



Healthy & Safe

Elucidating the cropping factors influencing *Fusarium* species and mycotoxin occurrence in Swiss oats

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13.07.2016





Facts

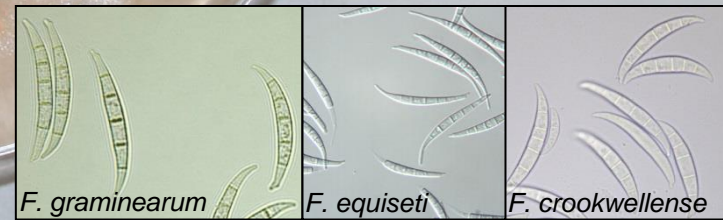
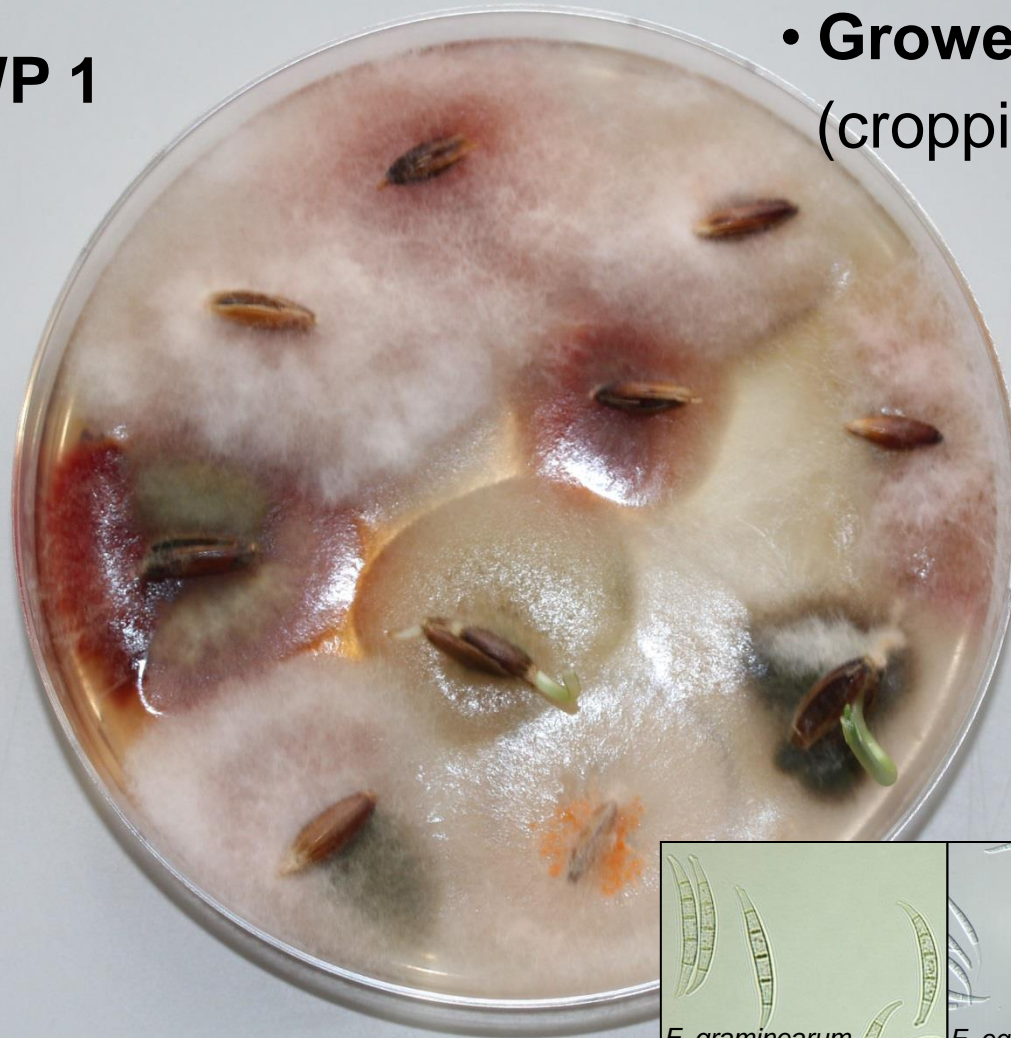
- Cereal types differ in the occurrence of predominant *Fusarium* species
- Strong effect of cropping and environmental factors on infection by FHB causing species



Occurrence

WP 1

- Growers' samples (cropping factors)



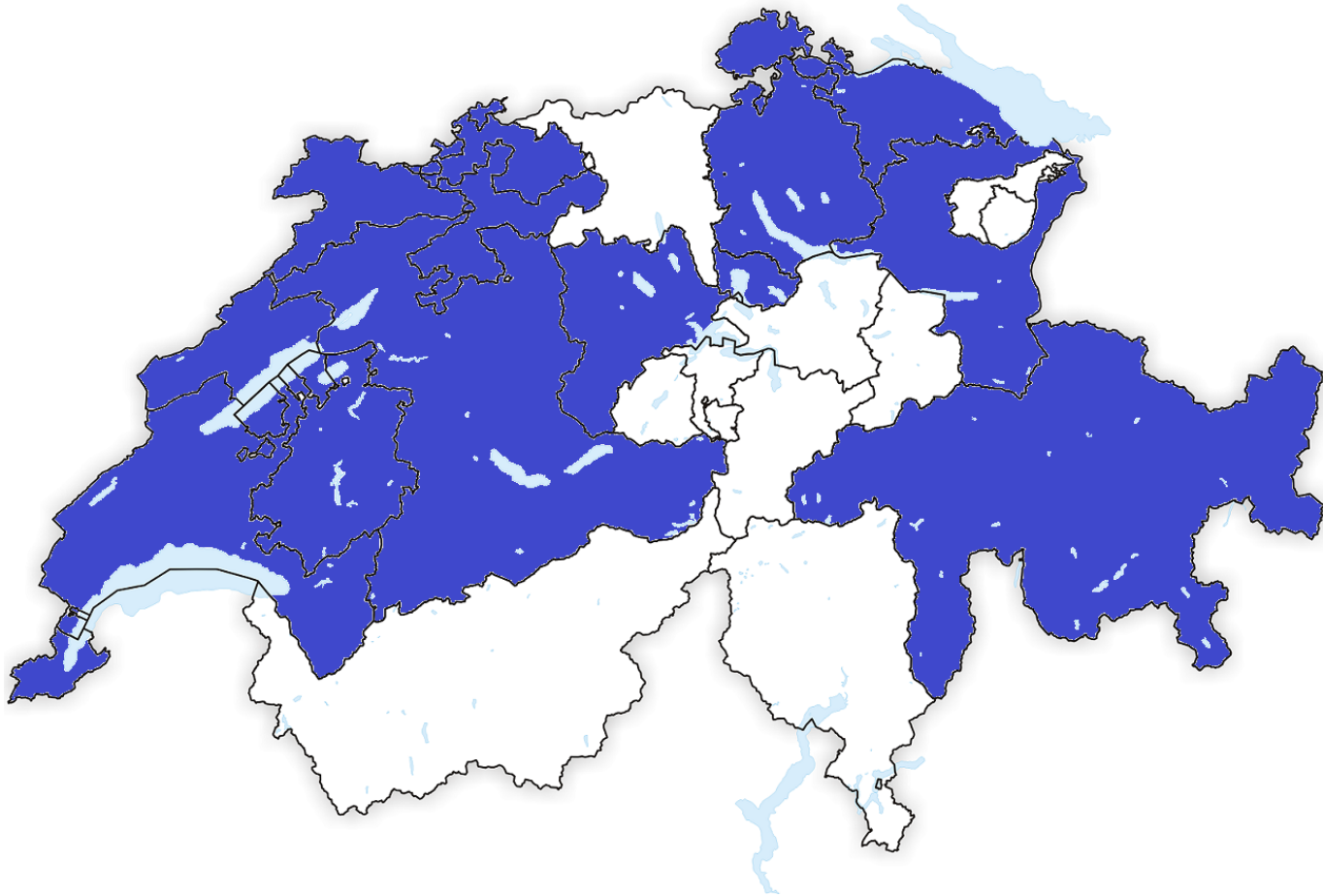
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Monitoring 2013-15

- 324 oat samples from 16 cantons



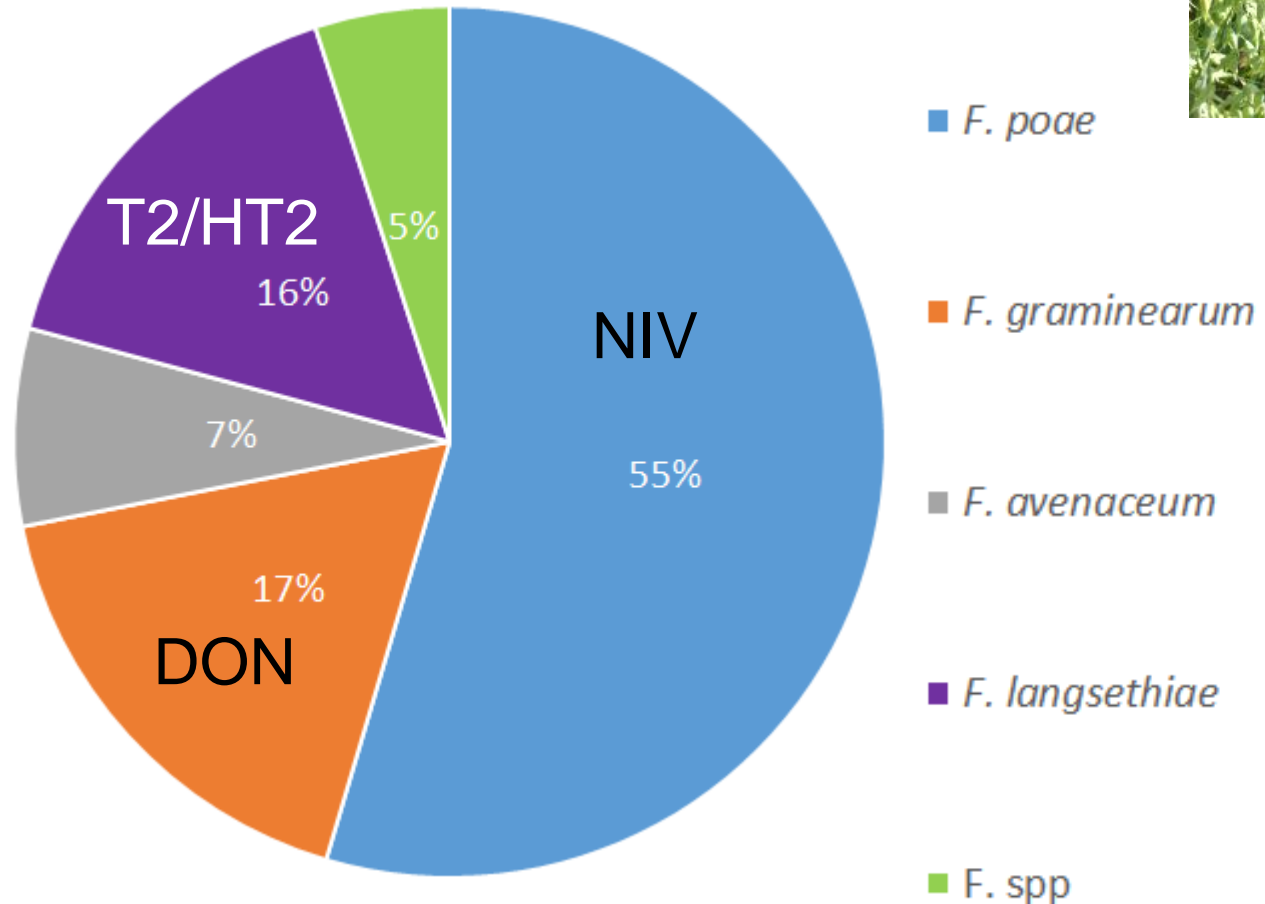
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Monitoring – Influencing Factors - Outlook/Summary



Monitoring 2013



Ø FP = 3.5%

n = 93

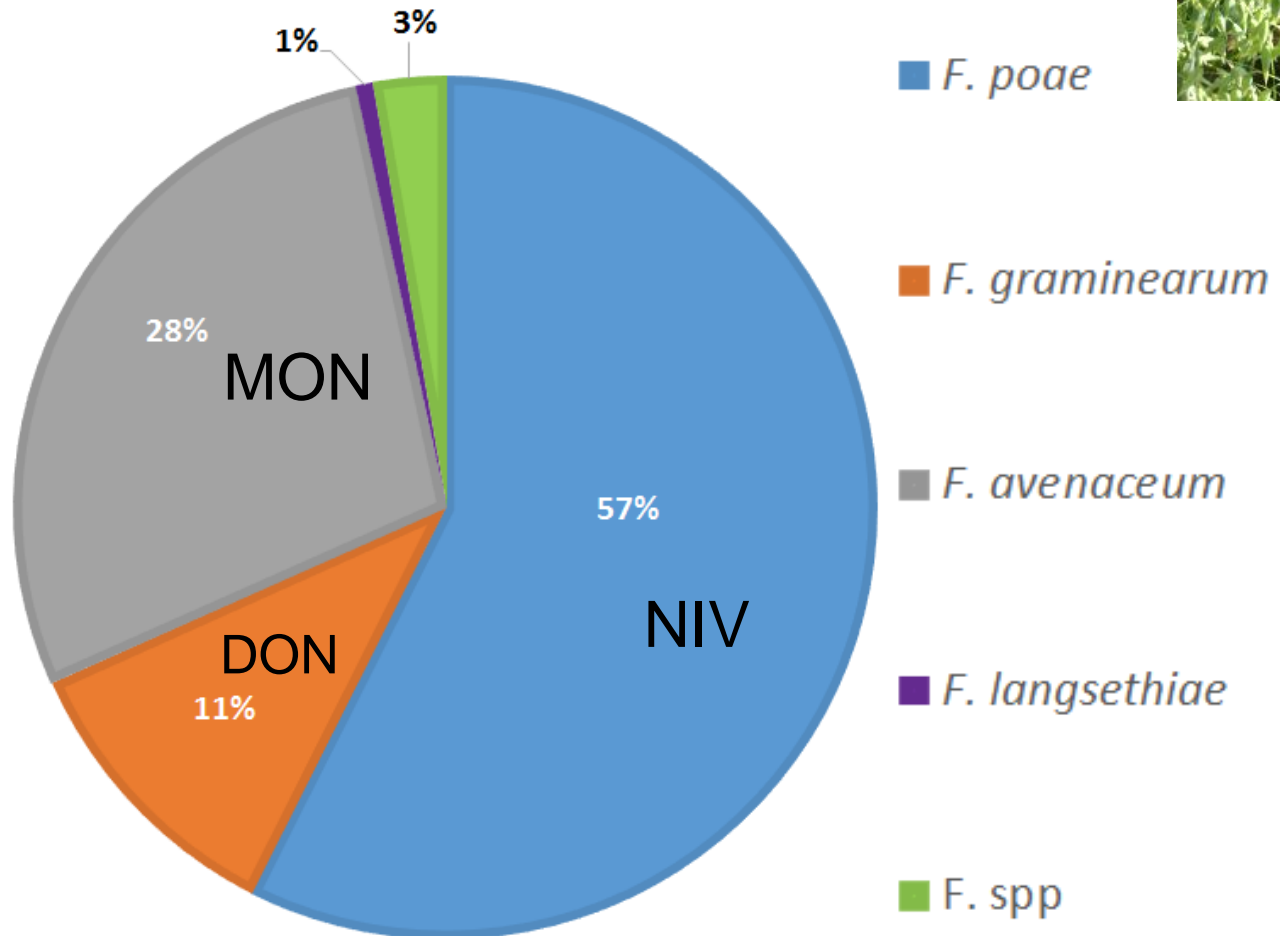
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Monitoring – Influencing Factors - Outlook/Summary



Monitoring 2014



Ø FP = 5.3%

n = 66

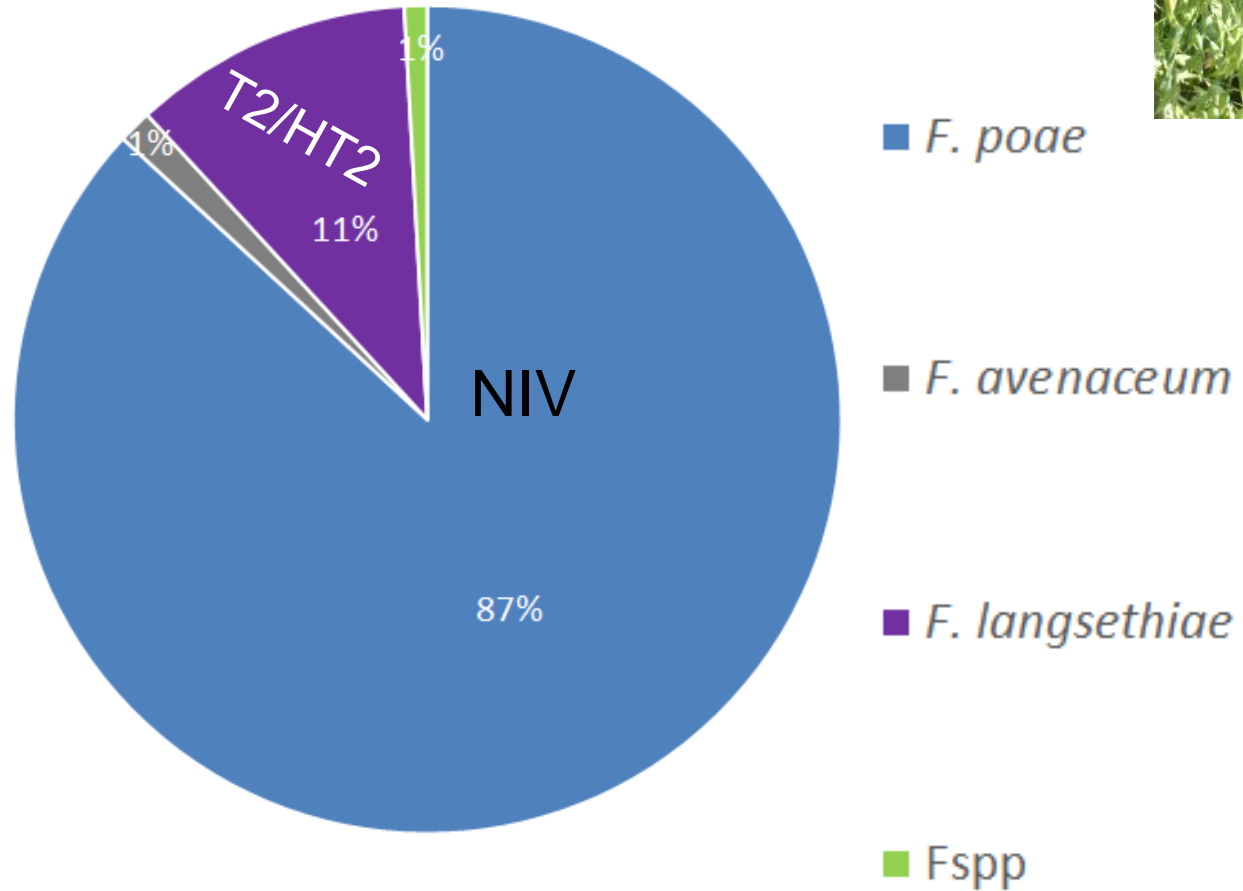
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Monitoring – Influencing Factors - Outlook/Summary



Monitoring 2015



n = 165

Ø FP = 10.0%

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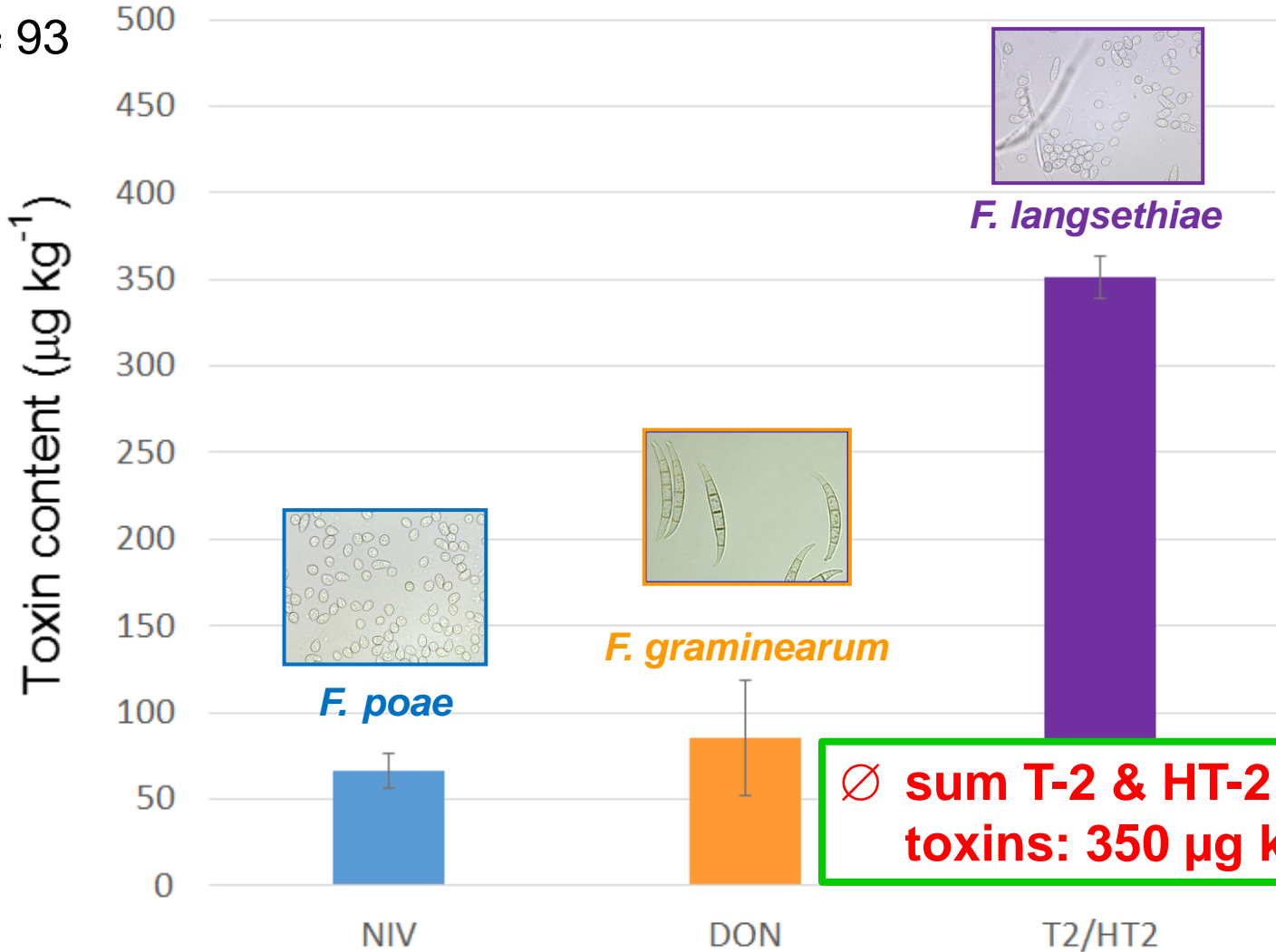
Monitoring – Influencing Factors - Outlook/Summary



Average Toxin Contents 2013



n = 93



∅ sum T-2 & HT-2 toxins: 350 µg kg⁻¹

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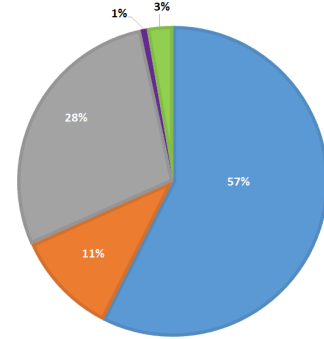
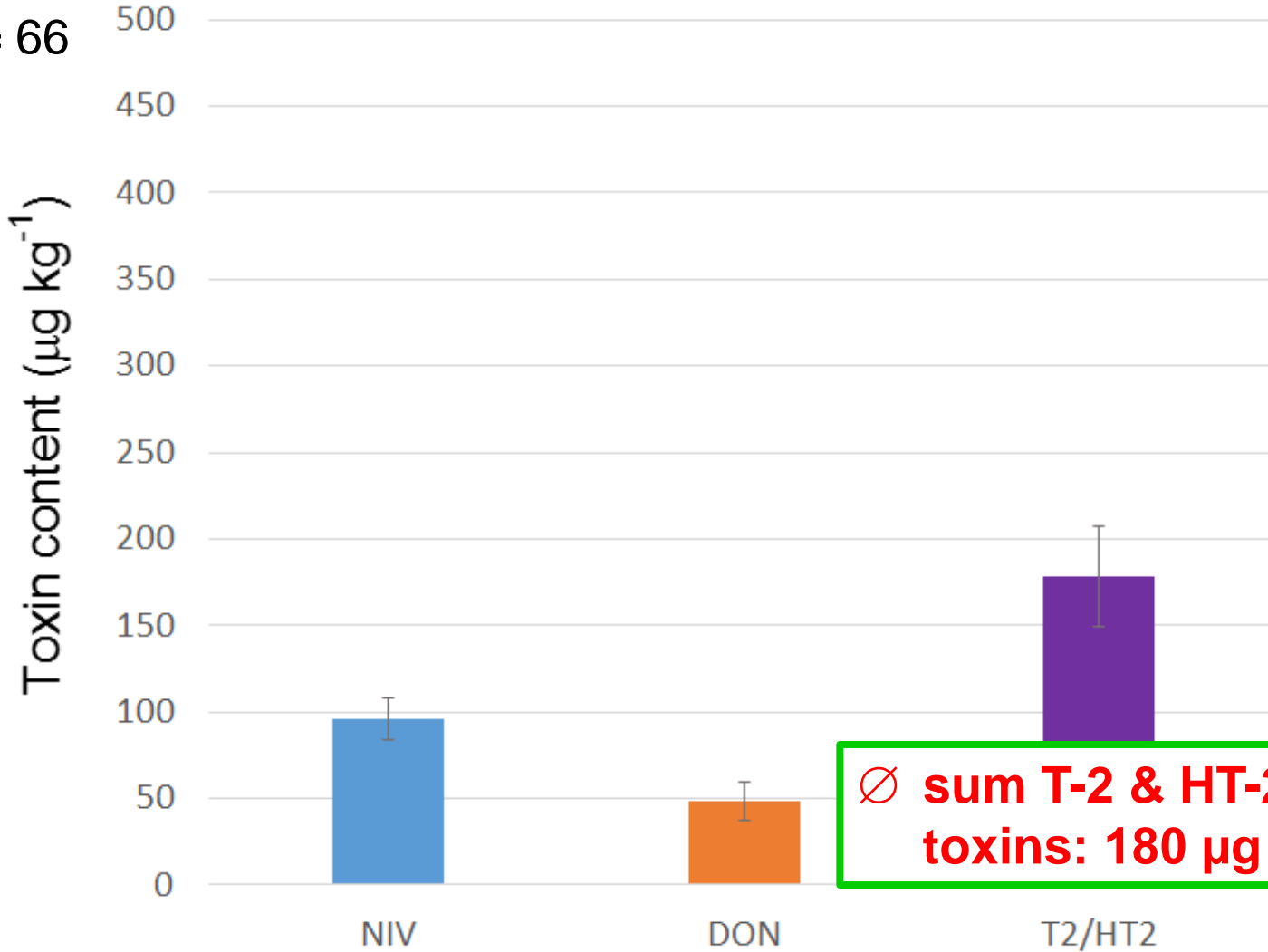
Monitoring – Influencing Factors - Outlook/Summary



Average Toxin Contents 2014



n = 66



∅ **sum T-2 & HT-2 toxins: 180 µg kg⁻¹**

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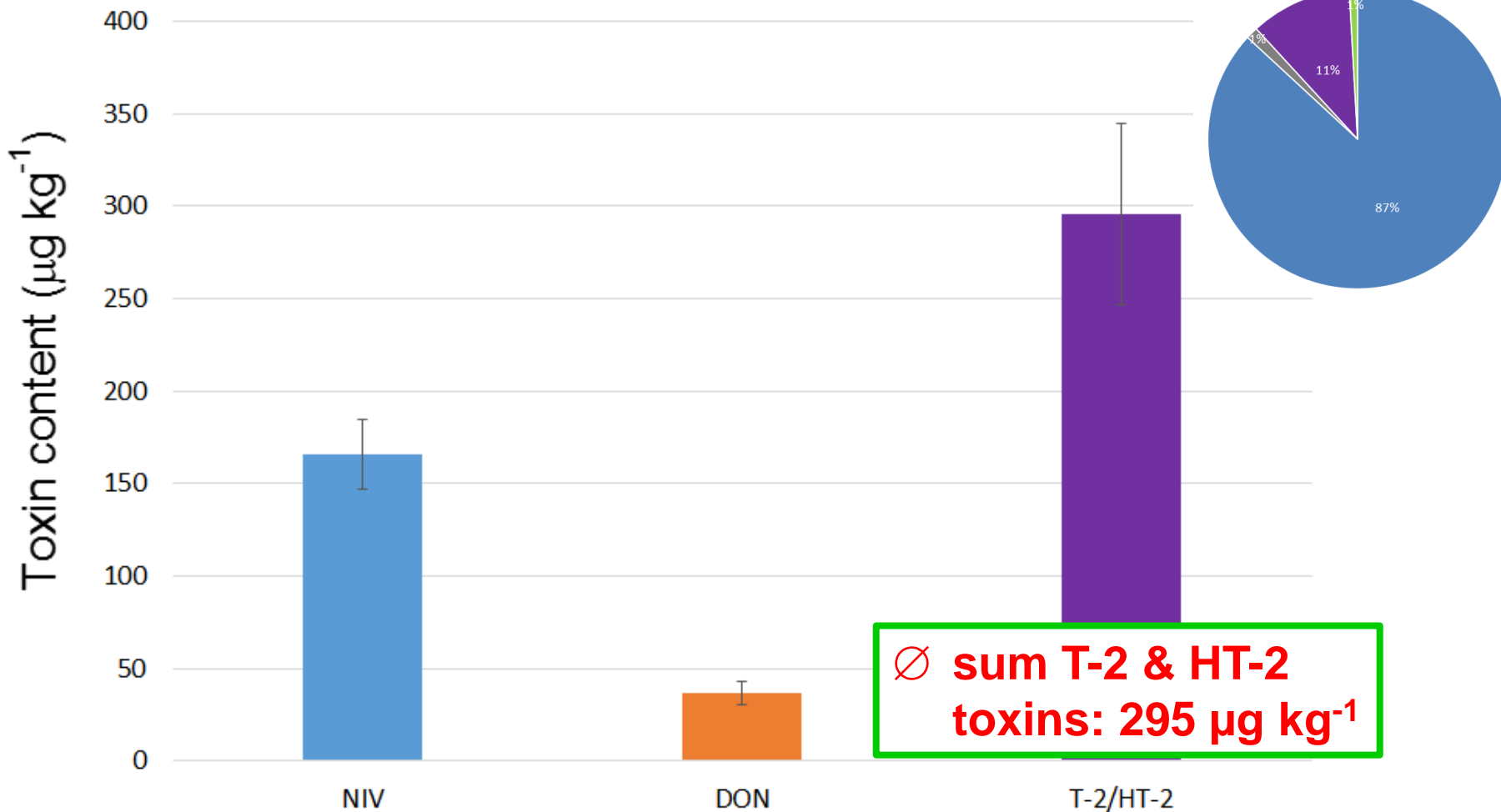
Monitoring – Influencing Factors - Outlook/Summary



Average Toxin Contents 2015



n = 165



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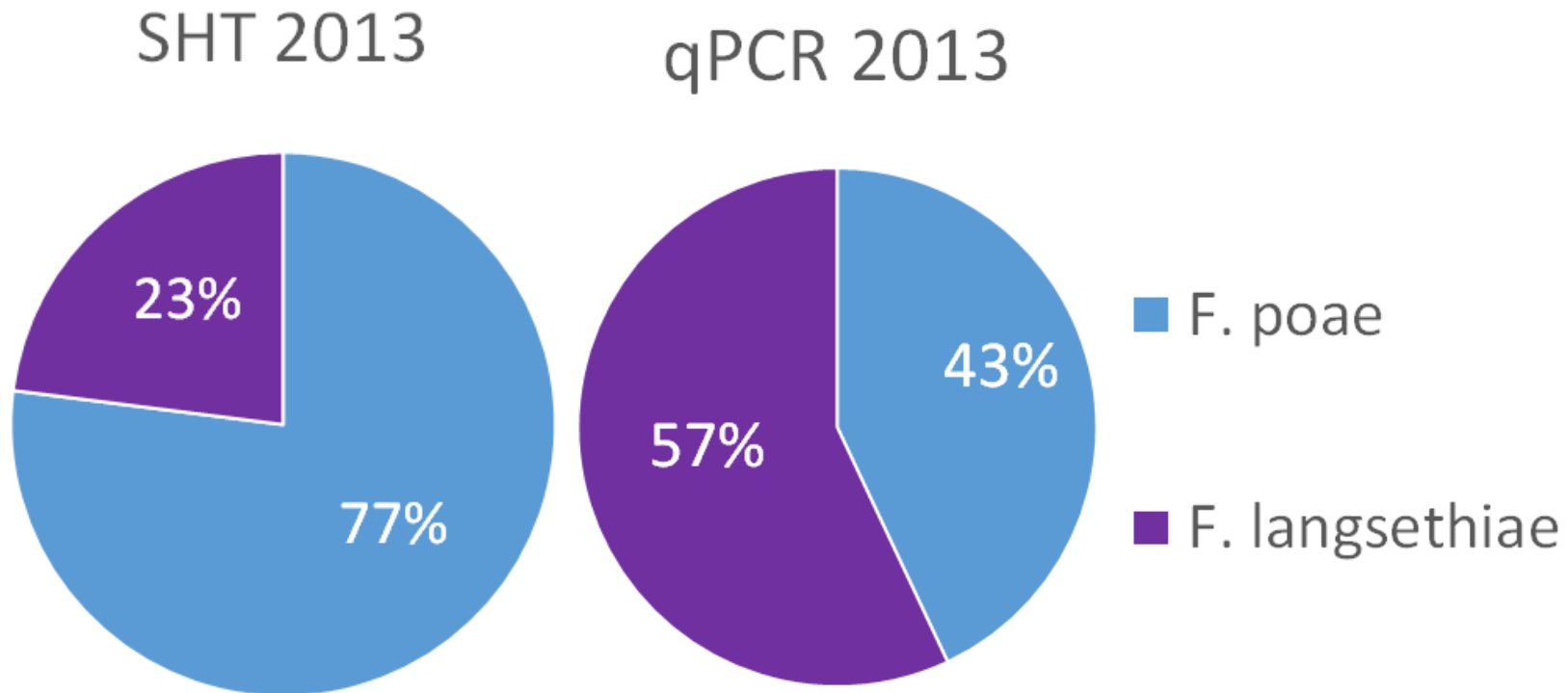
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Monitoring – Influencing Factors - Outlook/Summary

Occurrence Seed Health test vs. qPCR 2013



n = 93



350 $\mu\text{g kg}^{-1}$ T-2/HT-2 : 64 $\mu\text{g kg}^{-1}$ NIV

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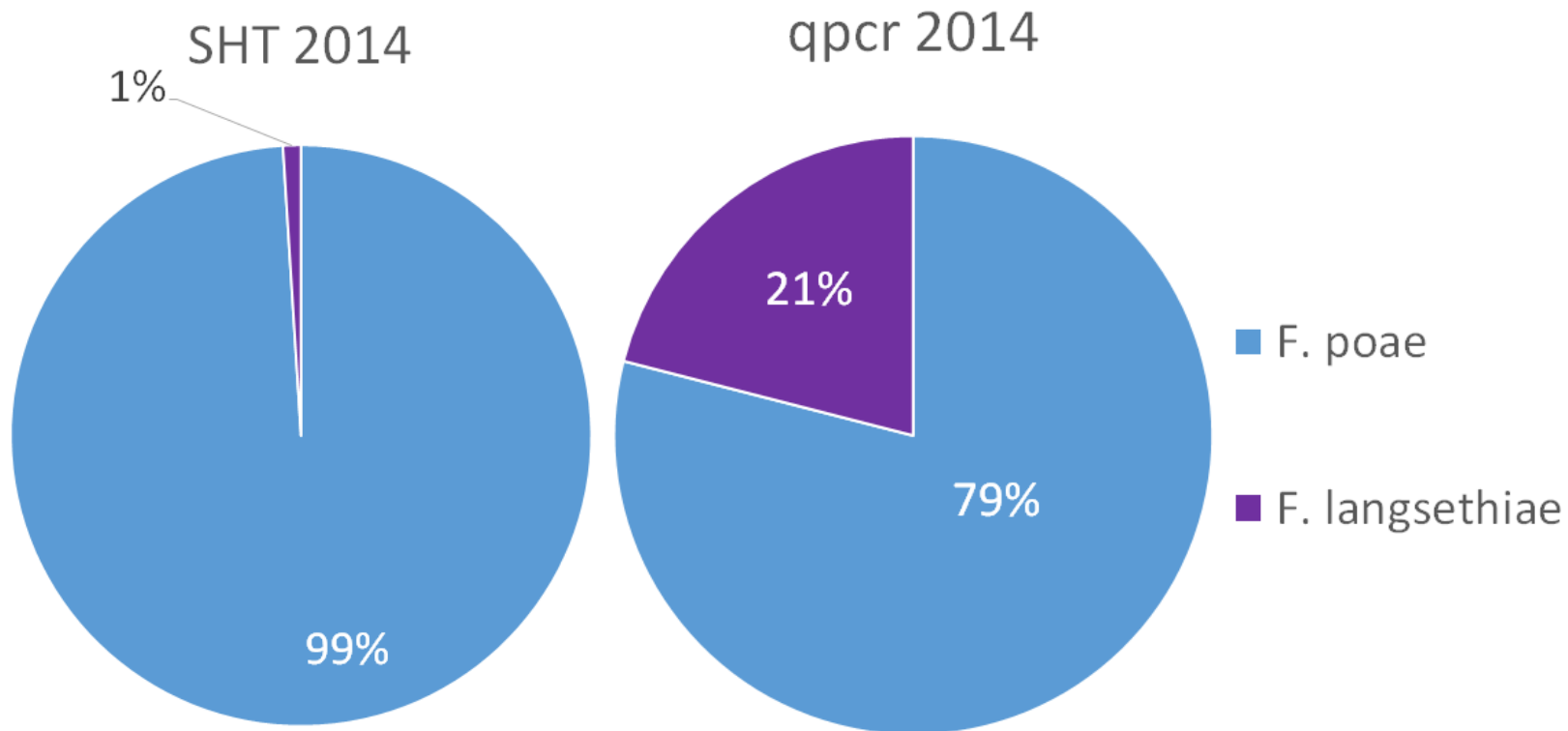
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Monitoring – Influencing Factors - Outlook/Summary

Occurrence Seed Health test vs. qPCR 2014



n = 63/69



180 $\mu\text{g kg}^{-1}$ T-2/HT-2 : 96 $\mu\text{g kg}^{-1}$ NIV




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Monitoring – Influencing Factors - Outlook/Summary



Observed Parameters

- Cropping system
- Cereal type
- Variety 
- Pre- previous crop
- Previous crop 
- Tillage 
- Sowing date
- Harvesting date
- Fertilization
- Fungicide treatment
- Growth regulators

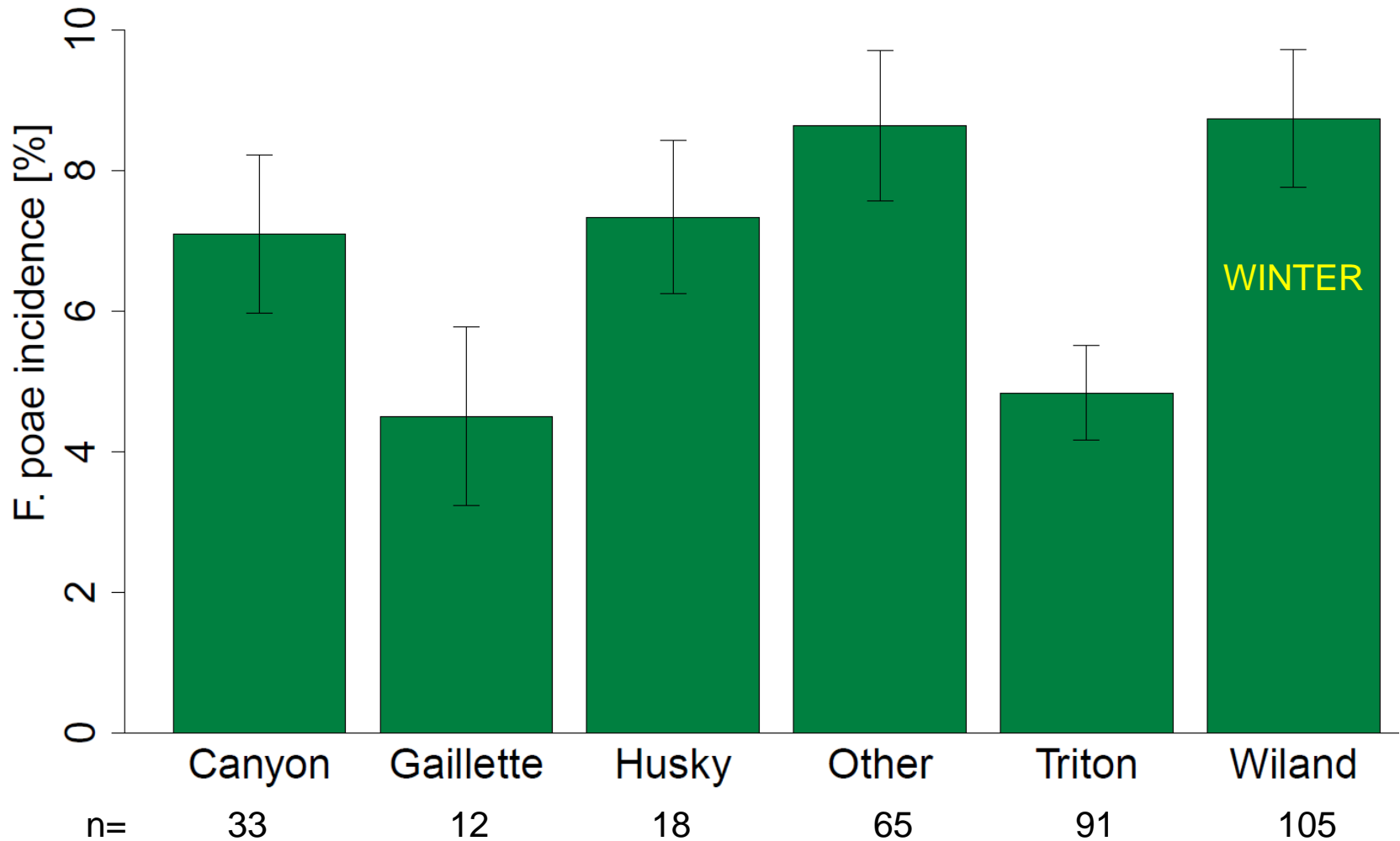
 Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra		Eidgenössisches Volkswirtschaftsdepartement Forschungsanstalt Agroscope Reckenholz-Tänikon ART	
Fragen zur Gersten- oder Haferprobe - Ernte 13			
Angaben zum Schlag, aus dem die Probe stammt			
Name und Adresse des Betriebsleiters		Konv. <input type="checkbox"/> ÖLN <input checked="" type="checkbox"/> IP-Label <input type="checkbox"/> Extenso <input type="checkbox"/> Bio <input type="checkbox"/>	
Ort des Schlages (falls nicht Wohnort):			
Getreideart (SG/WG, SH/WH) und Sorte: <i>W/Land</i>	Vorfrucht (2012), bei Mais Angabe Silo- oder Körnermais: <i>Wi Gerste</i>	Vor-Vorfrucht (2011): <i>KW 320 200</i>	
Haben Sie in Ihrem Getreideschlag Fusarien beobachtet? Ja <input type="checkbox"/> Nein <input checked="" type="checkbox"/> Bemerkung:			
Mährescher mit Unterflurhäcksler (2012) <input type="checkbox"/> ja <input checked="" type="checkbox"/> nein <input type="checkbox"/> unbekannt			
Zusätzliches Häckeln/Mulchen von Ernteresten <input type="checkbox"/> ja <input checked="" type="checkbox"/> nein Wenn gemulcht, mit welchem Gerät?			
Pflug <input checked="" type="checkbox"/> ja <input type="checkbox"/> nein			
Einarbeiten von Ernteresten: Grubber <input type="checkbox"/> ; Federzinkenege <input type="checkbox"/> ; Scheibenege <input type="checkbox"/> ; Kreiselege <input type="checkbox"/> ; Rototiller <input type="checkbox"/> Andere: <input type="checkbox"/>			
Direktsaat <input type="checkbox"/> ja <input checked="" type="checkbox"/> nein			
Sädatum: <i>25.9.12</i>		Blüh-Beginn (DC 61):	
Erntedatum: <i>22.7.13</i>			
N-Düngung: kg N / ha	1 <i>5,4, 13</i>	2 <i>23,4, 13</i>	3
Handelsname, falls bekannt	<i>750/5g Ammon 27d 40 kg N/ha</i>	<i>100/5g Ammon 27d 27 kg N/ha</i>	
Fungizid, falls verwendet	Produkt	Datum	Stadium
Wachstumsregulator, falls verwendet	Produkt <i>CCC</i>	Datum <i>22.4.13</i>	Stadium



Effect of the Variety on F. poae incidence 2013-15



n=324, n.s.



WINTER

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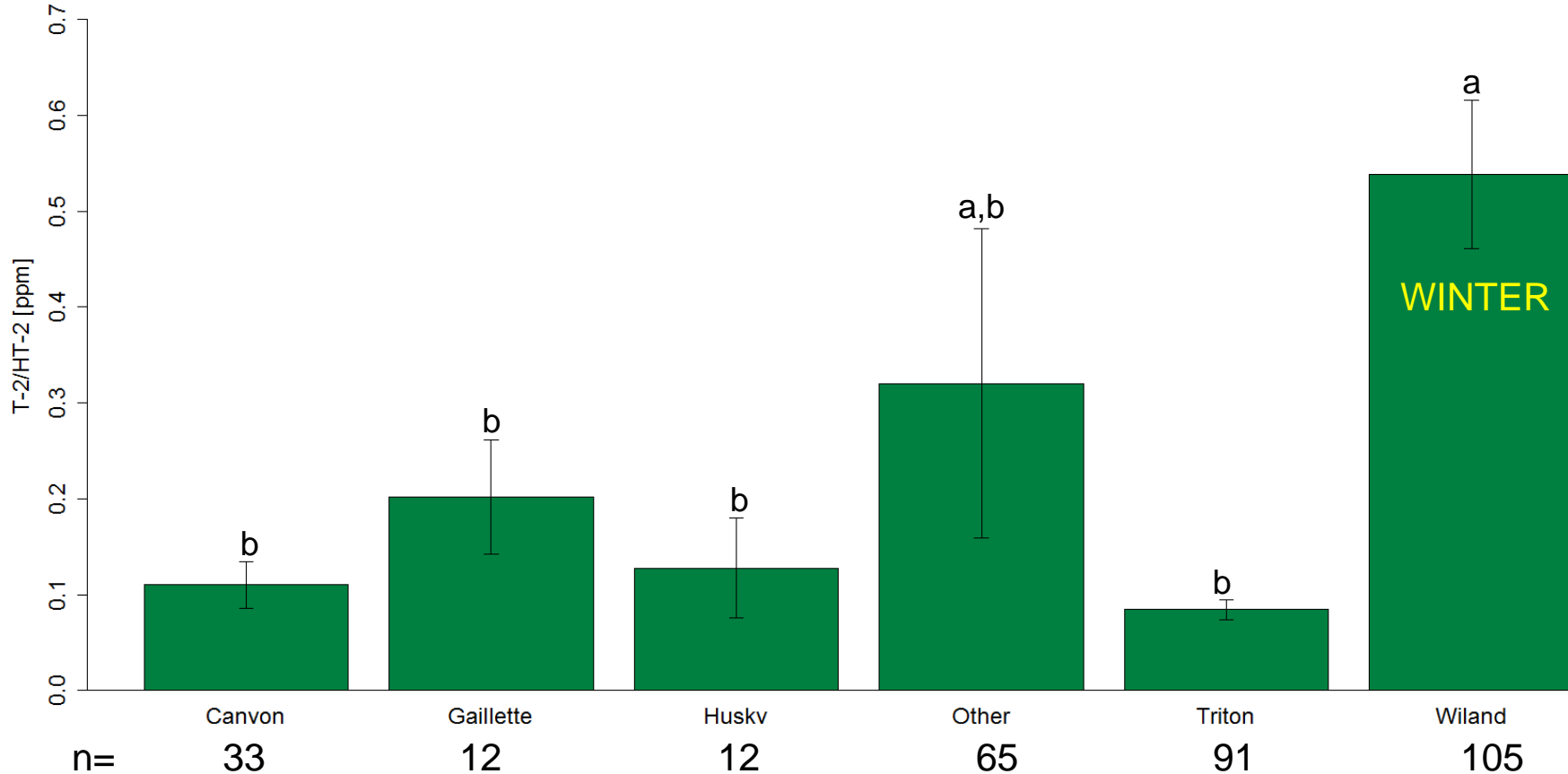
Monitoring – Influencing Factors - Outlook/Summary



Effect of the Variety on T2/HT2 content 2013-15



n=324, p=0.001

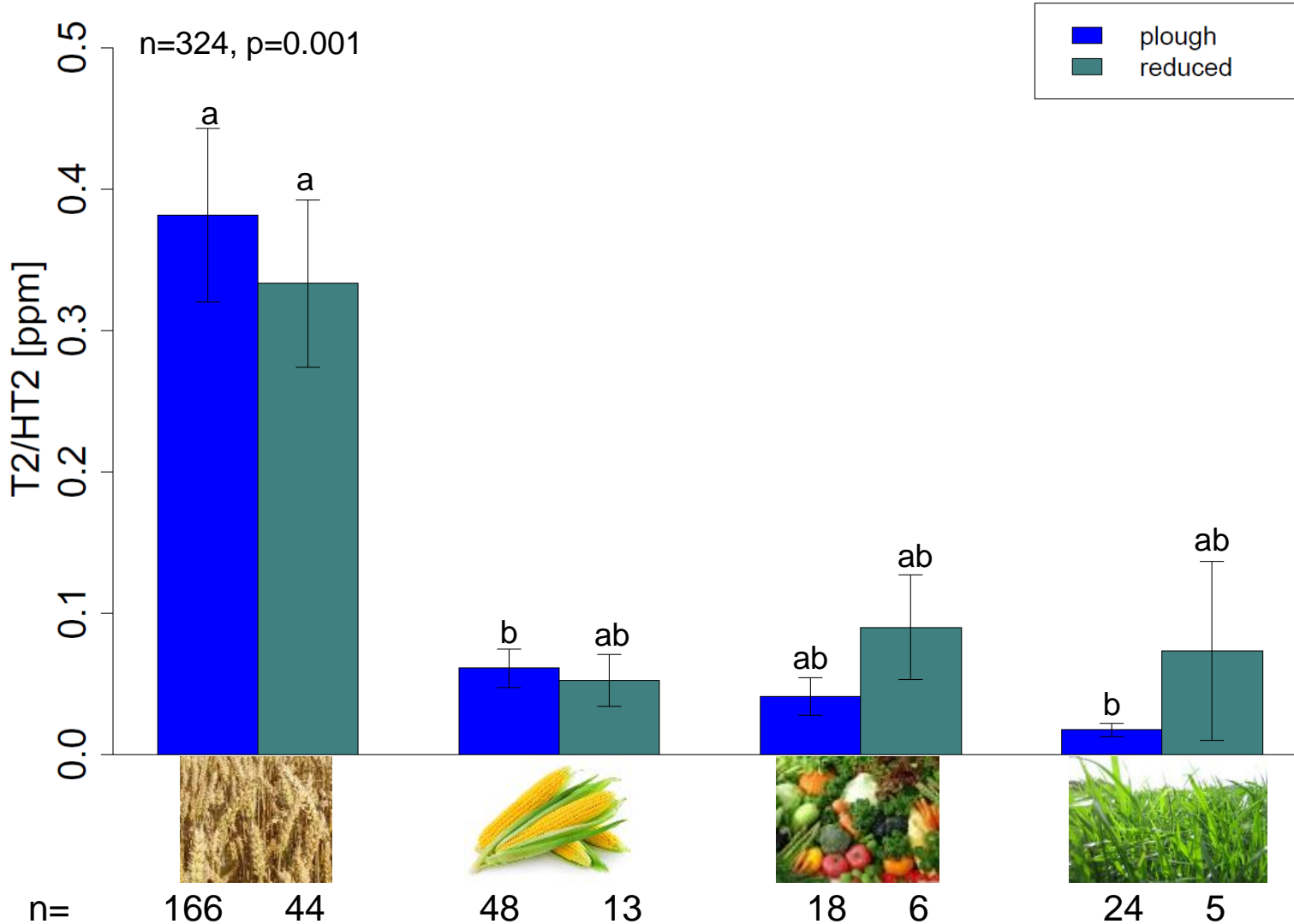


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Effect of Tillage & Previous Crop on T2/HT2 content 2013-15



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Summary

- Main occurring *Fusarium* species in 2013,14,15
 - *F. poae* (3.5%; 5.3%, 10.0%)
 - Main occurring toxins
 - T2/HT2
 - Nivalenol
 - Influencing factors (preliminary results)
 - Variety
 - “Wiland” most common variety **but** also most susceptible
 - FL and T2/HT2
- Precrop Cereal > Risk



Acknowledgements

- Andreas Kägi
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- Georg Oberer
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- Fionna Loeu
- Joyce Meissner
- Karin Kibler

- Irene Bänziger
- Eveline Jenny

- Beat Keller
- Christoph Ringli

- Phillip Streckeisen
- Felix Wettstein

- Field workers group

- Participating growers
- Cantonal plant protection officers

- RG Ecology of Noxious and Beneficial Organisms



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National Research Programme NRP 69



Thank you for your attention



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