



***Plant Risk Evaluator -- PRE<sup>TM</sup>  
Evaluation Report***

***Euonymus alatus 'Rudy Haag' -- Illinois***

***2017 Farm Bill PRE Project***

**PRE Score:** 17 -- Reject (high risk of invasiveness)

**Confidence:** 63 / 100

**Questions answered:** 20 of 20 -- Valid (80% or more questions answered)

**Privacy:** Public

**Status:** Submitted

**Evaluation Date:** September 21, 2017

*This PDF was created on June 15, 2018*



## Plant Evaluated

*Euonymus alatus* 'Rudy Haag'



Image by MBOT



## Evaluation Overview

A PRE™ screener conducted a literature review for this plant (*Euonymus alatus* 'Rudy Haag') 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.

## Summary

*Euonymus alatus* is invasive in Illinois and across the Midwest, Mid-Atlantic, and New England. 'Rudy Haag' has been promoted as a less-invasive alternative to other cultivars of this popular landscaping shrub. 'Rudy Haag' is more compact and produces fewer seeds. However, seed production appears to be variable: some studies counted 0, 6, or 12 seeds per plant, and others counted 986 to 2,186 seeds per plant. More research is needed on viability as no germination trials were available for this cultivar. 'Rudy Haag' does not come true from seed. Seedlings could show the invasive traits of the species, so spread into wild areas and impacts to native plants and animals cannot be ruled out. Birds disperse the seeds long distances, so even a few seeds present a risk of new invasive populations. Four states have banned all cultivars of *Euonymus alatus*. This evaluation confirms that 'Rudy Haag' is not a safe choice for Illinois landscapes either.

## General Information

**Status:** Submitted

**Screener:** Emily Russell

**Evaluation Date:** September 21, 2017

## Plant Information

**Plant:** *Euonymus alatus* 'Rudy Haag'

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

'Rudy Haag' is significantly smaller than the species at 4-5' high and wide, it has a slower growth rate, and it produces less seed.

## 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 **Medium** confidence in this answer based on the available literature.

#### Answer / Justification:

The species *Euonymus alatus* is naturalized across the Eastern United States. The cultivar 'Rudy Haag' shows less fecundity than the species, but does produce viable seed that can travel long distances. All cultivars of *Euonymus alatus*, including 'Rudy Haag', are prohibited in 4 states, which could be taken as evidence that it is expected to naturalize.

#### Reference(s):

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).
- 

#### 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 **Medium** confidence in this answer based on the available literature.

#### Answer / Justification:

*Euonymus alatus* is naturalized in Illinois, the Midwest, Mid-Atlantic, Northeast, and Ontario, which contain areas that are a climate match.



**Reference(s):**

- Kartesz, J. T. (2015). The Biota of North America Program (BONAP).
- 

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

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

**Answer / Justification:**

*Euonymus alatus* is invasive in Illinois and across the Midwest, Mid-Atlantic, and New England. Cultivars, including 'Rudy Haag', are prohibited in Massachusetts, Maine, New Hampshire, and Vermont.

**Reference(s):**

- Maine Department of Agriculture, Conservation and Forestry (2017). CRITERIA FOR LISTING INVASIVE TERRESTRIAL PLANTS.
  - NH Department of Agriculture, Markets & Food, Division of Plant Industry (2017). Fact Sheet: Prohibited Invasive Plant Species Rules, Agr 3800.
  - Massachusetts Department of Agricultural Resources (2009). Massachusetts Prohibited Plant List.
  - Vermont Agency of Agriculture, Food & Markets (2013). Quarantine # 3 - Noxious Weeds.
  - Midwest Invasive Plant Network (2015). Midwest Invasive Plant List.
  - Swearingen, J., Slattery B., Reshetiloff K., & Zwicker S. (2010). Plant Invaders of Mid-Atlantic Natural Areas. 168.
- 

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

- Answer: **Yes**, which contributes **3** points to the total PRE score.
- The *screeener* has a **Medium** confidence in this answer based on the available literature.



**Answer / Justification:**

*Euonymus alatus* is invasive in Illinois and across the Midwest, Mid-Atlantic, and New England. *Euonymus alatus* 'Rudy Haag' is prohibited in Maine and Vermont, parts of which share a climate with Illinois.

**Reference(s):**

- Maine Department of Agriculture, Conservation and Forestry (2017). CRITERIA FOR LISTING INVASIVE TERRESTRIAL PLANTS.
  - Vermont Agency of Agriculture, Food & Markets (2013). Quarantine # 3 - Noxious Weeds.
  - Midwest Invasive Plant Network (2015). Midwest Invasive Plant List.
  - Swearingen, J., Slattery B., Reshetiloff K., & Zwicker S. (2010). Plant Invaders of Mid-Atlantic Natural Areas. 168.
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**5. Are other species of the same genus (or closely related genera) invasive in a similar climate?**

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

**Answer / Justification:**

*Euonymus fortunei* is invasive in Illinois, Indiana, Missouri and Ohio.

**Reference(s):**

- Midwest Invasive Plant Network (2015). Midwest Invasive Plant List.
- 

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

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



**Answer / Justification:**

Native distribution in Korea and Hokkaido, Japan, match the climate of Illinois. Occurrences in GBIF in the Eastern United States and Northern Europe match. Occurrences in Central China, Southern Japan, Central Europe, and a few sparse occurrences in the Western United States do not match. In the US, the vast majority of states listing *Euonymus alatus* as invasive match the climate of Illinois.

**Reference(s):**

- GBIF (0). *Euonymus alatus* (Thunb.) Siebold\_GBIF.
- 

## 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 **Medium** confidence in this answer based on the available literature.

**Answer / Justification:**

For invasive *Euonymus alatus*: "It shades out native herbs and crowds out native shrubs." The cultivar 'Rudy Haag' is smaller, slower-growing, and produces fewer seeds. However, "if crossed with other cultivars or selfed, they produce offspring with traits and fecundities that do not resemble the parent plant" (Knight). Impacts to native plant communities cannot be ruled out for 'Rudy Haag'.

**Reference(s):**

- Knight, T. M., Havens K., & Vitt P. (2011). Will the use of Less Fecund Cultivars Reduce the Invasiveness of Perennial Plants?. *BioScience*. 61, 816–822.
  - US Forest Service (0). Weed of the week\_*Euonymus alatus*.
- 

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

- 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:**

According to the FEIS, the effects of *Euonymus alatus* on fire regimes are unknown and more research is needed. However, John Taft of the Illinois Natural History Survey notes: "This taxon displaces native species, particularly herbaceous taxa, that are part of the fuel load required for effective fire management. Consequently, infestations of *Euonymus alatus* (any cultivar) can have a negative impact on fire regimes needed to sustain healthy ecosystems in the Midwest" (see issues).

**Reference(s):**

- Fryer, J. L. (2009). *Euonymus alatus* - Fire Effects Information System.
- 

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

**Answer / Justification:**

All parts of *Euonymus alatus* 'Rudy Haag' are toxic to humans if ingested in large quantities. It is also poisonous to cats, dogs, and horses. However, there are not reports of *Euonymus* poisoning in the literature after years of invasion, so this doesn't seem to be a common hazard.

**Reference(s):**

- Plants.ces.ncsu.edu (0). *Euonymus alatus* 'Compactus'\_NC stateKB.
- 

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



**Answer / Justification:**

Dense thickets of *Euonymus alatus* are described in the literature. The cultivar 'Rudy Haag' is more compact than the species, but seedlings from this plant could be thicket-forming.

**Reference(s):**

- Swearingen, J., Slattery B., Reshetiloff K., & Zwicker S. (2010). Plant Invaders of Mid-Atlantic Natural Areas. 168.
  - Ebinger, J., Newman J., & Nyboer R. (1984). Naturalized Winged Wahoo in Illinois. Natural Areas Journal. 4, 26–29.
  - Knight, T. M., Havens K., & Vitt P. (2011). Will the use of Less Fecund Cultivars Reduce the Invasiveness of Perennial Plants?. BioScience. 61, 816–822.
- 

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

**Answer / Justification:**

*Euonymus alatus* tolerates hard pruning and will re-sprout from a cut stump. It also colonizes slowly by root suckers.

**Reference(s):**

- Fryer, J. L. (2009). *Euonymus alatus* - Fire Effects Information System.
  - US Forest Service (0). Weed of the week\_ *Euonymus alatus*.
- 

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



**Answer / Justification:**

No evidence of reproducing from fragments in the wild.

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

**Answer / Justification:**

Seed is the primary means of reproduction for *Euonymus alatus*. 'Rudy Haag' has been described as "nearly seedless," but there is evidence of seed production of varying quantities in different years and locations.

**Reference(s):**

- Brand, M. H., Lubell J. D., & Lehrer J. M. (2012). Fecundity of Winged *Euonymus* Cultivars and Their Ability to Invade Various Natural Environments. *HortScience*. 47, 1029–1033.
  - Finneseth, C., Geneve R., & Dunwell W. (2007). Fruit Production in 'Compactus' and 'Rudy Haag' Burning Bush.
- 

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

- 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:**

In a Connecticut study 'Rudy Haag' produced 986 seeds per plant in 2006 and 2,186 seeds per plant in 2007 (Brand). However, a Kentucky study found 'Rudy Haag' to produce only an average of 12 seeds per plant over three years at two sites. Brand explains: "both the Ranney et al. research (North Carolina) and the Finneseth et al. work were conducted in locations much further south than Connecticut and it is possible that *E. alatus* sets seed better in cooler regions, although there is no published evidence to support this theory." Though it is possible for 'Rudy Haag' to produce copious viable seeds, evidence is lacking that it does so every year.

**Reference(s):**

- Brand, M. H., Lubell J. D., & Lehrer J. M. (2012). Fecundity of Winged *Euonymus* Cultivars and Their Ability to Invade Various Natural Environments. *HortScience*. 47, 1029–1033.
  - Finneseth, C., Geneve R., & Dunwell W. (2007). Fruit Production in 'Compactus' and 'Rudy Haag' Burning Bush.
- 

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

**Answer / Justification:**

No germination trials of 'Rudy Haag' could be found, but *Euonymus alatus* generally has substantial rates of germination in the second growing season, preferring multiple cycles of warm and cold stratification. This slightly delayed germination still occurs at high rates and does not seem to be slowing the spread of the plant into natural areas. It is possible that passing through the digestive tract of birds provides some scarification and may allow germination in the first spring, but this is unconfirmed.

**Reference(s):**

- Ranney, T. G., Eaker T. A., & Mowrey J. A. (2007). Assessing Fertility among Cultivars of Winged *Euonymus*. *Proceedings of the Southern Nursery Conference*. 52, 352–354.
- Brand, M. H., Lubell J. D., & Lehrer J. M. (2012). Fecundity of Winged *Euonymus* Cultivars and Their Ability to Invade Various Natural Environments. *HortScience*. 47, 1029–1033.
- 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 **0** points to the total PRE score.
- The *screeener* has a **Medium** confidence in this answer based on the available literature.

**Answer / Justification:**

'Rudy Haag' reportedly has a slower growth rate than the species.

**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 **Very High** confidence in this answer based on the available literature.

**Answer / Justification:**

'Rudy Haag' blooms in May.

**Reference(s):**

- Missouri Botanical Garden (2017). *Euonymus alatus* 'Rudy Haag' - Plant Finder.
-



## 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 **High** confidence in this answer based on the available literature.

#### Answer / Justification:

The seeds are dispersed long distances by birds.

#### Reference(s):

- Brand, M. H., Lubell J. D., & Lehrer J. M. (2012). Fecundity of Winged *Euonymus* Cultivars and Their Ability to Invade Various Natural Environments. *HortScience*. 47, 1029–1033.
  - Fryer, J. L. (2009). *Euonymus alatus* - Fire Effects Information System.
  - Swearingen, J., Slattery B., Reshetiloff K., & Zwicker S. (2010). Plant Invaders of Mid-Atlantic Natural Areas. 168.
- 

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

#### Answer / Justification:

There is no evidence of dispersal 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 *screeners* has a **Medium** confidence in this answer based on the available literature.

**Answer / Justification:**

There is no evidence of accidental dispersal by humans.

**Reference(s):**

- [Anonymous] .
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**Total PRE Score**

**PRE Score:** 17 -- Reject (high risk of invasiveness)

**Confidence:** 63 / 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:

- John Taft

September 25, 2017

This evaluation has a total of 1 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](mailto:PlantRight@suscon.org) if additional action is required to resolve open issues.

### Issue ID # 5029

**Date Created:** September 25, 2017 - 12:18pm

**Date Updated:** December 10, 2017 - 1:41pm

**Submitted by:** John Taft

**Status:** Fixed

**Type:** Suggestion

**Severity:** Minor

**Scope:** Q08. Is the plant noted as promoting fire and/or changing fire regimes?

### Issue Description

As noted in Q7, this taxon displaces native species, particularly herbaceous taxa, that are part of the fuel load required for effective fire management. Consequently, infestations of *Euonymus alatus* (any cultivar) can have a negative impact on fire regimes needed to sustain healthy ecosystems in the Midwest.

### Issue Resolution (Screener's Response to Issue)

Changed answer to Yes with medium confidence and included quote from John Taft.

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## **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](mailto: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.