

Sugarcane Pre-harvest Burning: A Threat to Megafaunal Conservation in Brazil?

Olivier Cameron Trudel^{1*}, Marianne Bachand¹, Colette Anseau¹, Jarcilene Almeida-Cortez²

¹ Département d'Écologie, Université de Sherbrooke, 2500 Av. Université, Sherbrooke, J1K 2R1, Québec, Canada

* Corresponding author, E-mail: Olivier.C.Trudel@USherbrooke.ca

² Departamento de Botânica, Universidade Federal de Pernambuco, Av. Prof. Moraes Rego, 1235 Cidade Universitária, Recife, CEP 50670-901 Pernambuco, Brazil

Introduction

The Lowland tapir, *Tapirus terrestris*, listed as vulnerable in the IUCN red list (2009), and classified in section II by the CITES (2009), is scarce in many regions of Brazil. Although this species is not included in the threatened species list of the IBAMA (Ministério do meio ambiente 2003), it is reported in six of seven Brazilian state lists of animals threatened with extinction (Medici et al. 2007). This specie situation is principally due to habitat loss and poaching (IUCN 2009). Since the Lowland tapir may be considered a keystone species because of its role of seed-disperser (Galetti et al. 2001, Fragoso et al. 2003), its extirpation from a forest ecosystem may potentially have a substantial impact on the recruitment dynamics of some vegetal species.

Historically, an important part of the Atlantic Hcoastal forest has disappeared under the sugarcane agricultural regime, which creates habitat loss and fragmentation (Oliveira et al. 2004, Tabarelli et al. 2006). Sugarcane pre-harvest burning (SPB) is a common practice mainly used to increase harvest efficiency (Müller & Coetsee 2008). This exploitation technique is still required because a significant proportion of sugarcane fields are harvested by hand. Sugarcane fields are burned before harvesting to reduce harvest time and cost by eliminating leaves that slow harvesters. SPB also enhance the security of harvesters by killing snakes (Mbolidi-Baron et al. 2007). Although, it has advantages for famers, the use of SPB is actually socially controversial (Mbolidi-Baron et al. 2007) because of its environmental impacts (Oppenheimer et al. 2004, Lara et al. 2005, Hemwong et al. 2009) and because it may threaten the health of exposed populations (Cançado et al. 2006, Uriarte et al. 2009).

Results obtained in Ilha Grande National Park forest showed that intensive and extensive wildfires have the power to affect terrestrial reptiles and mammals both directly and indirectly (Koproski 2005). Most fires also have the potential to injure or kill fauna (U.S. Fish & Wildlife Service 2009). The destructive effect of fire has already been observed on many terrestrial large-bodied mammals (French & French 1996, Oliver et al. 1998).

Keywords: Atlantic forest, Conservation, Fire, Fragmented area, *Tapirus terrestris*

Observations

Observations were made during the fieldwork of a research project on the diet of Lowland tapirs (Bachand et al. 2009). The project was conducted in a fragment of the Northeastern Atlantic Forest, Mata dos Pintos, located on the property of Usina Serra Grande™, Alagoas, Brazil (8°58 S, 36°6 W). We discovered a tapir's resting and foraging site in a sugarcane field. Later that month in the same field, we observed a resting tapir that fled when surprised (3:45 PM, September 2006). We then investigated further and discovered numerous tapir resting sites in the field's borders and a complex network of trails in the field merging to the forest fragment at some points.

Unfortunately, one month after our ethological observations (October 2006), an immature female tapir of the studied population was burnt by a SPB in the same field we had investigated. It later received care from the warden and treatment from a veterinarian, before succumbing one month later. We hypothesized that this unfortunate accident was not an isolated case; other tapirs in the sugarcane production region may have been exposed to SPB.

Survey

We contacted 34 wildlife rehabilitation centers in Brazil (mostly CETAS and IBAMA) to find out if they were aware of similar cases (without taking into account if the region supported natural tapir populations, or was a sugarcane field-dominated landscape). Only 14 centers answered; none have ever received a tapir injured by a SPB, nor by a wild fire.

Almost one hundred sugarcane companies and company divisions in Brazil were contacted for the same purpose. The only answer we received was from a company located in the Goiás state. This ISO 14001 certified company, which only burns 10 % of its area, told us that they ensure that no animal is in the field before burning. However, we speculate that this statement is based on inconclusive evidence.

Discussion

During several seasons of a monitoring study in Morro do Diabo State Park, Medici and her colleagues also found a series of intricate trails crossing sugarcane fields. Other trails were found entering surrounding forest fragments and roaming through the sugarcane lines. Although two radio-collared tapirs crossed this sugarcane field almost every night, they appeared to never spend much time in the sugarcane. No tapir couches or eaten sugarcane stems were found by Medici and her peers during their research (Medici, pers. com. 2009).

A study on wildfire impacts on megafauna in the Emas National Park (Brazil) mentions one carcass of a juvenile Lowland tapir killed by an important fire in the park (also 16 giant anteaters (*Myrmecophaga tridactyla* L.) carcasses) (Silveira et al. 1999). Silveira and his colleagues stipulate that tapir are less vulnerable to fire, probably because they can detect fire and run from the flame more rapidly. Koproski (2005) observed a tapir that appeared unalarmed despite the intensity of the fire beside it in the Ilha Grande National Park, consequently to other large mammals species (Lyon et al. 2000). Large mammal mortality most likely occurs when fire fronts are wide and fast-moving, when fires are actively crowning, and thick ground smoke occurs (Singer and Schullery 1989), which may correspond to the SPB fire behavior.

There are few studies on the impact of fire on fauna. Due to the status of the species and its ecological role, we found it essential to share this report with the scientific community to strongly encourage further researches testing the validity of our hypothesis. If this sugarcane crossing, feeding and resting behaviors are wide spread in tapir populations at the landscape scale, it may be

necessary to outline adequate management solutions to reduce mortality risk in sugarcane field mosaics. We explore here three possible solutions to mitigate the potential of megafaunal mortality related to SPB. We stress that this is especially important for the conservation of large mammals (e.g., tapir, giant anteater), which generally have limited population size, extended home-ranges, and slow reproduction rates (long gestation, few young, and long parental care period).

Solutions

SPB Reduction

The first solution we propose is to reduce the frequency of SPB as a global effort of sustainability. The Sugar Cane Industry Union of Brazil (almost 100 mills united), UNICA, signed an agreement with the Environment Secretariat for the State of Sao Paulo to bring forward the end of sugarcane burning to 2014, as well as the end of manual cutting, in the majority of plantations (UNICA 2009). Hopefully, sugarcane growers in the North-East of Brazil will reproduce this great decision for sustainability in the future.

SPB Alarm

A potentially efficient solution to mitigate SPB risks could be based on the tapir's great acuteness of hearing. Producing loud noises from different locations in the field before lighting SPB may help to reduce the risk of accidents. Noises could be produced by clapping hands, shouting, emitting an alarm, honking a horn, and by knocking machetes or shovels together. This simple solution represents a rapid and cost-free method to make animals flee from a field, and it can be applied by harvesters without special equipment.

Firebreak around Canefield

A SPB out-of-control is potentially an important threat for fauna even outside of the burnt sugarcane field. Moreover, reducing the loss of Lowland tapir habitat due to fires is a priority goal for Brazil, especially outside of protected areas (Medici et al. 2007). Keeping a firebreak consisting of cut herbaceous vegetation around the field may reduce the risk of fire propagation when using SPB in fields near forest fragments.

Conclusion

Since the pre-harvest burning method in sugarcane fields (and other types of crop burning) will probably continue to be used for many years, we encourage researchers to carry out studies that could help to assess the impact of this agricultural technique.

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