A NEWLY DESCRIBED SUBFOSSIL

CULTIVAR OF CHENOPODIUM (CHENOPODIACEAE)

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Chenopodium berlandieri Moq. subsp. nov. jonesianum Bruce Smith.
Type: U.S.A., Ohio, Hocking County, 3 miles southeast of Bloomingville; Ash Cave (33Hol). 1876. Ebenezer Andrews s.n.
(holotype, US # 3036256)


Dorsal pericarp reticulate-alveolate, testa smooth, thin and truncate margined. Found in the eastern United States in excavations of prehistoric Indian sites.

Using morphological, cytological, and hybridization data, Hugh Wilson recently demonstrated that the taxa assigned to Chenopodium sect. Chenopodium subsect. Cellulata do, in fact, constitute a relatively coherent group, distinct from other elements of sect. Chenopodium (Wilson, 1980).

In addition to the cultivar forms of the Mexican domesticate Chenopodium berlandieri subsp. nuttalliae, subsect. Cellulata encompasses a wide range of wild and weedy American chenopods, including four modern non-domesticated Chenopodium taxa of the eastern United States: C. berlandieri var. zschackei; C. berlandieri var. boscianum; C. bushianum; and C. macrocalycium (see appendix A. for authorities of all species).

Based on the presence of a distinctive and diagnostic reticulate-alveolate dorsal pericarp pattern, Chenopodium fruits recovered from a number of prehistoric archaeological sites in the
eastern United States also qualify for inclusion in subsect. 
Cellulata (Figure 1). These archaeobotanical fruits, however, are 
morphologically quite distinct from those of closely related 
present day non-domesticated chenopod taxa belonging to subsect. 
Cellulata. They in fact exhibit a set of interrelated 
morphological changes associated with the adaptive syndrome of 
domesticated Chenopodium, and are virtually indistinguishable from 
the modern Mexican cultivar C. berlandieri subsp. nuttalliae cv. 
'chia' (Wilson, 1981:237) in terms of fruit morphology.

It is unlikely, however, that a prehistoric range extension of 
Chenopodium berlandieri subsp. nuttalliae cv. 'chia' into the 
eastern United States can be documented, as opposed to an 
independent process of domestication in the eastern United States 
('chia' has yet to be demonstrated to have a time depth in Mexico 
comparable to that of the "chia-like" prehistoric chenopod of the 
eastern United States). Because of the broad temporal and 
geographical separation of the modern Mexican cultivar 'chia' and 
the prehistoric "chia-like" cultivar of eastern North America, it 
is appropriate to assign a distinct subspecies designation to the 
former, rather than subsuming it under Chenopodium berlandieri 
subsp. nuttalliae cv. 'chia'. A taxonomic precedent in this regard 
is provided by the extinct eastern North American cultivar Iva 
annua L. subsp. macrocarpa.

The subspecies designation Chenopodium berlandieri subsp. 
jonesianum is therefore proposed to allow easier reference to the 
prehistoric domesticated taxon of the eastern United States. 
Volney H. Jones was one of the first individuals to suggest that a 
domesticated variety of Chenopodium might have been present 
prehistorically in the east, as part of the "eastern agricultural 
complex" (Jones, 1936).

Chenopodium berlandieri subsp. jonesianum is known primarily 
on the basis of large fruit assemblages (50,000 and 25,000 fruits, 
respectively) recovered from storage contexts in Russell Cave 
Alabama (1975 +/- 55 B.P., 2340 +/- 120 B.P.; Smith, 1984, 1985) 
and Ash Cave, Ohio (1720 +/- 100 B.P.; Smith, n.d.).

Maximum fruit diameter population statistics for the Russell 
Cave and Ash Cave assemblages of C. berlandieri subsp. jonesianum 
are comparable to 'chia', as well as conforming to modern 
geographical clines of variation for the two major eastern United 
States non-domesticated taxa belonging to subsection Cellulata 
(Chenopodium berlandieri and Chenopodium bushianum) (Smith, n.d.) 
(Russell Cave - mean maximum fruit diameter 1.32 mm., range 1.0 
1.8, S.D. .13, sample size 525; Ash Cave - mean 1.87, range 1.3 - 
2.2., S.D. .15, sample size 1,000).

Outer epiderm thickness values for Chenopodium berlandieri 
subsp. jonesianum are comparable to C. berlandieri subsp.
nuttalliae cv. 'chia' (Mean outer epiderm thickness values - Russell Cave 11 microns; Ash Cave 15 microns; 'chia' 16 microns; Smith, n.d.), and serve to distinguish C. berlandieri subsp. jonesianum from the thick testa modern non-domesticated taxa of eastern North America belonging to subsection Cellulata (Mean outer epiderm thickness values for seven populations of Chenopodium berlandieri and Chenopodium bushianum from the eastern United States - 43, 46, 47, 49, 50, 51, 52 and 60 microns.).

The fruits of Chenopodium berlandieri subsp. jonesianum also exhibit the truncate margin and rectanguloid cross-section characteristic of both 'chia' and the low frequency "red morph" fruits produced by modern eastern North American non-domesticated taxa belonging to subsection Cellulata (Smith 1984, 1985, n.d.). A smooth outer epiderm surface, however, serves to distinguish the fruits of 'chia' and C. berlandieri jonesianum from the thin testa "red morph" fruits produced by non-domesticated eastern North American taxa belonging to subsection Cellulata (Smith, n.d.).

Other specimens examined: U.S.A., Alabama, Jackson County, 6 miles west of Bridgeport; Russell Cave National Monument. 1956 Carl Miller s.n. (US #30362557, Fig. 1).

Appendix A.

C. berlandieri Moq.

C. berlandieri subsp. nuttalliae (Stafford) Wilson and Heiser

C. berlandieri subsp. zschackei Zobel

C. berlandieri subsp. boscianum (Moq.) Wahl

C. bushianum Aellen

C. macrocalycium Aellen

Iva annua L. subsp. macrocarpa (Blake) Jackson
Figure 1. Photomicrograph of a fruit of Chenopodium berlandieri subsp. jonesianum from Russell Cave, Alabama, showing the reticulate-alveolate dorsal pericarp pattern and truncate margin.

References


Smith, B.D. 1985 The Role of Chenopodium as a Domesticate in Pre-Maize Garden Systems of the Eastern United States. Southeastern Archaeology 4.

