

Effects of fungicides on severity of phoma leaf spot and phoma stem canker on winter oilseed rape in field experiments



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INTRODUCTION

Phoma stem canker (Fig 1) caused by fungi *Leptosphaeria maculans* (*Lm*) and *L. biglobosa* (*Lb*) leads to oilseed rape yield losses of £50-90M per annum in the UK. To control this disease, several fungicides are used, costing an additional £20M pa. Despite use of fungicides, crop yield losses have not decreased since 2005.



Fig 1: Symptoms of phoma stem canker on leaves and stems of oilseed rape

Aim

To investigate efficacy of fungicides prothioconazole-desthio or penthiopyrad+ picoxystrobin on *Lm* and *Lb* in field experiments

MATERIALS & METHODS

- Field experiments were done at Boxworth, Cambridge in 2015-2016 & at Terrington, Norfolk in 2016-2017 and 2017-2018 with six cultivars (cvs) (Table 1) and three treatments; no spray control, prothioconazole-desthio (Proline) or penthiopyrad + picoxystrobin (Refinzar).
- Numbers of *Lm* and *Lb* phoma leaf spots were counted in winter and severity of phoma stem canker was assessed in summer.
- Diseased stems were collected from untreated and fungicide-treated plots. DNA was extracted and analysed using quantitative PCR (qPCR) to determine amounts of *Lm* DNA and *Lb* DNA in the stems.

Table 1: List of cultivars with Recommended list (RL) resistance rating used in field experiments. Higher resistance rating= greater field resistance to *Leptosphaeria* spp.

Cultivars	RL cultivar resistance rating in 2015/2016 (1-9 scale)
DK-Cabernet (DKC)	6
Fencer	8
Harper	8
Incentive	4
PR46W21	3
Quartz	9

RESULTS

- Both fungicides reduced the numbers of *Lm* and *Lb* leaf spots in 2016-2017 and 2017-2018 ($P < 0.05$) but not in 2015-2016 ($P > 0.05$) (Fig 2).
- Both fungicides reduced the severity of phoma stem canker on most cvs in all seasons ($P < 0.05$) with more significant effects on susceptible cvs with less resistance against *Leptosphaeria* spp (Fig 3).
- Both fungicides were ineffective in reducing the amounts of *Lm* DNA in stem cankers on all cvs in 2015-2016 and 2016-2017 but equally effective in reducing the amounts of *Lb* DNA on resistant cvs in 2015-2016 and on all cvs in 2016-2017. In 2017-2018, penthiopyrad + picoxystrobin was more effective than prothioconazole-desthio in reducing the amounts of *Lm* DNA on resistant cvs. Both fungicides reduced the amounts of *Lb* DNA in 2017-2018 with significant correlations between fungicide and cv.

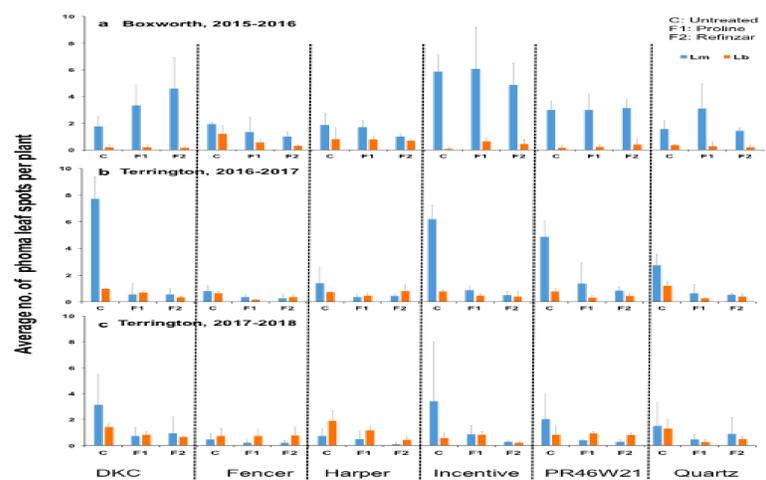


Fig 2: Average numbers of *Lm* and *Lb* phoma leaf spots on untreated and fungicide-treated plots of cultivars in field experiments at Boxworth in 2015-2016 (a) and at Terrington in 2016-2017 (b) and 2017-2018 (c)

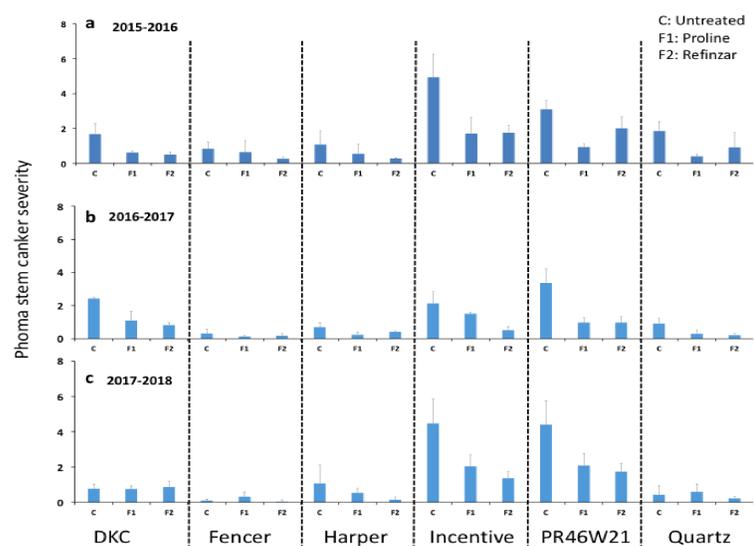


Fig 3: Average phoma stem canker severity on untreated and fungicide-treated plots of cultivars in field experiments at Boxworth in 2015-2016 (a) and at Terrington in 2016-2017 (b) and 2017-2018 (c)

CONCLUSIONS

Both fungicides effectively reduced severity of phoma leaf spotting and phoma stem canker on most cvs with correlations between fungicide and cv. on reducing stem canker severity and amounts of *Leptosphaeria* spp. DNA. Furthermore, considering the recent bans on fungicides including flusilazole and penthiopyrad + picoxystrobin, there is a need to investigate the effectiveness of new commercial fungicides on oilseed cvs to ensure effective control of phoma stem canker.

