

2019

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

John L. Hunt
University of Arkansas at Monticello, huntj@uamont.edu

Matthew E. Grilliot
Auburn University--Montgomery, mgrillio@aum.edu

Troy L. Best
Auburn University, besttro@auburn.edu

Collin S. Deen
University of Arkansas at Monticello, CSD20023@uamont.edu

Dixie Lozano-Lopez
University of Arkansas at Monticello, DLX20176@uamont.edu



Part of the [Comparative Nutrition Commons](#), and the [Desert Ecology Commons](#)

See next page for additional authors

Recommended Citation

Hunt, John L.; Grilliot, Matthew E.; Best, Troy L.; Deen, Collin S.; Lozano-Lopez, Dixie; Neilson, Emily R.; and Schlegel-Ridgway, Taytum R. (2019) "Energy Content of Seeds of Texas Doveweed (*Croton texensis*) from the Diet of Mourning Doves (*Zenaida macroura*) from Southeastern New Mexico," *Journal of the Arkansas Academy of Science*: Vol. 73 , Article 7.

DOI: <https://doi.org/10.54119/jaas.2019.7305>

Available at: <https://scholarworks.uark.edu/jaas/vol73/iss1/7>

This article is available for use under the Creative Commons license: Attribution-NoDerivatives 4.0 International (CC BY-ND 4.0). Users are able to read, download, copy, print, distribute, search, link to the full texts of these articles, or use them for any other lawful purpose, without asking prior permission from the publisher or the author.

This Article is brought to you for free and open access by ScholarWorks@UARK. It has been accepted for inclusion in *Journal of the Arkansas Academy of Science* by an authorized editor of ScholarWorks@UARK. For more information, please contact scholar@uark.edu.

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

Authors

John L. Hunt, Matthew E. Grillo, Troy L. Best, Collin S. Deen, Dixie Lozano-Lopez, Emily R. Neilson, and Taytumn R. Schlegel-Ridgway

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

J.L. Hunt^{1*}, M.E. Grilliot², T.L. Best³, C.S. Deen¹, D. Lozano-Lopez¹, E.R. Neilson¹,
and T.R. Schlegel-Ridgway¹

¹University of Arkansas at Monticello, School of Mathematical and Natural Sciences, 397 University Drive, Monticello, AR 71656

²Auburn University—Montgomery, Biology Department, College of Arts and Sciences, P.O. Box 244023, Montgomery, AL 36124

³Auburn University, Department of Biological Sciences, 331 Funchess Hall, Auburn University, AL 36849-5414

*Correspondence: huntj@uamont.edu

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

Energy Content of Seeds of Texas Doveweed from Mourning Dove Diet

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).

Acknowledgments

The authors thank A. L. Williams and J. M. Bramlett for technical support. Funding for equipment was provided by Arkansas INBRE and by the School of Mathematical and Natural Sciences at the University of Arkansas at Monticello. Thanks also to Marvin Fawley for help in procuring funding.

Literature Cited

- Best TL, TE Garrison, and CG Schmitt.** 1992a. Availability and ingestion of lead shot by mourning doves (*Zenaida macroura*) in southeastern New Mexico. *The Southwestern Naturalist* 37:287-292.
- Best TL, TE Garrison, and CG Schmitt.** 1992b. Ingestion of lead pellets by scaled quail and bobwhite quail in southeastern New Mexico. *The Texas Journal of Science* 44:99-107.

- Best TL and RA Smartt.** 1986. Feeding ecology of mourning doves (*Zenaida macroura*) in southeastern New Mexico. *The Southwestern Naturalist* 31:33-38.
- Browning BM.** 1959. An ecological study of the food habits of the mourning dove. *California Fish and Game* 48:91-115.
- Davis CA.** 1974. Mourning dove foods in semi-desert, south-central New Mexico. *The Journal of Wildlife Management* 38:941-944.
- Davis LW.** 1993. Weed seeds of the Great Plains. University Press of Kansas (Lawrence, KS). 145p.
- Davison VE and EG Sullivan.** 1963. Mourning doves' selection of foods. *The Journal of Wildlife Management* 27:373-383.
- Dick-Peddie WA.** 1993. New Mexico vegetation: past, present, and future. University of New Mexico Press (Albuquerque, NM). 244p.
- Dillery DG.** 1965. Post-mortem digestion of stomach contents in the savannah sparrow. *The Auk* 82:281.
- Farner DS.** 1960. Digestion and the digestive system. *In:* Marshall AJ, editor. *Biology and comparative physiology of birds*. Academic Press (NY). p 411-451.
- Fessler FR.** 1960. Managing woolly croton for doves and bobwhites. *Proceedings of the Annual Conference of the Southeastern Association of Game and Fish Commissioners* 14:74-77.
- Goforth WR and TS Baskett.** 1971. Effects of colored backgrounds on food selection by penned mourning doves (*Zenaidura macroura*). *The Auk* 88:256-263.
- Hayslette SE and RE Mirarchi.** 2001. Patterns of food preferences in mourning doves. *The Journal of Wildlife Management* 65:816-827.
- Hunt JL.** 1999. Dietary overlap and potential competition among scaled quail, mourning doves, and northern bobwhites in southeastern New Mexico [MS thesis]. Auburn (AL): Auburn University. 72p.
- Hunt JL.** 2004. Investigation into the decline of populations of the lesser prairie-chicken (*Tympanuchus pallidicinctus* Ridgway) in southeastern New Mexico [dissertation]. Auburn (AL): Auburn University. 294p.
- Hunt JL and TL Best.** 2001a. Foods of northern bobwhites (*Colinus virginianus*) in southeastern New Mexico. *The Southwestern Naturalist* 46:239-243.
- Hunt JL and TL Best.** 2001b. Foods of scaled quail (*Callipepla squamata*) in southeastern New Mexico. *Texas Journal of Science* 53:147-156.
- Martin AC and WD Barkley.** 1961. Seed identification manual. University of California Press (Berkeley, CA). 221p.
- Mirarchi RE and TS Baskett.** 1994. Mourning dove (*Zenaida macroura*). *Birds of North America* 117:1-32.
- Schmid WD.** 1965. Energy intake of the mourning dove *Zenaidura macroura marginella*. *Science, New Series* 150:1171-1172.
- Sedinger SD.** 1986. Biases in comparison of proventricular and esophageal food samples from cackling Canada Geese. *The Journal of Wildlife Management* 34:739-746.
- Shuman TW, RJ Robel, AD Dayton, and JL Zimmerman.** 1988. Apparent metabolizable energy content of foods used by mourning doves. *The Journal of Wildlife Management* 52:481-483.