

Preface

Grassland farming in Europe was already established during the settlement of the first farmers together with their domesticated animals after the last ice age. Since then, grassland provides the forage basis to feed ruminant animals for the production of meat and milk. Depending on the ecological conditions and intensity of usage, various plant communities with different species developed, displaying a rich biodiversity. With the introduction of improved crop rotations at the end of the 16th century, grasses and legumes were also grown to an important extent as forage crops on arable land. In the last decades the importance of amenity grasses increased markedly, due to the demand of the society for new usages like landscape protection.

Around 1900 interested farmers and academics identified the need for grassland improvement through systematic selection and seed production. This marks the beginning of breeding and research in companies but also at universities and specialized research institutes. Plant collection started with many of the species that are still of importance today. The collected materials were grouped according to the intended use and some type of phenotypic selection was applied. Seed multiplication of such populations was performed in pure stands and the harvested seed was marketed. Although the vegetative biomass and its quality are of utmost importance in forage crop breeding, it is the seed yield potential which determines the commercial success of a new variety.

There are some milestones in forage crop breeding that should be mentioned: the invention of the polycross leading to the replacement of open pollinated varieties by synthetic varieties, progeny testing, breeding of amenity grasses, induction of tetraploids in the ryegrasses and red clover, and the introduction and application of molecular tools. The invention of the forage plot harvester, computers, NIRS, and other new technologies has led to a tremendous increase in breeding intensity. Unfortunately, public funded research is decreasing dramatically in most highly developed countries, while in the commercial sector a concentration process took place. Thus, efforts are needed to avoid loss in knowledge and breeding experience.

Scientific and practical knowledge of forage plant breeding accumulated in the first 50 years of systematic fodder crop breeding has been summarized in the so far unique volume “Züchtung der Futterpflanzen – Breeding of Forage Plants” which appeared as the fourth volume of the bilingual “Handbuch der

Pflanzenzüchtung – Manual of Plant Breeding” in two editions, 1941 and 1959, and was edited by H. Kappert and W. Rudorf. In their foreword to the second edition, we can read that “the research results are scattered in profuse literature which can no longer be overlooked by the individual.” Now, another 50 years later, this is certainly true even more and we as editors of the “Fodder Crops and Amenity Grasses” volume of this new “Handbook of Plant Breeding” are proud to tackle again the challenge of making the most pertinent knowledge available to the plant breeding community.

Because forage crops have many topics in common and to avoid redundancy, we decided to start with nine general chapters devoted to the role of forage crops in multifunctional agriculture, genetic resources, breeding methodology, molecular tools, breeding objectives in forages as well as amenity grasses, breeding for seed yield, variety testing and release, and an outlook into the future. The second part comprises the nine most important groups of temperate species among the grasses, clovers, and alfalfa. Minor species are also treated in respective chapters. Each of the crop-specific chapters covers the whole range of topics related to breeding from the origin and history of the particular crop and genetic resources to breeding achievements, specific goals and techniques, including the potential and actual integration of new biotechnologies. The chapters have been written by outstanding breeders and scientists with wide experience in their crops and topics.

This volume contains all the basic and updated information on the state of the art of breeding fodder crops and amenity grasses. The vast amount of knowledge collected in this volume should not only serve breeders as well as researchers, students, but also their academic teachers. It may be regarded as a scientific knowledge platform which provides practical plant breeders with new scientific information, but also to make molecular biologists more familiar with the peculiarities of breeding the various species of fodder crops and amenity grasses.

The completion of this book would not have been possible without the contributions of the many authors, who have devoted much time to the task of writing the chapters. The scientific platform of the Fodder Crops and Amenity Grasses Section of EUCARPIA has been an extremely valuable resource of recruiting highly competent contributors. We also want to thank the staff of Springer, in particular Hannah Schorr, for their continuous support.

Last but not least, we would like to thank Christine, Brigitte, and Daniela for their patience and support while working on this volume.

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