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Essentials of Regeneration.

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Regeneration of germplasm resources is an integral part of a conservation program and this responsibility is a major commitment by a genetic resource center. The regeneration requires careful planning and correct allocation of resources to preserve both viability and genetic fidelity of the stored accessions.

Standards for regeneration are derived from considering genetical aspects, such as allelic frequency. Marshall and Brown, in establishing sampling priorities, recognized four groups on this basis as follows: 1) common ( $>0.05$ ) and widespread, 2) common locally, 3) rare ( $<0.05$ ) but widespread, and 4) rare and locally restricted, and they argue that it is the second group that should be considered important in plant exploration. The same considerations can be used in considering regeneration methodology and priorities.

However, in practical application, the determinants in regeneration are largely a function of the biological properties of a particular species and population, such as reproductive physiology, seed production potential, pollination method, and vectors, etc., all of which are involved in determining methodologies and costs of obtaining sufficient quantities of seed in relation to available resources of time, labour and facilities. It is therefore necessary to consider species separately and derive acceptable limits in relation to 1) isolation requirement and means, 2) seed handling techniques, 3) effective population sizes and 4) growing conditions to minimize genetic shift and/or drift.

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The basic hazards in maintaining the integrity of accessions during regeneration are contamination and genetic erosion. Contamination occurs through 1) adulteration by foreign pollen during fertilization, 2) seed adulteration during harvesting, threshing and packaging and 3) gene mutations while genetic erosion occurs through 1) genetic drift due to random loss of alleles particularly in small populations and 2) genetic shift due to unconscious natural selection during regeneration. The risk of contamination and/or genetic erosion is increased with every regeneration thus

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regeneration of accessions should be aimed at producing the best quality of seed to increase longevity.