

Seed Preferences of Nongame Birds in the Rio Grande Valley

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Abstract: Feeding stations were established on a ranch in south Texas to determine seasonal seed preferences of visiting bird species. Seed preferences varied seasonally for most birds with black-oil sunflower, cracked corn, and milo accounting for the majority of seed consumed and for the greatest number of bird species attracted. If more than 1 type of seed is offered, then several feeders should be used to avoid competition between species and reduce wasted seeds.

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The purpose of this study was to determine the relative attractiveness of selected commercial seeds for birds in the Rio Grande Valley of south Texas, an area that supports numerous avian species. Determination of seed preferences may enable nongame wildlife managers, ranchers, and homeowners to predictably attract birds to feeding stations for recreational observation and reduce the cost of seed purchased. This study was supported by the Caesar Kleberg Foundation for Wildlife Conservation at Texas A&M University-Kingville and by C. Corbett and M. Corbett. We appreciate the editorial assistance provided by F. S. Guthery and P. A. Moody.

Methods

Data were collected on the Corbett Ranch in southern Texas from June 1989 to July 1990. The 2,428-ha study site is 25 km northwest of Raymondville in Willacy County.

The major habitat type consists of mixed thorn-scrub communities. Dominant woody vegetation includes honey mesquite (*Prosopis glandulosa*), Texas ebony (*Pithecellobium flexicaule*), spiny hackberry (*Celtis pallida*), and other

species (Vines 1976). Brush control treatments have not been applied and much of the study site supports a mature brush community. Birds on the study site include green jays (*Cyanocorax yncas*), pyrrhuloxia (*Cardinalis sinuatus*), long-billed thrashers (*Toxostoma longirostre*), olive sparrows (*Arremonops rufivirgatus*), white-tipped doves (*Leptotila verreauxi*), grooved-billed anis (*Crotophaga sulcirostris*), and plain chachalacas (*Ortalis vetula*).

Three feeding stations were established in 10-m² open areas within climax thorn-scrub communities. Each station consisted of 6 1-m² feeding tables elevated on 1.5-m steel posts and placed around a centrally located, pedestal-mounted water dish. Each feeder was positioned 150 cm from its adjacent feeders and the water source. Feeding tables were assigned a letter A through F to enable an observer to identify the seed type in that feeder. Data were collected by an observer concealed in a blind placed within the brush about 8 m from feeder A.

Five seed types were tested at these feeding stations: black-oil sunflower (*Helianthus* sp.), white-proso millet (*Panicum miliaceum*), cracked corn (*Zea mays*), grain sorghum (*Sorghum vulgare*), and wheat (*Triticum aestivum*). Five of the feeding tables were filled with a specific seed and a sixth control table remained empty. Each seed type was randomly assigned to a feeding table for 1 month and then reassigned to a new position at the beginning of each succeeding month to ensure that birds searched for preferred choices. Premeasured amounts of seed were added as needed to ensure an adequate supply throughout the experiment.

Information was collected on species of bird consuming seeds and seed type selected. Morning observation sessions began at sunrise and continued for 3 hours. Evening sessions began 3 hours before sunset and continued to sunset. Data were segregated by the following seasons: summer (June–August), fall (September–November), winter (December–February), and spring (March–May). Seed preferences were determined for bird species observed making selections at ≥ 2 stations. A randomized complete block design was used with stations as replications and the number of visits to each seed type by bird species representing the dependent variable. Analysis of variance (ANOVA) was used to determine whether the number of selections for each seed type were significantly different ($P < 0.05$) for each bird species observed at ≥ 2 stations (SAS Inst. Inc. 1985). If a significant difference was reported, the seed preference for that bird species was identified. Bird species displaying no significant differences in seed preferences due to a low number of visits to ≥ 2 stations or those that were observed making seed selections at only 1 station were analyzed using the Petrides preference index technique (Schemnitz 1980:320–321) to determine possible seed preference trends. This index is derived from the relationship of the availability of a seed type to its number of selections with:

$$p = d/a$$

where p is the preference index, d represents the percentage of each seed type selected as related to all seed types selected, and a represents the percentage of

each seed type available as related to all seed types available. Seed types with preference indices >1.00 are preferred. Ten visits to a seed type by a bird species was selected as the minimum sample size.

A station similar to the 5-seed stations was developed to examine the preferences of bird species for four types of sunflower seeds. Five feeding tables were positioned around a central water dish to determine bird preference of black-oil sunflower, black-striped sunflower, grey-striped sunflower, and sunflower kernels. The fifth feeding table remained empty and served as a control. Data collection periods were similar to the 5-seed feeding station experiments. Seed preferences were identified using the Petrides technique.

Results

Five-seed Preference

Summer.—The 5 seed types attracted 10 bird species for a total of 697 visits. The most visits were made by green jays, white-tipped doves, and tufted titmice (*Parus bicolor*), followed by pyrrhuloxia and northern cardinals (*Cardinalis*). All seed types attracted birds. Black-oil sunflower ranked highest in number of visits (313) but cracked corn and mile were equal in attracting a greater number of species (8). ANOVA indicated no significant differences ($P > 0.05$) in seed types selected by any of the 10 species. However, preference trends existed for 7 species, suggesting that certain seeds were preferred (Table 1).

Fall.—The 5 seed types attracted 7 bird species for a total of 1,151 visits. The most visits were made by green jays and white-tipped doves, followed by tufted titmice. All seed types attracted birds. Black-oil sunflower ranked first in number of visits (642) and in number of species attracted (7). ANOVA indicated no differences ($P > 0.05$) in seed types selected by any of the 7 species but preference trends existed for 6 species suggesting that certain seeds were preferred (Table 1).

Winter.—The 5 seed types attracted 22 bird species for a total of 1,390 visits. The most visits were made by pyrrhuloxias, followed by green jays, northern cardinals, tufted titmice, white-tipped doves, long-billed thrashers, and golden-fronted woodpeckers (*Melanerpes aurifrons*). All seed types attracted birds. Black-oil sunflower ranked highest in number of visits (499) but cracked corn attracted the greatest number of species (19). ANOVA indicated no significant differences ($P > 0.05$) in seed types selected by any of the 22 species. Preference trends existed for 17 species suggesting that certain seeds were preferred (Table 2).

Spring.—The 5 seed types attracted 21 bird species for a total of 1,962 visits. The most visits were made by white-tipped doves and green jays, followed by northern cardinals, pyrrhuloxia, long-billed thrashers, green-tailed towhees (*Pipilo chlorurus*), bronzed cowbirds (*Molothrus aeneus*), and tufted titmice. All seed types attracted birds. Black-oil sunflower ranked highest in number of visits

Table 1. Seed preferences based on seed preference indices >1.00 for bird species at 5 seed^a stations during summer and fall 1989–1990, Corbett Ranch, Willacy County, Texas

Bird species	Seed(s) preferred ^b
Summer	
Green jay	BOS, MILO, CC
Pyrrhuloxia	BOS-WPM, CC
Northern cardinal	BOS
White-tipped dove	BOS, CC, MILO
Tufted titmouse	BOS
Olive sparrow	WPM, MILO
Bronzed cowbird	MILO
Fall	
Green jay	MILO, BOS
Pyrrhuloxia	WPM, CC
Northern cardinal	BOS
White-tipped dove	BOS, MILO
Tufted titmouse	BOS
Curve-billed thrasher	WPM-MILO

^aSeed type BOS-black-oil sunflower WPM-white-proso millet, CC-cracked corn, MILO-grain sorghum, and WHEAT-wheat.

^bSeed(s) preferred in order of sequence listed, (–) indicates equal preference.

(783) and equaled cracked corn in number of species attracted (17). ANOVA indicated 6 bird species had significant preferences in seed types, including green jay ($P = 0.008$) for cracked corn, northern cardinals ($P = 0.002$) for black-oil sunflower, white-tipped doves ($P = 0.03$) for black-oil sunflower, tufted titmice ($P = 0.0009$) for black-oil sunflower, long-billed thrashers ($P = 0.04$) for cracked corn, and golden-fronted woodpeckers ($P = 0.04$) for black-oil sunflower. No significant differences ($P > 0.05$) were found in seed types selected for the remaining 15 species although preference trends existed for 15 species suggesting that certain seeds were preferred (Table 2).

Sunflower Preference

The 4 sunflower seed types attracted 15 bird species for a total of 1,486 visits. Tufted Titmice were the most common visitors followed by pyrrhuloxia, green jays, white-crowned sparrows (*Zonotrichia leucophrys*), northern cardinals, and white-tipped doves. All seed types attracted birds. Sunflower kernels ranked first in number of visits (552) and number of species attracted (15). Black-oil sunflower and black-striped sunflower were nearly equal in number of visits and number of species attracted. Gray-striped sunflower ranked last in number of visits and number of species attracted. Seed preference trends were determined for 14 bird species (Table 3).

Table 2. Seed preferences based on seed preference indices >1.00 for bird species at 5 seed^a stations during winter and spring 1989–1990, Corbett Ranch, Willacy County, Texas

Bird species	Seed(s) preferred ^b
Winter	
Green jay	BOS, CC, MILO
Pyrrhuloxia	BOS-WPM, CC
Northern cardinal	BOS
White-tipped dove	CC, BOS, MILO
Tufted titmouse	BOS
Green-tailed towhee	WHEAT, MILO
Rufous-sided towhee	WHEAT
Olive sparrow	MILO, WPM, BOS
White-crowned sparrow	BOS
Clay-colored sparrow	WPM
Indigo bunting	WPM
Long-billed thrasher	CC, MILO
Curve-billed thrasher	CC-MILO, WHEAT, WPM
Golden-fronted woodpecker	BOS
Common flicker	CC
Plain chachalaca	CC, MILO
Northern bobwhite	BOS, WPM-MILO-WHEAT
Spring	
Green jay	CC ^c
Pyrrhuloxia	BOS, WPM-CC
Northern cardinal	BOS ^c
White-tipped dove	BOS ^c
Tufted titmouse	BOS ^c
Green-tailed towhee	CC, BOS-WPM
Rufous-sided towhee	BOS, CC
Olive sparrow	CC, BOS, MILO
House sparrow	CC, BOS, WPM
White-throated sparrow	BOS
White-crowned sparrow	BOS
Swamp sparrow	WPM, CC
Long-billed thrasher	CC ^c
Curve-billed thrasher	CC, MILO-WHEAT
Golden-fronted woodpecker	BOS ^c
Common flicker	CC
Bronzed cowbird	MILO, WPM-CC
Mourning dove	BOS
Common ground-dove	WPM-MILO
Plain chachalaca	CC

^aSeed type BOS-black-oil sunflower, WPM-white-proso millet, CC-cracked corn, MILO-grain sorghum, and WHEAT-wheat.

^bSeed(s) preferred in order of sequence listed, (-) indicates equal preference.

^cSeed(s) significantly preferred ($P < 0.05$).

Table 3. Seed preferences based on seed preference indices >1.00 for bird species at the sunflower seed^a station, Corbett Ranch, Willacy County, Texas, 1989–1990.

Bird species	Seed(s) preferred ^b
Green jay	BSS
Pyrrhuloxia	SM, BOS
Northern cardinal	SM, BOS
White-tipped dove	SM, BOS
Tufted titmouse	BOS, BSS
Green-tailed towhee	SM
Rufous-sided towhee	SM, GSS
White-throated sparrow	BOS-SM
White-crowned sparrow	SM
Long-billed thrasher	SM
Golden-fronted woodpecker	BSS, SM
Northern mockingbird	SM
Audubon's oriole	BSS, BOS
Rose-breasted grosbeak	BOS, SM

^aSeed type BOS-black-oil sunflower, BSS-black-striped sunflower, GSS-grey-striped sunflower, and SM-sunflower "meats".

^bSeed(s) preferred in order of sequence listed, (–) indicates equal preference.

Discussion

Commercially available seeds such as sunflower, millet, and corn are often offered at bird feeding stations (Kress 1985). However, granivorous birds display strong preferences for certain types of seeds due to differences in nutritional quality, taste, availability, and ease in opening (MacArthur and MacArthur 1972, Geis 1980, Kress 1985). Previous studies (Kalmbach and Welch 1946, Davison 1962, Davison and Sullivan 1963) suggest that mourning doves (*Zenaidura macroura*) and other bird species may use taste to select their foods. Hespeneheide (1966) and Myton and Ficken (1967) reported that birds feed most efficiently on seeds that are related to the size and shape of their bill and are easy to manipulate.

Birds generally consume seeds that give them the greatest amount of energy for the least expenditure of effort (Kress 1985). Food preferences seem to change readily and appropriately to variations in the environment (Emlen 1966). Willson and Harmeson (1973) suggested that certain seeds might be selected when environmental conditions (e.g., cold weather) increase energy needs or make foraging difficult. In general, more nutritious or energy-rich seeds are selected over poor nutritional options. (Kress 1985).

Several studies have been performed to determine seed preferences of wild birds at feeding stations (Davison and Sullivan 1963, MacArthur and MacAr-

thur 1972, Grey 1976, Geis 1980, Winter and George 1981). MacArthur and MacArthur (1972) stated that feeding stations offer advantages over laboratories because birds are not constrained and observations tend to be more natural. Geis (1980) suggested that feeding preferences should be determined for birds in many geographical regions.

Black-oil sunflower was attractive to many birds during all seasons and should always be offered. White-proso millet was primarily attractive in winter and should be offered only then. Cracked corn was most attractive in spring and summer but could be offered each season because of its low cost. Milo was most attractive in summer, fall, and winter. It is inexpensive and could be offered year-round. Wheat was attractive in winter to curve-billed thrashers (*Toxostoma curvirostre*), green-tailed towhees, rufous-sided towhees (*Pipilo erythrophthalmus*), and northern bobwhite (*Colinus virginianus*). However, these species are usually considered desirable by most bird watchers and offering wheat will greatly increase the chance of contact. Individuals who wish to attract a desired array of wild bird species to feeding stations should evaluate which seed types are preferred by those desired species and offer them according to season of preference.

After evaluation of data from the sunflower station, we conclude that black-oil sunflower seeds are the best choice to offer if a sunflower seed is to be included at a feeding station. It is preferred by many bird species each season and appears withstands extreme weather unlike sunflower kernels which spoil quickly after contact with moisture. Black-oil sunflower is readily available at most seed supply outlets and the least expensive of the four seed types tested.

Geis (1980) reported that blue jays (*Cyanocitta cristata*) preferred the larger, black-striped sunflower over black-oil sunflower. We found that green jays also preferred black-striped sunflower over the black-oil variety.

By offering preferred foods, the chances for encounters increase and seed is reduced. Intraspecific and interspecific competition occurred at feeding stations throughout the study. Green jays and white-tipped doves were aggressive towards conspecifics as well as other species. We recommend that individual seed types be offered in separate feeders to reduce competitive exclusion between species.

Multiple feeders, (e.g., several tube feeders joined together) are common on the market today. We do not recommend this feeder type because a single bird species may prevent other species from using it. Platform feeders were accepted by all bird species. Placing several of these feeders at various heights should lesson competition and optimize the attraction value of feeding stations.

The information gained from this study could be useful to individuals interested in developing the ecotourism industry in south Texas. This area is very popular with winter vacationers, many of whom are avid birders. If bird species can be predictably attracted for viewing, it might be feasible to market this opportunity to interested individuals.

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