

A selection of 24 references about diet and seed dispersal by Tapirs (Tapiridae)
Prepared by FSD2010.org

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Record 1 of 24

Author(s): Tobler, MW (Tobler, Mathias W.); Janovec, JP (Janovec, John P.); Cornejo, F (Cornejo, Fernando)

Title: Frugivory and Seed Dispersal by the Lowland Tapir *Tapirus terrestris* in the Peruvian Amazon

Source: BIOTROPICA, 42 (2): 215-222 MAR 2010

Abstract: The lowland tapir *Tapirus terrestris* is the largest herbivore in the Neotropics and feeds on a large quantity of fruits, often ingesting the seeds and defecating them intact. Seed dispersal by the lowland tapir in the southwestern Amazon was studied by examining seeds from 135 dung samples collected between 2005 and 2007. Seeds of a total of 122 plant species were identified, representing 68 genera and 33 families. The species accumulation curve showed that more species can be expected with further sampling. Many species (45%) were only encountered once, and only 10 percent of all species were found in 410 samples, indicating that the lowland tapir is an opportunistic forager. Seed diversity showed a clear seasonal pattern and was highly correlated with fruit availability. Seed diameter ranged from <1 to 25 mm with 81 percent <10 mm diam. The size distribution of seeds found in lowland tapir dung generally followed that of seeds found in the forest, but had a lower proportion of seeds in the smallest size class (<2.5 mm) and a larger proportion found in the largest size class (20-25 mm). The diversity of seeds encountered in dung of the lowland tapir in this study was much higher than in previous studies. We conclude that the lowland tapir is a potential disperser for a large number of plant species, including many that previously have been thought to be dispersed only by large primates.

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Record 2 of 24

Author(s): Clauss, M (Clauss, Marcus); Wilkins, T (Wilkins, Tamsin); Hartley, A (Hartley, Andy); Hatt, JM (Hatt, Jean-Michel)

Title: Diet Composition, Food Intake, Body Condition, and Fecal Consistency in Captive Tapirs (*Tapirus* spp.) in UK Collections

Source: ZOO BIOLOGY, 28 (4): 279-291 JUL-AUG 2009

Abstract: Intake measurements were carried out in 22 tapirs from seven UK zoological collections. Dry matter intake (DMI) ranged from 48 to 86 g/kg(0.75)/d. Across collections, the highest proportion of the ingested diet consisted of pelleted feeds (including grains and bread) at 46 +/- 17% DMI, followed by commercial produce at 26 +/- 12% DMI, roughage (excluding browse) at 17 +/- 11% DMI, and browse at 11 +/- 11% DMI. The proportion of roughage, crude protein, crude fiber, and neutral detergent fiber levels in the diets investigated were well below levels recommended for domestic horses and other ungulates. Intakes of digestible energy (DE) as estimated from food nutrients using of a standard equation for

domestic horses ranged from 0.58 to 0.88 MJ/DE/kg(0.75)/d, with many individuals exceeding the assumed maintenance requirement of 0.6 MJ/DE/kg(0.75)/d for hindgut fermenters. At values exceeding this DE intake, animals had higher than ideal body condition scores (BCS). Animals with higher BCS (i.e. more obese animals) generally had higher fecal scores (FS) (i.e. softer feces), and both BCS and FS were positively correlated to DMI and calculated DE intake, This Suggests that the population studied was generally overfed, with resulting obesity and softer fecal consistency. The use of highly digestible feeds such as commercial produce and pelleted feeds should be restricted in the diets of these animals and roughage intake promoted in order to attempt to achieve normal BCS and FS in this captive population. Zoo Biol 28:279-291, 2009. (C) 2009 Wiley-Liss, Inc.

ISSN: 0733-3188

DOI: 10.1002/zoo.20225

Record 3 of 24

Author(s): Talamoni, SA (Talamoni, Sonia A.); Assis, MAC (Assis, Miguel A. C.)

Title: Feeding habit of the Brazilian tapir, *Tapirus terrestris* (Perissodactyla: Tapiridae) in a vegetation transition zone in south-eastern Brazil

Source: ZOOLOGIA, 26 (2): 251-254 JUN 2009

Abstract: Tapirs are considered generalist herbivores and the differences in the proportions of dietary items are often attributed to differences in the habitats where individuals live. This study characterized the feeding habit of *Tapirus terrestris* (Linnaeus, 1758) in a nature reserve in south-eastern Brazil, located in a region considered a transition zone between the Cerrado (Brazilian savanna) and the Atlantic Forest biomes. Fecal samples from *T. terrestris* individuals were collected monthly at six sampling areas that encompassed a total of 242.22 ha. There were 147 fresh samples found (77 during the dry season and 70 during the wet season). The diet of the tapirs in this reserve was characterized by the prevalent browsing on leaves and stems. There was a low frequency of fruit seeds in the diet of the tapirs during both the wet and dry seasons. However, in the dry season a higher percentage of samples containing seeds was observed. Fruits of Rubiaceae, Solanaceae, and Annonaceae were most consumed during the dry season. Most of the fruit seeds found presented small mean diameter (3.7-8.4 mm) and most of the fruits were capsules and dry fruits. The characteristics of the fruits consumed by the tapirs indicate that they forage in the lower forest stratum and upon species from Cerrado. Additionally, *Psidium myrtilloides* O. Berg. clusters found in the study site suggest that the tapirs may be acting as dispersal agents of this species.

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Record 4 of 24

Author(s): Giombini, MI (Giombini, Mariano I.); Bravo, SP (Bravo, Susana P.); Martinez, MF (Martinez, Mariela F.)

Title: Seed Dispersal of the Palm *Syagrus romanzoffiana* by Tapirs in the Semi-deciduous Atlantic Forest of Argentina

Source: BIOTROPICA, 41 (4): 408-413 JUL 2009

Abstract: Vertebrates play a fundamental role in the dispersal of Neotropical trees, generating different seed shadows according to their physical and behavioral features. Tapirs are capable of consuming great quantities of large fruits, and they defecate seeds far from parent trees. For instance, intact seeds of the palm *Syagrus romanzoffiana* have been found in tapir dung piles in the Atlantic Forest of southeastern Brazil, suggesting that tapirs effectively

disperse this species. However, recruitment was not examined therein. We studied tapir endozoochory of large and medium seeds in the semi-deciduous Atlantic Forest of Argentina by examining dung piles found within Iguazu National Park. We recorded dung-pile positions to evaluate the spatial distribution. We also counted the number of juveniles in 2 x 2 m quadrats placed on old dung piles in latrines, beneath adults and in random sites to estimate recruitment levels. *Syagrus romanzoffiana* seeds were present in 98 percent of dung piles, averaging > 200 seeds/dung pile, indicating that this species constitutes the main fruit component in the tapir's diet. Dung piles showed a clumped deposition pattern reflecting the use of latrines. Juvenile recruitment in latrines was 21 times higher than that of under-adult sites and 500 times greater than in random sites, and correlated with the frequency of use of the areas. We concluded that the lowland tapir is a major disperser of *S. romanzoffiana*. Given that this palm can be considered a keystone species, a disruption of this interaction might affect the entire community of frugivores in the long term.

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DOI: 10.1111/j.1744-7429.2009.00526.x

Record 5 of 24

Author(s): Keuroghlian, A (Keuroghlian, Alexine); Eaton, DP (Eaton, Donald P.)

Title: Removal of palm fruits and ecosystem engineering in palm stands by white-lipped peccaries (*Tayassu pecari*) and other frugivores in an isolated Atlantic Forest fragment

Source: BIODIVERSITY AND CONSERVATION, 18 (7): 1733-1750 JUN 2009

Abstract: Long-term studies in a 2,178 ha fragment of semideciduous Atlantic Forest demonstrated important interactions between white-lipped peccaries (*Tayassu pecari*) and the common palms, *Syagrus romanzoffiana* and *Euterpe edulis*. We conducted fruit removal and medium-to-large-sized mammalian exclusion experiments to: (1) quantify seasonal fruit consumption from high-density patches beneath parent trees by *T. pecari* and other consumers, and (2) measure impacts of *T. pecari* rooting and foraging activities on seedling dynamics in *E. edulis* stands. A diverse array of fauna consumed *S. romanzoffiana* fruits. During the dry season, when *S. romanzoffiana* palms provided 68% of fruit dry weight in the fragment, *T. pecari* consumed significantly greater amounts than other consumers, and along with *Pecari tajacu* and *Tapirus terrestris*, were potential seed dispersers. The rodents, *Sciurus ingrami* and *Agouti paca*, consumed most *S. romanzoffiana* fruits in the wet season, acting as both seed dispersers and predators. More than 95% of *E. edulis* fruit removal was due to seed predation by *T. pecari*. Intense removal during the dry season was closely linked with previously documented range shifts and habitat preferences by *T. pecari*. Exclusion plot experiments in *E. edulis* (palmito) stands showed that the number and proportion of nonpalmito (not *E. edulis*) seedlings increased dramatically in the absence of *T. pecari* rooting and foraging activities that disturbed soil and thinned seedlings. We discuss the importance of these ecosystem engineering activities and palm-peccary trophic interactions for long-term maintenance of *E. edulis* stands and *T. pecari* populations, as well as water balance, in the forest fragment.

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DOI: 10.1007/s10531-008-9554-6

Record 6 of 24

Author(s): Tobler, MW (Tobler, Mathias W.); Carrillo-Percastegui, SE (Carrillo-Percastegui, Samia E.); Powell, G (Powell, George)

Title: Habitat use, activity patterns and use of mineral licks by five species of ungulate in south-eastern Peru

Source: JOURNAL OF TROPICAL ECOLOGY, 25: 261-270 Part 3 MAY 2009

Abstract: We Studied the habitat use, activity patterns and use of mineral licks by five species of Amazonian ungulate using data from four 60-d camera trap surveys at two different sites in the lowland rain forest of Madre de Dios, Peru. Camera traps were set out in two regular grids with 40 and 43 camera stations covering an area of 50 and 65 km², as well as at five mineral licks. Using occupancy analysis we tested the hypothesis that species are spatially separated. The results showed that the grey brocket deer (*Mazama gouazoubria*) occurred almost exclusively in terra firme forests, and that the white-lipped peccary (*Tayassu pecari*) used floodplain forest more frequently during some surveys. All other species showed no habitat preference and we did not find any spatial avoidance of species. The white-lipped peccary, the Collared peccary (*Pecari tajacu*) as well as the grey brocket deer were strictly diurnal while the lowland tapir (*Tapirus terrestris*) was nocturnal. The red brocket deer (*Mazama americana*) was active day and night. The tapir was the species with the highest number of visits to mineral licks (average 52.8 visits per 100 d) followed by the white-lipped peccary (average 16.1 visits per 100 d) and the red brocket deer (average 17.1 visits per 100 d). The collared peccary was only recorded on three occasions and the grey brocket deer was never seen at a lick. Our results suggest that resource partitioning takes place mainly at the diet level and less at its spatial level; however, differences in small-scale habitat use are still possible.

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Record 7 of 24

Author(s): de Araujo, RM (de Araujo, Roberta M.); de Souza, MB (de Souza, Maira B.); Ruiz-Miranda, CR (Ruiz-Miranda, Carlos R.)

Title: Density and population size of game mammals in two Conservation Units of the State of Rio de Janeiro, Brazil

Source: IHERINGIA SERIE ZOOLOGIA, 98 (3): 391-396 SEP 30 2008

Abstract: Density and population size of game mammals in two Conservation Units of the State of Rio de Janeiro, Brazil. The Atlantic Rain Forest even though suffering intense devastation, shelters 261 species of mammals, 73 endemic. Large mammals were among the most vulnerable to hunting, loss of habitat, and wildlife trade. In the State of Rio de Janeiro there are only two Federal Biological Reserves of lowland Atlantic Rain Forest: the Poco das Antas Biological Reserve and the Uniao Biological Reserve. The purpose of this study was to assess the presence and putative influence of illegal burning on the mammals in these two Conservation Units. Surveys were conducted using a line-transect method; 375 kilometers were covered during the period between December 2003 and January 2005. The data for the population density estimate was analyzed using the program DISTANCE 5.0. Twelve species were confirmed through visual encounters during the surveys, whereas 15 are regularly hunted in the region studied. The species that presented higher density were brown capuchin monkey (*Cebus nigritus* Erxleben, 1777), howler monkey (*Alouatta guariba* Lacepede, 1799), nine-banded long-nosed armadillo (*Dasypus novemcinctus* Linnaeus, 1758), and the seven-banded long-nosed armadillo (*Dasypus septemcinctus* Linnaeus, 1758). The most rare or absent species were the Brazilian tapir (*Tapirus terrestris* Brunnich, 1771), the red brocket deer (*Mazama americana* Rafinesque, 1817) and the white-lipped peccary (*Tayassu pecari* Link, 1795). In these two study areas both direct and indirect evidence of illegal hunting was

observed, indicating that hunting is a common practice inside these Biological Reserves. The long-term survival of the hunted species is questionable, because the remaining populations living in fragments that are small and isolated, making them more susceptible to extinction even under low hunting pressure.

ISSN: 0073-4721

Record 8 of 24

Author(s): Hummel, J (Hummel, Juergen); Fritz, J (Fritz, Julia); Kienzle, E (Kienzle, Ellen); Medici, EP (Medici, E. Patricia); Lang, S (Lang, Stefanie); Zimmermann, W (Zimmermann, Waltraut); Streich, WJ (Streich, W. Juergen); Clauss, M (Clauss, Marcus)

Title: Differences in fecal particle size between free-ranging and captive individuals of two browser species

Source: ZOO BIOLOGY, 27 (1): 70-77 JAN-FEB 2008

Abstract: Data from captive animals indicated that browsing (BR) ruminants have larger fecal particles indicative of lesser chewing efficiency than grazers (GR). To answer whether this reflects fundamental differences between the animal groups, or different reactions of basically similar organisms to diets fed in captivity, we compared mean fecal particle size (MPS) in a GR and a BR ruminant (aurochs *Bos primigenius taurus*, giraffe *Giraffa camelopardalis*) and a GR and a BR hindgut fermenter (Przewalski's horse *Equus ferus przewalskii*, lowland tapir *Tapirus terrestris*), both from captivity and from the wild. As would be expected owing to a proportion of finely ground, pelleted feeds in captive diets, MPS was smaller in captive than free-ranging GR. In contrast, MPS was drastically higher in captive than in free-ranging BR of either digestion type. Thus, the difference in MPS between GR and BR was much more pronounced among captive than free-ranging animals. The results indicate that BR teeth have adapted to their natural diet so that in the wild, they achieve a particle size reduction similar to that of GR. However, although GR teeth seem equally adapted to food ingested in captivity, the BR teeth seem less well suited to efficiently chew captive diets. In the case of ruminants, less efficient particle size reduction could contribute to potential clinical problems like "rumen blockage" and bezoar formation. Comparisons of MPS between free-ranging and captive animals might offer indications for the physical suitability of zoo diets.

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Record 9 of 24

Author(s): Stoner, KE (Stoner, Kathryn E.); Riba-Hernandez, P (Riba-Hernandez, Pablo); Vulinec, K (Vulinec, Kevina); Lambert, JE (Lambert, Joanna E.)

Title: The role of mammals in creating and modifying seed shadows in tropical forests and some possible consequences of their elimination

Source: BIOTROPICA, 39 (3): 316-327 MAY 2007

Conference Title: Annual Meeting of the Association-for-Tropical-Biology-and-Conservation

Conference Date: 2005

Conference Location: Uberlandia, BRAZIL

Abstract: Mammal populations are increasingly hunted, yet the consequences of their disappearance from tropical forests have only recently been explored. Here, we summarize

current research on the role of mammals in seed dispersal and postdispersal processes, such as seed predation and secondary dispersal, in different tropical regions. We evaluate how mammal features influence seed shadows and ultimately forest regeneration. Finally, we discuss the potential effect of changes in seed shadows caused by the elimination of many medium- and large-sized mammals. The complex role that mammals play in creating and modifying seed shadows in tropical forests cannot be easily quantified, and in this review we emphasize the variation that exists both within and among mammal taxa and across continents. To bridge this gap in information, we suggest that more studies should evaluate the relative importance of the disappearance of both seed dispersers and seed predators for particular plant species so that we may begin to understand the balance between these two influences. We also suggest that future studies identify ecological redundancy in nonhunted vertebrates within any particular community to evaluate compensatory behavior that may help ameliorate some of the negative effects of hunting of large and medium mammals.

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Record 10 of 24

Author(s): Rios, RS (Rios, Rodrigo S.); Pacheco, LF (Pacheco, Luis F.)

Title: The effect of dung and dispersal on postdispersal seed predation of *Attalea phalerata* (Arecaceae) by bruchid beetles

Source: BIOTROPICA, 38 (6): 778-781 NOV 2006

Abstract: Low postdispersal mortality of palm seeds in tapir dung is hypothesized to result from the mechanical barrier provided by dung against bruchid infestation and/or from the distance to adult palms at which seeds are dispersed. We tested these hypotheses by distributing endocarps of *Attalea phalerata* Mart. ex Spreng. in experimental dung piles in Beni, Bolivia. Predation rates were significantly lower for seeds covered by dung than for exposed or partially covered seeds, but did not differ between seeds placed below and 50 m away from palms. Thus, dung, not short-distance dispersal, protects seeds against bruchid beetles, and may ultimately promote survival of palm seeds.

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DOI: 10.1111/j.1744-7429.2006.00209.x

Record 11 of 24

Author(s): Fragoso, JMV; Silviu, KM; Correa, JA

Title: Long-distance seed dispersal by tapirs increases seed survival and aggregates tropical trees

Source: ECOLOGY, 84 (8): 1998-2006 AUG 2003

Abstract: The dominant models explaining tree species diversity and distribution patterns in tropical forests are the Janzen-Connell and Recruitment Limitation models, neither of which considers the effect of long-distance seed dispersal on seed survival, seedling establishment, or the aggregated distributions of trees empirically observed at mesoscales in tropical forests. At a neotropical forest site (Maraca Island Ecological Reserve, Roraima, Brazil), we experimentally reproduced long-distance clumped seed dispersal by tapirs for the palm *Maximiliana maripa*. Such dispersal protects seeds from attack by species-specific bruchid beetles by (1) covering them in protective fecal material and (2) placing them in sites distant from conspecific adult tree aggregations, where beetles are less active. Endocarps distant from parent patches survived bruchid attack at a significantly higher rate than those in parent

patches, as did in-feces endocarps compared to clean endocarps. A significant interaction effect between distance from patches and feces treatment showed that feces conferred protection to seeds within a parent patch but did not appear to confer additional protection to seeds already protected by distance from the parent patch. A mesoscale map compiled from aerial photography, satellite imagery, and air- and ground-truthing revealed an aggregated pattern of *M. maripa* palms associated with tapir latrine sites, supporting the view that long-distance seed dispersal by tapirs is responsible for the generation of palm patches and potentially important in forest-savanna boundary dynamics. We conclude that seed shadows and survival rates can justifiably be studied at the scale of tree aggregations rather than at the scale of individual trees, and that long-distance seed dispersal is neither rare nor unpredictable once we understand the movements and behavior of large, mobile animals.

ISSN: 0012-9658

Record 12 of 24

Author(s): Silvius, KM; Fragoso, JMV

Title: Pulp handling by vertebrate seed dispersers increases palm seed predation by bruchid beetles in the northern Amazon

Source: JOURNAL OF ECOLOGY, 90 (6): 1024-1032 DEC 2002

Abstract: 1 The simultaneous use of fruits and seeds by invertebrate seed predators and vertebrate seed dispersers produces complex ecological interactions that reduce the predictability of seed fate.

2 Cocosoid palm seeds in the Neotropics are subject to high mortality by bruchid beetle infestation and such attack is the major cause of mortality for seeds of the palm *Attalea maripa* at our study site in the northern Brazilian Amazon.

3 The exocarp and mesocarp of 1400 fruits were manipulated in different ways to simulate handling by vertebrates. No eggs of the bruchid beetle, *Pachymerus cardo*, were laid on intact control fruits, while the highest numbers of eggs were received by fruits whose exocarp and mesocarp had been partially removed, as if by primates and rodents (mean of 15.9 and 18.9 eggs fruit⁻¹, respectively, during the peak fruiting season). Fruits with intact mesocarp but no exocarp, and fruits with all mesocarp and exocarp removed, received low numbers of eggs (mean of 4.6 and 6.6 eggs per fruit, respectively, during the peak fruiting season). Thus both exocarp and mesocarp deter oviposition, and removal of these fruit structures increases fruit susceptibility to infestation.

4 Oviposition rates declined as the fruiting season progressed, but oviposition preferences remained the same. Seed mortality was high for any fruit on which eggs were laid.

5 Large rodents and primates, which have been considered among the most effective seed dispersers for large-seeded Neotropical trees such as palms, actually increased the susceptibility of seeds to bruchid beetle attack. Removal of (intact) seeds by other dispersers may be necessary to ensure seed survival.

6 These results indicate that the reliability of seed dispersers cannot be gauged without a complete understanding of variables that affect seed viability.

ISSN: 0022-0477

Record 13 of 24

Author(s): Tobler, MW

Title: Habitat use and diet of Baird's tapirs (*Tapirus bairdii*) in a montane cloud forest of the Cordillera de Talamanca, Costa Rica

Source: BIOTROPICA, 34 (3): 468-474 SEP 2002

Abstract: Results from 24 transects showed that tapirs were less abundant in areas with higher human presence. They also preferred less steep areas, especially as browsing sites. An analysis of feces showed that fibers were the largest component (40-55%) followed by leaves (10-30%) and twigs (15%). Bamboo (*Chusquea* spp.) was found in all samples and probably accounts for the high proportion of fibers. Twenty-seven plant species were identified to be eaten by tapirs.

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Record 14 of 24

Author(s): Galetti, M; Keuroghlian, A; Hanada, L; Morato, MI

Title: Frugivory and seed dispersal by the lowland tapir (*Tapirus terrestris*) in southeast Brazil

Source: BIOTROPICA, 33 (4): 723-726 DEC 2001

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Record 15 of 24

Author(s): Quiroga-Castro, VD; Roldan, AI

Title: The fate of *Attalea phalerata* (Palmae) seeds dispersed to a tapir latrine

Source: BIOTROPICA, 33 (3): 472-477 SEP 2001

Abstract: At the Beni Biological Station, Bolivia, we compared the fate of seeds of the palm *Attalea phalerata* dispersed by tapirs to a latrine with that of non-dispersed seeds. Survival of seeds that had passed through tapir guts did not differ significantly from that of unconsumed seeds, demonstrating that tapirs are legitimate seed dispersers of *A. phalerata*. Experimental and observational studies showed that tapir dispersal can contribute to escape from seed predation by bruchid beetles such as *Pachymerus cardo*. Nevertheless, the major contribution of the dispersal process may simply be the mechanical barrier to bruchid attack represented by the fecal material covering seeds. Furthermore, total absence of seedlings and adults from the tapir latrine studied suggests that seasonally flooded tapir latrines are not safe sites for *A. phalerata*.

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Record 16 of 24

Author(s): Downer, CC

Title: Observations on the diet and habitat of the mountain tapir (*Tapirus pinchaque*)

Source: JOURNAL OF ZOOLOGY, 254: 279-291 Part 3 JUL 2001

Abstract: Results of a 4-year study in Sangay National Park, Ecuador, indicated that the mountain tapir *Tapirus pinchaque*, consumes a wide variety of woody and non-woody plant taxa primarily as a foliose browser, and has a preference for some nitrogen-fixing plants. The more closed-cover Andean forest and chaparral habitats contain a greater abundance of mountain tapir-favoured food than the more open grassland paramo, riverine meadow, and pampas vegetation types. Andean forests are considered the most critical habitat for the survival of this tapir because of their provision of cover and food. Field observations and results of faecal germination experiments show that the mountain tapir assists in the successful seed dispersal of many species of Andean plants. Significant regressions between: (1) seed germination and (2) both the natural logarithm ($\ln e$) of the preference ratio and the dietary abundance of food species indicate a mutualism between the mid to high montane-

dwelling mountain tapir and the plants it consumes. A significant relation during the past 2 to 3 million years is proposed between: (1) the crossing of the Panamanian Isthmus and the occupation of the mid to high northern Andes by ancestors of the mountain tapir, and (2) the rise of the Andes and formation of the montane forest and paramo ecosystems above c. 2000 m elevation.

ISSN: 0952-8369

Record 17 of 24

Author(s): Fragoso, JMV; Huffman, JM

Title: Seed-dispersal and seedling recruitment patterns by the last Neotropical megafaunal element in Amazonia, the tapir

Source: JOURNAL OF TROPICAL ECOLOGY, 16: 369-385 Part 3 MAY 2000

Abstract: Tapirs (Tapiridae) are the last representatives of the Pleistocene megafauna of South and Central America. How they affect the ecology of plants was examined by studying the diversity, abundance, and condition of seeds defecated by the lowland tapir (*Tapirus terrestris*) in Amazonian Brazil. Additionally, the spatio-temporal pattern of the seed-rain and seed-shadows generated by tapirs was recorded. Three hundred and fifty-six tapir faeces were examined. Eleven per cent were found in water (n = 41), while 88% were located on dry land (n = 315). Of those found on dry land, 84% were located at sites that flood seasonally, while 14% of the total were encountered at forest sites that do not flood. In 127 faeces checked in the laboratory over 12 906 seeds of at least 39 species were found. Seed viability ranged from 65% for *Maximiliana maripa* to 98% for *Enterolobium schomburgkii*. Of nine seed species planted in the laboratory, seven germinated within 4 wk, with one species achieving an 89% germination rate. For many species recruitment to the seedling stage was also high under natural conditions, with 13 plant species occurring as seedlings in older faeces. Tapir generated seed-rain occurred throughout the year, with seeds defecated in all months. Two temporal patterns in species seed rain occurred: (1) contiguous monthly occurrence with peaks in abundance, and (2) discontinuous occurrence (time clumped) with small (a few months) to large (many months to more than a year) temporal gaps. The highest diversity of seeds appeared in April, at the end of the dry season. As the last of the Pleistocene megafauna of the region, tapirs may have particular importance as dispersers of large seeds and generators of unique seed dispersion patterns.

ISSN: 0266-4674

Record 18 of 24

Author(s): Henry, O; Feer, F; Sabatier, D

Title: Diet of the lowland tapir (*Tapirus terrestris* L.) in French Guiana

Source: BIOTROPICA, 32 (2): 364-368 JUN 2000

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Record 19 of 24

Author(s): Olmos, F; Pardini, R; Boulhosa, RLP; Burgi, R; Morsello, C

Title: Do tapirs steal food from palm seed predators or give them a lift?

Source: BIOTROPICA, 31 (2): 375-379 JUN 1999

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Record 20 of 24

Author(s): Fragoso, JMV

Title: Tapir-generated seed shadows: scale-dependent patchiness in the Amazon rain forest

Source: JOURNAL OF ECOLOGY, 85 (4): 519-529 AUG 1997

Abstract: 1 Maximiliana maripa is a large seeded palm that occurs in monodominant patches (clumps) in the Amazonian forest of Maraca Island, Roraima, Brazil.

2 Rodents, collared peccaries (*Tayassu tajacu*), deer (*Odocoileus virginianus* and *Mazama* spp.) and primates, all short-distance, small-to-medium bodied dispersers, ate the pulp of Maximiliana fruits and spat out intact seeds, from 97 to 100% of them within 5 m of parent plants (below the tree crown).

3 Tapirs (*Tapirus terrestris*) swallowed entire fruits and defecated intact seeds at latrines located up to 2 km from the nearest palm clump, creating a large-scale, punctuated seed shadow.

4 Bruchid beetle (*Pachymeris cardo*) larvae killed 77% of seeds remaining near parent trees, but only 0.7% of the 6140 seeds dispersed by tapirs to latrines.

5 Densities of zero-year seedlings to fifth-year saplings were significantly higher at tapir latrine sites than around parent trees located in conspecific aggregations; they were also significantly higher for the zero and one year classes at latrines than at randomly selected nonpalm, nonlatrine control trees.

6 Seeds dispersed by tapirs to latrines and secondarily dispersed by rodents gave rise to the seedlings and saplings located around the latrine sites, while seeds secondarily dispersed by rodents gave rise to the seedlings and saplings around control trees.

7 Collared (*Tayassu tajacu*) and white-lipped (*T. pecari*) peccaries accounted for high seedling and sapling mortality around parent trees.

8 Adult Maximiliana attained densities of 32 trees per 2500 m² within these patches.

9 Clump dispersal of seeds by tapirs, a meso-scale process, interacting with the small-scale process of seed dispersal by rodents, is sufficient to explain the creation of palm patches.

ISSN: 0022-0477

Record 21 of 24

Author(s): Salas, LA; Fuller, TK

Title: Diet of the lowland tapir (*Tapirus terrestris* L) in the Tabaro River valley, southern Venezuela

Source: CANADIAN JOURNAL OF ZOOLOGY-REVUE CANADIENNE DE ZOOLOGIE, 74 (8): 1444-1451 AUG 1996

Abstract: In this study we document the diet, determine diet selection, and evaluate the seed-dispersal role of lowland tapirs (*Tapirus terrestris* L.) in the Tabaro River valley of southern Venezuela. The diet was assessed by checking treefall gaps and closed-canopy areas of equal size for browsing signs, examining droppings for seeds and fruit remains, and casually asking experienced Ye'kwana Indian hunters. Plants browsed by tapirs were identified and counted. The abundance of each plant species at the study site was determined using 25-m² quadrats and compared with its abundance in the diet to determine selectivity. Because tapirs defecate in water, their role as seed dispersers was examined by analyzing the distribution of diet species using a data base of the locations of trees at the study site. Information from the 25-m² quadrats was used for lianas and shrubs. Results show that tapirs selectively browse on 256 out of at least 256 plant species, consistently avoiding more species in closed-canopy areas. Some species occur significantly more frequently in the diet than their relative abundance in the forest. Tapirs eat fruits of 33 species: 2 of these are mainly found near the

water and 9 away from the water.

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Author(s): RODRIGUES, M; OLMOS, F; GALETTI, M

Title: SEED DISPERSAL BY TAPIR IN SOUTHEASTERN BRAZIL

Source: MAMMALIA, 57 (3): 460-461 1993

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Record 23 of 24

Author(s): BODMER, RE

Title: STRATEGIES OF SEED DISPERSAL AND SEED PREDATION IN AMAZONIAN UNGULATES

Source: BIOTROPICA, 23 (3): 255-261 SEP 1991

Abstract: Amazonian ungulates, which include the red brocket deer, grey brocket deer, collared peccary, white-lipped peccary, and lowland tapir, consume large quantities of fruit and maximize nutritional gain by exploiting both pulp and seed. Amazonian ungulates often disperse seeds over short distances by spitting them out during mastication. The lowland tapir is the only ungulate that frequently disperses intact seeds through the digestive tract. Brocket deer destroy most of the seeds they consume by digesting them with rumen microbes, while peccaries crack seeds using their resistant teeth, strong jaw muscles, and thick skull bones. Defensive strategies of seeds include strength, chemical toxins, mast fruiting, fibrous lignin, and size variation. Brocket deer and peccaries have pregastric fermentation that may detoxify some secondary compounds of seeds. Small seeds occasionally pass intact through brocket deer and peccary guts. However, strong palm seeds that avert many mammalian predators are often destroyed by ungulates. The fibrous lignin that protects seeds of *Jessenia bataua* (Palmae) appears to be effective against ungulates which may explain its abundance in the study area.

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Record 24 of 24

Author(s): BODMER, RE

Title: INFLUENCE OF DIGESTIVE MORPHOLOGY ON RESOURCE PARTITIONING IN AMAZONIAN UNGULATES

Source: OECOLOGIA, 85 (3): 361-365 1991

Abstract: Resource partitioning of diet and habitat use was studied in the entire Amazonian ungulate community of Northeastern Peru, which comprises the red brocket deer (*Mazama americana*), grey brocket deer (*M. gouazoubira*), collared peccary (*Tayassu tajacu*), white-lipped peccary (*T. pecari*), and lowland tapir (*Tapirus terrestris*). Each ungulate species partitioned at least one type of resource from every other species. Digestive morphology had a greater influence on resource partitioning of diet than body size. Neither digestive morphology nor body size were related to segregation of habitats. However, species with similar diets partitioned habitats, whereas species with different diets often used the same type of forest. Increases in habitat breadth of ungulates were positively correlated with increases in dietary breadth.

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