform reductions in the quantities of available water in the soil, and thereby caused unfavorable conditions for plant growth

**THANK YOU FOR ATTENTION!**