

## Ploidy by Cytometry - New Applications

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In 1998, the Oregon State University Seed Laboratory introduced the cytometry method to determine the ploidy level in Annual ryegrass. The original goal was to distinguish tetraploid from diploid ryegrass varieties and to determine the percentage of tetraploid seeds in a sample. Since the method being used does not destroy the specimen, this test is finding many applications by researchers, breeders, producers and certification. This test can be performed on leaves from seedlings or mature plants from the laboratory, greenhouse or field. This flexibility in testing the crop at different stages of development without destroying the seedling/plant is creating opportunities to detect potential problems early enough in breeding, production and marketing seeds.

Some current applications of the ploidy by cytometry method are:

- **To determine the ploidy level in Annual ryegrass varieties.** This was the original application and continues to be in both certified and commercial samples. New Perennial ryegrass tetraploid varieties are being tested also. The ploidy test determines if the sample is above the minimum 98% to be labeled as certified.
- **To screen out diploid seedlings/plants from breeder/original seeds.** This has become a critical tool for plant breeders who want to make sure that their original selections are pure tetraploid. After the test, the tetraploid plants are kept and the diploid plants are discarded. This assures starting any seed increase programs with pure tetraploid seeds.
- **To detect the presence of diploid contaminants in a tetraploid field.** This is used by growers, quality/production managers, and field inspectors. Customers simply bring representative leaf samples from the field to determine if that field is tetraploid. Also, if they suspect contaminants based on visual observations, they bring plants believed to be tetraploid and those suspected to be diploid for ploidy verification. If a problem is detected, the information can be used to make prevention/management decisions.
- **To make ploidy distinctions in other species.** This application has been used by researchers to make distinctions between fine fescue species (e.g., hard fescue, sheep fescue); rough bluegrass from Kentucky bluegrass; and to detect crosses between species. Currently, the OSU Seed Lab is developing a non-destructive method to distinguish *Glyceria declinata* (diploid) from closely similar species such as *G. fluitans*, *G. occidentalis* or *G. leptostachia*, which are tetraploid.

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