GROWING KNOWLEDGE

Series content is coordinated by Dr. Lloyd Nackley, associate professor of nursery production and greenhouse management at Oregon State University in Corvallis, Oregon.

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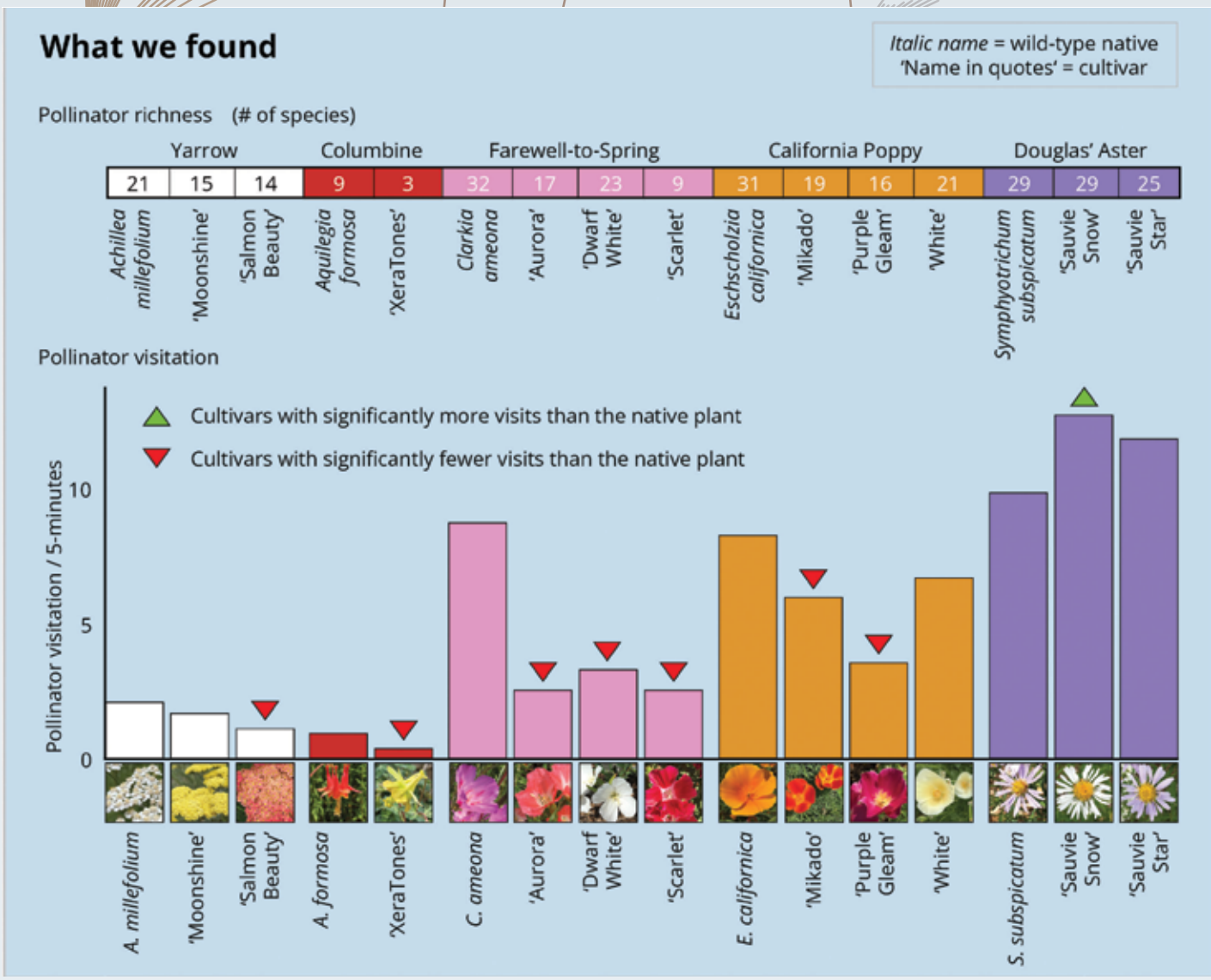

Figure 1. Pollinator richness (horizontal bar along the top) and visitation (bar graph towards the bottom) on five groups of native plants, and their cultivars. Cultivars with triangles had significantly greater (green) or fewer (red) visits than its native plant comparator. GRAPNIC COURTESY OF OREGON STATE UNIVERSITY

Native vs. native cultivars

OSU's study of native plants and cultivars provides insights into preferences of gardeners and pollinators

BY JEN HAYES AND GAIL LANGELLOTTO

Native plants have greatly increased in popularity among gardeners over the past several years, in part due to these plants' purported value to bees and other pollinators. However, many native plants are difficult to grow and finish at scale in modern nursery production systems.

Also, some native plants are viewed as too unattractive and too weedy-looking for gardens, although simple messages about the pollinators found on these plants can significantly increase a gardeners' willingness to plant them in their garden (Anderson et al. 2021).

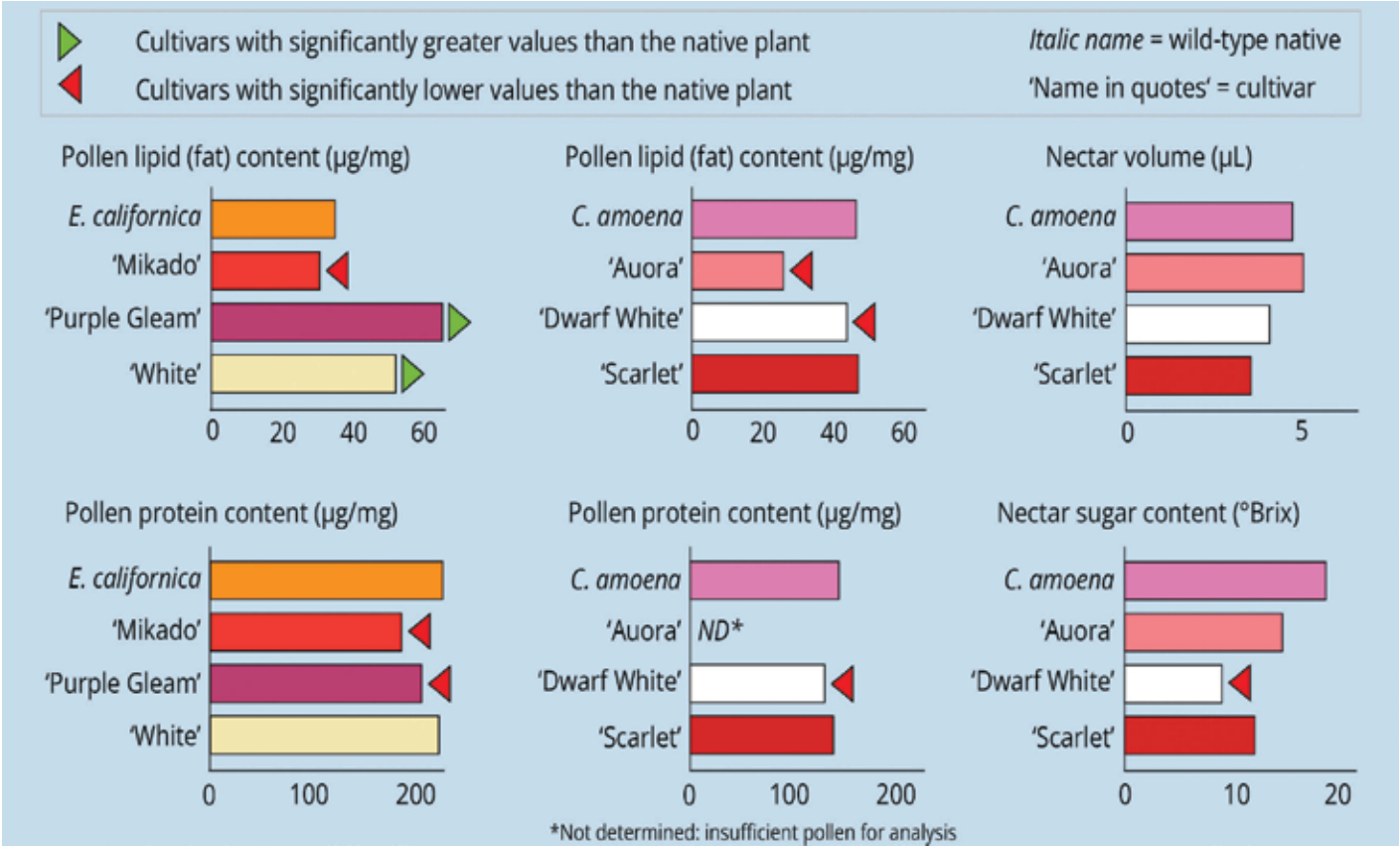

Figure 2. Pollen lipid (top two graphs) and pollen protein (bottom two graphs) content for California Poppy (left two graphs) and Farewell-to-Spring (right two graphs).

Native cultivars are a potential solution to some of the production and marketing limitations associated with native plants. Native cultivars are often bred for improved aesthetic traits like compact habit, larger flowers, and novel flower or foliage colors. However, these selected changes may influence how both pollinators and gardeners perceive a plant.

Led by Dr. Jen Hayes, our lab group conducted a four-year study of the relative attractiveness of five groups of native plants and their cultivars to pollinators, and to gardeners. These five plant groups included Yarrow (*Achillea millefolium*, including the 'Moonshine' and 'Salmon Beauty' cultivars), Columbine (*Aquilegia formosa*, including the 'Xera Tones' cultivar), Farewell-to-Spring (*Clarkia amoena*, including the 'Aurora', 'Dwarf White', and 'Scarlet' cultivars), California Poppy (*Eschscholzia californica*, including the 'Mikado', 'Purple Gleam', and 'White' cultivars), and Douglas' Aster (*Symphyotrichum subspicatum*, including the 'Sauvia Snow', and 'Sauvie Star' cultivars).

We identified pollinators and conducted five-minute observations of their visits to native plant-cultivar groups over three years (2020–2022) to see if pol-

linators had a preference for either plant type. In general, we found more pollinator species on native plants than cultivars (Figure 1, Pollinator richness), and that pollinators visited native plants more frequently than cultivars (Figure 1, Pollinator visitation).

For pollinator visitation, we specifically found that visitation was significantly reduced for 7 of 11 comparisons (64%), not significantly different than the native plant for 3 comparisons (27%) and was significantly higher in 1 of 11 comparisons (9%).

Pollinator visitation was significantly higher on the 'Sauvie Snow' cultivar, compared to the native plant. Pollinator richness was on 'Sauvie Snow' was equal to the native plant.

The Douglas' aster cultivars were selected from a local population of *Symphyotrichum subspicatum*, rather than bred for ornamental traits. They may thus be more similar to the native species, relative to cultivars in other plant groups, which may have promoted pollinator association with the cultivars.

We also studied the nutritional traits (pollen and nectar) of these native plants and cultivars to understand how plant breeding might impact the rewards offered by native plants to pollinators. We found that cultivars varied significantly from native plants across multiple floral display or reward traits.

Flowering phenology did not differ among plants in the *Clarkia* or *Symphyotrichum* groups. Within the Columbine group, 'Xera Tones' flowered for a significantly shorter time period than the native, as did 'Mikado' and 'Purple Gleam' within the poppy group. Only *Achillea* 'Moonshine' flowered longer than its corresponding native plant.

In terms of floral rewards 'Xera Tones' had significantly less nectar (than native Columbine), and 'Dwarf White' (farewell-to-spring) and 'Sauvie Star' (Douglas' aster) had significantly less sugar content than their corresponding native plants.

For each plant group, there was at least one instance where pollen protein and/or lipid content was significantly »

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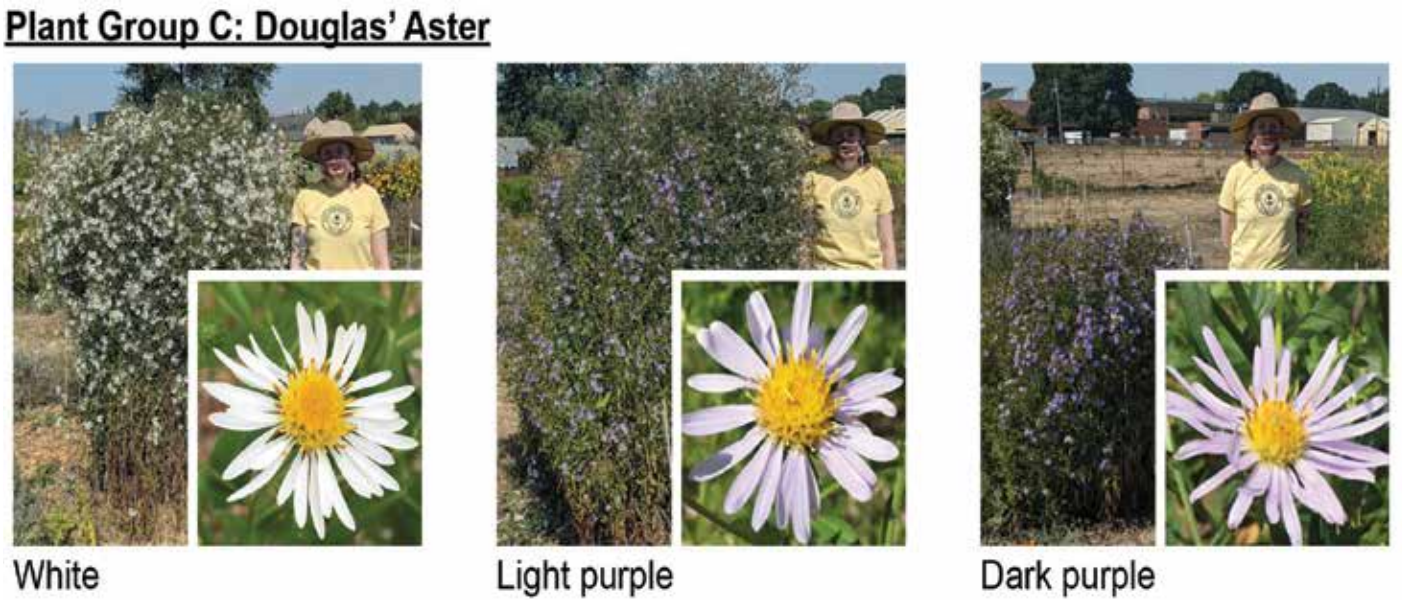

Figure 3. An example of the visuals presented to gardeners taking our aesthetic ranking survey. The order of the native plant (in this case, the one on the far right) and cultivars was randomly presented. Inset photos of flowers were set against photos that showed plant habit. In this case, a person is standing next to each plant, for scale. Visuals were coupled with more detailed information about each plant, including size, spread, bloom duration, etc., to help people determine which plants they preferred. GRAPNIC COURTESY OF OREGON STATE UNIVERSITY

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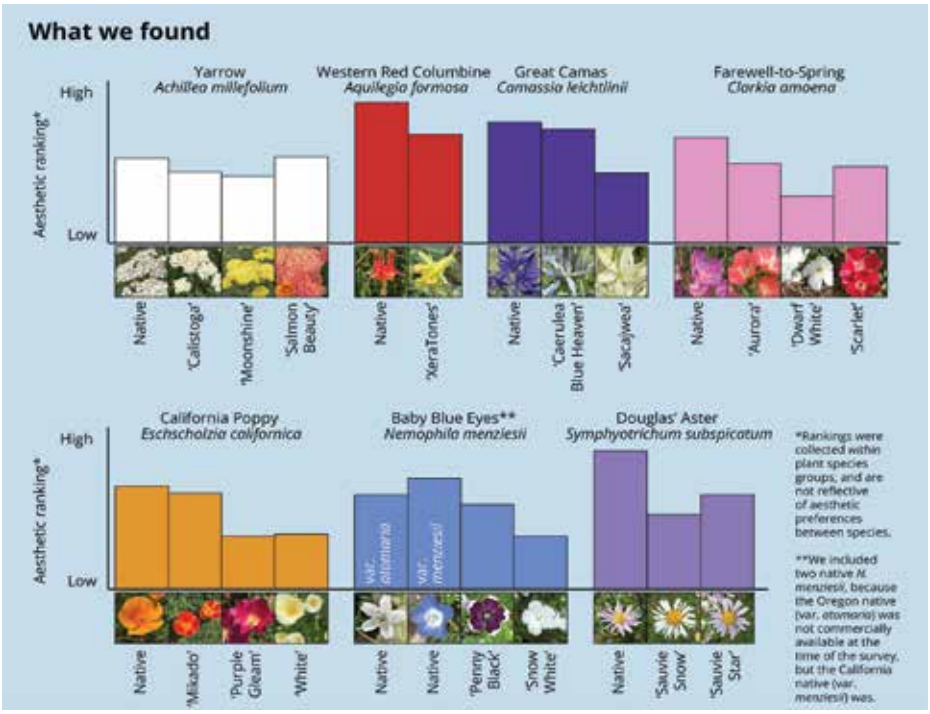

Figure 4. Aesthetic rankings (translated from Likert survey scores) of native plants and native cultivars. As with all of our studies, comparisons were made within a plant grouping, rather than across all plants. GRAPNIC COURTESY OF OREGON STATE UNIVERSITY

different than the native plant (illustrated for California Poppy and Farewell-to-Spring, Figure 2). These changes, whether positive or negative, change the protein-to-lipid ratio of pollen in ways that can ultimately affect the pollinator communities associated with each plant.

Notably, none of the native plant cultivars were bred for nectar or pollen traits. Thus changes in rewards were likely pleiotropic. All but one of our native plant versus cultivar groups had significantly different bee communities to their native plant counterpart. Once again, the mini-

mally developed Douglas' aster cultivars hosted similar bee communities to those found on the native Douglas' aster.

Finally, we created a survey to understand gardeners' aesthetic preferences for seven Pacific Northwest native plant species and their cultivars. We asked gardeners to rank native plants and cultivars of the same species by aesthetic preference, without labelling which plant was which (Figure 3).

We found that, on average, gardeners ranked native plants as more attractive than cultivars, except in the case of yarrow (*Achillea millefolium*), where the cultivar 'Salmon Beauty' had the highest aesthetic ranking (Figure 4). Notably, across all flowers, white flowers tended to be disfavored. This suggests that native plant cultivars may not represent aesthetic improvements in native plant species, and that breeders and nurseries producing native cultivars may be missing an opportunity to cater to the preferences of the ecological gardening movement.

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Hayes et al. (2025) "Pacific Northwest native plants and native cultivars part II: plant and pollinator traits." *Environmental Entomology*, 54(6): 1386-1402.

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Gail Langellotto, Ph.D. is a Professor of Horticulture and the Director of the BioResource Research Program at Oregon State University.

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