Chapter 22: Collecting vegetative material of forage grasses and legumes

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Abstract

Recent literature on forage collection has focused on seed collection, site selection and sampling strategy. New approaches using ecogeographical information and GIS mapping techniques have improved site selection targeting, sampling design and capture of more representative diversity from natural populations.

Introduction

While the reasons outlined in the original chapter for collecting forage grasses and legumes remain valid, a review of current literature comes up with very few references that cover collecting methods for vegetative material of forage grasses and legumes. As mentioned in the original chapter, the collection of vegetative material poses problems related to sample size, speed and transport due to the weight and bulk of vegetative cuttings compared to seeds. In addition, vegetative samples require more careful handling to avoid damage to the material before reaching the home base. This has led most collectors to focus on seed collection whenever possible and to avoid vegetative material by carefully timing collections to coincide with peak seed ripeness before shattering. Vegetative collection is usually restricted to those cases where it is the only practical option, such as for grass species that rarely or never produce seeds or for fodder trees that might take many years to flower and seed or when material is urgently required.

Current status

Recent advances in forage collection have focused on the use of targeting to better identify the areas and timing for collection. For example, the use of modelled ecogeographic attributes has been applied to the collection of forage germplasm in Southern Russia (Hart et al. 1996; Greene et al. 1999). The strategy for this collection was to make decisions on area and taxa for collection using map analysis combined with observations to improve the efficiency and effectiveness of the sampling design. This approach allowed

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This chapter is a synthesis of new knowledge, procedures, best practices and references for collecting plant diversity since the publication of the 1995 volume *Collecting Plant Diversity; Technical Guidelines*, edited by Luigi Guarino, V. Ramanatha Rao and Robert Reid, and published by CAB International on behalf of the International Plant Genetic Resources Institute (IPGRI) (now Bioversity International), the Food and Agriculture Organization of the United Nations (FAO), the World Conservation Union (IUCN) and the United Nations Environment Programme (UNEP). The original text for Chapter 22: Collecting Vegetative Material of Forage Grasses and Legumes, authored by N. R. Sackville Hamilton and K. H. Chorlton, has been made available online courtesy of CABI. The 2011 update of the Technical Guidelines, edited by L. Guarino, V. Ramanatha Rao and E. Goldberg, has been made available courtesy of Bioversity International.

better targeting of sampling gradients across collection-site habitats in order to acquire forage germplasm adapted to a broad range of environmental conditions. It can be used for either vegetative or seed-producing species.

Several collections that have been made for forage legumes and grasses over the past 15 years have been reported in the *Plant Genetic Resources Newsletter*. The most recent of these are reports on collection of forage legumes in Greece (Shackle et al. 2001), *Medicago* in Kazakhstan (Greene et al. 2005), *Centrosema*, *Stylosanthes* and *Desmodium* in Venezuela (Guenni et al. 2006) and forage legumes and grasses in the Carpathian Mountains in Ukraine (Diederichsen et al. 2007). However, most have focused on seed collections, and the reports do not address collecting methodologies. Several do address the use of mapping and GIS to determine sampling strategy and site selection to maximize the capture of genetic diversity within target species. It is now common to use GIS datasets to identify areas with specific soil types or climatic conditions within the distributional range of a species in order to target specific collection sites with a high probability of finding genotypes with specific adaptations to edaphic factors, or to maximize landscape diversity in collections, as described in detail by Greene et al. (2005).

Future challenges/needs/gaps

The major challenge in the collection of forages as vegetative material is to find ways to use new developments in modified atmosphere packing to improve storage conditions during transport and to reduce the weight and bulk of cuttings but to still have sufficient material to increase survival rates during shipping back to base. If this challenge could be overcome, the advantages of collecting vegetative cuttings (which provide more rapid growth and establishment than seeds) could be realized.

Conclusions

Improved targeting using ecogeographical information and GIS mapping techniques have been applied to forage collection to improve sampling design and the capture of more representative diversity from natural populations. However, there have been few advances in the collecting methodology and practical methods of handling vegetative material in the field.

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