Determination of heterozygosity among Alaskan populations of *Arabidopsis lyrata* subsp. *kamchatica* using microsatellites.

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**Abstract**

In this study of *Arabidopsis lyrata* subsp *kamchatica*, this experiment is trying to determine the polymorphism of microsatellite loci that might be used to determine the self-fertilization rate. Microsatellite loci used—genes with high intraspecies variation. 1 sample from each of 8 separate populations were taken. Collected from northern Interior to coastal Southwest Alaska.

**How the study was conducted…**

Standard PCR and fragment analysis protocol were used.

**What was discovered…**

Only 1 microsatellite locus of 6 analyzed had heterozygosity. There were too few samples analyzed to statistically conclude a reproductive pattern.

**What it means…**

Polymorphism in 1 locus might indicate ability to outcross (sexual reproduction) and have 2 chromosomes from different species. This loci portrays heterozygosity (1 allele) in samples 33, 36, 38, 40 (not shown). Samples 34, 36, 37 are homozygous (1 allele).

**Objective…**

Discover polymorphic microsatellite loci using primers designed by Clauss et. al. 2002.

Using these microsatellites, we can learn about various properties of *Arabidopsis lyrata*.

Might reveal rate of reproductive tendencies.

**Methods & Materials**

The 8 samples were provided beforehand with a minimum concentration of DNA verified. Amplified with polymerase chain reaction (PCR) using ready-made PCR beads. Visualized using electrophoresis to confirm presence of PCR product.

Fragments analyzed with a cycle sequencing machine using the LIQ500 size standard ladder. Therefore, fragments between the sizes of 50 and 500 base pairs would be seen.

Results obtained using GeneMapper™ to pinpoint microsatellite nucleotide fragment sizes to the nearest base pair.

**Results**

Fragment Analysis results

6 Primer Pairs Amplified

1 Pair indicates polymorphism: locus nga 112 (refer to Figure 4)

5 Pairs indicate monomorphism: no variation within loci

Within polymorphic microsatellite samples of locus nga 112 (7 samples)

**Observed Heterozygosity:**

- 3 homozygous (43%) samples: only allele
- 4 heterozygous (57%) samples: amplified 1 allele

**Expected (calculated) frequency of genotype:**

- Homozygous: 28.5%, the same for each sample, no variation
- Heterozygous: 71.5%, variation from other samples

**Hardy-Weinberg Equilibrium (HWE): Relationship between alleles and genotypes**

Assumptions include no genetic drift, no selection, random mating, and a large population size.

If samples are "out of equilibrium", a HWE assumption is violated.

**Chi Square Results**

Chi square test is a statistical test of the assumption of HWE. It is used to determine if the obtained values differ from the expected values.

The results from our Chi-square did not reject the null hypothesis that these samples are in HWE. This result may be due to small sample size leading to low statistical power.

**Literature Cited**


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