

**NEW STATE RECORDS FOR *CITRULLUS*, *CUCUMIS*, AND *CUCURBITA*
(CUCURBITACEAE)
OUTSIDE OF CULTIVATION IN THE USA**

GUY L. NESOM
2925 Hartwood Drive
Fort Worth, Texas 76109
www.guynesom.com

ABSTRACT

New records for *Cucurbita moschata* Duchesne outside of cultivation are documented for Mississippi, Louisiana, and Texas. Diagnostic features useful for the distinction of *C. moschata* and *C. pepo* are briefly discussed and illustrated. *Cucumis anguria* var. *anguria* is documented to occur in Georgia. The occurrence in California is documented for *Citrullus colocynthis*. The distribution of *Cucumis melo* subsp. *agrestis* is considered and augmented county distributions are given for Texas and Louisiana.

KEY WORDS: *Cucurbita moschata*, *Cucurbita pepo*, *Citrullus colocynthis*, *Cucumis anguria*, *Cucumis melo* subsp. *agrestis*, Cucurbitaceae, naturalized, USA

Four of the five domesticated species of *Cucurbita* are known to grow outside of cultivation in the USA: *C. ficifolia* Bouché, *C. maxima* Duchesne, *C. moschata* Duchesne, and *C. pepo* L. (as summarized by USDA, NRCS 2010). *Cucurbita moschata* has previously been reported to escape from cultivation in the USA in Florida, Georgia, North Carolina, Pennsylvania, South Carolina, and Virginia (Duncan & Kartesz 1981; Rhoads & Block 2007; Weakley 2010; Wunderlin & Hansen 2010) and its similar occurrence is documented here from three additional states of the eastern USA.

Cucurbita moschata. **Louisiana.** Bossier Par.: 4.7 mi N of Benton, ditchbank, sandy clay, 14 Jun 1956, *Shinners 23805* (SMU). **Mississippi.** Washington Co.: [ca. 6 mi SW of Hollandale], 0.6 mi W of Hwy MS 1, 0.2 mi S of Fisher Rd, Marathon Plantation, weed in cotton field, 16 Jul 1993, *Bryson 12500* (BRIT, VDB). **Texas.** Dallas Co.: Richardson, 1.5 mi W of Holford on Big Springs Rd, old native field, plant probably from seed in trash, 26 Jun 1989, *Hodges 453* (SMU); Grand Prairie, North Carrier Pkwy and NW 19th, into park about 3 blocks, probably a cultivated escape, 13 Nov 1974, *Wenk 1B* (BRIT). Smith Co.: western Tyler, one plant in waste ground back of Cottage Hill Courts, stems prostrate, ca. 1 m long, 7 Aug 1950, *Cory 57512* (SMU).

Over its range in the USA, the species flowers mostly in May through October and has been collected from various habitats outside of cultivation: oak-pine woods, agricultural fields, brush and trash heaps, roadsides, ditch banks, vacant lots, and disturbed sites. In addition to the USA localities, *C. moschata* has been reported as naturalized in the West Indies, Central America (Belize), and South America (Galapagos, Guyana, Surinam, French Guiana). In most cases, at least in the USA, these plants probably are most accurately characterized as “waifs” (Nesom 2000) as they apparently do not maintain themselves in persistent populations.

Cucurbita moschata Duchesne, Essai Hist. Nat. Courges, 7, 15. 1786.

The species has sometimes been identified as *Cucurbita moschata* (Duchesne ex Lam.) Duchesne ex Poir. (Dict. Sci. Nat. (ed. 2) 11: 234. 1819), based on *Cucurbita pepo* var. *moschata* Duchesne ex Lam. (Encyl. 2: 152. 1786), but the name at specific rank appeared first in Duchesne’s Essai of 1786, published slightly earlier than Lamarck’s Encyclopaedia.

Cultivars of *Cucurbita moschata* include butternut squash, golden cushaw, calabaza, winter squash, crookneck squash, neck pumpkin, Tahitian squash, West Indian pumpkin, Seminole pumpkin, large cheese pumpkin, Long Island cheese pumpkin, Tennessee sweet potato, Kentucky field pumpkin, Dickinson pumpkin, and others. The wild ancestor of *C. moschata* is unknown, but mitochondrial DNA data combined with other information suggest that it will be found in lowland northern South America (Sanjur et al. 2002).

Notes on identification.

Most of the collections recorded here as *Cucurbita moschata* were originally identified as *C. pepo* sensu lato, including var. subsp. *ovifera* (L.) Decker (domesticated forms include jack-o-lantern pumpkin, zucchini, pattypan squash, scallop squash, yellow squash crookneck squash, straightneck squash, acorn squash, summer squash, spaghetti squash, cocozelle, and others). The two species can be distinguished by the following contrasts.

- | | |
|---|---------------------------|
| 1. Stems, peduncles, and leaves moderately hirsutulous to puberulent and also moderately villous with unicellular-based hairs; calyx lobes narrowly lanceolate, thin-foliaceous, weakly hirsute to villous; fruiting peduncles abruptly and widely expanded at point of fruit attachment; seed surface somewhat punctate-sculptured, margins raised-thickened and somewhat undulate-hyaline, golden-yellow to silvery | Cucurbita moschata |
| 1. Stems, peduncles, and leaves sparsely to moderately hispid with pustulate-based hairs; calyx lobes linear to subulate-linear, stiff, usually hirsute-hispid; fruiting peduncles not abruptly expanded at point of fruit attachment or very gradually expanding toward it; seed surface essentially smooth, margins raised-thickened and smooth, same color as the surface | Cucurbita pepo |

An unequivocal distinction between these two species is best made through comparison of peduncles of mature fruits (Fig. 1) and seed morphology, but these are rarely available on herbarium collections or even in the field.

The development of foliaceous calyx lobes in *Cucurbita moschata* also appears to be diagnostic, but they vary from narrowly lanceolate (and hardly foliaceous) to distinctly broadened distally (and obviously foliaceous), thus the usefulness of this feature is not consistent. Vestiture of the calyx lobes appears to provide a useful but not entirely consistent distinction, because calyx vestiture in *C. pepo* is somewhat variable.

Vestiture of stems, peduncles, and leaves provides a useful character but, again, that of *Cucurbita pepo* is variable and the vestiture does not appear to be consistently diagnostic. In subsp. *pepo*, which includes most cultivated forms (cocozelle, jack-o-lantern pumpkins, vegetable marrow, zucchini, and some ornamental gourds), there are consistently two essential types of hairs — a shorter, thinner-walled and non-rigid type usually relatively densely distributed, and a longer, thicker-walled and rigid type more sparsely distributed. The rigid hairs characteristically arise from a “pustulate” base, which is many-celled and often distinctly broadened beyond the distal diameter of the trichome. In subsp. *ovifera* (L.) Decker, which includes the free-living var. *texana* (Scheele) Decker and var. *ozarkana* Decker-Walters and the primarily cultivated but escaping var. *ovifera* (L.) Alef. (with most ornamental gourds and the scallop, acorn, crookneck, and straightneck squashes), the pustulate-based hairs may be absent in some plants of all three entities, and development of the trichome base of the longer and rigid hairs varies from strongly pustulate (many-celled) to weakly so (1- or few-celled).

CITRULLUS

1. *Citrullus colocynthis* (L.) Schrad. — colocynth, bitter apple, bitter cucumber, vine of Sodom. Colocynth has been reported as a weed in Texas peanut fields (Smith & Cooley 1973; de Aquino Assis et al. 2000) and is included in the checklist by Hatch et al (1990), but a documenting voucher for Texas has not been seen for this report. The occurrence of colocynth in California is documented here.

Citrullus colocynthis. **California.** Kern Co.: San Joaquin Valley, Twisselman Road and Hwy I-5, 4.9 mi S of Kings Co. line, formerly saltbush scrub with *Atriplex polycarpa* and *Sueda*, now mostly cleared and planted to cotton, 220 ft; fairly common annual vine on a pond dike, fruit green with lighter blotches until ripe when uniformly yellow-green, largest 20 cm long, 12 cm in diam., flesh greenish yellow, no flavor and only vaguely watermelon scented, 12 Sep 1986, Sanders 6940 (NLU).

The following set of contrasts distinguishes *Citrullus colocynthis* from *C. lanatus*, which is commonly encountered as an escape, mostly from seeds of discarded watermelons. Label data for the California collection of colocynth note that it was an “annual vine” but the root was not included as part of the specimen.

1. Perennials; stems pustulate-scabrous to pustulate-hispid; tendrils unbranched or rarely 2-fid; fruit 4–7(–10) cm in diameter, mesocarp dry-spongy, light yellowish-orange to pale yellow, intense bitter

..... ***Citrullus colocynthis***

1. Annuals; stems villous; tendrils 2–3-fid; fruit 12–35 cm (or more) in diameter, mesocarp fleshy, red to orange or yellow, rarely white, sweet

Citrullus lanatus

Colocynth is a traditional food plant in Africa, grown particularly for its edible seeds, which are bitter but nutty flavored and rich in fat and protein, eaten whole or used as an oilseed. It also has been a standard cathartic remedy, mostly in combination with other cathartics. It is native to Africa, Pacific Islands, Europe, Asia; introduced also in Australia.

CUCUMIS

1. *Cucumis anguria* L. — West Indian gherkin, bur gherkin. Bur gherkin has been reported as an escape in California, Massachusetts, New York, Oregon, and Washington (var. *anguria*) and in Alabama, Florida, Georgia, Montana, and Texas (var. *longaculeata* Kirkbr.) — a summary of documentation is provided in USDA, NRCS (2010).

Two varieties within the bur gherkin were recognized by Kirkbride (1993), who distinguished them by the following contrasts.

1. Fruits obscurely aculeate, aculei 1–2 mm; leaf blades deeply 3–5-palmately lobed

..... ***Cucumis anguria* var. *anguria***

1. Fruits prominently aculeate, aculei 4–10(–15) mm; leaf blades deeply 3–5-palmately lobed to weakly 3-lobate or nearly unlobed

Cucumis anguria* var. *longaculeatus

Cucumis anguria var. *longaculeatus* has been noted to occur outside of cultivation in Georgia (Jones & Coile 1988); occurrence in Georgia of the typical variety is documented here.

Cucumis anguria var. *anguria*. **Georgia.** Sumter Co.: E side of Americas, jct of Vienna Hwy (Ga 27) and Whispering Pines Dr., sandy soil, 430 ft, sprawling vine on disturbed gravelly site, some stems to ca. 6–7 ft, 20 Oct 1996, Norris 6776 (NLU).

2. *Cucumis melo* L. subsp. *agrestis* (Naud.) Pangalo — Gulf Coast melon.

Only two formal infraspecific taxa within *Cucumis melo*, subsp. *melo* and subsp. *agrestis*, were recognized by Kirkbride (1993), who suggested that other variants should be treated with horticultural names. Among taxa included within subsp. *agrestis* are *C. melo* var. *agrestis* Naud., var. *chito* (Morren) Naud., var. *dudaim* (L.) Naud., var. *flexuosus* (L.) Naud., and var. *texanus* Naud.

Classification of melons into two subspecies has been generally supported by molecular phylogenies (Stepansky et al. 1999; Decker-Walters et al. 2002). Following Kirkbride's treatment (1993), the two taxa are distinguished by the following contrasts.

1. Hypanthium or youngest fruits retrorsely or antrorsely sericeous with appressed hairs; stems hispid with retrorse hairs; fruit 2.5–5 cm in diam. ***Cucumis melo* subsp. *agrestis***
 1. Hypanthium or youngest fruits pilose to lanate with spreading hairs; stems glabrous sparsely villous; fruit greater than 10 cm in diam. ***Cucumis melo* subsp. *melo***

Free-living populations of subsp. *agrestis* in the New World commonly have been assumed to represent escaped forms of cultivated var. *chito* or var. *dudaim* or less commonly of var. *agrestis*. Decker-Walters et al. (2002), however, showed that populations in the southeastern USA are morphologically and molecularly distinct and appropriately recognized as var. *texanus*. This variety shows the greatest genetic affinities to var. *chito* and to cultivars from Eastern Asia. Its wild or cultivated progenitor presumably was brought to the Western Hemisphere by humans intentionally (e.g., by Asian immigrants) or unintentionally (e.g., as seeds mixed with those of other introduced crops), either in pre-Columbian times (given the distinctiveness of genetic differentiation) or post-Columbian.

Cucumis melo subsp. *agrestis* in the flora area is documented by the following that I have studied: **Arkansas.** Lafayette Co.: 3 mi N of Gin City along Red River levee, fallow fields and field margins, 8 Sep 1988, *Sundell et al. 8654* (BRIT, VDB); ca. 3 mi NW of Canfield, levee above Field Bayou, 8 Sep 1988, *Sundell et al. 8670* (BRIT, VDB). **Connecticut.** Hartford Co.: town of Windsor, landfill, Huckleberry Rd, moist sandy waste areas near dumpsters adjacent of leaf dump, 18 Sep 1998, *Zebryk 5761* (NLU). **Florida.** Charlotte Co.: Port Charlotte Beach State Recreation Area, Manasota Key, N portion of park, beach dune 25 Jun 1991 *Erickson PB0052* (USF digital image!). Additionally, the ISB Atlas of Florida Vascular Plants (with specimen images) provides vouchers for 16 other counties, identified simply as *C. melo*; the FSU online database includes another three counties, for a total of 20 Florida counties. **Georgia.** Bryan Co.: Ft. Stewart Military Reservation, Training Area C-18, just W of Richmond Hill, jct Ga. Hwy 144 and FS 58, local in sandy disturbed loam, 22 Jul 1992, *Carter 10223* (VDB). **Louisiana.** Ouachita Par.: 1 mi NE of Bayou Lafourche, beside La 15, ditch banks and edge of soybean field, 10 Jul 1972, *Thomas 30836* (NLU). **Mississippi.** Warren Co.: just W of Yazoo River, Hwy 465, frequent on roadside and open disturbed places near water, 24 Sep 1972, *Rogers 8739* (BRIT, SMU); the MISS online checklist also shows collections from Washington and Wilkinson counties. **North Carolina.** New Hanover Co.: Wilmington, garbage dump S of Smith Creek and E of US 117, 21 Jul 1970, *Leonard 3339* (VDB). **Oklahoma.** Kingfisher Co.: 8 mi W of Dover, *Quercus marilandica*-*Q. stellata* woods beside road, between Crescent and US 81, 9 Oct 1970, *Thomas 21846* (NLU); McCurtain Co.: along river, 8 Oct 1977, *J. & C. Taylor 25638* (BRIT). **Tennessee.** Hamblen Co.: along Southern Railway tracks at US 25E in Morristown, 15 Aug 1981, *Thomas 77886* (NLU). **Texas.** Calhoun Co.: 15 1/4 mi SW of Port Lavaca, frequent on hwy embankment in river bottoms, 24 Nov 1945, *Cory 51136* (SMU).

Wilson (1993) provided a county-level map with documentation for *Cucumis melo* subsp. *agrestis* (as var. *texana*) in 12 states (including 125 counties): Texas, Arkansas, Louisiana, Oklahoma, Kansas, Missouri, Illinois, Indiana, Kentucky, Tennessee, Alabama, and Mississippi. In Mexico,

subsp. *agrestis* is known to occur in the states of Baja California, Baja California Sur, Sinaloa, Sonora, and Tamaulipas.

Cucumis melo subsp. *agrestis*, as identified by the criteria above, is abundantly documented in Louisiana by collections at NLU from 49 parishes: Acadia, Allen, Ascension, Assumption, Avoyelles, Beauregard, Bienville, Caddo, Calcasieu, Caldwell, Cameron, Catahoula, Claiborne, Concordia, Desoto, East Baton Rouge, East Carroll, Evangeline, Franklin, Iberia, Iberville, Jefferson, Jefferson Davis, Lafayette, Lafourche, LaSalle, Lincoln, Madison, Morehouse, Natchitoches, Orleans, Ouachita, Rapides, Red River, Richland, Sabine, St. Charles, St. Landry, St. Martin, St. Mary, Tensas, Terrebonne, Union, Vermilion, Washington, Webster, West Carroll, West Feliciana, and Winn. A collection from West Baton Rouge Parish is at SMU.

Subsp. *agrestis* in Texas is documented from various sources from 52 counties. From TEX-LL and SMU-BRIT: Brazoria, Burleson, Calhoun, Cameron, Chambers, DeWitt, Erath, Galveston, Harris, Hidalgo, Houston, Jackson, Jefferson, Jim Wells, Matagorda, Refugio, San Patricio, San Saba, Sutton, Travis, Waller, Webb, and Williamson. Additional counties from the TAMU online database: Brazos, Caldwell, Colorado, Grimes, Hill, Robertson, and Uvalde. Wilson (1993) documented its occurrence in an additional set of counties: Aransas, Bell, Bexar, Comal, Denton, Dewitt, Fayette, Goliad, Gonzales, Hamilton, Kinney, Kleberg, Lee, Llano, Madison, Menard, Milam, Navarro, San Jacinto, Trinity, Valverde, and Washington.

Label data indicate that *Cucumis melo* subsp. *agrestis* grows in a wide range of habitats: river and stream banks, lake shores, marsh edges, mangrove edges, bottomland hardwoods, cypress heads, creek beds, sand bars, levees and spoil banks, ditch banks, beach dunes, clearcut woods, burned-over pinelands, fallow fields, pastures, asparagus, alfalfa, soybean, rice, and sugarcane fields, railroad banks, abandoned homesites, vacant lots, roadsides and meridians, fencerows, trash dumps, and other disturbed areas.

Cucumis melo is sometimes encountered outside of cultivation in California, along waterways and irrigation canals, asparagus, cotton, and alfalfa fields, fallow fields, and roadsides. It is mostly identified as var. *dudaim* in that state. The Calflora database records it from 7 counties

Cucumis melo sensu lato is indicated by the PLANTS Database (USDA, NRCS 2010) to occur in 29 states of the USA and in Ontario, Canada — these records probably represent a mix of subsp. *melo* and subsp. *agrestis*. I have seen unequivocally identified collections of subsp. *melo* only from North Carolina, Texas, and Virginia, though it likely occurs wherever cantaloupes are discarded.

ACKNOWLEDGEMENTS

I am grateful to the staffs at BRIT-SMU-VDB, TEX-LL, and NLU for hospitality while studying there. This study was done in conjunction with preparation of the FNANM treatment of Cucurbitaceae and supported in part by the Flora of North America Association.

LITERATURE CITED

- de Aquino Assis, J.G., M.A. de Queiroz, S.M. Campos de Araújo, G. Bandel, and P.S. Martins. 2000. Implications of the introgression between *Citrullus colocynthis* and *C. lanatus* characters in the taxonomy, evolutionary dynamics and breeding of watermelon. *Plant Genet. Resour. Newsl.* 121: 15–19.
- Decker-Walters, D. S., S.-M. Chung, J. E. Staub, H. D. Quemada, and A. I. López-Sesé. 2002. The origin and genetic affinities of wild populations of melon (*Cucumis melo*, Cucurbitaceae) in North America. *Pl. Syst. Evol.* 233: 183–197.

- Duncan, W.H. and J.T. Kartesz. 1981. Vascular Flora of Georgia: An Annotated Checklist. Univ. of Georgia Press, Athens.
- Hatch, S.L., K.N. Gandhi, and L.E. Brown. 1990. Checklist of the vascular plants of Texas. Texas Agric. Expt. Station Publ. MP-1655, College Station.
- Jones, S.B. and N. Coile. 1988. The distribution of the vascular flora of Georgia. Dept. of Botany, Univ. of Georgia, Athens.
- Kirkbride, J.H., Jr. 1993. Biosystematic monograph of the genus *Cucumis* (Cucurbitaceae). Parkway Publishers, Boone, North Carolina.
- Nesom, G.L. 2000. Which non-native plants are included in floristic accounts? *Sida* 19:189–193.
- Rhoads, A.F. and T.A. Block. 2007. *The Plants of Pennsylvania: An Illustrated Manual* (ed. 2). Univ. of Pennsylvania Press, Philadelphia.
- Sanjur, O.I., D.R. Piperno, T.C. Andres, and L. Wessel-Beaver. 2002. Phylogenetic relationships among domesticated and wild species of *Cucurbita* (Cucurbitaceae) inferred from a mitochondrial gene: Implications for crop plant evolution and areas of origin. *Proc. Natl. Acad. Sci. U.S.A.* 99: 535–540.
- Smith, D.T. and A.W. Cooley. 1973. Wild watermelon emergence and control. *Weed Sci.* 21: 570–573.
- Stepansky, A., I. Kovalski, and R. Perl-Treves. 1999. Intraspecific classification of melons (*Cucumis melo* L.) in view of their phenotypic and molecular variation. *Pl. Syst. Evol.* 217: 313–332.
- USDA, NRCS. 2010. The PLANTS Database. National Plant Data Center, Baton Rouge, Louisiana. <<http://plants.usda.gov>>
- Weakley, A.S. 2010. *Flora of the Southern and Mid-Atlantic States*, working draft of March 2010. Univ. of North Carolina Herbarium, Chapel Hill, North Carolina.
- Wilson, H. 1993. Free-living *Cucurbita pepo* in the United States: Viral resistance, gene flow, and risk assessment. Report prepared for USDA APHIS BBEP Biotechnology Coord. <<http://botany.csd.tamu.edu/FLORA/flcp/flcp1.htm>>
- Wunderlin, R.P., and B.F. Hansen. 2008. *Atlas of Florida Vascular Plants*. [S.M. Landry and K.N. Campbell (application development), Florida Center for Community Design and Research.] Institute for Systematic Botany, Univ. of South Florida, Tampa. <<http://www.plantatlas.usf.edu/>>



Figure 1. Fruiting peduncles of *Cucurbita moschata* (5 on left) and *Cucurbita pepo* (4 on right).