Genetically Speaking

We see our aim as preserving the native flora and the genetic diversity found in our local populations. Therefore, unlike many commercially grown ornamental plants, WILDTYPE plants have not been bred or selected for uniformity. We grow most of our stock from seed collected from wild sources. Maintaining as much heterogeneity (genetic diversity) as we can in the stock we grow is our primary goal.

It is often asked, why not collect seeds of a particular species over its entire natural range and mix them together to maximize heterogeneity? Genotypes (a wild-type individual from a particular locality) from many hundreds or thousands of miles away may not be well adapted to our region. On the other hand, when dealing with rare species and/or isolated populations, of greater concern is that some individuals of these non-local genotypes can survive and even thrive. By cross-pollination there is a chance of introducing genes to a local population that can undermine its sustainability—a situation sometimes referred to as gene pollution.

Consider a species native to Michigan with a range that extends south to North Carolina. In this example, plants are moved from North Carolina and transplanted here in Michigan—not an unlikely scenario since much of the nursery stock sold in Michigan originates far outside the region. The North Carolina population is likely not as cold-hardy but may be adapted to a longer growing season than the northern genotype. In an average year these introduced plants may do well, even outgrowing the locals. The genes of the southern transplants are introduced to the population at large by cross-pollination or competitive advantage. A "new" population of highly productive but less cold-hardy individuals may thrive for many years until we get an extremely cold winter. Unusually high mortality during such a winter would result in an overall loss of heterogeneity in the population. This type of genetic problem can potentially imperil a small, isolated population of plants.

Adhering to an extremely rigid policy of using seeds or plants from a specific site may not always be the best approach either. Plants are generally thought of as sessile living things, but their continued survival is dependent upon establishing new sites over time. Dissemination of pollen, seed and/or plant parts are common ways plants and their genes move around the landscape. Over many generations, the distances that plants and their genes move can be quite large. Remember townships, counties and states are political, not ecological boundaries.

Cross-pollination also allows the exchange and recombination of genes between plant populations. Therefore a site-adapted individual may produce progeny that are not all well adapted to that particular site but may be well adapted to another site. As the environment experiences normal changes and fluctuations, or as plants spread to new locations, a warehouse of adaptive traits needs to be present in the population in order to sustain itself. It is important to note that some species naturally lack heterogeneity—examples can be found in both self- and cross-pollinated species. For species that rely

primarily on asexual reproduction, populations can be nearly if not completely genetically identical.

Habitat destruction and fragmentation by development interrupts normal plant dispersal and gene exchange. In extreme cases, isolation creates highly inbred populations which can have a number of deleterious effects. Highly inbred populations may not have the genetic variability “on the warehouse shelves” to adapt to change. Inbreeding poses additional problems for self-incompatible species. These species can become so inbred that cross pollination between “different” individuals is no longer possible, rendering the population unable to produce viable seed.

Our environment has changed drastically over the last several hundred years. Fire suppression, logging, drainage, agriculture and development have contributed to these changes. Since European settlement, some native plants and animals have all but vanished from the landscape while others have become more prevalent. The introduction of exotic species has had its own profound negative impact. Some sites have been so inextricably altered that it might not be safe to assume that seed from nearby remnant populations would be best suited to these new, highly altered conditions.

So what to do? There is no shortage of opinions on this subject but few facts to rely on. Much of the work in population genetics has been done on a small number of species. With hundreds of plants native to Michigan, each with a unique reproductive strategy, what should you do? Until more is known, we recommend a conservative and practical approach. When possible use seeds and plants from your region. D.A. Albert divides Michigan into four regions or *sections.** We suggest using Albert's regions as general guidelines—but keep in mind that they do not in themselves represent genetically distinct zones. If the species you need are not available from local or regional sources, attempt to find the next closest source. A more prudent approach is warranted when restoring high quality remnants. In these cases, collecting seed directly from the site is thought best. In general rely on common species to make up the matrix of your planting. For purposes of naturalizing and restoration, start directly from seed or from plants grown from seed. Cultivars and named horticultural varieties should be avoided in these applications.

The above map shows the four sections referred to in the Regional Landscape Ecosystems of Michigan, Minnesota and Wisconsin: A Working Map and Classification. Sections (regions) are differentiated by climate and physiography (land and water forms). These sections are further divided into smaller ecological units (not shown) by using additional and more refined information on geology and soils.

State threatened species can only be legally collected in Michigan by special permit. It is legal to sell these plants in Michigan as long as the seeds or plants are obtained from states where they are not threatened and therefore not protected. Regardless, many ecologists discourage

using state threatened species in restoration projects for the reasons mentioned earlier (gene pollution).

*Albert, D.A., 1995. *Regional Landscape Ecosystems of Michigan, Minnesota and Wisconsin: A Working Map and Classification.* USDA Forest Service, North Central Forest Experiment Station. General Technical Report NC-178.

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