Interspecific and Intergeneric Hybridization in Forage Crop Improvement

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SPEICES and genera are delimitations of populations and groups of populations set up by the taxonomist. Rarely have cytological and genetic studies played an important part in his deliberations. This is not meant to cast any reflections on the systematist, for cytogenetic studies are time-consuming and it is hardly to be expected that the systematic botanist would delay the classification of plants until the pertinent cytogenetic data were forthcoming. Nevertheless, anyone interested in the improvement of forage crops, and particularly the uncultivated grasses, must realize that the delimitations of populations set by the systematist do not always provide an accurate index of the potential hybridization possibilities of the material.

CYTOGENETIC STUDIES

When the plant breeder contemplates hybridization, cytogenetic studies can be of great assistance in a number of ways. Of first importance is a study of chromosome number and behavior in the parents themselves. For instance, at the beginning of the Stipa improvement program in California, many seed collections of Stipa pulchra Hitchc. were made. Many of these collections were labeled "slender type". A routine cytological examination showed that all the "slender type" plants had n = 35, 2n = 70 chromosomes, whereas typical S. pulchra plants had n = 32, 2n = 64 (10). A knowledge of these chromosome numbers threw into a new light the fact that typical S. pulchra and the "slender type" had been found growing together in a number of sites. A search for hybrids in one locality was successful. (They have since been found elsewhere and also made artificially.) They were intermediate in most respects, they had the intermediate chromosome number (2n = 67), and they were invariably sterile. Furthermore, meiotic studies showed that they had few chromosomes in common—a maximum of 19. As a result of these studies the "slender type" was set apart from S. pulchra and is now called S. cernua (11). In other words, it is not a strain or line of S. pulchra and cannot be expected to contribute to strain crossing with desirable selections of S. pulchra. A cytological study of a taxonomic species was very helpful in this instance in contributing to a better understanding of the delimitations of the species in question.

Again, on the contrary, the frequent occurrence of intergeneric hybrids has indicated that the generic lines in many grasses have not been too well drawn. In some tribes there is little correlation between

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3Numbers in parenthesis refer to "Literature Cited", p. 46.