Grower Summary

CP 124

Managing ornamental plants sustainably (MOPS)

Final 2017 – Powdery Mildew In Auster

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Before using all pesticides check the approval status and conditions of use.
Read the label before use: use pesticides safely.

Further information

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Project title:	Managing ornamental plants sustainably (MOPS)
Project number:	CP 124
Work package title:	Assessment of the efficacy of several conventional fungicides and biofungicides against powdery mildew in Aster
Work package leader:	Dr G M McPherson MBPR (Hort)
Report:	Final report, December 2016
Previous report:	None
Key staff:	Adam Ormerod – Trials Manager
Location of work:	Stockbridge Technology Centre
Date work commenced:	6th July 2016
Date work completed (or expected completion date):	18th December 2016

Growers Summary

Headline

- In 2016, several products, including conventional fungicides and biopesticides provided effective suppression and/or control of powdery mildew in Aster and a similar level of control could be expected in other ornamental crops, though crop safety would need to be checked assuming the product was authorized for use.
- Some of the integrated programmes devised provided effective disease control but only where the sprays were applied in advance of any visible mildew symptoms.
- A parallel study in 2016 using Ampelomyces quisqualis (in the product AQ10) to explore the possible adaptation of the mycoparasite on particular host crops for maximum efficacy proved inconclusive.

Background and expected deliverables

The HortLINK SCEPTRE programme was very successful in identifying and evaluating novel conventional chemical fungicides and biopesticide products for pest, disease and weed control in edible crops and has proved very valuable in terms of filling gaps in the crop protection armoury as older active substances and products are withdrawn. Whilst this is of some relevance through extrapolation to non-edible crops, including ornamentals, no work was conducted specifically on ornamentals as part of the SCEPTRE programme. The AHDB funded MOPS programme was therefore established in 2014 in response to growers concerns about potential losses of products in the ornamentals sector. Like SCEPTRE it potentially provides a valuable route for the comparative evaluation of important chemical & biologically active substances/products which can then be pursed for registration either by the manufacturers themselves or via AHDB through the active minor uses (EAMU) programme.

In the first year of the project (2014) STC evaluated a range of novel conventional and biological products for the control of rust in both Bellis and Antirrhinum and against powdery mildew in both Aster and Pansy. In the second year (2015) the trials focused on rust in Bellis and powdery mildew in Aster. This year (2016) the focus was on powdery mildew, largely due to the fact that insufficient data was gathered in the 2015 trial.

Such powdery mildew diseases commonly affect a wide range of woody and herbaceous perennial ornamentals, pot and bedding plants and cut flower species, causing yellow, crinkled and distorted leaves, premature senescence and reduced vigour. Young, soft shoots are particularly affected impacting on product quality. Even with slight infections, the white fungal

growth on leaves, stems and flowers, and associated leaf yellowing and distortion, make plants unsightly and often unsaleable.

Powdery mildew diseases are usually managed by regular treatment with fungicides. Cultural practices including environmental management, provide partial control, but fungicides are almost invariably necessary for the production of high-quality, saleable plants, especially on particularly susceptible species or cultivars. Some fungicides are more effective as protectants while others have curative/eradicant activity. Resistance can develop when the same fungicide or products from the same fungicide group are used repeatedly on the same crop. Availability of biofungicides on ornamentals could help to reduce development of resistance to conventional fungicides. Some of the existing fungicide mode of action groups are not necessarily safe to use on all ornamental crops and the potential risk of crop damage (phytotoxicity) needs to be evaluated with any new active ingredients as part of the MOPS project.

The replicated trials conducted in year one (2014) delivered very useful information on the efficacy and crop safety of a broad range of novel crop protection products. Further studies in year two (2015) allowed the comparison of additional novel products and also included evaluation of a range of 'prescriptive' and 'managed' disease control programmes incorporating both conventional fungicides and biological products. Whilst very effective control of rust was achieved with some of the straight products and programmes further data on powdery mildew was not obtained due to the poor development of powdery mildew in the designated trial plots. However, this proved interesting nonetheless as the mildew 'infector plants' became heavily colonized by the mycoparasite *Ampelomyces quisqualis* (in AQ10) presumably following use of this product in the 2014 trials . Whilst the product was largely ineffective in controlling or suppressing powdery mildew in aster or pansy in 2014 it appeared to effectively prevent mildew establishment in the 2015 trial. We raised the interesting hypothesis that perhaps the mycoparasite (raised commercially on a totally different host & mildew species) requires an adaptation or acclimatization period on the specific host & mildew species in question for optimum colonization and pathogen suppression. As such, relatively small-scale studies were carried out in 2016 to attempt to determine whether there is a requirement for an 'adaption period' in specific ornamental crops to ensure robust establishment and mildew control by this biopesticide product.

It is important to recognize that whilst the studies conducted help identify potential novel products for use in this sector, their actual approval remains the responsibility of the manufacturers/ marketing agents (on-label approvals) and the AHDB team (minor use or EAMU applications) and the pesticide regulators (CRD) who ultimately authorize products for use in the UK. Even though very promising products have been identified in the work reported

it remains very difficult to predict what active substances and products will be supported in the horticultural sector going forward. Whilst every effort is made by AHDB and others to encourage regulatory approval there is no guarantee that specific effective products will be made available for use on either outdoor or protected ornamentals. Withdrawal from the EU regulatory system through Brexit may have some impact in the longer-term though, at this stage, it is very difficult to predict the outcome of any negotiations and it is probably best to assume that UK pesticide regulations will continue to be guided by EU rules for some time.

Summary of the work and main conclusions

In the Autumn of 2016 replicated glasshouse trials were carried out at Stockbridge Technology Centre to assess the effectiveness of a range of experimental biological and conventional fungicides against Aster powdery mildew. In addition to a comparison of individual novel treatments with single products a number of prescriptive and managed programmes were included using a selection of the products found to be most effective in earlier studies.

Powdery Mildew – Aster 'Cassandra' was selected as a known disease susceptible cultivar for use following discussion with Lyndon Mason, Cut Flower Centre. The Aster crop was infected at the beginning of the trial following the introduction of infector plants. This allowed the disease to spread evenly throughout the trial yielding promising results similar to those from year 1 for conventional and biological products alike. Several prescriptive and managed programmes were evaluated some of which proved to be very successful.

Ten individual fungicides and biofungicides were evaluated alone together (including the standard Signum) with 4 managed and prescriptive programmes together with an untreated control for comparison. Of the individual fungicide product 77 (SDHI+QoI, FRAC codes 7 & 11) was as effective, if not slightly more so, than the standard product Signum (SDHI+QoI, FRAC codes 7 & 11). Takumi (phenyl-acetamide, FRAC code U6), product 10 (SDHI, FRAC code 7) and Product 211 (SDHI, FRAC code 7) provided moderate-good suppression of the disease. Product 156 (SBI: Class III, FRAC code 17) was largely ineffective against powdery mildew in this study.

The two prescriptive programmes consisted of regular or pre-scheduled bi-monthly applications of products, irrespective of visible disease symptoms. Programme 1 used biological products at application timings A1 and A5 and conventional products at A3 and A7. Programme 3 used conventional products at all application timings (see Table 3 for more detail on the actual application timings described here). The two managed programmes consisted of an initial preventative treatment; the crop then monitored and further applications only applied when visible signs of disease appeared. Programme 2 consisted of applications of a biological product (AQ10) at application timings A1 and A2 only, unless the disease continued

to develop. In this case, a further treatment was applied at application timing A5 using a different biopesticide (105). Programme 4 commenced with a single application of a conventional product at A1 with a further application using a different mode of action conventional product (156) at A3 as there was some evidence of disease development at this point. Both prescriptive programmes (one with a mixture of biological and conventional products, and one with solely conventional products) had broadly similar (moderate) disease control efficacy at the conclusion of the trial. The managed programme using conventional products only proved the most successful with exceptionally low disease levels present in the test plots at the conclusion of the trial with only 2 treatment applications being made throughout the trial duration. The managed programme consisting of biological products only proved to be significantly less effective and had moderate- high disease levels at the conclusion of the trial.

It is clear from this study that effective control of powdery mildew can be achieved where early protective treatment applications are made with products with strong efficacy, prior to appearance of visible symptoms in the crop. Whilst the biopesticides trialled were, in general, less effective those that provided moderate suppression of the disease could be very useful in an integrated disease management programme to extend the interval between conventional spray applications. They have the added benefit that they have a completely different mode of action so should go some way to minimizing any risk of resistance developing in the pathogen population from repeated frequent use of the same mode of action fungicides.

Action Points

- Several novel mode of action fungicides were effective and AHDB should pursue one or more of these products for minor use approval
- One biological product (105 : plant extract) provided a good suppression of powdery mildew and AHDB should work with the manufacturer to seek approval for use on ornamental crops to help with disease control, aid pesticide minimisation and to counter resistance development in the pathogen population
- The study provided evidence to show that spray programmes integrating both conventional products with biopesticides can retain effective control of powdery mildew and growers should be encouraged to adopt such strategies rather than relying on conventional products, assuming regulatory authorisation is forthcoming to allow this approach to be adopted.

- The study clearly demonstrated that early, pre-symptomatic, treatment provided the most effective control of powdery mildew and growers are encouraged to consider this when devising their spray programmes.
- As there is a moderate to high risk of resistance development through repeated use of the same mode of action fungicides, growers need to make themselves familiar with FRAC codes and 'ring the changes' to avoid repeated use of the same mode of action products.
- No phytotoxicity was observed in this trial, it is advisable for growers to test-treat a few plants of specific species & cultivars when using novel Approved products for the first time.
- Further work is required with microbial biopesticides to ensure compatibility with novel fungicides and to further refine the optimum conditions for their application & efficacy in a range of ornamental crops.

The additional study designed to explore the hypothesis on acclimatised strain *Ampelomyces quisqualis*, was inconclusive and this was considered, in part at least, to be due to the late onset of the pathogen in the trial crop which can't immediately be explained. Work in this area is difficult though due to the need to retain isolates of powdery mildew free from *Ampelomyces* colonization and if further work is proposed it would be necessary to put in place improved facilities to secure, manage and maintain discrete cultures of the obligate pathogen +/- isolates of *A. quisqualis* that have been acclimatised/adapted on the specific host over a minimum 12 month period.