Responsiveness of *Viburnum lantana* L. to ozone in field conditions:

first results to verify if this species can be used as bioindicator in remote and forested areas

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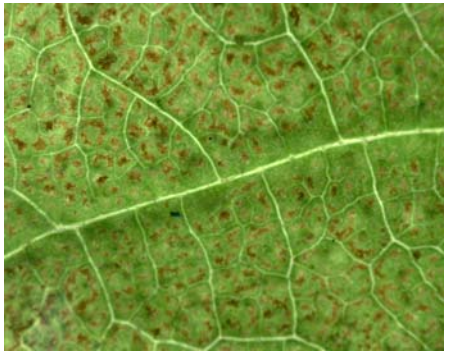


Aim:
to verify whether *Viburnum lantana* can actually be used as *in situ* bioindicator

Viburnum lantana L. was selected as the target species on the basis of:

- wide spatial distribution in the study area
- specific symptom development (red stippling and general leaf reddening of older leaves) in response to ozone exposure

Bioindicator requirements:

- wide spatial distribution
- high and documented sensitivity to the pollutant
- specificity of the response to that pollutant
- responsiveness to pollutant throughout the growing season
- quantitative response to pollutant exposure

Viburnum lantana:

✓ wide spatial distribution

✓ high and documented sensitivity to the pollutant

✓ specificity of the response to that pollutant

✓ responsiveness to pollutant throughout the growing season

? quantitative response to pollutant exposure

Need to verify the whole set of requirements under field conditions

Activities:

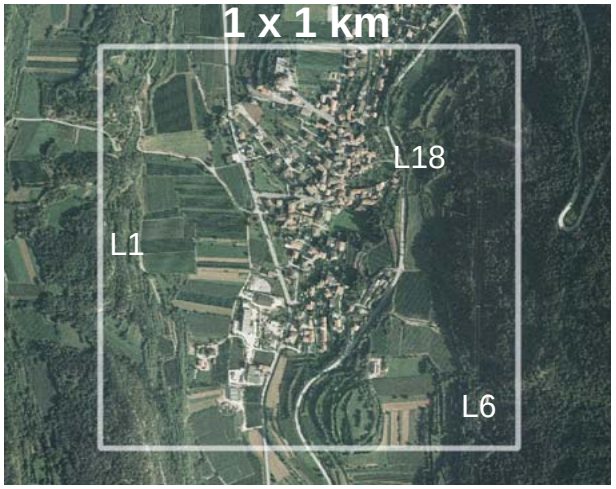
2009 - Time development of the frequency of symptomatic plants subjected to two different levels of ozone

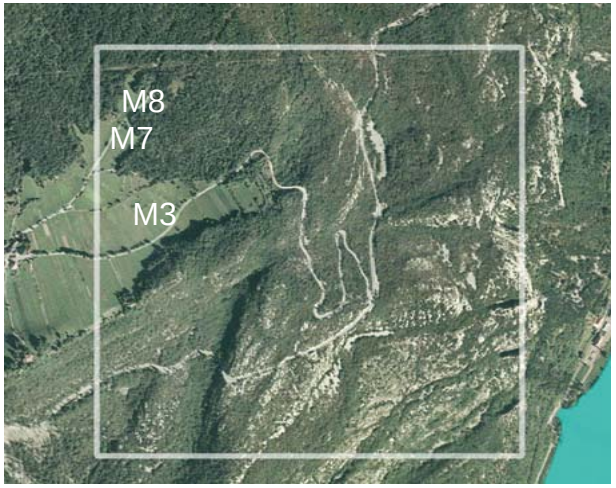
2010 - Spatial distribution of symptomatic plant frequency at different ozone exposure levels and elevation on the whole province of Trento

2009 - Time development of the frequency of symptomatic plants subjected to two different levels of ozone

Study design

Lasino
low O_3





Margone
high O_3

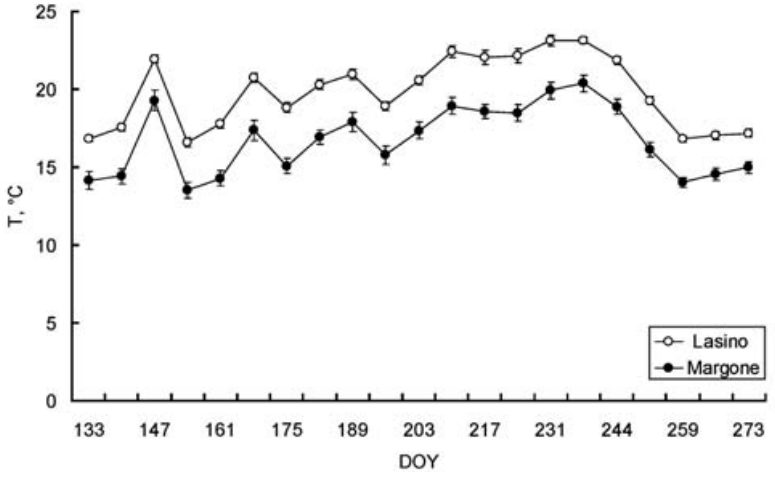
Sites, 1x1 km	N. of open areas	Code	N. of observed plants
		L1	10
		L6	10
Lasino	3	L18	10
		M3	16
		M7	10
Margone	3	M8	12
			TOT 68

Collected data, May - September:

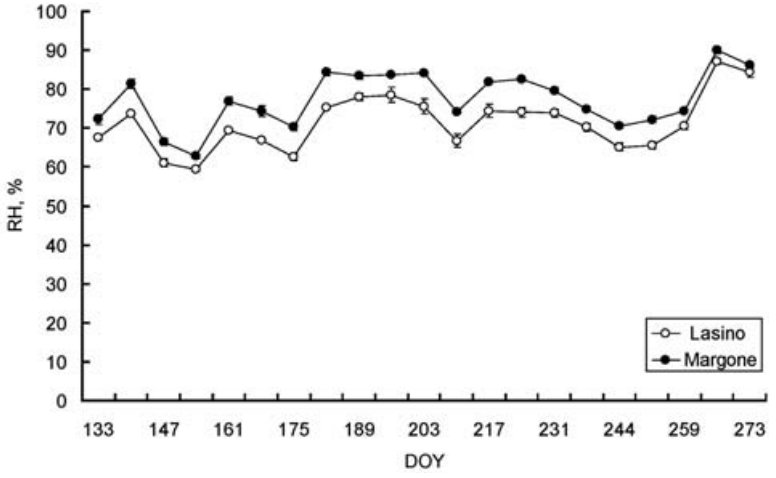
- O_3 concentration, AOT40
- T, RH
- Frequency of symptomatic plants
- Chlorophyll a fluorescence (Handy PEA)
- Chlorophyll content (SPAD)

Results

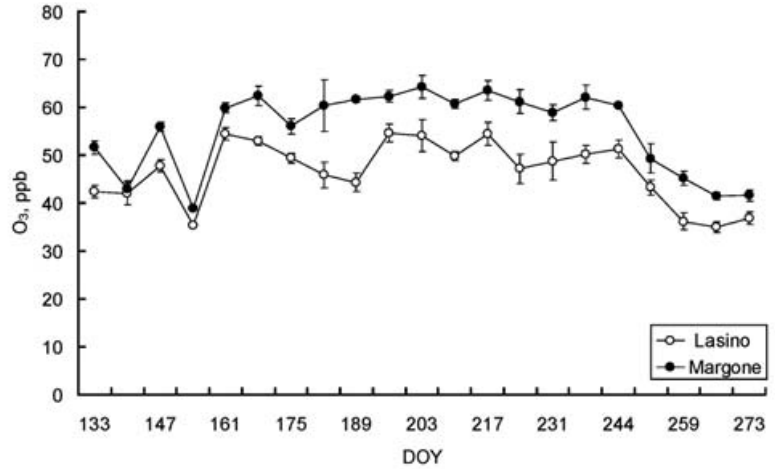
Temperature



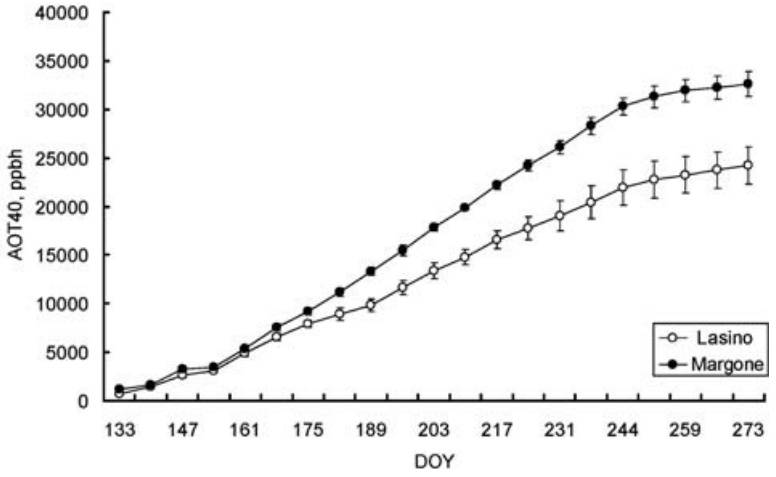
Relative humidity

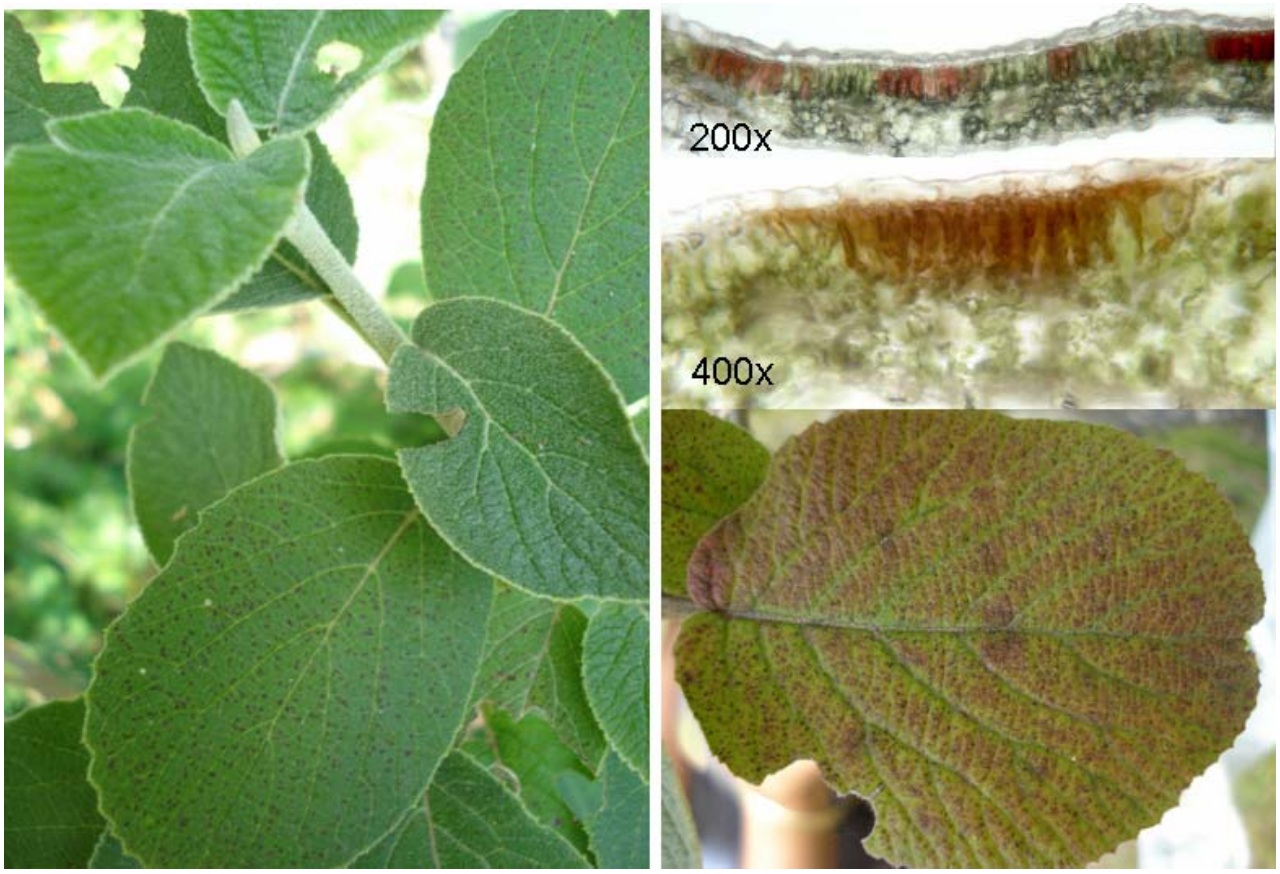


Ozone concentration



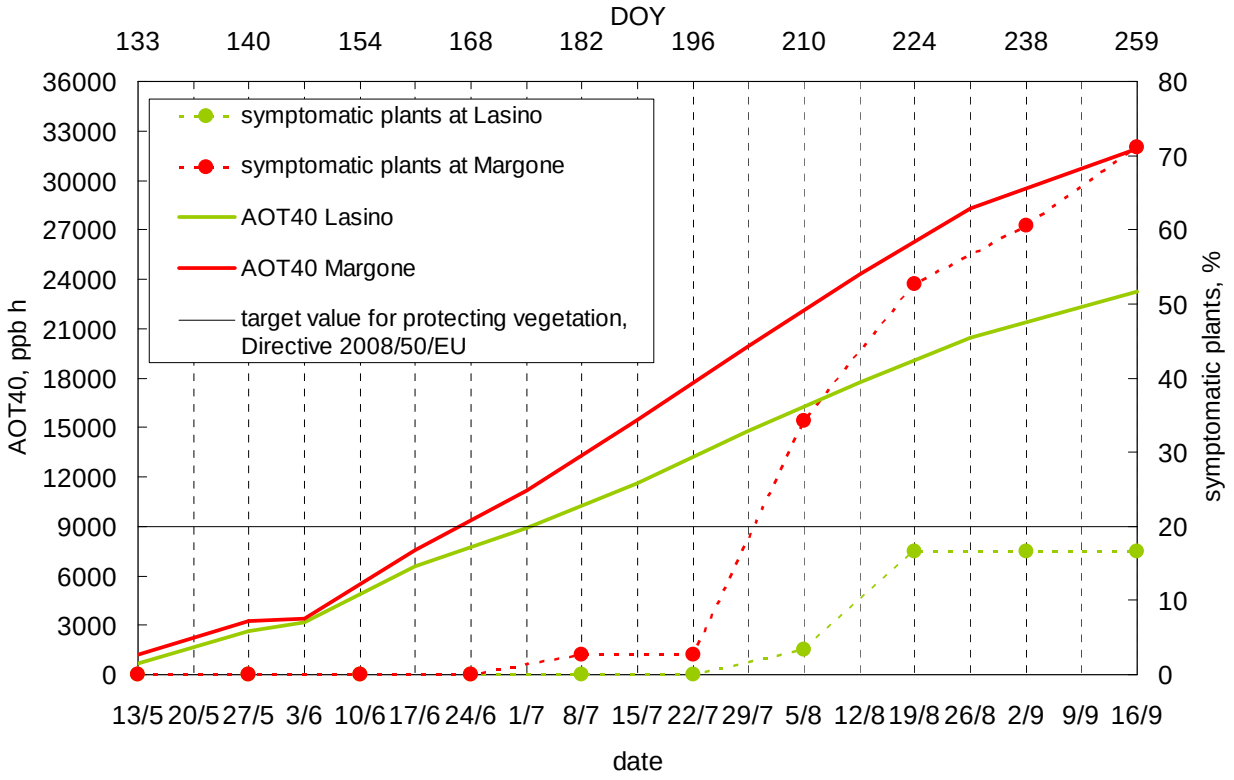
AOT40





Ozone visible foliar symptoms:

- matched the known symptomatology
- were confirmed by microscopical validation



Time development of symptomatic plants frequency and AOT40 in both sites

- Symptoms started at different AOT40 values: 12000 ppbh at Margone, 15000 ppbh at Lasino
- Symptomatic plants at mid September: Margone 71%, Lasino 17%
- Margone, the quadrate with the highest ozone exposure: higher frequency of symptoms, earlier date of onset and faster development
- Lasino: symptoms do not increase with further increase of AOT40

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PAPER

Responsiveness of *Viburnum lantana* L. to tropospheric ozone: field evidence under contrasting site conditions in Trentino, northern Italy

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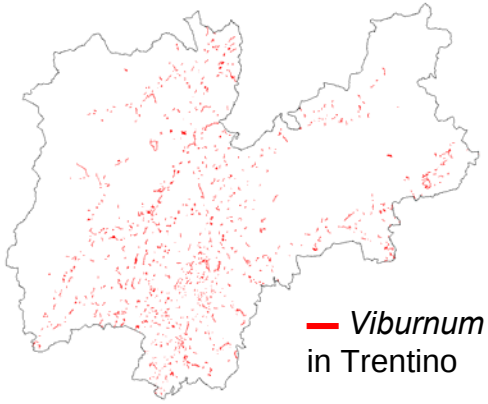
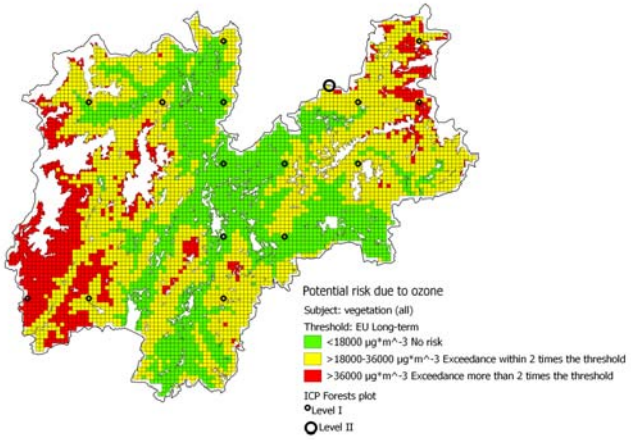
Under field condition, validated foliar injury on *Viburnum lantana* L. has higher frequency and faster development on plants exposed to higher ozone concentrations.

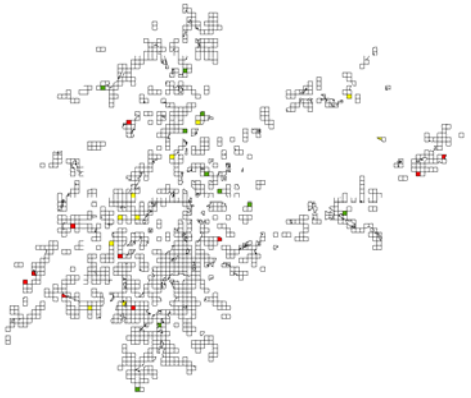
2010 - Spatial distribution of symptomatic plant frequency at different ozone exposure levels and elevation on the whole province of Trento

Study design



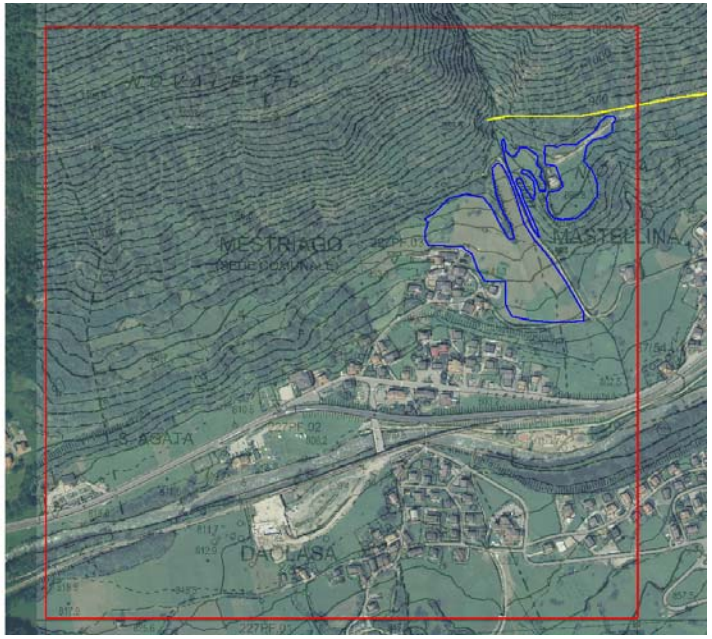
— *Viburnum lantana* in Trentino





Elevation, m a.s.l.	AOT40, ppb h		
	<9000	9000-18000	>18000
<700	5	5	5
>700	5	5	5

Number of 1 x 1 km quadrate for each strata



In each of the 30 quadrates:

- Identification of three open areas (by aerial photo)
- Assessment of ozone injury (on minimum 10 - maximum 30 plants)
  - percentage of symptomatic plants
  - percentage of symptomatic leaves on each plant

  0=no injury
  1= 1-5%
  2=6-50%
  3=51-100%
- Classification of soil moisture conditions

  1=wet or damp
  2=moderately dry
  3=very dry

Why another bioindicator?

• Bioindicators provide information on the real effect of ozone under real conditions, reflecting the complexity of all processes from exposure to response

- ➢ suitable to assess the actual impact of ambient ozone on plants

Passive bioindicators:

• No need to maintain of *ad-hoc* exposed plants

• Native plants are well adapted to the environment, not stressed by the transplantation

Thanks!