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Integrated pest and disease management to optimise yield in winter oilseed rape

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Healthy leaf area is a major determinant of yield in oilseed rape. Drastic declines in leaf area index usually occur from flowering onwards and can be exacerbated by factors such as disease infestation, pest damage, drought or insufficient nutrition. Decreases in canopy size and duration, and thus cumulative absorption of photosynthetically active radiation (PAR), subsequently reduce the amount of assimilate available to the crop and have a negative impact on yield.

Boscalid (BASF) is a SDHI fungicide which is marketed in co-formulation with dimoxystrobin and has efficacy against the key diseases of oilseed rape. However, yield increases have been reported following application of the fungicide that exceed expectations from disease control alone. The relationship between disease symptoms and yield loss varies across sites and seasons but can be strengthened when accounted for via the effects on green area index, canopy duration and accumulated light interception.

Six field experiments were conducted across three cropping seasons in the UK (2014 – 2016). The objective was to quantify the positive effects of fungicide application on yield, mediated through means other than the control of visible disease. The boscalid-picoxystrobin co-formulation was applied at mid flowering (BBCH 65) and evaluated against other fungicide products and an untreated control. Disease severity was assessed at key timings and physiological measurements included leaf, stem and pod green area indices (integrated through time to give 'healthy area duration' [HAD] values), intercepted light and yield. The amount of PAR accumulated by the crop during the yield forming period was calculated using Beer's Law.

Cross-site analysis showed that yield was significantly higher in boscalid-picoxystrobin treatments by a mean of approximately 0.25 t ha-1 after disease effects had been accounted for. A significant positive association was found between yield and HAD and each unit of HAD increased yield by approximately 0.05 t ha-1 when the canopy was modest. However, the overall relationship was found to be exponential so the HAD model may be (1) useful in identifying scenarios where further crop inputs would be of little or no benefit and (2) serve as a tool for breeders to help optimise the source:sink ratio of a new variety.