Induced Plant Succession as a Strategy to Reclaim Degraded Pastures in the Brazilian Amazon

Carlos M. S. de Andrade
EMBRAPA, Brazil

Judson F. Valentim
EMBRAPA, Brazil

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C . M . S . Andrade and J . F . Valentim
Embrapa Acre , Caixa Postal 321 , CEP 69908-970 , Rio Branco , AC , Brazil , E-mail : mauricio@cpafac .embrapa .br

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Introduction Succession , the change in botanical composition over time , is currently a subject of great importance in both natural and sown pastures (Tow & Lazenby , 2001) . In sown pastures , scientists worldwide have been working hard to overcome and prevent degradation and to improve long-term performance of these pastures , almost always by using techniques to help stop plant succession (e .g . avoiding weed invasion) . However , plant succession can also be induced by human actions to improve pasture performance and sustainability (e .g . overseeding of legumes) .

During the 80's and 90's marandugrass (*Brachiaria brizantha* cv . Marandu) was widely planted in Brazil to substitute signalgrass (*B . decumbens*) and *B . humidicola* pastures suffering from spittlebug attack . However , when planted in poorly drained soils , marandugrass started to die due to its low adaptability to waterlogging , which predisposes the plant to infection by some soil phytopathogenic fungi (Andrade & Valentim , 2007) . When marandugrass started to die in mixed pastures with *B . humidicola* , signalgrass or tropical kudzu (*Pueraria phaseoloides*) , these species progressively dominated the sward , a plant succession that prevented weed invasion in these pastures . Farmers initially viewed this process as those plants killing marandugrass . Researchers viewed this kind of plant succession as an excellent opportunity to reclaim degraded monocultures of marandugrass in poorly drained soils .

In this work we describe the development of a pasture reclamation strategy , based on plant succession , which is now helping hundreds of farmers to reclaim degraded marandugrass pastures in the Western Brazilian Amazon .

Materials and methods From 1998 to 2004 , a team of pasture scientists of Embrapa Acre interacted with some farmers in the State of Acre to establish participatory on-farm trials to validate and generate technical coefficients of a new pasture reclamation technique . This involved manual planting of stolons of one or more forage species into the empty spaces left in the pasture soon after the death of marandugrass tussocks . Soil preparation or fertilization was not applied . The species tested were *B . humidicola* , african stargrass (*Cynodon nlemfuensis*) , tannergrass (*B . arrecta*) , tangolagrass (*B . arrecta* x *B . mutica*) and forage peanut (*Arachis pintoi* cv . Belmonte) .

Results and discussion This method of pasture reclamation was successfully applied , especially in the beginning of the pasture degradation process (low weed percentage) . Once established , the stoloniferous species were able to gradually colonize new bare areas left by the death of marandugrass plants and to efficiently prevent weed infestation . Generally , three to five years are necessary for a complete colonization of the sward (plant succession) . Some advantages of this technique are : 1) its low cost , since only manual labour (8 to 12 man-days/ha) are involved during two to three rainy seasons ; 2) the soil is not exposed to erosion ; and 3) grazing is not interrupted . Because of the moderate to high fertility of these poorly drained soils , fertilization has not been used . Some lessons were learned during the development of the technique : a) plant succession is faster when pasture is intermittently stocked ; b) the process is cheaper and faster when started soon after marandugrass begin to die ; c) pasture colonization by grasses , especially African stargrass , is faster when tropical kudzu previously dominated the sward ; and d) forage peanut is the most efficient specie to colonize sites dominated by the grass weed *Paspalum conjugatum* . This technique has been called ecological pasture reclamation" and is now helping small , medium and big farmers to overcome the syndrome of death of marandugrass in the Western Brazilian Amazon . It has been successfully applied also to pastures suffering from repeated spittlebug attack .

Conclusions Plant succession in sown pastures can be induced by planting stoloniferous forage species in situations where the original forage specie has problems with diseases , pets or poor environmental adaptation .

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