



# Grower Summary

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## **HNS 196**

Identification of inoculum sources  
and potential control strategies for  
the newly emerged *Peronospora*  
causing downy mildew on aquilegia

Final 2016

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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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AHDB Horticulture,  
AHDB  
Stoneleigh Park  
Kenilworth  
Warwickshire  
CV8 2TL

Tel – 0247 669 2051

AHDB Horticulture is a Division of the Agriculture and Horticulture Development Board.

**Project title:** Identification of inoculum sources and potential control strategies for the newly emerged Peronospora causing downy mildew on aquilegia

**Project number:** HNS 196

**Project leader:** Dr Philip Jennings, Fera

**Report:** Final report, March 2016

**Previous report:** N/A

**Key staff:** Ms Gilli Thorp  
Mr Sam McDonough

**Location of project:** Fera

**Industry Representative:** Mr Toby Marchant, Orchard Dene Nurseries, Lower Assendon, Henley-on-Thames, Oxfordshire, RG9 6AL

**Date project commenced:** 01 September 2015

**Date project completed** 31 March 2016  
**(or expected completion date):**

# **GROWER SUMMARY**

## **Headline**

Oospores were detected at low levels in aquilegia seed, suggesting that aquilegia downy mildew can be seed borne and that infected seed could be a potential source of the pathogen.

## **Background and expected deliverables**

Aquilegia downy mildew (ADM) is caused by a currently unnamed *Peronospora* species which has not been reported outside of the UK. The first reported occurrence of ADM appears to be on a nursery in 2011. Since the first report, the disease has become widespread causing loss of plants both on nurseries and in public/private gardens. Some of these losses have led to coverage in the national gardening press.

Symptoms are typical of those produced by other downy mildews, with affected leaves developing angular, yellow patches which eventually turn brown. On the underside of the infected leaves a fine spore bearing fungal growth can often be seen. The disease spreads quickly and has led to rapid plant death.

A literature review revealed there was no information on the incidence, distribution and control of the disease either from the UK or overseas. However, there is an abundance of knowledge available for downy mildew diseases caused by other *Peronospora* species, which can be used to help determine potential sources of infection, the conditions required for both infection and sporulation, and control strategies.

## **Summary of the work and main conclusions**

### ***Grower survey***

28 questionnaires were distributed with seven completed and returned. Of these, five respondents reported having had an outbreak of ADM on their nursery. Four of the seven respondents bought-in their plants as plug plants or liners, one bought-in both seed and young plants and two bought-in seed to raise their own plants. Of the three growers who raised plants from seed, all had purchased them from the same company and two reported an outbreak of ADM. There did not appear to be any link between the plant varieties grown and the prevalence of ADM on nurseries.

### ***Seed contamination by the Peronospora responsible for aquilegia downy mildew***

Seed samples from 14 aquilegia varieties were obtained to determine whether the pathogen responsible for ADM could be detected within or on the seed. The seed supplier and variety

of the seed were selected based on the results of the grower survey and in consultation with the grower co-ordinator.

Seed washing showed that oospores (resting spores) were present in one seed sample (*Aquilegia vulgaris* var. *plena* 'Christa Barlow') at a rate of 1 oospore per 100 seeds.

A primer set was produced which detected the DNA of the pathogen responsible for ADM. The primer set did not detect ADM DNA in any of the seed samples; however funding was not available to fully optimise the test, so low levels of ADM DNA in the sample may have been undetected.

A trial using the oospore-contaminated seed sample was established to determine whether infected seed would lead to infected plants, and if so, determine the conditions required for infection. By the end of the project no ADM symptoms were found on any plants in the trial. The trial is being continued and results reported for the follow-on project (HNS 196a).

### **Financial benefits**

The average value of *Aquilegia* sales among the growers surveyed was £6,785.00, with high and low sales figures of £16,000 and £2,000 respectively. The number of commercial growers who have been adversely affected by ADM is unclear. Of those who responded to the survey, plant losses experienced due to the disease could be as high as 20%, with the *aquilegia* crop accounting for anything up to 10% of sales of herbaceous plants generally. Another issue was the level of press coverage warning of the dangers from the disease which led to concern among growers that a loss of retail sales may result. This would also be compounded by the inability of amateur growers to control the disease once established in gardens.

Understanding the pathogen responsible for *aquilegia* downy mildew, in particular through identifying pathways of introduction, will ensure effective management strategies can be developed to minimise future losses from the disease. Establishing an effective and economic strategy for the control of the downy mildew pathogen early in the supply chain will reduce the risk of financial loss through plant wastage and consumer dissatisfaction with the product. This is particularly important while the pathogen is at an early stage of establishment in the UK.

## **Action points for growers**

- Even though there is no definitive data to suggest that seed is the main source of contamination, it is recommended that as the disease is in circulation, suppliers should check stock plants for symptoms and seed batches for contamination.
- As far as possible ensure any starting plant material is disease-free.
- Isolate and clearly label bought-in seed, young plants and liners to permit traceability should problems arise.
- Ensure adequate air circulation around plants to minimise prolonged periods of leaf wetness. If possible, avoid overhead irrigation as this is likely to exacerbate the disease. If it is necessary to irrigate using overhead systems then do this early on in the day to allow foliage to dry out quickly.
- Practice good nursery hygiene, clean up crop debris between crops and at the end of the season to minimise the risk of carry-over of the disease. Place any infected plants into covered bins prior to disposal.
- Maintain an effective preventative fungicide programme, ensuring a range of products with different modes of action are included to minimise the risk of resistance development.