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Re-generation ecology of *Cymbopogon jwarancusa* and *Chrysopogon acheri* grassland in Highland Balochistan , Pakistan

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Introduction *Chrysopogon acheri* and *Cymbopogon jwarancusa* are the dominant bunchgrasses in grassland ecosystems of highland Balochistan . These grasses are found on a wide variety of soils over a wide range of elevations and play an important role in ecosystem level processes (Carney , 1989) . Both species provide the major source of forage for small ruminants . Overgrazing , coupled with human disturbances has degraded most of these grasslands . Management strategies aimed at reversing the degradation of *Cymbopogon-Chrysopogon* grasslands require an understanding of many aspects of plant ecology and recruitment (Schoot , 1995) .

Material and methods Highland Balochistan has a continental arid to semi-arid climate which is Mediterranean in character , with annual rainfall varying from 150 to 350 mm . Most of the rainfall occurs in the winter months . Temperatures vary with elevation ranging from 40 °C in summer to -10°C in the winters . Soils are mostly skeletal and are derived from sandstone , limestone and shale . Field experiments were conducted to investigate the seed attributes , movements and fates of dispersal units , soil seed bank and seedling establishment of *Chrysopogon acheri* and *Cymbopogon jwarancusa* in a representative grassland ecosystem in highland Balochistan . All the experiments were conducted on the natural stands of grassland . Three parallel transect were established for monitoring the seed dispersal (phase I & phase II) and soil seed bank . Seven major microhabitats (*Cymbopogon jwarancusa* plants , *Chrysopogon acheri* plants , dead centers of *Cymbopogon jwarancusa* plants , dead centers of *Chrysopogon acheri* plants , *Artemisia maritime* plants , gravel interspaces between plants , and soil interspaces between plants) were also evaluated to seedling recruitment and seedling establishment .

Results *Cymbopogon jwarancusa* had more filled and viable caryopses than *Chrysopogon acheri* . *Chrysopogon acheri* caryopses had greater mass (1.2 ± 0.1 mg) than *Cymbopogon jwarancusa* caryopses (0.6 ± 0.1 mg) . Seed viability of *Cymbopogon jwarancusa* was better (63%) than *Chrysopogon acheri* (50%) . Seeds (spikelets) of both species have similar morphological features . Spikelet dispersal occurs primarily by wind over a 2 to 3 week period in late June or early July . *Chrysopogon acheri* has one dispersal unit , a triplet spikelet . *Cymbopogon jwarancusa* has four different dispersal units : a paired spikelet , a partial raceme , an entire raceme , and a partial inflorescence (two racemes) . Mean phase-1 dispersal distances of spikelets from the edges of the basal crown of *Cymbopogon jwarancusa* and *Chrysopogon acheri* were recorded 94 and 79 cm , respectively . Spikelets of *Cymbopogon jwarancusa* and *Chrysopogon acheri* moved mean distances of 26 and 32 cm , respectively on the ground surface before becoming trapped in a microhabitat . Gravel interspaces and plants canopies occupied higher proportional area and captured relatively a higher proportion of spikelets of both species . Both species had a weakly persistent soil seed bank with higher amounts of seeds found under plant canopies compared to open interspaces . More spikelets were found in the upper (0-2.5 cm) soil depth than the lower (2.5-5.0 cm) soil depth in different microhabitats . Ants (*Tica Verona*) were the main spikelet predator for *Chrysopogon acheri* . *Cymbopogon jwarancusa* had higher seedling densities and more tillering capacity than *Chrysopogon acheri* .

Conclusions Gravel microhabitats had the highest proportional seedling survival for both species . Gravel interspaces were suitable microhabitats for seedling development , possibly due to the vertical entrapment of dispersal units and reduced competition from more distant established plants . *Cymbopogon jwarancusa* has a greater regeneration potential than *Chrysopogon acheri* in this grassland ecosystem in highland Balochistan . It may be difficult to increase the composition of *Chrysopogon acheri* , the more desirable species in these grasslands , when using management techniques that rely on natural regeneration .

References

- Carney , H .J (1989) . On competition and the integration of population , community and ecosystem studies . *Functional Ecology* , 3 , 637-641 .
- Schoot , G .W (1995) . A seed trap for monitoring seed rain in terrestrial communities . *Canadian Journal of Botany* , 73 , 794-796 .