

A Comparative Study of Lady Ferns and Japanese Painted Ferns (*Athyrium* spp.)

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Athyrium filix-femina

Lady ferns and Japanese painted ferns (*Athyrium* spp.) are among the most elegant yet utilitarian plants for the shade garden. Their lacy fronds arch and twist in a graceful manner, being both structural and ethereal at the same time. Ferns stand on their foliar merits alone, having no flowers to overshadow their feathery foliage. The lush green fronds of lady ferns are in marked contrast to the sage green, silver, and burgundy tones of the colorful Japanese painted ferns. The delicate quality of their fronds belies their stoutness—they are durable and hardy garden plants that can be broadly cultivated successfully throughout North America.

Lady ferns (*Athyrium filix-femina*, *A. otophorum*, and *A. vidalii*) and Japanese painted fern (*A. niponicum* var. *pictum*) are members

of the wood fern family (Dryopteridaceae) and just a few of the nearly 200 species native to temperate and tropical regions worldwide. The common lady fern (*A. filix-femina*) is a circumglobal species found in moist woodlands, meadows, and ravines throughout North America, Europe, and Asia, and is represented in gardens by a plethora of cultivars—many of the oldest forms originated in England during the Victorian era. Eared lady fern (*A. otophorum*) and Japanese lady fern (*A. vidalii*) are woodland natives in Japan, Korea, and China. Likewise, Japanese painted fern is native to moist shady sites in Japan, China, and Korea. *Athyrium niponicum* features green foliage, whereas the naturally occurring variant *pictum* offers up grayish-green fronds with purple midribs. In the past decade, the popularity of

Japanese painted ferns has spawned an array of new colorful cultivars as well as a few exceptional hybrids with the common lady fern.

While common botanical terms such as leaf, stem, and midrib can be used to describe fern foliage, specialized terminology further defines fern morphology. The fern leaf or frond is composed of the stipe (stem), blade (leaf), rachis (midrib), and pinna (leaflet). Crosier or fiddlehead describes the coiled frond as it emerges from the ground before it unfurls. The lacy or feathery texture of fern foliage is due to the number of pinnae (plural of pinna) and pinnules, which are the secondary division or subleaflets of a pinna. The division of the frond into multiple pinnae is described as bi- or tripinnate-pinnatifid, which means

two to three times divided. Ferns are non-flowering plants that reproduce asexually by spores, which are contained in capsules called sporangia that are often located on the undersides of the fronds. Clusters of sporangia are called sori; the shape and position of sori on the frond is important for fern identification.

Athyrium filix-femina has lance-shaped green fronds with green to reddish stipes and rachises. The bipinnate-pinnatifid blades have 20-30 pairs of pinnae, which accentuates the feathery texture of the foliage. Cultivars of lady fern are commonly grouped by enhanced foliar traits such as crested (*Cristatum*), crossed (*Cruciatum*), and feathery (*Plumosum*). Crested types feature fan-shaped tufts or tassels at the tips of the pinnae. The pinnae of the *Cruciatum* group crisscross along the rachis forming an X-pattern, while the pinnae of the feathery types are more finely divided giving the fronds a plumed look. Japanese

painted ferns feature lance-shaped, bipinnate blades with purple rachises. Cultivars have been selected for their frond color, which ranges from silvery to gray-green and is often suffused with purple or burgundy. Much like seed-grown plants, spore-grown ferns are variable in foliage coloration and character. The delicateness of the fronds of *Athyrium* spp. is not just about their appearance; in fact, the rachises and stipes are brittle and easily broken. The spores of lady ferns are borne in straight, crescent, or J-shaped sori, whereas the sori of Japanese painted ferns are half-moon to J-shaped and are positioned on the undersides of the fronds.

Lady ferns have clumping habits with gracefully arching fronds that arise from stout, upright rhizomes, giving them a somewhat formal look. The more organic habit of Japanese painted ferns is due to their slowly creeping and branching rhizomes, which form an irregular patch of

long-arching to twisted fronds. All species of *Athyrium* produce new fronds throughout summer and are deciduous in the fall; i.e. senescing foliage falls away naturally before winter.

Japanese painted ferns and lady ferns are generally easy to grow when correctly sited. They prefer moist, well-drained soils in partial to full shade but can tolerate some sunlight. While Japanese painted ferns grow in full shade, morning sun nicely enhances the leaf color. Consistent moisture is essential for keeping ferns healthy and lush but even so, fronds of lady ferns may look tattered by summer's end. Both of these ferns should be grown in sheltered locations to protect their fragile stipes and rachises. A heavy rain or irrigation event can beat down the delicate fronds of Japanese painted ferns, but in a day or two the plants should recover unless fronds were broken. Spores germinate readily in the garden, but cultivars will not come true to type from spores. Spring division or tissue-culture is necessary to propagate cultivars.

Japanese painted fern cultivars and hybrids are widely grown and popular garden plants, so much so that *Athyrium niponicum* var. *pictum* was the Perennial Plant of the Year in 2004. They are exceptional as accents or massed in shade gardens, woodlands, and near streams and ponds. And they work wonderfully in container plantings. Japanese painted ferns combine beautifully with bold-leaved perennials such as hostas (*Hosta* spp.), hellebores (*Helleborus* spp.), toad lilies (*Tricyrtis* spp.), and ligularias (*Ligularia* spp.). Their silvery and purple foliage pairs sublimely with the silver heart-shaped leaves of 'Jack Frost' and 'Silver Heart' buglosses (*Brunnera macrophylla*) or with a variety of purple-leaved coral bells (*Heuchera* spp.). Lady ferns can be used similarly in shady gardens, either singly or planted in drifts. Their elegant vertical form and lacy texture are equally well-paired with bolder leaves. Japanese painted ferns and lady ferns are listed for USDA Hardiness Zones 5-8, and possibly colder.



Photo by Richard Hawke

Athyrium niponicum 'Pictum Red'



Deparia acrostichoides

Photo by Pat Sommers

The Evaluation Study

The Chicago Botanic Garden (USDA Hardiness Zone 5b, AHS Plant Heat-Zone 5) evaluated 26 taxa of *Athyrium* from 2002 to 2014. The comparative study included *Deparia acrostichoides*, which was received as *Athyrium thelypteroides*, the previous name for this taxon. Each taxon was evaluated for a minimum of four years but due to the protracted trial period, many were grown for up to 12 years. The goal of the project was to identify outstanding lady ferns and Japanese painted ferns for upper midwestern gardens. In addition,

the study compared the named cultivars of *A. niponicum* var. *pictum* to determine the similarities of their foliar traits.

Three plants of each taxon were planted side-by-side for easy comparison of ornamental traits and landscape performance. Initially, the naturally shaded trial beds received either no sunlight or varying levels of filtered sunlight throughout the day. In 2006, the loss of a mature river birch exposed a portion of the trial site to western sun for several hours beginning in

mid-afternoon. The well-drained, clay-loam soil had a 7.5 pH during the trial.

Maintenance practices were kept to a minimum, thereby allowing the plants to thrive or fail under natural conditions. Water was provided via overhead irrigation as needed and the trial beds were top-dressed with composted mulch once each summer. Moreover, plants were never fertilized or winter mulched. Beginning in 2004, trial beds were surrounded by a 24-inch tall fence of hardware cloth to exclude rabbits.

The Performance Report

The trial began in the spring of 2002 with the planting of *Athyrium niponicum* var. *pictum* and seven cultivars and hybrids including 'Branford Beauty', 'Branford Rambler', 'Ghost', 'Pictum Red', 'Silver Falls', 'Ursula's Red', and 'Wildwood Twist'. An additional 18 taxa were added to the trials in subsequent years up to 2008. All plants were evaluated for their cultural adaptability to the soil and environmental conditions of the test site; disease and pest problems; winter hardiness or survivability; and ornamental qualities associated with foliage and plant habit. Final performance ratings are based on foliage and habit quality, plant health and cultural adaptability, and winter hardiness during the trial period. Plant traits and final performance ratings are shown in Table 1.

The majority of taxa in the trial received a five-star excellent rating or a four-star good rating for their overall performance. Top-rated plants displayed consistently attractive foliage, robust habits throughout each growing season, and winter hardiness during the evaluation term. The five-star plants included *Athyrium* 'Branford Beauty', *A.* 'Branford Rambler', *A.* 'Ghost', *A. filix-femina*, *A. filix-femina* 'Encourage', *A. filix-femina* 'Victoriae', *A. filix-femina* ssp. *cyclosorum*, *A. niponicum* var. *pictum* 'Apple Court', *A. niponicum* var. *pictum* 'Pewter Lace', *A. niponicum* var. *pictum* 'Regal Red', and *Deparia acrostichoides*. Only five taxa, *Athyrium filix-femina* 'Plumosum Axminster', *A. filix-femina* 'Vernoniae Cristatum', *A. niponicum* var.

pictum 'Soul Mate', *A. otophorum*, and *A. vidalii* received lower ratings for various reasons such as heat- and drought-stressed foliage, winter losses, and/or weak growth.

The ferns were generally adapted to the soil and environment of the test site, as long as their cultural needs were met. Droughty conditions occurred in most years of the trial, resulting in wilted foliage, leaf scorch, and/or foliar desiccation on many taxa. Symptoms were more pronounced on taxa that received afternoon sunlight following the removal of the mature river birch that had provided much of the shade for the trial site (see Table 1). After the loss of the tree in 2006, midsummer wilting was commonly observed in subsequent years during hot,

Table 1: Observed plant traits and performance ratings

Overall Rating ¹	<i>Athyrium</i>	Foliage Color	Growth Form	Height	Width	Trial Years	Light Exposure ²
★★★★★	<i>A.</i> 'Branford Beauty'	light silvery green, purple	clumping	18 in.	40 in.	2002-2014	☀
★★★★★	<i>A.</i> 'Branford Rambler'	bright green, purple	spreading	25 in.	40 in.	2002-2014	☀
★★★★★	<i>A.</i> 'Ghost'	silvery green, purple	clumping	30 in.	36 in.	2002-2014	☀
★★★★	<i>A.</i> 'Ocean's Fury'	light yellow-green, bronze	clumping	37 in.	40 in.	2007-2014	☀
★★★★★	<i>A. filix-femina</i>	bright green	clumping	33 in.	44 in.	2003-2014	☀
★★★★	<i>A. filix-femina</i> 'Dre's Dagger'	bright green	clumping	20 in.	36 in.	2005-2014	☀
★★★★★	<i>A. filix-femina</i> 'Encourage'	light green	clumping	22 in.	40 in.	2004-2014	☀
★★★★	<i>A. filix-femina</i> 'Frizelliae'	green	clumping	10 in.	22 in.	2003-2014	☀
★★★	<i>A. filix-femina</i> 'Plumosum Axminster'	lime-green	clumping	29 in.	50 in.	2007-2014	☀
★★★	<i>A. filix-femina</i> 'Vernoniae Cristatum'	bright green	clumping	24 in.	44 in.	2003-2014	☀
★★★★★	<i>A. filix-femina</i> 'Victoriae'	green	clumping	25 in.	36 in.	2003-2014	☀
★★★★★	<i>A. filix-femina</i> ssp. <i>cyclosorum</i>	green	clumping	36 in.	39 in.	2008-2014	☀
★★★★★	<i>A. niponicum</i> 'Pictum Red'	silvery green, green, purple	spreading	20 in.	32 in.	2002-2014	☀
★★★★★	<i>A. niponicum</i> var. <i>pictum</i>	silvery green, dark red	spreading	19 in.	32 in.	2002-2014	☀
★★★★★	<i>A. niponicum</i> var. <i>pictum</i> 'Apple Court'	silvery green to green, purple	spreading	24 in.	36 in.	2004-2014	☀
★★★★	<i>A. niponicum</i> var. <i>pictum</i> 'Burgundy Lace'	purple, silvery green	spreading	15 in.	27 in.	2003-2014	☀
★★★★★	<i>A. niponicum</i> var. <i>pictum</i> 'Pewter Lace'	bright silvery green, purple	spreading	18 in.	30 in.	2005-2014	☀
★★★★	<i>A. niponicum</i> var. <i>pictum</i> 'Red Beauty'	silvery green, purple	spreading	16 in.	32 in.	2005-2014	☀
★★★★★	<i>A. niponicum</i> var. <i>pictum</i> 'Regal Red'	silvery green, purple	spreading	16 in.	24 in.	2008-2014	☀
★★★★	<i>A. niponicum</i> var. <i>pictum</i> 'Silver Falls'	bright silvery green, purple	spreading	16 in.	28 in.	2002-2014	☀
★★★	<i>A. niponicum</i> var. <i>pictum</i> 'Soul Mate'	silvery green, purple	spreading	11 in.	14 in.	2004-2014	☀
★★★★	<i>A. niponicum</i> var. <i>pictum</i> 'Ursula's Red'	silvery green, green, purple	spreading	18 in.	30 in.	2002-2014	☀
★★★★	<i>A. niponicum</i> var. <i>pictum</i> 'Wildwood Twist'	silvery green, purple	spreading	20 in.	30 in.	2002-2014	☀
★★	<i>A. otophorum</i>	gray-green, burgundy	clumping	10 in.	22 in.	2004-2009	☀
★★★	<i>A. vidalii</i>	green-yellow	spreading	12 in.	22 in.	2010-2014	☀
★★★★★	<i>Deparia acrostichoides</i> (syn. <i>A. thelypteroides</i>)	green	clumping	20 in.	34 in.	2008-2014	☀

¹ Overall Ratings: ★★★★★ excellent, ★★★★ good, ★★★ fair, ★★ poor, ★ very poor

² Light Exposure in the Trial Site: ☀ full shade; ☀ mid-afternoon sun; ☀ morning sun, afternoon shade

Table 2: Weather summary for 2002-2014

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Lowest temperature °F (°C)	-5(-21)	-5(-21)	-9(-23)	-2(-19)	-8(-22)	-10(-23)	-6(-21)	-17(-27)	0(-18)	-7(-22)	2(-17)	-3(-19)	-16(-27)
Lowest temperature date	3/4	3/4	1/30	12/7	2/18	3/5	1/20	1/16	1/3	2/10	1/21	1/22	1/6
Highest temperature °F (°C)	101(38)	98(37)	93(34)	100(38)	100(38)	96(35)	93(34)	96(35)	97(36)	102(39)	105(41)	96(35)	91(33)
Highest temperature date	7/21	8/22	6/6	6/24	7/31	7/9	7/17	8/9	7/23	7/20	7/5	7/18	7/17
Number of growing season days ^a	146	150	155	158	143	196	181	175	177	192	165	185	186
Number of days below 0°F (-18°C)	1	4	10	2	2	11	16	8	16	5	0	3	24
Number of days above 90°F (32°C)	30	15	5	24	15	20	6	7	6	22	40	15	5
Last frost date	5/21	5/4	5/3	5/4	5/7	4/16	4/30	4/18	4/28	4/21	4/24	4/20	4/16
First frost date	10/14	10/1	10/5	10/23	10/12	10/28	10/28	10/10	10/22	10/30	10/6	10/22	10/19
Annual rainfall in inches (cm) ^b	33.6(85.3)	31.7(80.5)	35.5(90.2)	24.4(61.9)	42.5(107.9)	41.0(104.1)	49.5(125.7)	38.8(95.5)	35.6(92.5)	48.2(122.4)	31.1(78.9)	39.1(99.3)	42.5(107.9)
Annual snowfall in inches (cm) ^c	37.6(95.5)	15.6(39.6)	27.2(69.1)	44.4(112.7)	23.4(59.4)	38.5(97.8)	78.5(199.4)	28.8(75.2)	51.8(131.6)	35.3(89.7)	23.4(59.4)	40.3(102.4)	66.4(168.7)

^aNormal growing season: 162 days

^bAverage rainfall: 37.4 inches (94.9 cm)

^cAverage snowfall: 34.7 inches (88.1 cm)

Data collected at Chicago Botanic Garden weather station

Latitude: 41°51'N. Longitude: 87°37'W. Altitude: 578.74 ft. (176.4m)

droughty periods, affecting anywhere from several taxa up to 65 percent of the plants at any time. Irrigation or rainfall during these dry periods alleviated stress and promoted the production of new fronds.

Beginning in 2006, taxa that suffered some injury due to drought or too much sunlight in two or more years included *Athyrium filix-femina* 'Encourage', *A. filix-femina* 'Frizelliae', *A. filix-femina* 'Plumosum Axminster', *A. filix-femina* 'Vernoniae Cristatum', *A. filix-femina* 'Victoriae', *A. filix-femina* ssp. *cyclosorum*, *A. niponicum* var. *pictum* 'Burgundy Lace', *A. niponicum* var. *pictum* 'Silver Falls', *A. niponicum* var. *pictum* 'Soul Mate', *A. niponicum* var. *pictum* 'Wildwood Twist', and *A. otophorum*. Several taxa growing in full shade throughout the trial had some wilting and foliar desiccation from drought noted in two or more years, including *A. 'Branford Beauty'*, *A. 'Branford Rambler'*, *A. filix-femina*, *A. niponicum* 'Pictum Red', *A. niponicum* var. *pictum*, *A. niponicum* var. *pictum* 'Apple Court', and *A. niponicum* var. *pictum* 'Ursula's Red'. *Athyrium* 'Ocean's Fury' was the lone taxon grown in morning sun and afternoon shade, and was wilted in one year only during a dry period. No heat or drought stress was observed on a number of taxa grown in full shade including *A. 'Ghost'*, *A.*

niponicum var. *pictum* 'Pewter Lace', *A. niponicum* var. *pictum* 'Red Beauty', *A. niponicum* var. *pictum* 'Regal Red', *A. vidalii*, and *Deparia acrostichoides*. *Athyrium filix-femina* 'Dre's Dagger' was grown in afternoon sun but no wilting was observed.

Rabbit browsing was a significant problem in 2002 and 2003, and a minor issue in early spring 2004. Varying levels of browsing damage was observed on 'Branford Beauty', 'Branford Rambler', 'Burgundy Lace', 'Ghost', 'Pictum Red', 'Silver Falls', 'Ursula's Red', and 'Wildwood Twist'. 'Vernoniae Cristatum' was the only cultivar of *A. filix-femina* browsed during this time. A wire fence was erected around the original test site in 2004 to exclude rabbits; no damage was noted in later years. *Athyrium niponicum* var. *pictum* 'Apple Court' was browsed by deer in 2009.

Crown injury or plant losses in winter were uncommon and infrequent occurrences during the trial. Plant losses in one or more years were observed for *Athyrium filix-femina* 'Plumosum Axminster' (two plants killed in 2007-08 and one plant killed in 2009-10); *A. niponicum* var. *pictum* 'Soul Mate' (one killed in 2007-08) and *A. otophorum* (one killed in 2007-08). In addition, minor

crown injury was noted on *A. filix-femina* 'Dre's Dagger' (2006-07) and *A. filix-femina* 'Frizelliae' (2004-05). A summary of weather data during the trial period is noted in Table 2.

In general, the lady ferns and Japanese painted ferns exhibited superior foliage quality and habit traits. With few exceptions, plants formed robust clumping or rhizomatous habits in the second or third year. Foliar quality remained exceptional as long as plants received adequate soil moisture and appropriate light levels. Cultural and pest issues such as leaf scorching, wilting, and rabbit browsing affected ornamental displays at various times during the trial period.

The foliar and habit characteristics of *Athyrium* 'Branford Beauty' are intermediate between Japanese painted fern and lady fern. The upright habit and fine-textured leaves of this hybrid resemble the lady fern, while the colorful arching and curved fronds are like Japanese painted fern. 'Branford Beauty' was more uniformly silver-green than other cultivars—early purple highlights faded quickly and the leaves were a bit darker green along the purple rachis as they aged. 'Branford Beauty' was similar in habit to 'Ghost' but not as upright.



Photo by Richard Hawke

Athyrium 'Branford Rambler'

***Athyrium* 'Branford Rambler'** was essentially the opposite of 'Branford Beauty', with the spreading habit of Japanese painted fern and the green foliage of lady fern. The bright green leaves had a purple rachis and purple venation in the lower pinnae. Its irregular branching rhizome formed a large mass over time. 'Branford Rambler' remained fairly compact until the third summer when it began spreading. In August, lush growth created a two-tiered effect as erect new fronds stood above the horizontal older fronds. Although it was periodically affected by drought, it was noted as being the best looking fern in late August 2010 after a period of severely dry weather. Significant rabbit browsing was noted in 2002 and 2003.

The shuttlecock habit of ***Athyrium* 'Ghost'** comes from the lady fern, while its foliage color is akin to Japanese painted fern. The silvery green fronds were similar to but lighter in color than 'Branford Beauty'. The fiddleheads emerged purple but only the rachis and some veins held the purple coloration when the fronds were unfurled.

'Ghost' had a strong vase-shape with distinctly upright fronds. This hybrid fern was slower to emerge in the spring than Japanese painted ferns. 'Ghost' was generally not as affected by heat or drought as other ferns, but suffered severe rabbit browsing in 2003.

The description of ***Athyrium* 'Ocean's Fury'**—silver-leaved with a red rachis—did not match the yellow-green fronds with reddish bronze rachises that we observed. The leaf color was consistent every year and was likely influenced by the amount of sunlight received—it was grown in morning sun and afternoon shade after 1 p.m. 'Ocean's Fury' had a frothy texture because of the tasseled tips of the pinnae and fronds. Its robust bushy habit was the largest in the trial at 37 inches tall and 40 inches wide. Minor foliar burn and heat stress was observed in some years.

Athyrium filix-femina—lady fern—featured bright green leaves with a feathery appearance due to the tripinnate division of the frond. The clump-forming habit of lady

fern resembled a shuttlecock with graceful upright fronds arising from a short, vertical rhizome. Lady fern was slow to establish the first year in the garden but was vigorous the second summer. Although it was occasionally stressed by heat and drought in midsummer, it showed good heat resistance in 2007 during an especially hot, dry period. Lady fern prefers moist, shady locations protected from wind and sun, and produces new fronds throughout the growing season.

***Athyrium filix-femina* 'Dre's Dagger'** is purportedly a sport and dwarf version of 'Victoriae', but was not significantly smaller in size than it in the trial. The fronds had crested tips and the pinnae were arranged in a distinctive crisscross pattern that formed Xs along the rachis. Its vase-shaped habit featured strongly arched fronds with nodding tips; the pinnae and fronds were narrower than 'Victoriae'. 'Dre's Dagger' had slight crown damage in the winter of 2006-07. Despite being exposed to full sun in mid-afternoon, 'Dre's Dagger' did not have any heat or drought issues.

***Athyrium filix-femina* 'Encourage'** was one of the top performers in the trial. All pinnae were tasseled or crested at the tips, giving the light green fronds a frilly look. Slow to develop the first summer, 'Encourage' had a robust, vase-shaped habit by the second year and was particularly densely robust in the fourth year. Plants were in full sun by 3 p.m. so some leaf scorching was occasionally observed in July and August. 'Encourage' is a selection of 'Vernoniae Cristatum'.

***Athyrium filix-femina* 'Frizelliae'**, commonly called tatting fern, had a unique foliar structure compared to other cultivars. Rounded green pinnae with toothed margins were borne along the green rachis, somewhat reminiscent of a string of beads. 'Frizelliae' is a dwarf form with slender fronds and an arching vase-shaped habit. Plants remained small and open until the third year in the trial. Following the loss of the river birch in 2006, these plants went from growing in full shade to receiving full afternoon sun. Minor foliar desiccation was noted in 2006 and 2008. Although reputedly prone to reversion, 'Frizelliae' remained true to type throughout the trial.



Athyrium filix-femina 'Encourage'

Photo by Richard Hawke

The broad, lacy lime-green leaves of ***Athyrium filix-femina* 'Plumosum Axminster'** gave it a softer appearance compared to the species, and its vase-shaped habit was consistently good. 'Plumosum Axminster' was grown in two test sites—full shade or morning shade and afternoon sun. The plants in full shade did not exhibit any leaf scorching or desiccation during hot weather, although they suffered significant losses in the winters of 2008-09 and 2009-10. Plants in morning shade and afternoon sun were occasionally scorched in late summer.

***Athyrium filix-femina* 'Vernoniae Cristatum'** had bright green leaves and a broadly vase-shaped habit like the species, but each plant contained a mix of tasseled fronds and regular unadorned fronds. Due to the two foliage types, the plants were not as lacy overall as other crested forms such as 'Encourage'. It was typically one of the earliest lady ferns to emerge in the spring. Unfortunately, plants were consistently stressed by heat and afternoon sunlight, resulting in desiccated foliage during the summer in most years from 2006 onward. 'Vernoniae Cristatum' originated in England in the late 1800s.

***Athyrium filix-femina* 'Victoriae'** is another Victorian-era selection of lady fern. Victoria fern's similarity to 'Dre's Dagger' was indisputable—both featured slender green pinnae that crisscrossed along the rachis and nodding fan-shaped tips. The robust vase-shaped habit with upright, arching stems received high scores every year of the trial beginning in the third summer. Despite some late-season leaf scorch in 2008 and 2010, 'Victoriae' was a consistently vigorous fern.

Athyrium filix-femina* ssp. *cyclosorum—western lady fern—entered the trial in 2008 and filled out quickly its first year. By the third year it had developed into a robust, vase-shaped plant and grown to be one of the largest ferns at 36 inches tall and 39 inches wide—only 'Ocean's Fury' was slightly larger. Western lady fern had large green fronds that tapered at both ends. Like other lady ferns, the older fronds were



Athyrium 'Ghost'

Photo by Richard Hawke



Athyrium filix-femina 'Victoriae'

Photo by Richard Hawke



Photo by Richard Hawke

Athyrium niponicum var. *pictum* 'Red Beauty'

often tattered in late summer but new fronds were produced throughout the season. Grown in afternoon sun, plants had minor scorch in midsummer during droughty periods. Given that western lady fern grows naturally in wet, shady habitats where it can get up to 6 feet tall, the plants in our trial performed admirably well under less than ideal conditions.

Athyrium niponicum 'Pictum Red' is a name of no botanical standing but was in the trial because it is commercially available. Foliar color was variable among the plants but its traits were closest to 'Ursula's Red'. Fronds emerged purple and aged to silvery sage green with a darker green to purple-tinged zone near the base of the pinnae along the purple rachis. Like other taxa in the trial, plants suffered periodically from heat and drought stress but rebounded quickly after being watered.

In our trial, the three plants of *Athyrium niponicum* var. *pictum*—Japanese painted fern—were variable in their foliage color but were especially colorful compared to the cultivars. Young fronds were mostly deep red with silvery green tips that eventually faded to silvery green with hints of red in

the veins and along the rachis. Browning fronds within the plants were not uncommon, especially later in the season and in droughty periods. New fronds were produced all season, which helped maintain dense habits. In midsummer 2010, all plants were flattened due to heat stress and drought but rebounded well in September during a period of heavy rainfall.

Athyrium niponicum var. *pictum* 'Apple Court' featured the same silvery sage green and purple coloration of var. *pictum* but with tasseled and forked frond tips and crested pinnae. The fronds became greener by late July but the rachis remained purple. 'Apple Court' had a bushy upright habit in all years. The plants grew well in full shade during the early years; some leaf scorch was occasionally noted after 2006 despite no change in light exposure. Most fronds were browsed by deer in early July 2009.

The leaves of *Athyrium niponicum* var. *pictum* 'Burgundy Lace' were the darkest purple and remained purple longer than other cultivars. New fronds emerged completely purple before developing silvery tips and finally fading to light silvery green with a purple-flushed green zone at the base of

the pinnae. Plants were unaffected by heat stress or scorch until 2007 when the plot was exposed to more sunlight. Minor heat stress and leaf scorch issues were noted in 2007 and 2008 but were a moderate to severe problem in 2010.

Athyrium niponicum var. *pictum* 'Pewter Lace' was closest in foliar coloration to 'Burgundy Lace' in the early season. The new fronds emerged purple but aged silver-green with purple highlights on the lower portion of the pinnae along the purple rachis. The irregularly arched fronds and mounded habit were comparable to other cultivars. No rabbit damage, drought stress, or scorch was observed during the trial.

The fronds of *Athyrium niponicum* var. *pictum* 'Red Beauty' emerged green with a purple rachis and developed a silvery overlay with a reddish cast on the lower third of each pinna. Some green fronds were always present within each plant, although one plant was predominately green. 'Red Beauty' had the typical mounded habit with irregularly arching fronds. Like 'Pewter Lace', there was no rabbit damage, drought stress, or leaf scorch observed during the trial.

Athyrium niponicum var. *pictum* 'Regal Red' featured light sage green fronds with a purple rachis and a red-purple zone along the rachis; the fronds emerged deep purple. The contrast between the red-purple at the center of the frond and the silvery outer region was striking. 'Regal Red' had a vase-shaped habit with arched, slightly twisted fronds, and was not troubled by rabbits, drought, or heat stress.

The bright silvery leaves of *Athyrium niponicum* var. *pictum* 'Silver Falls' featured purple highlights near the base of the pinnae along the purple rachises. The foliar character of 'Silver Falls' was similar to 'Wildwood Twist' except that the unfurling fronds were silvery purple, and the outer fronds remained upwardly arched, whereas the fronds of 'Wildwood Twist' draped on the ground. Drought stress in July of 2007 and 2010 flattened the plants and exposed the crowns but rain in August helped the plants to rebound.

Athyrium niponicum var. *pictum* 'Soul Mate' had silvery green leaves with small tassels at the ends of the pinnae and purplish rachises. Plants were in partial sun from the beginning of its trial in 2004, so some desiccated foliage was observed in all years of the trial. The loss of natural shade in 2006 only exacerbated the problem. The weak performance of 'Soul Mate' was solely attributed to incorrect siting.



Athyrium niponicum var. *pictum* 'Silver Falls'

Photo by Jessie V. Stevens

The leaves of *Athyrium niponicum* var. *pictum* 'Ursula's Red' were quite similar in coloration to 'Pictum Red' but looked more silvery from a distance. The upper two-thirds of each pinna was silvery green and the lower third was darker green with a purplish cast. Its slowly spreading habit and irregular arching fronds were typical of the species. Fronds were browsed by rabbits in 2003 and 2004 before exclusion fencing was erected in mid-spring of 2004. Plants were flattened by droughty conditions in midsummer in several years but rebounded nicely in late summer following heavy rains.

Despite its name, *Athyrium niponicum* var. *pictum* 'Wildwood Twist' did not exhibit any distinctive foliar twisting apart from the curved apex that is common to the fronds of most cultivars. New fronds were bronze-colored until completely unfurled, and became silvery gray-green with some purple along the rachis. The irregular habit featured a mix of erect and low, arching fronds that touched the ground at the perimeter. 'Wildwood Twist' was similar in leaf color to 'Silver Falls' but was not as brightly colored. It suffered from excessive heat and drought stress in July of 2007 and 2010, resulting in open to flattened habits. All fronds were rabbit browsed in 2003.

Vase-shaped *Athyrium otophorum*—eared lady fern—had gray-green leaves with burgundy rachises in summer. New leaves were pale green to creamy yellow and were continually produced during the growing season. This was the only fern that struggled throughout its trial period. The original plants were thought to be dead after the first winter of 2004-05, but eventually sprouted in midsummer 2005. The habit of emerging late was observed in subsequent years. Although the original plants persisted, they were weak so new plants were acquired in 2007 to restart the trial. The second group was healthy and robust throughout 2007, but plants lacked vigor after emerging in subsequent springs until eventually all plants died over the winter of 2009-10. Winter hardiness likely contributed to the weak growth and poor performance; many references cite *A. otophorum* as cold-hardy to Zone 6.

Athyrium vidalii—Japanese or Vidal's lady fern—persisted in the trial but was never a strong or vigorous grower. Few fronds were produced each year, so plants remained small with loose one-sided habits. The red-tinged crosiers were attractive as they emerged in spring, and summer foliage was greenish yellow with reddish brown rachises. Plants were healthy although minor chlorosis was occasionally observed.



Photo by Richard Hawke

Athyrium niponicum var. *pictum* 'Ursula's Red'

Deparia acrostichoides—silvery glade fern—was received in the trial as *Athyrium thelypteroides*, a name by which it was long known. The three plants struggled after planting in 2008 but by the second summer had grown into robust vase-shaped plants with fine-textured green foliage. The upright fronds had silvery sori on the undersides of the leaves, which is the origin of the common name. Plants were grown in full shade throughout the trial period. *Deparia acrostichoides* is native to eastern North America, and is similar in appearance to *A. filix-femina*.

Summary

The deficiencies of the trial garden aside, the majority of Japanese painted ferns and lady ferns were grown successfully over the course of a long period. Of the 26 *Athyrium* taxa evaluated from 2002 to 2014, 21 received the highest marks. Beyond determining cultural adaptability to the growing conditions of the trial site, another of the study's goals was to ascertain the similarities between the named selections of Japanese painted fern.

The top-rated ferns displayed consistently attractive foliage, robust habits, and winter hardiness. The five-star plants included *Athyrium* 'Branford Beauty', *A.* 'Branford Rambler', *A.* 'Ghost', *A. filix-femina*, *A. filix-femina* 'Encourage', *A. filix-femina* 'Victoriae', *A. filix-femina* ssp. *cyclosorum*, *A. niponicum* var. *pictum* 'Apple Court', *A. niponicum* 'Pictum Red', *A. niponicum* var. *pictum* 'Pewter Lace', *A. niponicum* var. *pictum* 'Regal Red', and *Deparia acrostichoides*. Five taxa—*A. filix-femina* 'Plumosum Axminster', *A. filix-femina* 'Vernoniae Cristatum', *A. niponicum* var. *pictum* 'Soul Mate', *A. otophorum*, and *A. vidalii*—received low ratings due to heat- and drought-stressed foliage, winter losses, and/or weak growth.

There were few inherent shortcomings of the ferns related to plant vigor or ornamental quality. Most problems observed were the result of the cultural issues of the trial garden such as too much sunlight or dry soils. Even the weakest taxa, such as *Athyrium otophorum*, would likely have done much better if grown in a shady site with adequate soil moisture. The loss of a shade tree in 2006 greatly impacted the health and vigor of many of the ferns in the following years. Droughty periods and afternoon sunlight resulted in wilted foliage, leaf scorch, and/or foliar desiccation, which took its toll on health and ornamental quality at various times. Despite this dramatic adverse change in cultural conditions, the majority of the ferns thrived except in the driest of times. While planting these ferns in a sunny location is not recommended, most performed admirably given the less than ideal circumstances where they



Athyrium 'Branford Beauty'

Photo by Jessie V. Stevens

were grown. Foliar quality and health was maintained as long as plants received adequate soil moisture and appropriate light levels. Winter hardiness was generally not an issue for the evaluation group—only *Athyrium filix-femina* 'Plumosum Axminster' suffered plant losses in two winters.

The uniqueness of each Japanese painted fern cultivar was often indiscernible at a glance. Planting the cultivars side-by-side helped to distinguish the sometimes subtle foliar differences. Variations in leaf coloration and markings among the three plants of *Athyrium niponicum* var. *pictum* were not unexpected as this is not a clonal variety. Although the verification of every cultivar was not definitive, we were comfortable that the foliar and habit traits generally matched literature descriptions.

Japanese painted ferns and lady ferns are elegant plants for shady places. Their feathery fronds provide texture in a variety of colors to contrast and complement other perennials. Providing what they need to grow—moist, well-drained soils in partial to full shade—ensures they stay healthy and ornamental all summer. With few exceptions, these reliable and long-lived ferns are well-suited to a variety of gardens and landscapes.

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