

# RMD-18-01: Pest Risk Management Document – Deregulation of *Anisogramma anomala*, causal agent of eastern filbert blight

(Original)

## Preface

As described by the International Plant Protection Convention (IPPC), Pest Risk Analysis (PRA) includes three stages: initiation, pest risk assessment and pest risk management. Initiating the PRA process involves identifying pests and pathways of concern and defining the PRA area. Pest risk assessment provides the scientific basis for the overall management of risk. Pest risk management is the process of identifying and evaluating potential mitigation measures which may be applied to reduce the identified pest risk to acceptable levels and selecting appropriate measures.

This Risk Management Document (RMD) includes a summary of the findings of a pest risk assessment and records the pest risk management decision process for deregulation of *Anisogramma anomala* (Peck) E. Müll. It is consistent with the principles, terminology and guidelines provided in the IPPC standards for pest risk analysis which may be found at the [International Plant Protection Convention website](#).

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## Executive Summary

*Anisogramma anomala* is a fungal pathogen native to eastern North America and is an impediment to the commercial production of European hazelnuts (*Corylus avellana*). Historically, commercial production of hazelnuts was a profitable, low-input crop west of the continental divide, where *A. anomala* was absent. In the late 1960s, *A. anomala* was detected in Washington State and subsequently spread to British Columbia where it was first detected in 2002 (Davison and Davidson 1973, Sabaratnam *et al.* 2009).

In 1975, Canada put regulations in place to prevent human-assisted spread of *A. anomala* into British Columbia. More recently, under Directive *D-00-03: Import requirements from the United States and domestic movement requirements for material to prevent the introduction of eastern filbert blight into British Columbia*, importation of *Corylus* spp. from infested origins was restricted to *in vitro* plantlets, thereby permitting access to varieties of *Corylus* that are resistant to *A. anomala*, while limiting the opportunities for human-assisted spread of the pest.

In the years since 2002, *A. anomala* devastated the commercial hazelnut production area of British Columbia. However, the hazelnut industry across Canada is currently undergoing a revival, in part based on access to new varieties of *Corylus* spp. bred for resistance to *A. anomala*. Resistance is not absolute, and resistant plants are only part of an eastern filbert blight management program that must be implemented for successful commercial production (O’Dell 2018, Pscheidt *et al.* 2017).

*Anisogramma anomala* can no longer be considered a regulated pest in Canada due to its widespread distribution and the lack of control measures aimed at containing or eradicating it. The CFIA will take the necessary steps to deregulate this pest, including removing it from Schedule II of the *Plant Protection Regulations* and from the List of Pests Regulated by Canada. Directive D-00-03 will also be repealed.

## 1.0 Purpose

The purpose of this document is to record risk management considerations and inform stakeholders of the Canadian Food Inspection Agency's (CFIA's) decision to deregulate *Anisogramma anomala* (Peck) E. Müll.

## 2.0 Scope

This RMD provides the history and rationale for the CFIA's decision to deregulate *A. anomala*.

Information pertaining to current import requirements for specific plants or plant products may be obtained from the Automated Import Reference System ([www.inspection.gc.ca/airs](http://www.inspection.gc.ca/airs)).

## 3.0 Definitions, Abbreviations and Acronyms

Definitions of terms used in this document can be found in the [International Standard for Phytosanitary Measures 5: Glossary of phytosanitary terms](#) or the [Plant Health Glossary of Terms](#).

## 4.0 Background

*Anisogramma anomala*, the causal agent of eastern filbert blight, a disease of *Corylus* spp., is native to eastern North America. *Anisogramma anomala* is nonlethal to native species of *Corylus*, including American hazelnut (*C. americana*) and beaked hazel or California hazel (*Corylus cornuta*). European hazelnut (*C. avellana*), most commonly cultivated for the commercial production of hazelnuts, is highly susceptible to *A. anomala*, which is lethal to unmanaged trees.

The historic absence of *A. anomala* west of the Rocky Mountains permitted the establishment of a commercial hazelnut industry, starting in Oregon in the early 1900s and in British Columbia in the 1930s.

In the 1920s the Oregon and Washington imposed regulatory measures to prevent the introduction of *A. anomala* (Barss 1930; Thompson 1930). Canada put similar requirements in place in 1975 to protect British Columbia. Despite the efforts to prevent its spread into western North America, *A. anomala* was introduced to Washington State in the late 1960s (Davison and Davidson 1973). The pathogen continued to spread in the Pacific Northwest eventually reaching Oregon's Willamette Valley in 1986 (Mehlenbacher and Olsen 1996).

In 2002, the CFIA confirmed the presence of *A. anomala* in the British Columbia Lower Mainland region for the first time. The CFIA published a directive (D-00-03) in 2006 to allow growers in British Columbia to import *A. anomala*-resistant *Corylus* varieties developed in Oregon, while continuing to limit the risk of human-assisted spread of the pathogen into British Columbia. In 2007, the British Columbia Ministry of Agriculture (BCAGRI) reported a further

detection of *A. anomala* on Vancouver Island. Since its initial introduction to British Columbia, *A. anomala* has continued to spread within the province and is now present in all areas where hazelnuts are commercially produced.

## 5.0 Pest Risk Assessment Summary

A pest risk assessment was originally completed on *A. anomala* in 1991 (PRA 1991-01) and updated in 1996 (PRA 1996-14). Three additional assessments were completed on specific aspects of the pest's biology and its regulation (PRA 1998-69, 2014-86, 2016-73).

### 5.1 Pest Biology

*Anisogramma anomala* is a fungal pathogen and the causal agent of eastern filbert blight. This pathogen occurs only in North America and is associated with American hazelnut (*C. americana*) throughout its native range east of the Rocky Mountains (Gleason and Cronquist 1991). On American hazelnut, *A. anomala* is a nonlethal pathogen causing an insignificant canker, which typically ranges from 1 to 10 cm in length. In contrast, on European hazelnut (*C. avellana*), this pathogen can cause cankers that expand at rates of up to 1 m per year. If left unmanaged, the expanding cankers girdle the branches and limbs, resulting in canopy dieback and tree death within 5 to 12 years (Johnson *et al.* 1996).

European hazelnut becomes susceptible to infection by *A. anomala* only after budbreak, when vegetative buds initiate active growth in spring, and is most susceptible during leaf emergence and initial shoot elongation. Initial colonization occurs without obvious symptoms of disease for 12 to 15 months. Cankers form during the spring of the second year of infection and continue to expand until late autumn when ascospores are released from mature perithecia. Ascospores are released during periods of rain and are dispersed by wind.

Historically, *A. anomala* was absent from western North America, until the pathogen was introduced to Washington State during the 1960s (Gottwald and Cameron 1980; Johnson *et al.* 1996). Research into the development of *A. anomala* resistance in Oregon has focused on developing *Corylus* varieties suitable for cultivation in that region, where the genetic diversity and pathogenic variation of *A. anomala* is believed to be less than in eastern North America (CFIA 2015; Muehlbauer 2017). Molnar *et al.* (2010) found that some *A. anomala*-resistant *Corylus* varieties developed in western North America expressed symptoms characteristic of eastern filbert blight when cultivated in eastern North America. These observations support the idea that there are multiple strains of *A. anomala*, and that there is likely lower diversity of strains in western North America compared to eastern North America.

Currently, there are no regulatory diagnostic procedures capable of readily distinguishing between strains of *A. anomala* and no catalogue of strain distribution in North America.

### 5.2 Pathways

In addition to natural dispersal by wind, *A. anomala* may also be spread by human-assisted means, including the movement of infected plant parts such as bark, wood, shoots, branches and trunks. Roots, foliage, nuts and growing media associated with plants are not considered to be pathways for spread (CABI 2018).

### **5.3 Economic Considerations**

Despite the CFIA's regulations aimed at preventing the spread of *A. anomala*, the pest has established in all commercial production areas of Canada. The introduction and establishment of *A. anomala* in British Columbia has contributed to a shift in how hazelnuts are commercially produced. A crop that was once considered "low-input" now requires active disease management resulting in increased production costs. Oregon continues to be a major hazelnut producing state, despite the presence of *A. anomala* for more than 30 years. Effective disease management strategies have been developed including: scouting, reducing inoculum load, applying fungicides and planting disease-resistant varieties (Pscheidt *et al.* 2017).

Research in eastern North America has continued to advance efforts in breeding resistant varieties and new evidence suggests that some crosses of *A. anomala*-resistant varieties from Oregon can provide acceptable protection from at least some of the strains of *A. anomala* that are present in the east, although the mechanisms of resistance are complex and require further investigation (Muehlbauer *et al.* 2018). Continued development of disease-resistant varieties may serve to reduce production costs in the future.

## **6.0 Risk Management Considerations**

### **6.1 Standards of the International Plant Protection Convention**

The CFIA is designated as Canada's National Plant Protection Organization (NPPO) under the International Plant Protection Convention. As such, the CFIA's actions are guided by a suite of International Standards for Phytosanitary Measures (ISPM). *ISPM 5: Glossary of Phytosanitary Terms* defines a quarantine pest as, "a pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled" (IPPC 2017).

### **6.2 Plant Protection Regulations and Directive D-00-03**

*Anisogramma anomala* is currently listed in Schedule II of the *Plant Protection Regulations* (Restricted Movement within Canada), and is included in the List of Pests Regulated by Canada.

Directive D-00-03 describes phytosanitary requirements specific to the prevention of human-assisted spread of *A. anomala* to British Columbia. In brief, plants for planting from infested areas are prohibited; plants for planting from non-infested areas established by annual survey may enter British Columbia, and *in vitro* plantlets may enter British Columbia from both infested and non-infested areas.

The requirements described in D-00-03 were designed to address specific objectives. The first objective was to prevent the human-assisted spread of *A. anomala* to British Columbia. The second was to prepare growers for the eventual natural spread of *A. anomala* to British Columbia by permitting access to resistant plants developed by hazelnut breeding programs, for example the program at Oregon State University.

At the time D-00-03 was developed, resistance to *A. anomala* was viewed as an alternative to integrated pest management and a method to restore *Corylus* production as a low-input crop. In the intervening years, Molnar *et al.* (2010) observed that several *A. anomala*-resistant *Corylus* spp. varieties, developed by the hazelnut breeding program at Oregon State University, were susceptible to *A. anomala* strains present in eastern North America. Based on this information, the CFIA considered revising directive D-00-03 to prevent the strains of *A. anomala* present in eastern North America from reaching British Columbia. After considering all the elements that would be required in order to establish 'official control', the CFIA has determined that regulating *A. anomala* at the strain level is not justified.

### **6.3 Surveillance and Distribution**

In 2002 the CFIA carried out a survey to detect the presence of *A. anomala* and detected the pathogen for the first time in the Lower Mainland region of British Columbia. In 2007, BCAGRI detected the fungus on Vancouver Island. *Anisogramma anomala* is now considered to be present in all areas of Canada where European or American hazelnuts grow, with the exception of a few isolated pockets in British Columbia's Okanagan Valley, where the disease has not yet been reported.

### **6.4 Eradication/Containment**

*Anisogramma anomala* is naturally spread by wind-borne spores and cannot be eradicated or contained once it has established in an area.

### **6.5 Potential Environmental and Economic Consequences**

Deregulation of *A. anomala* is not expected to have a significant impact on the costs associated with commercial hazelnut production because this pathogen is already present in all commercial hazelnut production areas of Canada. Deregulation of *A. anomala* is expected to benefit the commercial hazelnut industry in British Columbia as growers will have increased access to new *A. anomala*-resistant germplasm.

Deregulation of *A. anomala* is not expected to have a significant environmental impact as this pathogen is nonlethal to native *Corylus* species.

### **6.6 Pest Status in the United States**

*Anisogramma anomala* is not regulated at the federal level in the United States. However, two states, Oregon and Washington, have implemented state regulations to prevent the introduction of strains of *A. anomala* present in eastern North America (Anonymous 2012; Brown 2014).

## 6.7 British Columbia Hazelnut Industry Considerations

Over the past fifteen years the hazelnut industry in British Columbia has lost nearly ninety percent of its orchards to *eastern filbert blight*. In 2018, BCAGRI launched a 3-year tree-removal and replanting program and a 2-year disease surveillance and management program for hazelnuts. The intention of these programs is to replant disease-resistant varieties originating from Oregon State. However, the phytosanitary import requirements that are in place to prevent the introduction of *A. anomala* to British Columbia also limit the importation of hazelnut planting materials and are viewed as an impediment to the growth of British Columbia's hazelnut sector.

## 7.0 Risk Management Decision

The CFIA has reviewed the available scientific information and has made the decision to deregulate *A. anomala*. *Anisogramma anomala* is present in all commercial hazelnut production areas of Canada, including British Columbia, and is also harboured by native species of *Corylus* throughout North America. This pathogen is not under official control in British Columbia. *Anisogramma anomala* no longer meets internationally accepted criteria to be considered a quarantine pest. The decision to deregulate *A. anomala* is expected to benefit the hazelnut industry in British Columbia by improving access to *A. anomala*-resistant hazelnut varieties.

The CFIA intends to remove *A. anomala* from Schedule II of the *Plant Protection Regulations* during the next regulatory revision process. Until this regulatory change is made, the following changes will serve to functionally deregulate *A. anomala*. The CFIA will revoke directive D-00-03: *Import requirements from the United States and domestic movement requirements for material to prevent the introduction of Eastern filbert blight into British Columbia*. In addition, the CFIA will not take regulatory action to enforce item 14 (10) of Schedule II of the *Plant Protection Regulations* as it pertains to the domestic movement of filbert (*Corylus* spp.).

As part of the deregulation process, *A. anomala* will be removed from the List of Pests Regulated by Canada and the Automated Import Reference System (AIRS) will be updated to reflect that the importation of articles of *Corylus* spp. are no longer subject to the requirements described in directive D-00-03. Importation of *Corylus* spp. plants for planting from the continental United States and the Netherlands will require a permit to import and a phytosanitary certificate. *Corylus* spp. plants for planting from the rest of the world are considered [Not Authorized Pending a Pest Risk Analysis](#) (NAPPRA). Trading partners will be notified through the World Trade Organization that *A. anomala* is no longer a pest regulated by Canada.

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