Viljelijän keinovalikoima fusariumin hallinnassa

Mahdollisuudet ennen ja jälkeen kylvön

Viljan hometoksiinien esiintyminen
ja torjunta-ilta 26.2.2025
Jussi Knaapi

Lehtiotsikko 1970-luvulta:

Puimurin maalia vai punahometta?

Lehtiotsikko Helmikuu 24.2025 - Tanska

Analyses show potent mycotoxin in over half of Danish grain samples

Analyses from Alltech show that the mycotoxin Fusarenon X is now found in Danish crops to a much greater extent than previously. Therefore, precautions must be taken.

Feb 24, 2025 at 1:21 PM

Theis Mellby Eriksen

Barley and wheat are at high risk of being contaminated with Fusarenon X. Photo: Agrofoto.

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Barley and wheat are at high risk of being contaminated with Fusarenon X. Photo: Agrofoto.

If you have wheat or barley in your mixture that is contaminated with Fusarenon X, and our studies show that this is very typical in the 2024 harvest, you can expect the daily gain for slaughter pigs to decrease by 13.78 grams, explains Per Laustsen.

Individual mycotoxins	Occurrence, %	Median, ppb	Average level, ppb	Maximum level, ppb
Moniliformin	88,0	17,38	26,16	108
HT2 Toxin	86,7	24,07	41,32	233
Deoxynivalenol	85,3	40,70	76,49	619
Fusarenon X	82,7	154,31	158,61	387
Enniatin B/B1	80,0	136,67	308,34	2 561
DON-3-Glucoside	61,3	3,69	9,95	163
T2 Toxin	61,3	7,26	13,33	96
Fumonisin B1	46,7	0,00	6,91	59
Enniatin A/A1	41,3	0,00	32,49	479
3-AcDon	32,0	0,00	3,83	56
Neosolaniol	28,0	0,00	2,47	23
Fumonisin B2	25,3	0,00	3,48	54
Beauvericin	21,3	0,00	1,66	52
Fumonisin B3	17,3	0,00	0,82	13
Fusaric Acid	14,7	0,00	0,66	14
Diacetoxyscirpenol	13,3	0,00	0,46	7
Ergosin(in)e	10,7	0,00	0,76	17
Zearalenone	9,3	0,00	0,74	13
Cyclopiazonic Acid	9,3	0,00	0,49	17
Ergocornin(in)e	6,7	0,00	0,30	9
Mycophenolic Acid	5,3	0,00	0,25	10
Ergotamin(in)e	5,3	0,00	31,02	2 304
Ergocryptin(in)e	5,3	0,00	0,58	16
Ergocristin(in)e	2,7	0,00	0,17	7

Alltech 37+ analyses show that Fusarenon X was detected in 82.7 percent of the tests performed on barley from the 2024 harvest. Graphic: Alltech.

Etelä-Afrikka helmikuu 8. 2025 – vehnäpellolla

.. Myös heillä on fusarium haasteita

Mykotoksiini-testauksen haasteet

- Näytteenoton edustavuus
- Jauhatuksen hienous
- Näyte-erien välinen kontaminaatio
- Itse testauksen virhemarginaali – plus/miinus X %
- Viljelijän oikeusturva rajatapauksissa
- Raakaerien vs. jalosteiden hylkyrajat, (kuori vs ydin)

- Asetusta ollaan uudistamassa!

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Alltech edustaja Suomessa: Feedex

Jan-Peter Brunell – 044 763 6653
jan-peter.brunell@feedex.fi

- Testaus kattaa viljat ja karkearehut
- Raportti räätälöidään rehukäyttöä silmällä pitäen
- Naudat
- Siat
- siipikarja

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The article continues after the ad

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Alltech 37+ analyses show that Fusarenon X was detected in 82.7 percent of the tests performed on barley from the 2024 harvest. Graphic: Alltech.

Mycotoxin Analysis Report

Alltech 37+* RESULTS: MYCOTOXINS LEVELS MEASURED AT 87.69 % DRY MATTER

Sample ID #:	DK3030	Customer Sample ID:	Feedex - Sample 45 Perttu Organic
Origin:	Finland	Feed Matrix:	Oats
Species:	Mature Dairy Cows	Customer Account #:	12000063

Internal Ref # EU21258	Mycotoxins	Levels Detected (ppb)(µg/kg)	± Stdev (ppb)(µg/kg)	Detection Limit (ppb)(µg/kg)	Lower Quantification Limit (ppb)(µg/kg)
1	Aflatoxin B1	ND	ND	0.047	0.155
2	Aflatoxin B2	ND	ND	0.071	0.235
3	Aflatoxin G1	ND	ND	0.046	0.152
4	Aflatoxin G2	ND	ND	0.059	0.193
5	Ochratoxin A	ND	ND	0.047	0.155
6	Ochratoxin B	ND	ND	0.040	0.132
7	Citrinin	ND	ND	0.125	0.411
8	Deoxynivalenol	260.59	210.05	0.634	2.093
9	3-AcDon	39.03	14.71	0.106	0.350
10	15-AcDon	27.15	0.72	0.112	0.369
11	DON-3-Glucoside	16.07	2.21	0.089	0.294
12	Nivalenol	ND	ND	0.270	0.891
13	Fusarenon X	ND	ND	0.082	0.270
14	Beauvericin	ND	ND	0.055	0.182
15	Moniliformin	44.45	1.94	0.055	0.180
16/17	Enniatin A/A1	ND	ND	0.057	0.188
18/19	Enniatin B/B1	ND	ND	0.108	0.359
20	Phomopsin A	ND	ND	0.047	0.154
21	Alternariol	ND	ND	0.070	0.232
22	Fusaric Acid	ND	ND	0.098	0.322
23	T2 Toxin	35.59	7.91	0.097	0.319
24	HT2 Toxin	105.52	23.01	0.093	0.306
25	Diacetoxyscirpenol	ND	ND	0.099	0.326
26	Neosolaniol	ND	ND	0.092	0.303
27	Fumonisin B1	7.54	0.47	0.671	2.213
28	Fumonisin B2	ND	ND	0.131	0.432
29	Fumonisin B3	ND	ND	0.049	0.160
30	Zearalenone	ND	ND	0.061	0.202
31	Patulin	ND	ND	0.128	0.422
32	Mycophenolic Acid	ND	ND	0.044	0.145
33	Roquefortine C	ND	ND	0.049	0.162
34	Penicillic Acid	ND	ND	0.050	0.163
35	Citreoviridin	ND	ND	0.048	0.159
36	Wortmannin	ND	ND	0.061	0.202
37	Gliotoxin	ND	ND	0.098	0.322
38	Sterigmatocystin	ND	ND	0.049	0.160
39	Cyclopiazonic Acid	ND	ND	0.072	0.239
40	Verruculogen	ND	ND	0.051	0.167
41/42	Ergometrin(in)e	ND	ND	0.021	0.170
43/44	Ergotamin(in)e	ND	ND	0.026	0.087
45/46	Ergocristin(in)e	ND	ND	0.036	0.118
47/48	Ergosin(in)e	ND	ND	0.060	0.200
49/50	Ergocornin(in)e	ND	ND	0.056	0.185
51/52	Ergocryptin(in)e	ND	ND	0.034	0.114
53	Lysergol	ND	ND	0.048	0.159
54	Methylergonovine	ND	ND	0.049	0.161

ND: Not Detected, value is below the limit of quantification.

Alltech 37+® RESULTS: MYCOTOXINS LEVELS MEASURED AT 87.69 % DRY MATTER

Sample ID #:	DK3036	**Customer Sample ID:**	Feedex - Sample 45 Perttu Organic
Origin:	Finland	**Feed Matrix:**	Oats
Species:	Mature Dairy Cows	**Customer Account #:**	12000063

Internal Ref # EU21258	Mycotoxins	Levels Detected (ppb)(µg/kg)	± Stdev (ppb)(µg/kg)	Detection Limit (ppb)(µg/kg)	Lower Quantification Limit (ppb)(µg/kg)
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Understanding the Risk of Mycotoxins to Animal Performance‡

When dairy cows consume mycotoxins, changes to performance and health may not be observed on a daily basis but could build up over time. When mycotoxins impact performance, there may also be a loss of profitability. Dairy producers should be aware of the costs of mycotoxins in order to better manage the risk. After examining a database of scientific research on the effects of mycotoxins, the ALLTECH 37+ REQ can be linked to performance and used to estimate the impact of mycotoxins on milk production and quality (Charts 1 and 2). This chart thus shows the potential range of impacts on dairy cow production due to mycotoxin contaminated feeds.

Chart 1. Potential change in dairy cows milk production during challenge with REQ = 136

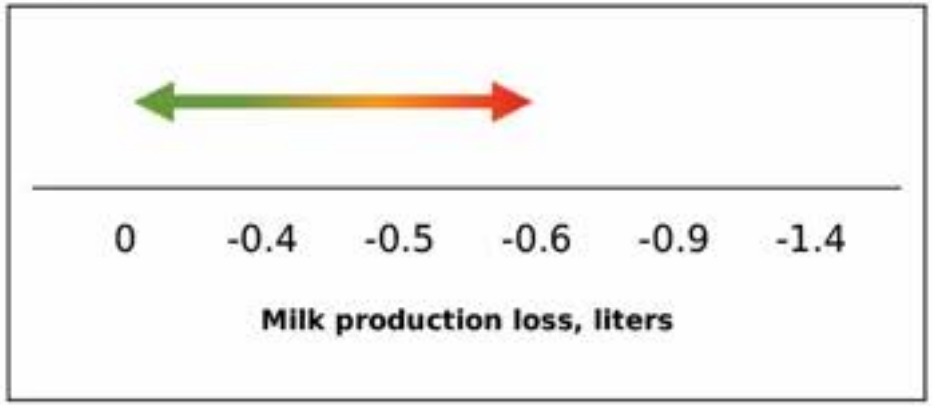
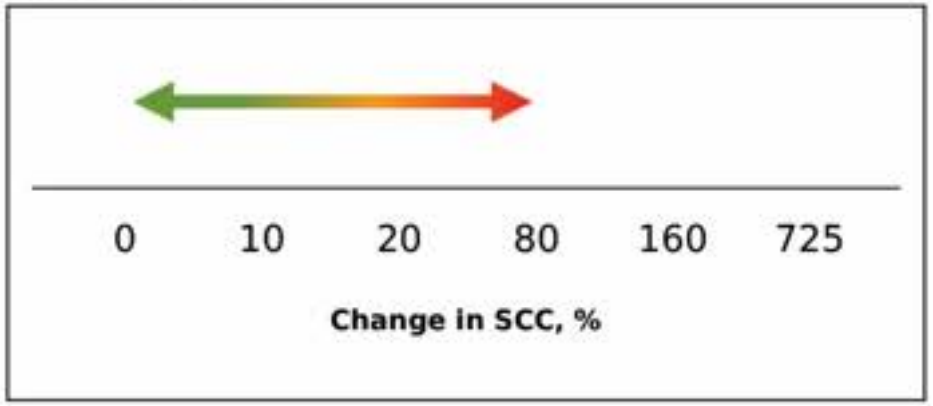


Chart 2. Potential change in dairy cows milk somatic cell count (SCC) during challenge with REQ = 136



What can this mean?

This Oats sample has a REQ of 136.1 ppb for dairy cows. Scientific research shows that milk production may be decreased by up to -0.6 liters per cow per day (-1.4 pounds per cow per day), and somatic cell count may be altered by up to 80 percent due to the presence of mycotoxins. Over time, this may add up to a significant loss to production and profitability. Animal health status and productivity level should also be considered and may play a role in observed effects.
This feedstuff may only be a portion of the total ration. As a result, inclusion rate and feeding duration may change the estimated performance impacts.

Altistava säätyyppi

- Lämmin orastumisvaihe
- Kostea kukinta-aika juhannuksen jälkeen
- Loppukesästä kasvava yökosteus

Ennen kylvöä….

Tillage System and Crop Sequence Affect Soil Disease Suppressiveness and Carbon Status in Boreal Climate

Ansa Palojärvi[1]*, Miriam Kellock[2†], Päivi Parikka[2], Lauri Jauhiainen[2] and Laura Alakukku[3]

[1] Natural Resources Institute Finland (Luke), Turku, Finland, [2] Natural Resources Institute Finland (Luke), Jokioinen, Finland, [3] Department of Agricultural Sciences, University of Helsinki, Helsinki, Finland

carbon status, fungistasis and yield in boreal climate. The disease suppression was improved by the long-term reduced and no tillage management practices with and without crop rotation. Compared to the conventional plowing, the non-inversion tillage systems were shown to change the vertical distribution of soil carbon fractions and the amount of microbial biomass by concentrating them on the soil surface. Crop sequence and the choice of tillage method had a combined effect on soil organic carbon (SOC) sequestration. The improved general disease suppression had a positive correlation with the labile carbon status and microbial biomass. From the most common *Fusarium* species, the predominantly saprophytic *F. avenaceum* was more abundant under non-inversion practice, whereas the opposite was true for the pathogenic ones. Our findings furthermore demonstrated the correlation of the soil fungistasis laboratory assay results and the prevalence of the pathogenic test fungus *Fusarium culmorum* on the crop cereals in the field. Our results indicate that optimized management strategies have potential to improve microbial related soil fungistasis in boreal climate.

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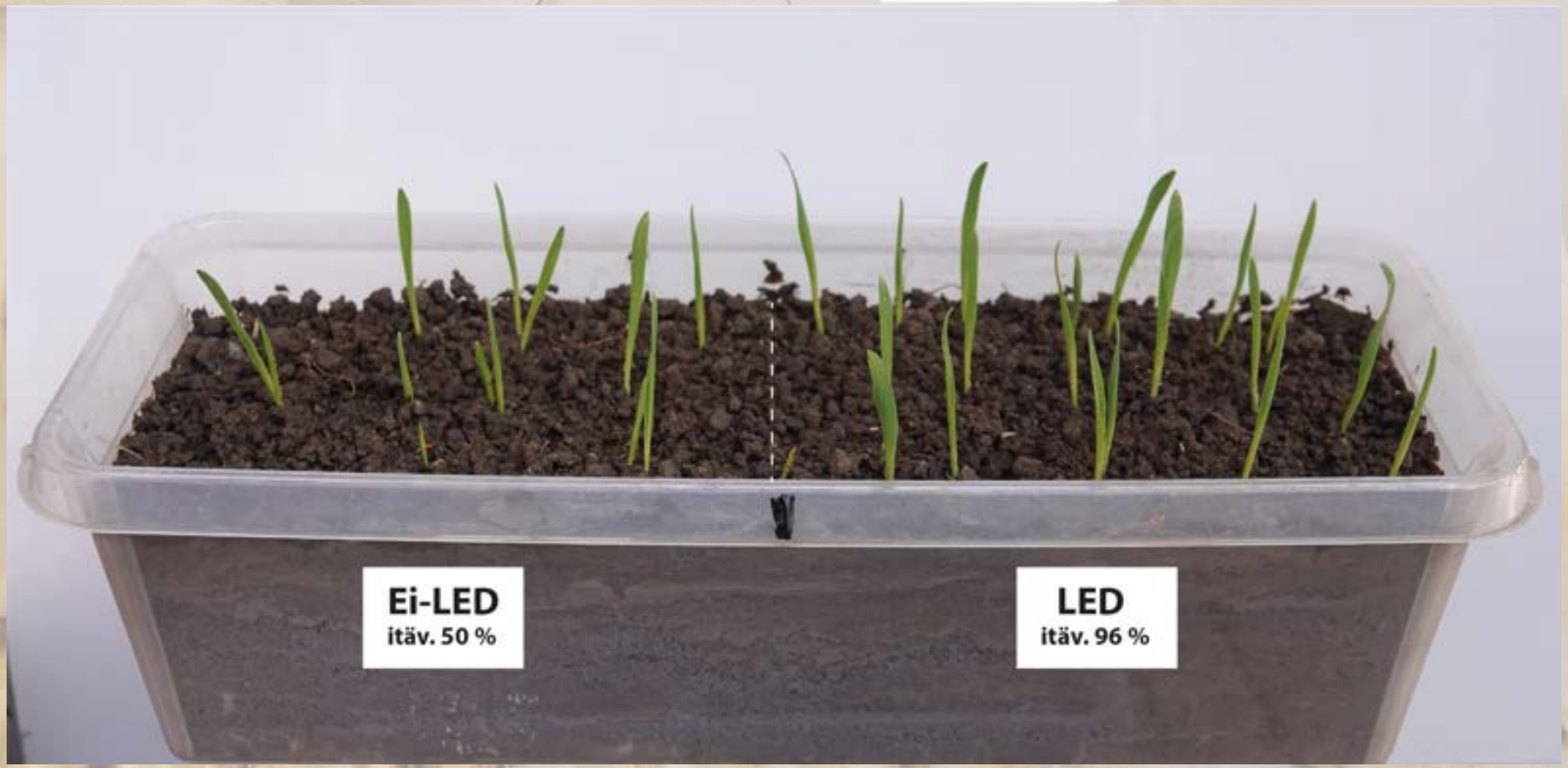
Tutkimus kumoaa perinteisen käsityksen, jossa kyntö nähdään fusariumia vähentävänä menetelmänä ja suorakylvö puolestaan fusariumia lisäävänä menetelmänä…

Kasvinjätteiden lahoaminen käyntiin nopeasti!

Olosuhteet mikrobeille?

- **C/N-suhde**
- **Mikrobitasapaino**


Ei-LED
itäv. 50 %
LED
itäv. 96 %

Itämisolosuhteet

Kylvöaikana ei itävän siemenen ympärillä saisi olla lahoamatonta olkea – kylvötarkkuus ja tautiriski !

Siemenkäsittely?, siementestaus!

Siemenkäsittelyn laatu saattaa jäädä vajaaksi, hyvä peitto-% auttaa aina.

Siemenkäsittelyn teho?

Fusarium-lajit voivat olla tauteja aiheuttavia ja/tai lahottajia! Viimeksi mainittuja tarvitaan, jotta pellon sisäinen ravintokierto toimii. Tähkäfusarioosi ja tyvitaudit ovat samojen fusarium-lajien aiheuttamia.

Plant Pathogens Increased by Glyphosate

Torjunta-aineet voivat myös lisätä tautipainetta!

Pathogen	Pathogen
Increased:	*Cercospora spp.*
Botryospheara dothidea	*Marasmius spp.*
Corynespora cassicola	*Monosporascus cannonbalus*
Fusarium spp.	*Myrothecium verucaria*
Fusarium avenaceum	*Phaeomoniella chlamydospora*
F. graminearum	***Phytophthora spp.***
F. oxysporum f. sp cubense	***Pythium spp.***
F. oxysporum f.sp (canola)	***Rhizoctonia solani***
F. oxysporum f.sp. glycines	*Septoria nodorum*
F. oxysporum f.sp. vasinfectum	*Thielaviopsis bassicola*
F. solani f.sp. glycines	*Xylella fastidiosa*
F. solani f.sp. phaseoli	*Clavibacter nebraskensis*
F. solani f.sp. Pisi	*Xanthomonas sterwartii*
Gaeumannomyces graminis	

Don Huber

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Gaeumannomyces graminis	

Don Huber

Kasvitaudit ja rikkaruohot menestyvät, missä hyötykasvusto kärsii!

Tautiherkkyyden tekijät = Kasvin stressin hallinta

Notill vs. Inversion practicies

koneviesti & "Novida farm school"

We study, compare and learn:

- How to grow profitably
- Soil structure & health
- More nutritious yield & quality
- How to minimize enviromental footprint
- How to increase carbon sponge

Loimaa Management trial

Measurements

Tillage System and Crop Sequence Affect Soil Disease Suppressiveness and Carbon Status in Boreal Climate

Viljelytavan vaikutukset

Project group: Maatalouden Ammattitapahtumat (Tuomas Levomäki, Erkki Mäkelä) , Koneviesti Ag-magazine (Uolevi Oristo, Eemeli Linna), Jussi Knaapi

KUNTA LOIMAA

1:2000

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Project group: Maatalouden Ammattitapahtumat (Tuomas Levomäki, Erkki Mäkelä) , Koneviesti Ag-magazine (Uolevi Oristo, Eemeli Linna), Jussi Knaapi

Torjuntatoimet, tekniikka ?

Pisaroiden peitto ja imeytyminen –
kova vesi

Pisaroiden peitto ja imeytyminen –
pehmennetty vesi

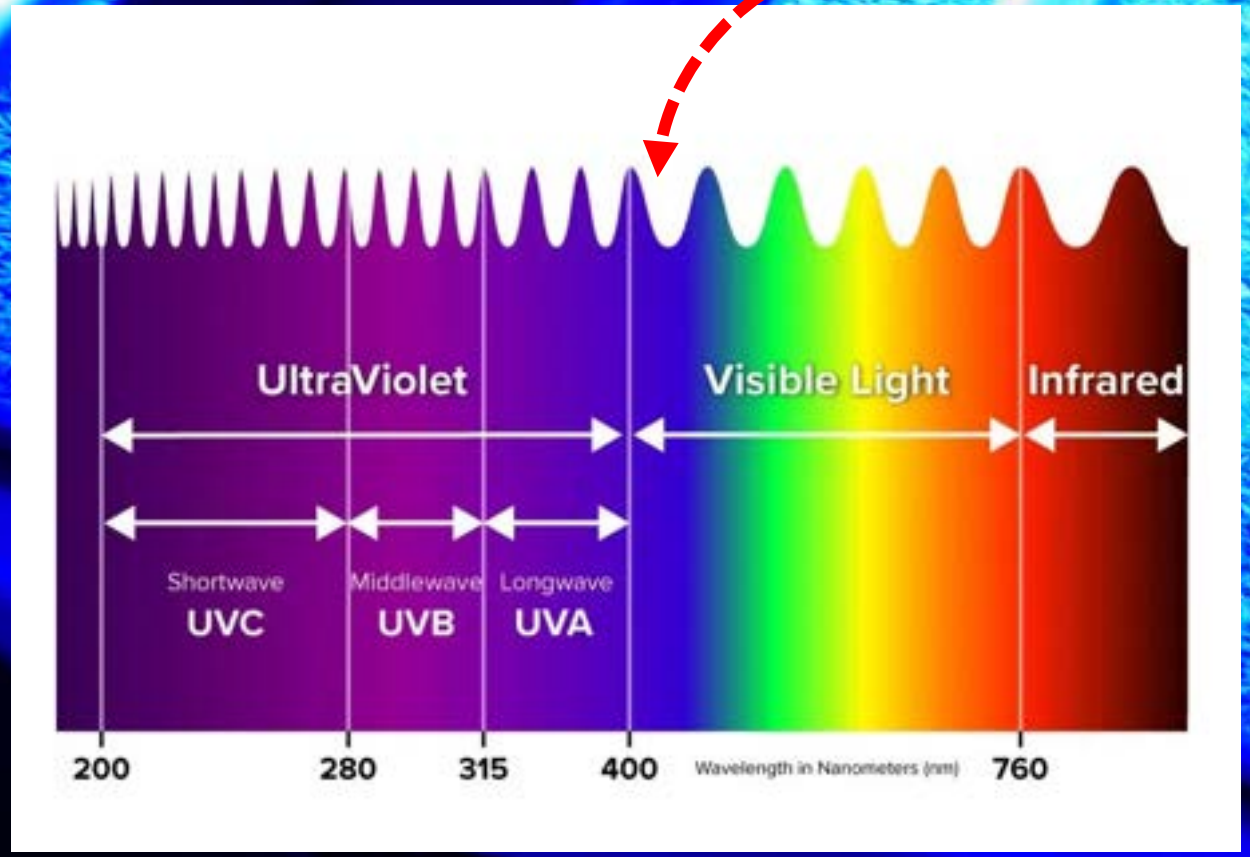
Turhia riskejä!!

- Ylitiheä kasvusto
- Runsas nitraattipainotteinen lannoitus
- Strobuliinia sisältävien fungisidien käyttö
  - (lisää kasvuston kosteuttta – korsi pysyy vihreänä pitkään, mahdollisesti muitakin vaikutustapoja)

Lähde: Syngenta

Sadon kunnostus

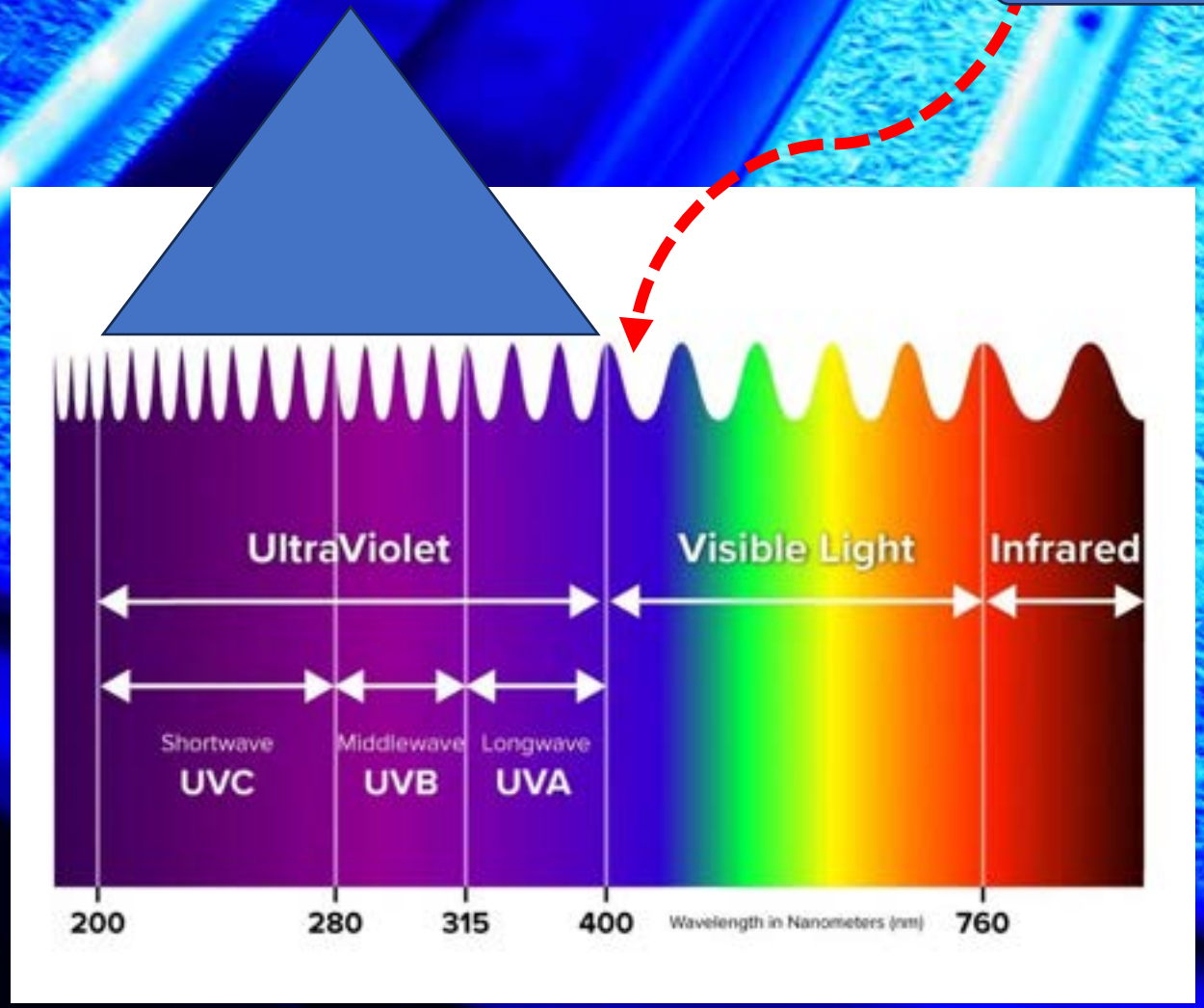
Sinivalo



Sadon kunnostus

UV-valo

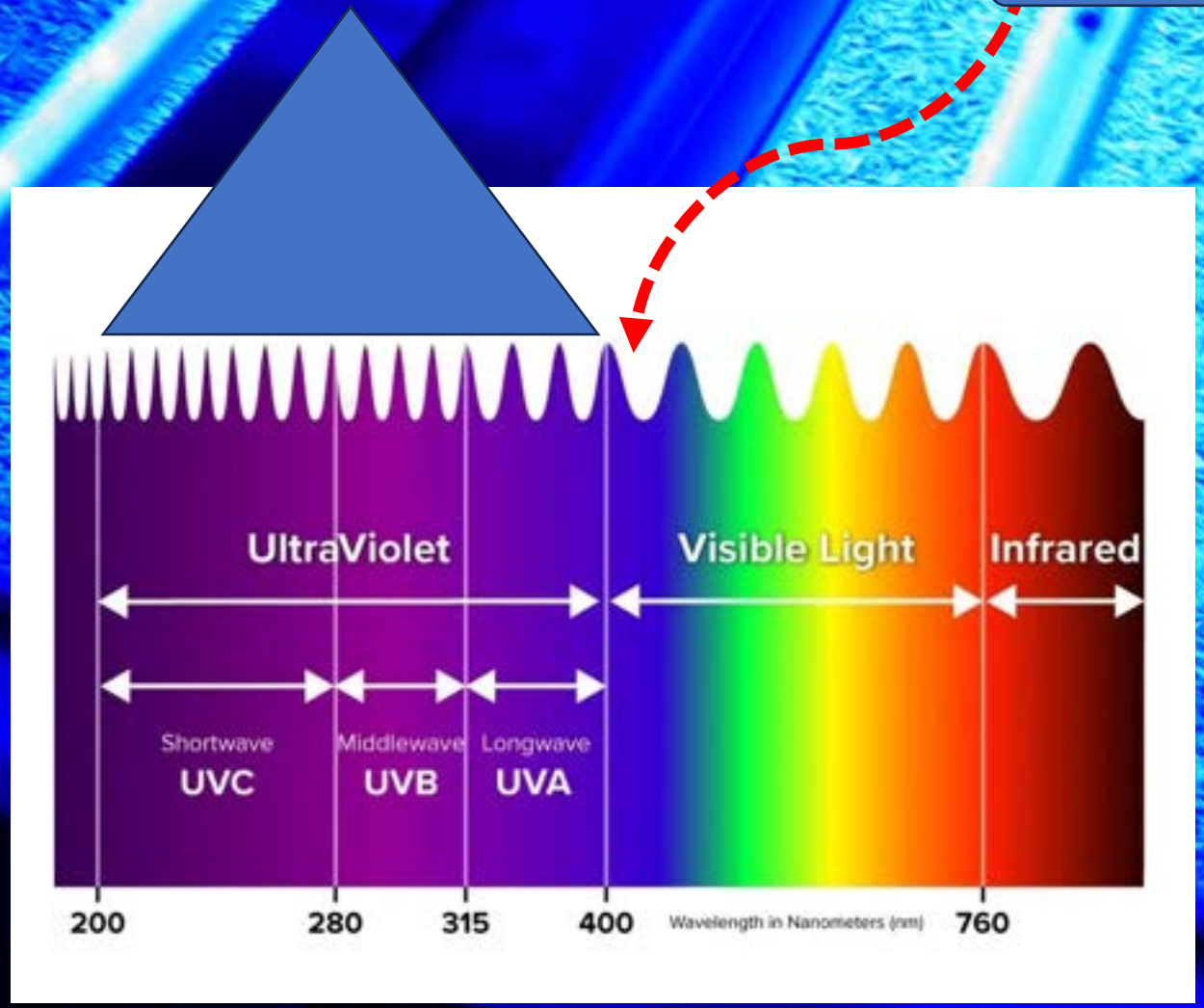
Sini-valo



Sadon kunnostus

UV-valo

Sini-valo

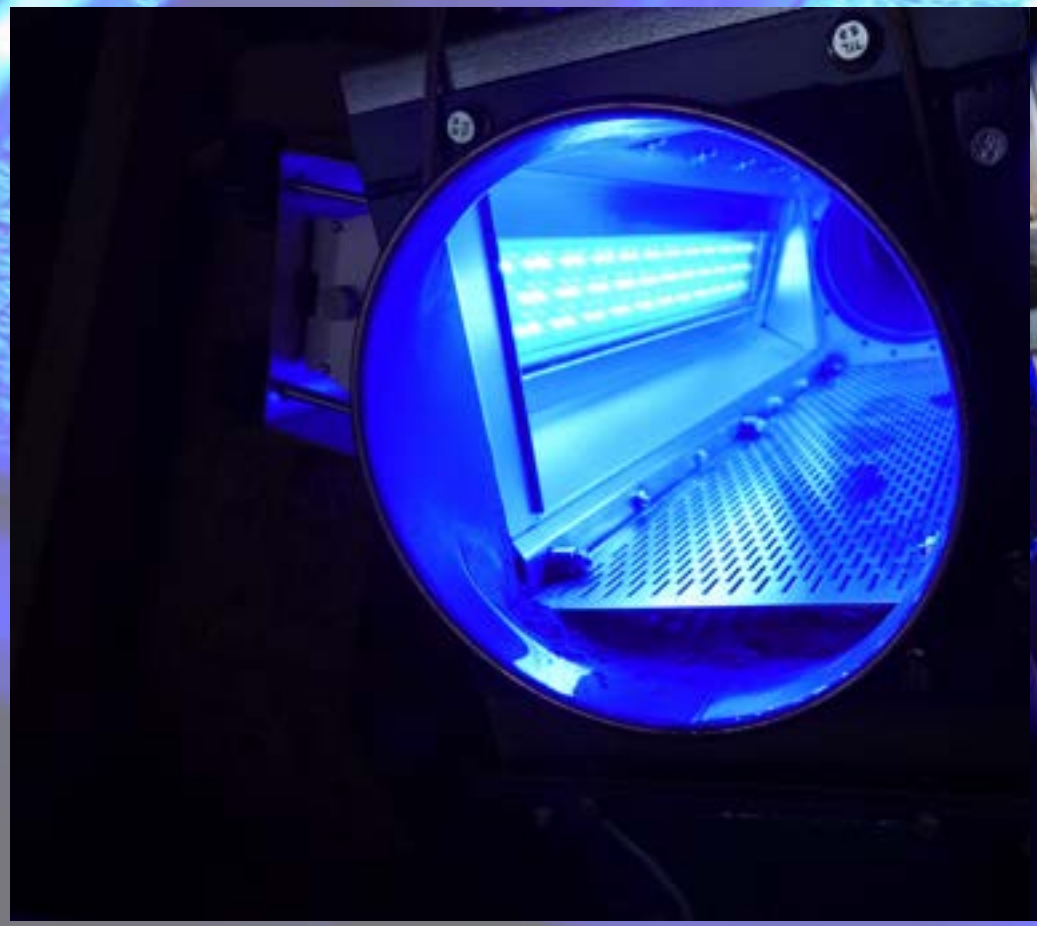


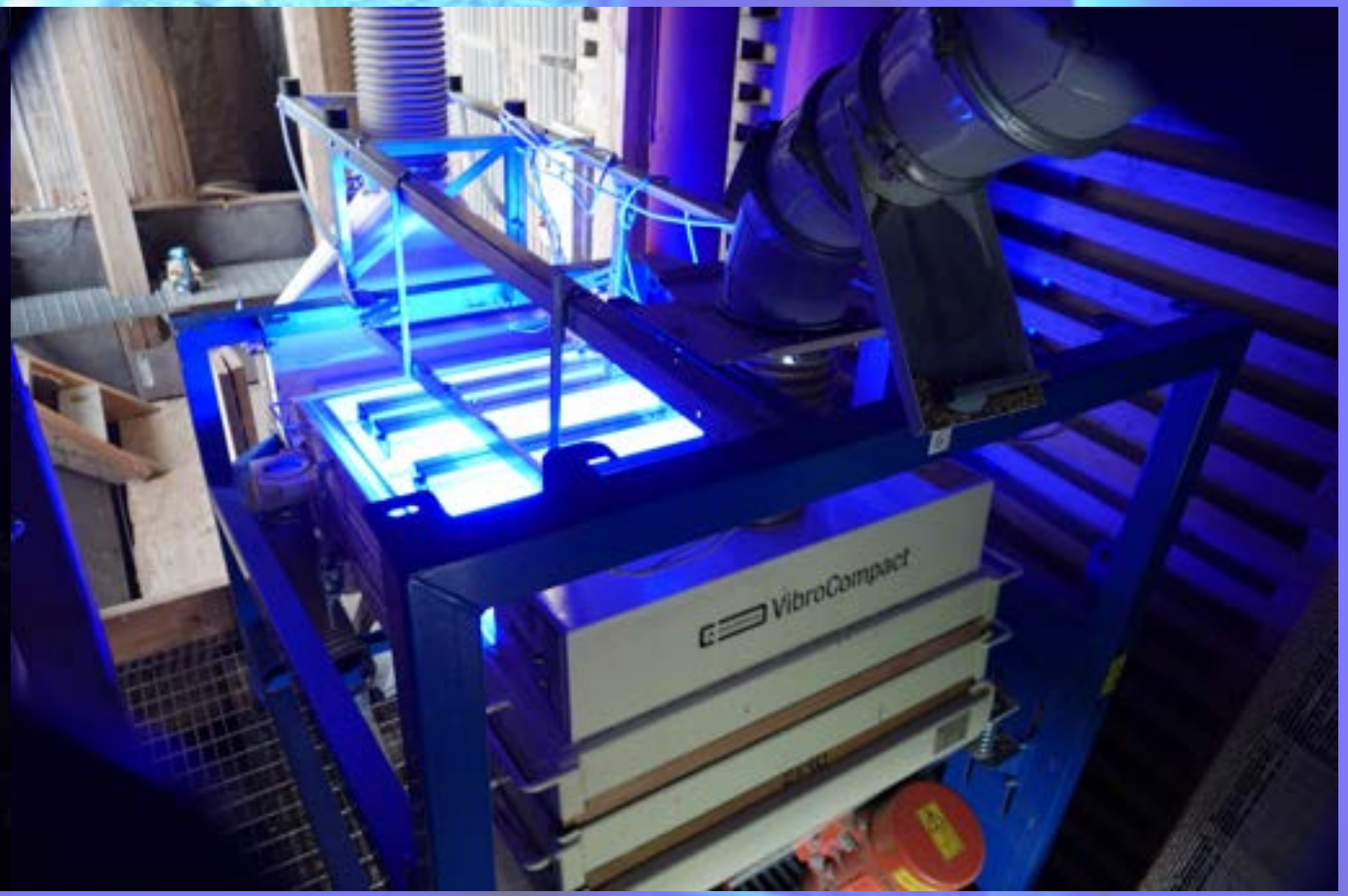
- Sini-valo on ’turvallisempaa’ ja sopii kylvösiemenen käsittelyyn
- Ei täyttä varmuutta, vähentääkö mykotoksiinien määrää

- UV-valo on ’tehokkaampaa’ ja tutkitusti toimii desinfioinnissa
- Alustavat kokeet: Teho mykotoksiineihin kuitenkin heikompi kuin sinivalolla

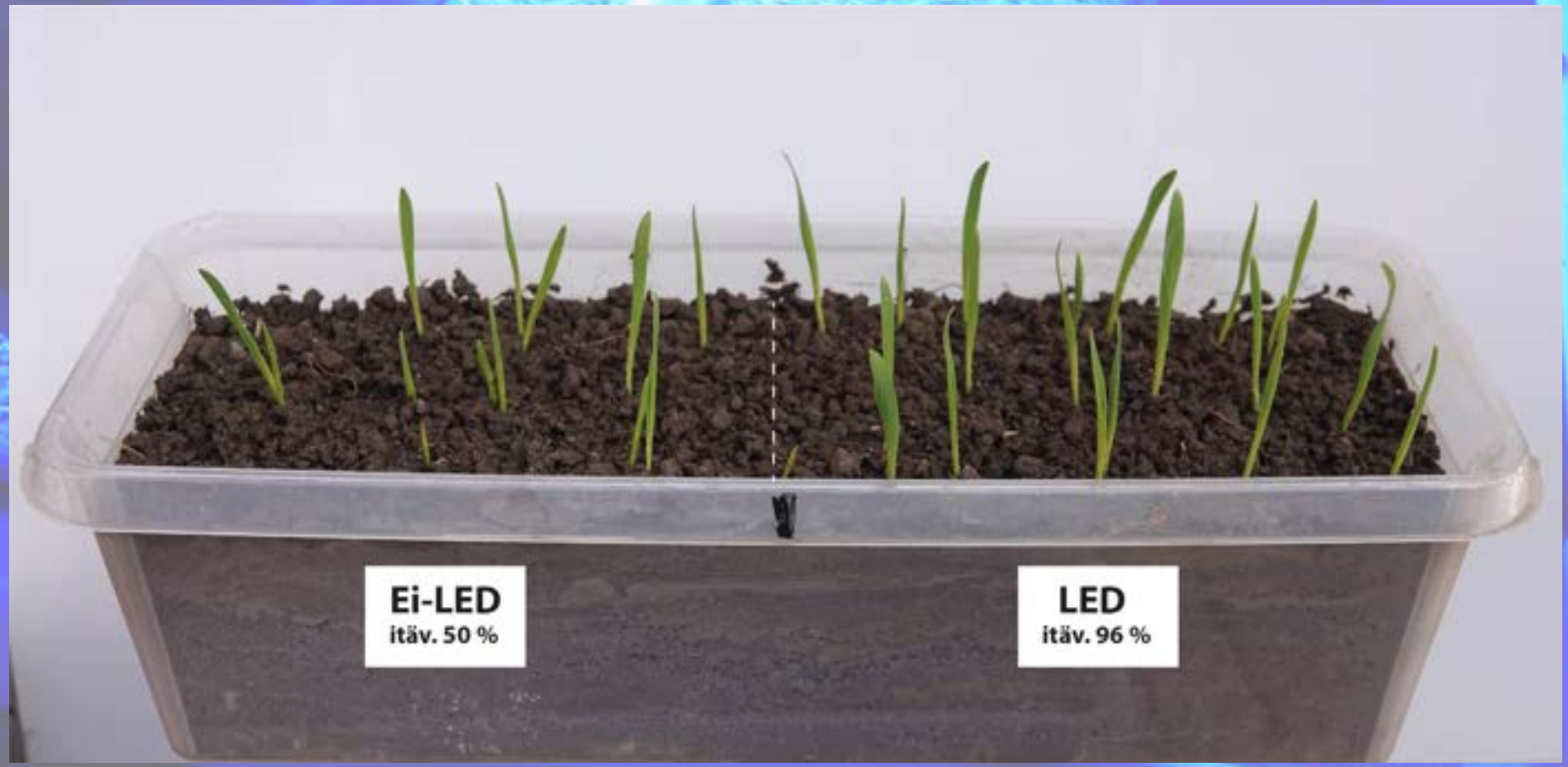
Huom! Valoteho ja valotusaika?

- Tähän saakka saadut kokemukset: Valokäsittely on yhdistetty lajitteluun/kierrätykseen/pölynpoistoon, joten tulosten palastelu yksittäisten toimenpiteiden osalta on haasteellista
- Lajittelussa alikokoisten (< n 2 mm) jyvien poisto on ollut tehokkainta, saastuneissa erissä niiden tyypillinen Don-mykotoksiinien taso on ollut 5000 - 7000 µgr/kg
- Varastoinnin aikana noussutta mykotoksiinitasoa on sinivalolla yksin vaikeaa saada laskemaan, ennakoivat toimenpiteet ovat tehokkaimpia





- Sinivalolla on joka tapauksessa saatu todistetusti tehoa elävien fusarium-sienten aiheuttamaan siementen elinvoiman laskuun!
- Oleellista olisi jatkossa tutkia, miten desinfioiva siemenkäsittely voitaisiin yhdistää muihin siemenen itävyyttä ja elinvoimaa vahvistaviin toimenpiteisiin



- Kauran siemenen kerrosrakenteen erityispiirteet
- Testauksen problematiikka
- Jyvän kuorinnan mahdollisuudet

Tutkittavaa – kylvötiheys – kumppanikasvit ym

Harva kasvusto, mikroilmasto, isompi jyväkoko?

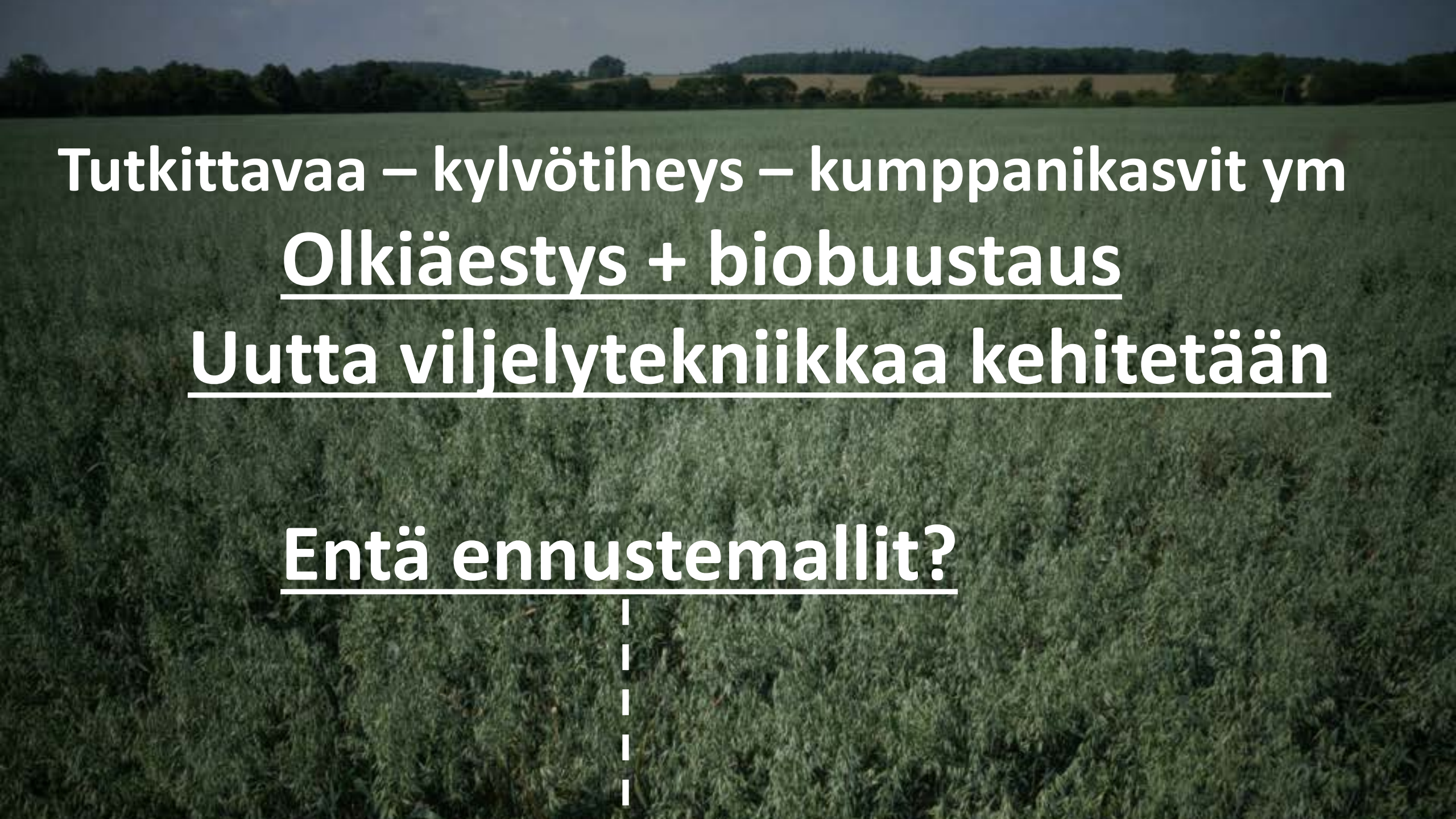
Tiheä kasvusto, mikroilmasto?

Lykkan-Pilotti: Porrastaen kylvetty syysrypsi kauran kumppanikasvina

- Oikeiden kumppanikasvien valinta
- Kylvötekniset kysymykset

Tutkittavaa – kylvötiheys – kumppanikasvit ym

Kasvuston mikroilmaston mittaus


Tutkittavaa – kylvötiheys – kumppanikasvit ym
Olkiäestys + biobuustaus
Uutta viljelytekniikkaa kehitetään
Entä ennustemallit?

Entä ennustemallit?

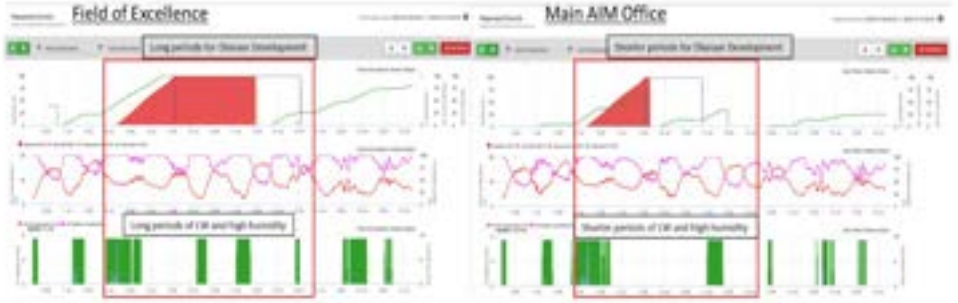
Field Trial at EMILI

The Innovation Farms team tested the subscription-based Metos Canada's Fusarium disease risk model, which was generated using data from a field-specific weather station in wheat. These IoT monitoring devices and sensors helped them to determine exactly what the field-specific conditions were, which in turn reduced trips to the field and helped them make timely management decisions. This model is based on peer-reviewed research and looks for certain periods of temperature, relative humidity, and leaf wetness to assess FHB risk.

Figure 4: METOS® weather station and crop camera solutions at EMILI FHB model trial

What was Learned this Year

The collection of field-level weather data is critical. It is very important to have localized weather data for disease model applications. Parameters used in the disease model can vary over short distances – especially precipitation and leaf wetness. Previous studies have shown that weather data that is 10 km away is not valid for field-level disease prediction.



Tutkittavaa – mikrobit ja niiden lokalisaatio

Lokaalimikrobeja

Biologisia ’buustereita’ tulossa

Torjunta-aineiden, lannoitteiden ja biologisten valmisteiden lupamenettelyt

- Miten saisimme tähän joustavuutta ja nopeutta?
- Koetoimintakäytön joustava mahdollistaminen

Torjunta-aineiden, lannoitteiden ja biologisten valmisteiden lupamenettelyt

- Miten saisimme tähän joustavuutta ja nopeutta?
- Koetoimintakäytön joustava mahdollistaminen

- Maaperän terveyden mittaus?

Lopuksi vielä…

Mykotoksiini-testauksen haasteet

- Näytteenoton edustavuus
- Jauhatuksen hienous
- Näyte-erien välinen kontaminaatio
- Itse testauksen virhemarginaali – plus/miinus X %
- Viljelijän oikeusturva rajatapauksissa
- Raakaerien vs. jalosteiden hylkyrajat, (kuori vs ydin)

- <u>Asetusta ollaan uudistamassa!</u>