IMPACT OF GRASS RESEEDING TECHNOLOGY ON REHABILITATION OF THE DEGRADED RANGELANDS: A CASE STUDY OF KIBWEZI DISTRICT, KENYA

BY

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ABSTRACT

A study was undertaken at Kibwezi division of Kibwezi district to investigate and evaluate the practice and success factors responsible for the range rehabilitation work undertaken by the Dryland Husbandry Project (DHP) in conjunction with local communities. The work involved the identification of most frequently used grasses, through visits and discussions with community groups and key informants.

The general objective of this study was to contribute to greater understanding of the land degradation problem in the drylands and the grass reseeding technology used in addressing the problem. Improvement in soil hydrological properties; increased infiltration, reduced runoff and sediment production and percentage ground cover were used to measure success in rehabilitation. A regression analysis was used to establish the primary contributors of land degradation in the study area. The identified grass species whose seed were available were tested for germination viability, established in field plots and monitored from germination, vegetative stage and early seed development. Three sites; two under rainfed and one under irrigation, were employed to test the reseeding capacity of the three grasses seeds commonly used for rehabilitation in the area: *Cenchrus ciliaris, Enteropogon macrostachyus* and *Eragrostis superba.*

Seed viability tests results showed that *Enteropogon macrostachyus* had the highest percentage germination under all treatments. Under controlled laboratory conditions, at 20°C, it had a percentage germination of 46%, whereas both *Cenchrus ciliaris* and *Eragrostis superba* had 0% percent germination. A repeat of the same experiment under the same conditions at 20°C after 9 months showed higher seed germination in all the three grass species. *Enteropogon macrostachyus* had the highest percentage germination of 85%, whereas *Cenchrus ciliaris* and *Eragrostis superba* had a percent germination of 40% and 21%, respectively. Under room temperatures of 30°C, in the study area, *Enteropogon macrostachyus* had the highest percentage seed germination of 53%, whereas *Cenchrus ciliaris* and *Eragrostis superba* had 12 and 10%, respectively. The differences observed among the grass species in terms of percent seed germination may

be explained by the intrinsic properties of the seeds such as dormancy and tegumental hardness, and climatic factors especially ambient temperatures.

Increasing grass height improves the soil hydrological properties. That is, there was a general increase in the infiltration capacity, a decrease in runoff and sediment produced with an increase in grass height. *Cenchrus ciliaris* had a greater influence in increasing the soil infiltration capacity and reducing runoff. *Enteropogon macrostachyus* and *Eragrostis superba* were ranked second and third, respectively. Established grasses positively influenced on the soil physical properties, for example, bulk density.

Plots under *Enteropogon macrostachyus* had the highest percentage plant frequency, basal cover, plant and tiller densities compared to the other plots. Plots under *Cenchrus ciliaris* and *Eragrostis superba* were ranked second and third, respectively for the same vegetation attributes. Biomass yields on dry matter basis varied across the different stages of development. *Enteropogon macrostachyus* had higher biomass yields at the early vegetative stages while plots under *Eragrostis superba* and *Cenchrus ciliaris* were ranked second and third, respectively. At the seed setting stage, *Cenchrus ciliaris* had the highest biomass yields followed by *Eragrostis superba* and *Enteropogon macrostachyus*. Plots under *Eragrostis superba* had the highest seed production compared to plots under *Cenchrus ciliaris* and *Enteropogon macrostachyus*.

Seventy six percent (76%) of the farmers interviewed practice grass reseeding as a means of rehabilitating their degraded individual farms. *Eragrostis superba* is the most preferred species, primarily due to its role in improving livestock productivity. *Cenchrus ciliaris, Chloris roxburghiana* and *Enteropogon macrostachyus* were ranked second, third and fourth, respectively. Other uses of the grasses include; sale of hay and grass seed as a source of income, thatching of houses and granaries, and soil conservation. Most of the farmers prefer sowing the grass seeds as pure stands as opposed to mixtures. Hand sowing along micro-catchments created by hand held hoes and/or ox-driven ploughs is the most preferred method of sowing grass in the study area. However, broadcasting is also practiced. Reduction of grass cover was cited to be the most important form of

visible land degradation in the area. Increase in woodland vegetation, livestock numbers and cultivated area were the most significant contributors to the current vegetation change.

The important factors favoring range rehabilitation through reseeding in the area include sufficient amount of moisture, creation of micro-catchments, use of the indigenous grass species and proper seed bed preparation. The main conclusions in this study were; sufficient moisture is the most critical ecological factor which contributes to successful reseeding, established grass stands improve soil physical, hydrological and chemical properties, grass mixtures give better cover compared to pure stands and that human factors as opposed to climatic factors are the most important contributors to land degradation in the study area.