



***Plant Risk Evaluator -- PRETM
Evaluation Report***

Malus 'Jewelcole' RED JEWEL -- 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: April 24, 2017

This PDF was created on June 15, 2018



Plant Evaluated

Malus 'Jewelcole' RED JEWEL



Image by Mark A. Miller



Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Malus 'Jewelcole' RED JEWEL*) 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: April 24, 2017

Plant Information

Plant: *Malus 'Jewelcole' RED JEWEL*

If the plant is a cultivar, how does its behavior differs from its parent's?

The cultivar 'Red Jewel' was named for its abundant red fruits a half inch in diameter that persist on the tree longer than other crabapples. The flowers are white. The habit is more upright and pyramidal than other selections, 15-18 feet high and 12 feet wide. It is reported to have good disease resistance to apple scab and cedar-apple rust. The exact parentage of Red Jewel is unknown, but it is likely to have both *Malus floribunda* and *Malus baccata* in its breeding history. 'Red Jewel' may be grafted onto a seedling or clonal rootstock. The cultivar 'Red Jewel' was introduced in 1971 by Bill Collins of the Cole Nursery Company in Circleville, Ohio. 'Red Jewel' was registered as a trademark in 2011, so the correct cultivar name is 'Jewelcole.'

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 *screeners* 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 'Jewelcole' 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 *screeners* 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 'Jewelcole' 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 *screeener* 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.
 - New Jersey Invasive Species Strike Team (2012). NJ Invasive Species Strike Team Target Species Fact Sheets.
 - East Central Illinois Master Naturalists, Champaign County Master Gardeners (2013). Invasive Plants of East Central Illinois.
 - Chicago Botanic Garden (2017). Invasive Plants in the Chicago Region.
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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 *screeners* 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.
 - 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.
 - Chicago Botanic Garden (2017). Invasive Plants in the Chicago Region.
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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 *screeners* 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..



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 *screeners* 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..
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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 *screeners* 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 'Red Jewel' 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 *screeners* 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] .
-

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 *screeners* 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] .
-



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 *screeners* 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.
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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 *screeners* has a **Medium** confidence in this answer based on the available literature.

Answer / Justification:

Malus 'Red Jewel' is often propagated by grafting or budding onto 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 *screeners* 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] .
-

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

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

Answer / Justification:

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

Reference(s):

- [Anonymous] .
-

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

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



Answer / Justification:

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

Reference(s):

- [Anonymous] .
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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 *screeners* has a **Low** confidence in this answer based on the available literature.

Answer / Justification:

Germination studies on Malus 'Red Jewel' 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.
-

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 points to the total PRE score.
- The *screeners* has a **Medium** confidence in this answer based on the available literature.



Reference(s):

- [Anonymous] .
-

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 *screeener* has a **High** confidence in this answer based on the available literature.

Answer / Justification:

Malus 'Red Jewel' blooms for only a few weeks in spring.

Reference(s):

- Tenenbaum, F. (2003). Taylor's Encyclopedia of Garden Plants.
 - The Morton Arboretum (2017). Crabapple cultivars. 2017,
-

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 *screeener* 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 'Red Jewel' 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 'Red Jewel'" (Michael Yanny, Johnson Nurseries, see issues).

Reference(s):

- [Anonymous] .
-

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

- Answer: **No**, which contributes points to the total PRE score.
- The *screeener* 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 points to the total PRE score.
- The *screeener* 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 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 # 6230

Date Created: December 22, 2017 - 12:11pm

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 # 6062

Date Created: December 6, 2017 - 12:54pm

Date Updated: December 10, 2017 - 12:04pm

Submitted by: Michael Yanny

Status: Fixed

Type: Suggestion

Severity:



Minor

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 'Red Jewel' 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 'Red Jewel'.

Issue Resolution (Screener's Response to Issue)

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

Issue ID # 3142

Date Created: May 10, 2017 - 9:16am

Date Updated: June 19, 2017 - 3:35pm

Submitted by: Richard Hawke

Status: Fixed

Type:

Severity: Minor

Scope: Q17. Does this plant continuously produce seed for >3 months each year or does seed production occur more than once a year?

Issue Description

The fruit of Red Jewel is viable for greater than 3 months, which seems equivalent to producing seed for greater than 3 months. As noted, flower production is fleeting in spring only but the persistent fruit remains on the tree for a long period and therefore can be eaten and potentially spread around for the duration of the fruiting period.

Issue Resolution (Screener's Response to Issue)



I interpret this question to refer to seed production only. Persistence of viable seed seems to be a different issue.

Issue ID # 3141

Date Created: May 10, 2017 - 9:12am

Date Updated: June 19, 2017 - 3:40pm

Submitted by: Richard Hawke

Status: Fixed

Type:

Severity: Minor

Scope: Q11. Does this species (or cultivar or variety) reproduce and spread vegetatively?

Issue Description

If the root stock of a clonal selection is suckering and spreading vegetatively, I'm not sure that that translates to the clonal selection (Red Jewel) becoming/being a potential pest. Of course, if suckering on Red Jewel is pervasive and generally unchecked, then this clone could theoretically pose a problem.

Issue Resolution (Screener's Response to Issue)

If the clonal selection is usually planted with a rootstock that suckers, then I do believe that selection presents a threat of spreading vegetatively in a real-world, practical sense. I will lower the confidence on this question to medium.



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.