The sunflower (Helianthus annuus) in Mexico: further evidence for a North American domestication

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- *From*: Jack Linthicum <jacklinthicum@xxxxxxxxxxxx>
- *Date*: Wed, 7 May 2008 11:57:35 −0700 (PDT)

On May 2, 2:57 pm, Hayabusa <peregr...@xxxxxxxxxx> wrote:

> On Thu, 01 May 2008 09:58:36 +0200, Peter Alaca
>
> <p.al...@xxxxxxxxxxxxxx> wrote:
>
> > I am not familiar with the details in the case here, but (I think
> > I
> > read this in Diamond's Steel, Gunsn'Germs) it is fairly easy
> > to spread
> > a plant parallel to a latitude because it remains more or less
> > in its
> > own climate zone to which it is adapted, whereas
> > nort−to−south
> > spreading crosses climate zones which takes much longer.
> > Take wheat:
> > from northern Iraq to Greece wasn't much of a jump, but
> > from Greece to
> > rainy Holland is.
>
> A source on the first find ofsunflowerin the Ohio Valley is in
> Nature 430, 201, 2004.
>
> Hayabusa

Still 2−3000 years. Many plants crossed the barriers
in the last 500 years.

> I know what you mean, but such boundaries do exist. Let me extrapolate from the world of birds (as I am not closely familiar with plants): in the US, the Mississippi is a strong climatic, floral and faunal divide, so strong that the birdwatcher's guides treat the Atlantic−Mississippi region and the Gran'Ol'River−Pacific region in two different books; and there are few overlaps.
>
> With regard to sunflowers, I happen to think that the evidence is still too patchy to really permit conclusions − whether this cultural plant originated in the Ohio Valley or in Central America. Right now it looks like the oldest traces are from the NE, but if older evidence is found in Mexico I would not fall on my back.
>
> Hayabusa

Pics at the cite. The seed was not a sunflower but a bottlegourd.

"As yet there is no compelling evidence that the sunflower was grown as a food crop in Mexico prior to European contact. In addition, the complete absence of any early historical record for the sunflower in Mexico argues against its presence in pre−Columbian times. Although no dates or boundaries can be set, the wild sunflower may have grown in northernmost Mexico in early times. A southward range expansion for the species is probably very recent, perhaps in the last few hundred years with the development of a modern road system. The widely used common names of the sunflower in Mexico are in Spanish or with Spanish words in them, which suggests that the sunflower is a post−contact arrival."

As someone who grew up with the firm knowledge that all roads with sunflowers growing in the margins led to Kansas, I accept the implied apology.

http://www.springerlink.com/content/8475434537757k61/fulltext.html

The sunflower (Helianthus annuus) in Mexico: further evidence for a North American domestication

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Abstract I have concluded that my initial verification of a specimen recovered from the San Andrés archaeological site in Mexico as

domesticated sunflower was incorrect. The specimen in question is most likely the seed of a bottle gourd. As yet there is no compelling evidence that the sunflower was grown as a food crop in Mexico prior to European contact. In addition, the complete absence of any early historical record for the sunflower in Mexico argues against its presence in pre−Columbian times. Although no dates or boundaries can be set, the wild sunflower may have grown in northernmost Mexico in early times. A southward range expansion for the species is probably very recent, perhaps in the last few hundred years with the development of a modern road system. The widely used common names of the sunflower in Mexico are in Spanish or with Spanish words in them, which suggests that the sunflower is a post−contact arrival.

Keywords Bottle gourd − Domesticated sunflower − Girasol − Helianthus annuus − Lagenaria siceraria − Maíz de teja − Mexico − North America − Plant domestication

An achene and a seed recovered from the archaeological site of San Andrés, Mexico and directly dated to ca. 4100 B.P. were initially identified as domesticated sunflower (Helianthus annuus L.). On the basis of this identification, Lentz et al. (2001) argued that this important crop plant was initially domesticated in Mexico, not in eastern North America. I was the first to verify the identification of the San Andrés achene as sunflower. I would now like to rescind my determination. As the plant parts were destroyed in the dating it may now be impossible ever to identify the plants. The achene, however, falls within the range of morphological variability of seeds of the bottle gourd (Lagenaria siceraria (Mol.) Standl.) (Fig. 1). I would suggest that the acheneé is a bottle gourd seed. I did not see the sunflower seed until a photograph of it was published (Lentz et al. 2001), and I do not intend to say more about it at this time except that Smith (2006) does not accept the identification of either the achene or seed as sunflower. My choice to change my original decision regarding the achene has been influenced by a molecular study (Harter et al. 2004) and the morphological study of Smith (2006) as well as by the lack of domesticated sunflowers in the early history of Mexico, which I had pointed out in a brief note (Heiser 2002). I should like particularly to expand upon this last topic here.

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Fig. 1 Modern seed of bottle gourds from the Americas. Numbers 6™7 from Mexico. Seed numbers 17 and 24 are 10 mm long (from Heiser 1973)

There are, insofar as I am aware, no early historical references to the sunflower in Mexico. Several authors, including Lentz et al. (2001) as well as Heiser (1951), have supposed that the domesticated sunflower was seen by Francisco Hernández in his stay in Mexico (1570 1577). Recently, however, I have reexamined Hernández works (Heiser 1998), and I now think that Hernández never saw the sunflower in Mexico. Acosta and Cobo, cited by Heiser (1951), do not give enough information to identify their plants as sunflowers. Moreover, Cobo s account begins In Peru & Both of these writers include their sunflowers under Flowers , rather than under Foods . Patiño

(1964), independently of me and more thoroughly, as well, went through the early historical accounts of domesticated plants in equinoctial America. For the sunflower in Mexico he adds little to what I reported in 1951, nor does Dressler (1953). Other Mexican domesticated plants fare well in these works.

The first account that I have found concerning a domesticated sunflower in Mexico (True 1912) states that Edward Palmer is reported in 1896 to have obtained sunflower achenes in Durango with black shells which give a purplish dye that is esteemed by some. [The Hopi of Arizona also valued their sunflower achenes for the same reason (Heiser 1945.)]

Lentz et al. (2001) cite Ramírez (1991) to support a widespread tradition of sunflower cultivation in Mexico. It is quite the contrary, Ramírez gives Nahuatl names for the native plants but only Spanish names for the introduced ones. Significantly, he identifies sunflower only by the Spanish term girasol .

In 1951 when I mentioned the Soviet Union s plant hunting expedition in 1925 in Mexico, I had available only Bukasov s (1930) English summary. Today I have an English translation of the text, and I can expand my earlier remarks.

In Mexico they traveled north to 25° latitude (San Luis Potosí, Coahuila and Durango). They also visited the central highlands, and Vera Cruz, Chiapas and Tabasco in the south. Bukasov writes, We only found now and then single plants (of sunflowers) in northern Mexico in the maize fields. It is more often raised as a decorative plant. In the Mexican literature it is mentioned as a weed& The Mexican samples of sunflower, of which there was a very small amount (about 10)& belonged predominantly to the late and very late varieties& In another place he states: The sunflower seems to occur more in the north than in the south, but always a single plant, sometimes for decorative purposes or in maize fields. There is no mention of seeing wild sunflowers. The sunflower was a very important plant in the Soviet Union at that time and wild sunflowers were used in breeding work. Had they seen wild sunflowers I think they would have mentioned it.

There are several things here that I cannot explain. In the last half of the nineteenth century European varieties were being grown in the United States, therefore, I think it is likely they were in Mexico long before 1925. However, I would expect the ones that Bukasov observed were Indian varieties, particularly the very late ones. But why single plants? Why for decorative purposes?

Martínez (1959a), who accompanied the Soviet expedition, later wrote (my translation), This plant (sunflower) is not presently used in popular medicine and we only know through the writings of Ximénez (translator of a Mexican edition of Hernández) that the ancient

Indians ate the leaves and the seeds & In his book (1959b) on the useful plants of Mexico, he wrote about the sunflower: To date it has been sown more as an ornamental, without exploiting it properly. Martínez (1979) used the name maíz de Texas (more often given as Tejas by others) for the sunflower; he believed it originated in North America. Some have used maíz de tejas or teja (Spanish for tile) probably referring to the tile−like arrangement of the achenes in the head.

Two papers that I have not cited in earlier works (Pennington 1963, 1979) refer to the use of wild sunflower in northern Mexico.

In my 1951 paper I discuss the Indian varieties of sunflowers. Two are described from Mexico, maíz de teja and maíz negro. I have little to add to what I said at that time, but I should point out that maíz negro is a hybrid between maíz de teja and a modern cultivar. It is unfortunate that the name maíz de teja was used for the Indian variety for this name may be used for any domesticated sunflower in Mexico. I have always felt that this Indian race was most closely related to the Hopi sunflower. Viable seeds of maíz de teja are no longer available. My attempts since 1950 to secure more Indian races from Mexico have been unsuccessful. I should point out that five Indian races of sunflowers still survived in widely scattered parts of the United States in 1950.

Thus far we do not have much of a history for the sunflower in Mexico, in fact, no history at all for four hundred years. This was all to change in the last half of the twentieth century when the sunflower became an important oil crop in Mexico, with seeds imported from the Soviet Union and later from the United States. Sunflowers are mostly grown in northern Mexico today (J. L. Escamilla, in litt. 2001). In 1994 the FAO Production Yearbook reported a yield of 1,762,000 metric tons for Mexico.
In their maps, Piperno (2001) and Lentz et al. (2001) show a fairly extensive distribution of the wild sunflowers in Mexico at present. The question should be was the wild sunflower in Mexico 4000 years ago? I think that it may be a much more recent introduction. Heiser et al. (1969) show the species as being found only in northernmost Mexico (Fig. 2). However, they had not borrowed specimens from Mexican herbaria. Had they done so, it may have made little difference with their mapping. Recently I obtained a list of the specimens held in the Herbario Nacional (MEXU), the oldest (founded 1888) and largest herbarium (555,000 specimens) in Mexico. Of the specimens with dates, 19 of them collected from 1923 through 1978 (with the exception of one from Sinaloa from 1977) came from northern states; the remaining 35 specimens, collected more recently, have extended the range of the sunflower southward considerably. I think this supports a recent southward spread of the sunflower into Mexico.
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Fig. 2 Weedy and wild Helianthus annuus in North America and Mexico. (from Heiser et al. 1969)

Bison were an important dispersal agent for the sunflower, not only did they carry achenes in their fur but they could also create the disturbance of the soil necessary for the sunflower s success (Asch 1993). Bison were probably most effective in dispersal in their primary range which extended from Texas and New Mexico into Canada (McDonald 1981; map p. 104) where the great population densities would create more extensive disturbances. In their secondary area of distribution, which included northern Mexico to the tropic of Cancer and nearly all of eastern North America, bison apparently had little or no effect in the spread of sunflowers. There is, of course, the possibility that they introduced them to northern Mexico. The recent spread of sunflowers there has been along roads according to my observations.

Other than the problematic San Andrés specimens, sunflower has been identified tentatively in only two other archaeological contexts in Mexico. There is a single isolated report of sunflower in the archaeological record of northern Mexico, and this identification needs to be confirmed. If the Ocampo Caves (Tamaulipas) specimen excavated by McNeish and identified by Callen (1969) as wild sunflower can be located, its taxonomic assignment should be verified, as various species of Tithonia and Viguiera, close relatives of Helianthus, are sometimes mistaken for sunflower. The former are often called mirasol or girasol in Mexico, as is Helianthus. I have not been able to locate the specimens in any of the places where MacNeish−Callen material is known to be stored.

In support of their hypothesis that the sunflower had a long history of cultivation in middle America Lentz et al. (2001, p. 372) mention a domesticated sunflower achene from the Santa Leticia site in El Salvador (Miksicek 1986). Although Miksicek mentions both sunflower achene and sunflower seeds in his report, from the context I believe that only one carbonized achene which measured 3.9 × 2.4 mm (p. 41) was found. He states that it falls into the size range for ruderal sunflowers, or lower limit of archaic cultivated sunflower, but that is has the thick, sculptured pericarp more characteristic of cultivated varieties. Nowhere does the author definitely state that this is a domesticated sunflower. In fact, in his final sentence on sunflower (p. 199) he says, a single achene is too small a sample for any but the most tentative conclusions. Miksicek s admittedly tentative identification of the specimen from El Salvador as sunflower should be viewed with considerable skepticism until it is relocated, described, and a clear morphological basis for its taxonomic status established. I think this achene should be examined by a sunflower specialist for two reasons: (1) its extreme geographical position and (2) the sculptured pericarp for in so far as I know the pericarps of wild and cultivated sunflower do not differ except in size and color.

In summary, there is no convincing evidence for the sunflower in the archaeological record of Mexico, and the historical record provides no

support for the domestication or pre−Columbian presence of the sunflower anywhere south of northern Mexico. The wide use of common names for sunflowers in Spanish, or with Spanish words in them, (girasol, mirasol, maíz de teja and maíz de tejas) suggests that sunflowers were a post−contact arrival.

It is of course possible that sunflowers, either wild or domesticated, were part of the diet in pre−Columbian Mexico at some point, and then went extinct prior to European contact. But any claims for the independent domestication of sunflower in Mexico, or its use as a food crop, should be based on strong supporting arguments and clear genetic or morphological evidence.

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Footnotes

1 Carbonized archaeological sunflower achene from San Andrés, Mexico: not available. Various difficulties prevented securing the photograph and permission to use it. In addition to the original source (Lentz et al. 2001) it may be seen in Smith (2006) as well as on http://www.pnas.org.cgi/content/full/103/33/12223. The achene as shown in the photo is 8.2 mm long. Originally it was slightly longer; the tip was broken off while it was at Indiana University.
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