

A selection of 10 references about fruit consumption and seed dispersal by Bear

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Record 1 of 10

Koike, S; Morimoto, H; Goto, Y; Kozakai, C; Yamazaki, K. 2008. Frugivory of carnivores and seed dispersal of fleshy fruits in cool-temperate deciduous forests. *JOURNAL OF FOREST RESEARCH* 13 (4): 215-222..

Author Full Name(s): Koike, Shinsuke; Morimoto, Hideto; Goto, Yusuke; Kozakai, Chinatsu; Yamazaki, Koji

Abstract: Five members of the order Carnivora in the cool-temperate deciduous forests of Japan consume the fruits of trees, and they are potential dispersers of the seeds of fleshy-fruited plants. We studied the frugivory of the Asiatic black bear, Japanese marten, badger, red fox, and raccoon dog in cool-temperate deciduous forest of central Japan. From May 2003 to April 2005, a total of 377 fecal samples of the five carnivores (bears, 91; martens, 158; badgers, 45; foxes, 36; and raccoon dogs, 47) were sampled to determine the presence and frequency of occurrence of seeds. Seeds from 17 plant species, representing about 50% of the fleshy-fruited plants occurring in the study forest, were recovered from the carnivore fecal samples. Large numbers (9-10,256) of seeds were present in those feces. Almost all the seeds of fleshy fruits retrieved from the fecal samples were undamaged whereas no intact acorns or nuts were recovered. These findings suggest that all five carnivores can act as seed dispersers for some fleshy-fruited plants in cool-temperate deciduous forest.

DOI: 10.1007/s10310-008-0069-5

Record 2 of 10

Koike, S; Kasai, S; Yamazaki, K; Furubayashi, K. 2008. Fruit phenology of *Prunus jamasakura* and the feeding habit of the Asiatic black bear as a seed disperser. *ECOLOGICAL RESEARCH* 23 (2): 385-392..

Author Full Name(s): Koike, Shinsuke; Kasai, Shinsuke; Yamazaki, Koji; Furubayashi, Kengo

Abstract: We investigated the relationship between the fruit phenology of *Prunus jamasakura* and the fruit-feeding period of the Asiatic black bear (*Ursus thibetanus*). The purposes of this study were to determine (1) when bears feed on the fruit of *P. jamasakura* in relation to phenology; (2) whether ingestion damages seeds; and (3) how ingestion influences seed germination. We assessed the relationship between the phenology of fruit maturation (size, sugar concentration, color, persistence, and germination percentage) and the feeding period of bears in the field, as judged from bear shelves and claw marks. We also compared the germination percentage of seeds ingested by captive bears with that of uningested. Bears fed on the fruit from days 50 to 66 after flowering, when most of the fruits were on the tree and became large, the germination percentage of seeds increased, and the sugar concentration became high. Bears fed only on mature fruits and so obtained high-quality nutrients. Germination tests showed that ingestion of fruits by the bears caused no physical damage to the seeds. Ingested seeds did not show a significant difference in germination percentage from seeds, whose pulp was artificially removed. These results indicate that bears are potentially effective dispersers from a qualitative perspective and, to some extent, from a quantitative

perspective.

DOI: 10.1007/s11284-007-0399-3

Record 3 of 10

Takahashi, K; Shiota, T; Tamatani, H; Koyama, M; Washitani, I. 2008. Seasonal variation in fleshy fruit use and seed dispersal by the Japanese black bear (*Ursus thibetanus japonicus*). *ECOLOGICAL RESEARCH* 23 (2): 471-478..

Author Full Name(s): Takahashi, Kazuaki; Shiota, Tadatoshi; Tamatani, Hiroo; Koyama, Masaru; Washitani, Izumi

Abstract: Fruit use by the Japanese black bear (*Ursus thibetanus japonicus*) and seed clumping in bear scat were studied in central Japan using fecal analyses. Between May and November 2003 and 2004, the life form and fruit size of plants consumed by bears and the species composition and intactness of seeds contained in scat were examined in five transects (approximately 10 km x 10 m) in broad-leaved deciduous forests. In 2003, scats with seeds were found only in the autumn, when fruiting trees and shrubs were abundant. In 2004, scats with seeds occurred intermittently from the summer, when fruiting plants were rare, up to the autumn. Yearly and seasonal variation in fruit use reflects the opportunistic foraging behavior of Japanese black bears. Seven of the nine plant species detected in scats had medium-sized fruits (6-15 mm width), whereas the other two species had relatively large fruits (20-100 mm width). In total, 14,492 seeds were detected, of which 97.6% were intact; the remainder were damaged. Intact seeds of one or two species were found in each scat. The number of intact seeds per scat ranged from 1 to 5476. Japanese black bears seldom digest ingested seeds, thereby contributing to the seed dispersal of their food plants, including species with fruits that are too large to be swallowed by frugivorous birds.

DOI: 10.1007/s11284-007-0382-z

Record 4 of 10

Kuhn, KM; Vander Wall, SB. 2007. Black bears (*Ursus americanus*) harvest Jeffrey pine (*Pinus jeffreyi*) seeds from tree canopies. *WESTERN NORTH AMERICAN NATURALIST* 67 (3): 384-388..

Author Full Name(s): Kuhn, Kellie M.; Vander Wall, Stephen B.

Abstract: We documented black bears (*Ursus americanus*) consuming the seeds of Jeffrey pine (*Pinus jeffreyi*) in the eastern Sierra Nevada from late August through September. Shells of pine seeds were the exclusive item in 20 of 27 scat samples collected in September and October and comprised >90% of the remaining 7 samples. Bears obtain seeds of Jeffrey pines by climbing trees, removing ripe, unopened cones from branches, dismantling cones on the ground, and consuming the seeds. Cone harvesting by bears can cause substantial damage to cone-bearing trees and might result in high predispersal mortality of seeds. In other regions, the rise of pine seeds by bears has been associated with whitebark pines (*P. albicaulis*) from which bears obtain seeds by exploiting the cone-storing activities of squirrels. Despite the lack of an apparent pine-squirrel-bear interaction, harvesting unopened cones might be a common foraging strategy used by black bears to obtain seeds of Jeffrey pines in the Sierra Nevada.

Record 5 of 10

Willson, MF; Gende, SM. 2004. Seed dispersal by Brown Bears, *Ursus arctos*, in southeastern Alaska. *CANADIAN FIELD-NATURALIST* 118 (4): 499-503..

Abstract: Mammals often consume fleshy fruits and disperse significant quantities of the enclosed seeds. In southeastern Alaska, Brown Bears (*Ursus arctos*) are among the most important dispersers of seeds for the numerous plant species producing fleshy fruits, because these bears are abundant, often eat large quantities of fruit, and commonly excrete seeds in germinable condition. Seat analyses showed that Brown Bears on Chichagof Island ate increasing quantities of fruit through summer and fall. Scats commonly contained several thousand seeds, often of two or more species. Four kinds of seeds of fleshy-fruited plants that normally grow in forest understory germinated at similar levels when experimentally deposited (in bear scats) in the two most common habitats (forest and muskeg), suggesting that habitat distribution of these plants is not determined simply by germination patterns. Although seed passage through bear digestive tracts and the composition of seats, are known to affect germination rates to some degree, the most important role of bears in seed dispersal is probably transport.

Record 6 of 10

Kitamura, S; Yumoto, T; Poonswad, P; Chuailua, P; Plongmai, K; Maruhashi, T; Noma, N. 2002. Interactions between fleshy fruits and frugivores in a tropical seasonal forest in Thailand. *OECOLOGIA* 133 (4): 559-572..

Abstract: Large frugivores are considered to be important seed dispersers for many tropical plant species. Their roles as seed dispersers are not well known in Southeast Asia, where degraded landscapes typically lack these animals. Interactions between 259 (65 families) vertebrate-dispersed fruits and frugivorous animals (including 7 species of bulbul, 1 species of pigeon, 4 species of hornbill, 2 species of squirrel, 3 species of civet, 2 species of gibbon, 1 species of macaque, 2 species of bear, 2 species of deer, and 1 species of elephant) were studied for 3 years in a tropical seasonal forest in Kbao Yai National Park, Thailand. The purpose was to examine the dietary overlaps among the large frugivores and the characteristics of fruits they consumed. Most fruit species are eaten by various kinds of frugivores; no close relationship between a particular fruit and a frugivore was found. The number of frugivore groups that served a given plant species was negatively correlated with seed size. Additionally, the fruit/seed diameters consumed by bulbuls were significantly smaller than consumed by the other nine groups. These trends of fruit characteristics were consistent with those observed elsewhere in Southeast Asia: small fruits and large, soft fruits with many small seeds are consumed by a wide spectrum of frugivores while larger fruits with a single large seed are consumed by relatively few potential dispersers. Importantly, these large, single-seed fruits are not consumed by the small frugivores that thrive in small forest fragments and degraded areas in Southeast Asia. To insure the natural seed dispersal process in the forest, an evaluation of all frugivore groups in the forest is urgently needed in Southeast Asia.

DOI: 10.1007/s00442-002-1073-7

Record 7 of 10

Sreekumar, PG; Balakrishnan, M. 2002. Seed dispersal by the sloth bear (*Melursus ursinus*) in South India. *BIOTROPICA* 34 (3): 474-477..

Abstract: Previous studies have shown that sloth bears are mainly myrmecophagous, but in this study, 39 and 83 percent (wet and dry season, respectively) of scats surveyed in South

India contained fruits. Seeds from three of six plant species collected from scats germinated faster than seeds not passing through bears; germination percentage was not higher in any of the six species. These results suggest that the sloth bear may play an important role in the population dynamics of fleshy-fruited species of the region.

Record 8 of 10

Auger, J; Meyer, SE; Black, HL. 2002. Are American black bears (*Ursus americanus*) legitimate seed dispersers for fleshy-fruited shrubs?. *AMERICAN MIDLAND NATURALIST* 147 (2): 352-367..

Abstract: Seeds of seven fleshy-fruited shrubs used by American black bears (*Ursus americanus*) were extracted from fresh fruit (controls) and from scats of free-ranging and captive bears (ingestion treatments). Effects of the digestive process on viability, germinability and germination rate were measured against controls. Results were species specific. Filled control seeds of all species were highly viable (>74%). Digestion by bears had no significant effect on initial viability, except for serviceberry (*Amelanchier alnifolia*) for which viability of seeds passed through captive bears decreased 14%. Percent germination of control seeds summed over five chilling durations at 1 C was significantly different from that of at least one bear ingestion treatment for five of the seven species. For chokecherry (*Prunus virginiana*), Oregon grape (*Mahonia repens*) and skunkbush sumac (*Rhus trilobata*), seeds ingested by wild black bears germinated to a significantly higher percentage than controls, but for snowberry (*Symphoricarpos oreophilus*) control seeds germinated significantly better. For serviceberry A viable seeds germinated after sufficient chilling, but germination of controls was higher than ingested seeds after shorter chilling durations. When seeds were prewarmed for 5 wk before chilling, percent germination of Oregon grape, skunkbush sumac and snowberry significantly increased. For serviceberry, prewarming lengthened the minimum chilling requirement from 7 to 14 wk. Results from ingestion treatments suggest that the digestive process of black bears may simulate prewarming of seeds. Future work clarifying the role of bears as seed dispersers should involve characterization of: (1) scat deposition sites. (2) activities of seed predators and secondary dispersers at the scats and (3) the relative importance of bears in communities containing other dispersal agents.

Record 9 of 10

McConkey, K; Galetti, M. 1999. Seed dispersal by the sun bear *Helarctos malayanus* in Central Borneo. *JOURNAL OF TROPICAL ECOLOGY* 15: 237-241, Part 2..

Record 10 of 10

Bermejo, T; Traveset, A; Willson, MF. 1998. Post-dispersal seed predation in the temperate rainforest of southeast Alaska. *CANADIAN FIELD-NATURALIST* 112 (3): 510-512..

Abstract: Post-dispersal predation on seeds of vertebrate-dispersed plants (*Rubus spectabilis*, *Oplopanax horridus*, and *Streptopus amplexifolius*) of the temperate rainforest of southeast Alaska was experimentally examined comparing "clean" seeds with seeds embedded in feces of bears, important dispersers in the area, and comparing also different microhabitats where seeds may be dropped or defecated. It was found that seed removal was significantly higher for clean seeds than for seeds within bear feces, and that levels of seed predation were similar

for seeds under plants of the same species and for seeds under plants of other species. These results indicate that seed predators (presumably mostly rodents) use neither fecal material nor the presence of a conspecific plant as a clue to the location of seeds.

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