FURTHER COMPARISONS OF PLANTS WITH DIFFERENT CHROMOSOME NUMBERS IN RESPECT TO CHEMICAL COMPOSITION

J. T. SULLIVAN

ONE OF the consequences of induced polyploidy may be the increase in size and volume of the plant cell. If this occurs, the chemical composition of the plant may be altered to contain a larger proportion of soluble cell constituents and a smaller proportion of structural constituents. Preliminary investigations in comparing the composition of diploid and tetraploid ryegrass (*Lolium perenne* L.) have been reported (7). Tetraploid ryegrass was found to be higher than diploid in all forms of sugars and in the proportion of dry matter soluble in alcohol. Differences in crude fiber were not significant.

Similar comparisons between plants of different chromosome numbers have been made by Kostoff and Axsamitnaya (3) who found that tetraploid tomatoes contain more water, protein, and soluble carbohydrate and less ash, starch, cellulose, and hemicellulose than the diploids. The same authors found no differences between diploid and tetraploid petunias. Many other reports have appeared concerning the relative amounts of miscellaneous chemical substances in plants of different chromosome numbers. Discussions of these studies may be found in papers by Dermen (2) and O'Mara (5).

The present paper contains the results obtained in a further study of diploid and tetraploid ryegrass and in a comparison of tetraploid and octoploid white clover, *Trifolium repens* L.

COMPARISON OF DIPLOID AND TETRAPLOID RYEGRASS GROWN IN FIELD ROWS

Diploid and tetraploid plants of perennial ryegrass of six clones originating as previously described (4, 7) were set out in the field in June, 1939, in 3-foot rows randomized in triplicate. Four of these clones were among the five previously reported. Samples of the top growth were gathered for chemical analysis from each row June 5 to 8, 1940. All plants were heading at this time but not yet in flower. There was some variation among different clones in maturity as indicated by the flowering date (determined later on undisturbed plants), but there was no difference in this respect between the diploid and tetraploid plants arising from the same original plant. Not all samples were gathered on the same day, but all three replications of the diploid and

---

1Contribution No. 63 of the U. S. Regional Pasture Research Laboratory, Division of Forage Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Dept. of Agriculture, State College, Pa., in cooperation with the northeastern states. Received for publication January 12, 1944.

2Physiologist. Acknowledgments are due to Doctors S. S. Atwood, W. M. Myers, and V. G. Sprague of this Laboratory for furnishing the plant material and also to Doctor Myers for assistance in the statistical analysis.

3Figures in parenthesis refer to "Literature Cited", p. 543.