CHAIRS' SUMMARY PAPER: Seed Production and Management - Temperate

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ENVIRONMENTAL EFFECTS ON SEED PRODUCTION OF FORAGE LEGUMES

The paper emphasized the complexity of the processes involved in seed production of forage legumes, which requires the action and interaction of many factors associated with the plants, their environment, and pollinating insects. The case of alfalfa/lucerne (*Medicago* spp.) was used to illustrate the detailed effects of the key plant and environmental factors involved but pointed out that realized seed yield is only about 4% of the calculated potential seed yield of about 12,000 kg/ha. Thus, enhancing seed yield, and the efficiency of the associated biological production processes, involves many challenges for the scientific and agricultural community in the upcoming 21st century. Throughout the world, specialized production zones have evolved for the seed production of specific forage seed crops; these are regions where the environmental conditions are more favourable to reproductive than vegetative growth. However, with this type of production, excessive genetic drift must be avoided by setting strict limits on the number of generations of seed multiplication outside the area of adaptation for end-use. The provision of appropriate pollinating insects, and/or an adequate habitat and population of native pollinators, together with the required environmental conditions for successful pollination and fertilization, are factors that add considerable complexity to the enhancement of the biological efficiency and consistency of production of seed of forage legumes.

NUTRIENTS AND MOISTURE INPUTS FOR GRASS SEED YIELD

In order to enhance the efficiency of utilization of nitrogen (N) fertilizer for the production of grass seed crops, particularly ryegrass (*Lolium* spp.) in New Zealand, prediction procedures involving tissue testing are being developed; under New Zealand conditions, maximum seed yield requires 5-6% N in the ryegrass herbage during spring growth just prior to stem elongation. Under conditions where soil moisture and growth conditions allow for the rapid uptake and utilization of applied N, it becomes feasible to implement production practices that optimize seed yield and avoid N leaching and environmental contamination. This may be achieved by multiple applications of smaller quantities of N fertilizer which can enhance the apparent recovery of N to 68% from the 31% achieved when a similar amount of N is applied in a single dose. This type of approach is being extended to other grass seed crops but the effort to enhance efficiency of N fertilizer utilization while minimizing environmental contamination will only be sustainable if the economic margin is great enough, and unit production costs are competitive with those of alternative growing regions.

POSTER PAPERS

The posters covered a broad range of topics with the emphasis on the effects of various management factors on seed yield of grasses, with particular attention being given to crop residue management. These contributions were spawned, to some extent, by the increasingly restrictive environmental regulations being placed on the use of field burning, for maintaining the health and longevity of grass seed stands, in the Pacific Northwest USA. Various mechanical alternatives to burning are proving successful for some grass species, at least for the short-to-medium term. Despite the increasing recognition of the role of endophytic fungi in enhancing stress tolerance in several grass species, when grown for seed or for amenity purposes, there was only one poster on this topic. Other important subjects that were, at best, only marginally represented were weed, disease and pest control practices, forage-legume seed production and the exploitation of beneficial insects for pollination, the integration of forage seed crops into cropping sytems, and more fundamental research into crop physiology, development and breeding/genetics towards the enhancement of seed yield, quality and vigour. Perhaps consideration should be given to some of these topics for the next Congress.

CONCLUDING COMMENTS

Growers are increasingly supportive of research that generates results for their own specific growing conditions and, as public resources for forage seed research are becoming increasingly difficult to obtain in many countries, there is considerable concern that long-term research of a more basic or fundamental nature is being displaced by increasingly short-term projects that conform more readily to the interests of growers, politicians, and funding agent(s). This is a particularly crucial issue for studies that generally involve only crops that have a perennial growth habit, as is the case for most forage seed crops. Will this de-emphasis on longer- term research hamper our ability to sustain technological development in our industry in the not-too-distant future? Furthermore, there is an increasing trend towards working with the seed crops that have a higher end-use value. This trend may prove to be detrimental to the forage-livestock sector of the agricultural industry because many of the plant species grouped under the general classification of forage crops are actually used mostly for amenity and related purposes, and the seed of these amenity varieties often commands a significantly greater economic return than that of varieties used solely for livestock feed. Another concern is that, in most countries, it is becoming increasingly difficult to evaluate and register new chemicals for controlling weeds, diseases and insect pests, particularly for minor-use crops such as forage seeds, because of environmental health and safety concerns. Thus, the production of "forage" seeds is likely to continue to pose many interesting challenges for the scientific researchers of the next century. To meet this challenge, scientists need to develop novel approaches for sustaining advances in seed yield and/or quality. Hopefully, the next International Grassland Congress will attract an increasing proportion of papers that present novel approaches to the study of the science of grassland agriculture, specifically in the seed production sessions.