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About dropleg

DROPLEG NOZZLES

Field trials for bee-friendly spraying during flowering

Prof. Dr. Verena Haberlah-Korr · Soest

Sclerotinia stem rot of oilseed rape (Sclerotinia sclerotiorum) can cause heavy yield losses in affected years. Farmers therefore often turn to fungicides to combat this disease when the oilseed rape is in full flower, but this can create problems for beekeepers.

Overhead spraying means that the flowers also come into contact with the pesticides. This can cause problems for bees, and people too: The German Bee Monitoring Project found residues of many of the active ingredients used in the pesticides in the pollen which the bees feed to their young. Residues are also found in honey.

This is where ‘dropleg’ technology comes into play: approx. 90 cm long nozzle wands (droplegs) guide the nozzles through the canopy at a depth of approx. 40 cm, rather than over it. The main difference between this method of application and the conventional approach is that the flowers are left virtually untouched, whilst the stems – the very area that needs protecting against stem rot – are sprayed much more effectively (Fig. 2). Various research bodies unanimously agree that this technique does not damage the oilseed rape crop because, although fixed in the direction of travel, the nozzles can swing freely across the rows. At the same time, this application method substantially reduces unwanted drift. Furthermore, the latest research indicates that the fungicide has virtually no effect on the added benefit of spraying during flowering – improved pod shatter-resistance – which is largely dependent on variety.

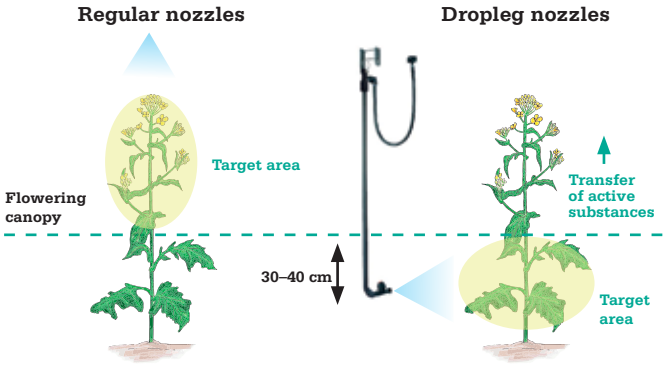
For farmers, the key question must surely be: Is this new technology just as effective in controlling sclerotinia as tried and tested overhead spraying? To answer this question Clemens Kemmer of the South Westphalia University of Applied Sciences in collaboration with the DSV and ADAMA Deutschland GmbH conducted two field trials in the Paderborn district in spring 2015 as part of his bachelor’s thesis. The test was conducted in three versions on 108 m² plots, each test version was repeated three times:

1. no treatment control test
2. conventional flower spraying (standard) (3 bar, 4 km/h) with 1 l/ha Custodia (Azoxystrobin 120 g/l + Tebuconazol 200 g/l)
3. Dropleg system (2 bar, 6.9 km/h) with 1 l/ha Custodia

The chemicals were applied at a rate of 300 l water/ha shortly before full flowering at BBCH 63 (Wewelsburg site) and at full flowering at BBCH 65 (Salzkotten site). To allow for the fact that the disease does not occur naturally each year, grains of barley infected with sclerotinia were scattered through the trial plots by hand beforehand. At the Salzkotten site this resulted in a very successful infection rate of max. 33% (Fig. 3), whereas at the Wewelsburg site the rate of infection after inoculation was only max. 5% due to the dry weather. However, the incidence of sclerotinia after treatment (standard and dropleg) was lower than in the no treatment control test at both sites, whilst there was virtually no difference between the two treatment variants. The stem rot had no significant impact on yield due to the hot, dry weather at the time of ripening. None of the three variants resulted in statistically robust yield increa-

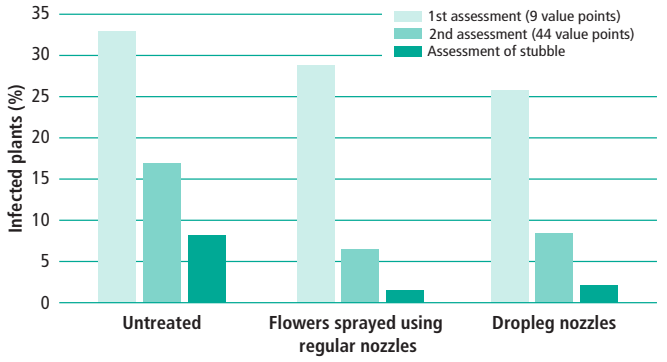
Fig. 1: Inoculation of oilseed rape with infected barley grains

Fig. 2: Comparing the two spraying methods by target area



Source: Haberlah-Korr 2016

Fig. 3: Infestation rate of sclerotinia after artificial infection*



Source: Haberlah-Korr 2016; *Salzkotten 2015

ses. In conclusion, these results show that the bee-friendly dropleg technique is comparable with conventional overhead spraying in terms of its ability to control the disease. Further studies are planned in 2016.

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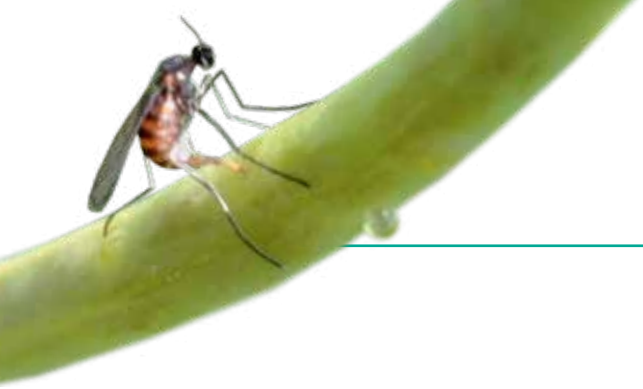
Suitability of dropleg nozzles for controlling sclerotinia

We know from the results of the German Bee Monitoring Project that pesticide residues from spraying oilseed rape at flowering are routinely found in bee pollen. Although the levels of residues found are not harmful to health, they are nevertheless undesirable. Studies conducted by the German State Institute of Apiculture (University of Hohenheim) show that pesticide inputs in beehives can be prevented or substantially reduced by using under-canopy nozzles (dropleg nozzles) for spraying during flowering.

The Plant Protection Service of the federal state of Hesse also investigated this issue in large-scale on-farm experiments by conducting trials in 2014 and 2015 in northern, central and southern Hesse using the test versions ‘no treatment control pass’, ‘treatment using a standard nozzle’ and ‘treatment using a dropleg nozzle’. In the treatment test versions, a mix comprising a fungicide (Boscalid in 2014 and Prothioconazol/Fluopyram in 2015) combined with an insecticide (Tau-fluvalinate) was applied to control sclerotinia at BBCH 63–65 (the flowering stage). When pod damage was assessed approx. 30 days after spraying, the incidence of sclerotinia was determined at BBCH 75–80, and yields were measured. In 2014 the dropleg nozzles were able to control sclerotinia just as well as the standard nozzles and in some cases even marginally better than the standard nozzles in a year when the no treatment control crop was heavily infected by the fungus. The treatment to control stem rot resulted in statistically robust yield increases compared with the untreated control. There were no significant differences between the two different application methods, dropleg and standard nozzle.

The results for 2015 showed no statistically reliable differences between the treatment variants. Were this technology to be fully developed, it could make a significant contribution to resolving the conflict between farmers and beekeepers. If there was found to be a reduction in the maximum residue levels in honey, this method could enable the continued use of pesticides for spraying during flowering since the dropleg system prevents pesticide inputs in honey. This would align the interests of farmers, beekeepers and consumers alike.



Thema Dropleg

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DROPLEG SYSTEM: INITIAL EXPERIENCES IN PEST CONTROL

Dr. Udo Heimbach and Meike Brandes · Braunschweig

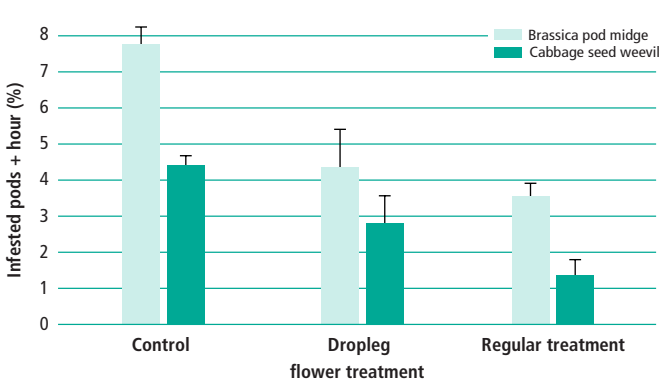
Cabbage seed weevil

In Germany, oilseed rape is the most widely grown flowering crop to be pollinated by bees. Oilseed rape flowers play a leading role in the growth of bee colonies after winter and are one of the beekeeper's main early sources of honey. To ensure that rape yields remain at a continuously high level, intensive crop management is required and this also includes the use of chemicals at the time of flowering to control fungal diseases and pests.

The practice of spraying oilseed rape at flowering creates potential controversy between farmers and beekeepers, since not only are the bees directly exposed to the pesticides and their residues on flowers and in pollen and nectar, but residues of active ingredients from the pesticides also crop up in bee products such as honey. Pesticide applications which avoid areas with open flowers, e.g. by using the dropleg system, would reduce the risk to pollinators and beekeeping by reducing the exposure of open flowers and therefore help to resolve conflicts between apiculture and agriculture. With

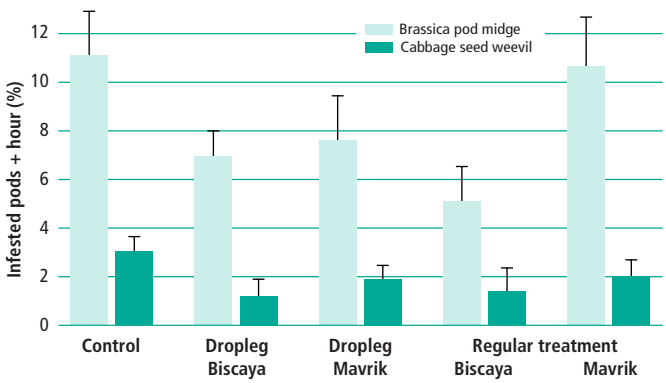
Abb.: Control of brassica pod midge and cabbage seed weevil

2014



Source: Pod damage (averaged and hourly results) by brassica pod midge and cabbage seed weevil at Wendhausen site 2014 in BBCH 80 after using regular and dropleg nozzles, spraying Biscaya in BBCH 65 (data from thesis of J P Gregor)

2015



Source: Pod damage (averaged and hourly results) by brassica pod midge and cabbage seed weevil at Wendhausen site 2015 in BBCH 87 using regular and dropleg nozzles, spraying Biscaya and Mavrik in BBCH 65 (data from thesis by J Gödeke)

the dropleg system the spray is applied under the canopy below the open flowers. This largely protects the flowering canopy from exposure to active substances. As yet only a limited number of trial results are available which compare the effects of conventional spraying and the dropleg system.

The effectiveness of the dropleg system in controlling pests in winter oilseed rape was tested in Braunschweig in 2014 and 2015 in field trials involving four repetitions. All applications in each repetition took place on the same day during flowering (BBCH 65) and both spraying methods were applied at a rate of 300 l water/ha and at 7 km/h. In both trial years the use of the dropleg system with Biscaya and Mavrik (2015 only) controlled oilseed rape pests, although to a slightly lesser degree than the conventional method. This was demonstrated with the oilseed rape pollen

The dropleg spraying system allows pesticides to be applied beneath the flowering canopy.

beetle, although it ceases to cause damage at the BBCH 65 stage, as well as with the brassica pod midge and the cabbage seed weevil (Fig.) Biscaya in particular was found to have a slightly weaker effect with the dropleg system. Mavrik was significantly less effective than Biscaya in controlling pod pests. This indicates that the open flowers themselves do not necessarily have to be treated for the pesticides to be effective. The bugs also reside deep within the crop, where they are then exposed to the chemicals.

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