

Induced plant succession as a strategy to reclaim degraded pastures in the Brazilian Amazon

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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, pests or poor environmental adaptation.

References

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