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NESTING-TREE PREFERENCE AND NESTING SUCCESS OF JAPANESE LESSER SPARROWHAWKS IN JAPAN

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KEY WORDS: Accipiter gularis; Pinus densiflora; *Japanese Lesser Sparrowhawk; Japanese red pine; nesting success; nest tree preference.*

Japanese Lesser Sparrowhawks (*Accipiter gularis*) breed throughout northeastern Asia (Brown and Amadon 1968). It has been shown that tree plantings in lowland areas are important breeding sites for this hawk in Japan (Endo et al. 1991) and these hawks mainly nest in Japanese red pines (*Pinus densiflora*) (Endo and Hirano 1990, Hirano and Kimizima 1992). Because prey abundance does not seem to be limiting (Hirano and Kimizima 1992, Ueta 1992), the availability of nest sites may be an important factor limiting the population of Japanese Lesser Sparrowhawks (Ueta 1996). Because nest sites of Japanese Lesser Sparrowhawks are important in predicting future populations of this hawk in Japan, I examined the nest-tree preferences of Japanese Lesser Sparrowhawks and determined whether such preferences influence nesting success.

METHODS

The study was conducted from 1987–94 at 16 groves of trees in suburban areas of Tokyo. The groves were isolated and ranged from 1–4 ha in area. They were mainly coppices composed primarily of Japanese chestnut oak (*Quercus acutissima*), Storax (*Styrax japonica*) and Sawara cypress (*Chamaecyparis pisifera*).

To determine nest-site preference, use by sparrowhawks and the availability of different tree species were compared. I excluded nests in which the hawks did not

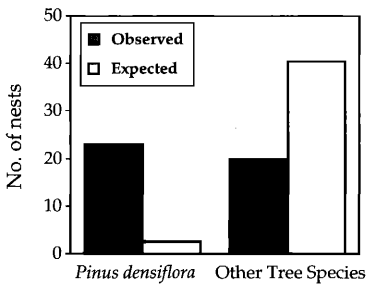

Figure 1. Nest-site preference of Japanese Lesser Sparrowhawks. Values for expected use were calculated based on the total number of sparrowhawk nests found and the percentage of Japanese red pines and other tree species in study groves.

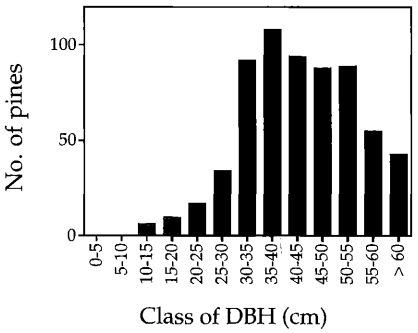

Figure 2. Frequency distribution of DBH of Japanese red pines in 16 groves in suburban areas of Tokyo.

lay eggs. Because the sparrowhawks nested mostly near the periphery of groves (3.89 ± 5.4 m inward from the edge, ± SD, N = 16; Ueta unpubl. data), I counted the number of each tree species on the edges of all nesting groves. To determine the abundance of different tree species in the groves, I used three 10 × 20 m rectangles that were randomly placed along the edges of groves and counted the number of each tree species larger than 25 cm in DBH (diameter at breast height, the ideal tree size for nesting Japanese Lesser Sparrowhawks, Hirano and Kimizima 1992) within each rectangle.

Nesting success of sparrowhawks in Japanese red pines and in other tree species was compared to determine the effect, if any, of nest-tree use on nesting success. Nesting success was calculated as the number of successful nests per total occupied nests and a successful nest is defined as one in which at least one fledgling was raised.

To determine the availability of preferred nest sites and to predict their future availability, I measured DBH of all Japanese red pines in all nesting groves.

RESULTS

I found a total of 43 Japanese Lesser Sparrowhawk nest structures from 1987–94. More than half of the nests were in Japanese red pines (53.5%) despite the fact that pines were the least available of all nest tree species (Fig. 1). Because I could not identify individual hawks, I analyzed nest-site preference, using only the first nesting record in each grove to avoid the affects of any individual variation in preference. Again, 10 of 16 occupied nests were in Japanese red pines (62.5%) despite that fact that pines were not the most abundant tree species in the nesting groves (5.8%, N = 774) indicating that sparrowhawks significantly preferred pine trees as nest sites over other nesting substrates (Binomial test, $P < 0.001$).

Eight nests in Japanese red pines successfully fledged young for a nesting success of 80% ($N = 10$ nests). Nesting success was significantly lower (Fisher Exact Probability Test, $P = 0.025$) for other tree species at only 16.7% ($N = 6$). Causes of nesting failures were confirmed for 15 of 18 failed nests. Most failures resulted when nests fell from branches (93.3%, $N = 15$) and 6.7% were due to predation by Japanese rat snakes (*Elaphe climacophora*).

Most pine trees in the study area had DBHs larger than 25 cm (95.0%, $N = 635$, Fig. 2). There were on average 37.7 pine trees within each grove ($N = 16$). No new pine trees had recently been planted in the area.

DISCUSSION

Many studies show the importance of nest-site preference in reducing nest predation (Martin and Roper 1988, Martin 1993a, Kelly 1993, Picman et al. 1993) indicating that nest predation is a common source of nesting failure for many bird species (Nilsson 1986, Martin 1988, 1993b). In this study, nest predation was minimal and 93.3% of nest failures of Japanese Lesser Sparrowhawks were caused when nests fell from nest trees. Therefore, it may be more important for sparrowhawks to select nesting substrates which best hold their nests rather than to avoid nest predation.

The stature of Japanese red pines seems to prevent nests from falling from branches. Sparrowhawk nests are built on thick, stable branches. Japanese red pines require abundant sunshine for growth. There were few young Japanese red pines in the study area probably because the crowns of groves had become closed by Japanese chestnut oaks. Numbers of Japanese red pines have decreased in some areas of Japan (Da and Osawa 1992, Fujiwara et al. 1992) and the lack of young pine trees indicates that there will be further decreases in the numbers of pine trees in the future. Because the nesting success of Japanese Lesser Sparrowhawks appears to rely on the availability of Japanese red pines, the breeding population of the sparrowhawks in Japan could correspondingly decline if the abundance of pine trees continues to decline.

RESUMEN.—Yo estudie la preferencia del árbol para el nido de *Accipiter gularis* y sus afectos en el éxito del nido. *A. gularis* prefirió hacer nido en *Pinus densiflora,* y el éxito del nido fue significantemente mas alto en *P. densiflora* que en otras especies de árboles. éxitos de razón altos resultaron porque nidos casi nunca se cayeron de los *P. densiflora* pero frecuentemente se cayeron o estaban caídos cuando construidos en otras especies de árboles. Los resultados indicaron que la preferencia de nido en *P. densiflora* por *A. gularis* evitaba el desalojamiento del nido.

La estructura por años del *P. densiflora* en estudios de arboleda fueron medidos para pronosticar el futuro disponibilidad de nidos. Pinos jóvenes mas bajos que 25 cm DBH hicieron no mas de 5% de todos los árboles y ningún pino nuevo fue recientemente plantado en la área. Desde entonces una falta posible de árboles de nido conveniente puede ocurrir en el futuro, yo a concluido que la población de *A. gularis* también se va ir disminuyendo mientras la disponibilidad de pinos también disminuye si no tomamos pasos para otra vez continuar plantación de pinos en Japan.

[Traducción de Raúl De La Garza, Jr.]

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