

Energy Content of Seeds of Texas Doveweed (*Croton texensis*) from the Diet of Mourning Doves (*Zenaida macroura*) from Southeastern New Mexico

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Running title: Energy Content of Seeds of Texas Doveweed from Mourning Dove Diet

Abstract

We analyzed the energy content of seeds of Texas doveweed (*Croton texensis*) obtained from the crops of mourning doves (*Zenaida macroura*) collected from plains-mesa sand-scrub habitat in Eddy and Lea counties, New Mexico. Seeds were removed from crops and dried for 48 hours at 60°C to remove moisture and to standardize masses. Seeds were then analyzed for gross caloric value (i.e., energy content) in an oxygen bomb calorimeter. Energy content of seeds of Texas doveweed was greater than that of many seeds previously reported from the diet of mourning doves.

Introduction

Knowledge of the energy content of food items is critical to understanding why an animal might choose one food item over another, and is necessary for conservation and management of game species. While feeding habits of mourning doves (*Zenaida macroura*) are well studied (Mirarchi and Baskett 1994), daily energy requirements have not been determined. Only a single study (Schmid 1965) has measured the energy content of food of free-living mourning doves, although another (Shuman *et al.* 1988) measured some known and potential food items of mourning doves in conjunction with determination of how well captive mourning doves metabolized various food items. No study of energy content of food of mourning doves has been conducted with birds from sand-scrub habitat of New Mexico.

A study of feeding habits of mourning doves in southeastern New Mexico determined that seeds of Texas doveweed (*Croton texensis*) made up the largest portion (32%) of the total mass of crop contents, and were present in 55% of the crops of mourning doves

(Hunt 1999). Texas doveweed is also reported to be an important food item of other birds, such as northern bobwhites (*Colinus virginianus*—Hunt and Best 2001a) and scaled quail (*Callipepla squamata*—Hunt and Best 2001b). We used an oxygen bomb calorimeter to determine the energy content of seeds of Texas doveweed.

Methods and Materials

Mourning doves were collected at the Waste Isolation Pilot Plant site in southeastern New Mexico in conjunction with long-term studies of lead poisoning of game birds (Best *et al.* 1992a; 1992b) and studies of feeding habits of game birds in southeastern New Mexico (Hunt 1999; Hunt and Best 2001a; Hunt and Best 2001b). Most of the study area is in eastern Eddy County, but it also extends into western Lea County. All mourning doves were collected in uncultivated, shinnery oak-honey mesquite (*Quercus havardii-Prosopis glandulosa*) habitat, part of the plains-mesa sand-scrub vegetation type (Dick-Peddie 1993). Several studies of the feeding ecology of mourning doves have been conducted in this area (Davis 1974; Best and Smartt 1986; Hunt 1999). The study area is heavily grazed by cattle, and several man-made stock tanks are located on the site.

In late summer and autumn 1988, 150 mourning doves were collected by shooting as encountered. Collected birds were placed on ice within 10 minutes of shooting to minimize effects of post-mortem digestion (Dillery 1965; Farner 1960; Sedinger 1986); no effect of digestion on crop contents was observed. Crops were removed, placed into plastic vials, and frozen. Contents of crops were later thawed, separated by type of food, and placed into envelopes for drying. Food items were dried for 48 hours at 60°C to standardize masses. Food

items were identified by comparison with samples of plants collected at the study site, and by using identification manuals (Davis 1993; Martin and Barkley 1961).

Samples of seeds of *Croton texensis* were analyzed for gross caloric value (i.e., energy content) in an oxygen bomb calorimeter (Model 1341, Parr Instrument Company, Moline, Illinois). Samples of seeds from 9 individual mourning doves with crops that contained enough seeds for analysis were selected; each sample weighed approximately 1 g. Seeds were combusted in the oxygen bomb; after combustion, the bomb was washed and bomb washings were titrated with sodium carbonate to allow adjustment of results for nitrate content.

Results

The 9 samples analyzed contained an average of 5.2 kcal/g (range, 4.4-6.2; standard deviation, 0.5—Table 1). This figure is greater than that for most previously tested food items in the diet of mourning doves.

Table 1. Gross caloric value (energy content) of seeds of Texas doveweed (*Croton texensis*) from the crops of mourning doves (*Zenaida macroura*) collected from Eddy and Lea counties, New Mexico.

Sample No.	Energy in kcal/g
MD003-88	4.6
MD004-88	5.0
MD005-88	5.0
MD006-88	5.2
MD007-88	5.3
MD009-88	5.3
MD088-88	5.5
MD122-88	4.4
MD138-88	6.2

Discussion

Mourning doves are known to be selective in food choices (Browning 1959; Davison and Sullivan 1963), although criteria for their selection are imperfectly understood. Among suggested criteria are taste (Davison and Sullivan 1963), color (Goforth and Baskett 1971), nutrient content (Hayslette and Mirarchi 2001) and energy content (Schmid 1965; Shuman *et al.* 1988). Although no study has demonstrated that mourning doves preferentially select Texas doveweed over other food items, Davison and Sullivan (1963)

categorized Texas doveweed as a “choice” food plant for mourning doves, meaning it was readily eaten when encountered. Our study demonstrates that Texas croton has an energy content comparable to or greater than food items from previous studies. For example, in a study of 9 food items collected from crops of mourning doves in North Dakota, Schmid (1965) found only 2 that had a greater energy content—seeds of flax (*Linum usitatissimum*, 6.3 kcal/g) and field mustard (*Sinapis arvensis*, 5.98 kcal/g). Other seeds tested from North Dakota had less energy content; examples include wild plants such as green foxtail (*Setaria viridis*, 4.4 kcal/g) and cultivated crops such as corn (*Zea mays*, 4.06 kcal/g) and wheat (*Triticum aestivum*, 3.96 kcal/g). Likewise, Shuman *et al.* (1988) tested 8 varieties of seeds that were considered to be potential food items for mourning doves in Kansas, and found only 2 that had greater energy content—thistle (*Cirsium*, 6.2 kcal/g) and Maximilian sunflower (*Helianthus maximiliani*, 5.6 kcal/g). Other seeds analyzed in Kansas had less energy content; examples include proso millet (*Panicum millaceum*, 4.5 kcal/g) and timothy (*Phleum pratense*, 4.7 kcal/g).

Doveweed and other crotons are associated with disturbance, particularly with areas grazed by cattle (Fessler 1960). Much of southeastern New Mexico is heavily grazed by cattle (Hunt 2004), so that Texas doveweed grows in abundance. Availability of seeds of Texas doveweed, coupled with the relatively great energy content, helps explain its prevalence in the diet of mourning doves (Hunt 1999).

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