Plant Risk Evaluator -- PRE™
Evaluation Report

Malus 'Donald Wyman' -- Illinois

2017 Farm Bill PRE Project

PRE Score: 10 -- Accept (low risk of invasiveness)
Confidence: 52 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

Privacy: Public
Status: Submitted

Evaluation Date: July 19, 2017

This PDF was created on June 15, 2018

Plant Evaluated

Malus 'Donald Wyman'

Image by MBOT

Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Malus 'Donald Wyman'*) in an effort to understand the invasive history, reproductive strategies, and the impact, if any, on the region's native plants and animals. This research reflects the data available at the time this evaluation was conducted.

General Information

Status: Submitted
Screener: Emily Russell
Evaluation Date: July 19, 2017

Plant Information

Plant: *Malus 'Donald Wyman'*

If the plant is a cultivar, how does its behavior differs from its parent's?
'Donald Wyman' has a broad, rounded habit. It is a larger crabapple that is sometimes used as a street tree. The flowers are white. The bright red fruit is noted to be "among the most persistent of all crabapples." It is also noted to be resistant to scab, cedar-apple rust, and mildew. 'Donald Wyman' was discovered as a chance seedling at the Arnold Arboretum around 1950. The exact parentage is unknown, but it is likely to have both Malus floribunda and Malus baccata in its genetic make-up. 'Donald Wyman' may be grafted onto a seedling or clonal rootstock.

Regional Information

Region Name: Illinois

Climate Matching Map

To answer four of the PRE questions for a regional evaluation, a climate map with three climate data layers (Precipitation, UN EcoZones, and Plant Hardiness) is needed. These maps were built using a toolkit created in collaboration with GreenInfo Network, USDA, PlantRight, California-Invasive Plant Council, and The Information Center for the Environment at UC Davis.

Click here to see the generated climate matching map for this region. This climate match database is hosted by GreenInfo Network and publicly accessible.

Evaluation Questions

These questions are based in an original article published at the University of California, Davis, and can be found on the PLOS One website, here: https://doi.org/10.1371/journal.pone.0121053

Invasive History and Climate Matching (Questions 1 - 6)

1. Has the species (or cultivar or variety, if applicable; applies to subsequent "species" questions) become naturalized where it is not native?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Several species and hybrids of flowering crabapple have become naturalized where they are not native. Though the exact parentage is unknown, there is no evidence that Malus 'Donald Wyman' does not or would not naturalize.

Reference(s):

- USDA NRCS (2017). USDA PLANTS Database: Malus baccata (Siberian crab apple).
- USDA NRCS (2017). USDA PLANTS Database: Malus floribunda (Japanese flowering crab apple).
- USDA NRCS (2017). USDA PLANTS Database: Malus platycarpa (bigfruit crab).
- USDA NRCS (2017). USDA PLANTS Database: Malus prunifolia (plumleaf crab apple).
- USDA NRCS (2017). USDA PLANTS Database: Malus toringo (toringo crab).

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2. Is the species (or cultivar or variety) noted as being naturalized in the US or world in a similar climate?

- Answer: **Yes**, which contributes **2** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Several species and hybrids of flowering crabapple have become naturalized in the Midwestern and Mid-Atlantic United States. Though the exact parentage is unknown, there is no evidence that Malus 'Donald Wyman' does not or would not naturalize.

Reference(s):

- USDA Forest Service (2002). Midewin National Tallgrass Prairie Environmental Impact Statement Appendix C - Invasive Species.
- Wisconsin DNR Forest Health Protection Unit (2014). Southern Wisconsin Forest Health Update. 11(6), 7-9.
- Hilty, J. (2016). Plum-Leaved Crab Apple (Malus prunifolia).
- USDA NRCS (2017). USDA PLANTS Database: Malus baccata (Siberian crab apple).
- USDA NRCS (2017). USDA PLANTS Database: Malus floribunda (Japanese flowering crab apple).
- USDA NRCS (2017). USDA PLANTS Database: Malus platycarpa (bigfruit crab).
- USDA NRCS (2017). USDA PLANTS Database: Malus prunifolia (plumleaf crab apple).
- USDA NRCS (2017). USDA PLANTS Database: Malus toringo (toringo crab).

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3. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Malus species generally appear on invasive lists as naturalized, needing further evaluation, or potential invaders. Evidence of significant damage caused by Malus is lacking.

Reference(s):

- USDA Forest Service (2002). Midewin National Tallgrass Prairie Environmental Impact Statement Appendix C - Invasive Species.
- Chicago Botanic Garden (2017). Invasive Plants in the Chicago Region.
- East Central Illinois Master Naturalists, Champaign County Master Gardeners (2013). Invasive Plants of East Central Illinois.
- New Jersey Invasive Species Strike Team (2012). NJ Invasive Species Strike Team Target Species Fact Sheets.

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4. Is the species (or cultivar or variety) noted as being invasive in the US or world in a similar climate?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Malus species are generally described as naturalized, needing further evaluation, or potential invaders in the Midwest. Evidence of significant damage caused by Malus is lacking.

Reference(s):

- USDA Forest Service (2002). Midewin National Tallgrass Prairie Environmental Impact Statement Appendix C - Invasive Species.
- Chicago Botanic Garden (2017). Invasive Plants in the Chicago Region.
- East Central Illinois Master Naturalists, Champaign County Master Gardeners (2013). Invasive Plants of East Central Illinois.
- Hilty, J. (2016). Plum-Leaved Crab Apple (Malus prunifolia).
- Adelman, C., & Schwartz B. L. (2017). Midwestern Native Shrubs and Trees: Gardening Alternatives to Nonnative Species.

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5. Are other species of the same genus (or closely related genera) invasive in a similar climate?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Malus x domestica, M. pumila, and M. sylvestris (which some taxonomists consider to be synonyms) are widely naturalized and listed as an invasive or environmental weeds in the Global Compendium of Weeds in warmer climates such as Australia, the Mediterranean, and Argentina. Significant damage in a similar climate to Illinois has not been documented.

Reference(s):

- Randall, R. (2012). A Global Compendium of Weeds. 2nd Edition..

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6. Is the species (or cultivar or variety) found predominately in a climate matching the region of concern?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Very High** confidence in this answer based on the available literature.

Answer / Justification:

Flowering crabapple hybrids are widespread and grow in many climates.

Reference(s):

- GBIF Secretariat (2016). GBIF Backbone Taxonomy: Malus Mill..

Impact on Native Plants and Animals (Questions 7 - 10)

7. Does this plant displace native plants and dominate (overtop or smother) the plant community in areas where it has established?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

The Wisconsin DNR documented two populations of invasive crabapples displacing native plants and dominating the plant community. The New Jersey Invasive Species Strike Team says Malus toringo is "highly threatening to natural plant communities." However, many naturalized populations of Malus do not dominate the communities where they are established and the potential impacts of Malus 'Donald Wyman' are unknown, resulting in a low confidence level for this answer.

Reference(s):

- Wisconsin DNR Forest Health Protection Unit (2014). Southern Wisconsin Forest Health Update. 11(6), 7-9.
- New Jersey Invasive Species Strike Team (2012). NJ Invasive Species Strike Team Target Species Fact Sheets.

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8. Is the plant noted as promoting fire and/or changing fire regimes?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Hybrid crabapples are not noted as changing fire regimes.

Reference(s):

- [Anonymous] .

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9. Is the plant a health risk to humans or animals/fish? Has the species been noted as impacting grazing systems?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Malus is not a health risk to humans or animals. There are not reports of impacting grazing systems.

Reference(s):

- [Anonymous] .

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10. Does the plant produce impenetrable thickets, blocking or slowing movement of animals, livestock, or humans?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Crabapples often grow in thickets in their native habitats. The Wisconsin DNR documented a thicket of invasive crabapples that were "near impossible to walk through."

Reference(s):

- Wisconsin DNR Forest Health Protection Unit (2014). Southern Wisconsin Forest Health Update. 11(6), 7-9.

Reproductive Strategies (Questions 11 - 17)

11. Does this species (or cultivar or variety) reproduce and spread vegetatively?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Malus 'Donald Wyman' is often propagated by grafting or budding onto a a seedling or clonal rootstock. Suckering is not uncommon and some rootstocks are particularly prone to suckering.

Reference(s):

- The Morton Arboretum (2017). Crabapple cultivars. 2017,
- Christman, S. (2014). Malus sp Plant Profile in: Floridata Plant Encyclopedia.

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12. If naturally detached fragments from this plant are capable of producing new plants, is this a common method of reproduction for the plant?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Reproduction from fragments is not a common occurrence for crabapples.

Reference(s):

- [Anonymous] .

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13. Does the species (or cultivar or variety) commonly produce viable seed?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Seed viability studies are not available for Malus 'Donald Wyman,' but hybrid crabapples generally do have viable seed. 'Donald Wyman' is known for producing abundant fruits and there is no evidence of low viability.

Reference(s):

- Smith, E.. M. (1981). The Flowering Crabapple – A Tree for All Seasons. Journal of arboriculture.
- Missouri Botanical Garden (2017). Malus 'Donald Wyman' - Plant Finder.

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14. Does this plant produce copious viable seeds each year (> 1000)?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Seed viability studies are not available for Malus 'Donald Wyman,' but hybrid crabapples generally do have viable seed. Some Malus cultivars tend toward alternate bearing. 'Donald Wyman' is known for producing abundant fruits and there is no evidence of low viability.

Reference(s):

- Smith, E.. M. (1981). The Flowering Crabapple – A Tree for All Seasons. Journal of arboriculture.

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15. Is there significant germination (>25%) of seeds the next growing season, with no requirement of an infrequent environmental condition for seeds to germinate (i.e. fire) or long dormancy period?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Germination studies on Malus 'Donald Wyman' are not available, but for Malus species "germination percentages of 90% or greater are commonly achieved using the relatively simple cold stratification process." Malus baccata had a 54% germinative capacity after 30 days of cold stratification in a USDA Forest Service test. Illinois winters regularly provide cold stratification.

Reference(s):

- USDA Forest Service (2008). USDA FS Agriculture Handbook 727 - The Woody Plant Seed Manual.

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16. Does this plant produce viable seed within the first three years (for an herbaceous species) to five years (for a woody species) after germination?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Reference(s):

- [Anonymous] .

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17. Does this plant continuously produce seed for >3 months each year or does seed production occur more than once a year?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Malus 'Donald Wyman' blooms for only a few weeks in spring. Though the fruits are highly persistent, they are only produced once a year.

Reference(s):

- The Morton Arboretum (2017). Crabapple cultivars. 2017,
- Smith, E.. M. (1981). The Flowering Crabapple – A Tree for All Seasons. Journal of arboriculture.

Dispersal (Questions 18 - 20)

18. Are the plant’s propagules frequently dispersed long distance (>100 m) by mammals or birds or via domestic animals?

- Answer: **Yes**, which contributes **1** points to the total PRE score.
- The *screener* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Crabapples are generally eaten by mammals and birds, and could potentially be dispersed long distance. However: "From personal observation, the cultivar 'Donald Wyman' has very persistent fruit with much of it remaining hard and falling to the ground in spring. The birds don't like to eat hard crabapple fruit. I suspect most of the fruit either rots beneath the tree or is consumed by ground dwelling animals like squirrels or mice. Because the fruit does not soften readily, the birds do not find it attractive so this decreases the chances of this plant being spread far distances. Other cultivars, like 'Bob White' or zumi 'Calocarpa' or others that soften on the tree are much more attractive and palatable to birds than 'Donald Wyman'." (Michael Yanny, Johnson's Nursery, see issues).

Reference(s):

- [Anonymous] .

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19. Are the plant’s propagules frequently dispersed long distance (>100 m) by wind or water?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Crabapples are not frequently dispersed by wind or water.

Reference(s):

- [Anonymous] .

20. Are the plant’s propagules frequently dispersed via contaminated seed (agriculture or wildflower packets), equipment, vehicles, boats or clothing/shoes?

- Answer: **No**, which contributes **0** points to the total PRE score.
- The *screener* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

There is not evidence of accidental human dispersal.

Reference(s):

- [Anonymous] .

Total PRE Score

PRE Score: 10 -- Accept (low risk of invasiveness)
Confidence: 52 / 100
Questions answered: 20 of 20 -- Valid (80% or more questions answered)

PRE Score Legend

The PRE Score is calculated by adding the point totals for each (answered) question.
< 13 : accept (low risk of invasiveness)
13 - 15 : evaluate further
> 15 : reject (high risk of invasiveness)

Questions Answered Legend

It is important to answer at least 16 questions to consider a PRE Score as "valid".
>= 16 : valid (80% or more questions answered)
<= 15 : invalid (not enough questions answered)

Organization Ownership and Content Privacy

Organization: 2017 Farm Bill PRE Project
Content Privacy: Public

Evaluation Reviewers

The PRE approach is to base decisions on science and make decisions by consensus of diverse horticultural stakeholders. The literature review and process of answering PRE's questions are based on science; the decisions of which plants to prioritize are based on consensus. To ensure this process is in place and that PRE is collaborative, volunteer stakeholders are recruited from each region to review evaluations. The following experts in their profession (plant science, conservation, or horticultural trade) have participated as volunteer PRE reviewers for this evaluation:

• Steve Worth	December 22, 2017
• Michael Yanny	December 6, 2017
• Kim Shearer	November 13, 2017
• Linda Mackechnie	November 12, 2017

This evaluation has a total of 4 reviewer(s).

Evaluation Issues

The following section lists all public issues for this evaluation. Issues provide a way for stakeholder reviewers to communicate any concerns or suggestions they might have with the plant or evaluation. Please email PlantRight@suscon.org if additional action is required to resolve open issues.

Issue ID # 6226

Date Created: December 22, 2017 - 12:07pm
Date Updated: February 19, 2018 - 7:51pm

Submitted by: Steve Worth

Status: Fixed
Type: Comment
Severity: Major
Scope: Q03. Is the species (or cultivar or variety) noted as being invasive in the U.S. or world?

Issue Description

see malus Adams

Issue Resolution
No resolution has been entered for this issue.

Issue ID # 6058

Date Created: December 6, 2017 - 12:37pm
Date Updated: December 10, 2017 - 12:26pm

Submitted by: Michael Yanny

Status: Fixed
Type: Suggestion
Severity:

Major

Scope: Q18. Are the plant’s propagules dispersed long distance (>100 m) by mammals or birds or via domestic animals?

Issue Description

From personal observation, the cultivar 'Donald Wyman' has very persistent fruit with much of it remaining hard and falling to the ground in spring. The birds don't like to eat hard crabapple fruit. I suspect most of the fruit either rots beneath the tree or is consumed by ground dwelling animals like squirrels or mice. Because the fruit does not soften readily, the birds do not find it attractive so this decreases the chances of this plant being spread far distances. Other cultivars, like 'Bob White' or zumi 'Calocarpa' or others that soften on the tree are much more attractive and palatable to birds than 'Donald Wyman'.

Issue Resolution (Screener's Response to Issue)

Added these observations to the answer, and lowered confidence level due to conflicting information.

About PRE and this Plant Evaluation Report

The PlantRight Plant Risk Evaluator -- PRE is an online database and platform enabling those involved in non-native, terrestrial plant production to know before they grow if a plant poses a regional invasive risk. This tool offers many benefits, and we encourage you to visit the PRE website (https://pre.ice.ucdavis.edu) for more information.

If you are a nursery trade association, or involved in the research, development or distribution of horticultural plants we invite you to join the PRE community. If you are a plant scientist, affiliated with a horticultural college or botanic garden, and would like to learn more about becoming a PRE Screener, please drop us an email, PlantRight@suscon.org, requesting a PRE Account.

PRE beta funding is provided by Sustainable Conservation (http://www.suscon.org/) and a USDA Farm Bill grant.