



## **Integrated management of foliar diseases in sugar beet**

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**Most important foliar diseases**

	
<b>Cercospora</b> <i>(Cercospora beticola)</i>	<b>Stemphylium</b> <i>(Stemphylium beticola)</i>
<b>Both can cause sugar yield losses up to 40%!<sup>1,2</sup></b>	
<small><sup>1</sup> Hanse, et al., 2015 <sup>2</sup> Vereijssen, 2007</small>	



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## Circumstances are determinative

**Mediterranean summer:**  
less rain and higher  
temperatures than average



**cercospora**

**typical Dutch summer:**  
regular rainfall and  
average temperatures



**stemphylium**



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## Often we end up with a mixture




**We need to manage both!**



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



## Available management options

- crop scouting
- damage threshold all foliar fungi apply fungicides when
  - first visible signs of infection i.e. first spots
  - repeat when spots spread
  - another foliar fungus appears
- growers in a region receive via SMS an attention to inspect fields when on 2 fields foliar fungi are verified




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## Available management options

- Fungicides with different mode of action
  - strobilurins  *Stemphylium beticola*: no efficacy of azoxystrobin, good efficacy of pyraclostrobin<sup>1</sup>
  -  *Cercospora beticola* >75% of isolates strobilurin resistant (G143A)<sup>2</sup>
  - Triazoles  *Stemphylium beticola*: no efficacy of epoxiconazole, good efficacy of difenoconazole + fenpropidin<sup>1</sup>
  -  *Cercospora beticola* shifting in DMI-susceptibility<sup>2</sup>

Essential to know which fungal pathogen is present in the field and which one has the potential to cause an epidemic!



<sup>1</sup> Hanse, et al., 2015  
<sup>2</sup> Hanse, 2019

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## Sensors to assist in management

### assist growers in better timing and effective fungicide applications



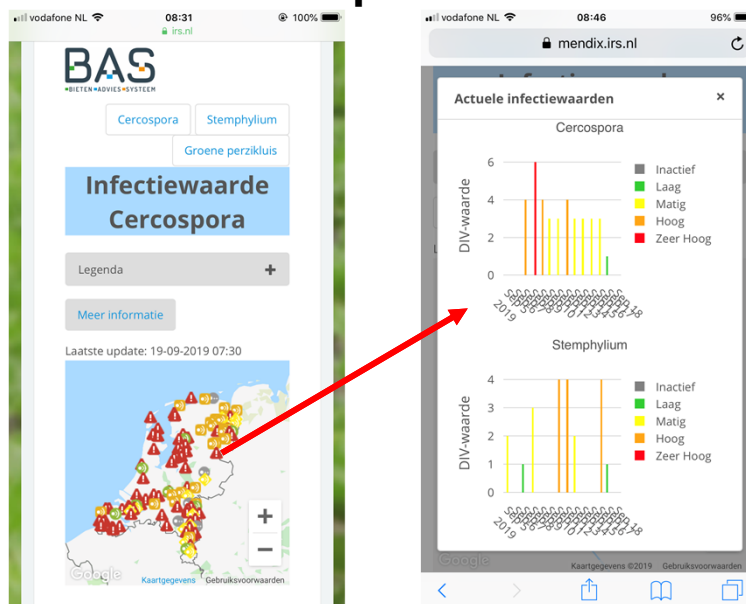
- RH and temperature each 15 minutes sent via LoRa network to server
- using infection models to calculate DIV for *Cercospora beticola*<sup>1</sup> and *Stemphylium beticola*<sup>2</sup>
- Validation on 6 IRS trial fields and 100 commercial fields in 2018 and 2019

<sup>1</sup> Shane & Teng, 1983; Vereijssen et al, 2007  
<sup>2</sup> Hanse, 2019

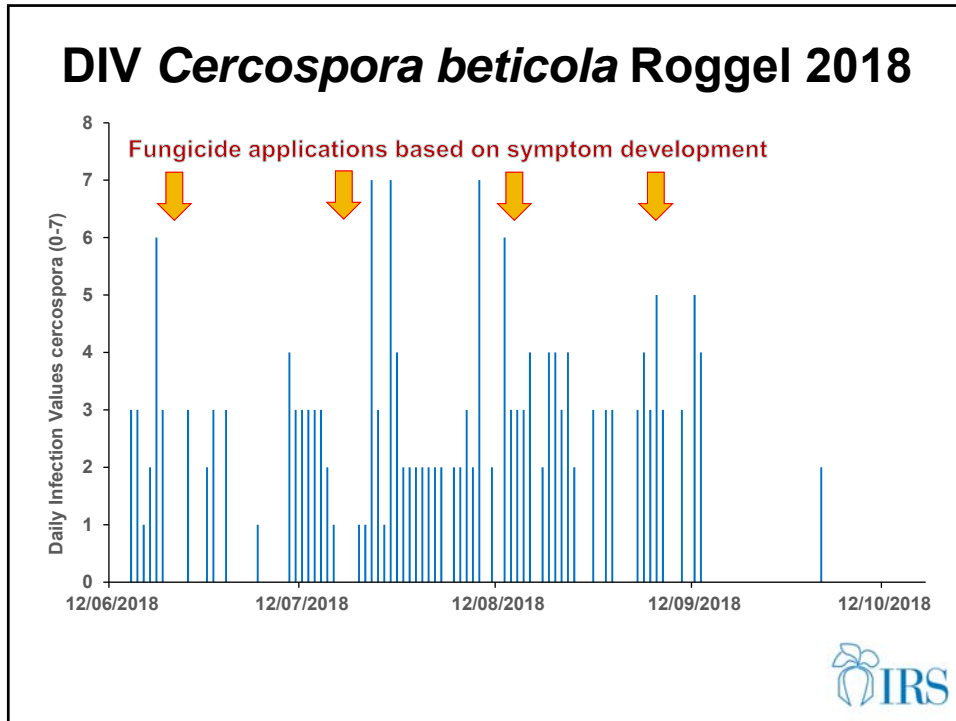


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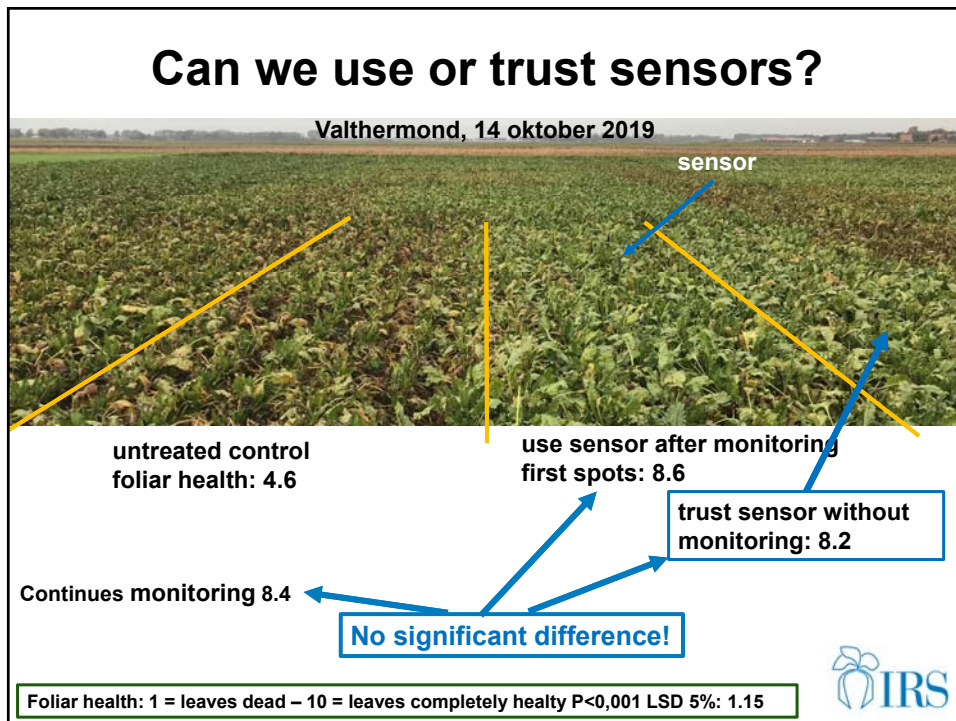
## Output sensors



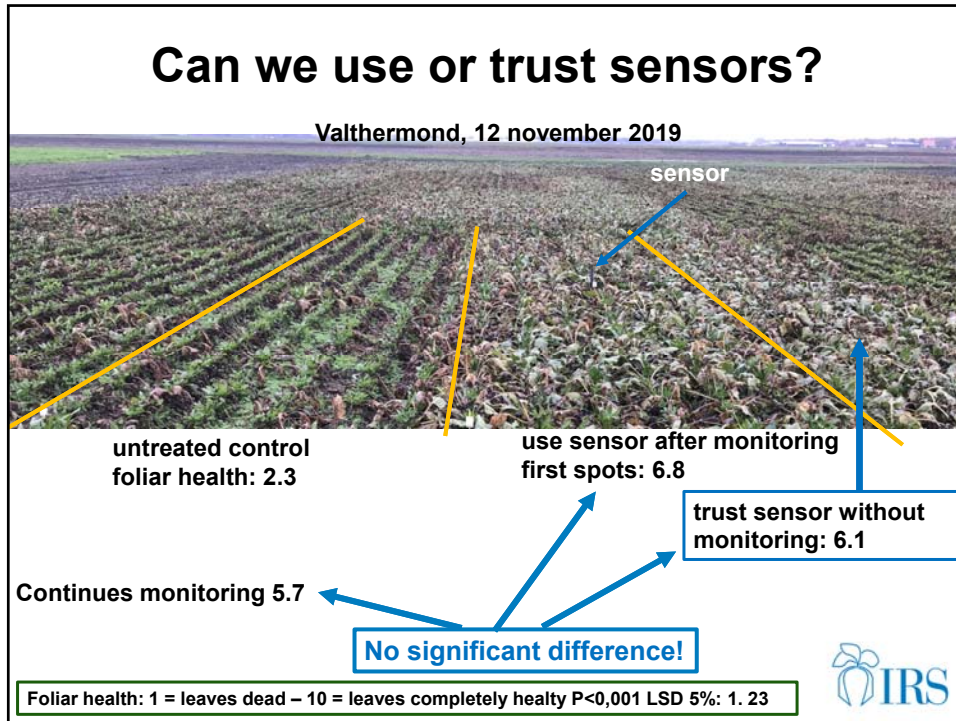
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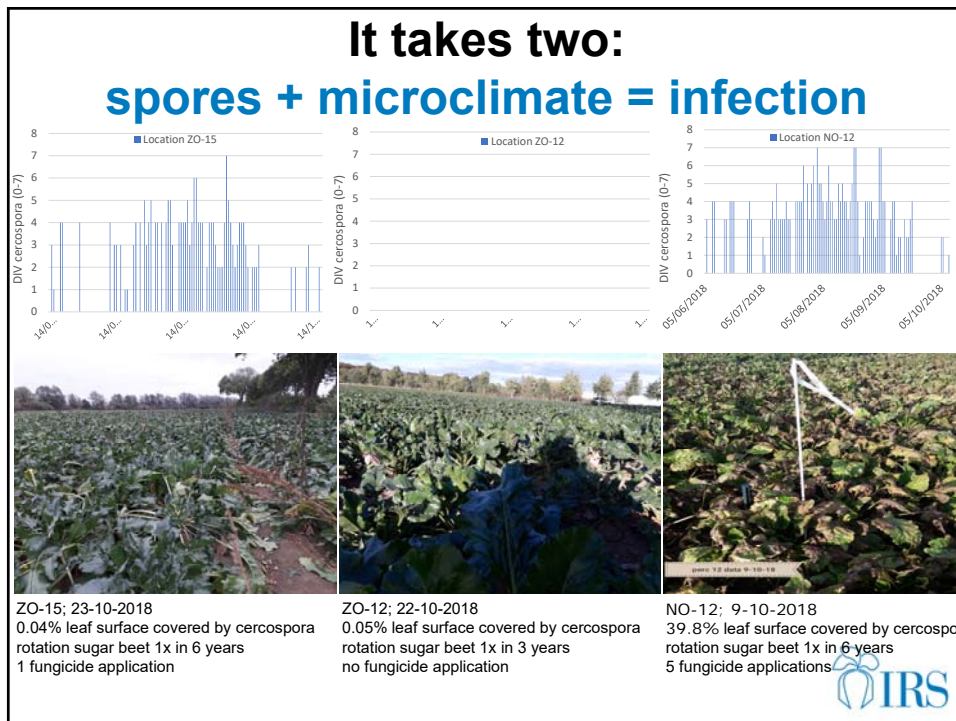
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## New developments

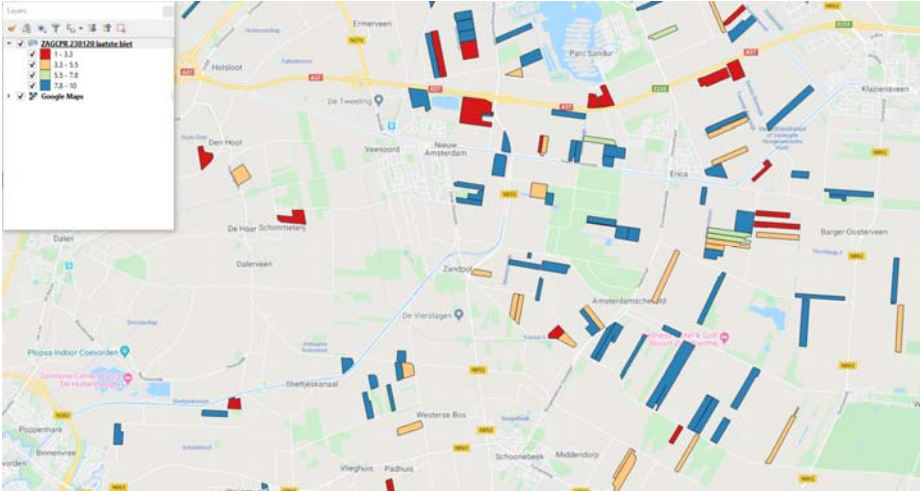
- can we combine field data with sensordata to improve foliar health?
- **risky fields:**
  - close crop rotation of hosts ( $1:\leq 4$ )
  - neighbouring sugar beet field last year
  - sugar beet clamps
- **available:**
  - open data on field and its history
  - gps locations of sugar beet clamps




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## BAS - Beet Advisory System (current development)

■ BIETEN ■ ADVIES ■ SYSTEEM

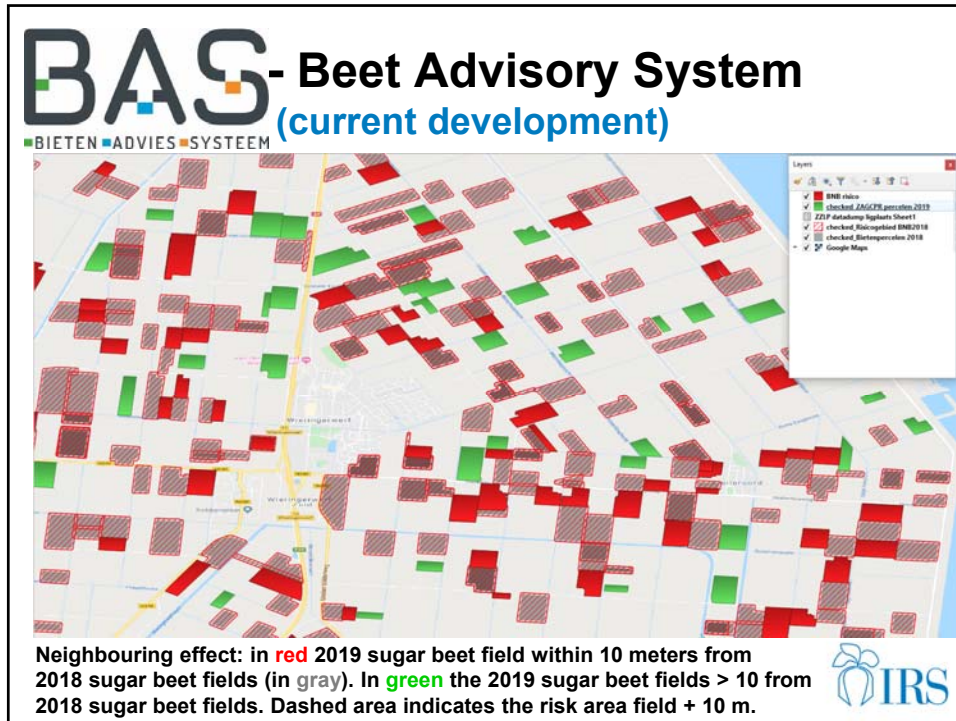


**History of sugar beet growing on fields**

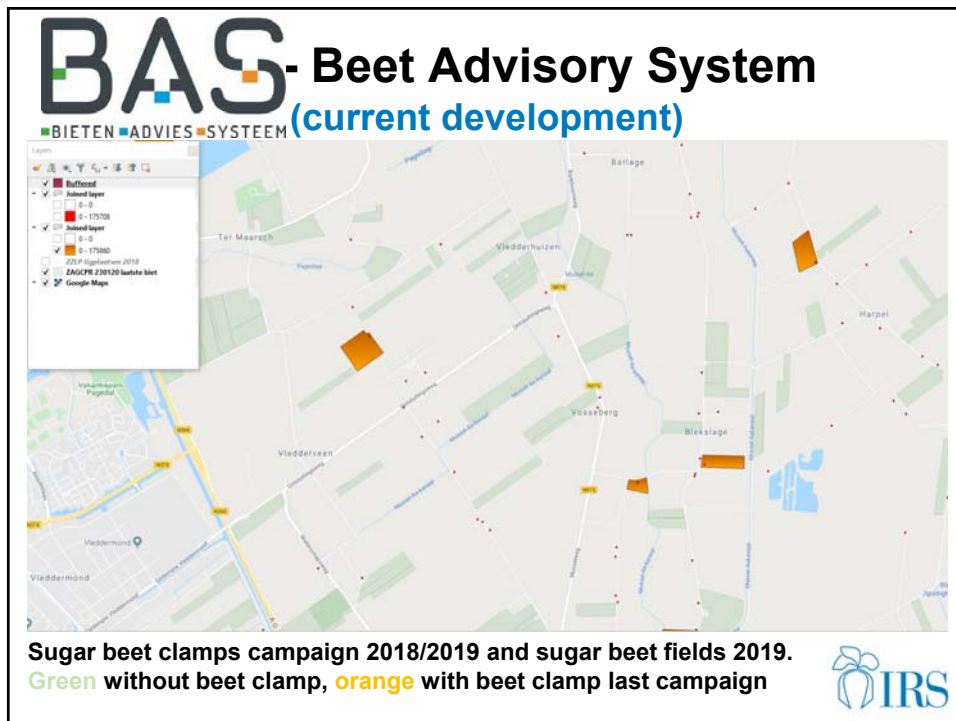


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## Beet Advisory System

(current development)

- **assign risk score to fields**
- **combine with Daily Infection Values**
  - high risk fields early warning for monitoring
  - put forward fungus most likely to cause epidemics (influences fungicide choice!)
  - follow up for fungicide applications
- **variety advice on susceptibility for foliar diseases**



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**Sensor data and open field data are great opportunities for the management of foliar diseases!**



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## References

- *Hanse, B., Raaijmakers, E. E. M., Schoone, A. H. L. and Van Oorschot, P. M. S., 2015, Stemphylium sp., the cause of yellow leaf spot disease in sugar beet (Beta vulgaris L.) in the Netherlands. European Journal of Plant Pathology 142: 319-330. DOI: 10.1007/s10658-015-0617-8.*
- *Hanse, B., 2019, Cercosporabeheersing in suikerbieten. Resultaten proefveldonderzoek en resistentieonderzoek isolaten 2018. IRS-Publicatie 19P01. IRS Dinteloord, 31p.*
- *Shane, W. W. and Teng, P. S., 1983, Cercospora beticola infection prediction model. Sugarbeet Research and Extension Reports 23: 174-179*
- *Vereijssen, J., Schneider, J. H. M. and Jeger, M. J., 2007, Supervised control of Cercospora leaf spot in sugar beet. Crop Protection, 26(1), 19-28 doi:<http://dx.doi.org/10.1016/j.cropro.2006.03.012>.*

