

Positive side effects of Cantus® Gold at flowering against *Verticillium longisporum* in Oilseed Rape

We ♥ OSR

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Biology and economic importance of *V. longisporum*

- Cruciferae specific soilborne disease
- Spread by microsclerotia on hostplant debris in the soil
- Development in 3 phases
 - infection of roots
 - development in the cruciferous host plant (e.g. OSR)
 - visual damage on the cruciferous host plant (e.g. OSR)
- Yield loss in oilseed rape up to 1,5 ton per ha
- Spread throughout Germany and increasing

PROFILE

	Phase 1 Infection of the roots	Phase 2 Development in the Cruciferae host plant	Phase 3 Visual damage symptoms
When does it happen?	Emergence and juvenile development (autumn)	Beginning/mid May	Ripening (BBCH 80–85)
Where does it happen?	Root and shoot	Vascular system	Root, leaf, stem
What favours the phase?	Soil temperature	Decreasing nutrient content in xylem sap	Decreasing nutrient content in xylem sap in ripening stage
What factors intensify these phases?	<ul style="list-style-type: none"> ■ Soil temperature > 12 °C in summer/autumn ■ Phytopathogenic nematodes ■ Phoma infestation, wind, waterlogging 	<ul style="list-style-type: none"> ■ Stress situations (drought stress, heat stress, nutrient stress) 	<ul style="list-style-type: none"> ■ Premature ripening
External symptoms	None	None	One-sided leaf and stem necrosis

Parameters stimulating pathogen infection

Parameters	Degree of stimulation
More oilseed rape in crop rotation	++
Longer growing seasons of oilseed rape	++
Brassica catch crops (mustard, oilseed radish, etc.)	++
Brassica weeds and volunteer oilseed rape from previous crops	++
Reduced tillage	+
Application of nitrogen fertilisers	+

+ medium effect ++ strong effect

How can *Verticillium* be controlled?

In the long term, only an **integrated concept comprising a range of sustainable measures** can be effective against *Verticillium*.

There are no individual potent measures, except for stopping cultivation for at least eight-years.

Preventive measures

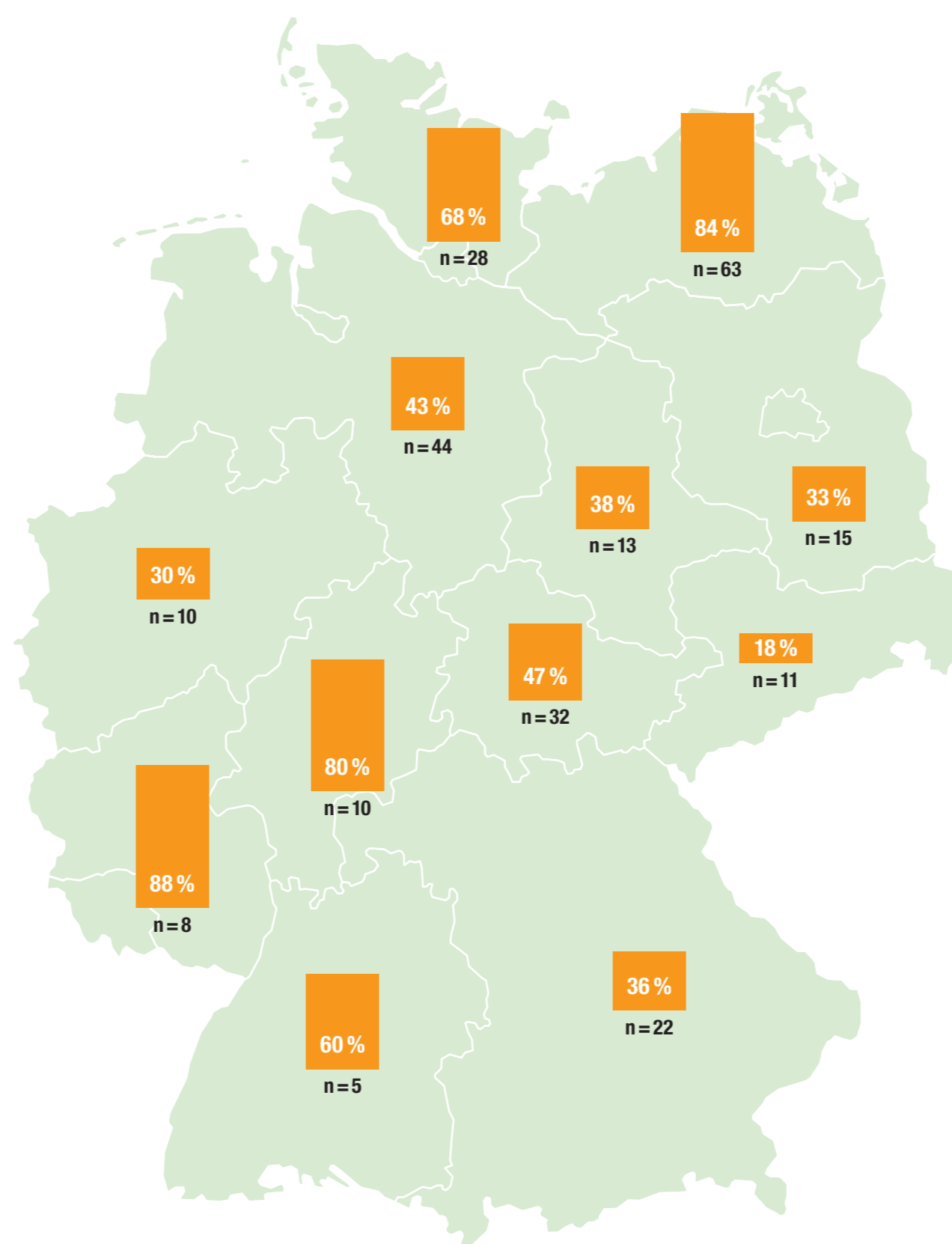
- Wider OSR crop-rotation to lower soil-borne infection potential
- Very early, repeated control of volunteer OSR until sowing of wheat
- No Cruciferae in intermediate crops
- Effective early control of Cruciferae in other crops in rotation

Inhibition of the fungus in the OSR plant

- **Choice of a variety more tolerant to *Verticillium***, e.g. new BASF OSR variety InVigor® InV1035
 - Reduction of infection frequency until harvesting by 5–10 %
- **Integrated pest management** in autumn and spring against cabbage stem flea beetles and stem pests to promote plant health.
 - With the hope for suitable insecticides.
- **Apply Calcium cyanamide before sowing OSR**
- **Intensive application of fungicides in OSR**

Occurrence of *Verticillium* in Germany

(Period 2000–2003*; visual assessment of OSR stubble)



*2000–2001 Locations of variety trials
2002–2003 Locations with suspected infection

(Dr P. Steinbach, Landespflanzenenschutzamt Mecklenburg-Vorpommern – Department of Plant Protection in Mecklenburg-West Pomerania)

The fungal pathogen *V. longisporum* is host specific to members of the family *brassicaceae*. Infestation and density of the soil-borne inoculum are crucially influenced by the concentration of brassica host plants in the crop rotation scheme.

Symptoms and damage effects of *Verticillium*



One-sided leaf necrosis – stems still appear outwardly healthy

Typical *Verticillium* stem necrosis around two to three weeks before harvesting



Typical stem and root symptoms: desiccated, grooved thin stems, detachment of root epidermis, plants can easily be pulled out of the soil

TAKE HOME MESSAGE

- *Verticillium* is increasing in Germany and can cause severe yield loss in OSR. The spread of *Verticillium* negatively impacts future successful growing of OSR in Germany.
- Reducing the spread/yield impact of *Verticillium* can only be made by adopting an integrated concept based on preventing and in-crop measures
- In-crop measures include the usage of tolerant varieties and the intensive use of fungicides. These measures target to retard the development of the *Verticillium* in the plant.
- Long year trial work by BASF demonstrated a significant reduction of *Verticillium* in infected plants and prevented a premature ripening and yield loss by using its PGR fungicides Carax® in Autumn and spring and especially with the subsequent treatment of Cantus® Gold at flowering.
- Cantus® Gold, applied at flowering, resulted in a ca. 25 % less *Verticillium*-infected OSR plants and premature ripening. The yield increase was in average 260 kg and in some cases up to 640 kg per ha.
- Cantus® Gold is registered in the flowering against *Sclerotinia*, *Alternaria* and *Phoma*. Side along to the reliable control of these target diseases, Cantus® Gold leads to an increased vitality and a more stress tolerant OSR-Crop.

Benefits of Cantus® Gold at flowering when *Verticillium* occurs

Results according to trial locations

% additional yield after increasing % of green stems (stubble assessment) in comparison with OSR not treated during flowering (BASF trials in southern and central Germany in the period 2015 to 2018; *Sclerotinia* infection < 2%)

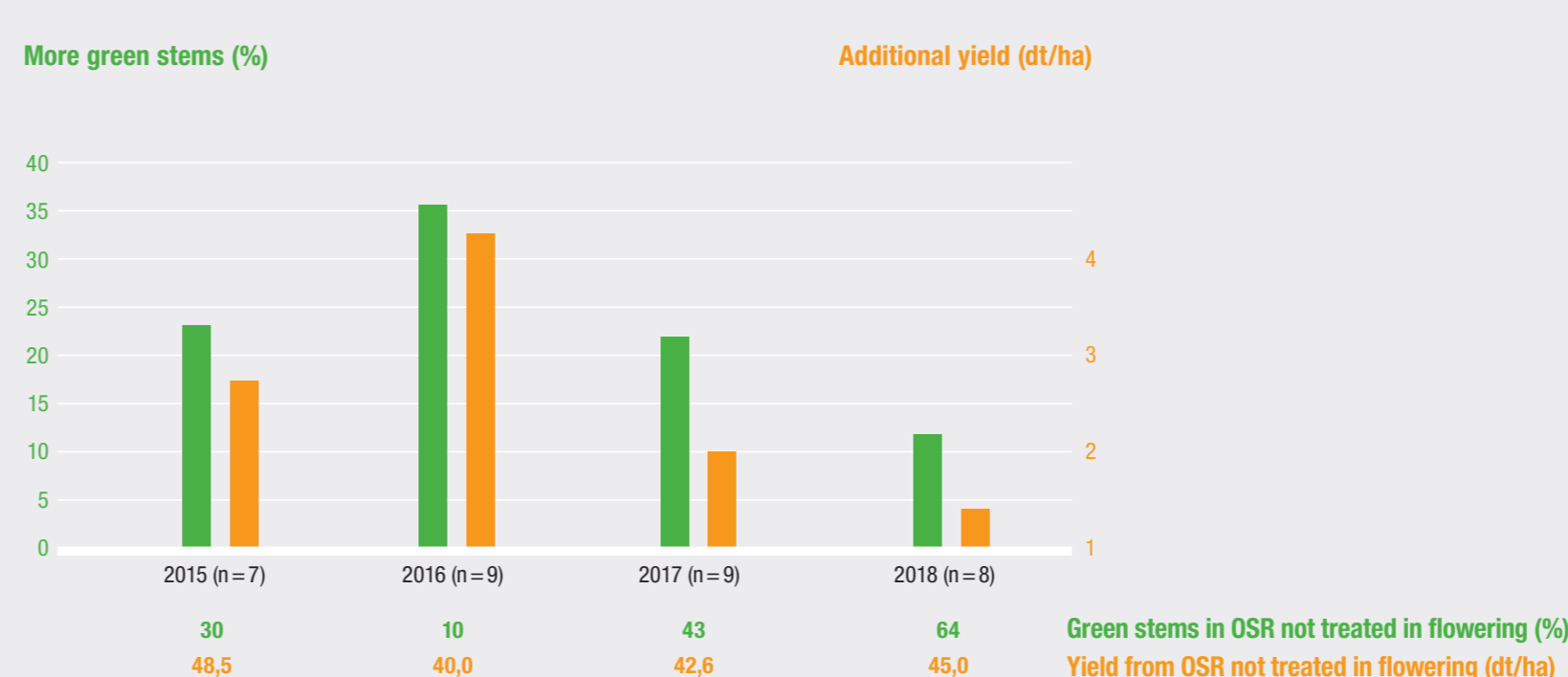


OSR treated with Cantus® Gold at flowering gave in the timeframe 2015 till 2018 in trials without winter kill and *Sclerotinia*.

- Reduced premature ripening (observed as more green plants in the OSR-stubble)
- Thereof resulting a higher yield, in average +260 kg OSR-kernel per ha
- Higher reductions in premature ripening lead to higher yield benefit
- Reduced premature ripening and increased yield in every year

Results by year

% increase in green stems (stubble assessment) and additional yield in comparison with OSR not treated in flowering (BASF trials in southern and central Germany in the period 2015 to 2018; *Sclerotinia* infection < 2%)



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