

outline

- Nativars!
- Speak to Vincent (texted) + Plantsmen nursery (called)
- Nativars: it depends. Sometimes having a strong healthy plant is good bc... are pollinators even going to want to hang around a dying, weak plant? Maybe a nativar is good because its STRONG??
- For homeowners, it can be just as good as the wild type!!
- Different ecotypes of the same species can vary enormously.
- Sometimes we know about where a nativar comes from than where the wild type comes from.
-
- Soil feedback:
<https://www.proquest.com/docview/3223048368?pq-origsite=gscholar&fromopenview=true&sourcetype=Dissertations%20%20Theses>
- Mt Cuba center: <https://mtcubacenter.org/research/trial-garden/>
- Podcast with Sam from Mt Cuba:
<https://awaytogarden.com/the-straight-talk-on-cultivars-with-sam-hoadley/>
- Prairie Up w/ Benjamin Vogt:
https://prairieup.com/native-plant-cultivars-101/?fbclid=IwY2xjawSNRO9leHRuA2FibQlxMQBzcnRjBmFwcF9pZBAyMjlwMzkxNzg4MjAwODkyAAEeChFy-CN1RCbWX_9aCx8BZvpXYEgODPG9Fgn6yf5n5WUz_6KdnikNnEfnFAM_aem_A6vGErlcX7EW4JuiDNgnnA
- Pacific northwest study (part 1, need part 2):
<https://academic.oup.com/ee/article/54/1/199/7952834?login=true>
- Native plant trust:
<https://plantfinder.nativeplanttrust.org/plant/Hydrangea-arborescens-Annabelle#:~:text=Annabelle%20hydrangea,-Smooth%20hydrangea%20is&text='Annabelle'%20is%20a%20well%2Dof%20no%20use%20to%20pollinators>.
- https://www.reddit.com/r/NativePlantGardening/comments/1dv4dbq/if_up_to_30_of_a_garden_can_be_nonnative_and/ - the patio furniture isn't native either
- Grow native: <https://grownative.org/learn/natives-cultivars-and-nativars/> - and resources on native plants study
(<https://grownative.org/learn/natives-cultivars-and-nativars/#research>)
- MGNV slideshow:
<https://mgnv.org/wp-content/uploads/2024/05/Native-Species-vs-Cultivars-PowerPoint-Presentation.pdf>, MGNV video: <https://www.youtube.com/watch?v=eZIDWQbcOWQ>
- Sag moraine native plant community video:
<https://www.youtube.com/watch?v=LjzkQ5ozVPU>
- Other studies to look into: Penn state
- <https://www.summerwindsnursery.com/ca/inspire/blog/what-are-hybrid-plants/> (how hybridization occurs)

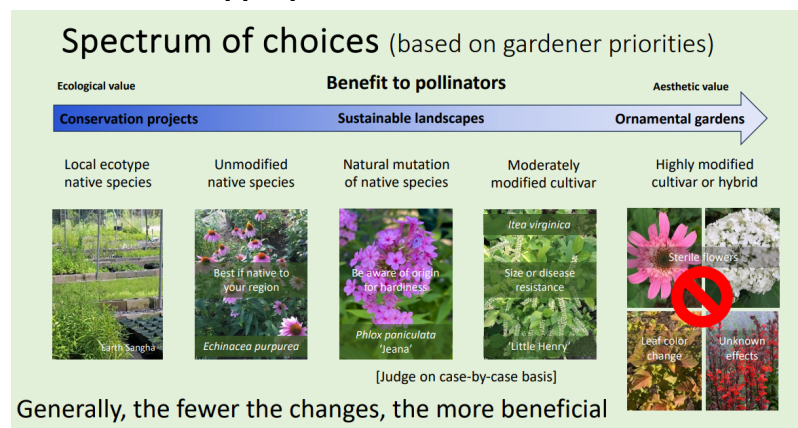
- <https://www.nature.com/scitable/knowledge/library/history-of-agricultural-biotechnology-how-crop-development-25885295/> (cultivated varieties overview)
- some of audience might be doing stuff in conservation perspective: restoration ecologists would never use natives
- LEADS - annabelle hydrangea (sterile) vs. haas halo hydrangea → breeding for emphasis on sterile flowers vs. fertile, less pretty parts of the plant
- Goldenrods article on Mt. Cuba
- Jeana phlox is a good native?

Outline:

- **Native plant vs. non native**
 - Benefits of native plants → insects and pollinators familiar with plants, utilize them effectively
 - For birds specifically: eat the insects using these plants OR drink nectar from the plants (MENTION: 96% OF BIRDS FEED YOUNG INSECTS, HUMMINGBIRDS UNDERNOURISHED?)
 - Why native plants? Further, non-native/ornamental (harmless, but take up resources - issue is not the presence of ornamentals, but absence of natives) vs. invasive (KILL) vs. native
 - What is generally available? Retail sells lots of non-natives; 25%?
- **What are cultivars?**
 - How can a cultivar be made?
 - Explain cloning: vegetative propagation (cutting, division, layering, grafting, budding, tissue culture) vs. sexual / seed propagation; cloning usually used on cultivars, reduces genetic diversity (resources for this)
 - Selected / natural cultivar (pick from wild, then clone or seed - look at MGNV for help)
 - Bred cultivar
 - Selected for a certain trait (this happens a lot with food)
 - Hybridized (give example, MGNV possibly), same genus (factcheck), can occur in nature → explain how hybridization happens, give example (stargazer lily)
 - Cultivar notation: given a patented (is it always?) english name in single quotes
 - What factors are changed?
 - Growth habit (HEIGHT has impact on birds)
 - Leaf / flower color
 - Leaf / flower shape

- Leaf / flower size
- Makeup of inflorescence
- Disease resistance
- Altering structure of inflorescence - double flower, increase petals, etc
 - Extra petals can reduce fertility by removing fertile parts of flower; hydrangea annabelle, echinacea variations → some cultivars sterile, no pollinators!
- Fruit size
- Cold hardiness
- **What are nativars?**
 - Define wild type / straight type
 - Native plant → cultivated → nativar!
 - Some good: OF NOTE: jeana phlox, preferred by butterflies because of shallowness of flower tube; has impressive floral display + mildew resistance; yale study with ash trees (<https://e360.yale.edu/features/ash-tree-borers-breeding-wasps>) against EAB
 - OR: echinacea double flowering → native, but produces sterility that means no pollinators
 - So; it is the SAME species as the native plant; but a certain variety of that species (define variety: natural variation → cultivar is a "cultivated variety")
 - the wild type is native to the area, and then refined in a certain way (explain: you could take a goldenrod from your backyard that has large flowers, and take a cutting from it, then vegetatively clone by planting cuttings, and sell it as a native cultivar; a nativar!)
- **Why are we wary about nativars?**
 - Animals may not recognize a nativar if it dramatically differs aesthetically from wild-type
 - PLEIOTROPY - selecting for one trait changes other w/out meaning to (Oregon)
 - Give EXAMPLES for each: draw from MGNV, w examples from Oregon, Mt Cuba, Penn state, Annie white
 - Nativars that modify flower / leaf colors → pollinators and herbivores don't recognize → plant goes unutilized; also, features are like "landing lights / runway lights" for pollinators (sag moraine native plant community); bees see UV light, look for patterns (cant see red)
 - Modification of plant visually in any way risks allowing it to go unnoticed by pollinators and herbivores
 - Good example: echinacea purpurea → "Avalanche" in mt. cuba, or "double decker"
 - Changing foliage / leaf colors: LOOK INTO toxicity; anthocyanins / carotenoids in manipulating color to purple or red; moths / butterflies feed on leaves, look for green, not purple (common ninebark vs. summer wine physocarpus); pollinators will be better, but butterflies / moths will not have their offspring on these leaves / caterpillars will not feed
 - Animals may not be able to utilize a nativar if it differs functionally from wild-type

- Nativars that modify inflorescence → reduce fertile bits / create sterility → no resources for pollinators to exploit in the flower (Annabelle hydrangea)
- Too many flowers; difficult to pick out an individual flower, can look like a massive blob of color to a pollinator
- Animals may not be able to access a nativar
 - Nativars that are too short → low hanging fruit / seeds → birds can't access? NEEDS FURTHER STUDY - can birds swallow larger fruit? FURTHER STUDY
 - Nativars that modify shape of flowers → obstructed access to nectar and pollen in flowers
 - Plants upright vs. drooping draw different pollinators
- Shouldn't need to modify native plant for cold hardiness - they are ok! Generally more a thing for non-natives
- Moreover: important from oregon state study - functional diversity metrics; different plants may attract same number of pollinators, but could get fewer diversity of bees, or fewer large bodied bees, or other factors; nectar / pollen qualities and quantities can change, even when not selecting for it
- **In what contexts it is appropriate to use nativars?**



- Restoration ecologists would never use nativars
- Nativars can act as a bridge for gardeners looking to step away from ornamentals, but not sure where to begin
- Often, nurseries don't offer wild-type native plants; they only have nativars (this is if they have native plants at all!); you might be in a native plant desert, have to order them from far away - so this is the economic / cultural reality
- Can be worth investing in nativars as you are moving towards native plant use
- Moreover, some nativars are actually good! And effective! You can confidently use them!
- As for "bad" nativars, having them around is not inherently bad - just make sure you have other native options for pollinators (Doug tallamy, up to 30% of garden can be non-native?)
- **Concluding thoughts?**
 - Nativars have a real role in the native plant movement
 - Always safe using native plants

- It doesn't have to be a compromise between beauty and ecological productivity; but you may have to make some tradeoffs
 - Look into specific varieties; there are resources for ecotypes, native plants, nativars (provide)
 - Beauty inspires
 - NO NEONICOTONOIDS IN SEEDS
 - Birds will thank you!
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- Goldenrods are the top genus for supporting lepidoptera
 - Pollinators use color to distinguish correct plants to use, communicate what colors have higher nectar yields; less compact plants
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- I naturalist - you can get photo licensing, look on pictures!
 - Flickr creative commons, unsplash, macauley

In gardening for birds, the best practice is to use a non-cultivar native plant,

article megadraft

Introduction

- Note at EOD 6/11. Will need separate introductions for two separate articles. Tabling this for now, until both articles are defined.
- Nativar - what are they? (we'll get into that.) Acknowledge the confusing terms, unclear research consensus, general hubbub around nativars.
- The mission: make a garden that can support local ecosystem!

What is a native plant?

> Relative to where you live, a **native plant** is an indigenous plant species that naturally grows within that region. Sans human intervention, a native plant evolves over thousands of years to flourish within its local ecosystem. It occupies a specific ecological role within its environment and maintains important relationships with the native wildlife. A native goldenrod plant, for example, would be recognizable to a local species of goldenrod gall fly, which could then lay its eggs within the plant. The goldenrod plant nourishes the fly larvae, which can eventually feed larger insects or birds in the area.

[PHOTO: MACAULEY: BIRD EATS GALL FROM GALL FLY]

Humans have severely disrupted native ecosystems within the last several hundred years by introducing countless non-native plant species to North America. Foreign plants may not be ecologically productive in their new environments. Moreover, some non-native plants are **invasive**, meaning that they out-compete native plants for resources and spread rapidly and uncontrollably. An example you can see coating forests in the American South is kudzu (*Pueraria montana*), an invasive vine introduced to the United States in the 1800s. These iconically intimidating vines literally blanket and smother native plants.

Regardless of your goals and aesthetics, it is imperative to forgo and, when possible, eradicate invasive plants in your garden. Below are resources for invasive plant identification and removal.

[resources]

What is a cultivar?

> **Cultivar** is a shortening of “cultivated variety”, referring to a variety of a plant species that has been cultivated by humans to select for specific, desired traits. The version of a plant one could find in the wild is known as the **wild type** or the **straight species**. A **selected** cultivar is produced when a botanist discovers a plant in the wild that has naturally mutated towards a desired trait, and removes and propagates the plant into a cultivar. A **bred** cultivar is created by

deliberately breeding two plants together to produce a desired trait, and sometimes entails the hybridization of two separate plant species.

Most cultivars are propagated by cloning, which can be as simple as planting a cut taken from the parent specimen. One plant of a cloned cultivar is therefore practically genetically identical to the rest. This practice preserves the cultivar's characteristic traits, but restricts their genetic diversity.

Cultivars are notated with a given name to distinguish from the wild type species. They will be written by following the Latin species name with the given name in single quotes. For example, the Venus flytrap (*Dionaea muscipula*) cultivar B52 is notated as *Dionaea muscipula* 'B52'.

Cultivars are as old as agriculture; nearly all of the ample-fruited, easy-growing produce consumed by our civilization are varieties cultivated from ancient wild plants. Long before modern genetics, humans were selectively breeding for favorable traits in their vegetable gardens. Wild cabbage (*Brassica oleracea*) alone has been cultivated into kale, cabbage, broccoli, cauliflower, Brussels sprouts, and more. Cornell Orchards has famously cultivated over 70 apple varieties that now widely populate New York orchards, maximizing for disease resistance, flavor, winter hardiness, and storage potential.

By pulling the strings of the plant genome, our species fills grocery stores and botanical gardens alike with lush cultivars. Cultivars, however, have limited ecological value. As a plant is modified further from its wild type, it becomes unrecognizable or unusable by pollinators and herbivores, originating rippling consequences throughout the food web. A garden full of beautiful cultivars may be barren of local fauna.

What is a nativar?

> **Nativar** is a shortening of "native cultivar", and, as suggested, nativars refers to a human-cultivated variety of a native plant. Nativars are cultivated and propagated like any other cultivar—generally through breeding, selection, and cloning—and can be understood as an ecological intermediary between wild type native plants and non-native cultivars. A nativar deviates from the wild type in some aspects, and thus can blur its ecological function in complicated ways.

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These terms are easily synthesized with the example of *Hydrangea aborescens* 'Annabelle', a cultivar derived from smooth hydrangea, which is native to the eastern United States. Legend tells that Harriet Kirkpatrick found the original 'Annabelle' hydrangea growing wild in the woods of Anna, Illinois in 1910. Impressed by its large, snowball-like blooms, she took cuttings of the plant to clone and propagate in her own garden, and went on to share the cultivar with her neighbors and friends. Over a century later, 'Annabelle' is one of the most famous hydrangea cultivars on the continent.

In places where wild type smooth hydrangea is native—on moist or rocky wooded slopes, south from New York to Florida, and west from the Atlantic to several hundred miles west of the Mississippi—the ‘Annabelle’ variety could be considered a nativar. However, its blooms are primarily comprised of sterile flowers; the fertile flowers of a hydrangea are smaller and lack the showy petals characteristic of ‘Annabelle.’ Large, primarily-sterile blooms make ‘Annabelle’ attractive to humans, but are unproductive for pollinators due to their lack of pollen and nectar. A local bumblebee *could* recognize and approach ‘Annabelle’, but may leave unable to find a meal.

Moreover, should ‘Annabelle’ be planted in large swathes, the lack of genetic diversity between plants supports a narrower range of wildlife and creates vulnerability to local climate conditions, pests, and disease. If ‘Annabelle’ breeds with wild plants nearby, the diversity of the local gene pool may be reduced as well, introducing these issues to the surrounding plant community.

Hydrangea aborescens ‘Annabelle’ is a great illustration of the complicated questions associated with nativars. When evaluating nativars for use in native plant gardens, we are primarily concerned about their utility for pollinators and herbivores. Nativars are not a monolith; they should generally be evaluated on a case-by-case basis. Some may even draw increased pollinator attention compared to their wild type counterparts.

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Flower Color and Pattern

> Showy, colorful flowers are enticing to gardeners, and even more so to many pollinators. Plants often use specific visual cues to attract pollinators—some of which are invisible to humans. Plateau goldeneye (*Viguiera dentata*), a bushy plant native to the Southwestern U.S., displays a bullseye pattern on its flowers visible in ultraviolet wavelengths, marketing itself to UV-spotting bees. When flower color and patterning is modified in a nativar, these important visual cues could be disrupted as well.

In a 2025 study at Oregon State University, five plants native to the Pacific Northwest were analyzed alongside one to three cultivars for each species. The cultivars used represented several trait variations, including flower color. Researchers were unable to conclude if pollinators universally preferred wild type plants to nativars. Moreover, a 2022 study of pollinator-cultivar interactions found that most pollinators preferentially visited cultivars with colors similar to the wild type, although some notable exceptions were recorded (*Agastache* ‘Heatwave’, *Agastache* ‘Summer Glow’, and *Nepeta* ‘Snowflake’ saw increased visits despite their unnatural colors).

Similarly, in Mt. Cuba Center’s study of coneflower (*Echinacea*) nativars in the Mid-Atlantic region, no clear conclusions could be drawn about pollinator preference for flower color. Most of the top 15 coneflowers for pollinator visitation were colored similarly to wild type, with pink and

purple flowers dominating. However, the most attractive coneflower to pollinators was *Echinacea purpurea* 'Fragrant Angel', a nativar with white-colored flowers.

There is no universal consensus on flower color variation in nativars. Plants should be evaluated on a case-by-case basis. When in doubt, a nativar colored similarly to the wild type is your safest option for most pollinators; knowing this, some unnaturally-colored nativars can still perform just as well, or occasionally better, than wild type plants. More research, focused on species specific impacts, is needed to deepen our understanding of color-modified nativars.

Leaf Color and Pattern

Insect herbivores, notably caterpillar larvae of moths or butterflies, can make a feast of native plant leaves. The holey foliage they leave behind may clash with traditional garden aesthetics—but a garden that can support insect herbivores is supporting a healthy, vibrant ecosystem. Birds will happily visit to indulge in a delicious meal. When the surviving caterpillars metamorphosize into pollinating butterflies, your garden will not only sparkle with fluttering foragers, but will also produce the next generation of food resources for baby birds.

Insect herbivory can be disrupted by modified leaf color. In a study conducted by Emily Baisden and Doug Tallamy in 2018, researchers found that cultivars selected to alter leaf color from green to red, blue, or purple significantly reduced insect herbivory. They hypothesized that insects were avoiding certain pigments; excluding chlorophyll, many plant pigments (notably anthocyanins and carotenoids) are secondary metabolites, or organic compounds that protect the plant from herbivory by impeding protein assimilation in bugs.

In the same study, Baisden and Tallamy found they could not make a broad conclusion on the effects of modified leaf variegation; for this reason, nativars with leaves differentially variegated from the wild type should be evaluated on a case-by-case basis. In general, when selecting a nativar, look for wild type color leaves to feed insect herbivores.

(IMAGE: picture of common ninebark vs. summer wine physocarpus, from Tallamy)

Inflorescence (aka Flower Head) Composition

'Inflorescence' refers to the complete flower head of a plant—often the most visually stunning component of the plant, and the area containing the organism's essential reproductive organs. The inflorescence is where pollinators look to procure pollen and nectar. Therefore, nativars with heavily modified flower heads are often unusable by pollinators.

The previously-mentioned case of *Hydrangea aborescens* 'Annabelle' is an example of inflorescence modification gone awry. By selecting for showy and sterile flowers over smaller, fertile flowers, botanists produce plants unable to feed pollen and nectar-loving pollinators.

Double-flowered varieties of plants, which contain extra petals (“flowers within flowers”), are also problematic for pollinators. The extra petals may replace fertile parts of the flower, or physically block pollinators from accessing nectar and pollen. Mt. Cuba’s 2020 coneflower (*Echinacea*) study illustrates this issue; double-flowered varieties made up 16% of the trialed coneflowers, but accounted for only 4% of pollinator visits.

When looking for natives to use in your garden, inflorescence is one of the most important factors to consider. The more closely the inflorescence resembles the wild type, the more likely the nativar is to be suitable for pollinators. *Hydrangea arborescens* ‘Haas’ Halo’ is an alternative to ‘Annabelle’ that has a “lacecap” inflorescence, with a bundle of small, fertile flowers in the center of the inflorescence. This variety more closely resembles wild type *Hydrangea arborescens*, and makes ‘Haas’ Halo’ a great nativar option for gardeners in the eastern United States.

(IMAGE: comparison of annabelle vs. haas halo)

Flower Shape and Size

> The flower is the vessel through which pollinators access their meal. Accordingly, plants have evolved a mosaic of eccentric characteristics to market their flowers to specific pollinators. *Magnolia* is bowl-shaped to provide an easy landing pad for pollinating beetles; beardtongue (*Penstemon*) offers tubular nectar channels for hummingbirds; and closed bottle gentian (*Gentiana andrewsii*) is exclusive only to particular bees able to wriggle inside. These plants, and countless others, could become inaccessible to certain pollinators when undergoing flower modification.

Phlox paniculata ‘Jeana’ is a top-performing nativar popularized by Mt. Cuba Center’s study of Mid-Atlantic *Phlox*, beloved by butterflies. Researchers theorized that ‘Jeana’ is particularly accessible to butterflies due to the small size of its flowers, and the narrowness and shallowness of the flower tube. In this case, the modification of flowers from wild type significantly increased pollinator visitation.

In another study, researchers analyzed pollinator interactions with cultivars possessing modified flower structure. The ring of petals around a flower form a structure known as a corolla; the depth, length, and size of the corolla were associated with varying preferences by visiting bees. The size of the bee, and the length of its tongue, helped predict its preference for corolla type. These preferences varied on a plant-by-plant basis, and no broader conclusions about pollinators and flower shape modification could be drawn.

There is no universal consensus about modification of flower shape and size in natives. While pollinators certainly notice and react to these differences, the effects are variable and occasionally desirable. Plants with modified flowers should be evaluated individually and carefully.

Growth Habit

> Plants come in all different heights, sizes, and shapes; a woodland sunflower (*Helianthus divaricatus*) stretches proudly towards the sky, while a Virginia creeper (*Parthenocissus quinquefolia*) winds itself carefully around walls and trees; beneath them, a patch of creeping phlox (*Phlox stolonifera*) might sprawl low to the ground. These traits, known as the plant's **growth habit**, have specific utility for wildlife; birds might prefer to nest in dense or tall shrubs, insects and smaller mammals, reptiles, and amphibians could prefer denser plants for shelter, and deer might want to access a plant at a specific height to feed.

In a 2023 review, researchers concluded that diverse plants make a natural space more complex, and complex spaces support greater diversity of wildlife. The use of cloned natives decreases the diversity and complexity of a space, and could possibly decrease wildlife diversity. Moreover, modifications to an individual plant's density and size, such as making a "dwarf" variety, could lower spatial complexity within the plant.

Very little research has been conducted exploring these exact questions, especially as they relate to natives. The modified growth habit of a cultivar could be consequential across many levels of an ecosystem, but the research that *does* exist focuses primarily on pollinators.

In another Mt. Cuba Center study, this time studying ironweed (*Veronia*), the *Veronia gigantea* 'Jonesboro Giant' native was exceptionally beloved by pollinators. The enormous plant was attended by late-season insect pollinators and ruby-throated hummingbirds. It is unclear why pollinators flock to 'Jonesboro Giant'; perhaps its huge size makes it stand out in the crowd!

Meanwhile, Jacob Ricker's 2019 thesis at the University of Connecticut investigated several compact natives of black chokeberry (*Aronia melanocarpa*), or "dwarf" versions of wild type chokeberry. No consistent conclusion about pollinator preference was drawn. Given this, natives with a modified growth habit should be investigated case-by-case.

Resistance and Hardiness (adjusted catch title might be something like... "Will Ash Trees Be Saved by Natives?")

> The emerald ash borer (E.A.B.), native to northeastern Asia, is one of the more recent destructive invasive pests in North America. It has felled tens of millions of ash trees across the continent as ravenous larvae feed on bark from the inside-out, cutting off essential nutrient channels and eventually starving the tree. Emerald ash borer infests great swathes of the eastern United States, including parts of Sapsucker Woods here at the Cornell Lab.

The prognosis for North American ash trees is uncertain. However, selecting natives for disease or pest resistance can actually be helpful when battling these invasives. In a 2024 article from The Yale School of the Environment, Radka Wildova and Jonathon Rosenthal detail their investigation of natural E.A.B. resistance among ash trees. The researchers hope to use

the few resistant ash trees left to breed new varieties of resistant ash, which could repopulate ecosystems suffering from the enormous loss. The cultivation and propagation of these natives has the potential to save ash species from extinction.

Natives have, then, a distinct utility for disease and pest resistance. This is not so true when selecting for winter hardiness and plant toughness; if you are using native plants, they should be generally capable of surviving local conditions. Moreover, genetic diversity can help a native plant population survive long-term in extreme scenarios.

- More of a clear conclusion here? Not much research on natives selected for winter hardiness / plant toughness

Additional Considerations

> Ecology is spectacularly complex. It is difficult to track exactly how a modification of *one* trait, of *one* plant, can affect the countless species who interact with it; it is impossible to universally predict any outcome. These complexities have only been complicated by a recent study at Oregon State University.

Jen Hayes opened several doors to further research in her 2025 study of native-pollinator interactions. In an experimental garden of Pacific Northwest plants and corresponding natives, nine out of ten natives attracted dissimilar bee communities to their wild type counterpart. While pollination was still occurring for native plants, the exact groups of species interacting with natives varied significantly. Moreover, highly modified natives potentially support less pollinator diversity. This is an area where more research is needed; pollinator diversity is a yet-to-be-explored issue in the native conversation.

Importantly, this study also concluded that **selecting for specific traits can sometimes unknowingly alter other traits**. The quantity and nutrition of pollen and nectar can be indirectly affected by selection for ornamental traits; the researchers theorized that major alterations in flower color can affect pollen nutrition of a plant. This occurs through a mechanism called **pleiotropy**, wherein two seemingly-unrelated traits are linked to the same gene.

Hayes' work implies that there are many yet-undiscovered ecological and genetic mechanisms involved in native cultivation. The myriad genetic shifts involved in plant breeding remains an area of active research.

Conclusion

> The summarized recommendations are listed below, organized by how your potential native might differ from the wild type.

- Modified flower color can be evaluated case-by-case.

- Avoid modified leaf colors. Variegated leaves can be evaluated case-by-case.
- Avoid heavy modification of the inflorescence, especially double flowers or other modifications in which the plant's fertility decreases.
- Flower shape and size modifications can be evaluated case-by-case.
- Growth habit modifications can be evaluated case-by-case. Plants modified for increased height sometimes perform well for pollinators.
- It is difficult to fully understand genetic and ecological change. Nativars can have unknown consequences that are still being researched.

Having immersed ourselves in the abstract world of research papers, university studies, and botanical science, this guide should help the curious gardener optimize their nativar usage. But—to stumble back into the real world—what is the economic reality of native plant gardening?

Native plant gardening may be on the rise, but most nurseries still prioritize ornamental over native plants. If a nursery sells native plants at all, they are likely to be nativars. You may not be able to procure wild type natives without ordering online (or taking a dip into a local forest). If nativars are all you can access, they are certainly a better option than non-natives. It may be worth searching for a local native gardening community to find resources and sellers specific to your area.

That being said, nativars serve some contexts better than others. If you are an ornamental gardener looking to support a few more local critters in your garden, nativars are a great way to get started. They can be a compromise between traditional garden aesthetics and ecological utility. If you are an experienced native plant gardener, you might use nativars sparingly, to add a splash of your desired aesthetic. If you are a restoration ecologist, nativars are probably not a part of the conversation.

- Links to many many resources. So many resources. How to find native plants in your area, mt cuba databases, nativar guide from MVNG, etc.

- Studies used, in this draft
- Oregon State studies, Pacific Northwest, Part 1 and 2

- Emily Erickson 2022 pollinators study
- Mt Cuba coneflower study
- Doug Tallamy insect herbivory study
- Mt Cuba - Phlox study, with Jeana - Keith Nevison at University of Delaware theorized shallow tube
- British ecological society, 2023, tyler coverdale
- Mt. Cuba veronia study
- Jacob Ricker 2019 thesis Uconn
- Yale School of Environment EAB nativar

article 1!

Introduction

Nativar is one of the newest and most hotly-debated terms in horticulture. Research on these plants has exploded in the past decade. Are they good for pollinators? Where can they be purchased? Can they be used in my garden?

...What are they?

In this article, we hope to give some clarity on native plants, cultivars, nativars, and the role these plants play ecologically and aesthetically in our garden. This article is directed towards those interested in building a garden that supports local wildlife, particularly birds.

If you are very interested in nativars, part two of this article will be released soon, featuring a deep dive into the research backing the claims made in this article. Stay tuned!

[IMAGE: hummingbird feeds on a scarlet beebalm, ML351975421]

What is a native plant?

> Relative to where you live, a **native plant** is an indigenous plant species that naturally grows within that region. *Sans* human intervention, a native plant evolves over thousands of years to flourish within its local ecosystem. It occupies a specific ecological role within its environment and maintains important relationships with the native wildlife. A native goldenrod plant, for example, would be recognizable to a local species of goldenrod gall fly, which could then lay its eggs within the plant. The goldenrod plant nourishes the fly larvae, which can eventually feed larger insects or birds in the area.

[ADD a resource bar to the side linking to Garden For Birds native plants article]

[IMAGE: gall from inaturalist, <https://www.inaturalist.org/observations/307173480>]

Humans have severely disrupted native ecosystems within the last several hundred years by introducing countless non-native plant species to North America. Foreign plants may not be ecologically productive in their new environments. Moreover, some non-native plants are **invasive**, meaning that they out-compete native plants for resources and spread rapidly and often uncontrollably. These plants can cause massive ecological damage. **For supporting local wildlife, native species are preferred over non-native—and especially invasive—species.**

What is a cultivar?

> **Cultivar** is a shortening of “cultivated variety”, referring to a variety of a plant species that has been cultivated by humans to select for specific, desired traits. The version of a plant one could find in the wild is known as the **wild type** or the **straight species**. A **selected** cultivar is produced when a botanist discovers a plant in the wild that has naturally mutated towards a

desired trait, and propagates the plant into a cultivar. A **bred** cultivar is created by deliberately breeding two plants together to produce a desired trait, and sometimes entails the hybridization of two separate plant species.

Most cultivars are propagated by cloning, which can be as simple as planting a cutting taken from the parent specimen. One plant of a cloned cultivar is therefore genetically identical to the rest. This practice preserves the cultivar's characteristic traits, but restricts their genetic diversity.

Cultivars are notated with a given name to distinguish from the wild type species. They will be written by following the scientific species name with the given name in single quotes. For example, the Venus flytrap (*Dionaea muscipula*) cultivar B52 is notated as *Dionaea muscipula* 'B52'.

Cultivars are as old as agriculture; nearly all of the ample-fruited, easy-growing produce consumed by our civilization are varieties cultivated from ancient wild plants. Long before modern genetics, humans were selectively breeding for favorable traits in their vegetable gardens. Wild cabbage (*Brassica oleracea*) alone has been cultivated into kale, cabbage, broccoli, cauliflower, Brussels sprouts, and more. Cornell Orchards has famously cultivated over 70 apple varieties that now widely populate New York orchards, maximizing for disease resistance, flavor, winter hardiness, and storage potential.

[IMAGE: wild brassica oleracea, <https://www.inaturalist.org/observations/120710069>]

[IMAGE: another brassica oleracea, <https://www.inaturalist.org/observations/363828338>]

[IMAGE: another brassica oleracea, <https://www.inaturalist.org/observations/209437545>]

By pulling on the strings of the plant genome, our species fills grocery stores and botanical gardens alike with lush cultivars. Cultivars, however, have limited ecological value. As a plant is modified further from its wild type, it can become unrecognizable or unusable by pollinators and herbivores, originating rippling consequences throughout the food web. A garden full of beautiful cultivars may be barren of local fauna.

What is a nativar?

> **Nativar** is a shortening of “native cultivar”, and, as suggested, refers to a human-cultivated variety of a native plant. Nativars are cultivars that are planted in their home range. They are cultivated and propagated like any other cultivar—generally through breeding, selection, and cloning—and can be understood as an ecological intermediary between wild type native plants and non-native cultivars. A nativar deviates from the wild type in some aspects, and thus can blur its ecological function in complicated ways.

—

These terms are easily synthesized with the example of *Hydrangea aborescens* 'Annabelle', a cultivar derived from smooth hydrangea, which is native to the eastern United States. Legend tells that Harriet Kirkpatrick found the original 'Annabelle' hydrangea growing wild in the woods of Anna, Illinois in 1910. Impressed by its large, snowball-like blooms, she took cuttings of the plant to clone and propagate in her own garden, and went on to share the cultivar with her neighbors and friends. Over a century later, 'Annabelle' is one of the most famous hydrangea cultivars on the continent.

In places where wild type smooth hydrangea ([*Hydrangea arborescens*](#)) is native—on moist or rocky wooded slopes, south from New York to Florida, and west from the Atlantic to several hundred miles west of the Mississippi—the 'Annabelle' variety could be considered a nativar. However, its blooms are primarily comprised of sterile flowers; the fertile flowers of a hydrangea are smaller and lack the showy petals characteristic of 'Annabelle.' Large, primarily-sterile blooms make 'Annabelle' attractive to humans, but are unproductive for pollinators due to their lack of pollen and nectar. A local bumblebee *could* recognize and approach 'Annabelle', but may leave unable to find a meal.

[IMAGE: annabelle hydrangea,

https://commons.wikimedia.org/wiki/File:Hydrangea_arborescens_Annabelle_over_a_fence_under_a_cloud.jpg]

[IMAGE: wild type hydrangea, <https://www.inaturalist.org/observations/124568569>]

Moreover, should 'Annabelle' be planted in large swathes, the lack of genetic diversity between plants supports a narrower range of wildlife and creates vulnerability to local climate conditions, pests, and disease. If 'Annabelle' breeds with wild plants nearby, the diversity of the local gene pool may be reduced as well, introducing these issues to the surrounding plant community.

Hydrangea aborescens 'Annabelle' is a great illustration of the complicated questions associated with nativars. When evaluating nativars for use in native plant gardens, we are primarily concerned about their utility for pollinators and herbivores. **Nativars are not a monolith; they should generally be evaluated on a case-by-case basis. Some may even draw increased pollinator attention compared to their wild type counterparts.**

Phlox paniculata 'Jeana' is a top-performing nativar popularized by Mt. Cuba Center's study of Mid-Atlantic *Phlox*, beloved by butterflies. Researchers theorized that 'Jeana' is particularly accessible to butterflies due to the small size of its flowers, and the narrowness and shallowness of the flower tube. In this case, the modification of flowers from wild type significantly increased pollinator visitation.

[IMAGE: Jeana phlox from plantsmen]

[IMAGE: Achillea millefolium 'paprika' yarrow, from plantsmen]

[IMAGE: Achillea 'moonshine' yarrow]

Given this complexity, is there any definite rule to nativar planting? The unfortunate answer is *probably not*. The fortunate upside—many scientists have taken on the nativar question with rigor and expertise.

Doug Tallamy, an entomologist at the University of Delaware, has dedicated years to the study of native plants and insects. In a 2018 interview with *A Way to Garden*, he explains why he wouldn't use cultivars as a first choice.

“Most of them are propagated clonally, which means there's zero genetic variability. In the age of climate change...it's particularly important. The other thing that bothers me... it perpetuates the idea that plants are just decorations. Of course, they are decorations, and they are beautiful, and we do want beautiful plants in our yard. But we also want to think about those vital functions that they must be performing in our yard.”

He advises analyzing nativars on a case-by-case basis. “That's what people have to realize. What has a cultivar change actually done to your particular plant? There's no one answer to that. The answer is: It depends.”

This conclusion was supported by a 2025 study at Oregon State University, wherein eight plants native to the Pacific Northwest were analyzed alongside one to three cultivars for each species. The cultivars used represented several modifications from the wild type, including flower color, vegetation color, flower size, and plant size. Researchers were unable to conclude if pollinators universally preferred wild type plants to nativars; they were either favored the same as, or less than, the corresponding native plant.

[IMAGE: orange sulphur feeding on plant, ML643766855]

The study did raise concerns about the diversity of nativar-feeding pollinators. Moreover, researchers hypothesized that selection for certain traits could lead to changes in other traits through unforeseen genetic mechanisms. A nativar selected for a bright flower color, for example, could subsequently produce less pollen. These questions are not fully researched, but their exploration may be of interest to cautious gardeners.

Conclusion

> There are some pointers that can be helpful in nativar use, based on how your potential nativar differs from the wild type. Several summarized recommendations are listed below. These pointers are explained with relevant research in part two of this article.

- Modified flower color, shape, patterns, and size can be evaluated case-by-case. Generally, the more similar to wild type, the better.
- Avoid modified leaf colors (modifying from green to, say, red or blue).

- Avoid heavy modification of the flower head, especially double flowers or other modifications in which the plant's fertility decreases by replacing reproductive parts with petals.
- Plant size modifications can be evaluated case-by-case. Plants modified for increased height sometimes perform well for pollinators. **When in doubt, stick closely to the wild type.**

Having immersed ourselves in the abstract world of research papers and expert opinions, this guide should help the curious gardener optimize their nativar usage. But—to stumble back into the real world—what is the economic reality of native plant gardening?

Native plant gardening may be on the rise, but most nurseries still prioritize ornamental over native plants. If a nursery sells native plants at all, they are likely to be nativars. You may not be able to procure wild type natives without ordering online. If nativars are all you can access, they are certainly a better option than non-natives. **It may be worth searching for a local native gardening community to find resources and sellers specific to your area.**

That being said, nativars serve some contexts better than others. If you are an ornamental gardener looking to support a few more local critters in your garden, nativars are a great way to get started. They can be a compromise between traditional garden aesthetics and ecological utility. If you are an experienced native plant gardener, you might use nativars sparingly, to add a splash of your desired aesthetic. If you are a restoration ecologist, nativars are probably not a part of the conversation.

Keep in mind that nativars may not be necessary for your aesthetic goals. If you have a specific idea of your “ideal plant” for a space, and are seeking a certain color, size, or otherwise, there’s a good chance you could meet that need with any of the *hundreds* of native plants to choose from for your given region.

Regardless, we hope you can move a little more comfortably through your local nursery with these concepts in mind. If you are fascinated by nativars, check out part two of this article—coming soon. Happy gardening!

[IMAGE: townsend warbler in the flowers. ML563721541]

- Unsplash for pictures
- Inaturalist cultivated filter - search up research grade!! Flag for captive / cultivated
- Look for columbine species - native here is orange? Look for different cultivars
- switchgrass ?? natives
- Go back to plantsmen nursery and take pictures!!!!
- Cayuga landscaping
- Be careful about how to cite pictures
- Homegrown collab - focus on pollinators! Article about that?
- Wetland native plants article?

article 2!

Introduction

This article is a continuation of our previous piece on nativars. Check out that article for definitions and general recommendations; this article is aimed at those interested in an in-depth review of recent research. If you are looking for science, you're in the right place!

Flower Color and Pattern

> Showy, colorful flowers are enticing to gardeners, and even more so to many pollinators. Plants often use specific visual cues to attract pollinators—some of which are invisible to humans. Toothleaf goldeneye (*Viguiera dentata*), a bushy plant native to the Southwestern U.S., displays a bullseye pattern on its flowers visible in ultraviolet wavelengths, marketing itself to UV-spotting bees. When flower color and patterning is modified in a nativar, these important visual cues could be disrupted as well.

<https://www.inaturalist.org/observations/185917405> - toothleaf goldeneye

A 2022 [study](#) of pollinator-cultivar interactions found that most pollinators preferentially visited cultivars with colors similar to the wild type, although some notable exceptions were recorded (*Agastache* 'Heatwave', *Agastache* 'Summer Glow', and *Nepeta* 'Snowflake' saw increased visits despite their unnatural colors).

Similarly, in Mt. Cuba Center's [study](#) of coneflower (*Echinacea*) nativars in the Mid-Atlantic region, no clear conclusions could be drawn about pollinator preference for flower color. Most of the top 15 coneflowers for pollinator visitation were colored similarly to wild type, with pink and purple flowers dominating. However, the most attractive coneflower to pollinators was *Echinacea purpurea* 'Fragrant Angel', a nativar with white-colored flowers.

<https://www.inaturalist.org/observations/238450161> - echinacea purpurea

There is no universal consensus on flower color variation in nativars. Plants should be evaluated on a case-by-case basis. When in doubt, a nativar colored similarly to the wild type is your safest option for most pollinators; knowing this, some unnaturally-colored nativars can still perform just as well, or occasionally better, than wild type plants. More research, focused on species specific impacts, is needed to deepen our understanding of color-modified nativars.

Leaf Color and Pattern

Insect herbivores, notably caterpillar larvae of moths or butterflies, can make a feast of native plant leaves. The holey foliage they leave behind may clash with traditional garden aesthetics—but a garden that can support insect herbivores is supporting a healthy, vibrant ecosystem. Birds will happily visit to indulge in a delicious meal. When the surviving caterpillars

metamorphosize into butterflies and moths, your garden will not only sparkle with fluttering foragers, but will also produce the next generation of food resources for baby birds.

<https://www.inaturalist.org/observations/121524670> - caterpillar on leaf

https://search.macaulaylibrary.org/catalog?birdOnly=true&sort=rating_rank_desc&tag=carrying_food - bird with food

Insect herbivory can be disrupted by modified leaf color. In a 2018 [study](#), Emily Baisden and Doug Tallamy found that cultivars selected to alter leaf color from green to red, blue, or purple significantly reduced insect herbivory. They hypothesized that insects were avoiding certain pigments; excluding chlorophyll, many plant pigments (notably anthocyanins and carotenoids) are secondary metabolites, or organic compounds that protect the plant from herbivory by impeding protein assimilation in bugs.

In the same study, Baisden and Tallamy found they could not make a broad conclusion on the effects of modified leaf variegation; for this reason, nativars with leaves differentially variegated from the wild type should be evaluated on a case-by-case basis. In general, when selecting a nativar, look for wild type color leaves to feed insect herbivores.

Inflorescence (aka Flower Head) Composition

‘Inflorescence’ refers to the complete flower head of a plant—often the most visually stunning component of the plant, and the area containing the organism’s essential reproductive organs. The inflorescence is where pollinators look to procure pollen and nectar. Therefore, nativars with heavily modified flower heads are often unusable by pollinators.

The previously-mentioned case of [Hydrangea aborescens](#) ‘Annabelle’ is an example of inflorescence modification gone awry. By selecting for showy and sterile flowers over smaller, fertile flowers, botanists produce plants unable to feed pollen and nectar-loving pollinators.

Double-flowered varieties of plants, which contain extra petals (“flowers within flowers”), are also problematic for pollinators. The extra petals may replace fertile parts of the flower, or physically block pollinators from accessing nectar and pollen. Mt. Cuba’s coneflower (*Echinacea*) [study](#) illustrates this issue; double-flowered varieties made up 16% of the trialed coneflowers, but accounted for only 4% of pollinator visits.

When looking for nativars to use in your garden, inflorescence is one of the most important factors to consider. **The more closely the inflorescence resembles the wild type, the more likely the nativar is to be suitable for pollinators.** *Hydrangea arborescens* ‘Haas’ Halo’ is an alternative to ‘Annabelle’ that has a “lacecap” inflorescence, with a bundle of small, fertile flowers in the center of the inflorescence. This variety more closely resembles wild type *Hydrangea arborescens*, and makes ‘Haas’ Halo’ a great nativar option for gardeners in the eastern United States.

Flower Shape and Size

> The flower is the vessel through which pollinators access their meal. Accordingly, plants have evolved a mosaic of eccentric characteristics to market their flowers to specific pollinators. *Magnolia* is bowl-shaped to provide an easy landing pad for pollinating beetles; beardtongue (*Penstemon*) offers tubular nectar channels for hummingbirds; and closed bottle gentian (*Gentiana andrewsii*) is exclusive only to particular bees able to wriggle inside. These plants, and countless others, could become inaccessible to certain pollinators when undergoing flower modification.

<https://www.inaturalist.org/observations/372485001> - sweetbay magnolia

<https://www.inaturalist.org/observations/375999553> - manyflower beardtongue

<https://www.inaturalist.org/observations/103238309> - closed bottle gentian

As mentioned in article one, the nativar *Phlox paniculata* 'Jeana' is beloved by butterflies. 'Jeana' may be desirable to butterflies due to the small size of its flowers, and the narrowness and shallowness of the flower tube. In this case, the modification of flower shape and size significantly increases pollinator visitation.

In another [study](#), researchers analyzed pollinator interactions with cultivars possessing modified flower structure. The ring of petals around a flower form a structure known as a corolla; the depth, length, and size of the corolla correlated to varying preferences by visiting bees. The size of the bee, and the length of its tongue, helped predict its preference for corolla type. These preferences varied on a plant-by-plant basis, and no broader conclusions about pollinators and flower shape modification could be drawn.

<https://search.macaulaylibrary.org/catalog?otherAnimalsOnly=true&taxonCode=t-10519698&taxonFilter=insect&includeChildTaxa=true> - bee feeding from a flower

There is no universal consensus about modification of flower shape and size in nativars. While pollinators certainly notice and react to these differences, the effects are variable and occasionally desirable. Plants with modified flowers should be evaluated individually and carefully.

Growth Habit

> Plants come in all different heights, sizes, and shapes; a woodland sunflower (*Helianthus divaricatus*) stretches proudly towards the sky, while a Virginia creeper (*Parthenocissus quinquefolia*) winds itself carefully around walls and trees; beneath them, a patch of creeping phlox (*Phlox stolonifera*) might sprawl low to the ground. These traits, known as the plant's **growth habit**, have specific utility for wildlife; birds might prefer to nest in dense or tall shrubs, insects and smaller mammals, reptiles, and amphibians could prefer denser plants for shelter, and deer might want to access a plant at a specific height to feed.

<https://www.inaturalist.org/observations/218786960> - woodland sunflower

<https://www.inaturalist.org/observations/353187351> - virginia creeper

<https://www.inaturalist.org/observations/245482148> - creeping phlox

In a 2023 [review](#), researchers concluded that diverse plants make a natural space more complex, and complex spaces support greater diversity of wildlife. The use of cloned natives decreases the diversity and complexity of a space, and could possibly decrease wildlife diversity. Moreover, modifications to an individual plant's density and size, such as making a "dwarf" variety, could lower spatial complexity within the plant.

Very little research has been conducted exploring these exact questions, especially as they relate to natives. The modified growth habit of a cultivar could be consequential across many levels of an ecosystem, but the research that *does* exist focuses primarily on pollinators.

In another Mt. Cuba Center [study](#), the *Vernonia gigantea* 'Jonesboro Giant' native, modified for large size, was exceptionally beloved by pollinators. The enormous plant was attended by late-season insect pollinators and ruby-throated hummingbirds. It is unclear why pollinators flock to 'Jonesboro Giant'; perhaps its huge size makes it stand out in the crowd!

<https://www.inaturalist.org/observations/313856761> - vernonia gigantea, wild type

Meanwhile, a 2019 [thesis](#) at the University of Connecticut investigated several compact natives of black chokeberry (*Aronia melanocarpa*), or "dwarf" versions of wild type chokeberry. No conclusion about pollinator preference was drawn; perhaps dwarf species are just as good as the original. Given this, natives with a modified growth habit should be investigated case-by-case.

Resistance and Hardiness (adjusted catch title might be something like... "Will Ash Trees Be Saved by Natives?")

> The emerald ash borer (*Agrilus planipennis*), native to northeastern Asia, is one of the more recent destructive invasive pests in North America. It has felled tens of millions of ash trees across the continent as ravenous larvae feed on bark from the inside-out, cutting off essential nutrient channels and eventually starving the tree. Emerald ash borer infests great swathes of the eastern United States, including parts of Sapsucker Woods here at the Cornell Lab.

<https://www.inaturalist.org/observations/233210336> - emerald ash borer

The prognosis for North American ash trees is uncertain. However, selecting natives for disease or pest resistance can actually be helpful when battling these invasives. In a 2024 [article](#) from The Yale School of the Environment, Radka Wildova and Jonathon Rosenthal detail their investigation of natural emerald ash borer resistance among ash trees. The researchers hope to use the few resistant ash trees left to breed new varieties of resistant ash, which could

repopulate ecosystems suffering from the enormous loss. The cultivation and propagation of these nativars has the potential to save ash species from extinction.

<https://www.inaturalist.org/observations/348824302> - EAB-affected tree

Nativars have, then, a distinct utility for disease and pest resistance. They are not as useful when selecting for winter hardiness and plant toughness; native plants should be capable of surviving local conditions, without genetic modifications. Moreover, the genetic diversity of wild type plants can help a native plant population survive long-term in extreme scenarios, such as those caused by climate change.

Additional Considerations

> Ecology is spectacularly complex. It is difficult to track exactly how a modification of *one* trait, of *one* plant, can affect the countless species who interact with it; it is impossible to universally predict any outcome. These complexities have only been complicated by a recent study at Oregon State University.

Jen Hayes opened several doors to further research in her 2025 [study](#) of nativar-pollinator interactions. In an experimental garden of Pacific Northwest plants and corresponding nativars, nine out of ten nativars attracted dissimilar bee communities to their wild type counterpart. While pollination was still occurring for nativar plants, the exact groups of species interacting with nativars varied significantly. Moreover, highly modified nativars potentially support less pollinator diversity. This is an area where more research is needed; pollinator diversity is a yet-to-be-explored issue in the nativar conversation.

<https://www.inaturalist.org/observations/215771301> - tri colored bumblebee gorges on pollen
<https://www.inaturalist.org/observations/25655952> - fender's blue feeds in oregon

Importantly, this study also concluded that **selecting for specific traits can sometimes unknowingly alter other traits**. The quantity and nutrition of pollen and nectar can be indirectly affected by selection for ornamental traits; the researchers theorized that major alterations in flower color can affect pollen nutrition of a plant. This occurs through a mechanism called **pleiotropy**, wherein two seemingly-unrelated traits are linked to the same gene.

Hayes' work implies that there are many yet-undiscovered ecological and genetic mechanisms involved in nativar cultivation. The myriad genetic shifts involved in plant breeding remains an area of active research.

Ultimately, no gardener can create a space uncompromised by human impact. So long as humans are present, our spaces are merely representations of what we imagine "wilderness" to be. You cannot hope to control for every possible ecological downside in your garden design. That being said, our garden spaces can still be meaningfully hospitable to wildlife, and some care in plant selection goes a long way for local critters. We hope these considerations are

helpful when designing your garden—or, at the very least, have stirred some interest in the wonderful world of plant ecology. Good luck gardening!