



CGIAR Research Program on Livestock

Aims to increase the productivity of livestock agri-food systems in sustainable ways across the developing world.

Managing rangelands: promoting sustainable practices

Reseeding: a practical and cost-effective technique that enhances ecological sustainability while strengthening system resilience

Land degradation erodes the supply of services in rangelands, resulting in livelihood challenges for the agro-pastoral communities that depend on these ecosystems. It results from the persistent effects of high temperatures, recurrent droughts, and unreliable rainfall distribution which cause significant livestock and crop losses.

Combating land degradation in arid and semi-arid rangelands is essential to ensure the long-term productivity of these regions and the socio-cultural services these environments provide, such as grazing systems and the aesthetic and recreational values of the landscape.

Benefits:

- Cost-effective
- Minimal plant damage
- Established plants develop more naturally than transplanted seedlings
- Simpler and quicker to establish trees/shrubs
- Suitable for inaccessible areas
- Increase rangeland productivity and preserve soil



RESEEDING

increases
production
and enhances
plant diversity

The problem of rangeland degradation can be reversed through revegetation, for example through inclusion of various locally adapted native species in the reseeded. Reseeding is the process by which rangelands are rehabilitated and it has two purposes; to 'repair' the degenerated rangeland system, and to increase the forage available for grazing animals. It involves sowing seeds directly into their final growing position, and is applied on rangelands with an advanced degree of degradation, low plant density or poor productivity levels. Reseeding is beneficial as it reduces the high costs associated with raising seedlings from nurseries and transplanting them to fields. If properly implemented, this technique is particularly effective for rehabilitating steep slopes, or otherwise inaccessible areas. Reseeding reduces root deformities caused by seedlings outgrowing their containers or careless transplanting techniques. It can potentially yield high plant density at low costs, and may also be an inexpensive means of providing wildlife habitats through a more diverse plant mixture which includes naturally regenerated plant species.



Hand sowing of *Salsola vermiculata*
(Syrian Badia)



Rangeland drill
(Central Tunisia)



Perennial ryegrass
(Central Tunisia)

Establishment and management

Establishing a seed collection from the local ecosystem is advisable to ensure availability when restoration begins and reseeding only those rangelands having sufficient potential to insure reasonable chances of success. Reseeding will involve protecting the area from grazing. The effectiveness of reseeding is influenced by the quality and period of seed storage, which may increase dormancy and eventually lead to seed death. For many species, seeds should also be pretreated before reseeding to break dormancy. When reseeding, hardpans and water-logging are generally not suitable for plants. The common causes of reseeding failure are prolonged drought, heat injury and rodent depredation.

With appropriate methods of soil preparation and careful choice of plant material, successful reseeding can be however be made in low rainfall areas. For crusted soil, scarification is needed to allow seed and rain to enter soil (increased water infiltration), allowing emergence and subsequent establishment of the species. Seeds are sown when they have the best chances of germination, which is when moisture is plentiful. Using rangeland drill or hand broadcasting are the commonly used ways of reseeding. A mixture of species when reseeding is beneficial in maximizing land utilization and potentially yielding higher biomass yields within a piece of land, compared to monoculture planting.

Choice of species

Suitable species should be selected depending on management objectives and large numbers of highly viable seeds are required. A mixture of species and seed treatments are recommended to increase chance of establishment. This is because multiple species are far easier to handle as seeds than as seedlings. The choice of species for reseeding must focus on species which have early establishment vigor to ensure good root anchorage on the soil surface, weed competitiveness and drought tolerance.

Site characteristics for reseeding must be evaluated against the choice of species. For example: on shifting sand dunes seeding of *Calligonum polygonoides* gave a good germination of 85 % and developed into beautiful stands of 60 to 90 cm in height. Leguminous shrub species which are drought and cold tolerant such as *Hedysarum* and *Medicago* species, are recommended for the reseeding technique, as these enrich the soil with nutrients. Grass species ideal for reseeding are *Lolium perenne* and *Stipa lagascae*.

Effective Management

- Annual rainfall must be >350 mm
- Avoid water-logged soils, crusted soils and very dry conditions
- Soil surface must be scarified
- Covering the seeds with a thin layer of soil is needed
- Depending on the landscape topography reseeding can be done by hand or using a rangeland drill
- Under favorable conditions, reseeding may be associated with fertilizers, mainly phosphates.

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ICARDA's Rangeland Ecology and Management Unit

ICARDA's Rangeland Ecology and Management Unit aims to address the unsustainable use of resources induced by adverse effect of climate change and an increasing demand for food and feed in the dry areas. ICARDA programs promote the enhanced quality and productivity of crop, forage, livestock, and the improved management of water resources through close cooperation with farmers and national researchers.