INDIAN PAINTBRUSH

state wildflower and challenge to cultivate!

Question: I'd like to have Indian paintbrush growing in my landscape. Why do I never see it for sale at my local nursery?

Answer: They are not that easy to grow successfully.

Indian paintbrush is a common sight across Wyoming.

They can be bright red, orange, yellow, and even pink blossoms (long-lived bracts really, the actual flowers are very inconspicuous) and brighten our wild landscapes and grab our attention. So much so that *Castilleja linariifolia* (Wyoming Indian paintbrush) is our state wildflower.

No wonder so many people would like to have this plant growing in their landscapes but is almost never seen in nurseries for sale. Why? The main reason is Indian paintbrush is a hemiparasitic (partially parasitic) plant. Hemiparasitic plants produce some of their own food through photosynthesis, but they also latch onto other plants' roots to get more resources such as water, nutrients, and minerals. There are a range of other parasitic and hemiparasitic native plants in Wyoming such as coralroots *Corallorhiza* spp., bastard toadflax *Comandra umbellata*, lousewort *Pedicularis* spp. and oneflowered broomrape *Orobanche uniflora*.

Parasitism is part of the array of survival strategies for plants growing in challenging environments. Because Indian paintbrush roots need to be attached to another host plant (grass, sagebrush, penstemon, etc.), the challenge lies in the successful creation and maintenance of this relationship in a nursery setting.

Growing pains

I have grown hundreds of species of plants from seed over the years for fun. I admit when I started looking into growing Indian paintbrush it was in the spirit of "why not give it a whirl?" rather than with serious intent. I had long heard it was difficult to grow. So when I started paying more attention, a couple of things surprised me.

First, Indian paintbrush plants produce a lot of seed; I was thinking since they were hard to grow, they'd be pretty frugal seed producers.

If you are ever on the University of Wyoming campus in summer swing by the Berry Center. There you will find a whole bed of Indian paintbrush growing happily with fringed sage plants – grown by Dorothy Tuthill from the UW Biodiversity Institute.

The small seeds can be found in cup-like seed pods that open once the seed is mature.

Secondly, the species I tried really weren't that hard to germinate. I gave them a cold stratification period of 6 to 8 weeks and then planted them inside under fluorescent lights. I had seedlings left, right, and center, since I planted quite a bit, thinking they wouldn't germinate well. They popped right up and grew quite quickly.

It all fell apart after transplanting.

I transplanted the seedlings in the garden near possible host plants. Most of them decided it was time to quit and croaked. One made it and decided to thrive (1 out of 20 isn't bad, is it?). I suspect it is living off of one of the nearby penstemons, but without x-ray vision I can only speculate.

What the literature says

I started paying a bit more attention and decided to look into the scientific literature and other sources to see what might be more successful approaches.

Some things I learned:

- Put seedlings in close contact with a host plant so they can make a successful hemiparasitic connection,
- Pair them with a host plant that can handle the freeloading without dying, and
- Try pairing them with a short host plant so they aren't hidden.

Orange-flowered, lone surviving Indian paintbrush plant grown from seed, in the author's landscape. Perhaps one plant is enough?

What are some approaches to create the critical host-hemiparasite relationship? Some thoughts in the plant-growing world are:

- Plant the seeds of both species – host and paintbrush – in the same pot and hope they both germinate promptly.
- Germinate the Indian paintbrush and host plant seeds separately and then transplant them into the same pot. Then gently transplant outside after the relationship is established.
- Plant the seeds of the Indian paintbrush outside near a potential host plant that is already growing. Hopefully, they make contact when the paintbrush germinates.

A paper by Stephen L. Love and Tony A. McCammon called "Compatible host/parasite pairs enhance propagation of paintbrush (*Castilleja* spp.)" was the most useful paper I came across during my research. The University of Idaho carried out a study to see how Indian paintbrush could best be cultivated by the horticulture industry. (The short note results from this study on one species, *Castilleja integra*, can be viewed at the "Native Plants for the Intermountain West" website produced by a consortium of university plant experts: bit.ly/Western-Native-Plants).

Creating that plant-to-plant relationship

Love and McCammon tried 34 species of paintbrush, a number of host plants, and a couple of different methods to create the host relationship. They found:

- Some Indian paintbrush species germinated better for them than others.
- *Castilleja integra*, *Castilleja scabrida* and *Castilleja chromosa* were the most successful species of Indian paintbrush they tried. These species were most likely to grow and survive the process.
- They believed that higher levels of paintbrush survival, plant vigor, and aesthetic compatibility occurred when *C. integra* was paired with Fringed sage (*Artemisia frigida*), Michaux's wormwood (*Artemisia michauxiana*), Rubber rabbitbrush (*Ericameria nauseosa*), Pineleaf beardtongue (*Penstemon pinifolius*), Yellow sundrops (*Calylophus serrulatus*), Blue Mountain buckwheat (*Eriogonum strictum*), and James' buckwheat (*Eriogonum jamesii*).
- They had the best success growing the paintbrush and host plants separately from seed and then transplanting multiple seedlings into the same pot when the paintbrush plants were about 4 inches. (They placed two seedlings of each type of plant together in a 4-inch pot, so four plants total per pot.)
- Great care should be taken when transplanting these paired plants into a landscape as a unit. Disturbance to the root ball will kill the paintbrush.

How much does the host plant tend to spread (by seed or roots/rhizomes)? A host plant such as Rocky Mountain penstemon produces lots of seed but is easy to control by cutting the seed heads off before they mature. Fringed sage is a fairly vigorous spreader (creeps along to cover the surrounding area and reseeds when it has the chance), and I have known folks who found rubber rabbitbrush's reseeding tendencies too much and ripped it out (these characteristics may vary by cultivar).

Give growing Indian paintbrush a whirl if interested. There are plenty of places from which to purchase seed, and some experimentation might give you some big blooms.

Not interested in the effort? There is enough interest in growing these plants I would not be surprised to see it offered more commonly in nurseries in the future. (You'll still have to transplant very carefully.) And then there is the ultimate in easy – just enjoy it growing in the great outdoors each summer! There really is nothing like seeing the bright red-orange of Indian paintbrush gleaming amongst the sagebrush. Long live *Castilleja* and its accommodating hosts!

For more information on growing native plants, visit our "Native Plants" web page by going to www.uwyo.edu/barnbackyard and clicking on the Native Plants link under Welcome to Barnyards&Backyards.

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