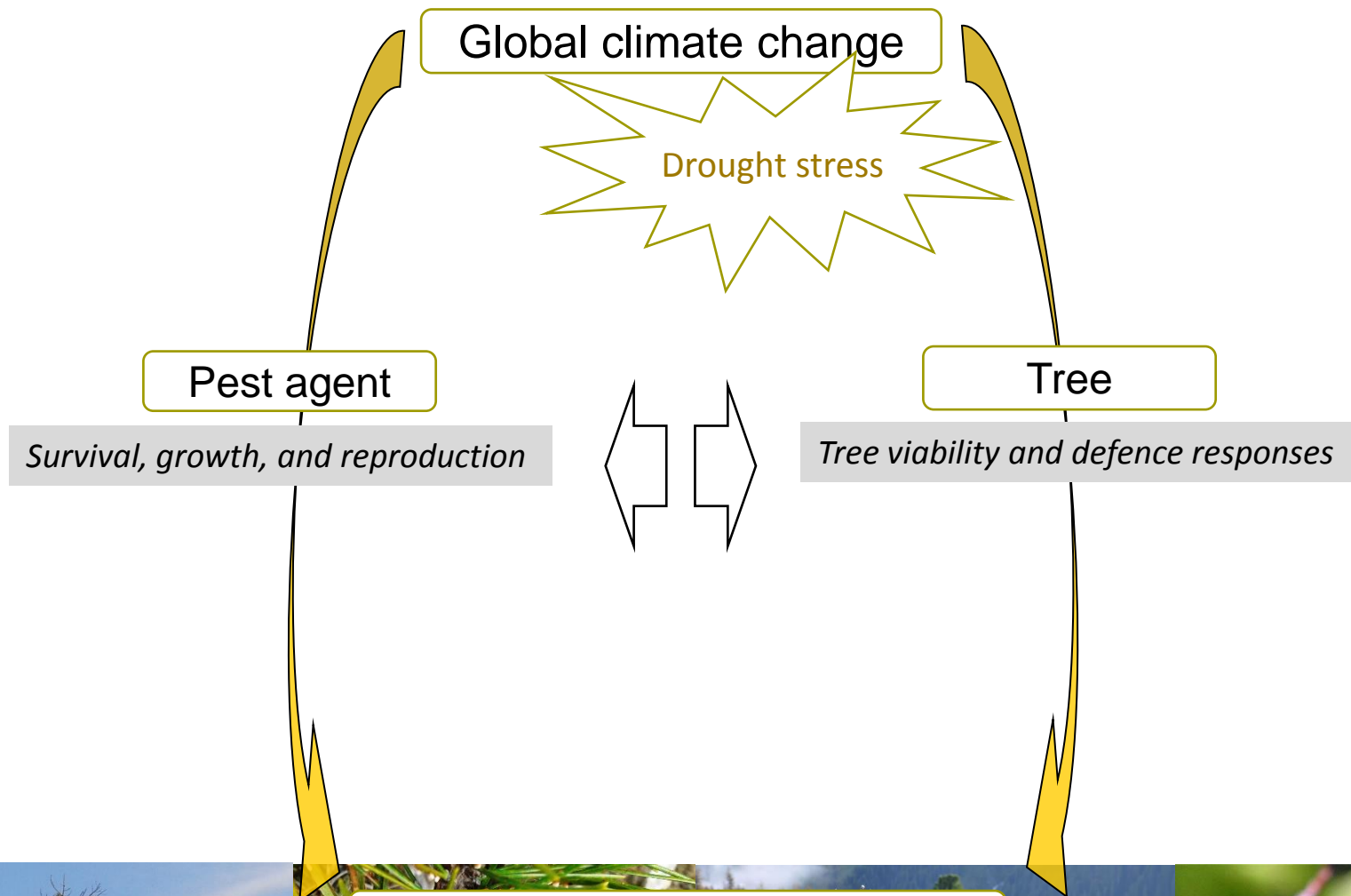


PATHOGEN DAMAGES IN MOUNTAIN FORESTS

Direct and indirect effects of altered climatic conditions

Andrea Ganthaler



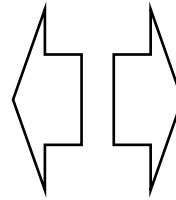


Global climate change

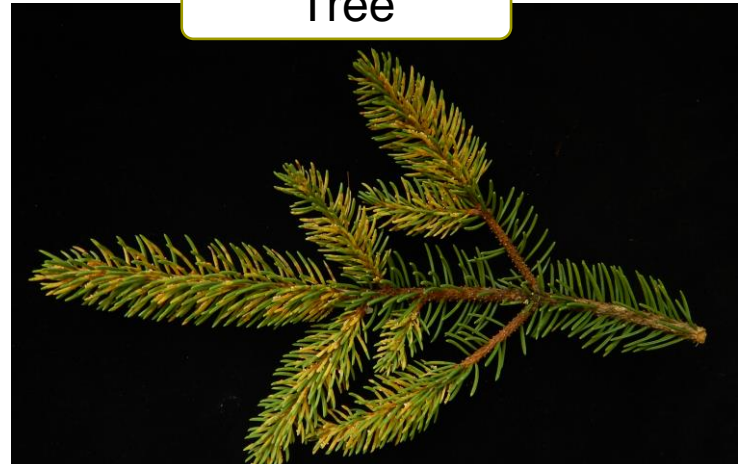
Pest agent



Needle rust fungus
(*Chrysomyxa rhododendri*)



Tree



Norway spruce
(*Picea abies*)

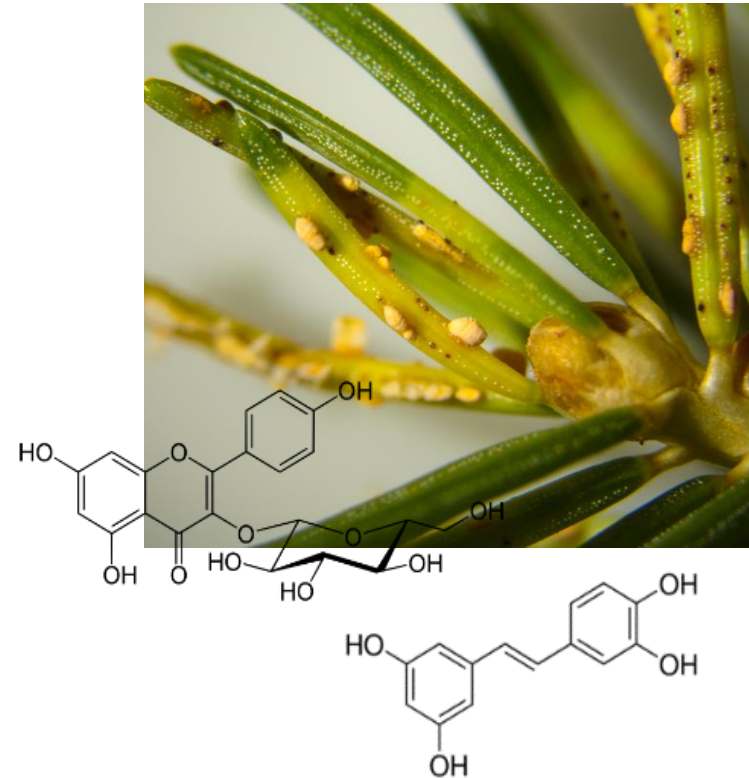
Pest caused forest damages

Example: Effects of drought stress on the tree phenolic defence

Water limitation during infection

month needle specification	avg. concentration ($\mu\text{mol/g}$)		
	May	July	
		D _{2HN}	D _{2DN}
Picein	0.20	1.81	0.47
Shikimic Acid	225.89	520.47	46.31
<i>trans</i> -Astringin	0.11	0.74	0.48
<i>cis</i> -Astringin	0.11	0.11	0.14
<i>trans</i> -Isorhapontin	0.01	0.35	0.27
<i>cis</i> -Isorhapontin	0.02	0.04	0.04
<i>trans</i> -Piceid	0.11	3.44	2.08
<i>cis</i> -Piceid	0.01	0.01	<0.01
Kaempferol	5.96	0.06	0.03
Kaempferol 3-G	20.63	1.49	1.09
Kaempferol 7-G	6.63	0.59	0.53
Kaempferol 3-R	0.65	0.43	0.15
Quercetin	0.27	0.05	0.04
Quercetin 3-G	2.20	0.51	0.35
Catechin	5.89	6.05	8.92
Galocatechin	6.94	3.30	1.90
Taxifolin	0.06	0.34	0.17
Piceatannol	0.03	0.09	0.05
Naringenin	<0.01	0.01	<0.01

Guggenberger et al., *unpub.*



Development of new tools and strategies

Identification of resistant trees

