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### Occurrence of fungal diseases on spring rape in Poland

Sadowski, C., Dakowska, S., Łukanowski, A. & Jêdryczka, M. .... 1

**Abstract** For many years spring oilseed rape (*Brassica napus* subsp. *oleifera* forma *annua*) was cultivated in Poland in very small areas and from an economical point of view it was not regarded as an important crop. The dominating crop was the winter type of oilseed rape (*Brassica napus* subsp. *oleifera* forma *biennis*), which was the main source of domestic oil production for consumption and for technical purposes. However, for the last few years spring rape has become more important, especially in years with severe and long winters. Due to a low interest of farmers in growing spring rape in Poland, there have been no intensive breeding programmes or research on this crop. At present there are seven officially registered varieties, one of which is of Polish origin.

So far, there has been very little work on occurrence of diseases on spring cultivars in Poland. Since 1997 we have observed disease symptoms in several regions of spring rapeseed cultivation. The main aim was to evaluate the spectrum, incidence and severity of diseases on production fields and to compare disease levels on some officially registered varieties.

The dominating disease was dark leaf or pod spot caused by *Alternaria* spp. The disease was observed every year and in all regions. The symptoms were present on stems, leaves and pods. The seeds collected from plants were highly contaminated with pathogenic and saprophytic species of fungi from this genus. Another pathogen observed every year was *Peronospora parasitica*, the cause of downy mildew. It was usually present on leaves for the whole vegetative period, but its effect was not as damaging as that caused by dark pod spot. In two years, 1998 and 1999, there was quite a high incidence (DI up to 29,6%) of powdery mildew (*Erysiphe cruciferarum*). The disease symptoms were observed on leaves, main stems and side stems. The disease was not reported in 1997. The pathogens, *Sclerotinia sclerotiorum* (stem rot) and *Botrytis cinerea* (grey mould), were observed in lower or intermediate quantities in some years and/or regions only. *Leptosphaeria maculans*, the cause of stem canker and *Verticillium dahliae*, the cause of wilting and tracheomyces, were noted very sporadically.

In 1999 and 2000 systematic observations were made on the five officially registered cultivars in three different growing regions: north-western, north-eastern and southern parts of Poland. The results varied depending on the year and region. The dominating disease was dark leaf or pod spot, followed by powdery mildew, grey mould and stem rot. The usual high number of pests was greatly reduced by high doses of pesticides, used routinely on experiment plots in contrast to some commercial fields.

**Key words** : spring oilseed rape, diseases. healthiness, Poland

### Spectrum and severity of fungal diseases on spring oilseed rape in Russia

Jedryczka, M., Nikonorenkov, V.A., Levitin, M. Gasich, E., Lewartowska, E. & Portenko L. .... 13

**Abstract** Main oilseed crops in Russia are sunflower and soybean. Although the cultivation area of oilseed rape is low (ca. 300 thous. ha), it is regarded as an increasingly important oil crop with great perspectives. Spring type is predominating over the winter type (from 72 to 97% of area under oilseed rape, depending on the year). There are five main regions of spring rape cultivation: Volga (30%), Central region (15%), West Siberia (15%), East Siberia (6%) and Ural (5%) and the rest of fields are dispersed in other areas.

During the last five years (1996-2000), observations of plant healthiness were done semi-systematically in two regions of the European part of Russia: the North-Western region (near St. Petersburg) and central region (around Lipeck, ca. 600 km south of Moscow). Infected plant organs were collected and causal pathogens were isolated, identified and characterised. In the North-Western region the most damaging fungus was clubroot (*Plasmodiophora brassicae*) and in Central region the most damaging disease was Fusarium wilt (*F. oxysporum*). Several other diseases were also found: grey mould, downy and powdery mildew, Sclerotinia stem rot, Alternaria black spot and root rot complex caused by *Rhizoctonia solani* and *Fusarium* spp. A few diseases commonly observed on spring or winter rape in other regions of Europe, Canada or Australia were not found: light leaf spot, white leaf spot, Verticillium wilt and stem canker.

## Biology of *Leptosphaeria maculans* (stem canker) ascospore release in England and Poland

West, J.S., Jêdryczka, M., Leech, P.K., Dakowska, S., Huang, Y.-J. & Fitt, B.D.L. ....21

**Abstract:** Experiments over three growing seasons in the UK (1997/98-1999/2000) and two seasons in Poland (1998/99-1999/2000) showed that air-borne ascospores of *Leptosphaeria maculans* were mainly present from autumn (September/October) to spring (April/May). Populations of *L. maculans* in the UK and Poland differed from each other; in the UK most isolates belonged to A group (Tox<sup>+</sup>), whereas in Poland most isolates belonged to B group (Tox<sup>0</sup>). In both countries, ascospores were first released in the autumn, after rain and when the mean daily temperature had decreased to below 15°C. In England, phoma leaf spotting appeared 14-25 days after ascospores were first detected in the autumn; in Poland leaf spotting was uncommon. In 1999/2000 in England, the timing of infection by the two species appeared to differ; leaf lesions in the autumn were predominantly attributed to the A/Tox<sup>+</sup> species, while the proportion of leaf spots attributed to the B/Tox<sup>0</sup> species increased in mid-winter. In England, very low numbers of ascospores were detected on wet days in August and September (<4 spores per m<sup>3</sup> per day). The first spore releases attributed to stubble of the current year's harvest were detected from mid-September to early October, with the majority of spores detected in the period between late October and late December. Ascospores continued to be released throughout the winter, depending on rainfall, but with numbers declining to the background level by late spring. In Poland, the beginning of ascospore release in the autumn was in late September (in 1998) and in mid-October (following a particularly hot, dry summer in 1999). Although most spores were released in the autumn in Poland, the incidence of phoma leaf spot was very low. Ascospores were occasionally detected in low numbers in the winter, when temperatures were oscillating around 0°C and when snow cover was absent. Ascospores were again trapped in large numbers in the spring (in April 1999, late March 2000) and even the summer in Poland (in July 2000). In England, there was a diurnal periodicity in spore release in the absence of rain, with many more spores released during the day, when the temperature was higher than at night. In Poland, most ascospores of *L. maculans* were observed late in the morning, when temperatures were rising, but the humidity was still high. In controlled conditions, most spores were released from mature pseudothecia at 15°C, but many were still released at 20°C and at temperatures as low as 5°C.

**Keywords:** *Leptosphaeria maculans*, stem canker, ascospore, epidemiology, disease prediction

## Effects of temperature and incubation time on germination of ascospores of A-group and B-group *Leptosphaeria maculans* *in vitro*

Huang, Y.-J., Fitt, B.D.L., West, J.S., Hall, A., Todd, A., Underwood, C. & Jedryczka, M. ....31

**Abstract** Ascospores of both *L. maculans* and *L. biglobosa* germinated on water agar at temperatures from 5 to 20°C. After 2 h of incubation on water agar, some *L. maculans* ascospores had germinated at 10 to 20°C and some *L. biglobosa* ascospores had germinated at 5 to 20°C. The percentages of both *L. maculans* and *L. biglobosa* ascospores that had germinated after 24 h of incubation increased with increasing temperature from 5 to 20°C. The observed time ( $V_{0.50}$ ) which elapsed from inoculation until 50% of the spores had germinated was shorter for *L. biglobosa* than for *L. maculans* ascospores. Germ tube length increased with increasing temperature for both ascospore groups. Germ tubes from *L. biglobosa* ascospores were longer than germ tubes from *L. maculans* ascospores at all temperatures tested, but the mean diameter of germ tubes from *L. maculans* ascospores (1.8  $\mu$ m) was greater than that of those from *L. biglobosa* ascospores (1.2  $\mu$ m) at 15 and 20°C. The average number of germ tubes produced from *L. maculans* ascospores (3.8) was greater than that from *L. biglobosa* ascospores (3.1) after 24 h of incubation at 20°C. Germ tubes originated predominantly from interstitial cells of *L. maculans* ascospores or terminal cells of *L. biglobosa* ascospores. Hyphae from *L. maculans* ascospores grew tortuously, whilst those from *L. biglobosa* ascospores grew in almost straight lines.

**Key words:** *Leptosphaeria maculans*, *Leptosphaeria biglobosa*, ascospores, germination, water agar

Studies on diseases of false flax (*Camelina sativa* (L.) Crtz.) with special regard to downy mildew (*Peronospora parasitica* (Pers.) Fr.)  
Föller, I., Henneken, M. & Paul, V.H. ....43

**Abstract** In the study presented here, the disease susceptibility of false flax was investigated in field and laboratory trials. In these field investigations more diseases were found on false flax than the older literature suggested. These diseases were downy mildew (*Peronospora parasitica*), grey mould (*Botryotinia fuckeliana*), stem rot (*Sclerotinia sclerotiorum*), white rust (*Albugo candida*), white leaf spot (*Pseudocercospora capsellae*), stem and root rot (*Rhizoctonia solani*), powdery mildew (*Erysiphe spec.*), and bacterial blight (*Pseudomonas syringae* pv. *spec.*). Among the most important diseases found was downy mildew. In further laboratory studies the cultivars/lines showed clear differences in regard to their susceptibility to this disease. In these studies inoculations at three different growth stages were tested. For resistance breeding against downy mildew, the inoculation in the cotyledon stage is the most suitable. Furthermore, an easy and cost efficient storage methods for conidia of downy mildew was developed. Conidia stored on infected leaves at -25 °C survived and were viable for more than 10 months. In an additional test positive effects of the plant activator BION® were noted in regard to the susceptibility of false flax against downy mildew. With application of the plant activator BION® prior to infection, the infection with downy mildew could be severely reduced.

**Keywords** : False flax, *Camelina sativa*, *Peronospora parasitica*, BION®, *Botryotinia fuckeliana*, *Sclerotinia sclerotiorum*, *Albugo candida*, *Pseudocercospora capsellae*, *Rhizoctonia solani*, *Erysiphe spec.*, *Pseudomonas syringae* pv. *spec*

Factors affecting the pathogenicity of *Verticillium dahliae* on spring linseed  
Gkilpathi, D., Fitt, B.D.L., Ward, E. & Dickinson, M. ....53

**Abstract**: Experiments were done to examine the pathogenicity of *V. dahliae* isolates from linseed and other hosts to linseed cultivars. No evidence of host adaptation was found as linseed isolates were not more pathogenic to linseed than isolates from other hosts. The molecular variation of *V. dahliae* isolates from different hosts was tested using RFLP analysis of ribosomal DNA; the isolates could be divided into two groups by this method; isolates from linseed were all in the same group. The effects of air temperature and soil temperature on the progress of the disease caused by *V. dahliae* were tested in controlled environment conditions. An increase in soil temperature from 16°C to 24°C increased the severity of the disease symptoms but the effect of the soil temperature also seemed to be influenced by the pathogenicity of the *V. dahliae* isolate. An increase in air temperature from 16°C to 24°C increased the severity of the disease symptoms for all isolates of *V. dahliae* used. Disease progress in a spring linseed crop was not related to the initial inoculum density or to the previous cropping sequence. At the end of flowering the plants appeared symptomless even though the fungus had already spread within them, whereas symptoms had developed by the time capsules were senescing.

**Key words**: RFLP, air temperature, soil temperature, soil borne

First results on three year field trials on the influence of Metconazol on plant morphology and yield development of oilseed rape (*Brassica napus* L.)  
Dapprich, P., Liu, Y., Henneken, M., Paul, V.H., Buchenauer, H. & Föller, I. ....67

**Abstract**: The triazole fungicide, tebuconazole, has been used in winter oilseed rape for about seven years. This group of triazoles is known not only for its fungicidal but also for its growth regulatory effects. In 1999 a new triazole fungicide with the active ingredient metconazole was registered as a growth regulator with fungicidal effects. This paper compares the growth regulatory characteristics of both triazoles, measuring typical parameters of plant development and yield formation.

In a three year field study, established in 1998 at the experimental farm of the Department of Agriculture in Merklingsen, metconazole was applied at three different concentrations (100 %, 75 % and 50 % of the standard application rate of 1,5 l/ha) at 10 different application times (early autumn, late autumn, early spring, late spring) and application numbers (one / two applications). At the growth stages 1.0, 1.5 (before winter), 1.10 (early spring), 5.0, 6.3, 6.7 (maturity), plant response (plant height, leaf position and colour, diameter of hypocotyl, fresh/dry matter, root length and tendency to lodge) was recorded.

A good correlation was found between product concentration and application time. Applications also had a significant effect on plant height, leaf position and colour and lodging. For example, the

effect of the chemical on lodging was very evident after an unexpected snowfall during flowering in mid-April 1999 (5 cm of snow !).

Best results were seen with the early autumn treatment with an assessment rate of 3.0 – 3.8 versus 6.8 of the control. Also a combination of late autumn and early spring application tended to stand better than the control and other applications. For hypocotyl diameter, larger diameters were observed with increased concentration, but the effects were not significant and not reproducible over the years. However, yield was higher than the untreated control regardless of the treatment concentration.

**Key words:** Triazole, metconazole, winter oilseed rape, growth regulatory effects

## Investigations on the effect of Metconazol on diseases of oilseed rape under controlled conditions

Liu, Y., Föllner, I., Henneken, M. & Paul, V.H. ....77

**Abstract** First results of the effects of Metconazol (C) and a comparative product (VGM) on stem rot, powdery mildew and *Rhizoctonia*-Damping off on *Brassica napus* have been obtained in climatic chamber experiments. Through different inoculation methods the protective and curative effects of Metconazol in 3 different concentrations (100%, 75% und 50% of the registered doses of 1,5 l/ha) were investigated.

Application date and application concentration showed a high correlation with the effects of the fungicide. The earlier the application and the higher the concentration the better the effects of the fungicide against the pathogens tested.

**Keywords:** *Brassica napus*, Metconazole, Tebuconazole, *Sclerotinia sclerotiorum*, *Erysiphe cruciferarum*, *Rhizoctonia solani*

## Optimising control of stem canker in winter oilseed rape in the UK

Steed, J., Fitt, B.D.L., Gladders, P. & Naik, A. ....87

**Abstract** As part of a project to improve strategies for phoma stem canker control, field experiments were done in two seasons at two sites (Rothamsted and Boxworth) in south east England. Four spray timings, determined by epidemic progress, were used in a full factorial design to investigate the effect of the number and timing of fungicide applications on phoma leaf spot and stem canker, other diseases and on yield. While phoma leaf spot / stem canker was the only major disease present at Boxworth, moderate light leaf spot epidemics also occurred at Rothamsted. In 1998/99, phoma leaf spot epidemics started in November and resulted in only moderate stem canker epidemics at both sites. In this season, economic yield responses were only achieved at Rothamsted where yield benefits were associated with light leaf spot control. In 1999/2000, early and prolonged phoma leaf spot epidemics caused severe stem canker epidemics at both sites and untreated yields were c. 1t/ha lower than in the previous season. In 1999/2000, multiple spray programmes gave good control of canker and yield increases of up to 0.7 t/ha. Single fungicide applications gave economic but variable yield responses at Boxworth and a minimum of two applications were needed at Rothamsted where light leaf spot was also present. Management of early phoma epidemics was shown to be cost effective with well timed sprays of fungicide.

**Key words** *Leptosphaeria maculans*, stem canker, winter oilseed rape

## Health status of spring rape plants and seeds as affected by the sowing date and fertilisation with sulphur, boron and magnesium

Sadowski, Cz. K., Jankowski, K., Łukanowski, A. & Trzciński, J. ....93

**Abstract:** The experiment was carried out in two sowing dates of oilseed rape, early one (at the time of spring cereals sowing) and three weeks later. The cultivation field was fertilised with sulphur (0 or 35 kg S per ha) before sowing, while the plant leaves were sprayed with nitrogen and magnesium (0 or 6 kg N per ha + 1 kg Mg per ha) or boron (0,5 kg of boron per ha). Healthiness of plants was evaluated in the flowering phase and maturation phase using the relevant scales of infection. Infection index was also calculated.

Downy mildew (*Peronospora parasitica*), dark leaf and pod spot (*Alternaria* spp.) and powdery mildew (*Erysiphe cruciferarum*) were detected most often on the plants, while *Phoma lingam*, *Sclerotinia sclerotiorum* and *Botrytis cinerea* occurred by far less intensively.

The date of sowing and fertilisation systems did not have any effect of statistical significance on the infection with downy mildew. Mean infection index fluctuated between 12.4% and 14.2%. The occurrence of *Alternaria* spp. was relatively high. This genus was present on leaves, shoots and pods. Significant differences in the infection degree occurred in respect of the date of sowing. The plants of the later sowing time were more strongly infected. Fertilisation with sulphur decreased pathogenic effects on siliques, while its impact on the infection of shoots and leaves was less pronounced. Fertilisation with magnesium decreased significantly the occurrence of the pathogen on leaves and shoots in case of earlier sowing, while the effect of fertilisation with boron was negligible. The positive effect of fertilisation with all three elements (S<sub>1</sub>Mg<sub>1</sub>B<sub>1</sub>) was observed in the case of earlier date of sowing in two years of investigations. Disease occurrence on leaves was significantly lower. Powdery mildew occurred over two years at a high level. In this case the plants of the earlier sowing date were infected by far more intensely. The use of boron limited this effect to some extent.

**Key words:** spring oilseed rape, fertilisation, sulphur, magnesium, boron, diseases, healthiness, Poland

### Interactive forecasting of light leaf spot (*Pyrenopeziza brassicae*) risk of winter oilseed rape on the internet

Evans, N., Steed, J., Welham, S.J., Antoniw, J. & Fitt, B. ....103

**Abstract** Detailed disease survey and weather data from different regions of the UK were used to produce a model that predicts the risk of severe light leaf spot for winter oilseed rape crops in that region. At the start of the season (in October), a prediction is made for each region, using the deviation of summer temperature from the 30 year mean and the incidence of light leaf spot on the pods of the previous crop immediately before harvest (previous July). The forecast is then updated periodically to take account of observed deviations from the average winter rainfall. Recently, the Internet version of the model that is hosted on the web-site at [www3.res.bbsrc.ac.uk/leafspot/](http://www3.res.bbsrc.ac.uk/leafspot/) has been updated to make it more crop-specific. Oilseed rape growers are required to input two pieces of information specific for their crop; cultivar (to take account of the light leaf spot resistance rating of the cultivar) and sowing date (as the model indicates that early sowing increases the risk from the disease). A crop-specific prediction of risk from light leaf spot, with or without the effect of an autumn fungicide application targeted at light leaf spot, is then delivered to the grower. The interactive light leaf spot model will be incorporated into a two-way interactive oilseed rape pest and disease Decision Support System (DSS) for winter oilseed rape (PASSWORD).

**Key words:** Forecast, interactive, Internet, light leaf spot, *Pyrenopeziza brassicae*.

### The influence of temperature on the production of Camalexin and Methoxycamalexin in *Camelina sativa*

Henneken, M., Paul, V.H. & Krohn, K. ....111

**Abstract:** A method to extract the indolic *C. sativa* phytoalexins Camalexin and Methoxycamalexin with C-18 sorbent and simultaneous determination with HPLC was optimised. With this method the influence of temperature on the production of phytoalexins was investigated in *Camelina sativa*. After activation of the production of phytoalexins in *C. sativa* with the plant activator BION<sup>®</sup> the optimised method was used to measure the amount of phytoalexins. For this investigation four different *C. sativa* cultivars were used. These were cultivated under climatic chamber conditions at 18/11 °C and 14/10 day/night rhythm to rosette stage. At this stage the plants were treated with BION<sup>®</sup>. The plants of the control were treated with tap water. For incubation three different temperatures were used. A cold regime with 11/6 °C, a middle regime with 18/11 °C and a warm regime with 24/16 °C. After fourteen days the plants were harvested and immediately stored at -21 °C. For the extraction and analyses of the phytoalexins with the optimised method it was not required to dry the plant material, so frozen fresh material was used.

The amount of the phytoalexins Camalexin and Methoxycamalexin produced show a high variation with regard to the temperature regimes and the four cultivars concerned. The control (only one cultivar was taken representatively) shows the lowest amount of phytoalexins.

Of the used cultivars, one produced a high amount of Camalexin and a low amount of Methoxycamalexin. In another cultivar the amounts of Camalexin and Methoxycamalexin produced were approximately equal. While in the other two cultivars the amount of Methoxycamalexin was higher than the amount of Camalexin, and one of them produced a lower quantity of phytoalexins compared with the other three cultivars.

The total amounts of Camalexin and Methoxycamalexin decreases with warmer temperatures.

When the amounts of Camalexin and Methoxycamalexin were added up for the total quantity of phytoalexins produced the concentration of phytoalexins in three of the four cultivars at the cold regime were between 800 and 1100 µg/kg fresh matter (FM). One cultivar showed a quantity of 200 µg/kg FM. At the middle temperature regime the quantity of phytoalexins decreases (200 to 600 µg/kg FM) and there were further differences between the cultivars noted. The total quantity of phytoalexin was similar in all cultivars at the warm temperature regime and ranged between 100 and 180 µg/kg FM.

**Key words:** *Camelina sativa*. anti-microbial compounds, phytoalexins, plant activator, BION®

### Parasitization Rates of the Oil Seed Rape Pests *Ceutorhynchus napi*, *Ceutorhynchus pallidactylus* (Coleoptera, Curculionidae) and *Meligethes* *aeneus* (Coleoptera, Nitidulidae) by Ichneumonids in Several Localities of Eastern Austria

Kraus, P. & Kromp, B. ....117

**Abstract:** In winter rape fields of Eastern Austria investigations were carried out to evaluate the parasitization rates of the rape stem weevil (*Ceutorhynchus napi* Gyll.), the cabbage stem weevil (*Ceutorhynchus pallidactylus* Marsh., both Coleoptera, Curculionidae) in 1996, 1999 and 2000 and the pollen beetle (*Meligethes aeneus* F., Coleoptera, Nitidulidae) in 1999 and 2000 by their larval parasitoids *Tersilochus fulvipes* Grav., *Tersilochus obscurator* Aub. and *Tersilochus heterocerus* Thoms. (all Hymenoptera, Ichneumonidae), respectively.

For the weevils, larvae were sampled from unsprayed field plots (1996: 144m<sup>2</sup> each; 1999 and 2000: 1000m<sup>2</sup> each) and reared in the laboratory to evaluate their parasitization rates. The adult parasitoids in pre-emergence state were removed from their cocoons and identified. For the pollen beetles, rape flowers were sampled from the unsprayed plots and handsorted for *Meligethes aeneus* larvae in the laboratory. The parasitization rate was evaluated by counting the infested larvae.

In 1996, the parasitization rates ranged from 60% to 81% for *C. napi* and from 49% to 81% for *C. pallidactylus*. In 1999, the parasitization rates were between 2% and 26% for *C. napi*, between 40% and 76% for *C. pallidactylus* and between 16% and 29% for *M. aeneus*. In 2000, the parasitization rates ranged from 7% to 28% for *C. napi*, from 49% to 53% for *C. pallidactylus* and from 22% to 83% for *Meligethes aeneus*.

**Key words:** oil seed rape, pests, *Ceutorhynchus napi*, *Ceutorhynchus pallidactylus*, *Meligethes aeneus*, larval parasitoids, Tersilochinae, parasitization rates

### Aphids in oil seed rape in autumn, possibilities to reduce virus transmission

Heimbach, U., Eggers, C. & Thieme, T. ....123

**Abstract:** Aphids, mainly *Brevicoryne brassicae* and *Myzus persicae*, can colonise oil seed rape in autumn. They can transmit Turnip yellows virus (TuYV) disease to rape, which can affect the yield in certain situations. Therefore field experiments were carried out for several years, in which different methods were used to reduce aphid numbers. Aphid numbers and TuYV infection rates in autumn were reduced by straw mulch or seed treatment with Poncho β-cyfluthrin 2 g a.i. + imidacloprid 10 g a.i./kg seed) to a similar degree, but the effect of Poncho lasted longer. Seed treatment with isofenphos had no effect on aphid number and virus infection, whereas seed treatment with Chinook (2 g a.i. β-cyfluthrin plus 2 g a.i. imidacloprid/kg seed) reduced aphid numbers and virus infection only slightly. The reason for lower aphid numbers in mulched plots seems to be an altered settling behaviour of aphids as the number of trapped alate aphids indicate. The degree of virus infection was correlated to a certain degree with the number of aphids counted in the plots. Yield was not influenced in the trials though different aphid / virus infections were reached.

In one year aphid and TuYV infection were analysed in small plots (approx. 50 m<sup>2</sup> per plot) parallel to larger plots (approx. 1000 m<sup>2</sup> per plot). Results show that control and other untreated areas neighbouring the experimental area influence the degree of virus infection in treated plots for several meters. Thus virus infection rates in e.g. Poncho treated plots near to untreated areas were about 80 % whereas in 20 m distance they were only about 40 %.

**Key words:** aphid settlement behaviour, oil seed rape, Turnip yellows virus (TuYV), mulch, imidacloprid seed treatment, plot size

Strategies for the control of cabbage stem flea beetle on winter rape in Sweden.  
Nilsson, C. ....133

**Abstract.** Cabbage stem flea beetle (CSFB) is a winter active pest of oilseed rape distributed over most regions of northern Europe with a maritime climate. In Sweden, it is confined to the coastal areas of the southern part. It can be controlled with seed treatments against adults or sprays against adults and/or larvae. Control thresholds have been established and prognoses have been used for the past 30 years. The different strategies and their effects on economic damage and the population dynamics of CSFB are discussed.

**Key words:** chemical control, cabbage stem flea beetle, winter rape, seed dressing, spraying, prognoses

Within-field distributions of the seed weevil, *Ceutorhynchus assimilis* (Paykull) and its parasitoid, *Trichomalus perfectus* (Walker), on winter oilseed rape  
Williams, I.H., Murchie, A.K., Ferguson, A.W., Klukowski, Z., Perry, J.N. & Walczak, B. ....143

**Abstract:** *Ceutorhynchus assimilis* (Paykull), the cabbage seed weevil, is a major pest of winter oilseed rape in Europe. It is attacked by *Trichomalus perfectus* (Walker), a pteromalid larval ectoparasitoid, and parasitism rates can exceed 70%. The spatio-temporal distributions of *C. assimilis* and of *T. perfectus* within a crop of winter rape were investigated over two years. Insects were sampled from the points of intersections of a grid on the crop, and their distributions were mapped. Spatial Analysis by Distance IndicEs (SADIE) and a randomisation procedure were used to describe and compare patterns of distribution across time and between species. During immigration, adult *C. assimilis* were aggregated at the edges of the crop, but later were more widespread. Adult *T. perfectus* migrated to the crop later than *C. assimilis* and were not aggregated at the crop edge except briefly during the early phase of immigration. Adult female and larval *C. assimilis* were spatially associated, as were densities of *C. assimilis* larvae and those parasitised by *T. perfectus*. The implications of the observed distributions of *C. assimilis* and *T. perfectus* for a) integrated pest management strategies for winter rape that seek to employ insecticides, targeted in time and space, together with parasitoids for biological control, b) accurate sampling for pest and parasitoid, and c) push-pull strategies incorporating semiochemicals, are discussed.

**Key words:** pest, parasitoid, *Ceutorhynchus assimilis*, *Trichomalus perfectus*, insecticide targeting