

What should I plant?

For those who become serious about increasing animal diversity in suburbia, it is important to recognize that all native plants are not equal when it comes to supporting insect herbivores and thus other forms of wildlife. For a variety of reasons, some plant species host many dozens of specialist herbivores, while others host only a few. For example, poison ivy, ferns, and tulip trees are among the plants that few extant insect species have the ability to eat, while oaks, willows, and cherries are at the other end of the spectrum, hosting over a thousand species among them. In a study in Illinois, John Lill and Robert Marquis found that a single white oak tree can provide food and shelter for as many as 22 species of tiny leaf-tying and leaf-folding caterpillars, insects most people never notice on their walks in the woods (Lill & Marquis 2003). When all of the other Lepidopterans (moths and butterflies), Heteropterans (true bugs), Homopterans (aphids, plant hoppers and scales), Thysanopterans (thrips), Orthopterans (katydids, grasshoppers and crickets), Phasmids (walking sticks), Coleopterans (beetles), and herbivorous Hymenopterans (sawflies) that develop on white oaks are considered as well, you can appreciate how important this one plant species is to the maintenance of biodiversity in the Eastern deciduous forest.

Without a doubt, the question regarding suburban restoration that I am asked most often is, “What should I plant? The answer is to plant the species that support the most insect biodiversity because so many other types of animals get most or all of their nourishment from eating insects. But which plants produce the most insects? You might expect every entomologist to be able to come up with such a list with no trouble at all. Not so. To my knowledge, nobody has ever tried to answer this question before and for good reasons. First of all, there are many thousands of species of insect herbivores in North America, a fair percentage of which we know little or nothing about in terms of nutritional requirements. Second, what we do know about the diets of insect herbivores is scattered throughout several thousand scientific reports. The task of accumulating and managing all of that information would in itself be monumental. Yet, the question of which plants to recommend to gardeners who want to make the biggest difference in the shortest time is so important that I am willing to compromise a bit a comprehensive list of all host plants and let one order of insect herbivores, the Lepidoptera, serve as a surrogate for all insect herbivores. In this case some information is clearly better than no information.

I have chosen moths and butterflies as my surrogate taxon for three reasons. First, there are so many of them (11,500 species in North America) that they represent over 50% of all insect herbivores in this country (Arnett 2000). Coming up with some measure of host use in the Lepidoptera, therefore, should provide a good estimate of host use by all herbivores. Second, caterpillars are important components of the diets of many of the vertebrates we value most in our society, particularly birds. Finally, more information about host use in Lepidoptera is already published than for any other large group of herbivores, and so compiling a list of Lepidopteran host plants for the mid-Atlantic states has been possible.

The following list is the result of the labors of Kimberley Shropshire who has waded through host plant literature for over a year. She would be the first to point out that this list is not definitive; it is a work in progress. The number of species each plant supports is likely to change slightly as she adds to her survey over time, but I am confident that the ranking of plants based on their ability to support Lepidoptera is accurate.

20 most valuable woody and perennial genera in terms of supporting biodiversity in the mid-Atlantic region

Woody Plants			Perennials		
Plant Genus	Common Name	# of Lepidoptera species supported	Plant Genus	Common Name	# of Lepidoptera species supported
<i>Quercus</i>	oak	410	<i>Aster</i>	asters	111
<i>Salix</i>	willow	350	<i>Solidago</i>	goldenrod	107
<i>Prunus</i>	black cherry	285	<i>Eupatorium</i>	joe pye, boneset	42
<i>Acer</i>	maple	258	<i>Carex</i>	sedges	36
<i>Betula</i>	birch	229	<i>Convolvulus</i>	morning glory	35
<i>Populus</i>	poplar	215	<i>Lupinus</i>	lupine	33
<i>Vaccinium</i>	blueberry	189	<i>Lonicera</i>	honeysuckle	32
<i>Malus</i>	crabapple	186	<i>Viola</i>	violets	22
<i>Ulmus</i>	elm	182	<i>Geranium</i>	geraniums	18
<i>Alnus</i>	alder	165	<i>Rudbeckia</i>	black-eyed susan	16
<i>Carya</i>	hickory	161	<i>Oenothera</i>	evening primrose	15
<i>Tilia</i>	basswood	129	<i>Iris</i>	iris	14
<i>Pinus</i>	pine	127	<i>Asclepias</i>	milkweed	12
<i>Crataegus</i>	hawthorn	127	<i>Penstemon</i>	beardtongue	8
<i>Fraxinus</i>	ash	124	<i>Verbena</i>	verbena	8
<i>Picea</i>	spruce	117	<i>Phlox</i>	phlox	6
<i>Rosa</i>	rose	108	<i>Monarda</i>	bee balm	6
<i>Fagus</i>	beech	107	<i>Veronica</i>	veronica	6
<i>Juglans</i>	walnut	102	<i>Schizachyrium</i>	little bluestem	6
<i>Castanea</i>	chestnut	85	<i>Lobelia</i>	cardinal flower	4