TIME	TITLE	AUTHOR/S
PLATFORM SESSION: Land Transformation and Rehabilitation (Session Chair: Clement F Cupido)		
09:30-09:50	Important factors for selecting appropriate grass seed types in active re-seeding restoration applications	***Klaus Kellner*** *and Loraine van den Berg*
09:50-10:10	From cropland to grassland in three years: a restoration study	***Frits P van Oudtshoorn****, Leslie R Brown and Klaus Kellner*
10:10-10:30	Fire as a management tool in the rehabilitation of old croplands in Ithala Game Reserve	*Caiphus E Khumalo, N Peter le Roux,* ***Cathy C Greaver*** *and A Roland Phamphe*

Land Transformation and Rehabilitation II

SESSION CHAIR: CLEMENT CUPIDO

Platform Presentations

IMPORTANT FACTORS FOR SELECTING APPROPRIATE GRASS SEED TYPES IN ACTIVE RE-SEEDING RESTORATION APPLICATIONS

Klaus Kellner[1*#] and Loraine van den Berg[2]

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The list of factors leading to the degradation of natural resources is long and includes aspects such as several forms of mining, pollution and toxic contamination of derelict land, de-forestation, increased salinity due to agricultural irrigation and the overgrazing of especially arid- and semi-arid rangelands. The type of restoration to be applied in degraded natural rangelands will depend on the degree of degradation. Degraded areas that are beyond the threshold of natural recovery normally need active restoration interventions. This includes the disturbance of the soil surface or removal of undesired species to reduce the competitive effect of the existing vegetation. One of the main goals of restoration in degraded arid and semi-arid rangelands is to increase the grazing capacity for livestock production. It is recommended that the restoration application includes re-seeding or re-vegetation with local ecotype selected mainly grass species, adapted to the specific soil and climatic conditions of the area. To facilitate seed germination and seedling establishment the restoration practice should also include protection measures such as brush packing or any cover by other organic matter. The timing of re-seeding is dependant on the seasonality and mainly precipitation, especially in areas where rainfall events are erratic and unpredictable. Re-seeding of large degraded areas with specific ecotype selected species greatly depends on the availability of seed. This is a major limiting factor and contributes to the fact that seed, which are more available in large quantities for the establishment of cultivated pastures and can be purchased from commercial seed merchants, are usually used. However, to collect large quantities of seed from the specific habitat is very labour intensive and often not cost effective. Furthermore, if local ecotype selected seed is used, the quality, viability and purity are often not of a high standard, leading to poor restoration results. Although the economic implications of restoration application are often regarded as the determining factor, the ecological importance and improvement in the range condition should not be underestimated. Restoration applications have to be implemented according to a predetermined plan and should include sound long-term management principles. Types of restoration, the role of selecting the correct grass ecotypes and some constraints and challenges in active re-seeding restoration applications will be discussed. These include aspects such as important legislation to be considered, distribution patterns and adaptations of plants to the environment, seed types and seed dynamic attributes and the general relationship to degree and size of disturbance and possible sources of plants to be used for restoration projects, will be discussed.

FROM CROPLAND TO GRASSLAND IN THREE YEARS: A RESTORATION STUDY

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Conversion of grasslands to row-crop agriculture alters the structure, function, and complexity of grassland soils. Although plant communities recover from disturbance through natural succession, many aspects of community structure are slow to return without human intervention. This is particularly the case in formerly cultivated lands, where physical and chemical soil properties have been completely altered and the natural seed bank entirely removed. The need for scientifically proven restoration technologies is vital to grassland restoration and conservation in South Africa. However, research in South Africa on restoration of formerly cultivated lands is currently either insufficiently executed or poorly documented. Suikerbosrand Nature Reserve, situated in the grassland biome of South Africa, recently acquired a significant area of land to extend the reserve. It is estimated that 30-40% of this extended portion consists of old lands. It is envisaged by the management team that these areas would be restored to some state resembling the vegetation that would originally have occurred. In the study, conducted on this property, we test different re-seeding methods, which consist of a combination of two site preparation techniques, two seed mixtures and two seeding densities on a recently abandoned cropland. Out of these treatments ten restoration trials (including controls) were replicated twice and applied to 20 x 10 m plots in a randomised complete-block design. All species accessions used for re-seeding were indigenous to the area. The treated plots were monitored, towards the end of each growing season, for three consecutive years after establishment. The main data collected were on species abundance and above ground biomass for sown and non-sown species. The treatments significantly reduced early successional species and produced a stable, late successional plant community after three seasons, compared to the control. The ploughed treatments demonstrated more resilience to *Hyparrhenia hirta* invasion, a common phenomenon in formerly cultivated lands in the area, than the ripped and control treatments. The ploughed treatments, in combination with the wild grass seed mixtures, showed more resemblance to the natural rangeland, in terms of structure and heterogeneity, than the ripped treatments in combination with the pasture grass mixtures.

FIRE AS A MANAGEMENT TOOL IN THE REHABILITATION OF OLD CROPLANDS IN ITHALA GAME RESERVE

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Prior the proclamation of Ithala Game Reserve (IGR), people farmed extensively in the area using the land for both commercial and subsistence cultivation. This resulted in almost 30% of flat land being transformed. After the reintroduction of game, pressure arose to rehabilitate the transformed lands dominated by tall unpalatable grasses and other undesirable weed species which lowered the grazing value of the reserve. Other concerns were that tall grasses also impeded visitor's game viewing. Due to the extent to which the reserve was transformed, a most cost effective method had to be identified for rehabilitation, hence the utilization of fire as a management tool. Early burns were instituted from 1986 over small patches on croplands to force grazers to concentrate their grazing on the new green flushes. This was intended to reduce competition from the tall bunch grasses in favour of the palatable and structurally less impeding creeping grass species. An experiment was set up to evaluate the success of this intervention, and results revealed the change in structure, together with some increase of desired palatable grass species. Today IGR's old croplands have changed considerably to resemble the untransformed lands, and species diversity has continued to increase, marking the success of some early management interventions in the reserve.