Diversity of Seaside Goldenrod Along the Shores of the Chesapeake Bay and Maryland Coast: Implications for Conservation

XXX
Department of Molecular Biology, Biochemistry & Bioinformatics
XXX

Seaside goldenrod (*Solidago sempervirens*), is a perennial plant that grows in sandy soils and salt marshes where it is exposed to either salt spray or salt water. This new world species has a patchy distribution along the Atlantic coast, the Gulf of Mexico and the Caribbean. Its distribution in the Mid Atlantic region includes the shores of the Chesapeake Bay and the Atlantic coast of the Delmarva Peninsula. The lack of appropriate habitat on the Peninsula prevents the establishment of inland populations. The exchange of genetic material among these populations can result from pollination and seed dispersal. Insect pollinators and seeds are unlikely to travel long distances. Thus, without geographically intervening populations it is likely the Bay and the Peninsula may limit gene flow between populations. Genetic differentiation among populations on different shorelines should occur if gene flow is limited. To test our hypothesis, we have sampled populations along the coasts of the Bay and the Peninsula and have conducted genetic analysis using microsatellites to measure genetic structure and estimate gene flow. Preliminary results show genetic differentiation between populations separated by the Peninsula but no such differences between populations separated by the Bay, indicating the Peninsula acts as a barrier to gene flow. Barriers to genetic exchange present challenges in conservation. In order to conserve a species the full genetic diversity in that species should be protected. The limited gene flow among populations, resulting in genetic differentiation may introduce the need to conserve multiple geographically separated populations.

<u>Typical Reviewer Feedback to the Selection Committee</u>
Reviewers evaluate abstracts with scores ranging from 1(unacceptable) to 5 (exceptional). Typical reviewer scores for this abstract would range between 4.5 and 5.0 (our goal is to have each abstract reviewed by three individuals in the discipline). Some items that could be fixed in this abstract include

a. Most people will not know what microsattelites are.
b. The term "genetic differentiation" should be explained.

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Seaside goldenrod (*Solidago sempervirens*), is a perennial halophyte. Its distribution in the Mid Atlantic region includes the shores of the Chesapeake Bay and the Atlantic coast of the Delmarva Peninsula. *S. sempervirens* reproduces both asexually by rhizomes, and sexually. The exchange of genetic material among these populations can result from pollination and seed dispersal. Pollination is by insects. Insect pollinators are unlikely to travel long distances. The pappi to fruit ratio is not conducive for long-distance wind dispersal of achenes. Thus, without geographically intervening populations it is likely the Bay and the Peninsula may limit gene flow between populations. Genetic differentiation among populations on different shorelines should occur if gene flow is limited. To test our hypothesis, we have sampled populations along the coasts of the Bay and the Peninsula. Microsatellite analysis was carried out using nine polymorphic primers. The PCR profile was 95° C for 5 mins; 34 cycles of 95° C for 30 s, the appropriate annealing temperature for 30 s, and 72° for 45 s; and a final extension of 75° for 30 mins. Amplicons were size separated by capillary gel electrophoresis. To assess genetic diversity within loci and among populations, allelic richness (Na), effective number of alleles (Ne), unbiased expected heterozygosity (UHe) and the Fixation Index (Fst) were calculated. An AMOVA analysis was carried out to identify sources of variation. The allele frequencies by loci indicate allelic diversity in all populations, with the Atlantic coast population being the most diverse with a large number of low frequency alleles and, in some cases, private alleles. Average number of alleles per locus and average allelic richness are similarly greatest in the Atlantic coast population. The AMOVA analysis indicates that most of the variation is attributable to the microsatellite loci within individuals (76%). Of the remaining variability, approximately half occurs among populations (10%), indicating the potential for genetic differentiation among the populations. Pairwise population Fst values indicate that the Atlantic coast population is also the most genetically distinct, indicating the Peninsula acts as a partial barrier to gene flow.

Typical Reviewer Feedback to the Selection Committee

Reviewers evaluate abstracts with scores ranging from 1(unacceptable) to 5 (exceptional). Typical scores would probably average around a 2 from most divisions. There is a wide range of problems with this abstract. While the project is technically sound and is complete, it uses technical terms too often, the ability of the student to present the material to a general audience is questionable and the level of interest this project would illicit would likely be low. The score for readability would likely be a "1"because of the reliance on technical terms. As a result, the reviewers would likely question the ability of the student to present (convey information) to a non-technical but educated audience. Interest in this project would also likely be low because the author has not explained the significance of restricted gene flow between populations.

An abstract like this would most likely never be selected for presentation at this event.