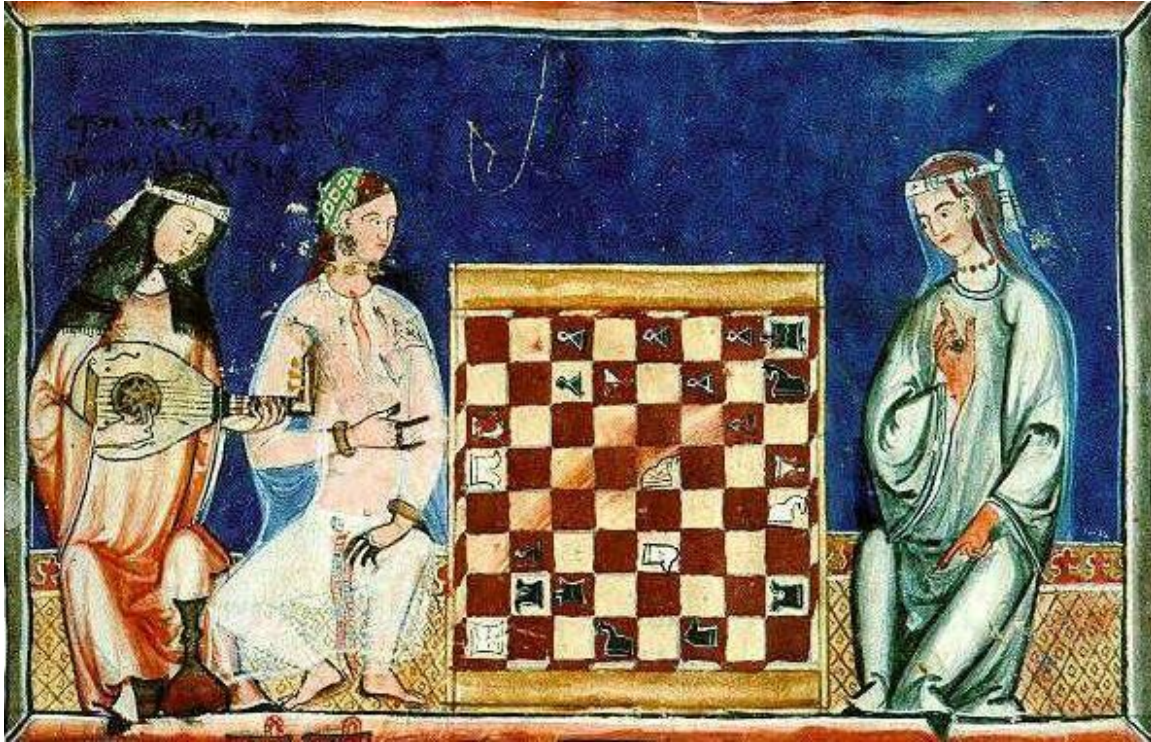


Henna in Medieval Spain and the Spanish Inquisition

Catherine Cartwright-Jones PhD

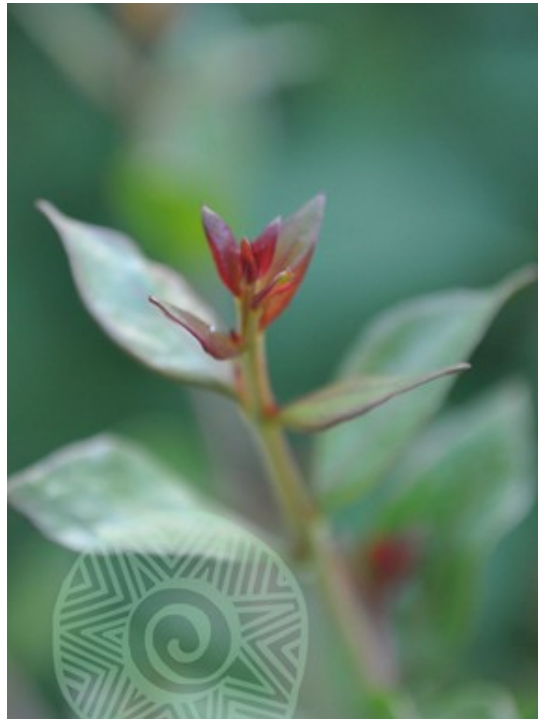
Kent State University (written 2003, revised for publication 2017)



Hennaed Moorish woman from *Tratado de Ajedrez Dados y Tablas*, the Book of Chess, Checkers and Dice, 1283, under patronage of Alfonso X, king of Leon and Castile, El Escorial

Spanish people and saints were depicted with hennaed hands, feet, and hair, and there are records of henna mills, henna artists, and laws regulating henna from the Iberian Peninsula between 900 CE and 1560 CE. These were the only people in medieval continental Europe to regularly use henna for body art. During the Medieval Warm Period, there are Christian manuscripts from north central Spain with depictions of henna on saints. By the Edict of Granada, in the Little Ice Age, henna was outlawed, and women using henna were subject to imprisonment and torture on the accusation of heresy and witchcraft. Both climate and cultural conflict created this repression and erasure of, rather than celebration of henna traditions during the Spanish Convivencia.

Henna



Henna, *lawsonia inermis*, is a drought and heat tolerant plant of the *Lythraceae* family. Women use powdered or pulped henna leaves to create traditional decorative stains on skin. Henna looks like a Myrtle, and can grow to the size of a small tree. Henna is indigenous to the eastern and southern Mediterranean rim. It is presently grown commercially in southern Morocco and Sudan, and is a common garden shrub across North Africa.

Henna will not tolerate minimum temperature below 11C and thrives at temperatures of 40 to 45C (Al-Ashaf, 2002). Henna grown in arid, hot conditions has a higher dye content and gives a darker, more long lasting stain than henna grown in cooler, more moist conditions. Commercial planters propagate henna from cuttings rooted in riverbanks. In the wild, henna propagates from seed excreted by birds that have eaten the fruits. A henna plant does not produce the best stain until the plant has matured, at about 5 years, when it is the size of a small tree.

Henna leaves contain lawsone, a dye that stains keratin an orange-red to dark brown color. Women apply henna to their hair, nails, skin, where it strengthens the protein matrix, and acts as a sunblock and antidesiccant. Henna is also used to mark livestock, and has some value as anti-fungal when applied to skin and hair (Bosoglu et al, 1998). Henna has fragrant flowers. Henna seed oil and henna pastes were used in traditional Arab medicine.

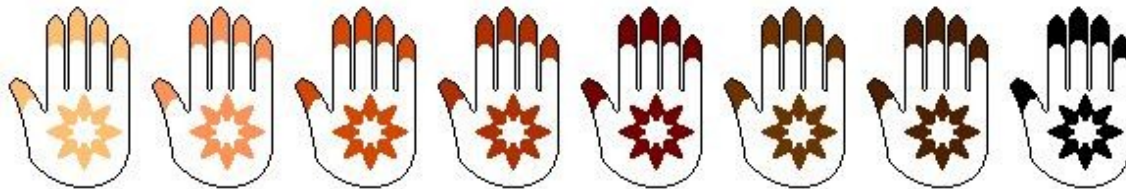


When henna paste is removed from skin, an orange lawsone stain remains.

To create henna body art, women pound fresh henna leaves to a pulp and add lemon juice, let that paste rest for a few hours for dye release, then apply the paste to skin or hair. The henna paste is left on for a few hours, and then removed. A stain remains on the skin, nails and hair where the paste was applied.

Fresh picked henna, grown in ideal conditions of high temperatures and minimal rainfall, easily stains palms, soles, and fingernails black-cherry red to coffee color. Henna leaves are dried for later use, but dried henna is perishable. Stale dried henna stains skin orange. If dried henna leaves are used within a few weeks of harvest, or stored in airtight cool conditions, paste made from dried henna can still make brick red to dark chestnut stains.

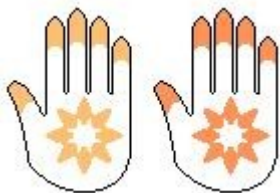
Reading Climate through Henna Stains:



Henna stain color range

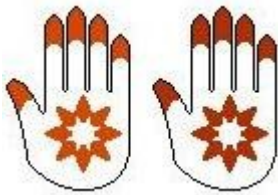
Henna stains are dependent on the amount of lawsone in the leaf, and the length of time between harvest and application to skin. If henna is grown in cool, moist conditions, the lawsone level is low and stains are pale orange. If henna is grown in severe drought and hot desert conditions, lawsone levels can be extremely high and give dark brown to near black stains.

Pale orange stains indicate low levels of lawsone, below 0.3% (or a brief or fading application). Pale stains are typical of henna transported over a long distance and gone stale, or henna grown locally in conditions of 20C and regular rainfall. Henna grown as a well-watered houseplant in Cleveland, Ohio gives this color. Henna powder stored for several months in contact with light and air makes pale orange stains.

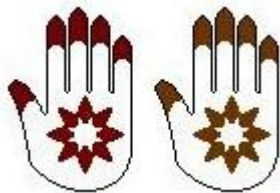


Dark orange or red stains indicate moderate levels of lawsone. These are typical of henna grown locally in a warm climate, days around 35C with some rainfall, or henna transported recently from an area with higher daily temperatures and less rainfall. Fresh

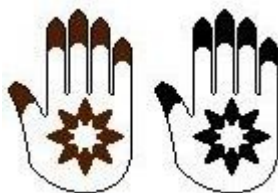
henna grown as a household shrub in Texas gives this color stain. Henna dried and imported from Egypt, used within 3 months, gives this stain.



Deep red or brown stains indicate higher levels of lawsone. These stains are achieved with fresh henna grown locally where days are over 40C and rainfall is scant, with frequent droughts. Recently transported dried henna from areas with daily highs over 45C and prolonged droughts will also give this color. Henna from the Persian Gulf and southern Morocco will stain skin dark burgundy or rich brown.



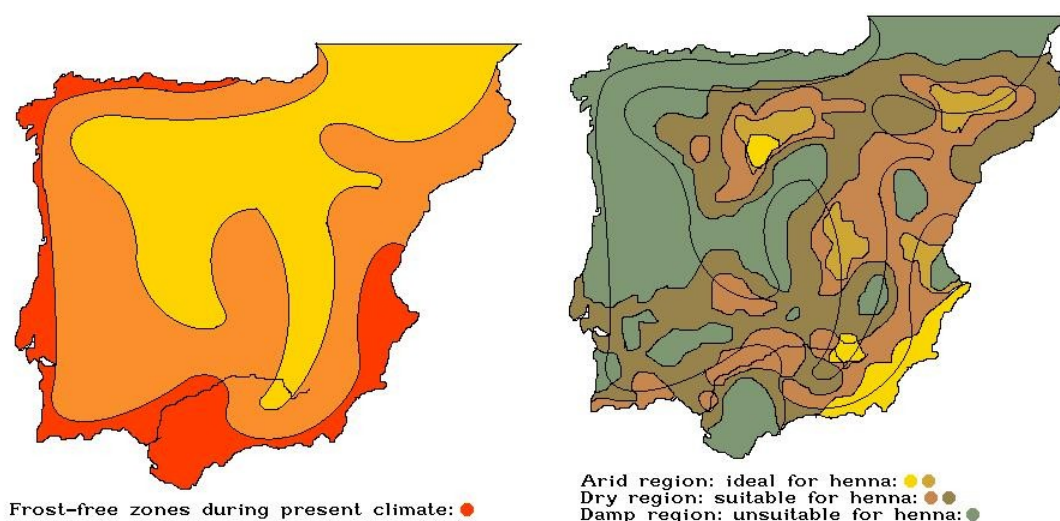
Extremely dark henna stains indicate very high levels of lawsone, or additional application of high heat or caustics. Henna grown in climates with daytime temperatures over 45C prolonged droughts, with less than 100mm of rain per year often makes this color stain. Henna from the Hadramaut in Yemen stains skin this color.



Henna harvested under cool, moist conditions stains skin orange. Henna harvested when the temperature is in excess of 40C, with scant rainfall, around 80mm per year, gives dark red to black stains easily. There is no other vegetal dye that will easily stain skin and

nails orange to red to near brown. Therefore, if a person has with dark brown, near black, or dark red stains on their hands or feet, one can conclude that henna was available locally, or transported from a nearby growing area, and that area must have had no nighttime temperature less than 11 C for a minimum of 5 years previous, must have regular daytime temperatures over 40C and scant rainfall.

The current climate in most of Europe will not support henna cultivation, though some areas of Spain have the correct balance of rainfall to produce henna of moderate quality



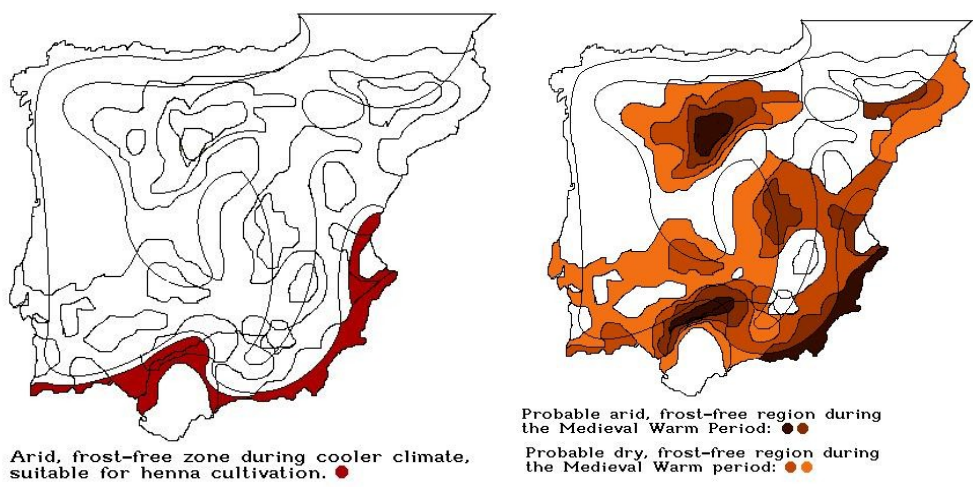
The Iberian Peninsula has a frost-free zone along the coastline. Henna will tolerate a 11C minimum temperature tolerated, and temperatures must remain over 11C for 5 years for a henna tree to mature. Henna presently could be grown presently on Spain's southern coast. Warmer climate periods, such as the Medieval Warm Period would have increased the growth range and potential color intensity for henna. Cooler climate periods, such as the Little Ice Age would have weakened stains or prevented henna cultivation entirely.

Henna thrives in an arid ecology, of less than 300mm precipitation per year.

Precipitation also influences henna stain: henna from arid areas produces a greater concentration of lawsone (al-Ashaf 2002). Henna from areas receiving less than 300mm precipitation per year yield superior stain to henna from areas receiving more than

500mm precipitation. The north coast of Spain, and the Atlantic Portuguese coast, have mild temperatures, would not grow henna easily because there is too much rainfall, and if henna were grown, the stains would be poor.

The warm areas near Gibraltar, including Malaga, might have been too moist to give the best stains if precipitation patterns and amounts were comparable in the 10th century to present. The area near Almeria, with its lower rainfall, may have provided ideal conditions of both heat and aridity for henna cultivation. The Costa Del Sol region of Spain often has droughts lasting for several years and high temperatures, creating a probable area for henna production. The Guadalquivir basin also has conditions that could be suitable for henna cultivation during warm periods.



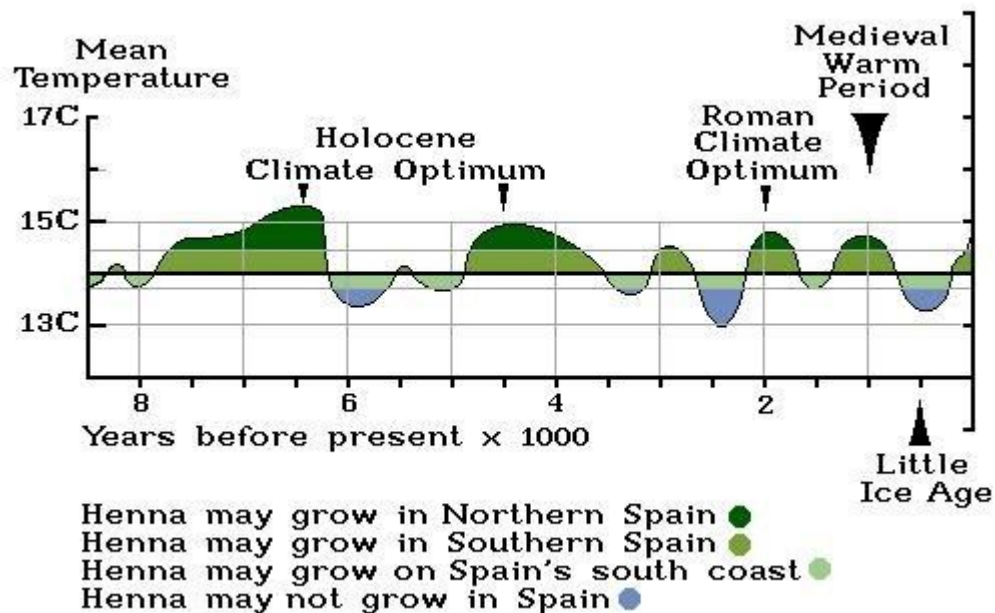
Area suitable for henna during present period and those potentially suitable during the Medieval Warm Period

Henna has the same climate requirement as lemons do. Lemon trees fail below 11C, and take many years to mature. Therefore lemon orchards must not only be in a frost-free zone, that zone must be stable. Lemons are presently cultivated in the Levant region of Spain, where there are currently about 35,000 hectares of commercially bearing lemon groves (USDA, 1998). Therefore, in present climate conditions, henna could be cultivated in the Levant region, along the southeastern coast. In warmer periods, this

growth zone may have extended farther north. In cooler periods this zone may have diminished.

Henna in the Mediterranean between the Bronze Age and 900 CE:

People used henna in the southern and eastern Mediterranean, across North Africa and the Middle East since the late Bronze Age. In Syria and Palestine, it has been used at least since the Bronze Age (de Moor, 1971: 85). Evidence of henna use and cultivation in medieval Spain exists in records such as tax roles, henna mills, shipping cargoes, laws, poetic references and depictions in art. These documents demonstrate that henna was grown and used by Christians, Jews and Muslims in Spain from at least 900 until 1550.



The Guadalquivir River marshes are part of the avian migratory flyway between Africa and Western Europe, and have been so through the Quaternary period. Henna presently grows across North Africa, and was grown and used at least from 1500 BCE in Egypt and Libya (Foster 1958: 99). Henna is spread easily via avian consumption of henna berries

and subsequent excretion of henna seed. Therefore, henna could have arrived in southern Spain at any time birds migrated northward 7 miles across the strait of Gibraltar after consuming henna berries in Morocco. At any time the climate conditions were consistently above 11C for 5 years, henna could have grown to the size of a small tree, and provided henna suitable for dye use. If a cooling period dropped the growing zone south into Morocco, henna could have been naturally reseeded through avian distribution in the subsequent warm period.

People from Phoenicia, the Syrian coast of the Mediterranean established settlements in Spain during the 11th c BCE (Harrison, 1988: 9). These people used henna as part of their cultural and religious traditions, and the fertility rituals involving their female deities required henna body art (de Moor, 1971 p 85 and Hooke, 1963, p 83). Statuettes and figures of this goddess, Tanith, from Syrian colonies during the same period in Crete (Castledon, 1990: fig 4), Cyprus (Tatton-Brown, 1997: fig 70), Sicily, Sardinia (Haynes, 2000: fig 19), Morocco and Tunisia show the female deity with her hands raised, and in the figures with coloration, the hands are colored red or red/brown, and fingers banded in red/brown. Their settlements were along the southern coast of Spain and into the Guadalquivir valley by 755 BCE (Harrison, 1998: 52), and if climate were similar then to present day, henna would have survived. They established olive groves and vineyards, so climate and culture may have also supported henna. 2200 years later, this area had henna mills and henna artists registered on the tax rolls.

Spain was part of the Punic Empire, a henna-using culture. Henna was part of the veneration of the deity Tanith. A fertility cult shrine at Illa Plana on Ibiza was dedicated to Tanith, and the cave sanctuary of Es Cuyram on Sardinia included over 600 female figures, many with red painted hands still extant (Harrison, 1988: 88)

Roman civilization dominated until Spain after the Second Punic War in 201 BCE until 409 CE. Jews living in Spain during the Roman may have celebrated “Night of the Henna” and hennaed for circumcisions and Purim as did Jews in Palestine (Foster 1958: 100). Mozarabic Christians in Spain who had immigrated northward from Byzantine

North Africa may also have hennaed, as did Egyptian Copts during the Roman period. Henna may have grown in Spain during this period, the Roman Climate Optimum. Visigoths invaded from Germany and expelled and repressed both North African Byzantine Christians and Jews (Reilly, 1993: 3-4) during the Human Migration Period, during a cooler climate period. Visigoths ruled until the Umayyad Islamic and Berber armies led by Tariq and Musa ibn Nusayr captured the Iberian Peninsula to the Pyrenees in 711.

15% of Iberian inhabitants in Muslim held territories had converted to Islam by 800 CE, and by 950, over half the people in Spain were Muslim. A wave of cultural "orientalization" began during the reign of Abd al-Rahman II (822-852), who imported numerous oriental Muslim artists and educators. The high culture of the Spain had strong Middle Eastern orientation, and the art, domestic culture and literature of Al-Andalus was established almost completely on oriental Arabic forms (Payne, 2002: chapter 2). Christians, Moors and Jews spoke and wrote Arabic as well as medieval Spanish (Fletcher, 1992: 140-2). The Arab tax structure favoring Muslims further encouraged Spanish Christians to convert to Islam.

If henna were not growing naturally or in use in Spain under the Visigoths, it would have been brought in with the Moors though the period of "orientalization", as henna was part of Muslim celebrations associated with marriage, circumcision, Id al-Adha, bathing, and birth. The prophet Mohammed explicitly recommended that women use henna (Abu Dawud, Book 33: 4154). He recommended its use to cover gray hair and skin injuries (Al-Jawziyya, 1998, p. 259). Since women were part of war booty; captured Christian women would have become acquainted with henna as they assimilated into Muslim households. Henna is a popular household garden shrub in North Africa, valued for its intensely fragrant flowers as well as its cosmetic use. The potential area suitable for henna growth may have been enlarged through sheltered household garden microclimates in Spain.

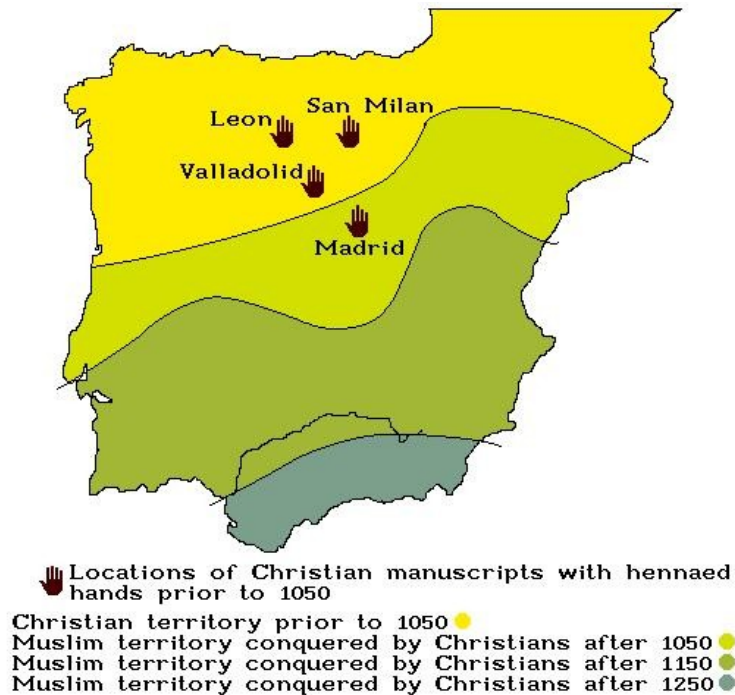
Muslims in Spain brought their crops and agro-ecology with them as well as their religion and customs. They introduced rice in 961 near Valencia. They farmed sugar cane in the

southern river delta areas. They imported and grew melons usually grown in Pakistan and Palestine. They began raising oranges in the 11th century in Valencia. Lemons and limes grew in cottage gardens. They grew bananas in Almunecar and Elvira. The sultanate of Seville had 2 ½ million olive trees when the Christians conquered in 1248. Seville and Malaga also grew figs for export (Imamuddin, 1965: 85). All these crops require to a frost-free hot climate, the same as supports henna. These crops were grown along the southern coast continuously through the period of final Muslim expulsion in 1570, though probably only in increasingly marginal southern coastal and sheltered locations as the Little Ice Age progressed. Columbus carried orange seeds from Spain on his voyages to the New World (McPhee, 2002). When Mondejar set out to take the Alhambra and force surrender from rebellious Moriscoes in 1568, he fought battle after battle in the mountains above Granada, in heavy snow and intense cold (Lea, 1968: 240 – 2), though Charles V grew oranges in the Alhambra courtyard gardens during the same period (McPhee, 2002). This shows that showing that even with global cooling, warm microclimates remained in southern Spain that could support frost-sensitive plants.

Henna in Northern Christian Spain between 900 and 1050 CE:

The Umayyad Muslims entered Spain in 711 CE, and conquered territory up to the border of the Pyrenees. The Arab and Berber army, led by Tariq and Musa ibn Nusayr captured more territory from the Visigoths than it could hold, and the boundary between Christian and Muslim Spain settled at a frontier south of the Durero River until 1050, when Christian armies regained territory to south of Toledo.

Arab culture in the conquered territory strongly influenced Christian art, clothing, language, science and agriculture. Christians assimilated into Arab culture were called Mozarabs. Christian Mozarabic, or culturally Arab-influenced, sacred art during 10th and 11th century Spain includes depictions of saints and holy persons with dark stained fingertips.



The Leon Bible c 920, the Leon Biblia Primera c 960, and the Valladolid Beatus c 970 and other manuscripts show Christian saints, both male and female, as well as angels, with dark stained fingertips and toes ¹. There are no similar depictions of darkened fingertips in manuscripts anywhere else in medieval Europe, though the Coptic Christian manuscripts from Egypt showed saints as having markings consistent with henna. Later manuscripts from northern Spain, such as *Cantigas de Santa Maria*, done in a cooler physical

1

Leon Bible dated c 920 Leon Cathedral: 6 fol 154 Canon tables

Leon Bible dated c 920 Leon Cathedral: 6 fol 209 Symbols of the Evangelists

St Gregory the Great, *Moralia in Job*, c 945, Madrid Bibl Nac 80 fol 2, *Vision of Isaiah*, Manuscript by Florentius

Biblia Primera Leon c 960, R.C San Isidro 2 fols 97 c 960

Valladolid Beatus c 970 Valladolid B.U. 422 fol 98v, Opening of the 6th Seal Rev VI, 12 – 17

San Millan Beatus, 10th c, Madrid R.A H. 33 fol 68, St Johns Message to the church of Thyattra Rev. 18029

climate, under greater northern European Christian cultural influence and less influenced by the Coptic Egyptian Christian church show no evidence of henna (Keller and Cash, 1998).

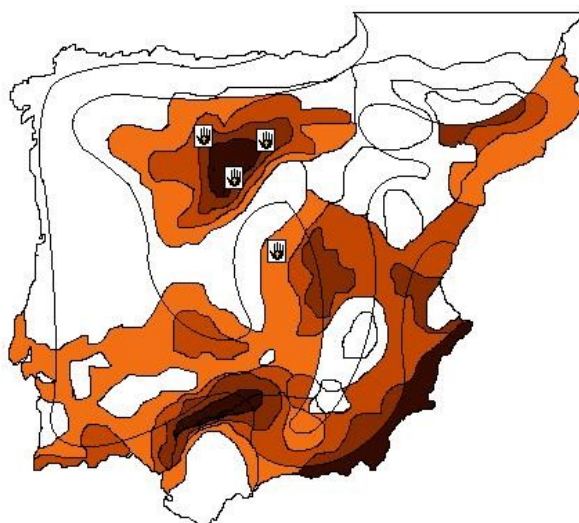
If Mozarabic artists in north central Spain depicted stained fingertips and toes, and did so in a way that is consistent with the color and limitations of henna, one can interpret this as evidence that the artists had firsthand acquaintance with henna. The Madonna figure from the Leon Bible Canon *Tables* clearly shows darkened fingertips and toes, with added decorative lines, consistent with henna stain, as does Joseph in the *Biblia Prima*. The darkened forearms and hands on angels from the Valladolid *Beatus* may represent more complex henna patterning extending up the arms, a common practice in North African henna body art. The *Maqamat* and other texts from the eastern part of the Islamic world have depictions of henna body art with this level. During the 10th century, Valladolid and Leon were in the Christian, not Moorish, dominated areas of Spain, demonstrating that the Christian community had assimilated henna body art traditions and were using henna in the Christian geographic area of political influence.


In the climate of the late 20th century, the southeast coast and north central areas of Spain are arid, favoring henna growth. The northern, eastern and central areas of Spain are too wet for henna. In the climate of the late 20th century, the southern coastal region of Spain has is the most reliably frost-free zone, suitable for growing henna. Therefore, at present climate, the most favorable areas for growing henna in Spain are along the southeastern coast of Spain. If, in the medieval warm period, the frost free zone extended into the central northern Spain, and rainfall patterns remained the same, north central Spain would have been an ideal area for henna cultivation.

If there were still frosts in that region, henna could have been transported from the southern coast, 300km from Leon. Henna could be picked, dried, and carried from the southern coast to Leon in as little as a month. Henna would lose some dye potency through drying and transport. This would have created stains in the rust-color range, but stains into the dark brown and black ranges as depicted on the paintings would be unlikely. The appearance of the stains in the paintings implies locally available high

quality henna, and thus high temperatures and prolonged drought conditions in the northern central region during the period of 900 to 1050.

The number and variety of henna body art depictions in the *Beatus* of Fernando I support the possibility that the artists were familiar with henna pattern technique, its strengths and limitations as a body art. It is unlikely that artists could make varied and accurate depictions of henna stains if they had not had personal experience with henna body art.



 Location of Christian manuscripts showing henna during the 10th and 11th c:

Probable frost-free, arid zones during 10th and 11th c: ●●

Probable frost-free, dry zones during 10th and 11th c: ●●

During the 11th century, Mozarabic holy books from north and central Spain, such as the *Beatus* of Fernando I, showed Christian saints with dark stained hands, fingertips, patterned forearms and feet.² . These stains are depicted as coffee-color or black, achievable only with fresh, high quality henna, grown in hot, arid weather. Currently

2

Beatus of Fernando I, c1047, Madrid, Bibl. Nac. Vit. 14.2, fols 253v-254
The Heavenly Jerusalem Rev XXI 1-27

Beatus of Fernando I, c1047, Madrid Bibl Nac Vit. 14.2 fol 116v, Celestial Liturgy Rev IV 6-V,
14

Beatus of Fernando I, c1047, Madrid Bibl Nac. Vit. 14.2, fol. 240
The Heavenly Armies Reg XIX 11-16

areas of north central Spain have summer temperatures warm enough for henna to thrive, winter lows would kill a henna plant. During the 10th and 11th century, when these very dark stains were depicted, fresh henna must have been familiar and available in north central Spain, either through trade or grown locally.

Since the northern boundary for wine cultivation in the Medieval Warm Period was 660k north of the present day boundary, the northern boundary for henna cultivation might also been 660k north of present. This could place Leon in a viable climate zone for henna, comparable to present conditions in Morocco, where henna is currently grown commercially.

In the last 100 years, temperatures in north central Spain, such as at Valladolid have been too cool to support henna, with winter temperatures sustained below 10C.

Valladolid average temperatures averaged from 1866 to 1990: (NOAA 1992, GHCN1):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	3.4	5.4	7.9	10.3	13.8	18.0	21.2	21.1	17.9	12.5	7.3	3.9	11.9

Malaga, in southern Spain, at present, does not have sustained average temperatures below 11 C, and could, in sheltered areas, support henna cultivation, though trees could be endangered by cool January weather.

Malaga average temperatures for the period between 1981 and 1990: (NOAA 1992, GHCN1):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	12.1	12.9	14.7	15.7	18.7	22.6	25.1	25.1	23.6	19.6	16.0	13.3	18.4

If Northern Spain were not substantially warmer during the 10th and 11th centuries than it is now, henna would have to have been imported from warmer areas to the south. The time required for importing henna from the southern coast to northern Spain would not have prevented dark stains, if transport was in sacks of whole leaves and was brought north quickly, if henna were cultivated in ideal conditions with high summer heat.

Southern Spain can have very high maximum summer temperatures, and did so even during the “Little Ice Age”, when Seville reached an extreme of 122F in August 1881. (NOAA).

Almeria’s current climate is cooler than Cairo during this same period, where henna presently grows in household gardens, and will self-propagate.

Almeria average temperature between 1951 and 1990 (NOAA 1992, GHCN1):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	12.2	12.7	14.4	15.8	18.7	21.8	24.9	25.6	23.3	19.5	15.6	13.2	18.1

Cairo average temperature between 1951 and 1991 (NOAA 1992, GHCN1):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	13.8	15.2	17.4	21.4	24.7	27.3	27.9	27.9	26.3	23.7	19.1	15.1	21.7

If temperatures in north central Spain had winter minimums 10C warmer in the 10th and 11th centuries than present, with no minimums less than 11C, then the climate would have been comparable to Cairo, and henna would have been available fresh in Leon. The relatively arid conditions in Leon, in combination with a hot climate, could have provided the very dark henna stains depicted in Mozarabic art. If this area was not frost free, henna could have been imported from further south. Core samples containing pollen from 11th century Cordoba demonstrate it was frost-free area during that period (Martýn-Consuegra, E., and Ubera, J.L., 1996). If the averages were 3C warmer than present, and minimums no less than 11C, henna would have grown easily in Almeria.

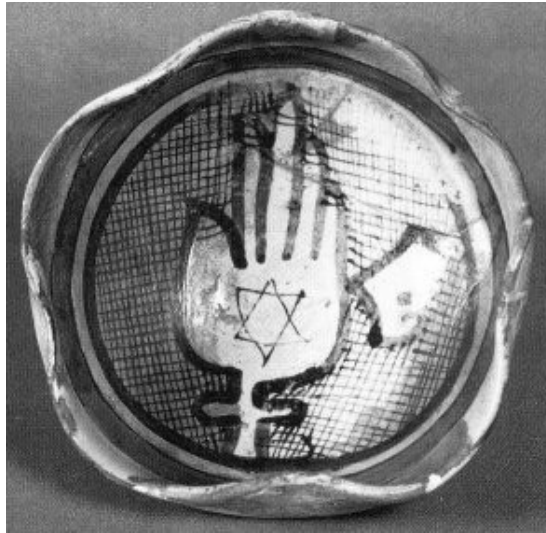
Convivencia and Henna Traditions: 1050 to 1490



Lusterware bowl with patterned *Hand of Fatima*, Malaga, late 11th to 12th century (O'Neill, 1993: pl 53)

Through the Medieval Warm Period and into the late 15th century, from 711 to 1492, Jews, Christians and Moors lived on the Iberian Peninsula in a diverse society, the *Convivencia*. Between 1050 and 1492, Catholic monarchs and armies regained control of the Iberian Peninsula, referred to as *Reconquista*. During periods of political stability and tolerance these groups lived alongside each other, cooperating in commerce, intellectual activity, politics, and occasionally intermarrying. One of the leaders who supported cooperation between the groups was Alfonso X, king of Leon and Castile, ruling from 1252 – 84. Though he was a Catholic king who aspired to be Holy Roman Emperor, he encouraged cooperation among the ethnic groups. There were *Morranos*, who were ethnically Jewish but nominally converted to Christianity. They lived alongside *Moriscoes*, who were ethnically Arab or Berber but nominally converted to Christianity,

and *Mujedars* who were Muslims choosing to stay in Christian reclaimed territories without converting. There were also ethnically Iberian and European Catholics. Alfonso X patronized the translation and publication of many Arab books, scientific and cultural works, some of which showed depictions of women wearing patterned henna.



14th century salt container for Passover from Paterna, Collection of the Ayuntamiento de Valencia, Museo Nacional de Ceramica “Gonzalez Marti” of Valencia (Mann, et al, 1992: pl 75)

Muslim and Jewish women during the medieval period in the Middle East and North Africa both celebrated a “Night of the Henna” prior to marriage. The custom of adorning a bride with henna patterns was practiced in Bronze Age Syria and Assyria, and was incorporated into Islam and Judaism. The bride was ornamented with henna, often in protective patterns, on her hands, feet, arms and legs for her wedding night. The groom, family members and guests were also hennaed for the wedding. There were ethnically mixed marriages in Spain during *Convivencia*, and neighbors attended each other’s weddings (Fletcher, 1992: 39). Weddings are community occasions; so Muslim and Jewish henna traditions would have been dispersed through cross-cultural contact with Christians. Jewish mothers hennaed prior to their son’s circumcision. Muslim families hennaed the son as well as the mother, family and guests for circumcision. Muslim families hennaed the sacrificial ram for Id al-Adha, as well as family, and hennaed at the end of Ramadan.

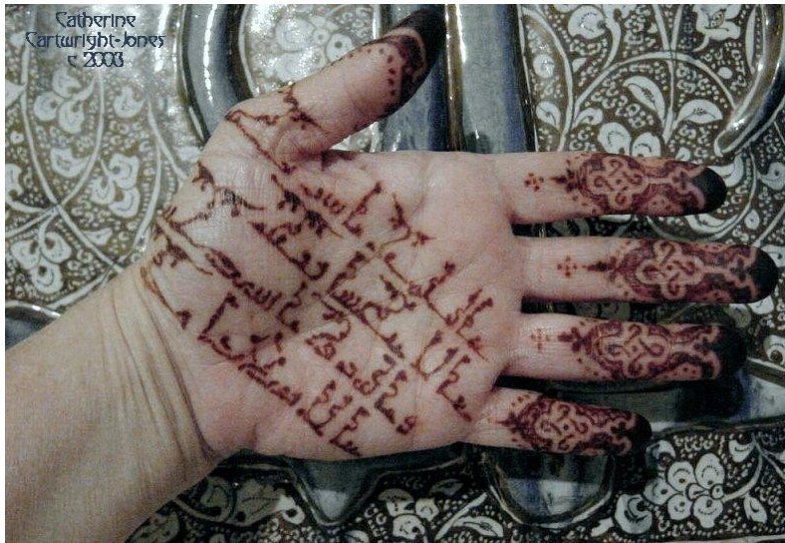


Catherine Cartwright-Jones c 2002

By 1000 CE, al-Andaluz was 75% Muslim, so the influence of Muslim cultural practices was very strong, extending to the Christians, who spoke Arabic, and shared many Muslim customs including the use of public baths and henna (Fletcher, 1992: 85). Jewish and Muslim women ritually bathed at the end of each menstrual cycle, as required by religious law. This purifactory bath, as well as their weekly bath, often included henna application to hair, soles and fingertips. Good quality henna applied in very hot conditions achieves deep brown to near black colors: the women's baths had steam rooms. Cordoba, in 1000 CE, had over 900 public baths (Encarta 2001), so this facility for creating dark stains would have been available to many people, and the technique shared among the Christians, Jews and Moors who all visited the baths.

Women are depicted with red and near black stains consistent with henna body art, as well as hennaed fingernails in *Tratado de Ajedrez Dadps y Tablas*, the *Book of Chess, Checkers and Dice*, from 1283. These depictions show that detailed patterning and Arabic writing were part of henna work, as was done in the Middle Eastern countries

during the same period (*Maqumat al-Hariri*, 1237 CE, Paris Bibliotheque, Arabe 5847, f. 58v)

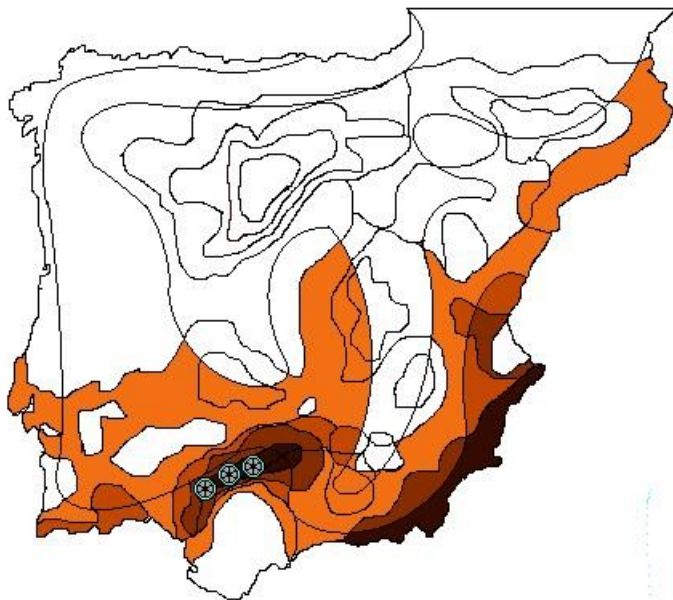


Henna body art, darkened with heat, wrapping, and high lawsone content, consistent with that depicted in medieval Spanish depictions of hands.

North African records indicate that in most Muslim and Jewish homes, a member of the family or a servant applied henna for special occasions and regular henna was done at the *hamam*, the village bath (Westermarck, 1926, Bassano da Zara 1545). If the family was wealthy, a specialist might be hired to apply the henna. Moroccan and Algerian traditions of the 19th century might be presumed to be similar to Spanish traditions of the centuries previous, as the Muslims and Jews fled to these countries after the expulsions from Spain. There certainly were professional henna artists in Spain, as listed on the city tax roles of Rondo, Fez and Seville, large wealthy Muslim cities in the 13th century (Glick, 1979:151-2). These people were of low social status, Sufi, and were classified as *Hinnawi*, henna sievers. The reference to sifting is significant as henna for body art application is sifted to achieve detailed patterning; henna for hair or full sole application does not require sifting. Finely detailed complex patterns were reserved for brides and other special occasions (Messina, 1988). If *Hinnawi* was listed as an occupation on a tax role, then there was enough demand for henna work that a person, usually a woman, so support herself as a henna specialist, and there was good body art quality henna for her to

work with. Moroccan and Algerian henna specialists in later centuries were often older women who had been musicians and entertainers in their youth (Messina, 1988).

“Henna sifter” implies that a person is sifting henna. To be sifted, the henna leaves must have been harvested, dried and ground. Fresh leaves are pounded to a pulp and that pulp is daubed onto the skin in simple patterns, usually lines and dots. Dried, ground, sifted leaves can be made into a paste that is finer, so a person can draw more intricate patterns than would be achieved with fresh plant pulp. Several of the henna depictions from Medieval Spain indicate henna artists were capable of creating complex patterns, including written Arabic words or phrases³. When henna leaves are harvested in present day Morocco, harvesters prune new growth and strip leaves off the twigs. These leaves are dried, and then taken to a cooperative henna mill for grinding.



Location of henna mills on Guadalquivir River
 Areas most likely to be suitable for henna cultivation during the 13th century: ●●
 Areas possibly suitable for henna cultivation during the 13th century: ●●

Henna mills, *arha al-hinna*, were recorded in al-Andaluz west of Cordobz at Munyat Nasr. Henna mills were vertical, and were placed in sequence with horizontal mills along

³ Hennaed Moorish Woman from *Tratado de Ajedrez. Dados y Tablas*, the Book of Chess, Checkers and Dice, 1283, under patronage of Alfonso X, king of Leon and Castile, El Escorial,

a watercourse, because undershot and overshot mills could take advantage of the head needed to operate the former, increasing efficiency of both (Glick, 1979: 232-3). This region of henna mills is in easy transport distance of the warmest areas of coastal southern Spain, where henna could have been grown longest into the Little Ice Age.

Volume of henna required for Moorish population prior to 1567

Henna was used for end of Ramadan, Id al-Adha, and weddings, circumcisions, births, as well as monthly maintenance of hair and fingernails. Some estimate of the amounts of henna used by a Muslim wedding may be taken from photographs and descriptions of henna used at Moroccan weddings and other celebrations. A family with 20 members and guests at a celebration prepared about 300g of henna for bodies, guests, hands, sheep, horses, and dogs for a celebration. A wedding, a circumcison, and Id al-Adha celebration in a year might require 1 kilo of henna for a family. If adult women hennaed waist-length hair once a month, and did their fingernails and soles weekly, that might require 500 g per month, or 6 kilos of henna per year. Wealthier women might require more henna, poorer families less.

There are few population records for Moors in Spain prior to 1567, but some historians estimate that the Inquisition displaced 500,000 Moors. If that can be taken to represent 150,000 adult ethnically Muslim women in al-Andaluz in the 16th century, they might have used 1,050,000 kilos of henna per year. A mature henna tree produces 5 – 7 kilos of henna leaves per year (al-Ashaf, 2002), therefore over 200,000 henna trees would be required to supply henna for the Morisco women of al-Andaluz per year prior to the Edict of Granada. These trees might have been grown in their home courtyards, but the existence of henna mills on the rivers west of Cordoba points to commercial cultivation as well as personal garden growth.

Ethnic pressures following the end of the Medieval Warm Period

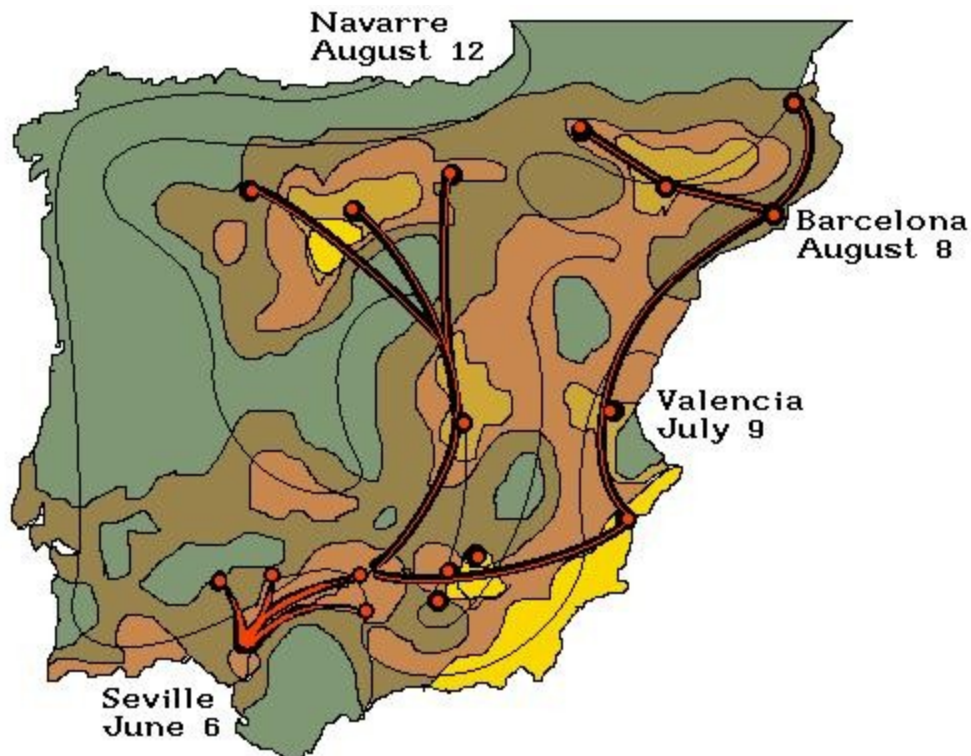
The end of the medieval warm period brought periods of intense heat and drought to Spain. The summer of 1248 was extremely hot and dry, destroying crops. In Cordoba, a city of 500,000, the starvation was so severe that people were reduced to eating cats and dogs. Christians had taken Cordoba in 1236 but had difficulty holding it due to the famine (Fletcher, 1992: 129).

Environmental stresses on population from the climate cooling following the Medieval Warm Period often gave rise to intolerance and persecution, which fell along religious and ethnic lines, particularly when political power was consolidated through pogroms or forced conversions. Expulsions and violence against Moors and Jews in 1348 – 50 followed Black Death epidemics. The Catholic population, encouraged by religious zealots, believed Jews or Moors had poisoned wells or brought the plague through sorcery. The northern, cooler, Christian areas such as Catalonia were depopulated in the Spanish plague years of 1363, 1367, and 1374, while the southern areas and Valencia, where Moors and Jews predominated suffered far less and even grew in population and prosperity (Mackay, 1977: 165). These demographics were interpreted as proof of “pacts with devils” rather than environmentally driven disparities.

The 1390 pogroms were precipitated by a combination of financial pressure and religious revival in southern Castile that preached Puritanism, strict observance, ultra-orthodoxy, and segregation of Jews and Muslims from Christians. This violence was the result of tensions rising from decades of epidemics, failed harvests and currency inflation caused by a cooling climate during the 14th century (Payne 2002: chapt.11).

Severe drought and heat at the onset of the dry season sparked violence against Moors and Jews in Seville in June 1390. Seville was geographically vulnerable to ethnic tension over water because it is a hot, arid area of Spain, relying on the Guadalquivir River for water. When rains failed, ethnic tensions rose because of Muslims and Christians had different systems of water rights and different systems of water usage. The Christian

farmers were wheat growers, and relied on surface irrigation from rivers to grow their crop. The old Roman legal system of land ownership and irrigation rights assured that if a person owned land, they had a right to irrigation from the local river (Glick, 1979: 82). Muslim water rights were very different. Water was stored in underground cachment systems, based on the models in North Africa, Arabia and Yemen, and water was purchased separately from land ownership. “Christian” surface water evaporated during severe droughts while “Muslim” cachment water was conserved (Glick 1970). During the terrible drought year of 1390, Christian violence against Muslims and Jews moved precisely along the lines of greatest drought stress through the driest summer months.



Source and spread of 1390 Pogroms, Christians attacking Moors and Jews because of drought stress and religious fervor ●

Arid region: may suffer severe drought ●●
 Dry region: may suffer prolonged drought ●●
 Moderate region: seasonal drought ●

Map adapted from Fletcher 1992

Moors who were growing and exporting figs, silk, almonds, oranges, citrons and candied fruits for wealthy overseas markets in Egypt, Turkey and Europe (Immaudin, 1965: 127 – 9) had more capital to purchase water than Christians who were farming wheat at a subsistence level. Water theft and lawsuits regarding water rights were the source of extreme ethnic tensions in the droughts of 1413, 1414, 1443, and 1486 (Glick 1970:69-74).

Spain had a period of high inflation after 1445, becoming serious in the 1460's and 1470's when grain prices in Andalusia became catastrophic. Urban riots erupted resulted from the stress of drought and famine in 1473, leading the Monarchy to setup the office of Inquisition in 1478, an institutionalization of popular unrest (MacKay. 1977: 168). Whereas institutions prior to 1391 had largely legislated openness and ethnic tolerance, the anti-converso movements in the late 1400's became increasingly racial. The harshness of religious persecution paralleled the chilling climate

In 1475, a Valencian galleon sailing from Oran, Algeria, was seized and its cargo enumerated. On board was a measure of henna seed bound for Granada (Lluch 2001: 305). Without comprehensive ship manifests for comparison, it is difficult to know whether this shipment is representative, or for what purpose the seed was intended. Presumably, seed would normally be purchased to plant a profitable crop. The present climate of Oran is presently slightly cooler than that of Malaga and Almeria. If the same comparative climates existed then as now, henna would not have been lost to cold in southern Spain without also being lost to cold in Oran, though localized frosts, heavy rains, or floods could have destroyed plantings.

Average temperatures in Oran, Algeria between 1852 and 1992 (NOAA 1992, GHCN1):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
°C	11.0	11.8	13.5	15.6	18.3	21.6	24.3	24.9	22.8	18.8	14.9	11.8	17.4

If henna seed was being imported on a merchant ship to be sold, someone must have been expected to purchase the seed and grow henna. The areas of the henna mills west of

Cordoba were in a Christian held area with Muslim enclaves where there were violent ethnic tensions during the late 15th century. Henna groves may have been destroyed by racially motivated vandalism and farmers decided to replant in a safer area. Or, drought could have ruined trees that required more water than henna, and farmers might have decided to replace those crops with a more drought resistant cash crop. If the climate was cooling enough that henna could no longer be grown in open fields, perhaps the seed was intended for sheltered home gardens.

Between periods of ethnic violence and unrest, the Muslims remaining in the Christian territories were generally allowed to practice their religious and ethnic customs, which would have included the “Night of the Henna”. After the fall of Granada in 1492, Cardinal Ximénez converted many Moors by peaceful means, though private celebration of customs was carried on by people in their homes, out of sight of the Catholics (Lea, 1969).

Criminalization of Henna in the 16th century

In 1492, Catholic forces captured the Muslim Kingdom of Granada, and Muslims were required to convert to Christianity. Granada was small and economically weak, and not self-supporting in food (Fletcher, 1992:157), so conquering was inevitable without support from North African Islamic states, which at that time were in political disarray.

Cardinal Ximenes baptized 3000 Muslims on December 18th, 1499, though most conversions between 1490 and 1525 during this period were pro forma. Muslims would bring children to baptism but would wash the “Holy Water” off them when they got home (Fletcher, 1992: 167). The converts were required to surrender all books in Arabic, thousands of which were destroyed by the Cardinal in a public bonfire. Only a few rare books, or books on medicine were kept for the University. In 1500, over 1,005,000 books on Moorish culture were burnt in the Vivarrambla public square. Muslims forfeited all rights under the terms of capitulation, and were given the choice of baptism

or expulsion. At Andarax, women and children took refuge in the principal mosque, which was then ordered blown up with gunpowder (Kamen, 1998)

The laws written by the office of Inquisition indicate that converted Moors, Jews and Christians continued henna use after 1500. The Edict of Granada, in 1526, made henna use illegal. Mari Gomez la Sazeda pleaded to the court that henna use was not necessarily a Muslim custom, and that Christian women regularly hennaed their fingernails and hair. The court suspended the ruling. In 1530, Angonio de Guevara, the Bishop of Guadix complained to the chancellery of Granada of henna use among his female parishioners, but Captain-general Mondejar, intervened and repeated that henna use had nothing to do with the Muslim religion (Lea, 1968:130 from Marmol Carvajal, *Rebellion y Castigo*: 164). At that point, a person using henna could be arrested and tortured to determine the reason for henna use: if it was determined that henna had been used for for Ramadan, *ghusl* (the Muslim and Jewish purification bath), with prayers to the new moon, Id al-Adha, Night of the Henna, circumcision or birth, the person was convicted of heresy and put to death. If Inquisitors determined that the prisoner had only used henna had been used only to dye hair and fingertips, with no accompanying forbidden practice, the woman was released from prison. Over 90% of women arrested during the Spanish Inquisition were charged with henna use, indicating that henna use remained widespread into the 16th century (Lea, 1968:130-2).

On January 1, 1567, the Edict of Granada was enacted, and copies printed and distributed with the intention of driving the Moriscos, the ethnic Muslims who had nominally converted to Catholicism to despair. The articles of the Edict specified that henna be abandoned. All public and private baths were to be destroyed, where henna would have been applied. Betrothal, marriage and feasts were to conform to Catholic rituals, and doors must be kept open during these celebrations so that they could be examined for illegal activity (Lea 1968:228-90). All these household celebrations would have included henna, and henna was forbidden. Any person found bathing, using henna, abstaining from wine, refusing to eat pork, owning a book in Arabic, or having a Muslim surname was arrested, imprisoned, and tortured to confession, and put to death or expelled. All

births had to be attended by a Christian midwife, to be certain no Muslim rituals, such as hennaing the mother and child, were administered (Encarta 2001). These laws, especially those requiring open doors indicate that the private use of henna for weddings, circumcisions, births and Id al-Adha had continued through the expulsions.

150,000 moors were forcibly resettled, 300,000 expelled. Areas were depopulated of skilled labor and this loss was a harsh blow to the economy. Valencia alone lost 1/3 of its productive adults (Fletcher, 1992:168 – 9).

Following henna's criminalization, plants surely would no longer have been cultivated commercially, or kept in household gardens. Any henna plants following 1567 would have grown without cultivation, or the owners would have fallen under suspicion of being Muslim and subject to arrest. In 1590's there were unusual snowfalls in Spain, and frosts in 1600 as the Little Ice Age continued to cool Europe. Henna may not have survived untended, and simply retreated in growth zone back into North Africa, though it was not entirely forgotten. In 1727, a community of Moriscoes in Granada was charged with performing heretical acts, and were burnt or hanged. They were charged with washing themselves during the daytime, abstaining from pork and wine, and using henna (1911 Edition Encyclopedia <http://63.1911encyclopedia.org/I/IN/INQUISITION.htm>).

Climate, culture, religious and ethnic tensions all contributed to the Edict of Granada's ruling to arrest and torture any person found using henna, resulting in a 430-year interruption of henna art between the Inquisition and present day Spain.

Reading Climate Change and Culture through Henna:

Tenth and eleventh century manuscripts showing dark, nearly black dark henna stains, come from a semi-arid zone in central Northern Spain. Henna stains this dark are only obtainable in a few ways. Fresh henna grown in temperatures above 35CF, with in drought conditions, pulped and applied to the skin, will make dark brown or nearly black stains. Stains from henna grown at temperatures over 35C, then bathed in an alkaline, such as ammonia will turn black, as shown in

the following photograph. Dried henna grown in temperatures over 40F with extreme drought conditions, mixed with lemon juice, then wrapped or steamed, will make dark brown to near black stains on skin. Winter minimums required to grow mature trees to produce the henna necessary to create dark stains would have to have been above 11C for five years or more.



Henna grown in Rajasthan, dried, and exported, applied and darkened with ammonia.

Manuscript illustrators may be presumed to draw things that they have some personal experience with. If the illustrators of these manuscripts depicted henna stains as brown to near black, then it may be presumed that they were familiar with dark stains rather than red or orange stains. That may offered as evidence that the illustrators were living in an area where henna had very high levels of lawsone, and a sufficiently hot, arid climate to produce that lawsone.



detail, Biblia Primera Leon, R.C San Isidro 2 fols 97, c 960 (Mentre', 1996: 97)

The Saint Biblia Primera Leon, R.C San Isidro 2 fols 97, c 960 , painted in 960, has nearly black stained fingertips, comparable to henna stains achievable from current henna crops from Pakistan, Rajasthan and Yemen. Further paintings from the same area and period all have these characteristic dark hand, arm, and fingertip stains. The deliberate fingertip marking in this Biblia Primera detail from Leon, 960, eliminates the possibility that the fingertips are smeared ink.



detail, Valladolid Beatus, c 970, Valladolid B.U. 422 fol 98v, Opening of the 6th Seal Rev VI, 12 – 17, (Mentre', 1996: 136)

Others of these dark fingertips might be from inks wicking away from painted lines, or degradation, so each has to be evaluated separately to determine if the dark stains are accidental, or if they represent deliberate henna representation. The Valladolid Beatus, above, c 970, seems to show a representation of symmetrical patterning up the arms, similar to 19th century Moroccan henna patterning. Other pieces, such as the San Millan “St. John’s Message” detail following, may be either depictions of henna or inks bleeding out from lines. However, when paired with other manuscripts from the same area during the same period, which do have clear hand markings consistent with henna, a henna interpretation has stronger support. These would then read as evidence through henna that Leon and San Millan area in north central Spain, or some area very near there, was experiencing high temperatures and prolonged droughts through the 10th century.

When possibly ambiguous hand markings, such as these on angels in the Beatus of San Fernando, (following images) can be coupled with other details in the same piece, such as the musicians below, which have more clearly deliberate darkened fingertips, it is easier to conclude that dark fingertips are depictions of henna. Depictions of henna stains on angels and musicians are also consistent with Arabic manuscripts of the same period and Egyptian Coptic Christian manuscripts of the same period. Arabic and North African cultural connections as well as climate conditions can be read through henna in these manuscripts.



San Millan Beatus, late 10th c, Madrid R.A H. 33 fol 68, St. John's Message to the church of Thyattra
Rev. 18029 (Mentre', 1999: pl 39)



detail, Leon Bible c 920, Leon Cathedral, 6 fols 209 Canon Tables (Mentre', 1995: pl 124)



details from Beatus of Fernando I, Madrid, c 1047, Celestial Liturgy Rev IV 6-V, 14, Bibl Nac Vit.
14, 2, fol. 116v (Mentre' 1996: 127)

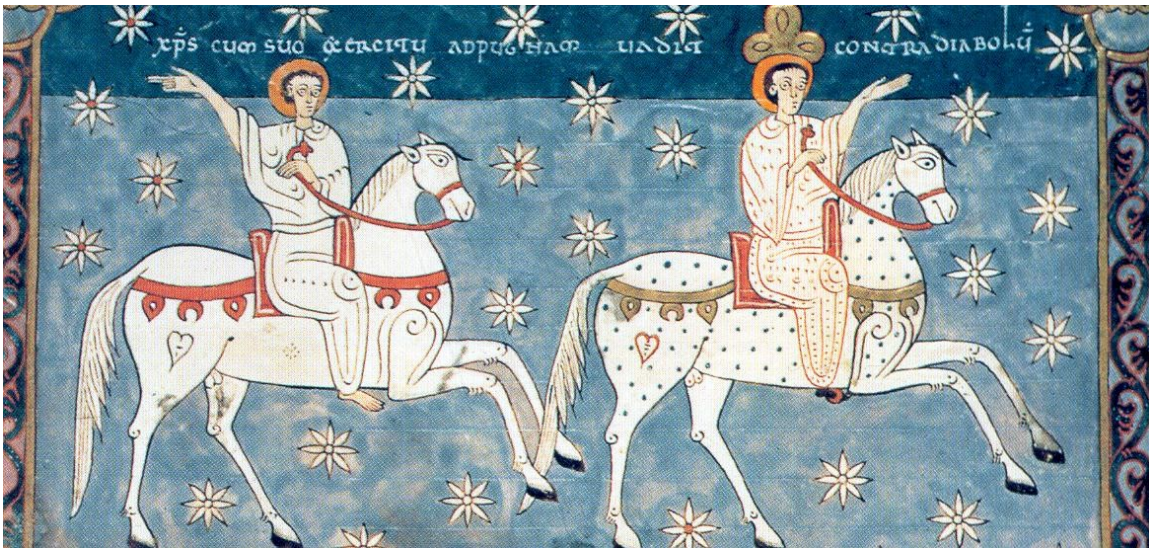


detail from **Beatus of Fernando I, Madrid, c 1047, Celestial Liturgy Rev IV 6-V, 14, Bibl Nac Vit. 14, 2, fol. 116v (Mentre' 1996: 127)**

When there are numerous depictions of stained fingertips consistent with henna in a single document, the evidence is stronger that the artist's intention was to depict henna and was personally familiar with henna. These depictions, and others in the *Beatus of Fernando I*, support a reading through henna of high temperatures and prolonged droughts in or near Madrid through at least 1030 to 1047 CE.



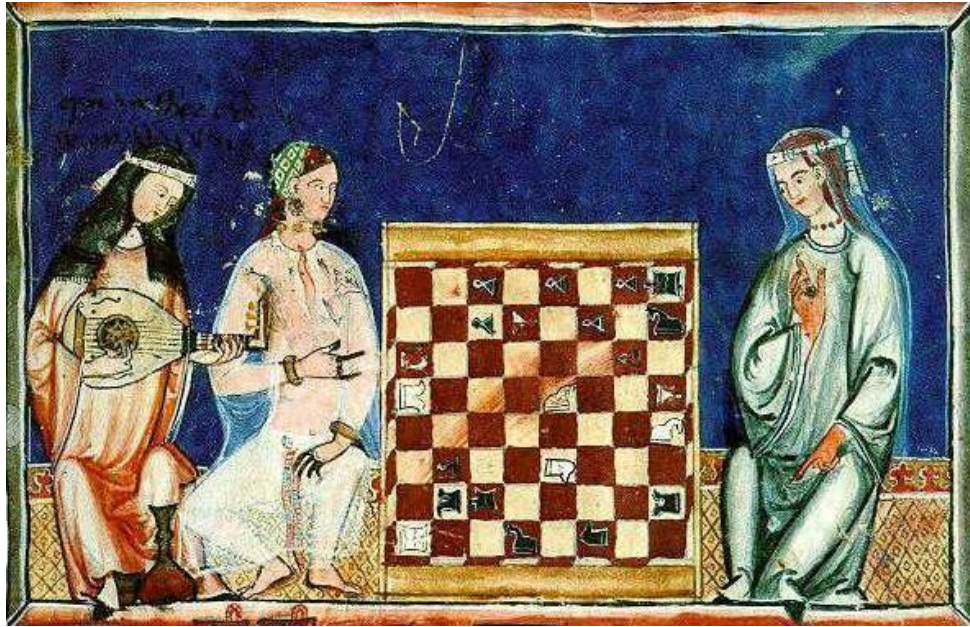
Beatus of Fernando I, Madrid, c1047, Bibl Nac. Vit. 14.2, fols 253v-254, The Heavenly Jerusalem Rev xxI 1-27 (Mentre' 1996: 130)



The Heavenly Armies, c 1047, Rev, XIX, 11- 16, Beatus of Fernando I, Madrid, Bibl. Nac. , Vit. 14.2, fol. 240 (Mentre' 1996: pl. 96)

The depiction of “*The Heavenly Armies*”, also in the *Beatus* of Fernando I, show horses with henna patterns on their flanks. North African and Middle Eastern Muslims often hennaed horses at Id al-Adha, at a springtime festival, and important personages hennaed their horses to protect them from the Evil Eye. No similar horse markings are depicted in other European art. The artists in Spain must have had personal knowledge of how henna stains skin, fingernails, and horse flanks to include them in their paintings. This knowledge of henna characteristics implies henna proximity, and thus can be read as information about climate and culture.

At the end of the Medieval Warm period, into the cooling of the Little Ice Age, Christian armies conquered Muslim territories. During Convivencia, there are depictions of henna on women’s hands, both very dark brown and the red-orange henna colors. These can indicate different harvesting temperatures, different application techniques, or different times in stain development. The women’s hennaed hands *Tratado de Ajedrez Dados y Tablas* from 1283 shows both red and dark henna on two women in the same room. One could be a depiction of matured henna stains, darkened about 48 hours after application and the other could depict hands with henna just removed when the stains are still orange.



Hennaed Moorish woman from *Tratado de Ajedrez Dados y Tablas*, the Book of Chess, Checkers and Dice, 1283, under patronage of Alfonso X, king of Leon and Castile, El Escorial

Henna stains as dark as those on the woman on the left would have to have been created by henna with a very high lawsone content, from intense heat and drought.



The detail of the Moorish woman's hands in *Tratado de Ajedrez Dados y Tablas* have markings below the knuckles consistent with writing done on the skin with henna. The

woman on the right has stains consistent with a brief application or low dye content henna.

However, 1283 is the last time in central Spain when there are depictions of henna in the dark brown to black range. Later henna depictions come from the southern coast, and are only red-orange. The ceiling of the Hall of Kings in the Alhambra, painted in the late 14th century depicts a knight rescuing blonde women in a scene illustrating courtly love. These women have hennaed fingertips and fingernails, though the henna is depicted as red-orange rather than near black.



Female figure from the ceiling of the Hall of Kings, Alhambra, late 14th century (Stewart, 1974: 97)

These henna stains may be taken as evidence that 14th century cooling climate was reducing the dye content of henna crops by the late 14th century. Phases of cold and deluge between 1310 and 80 were recorded in S. France and N. Italy, but flourishing silk Spanish industry during that period indicates frost-free areas remained in southern Spain through that period. Henna could grow, but in cooler conditions than the Medieval Warm Period. The North Atlantic oscillation with Greenland below brought deluges to much of Europe, but the westerlies and the southern position of the Gulf Stream sheltered temperatures in Spain (Fagan, 2000: 23-30). There were still severe droughts in Spain through the 14th century, favoring henna cultivation.



Female figure from the ceiling of the Hall of Kings, Alhambra, late 14th century (Stewart, 1974: 97)

Spain's climate on the southern coast in the late 14th century may be read in the Hall of Kings female figure's henna stains as less hot and dry than central Spain 400 years earlier. Her hair may also be read as blonde hair dyed with low dye content henna.

When the Spanish Inquisition burned hundreds and thousands of Arabic manuscripts, they surely destroyed other more specific and continuous evidence for Spain's climate changes that could be read through henna, so only fragments of the Spanish Medieval henna culture can be studied. By 1560, henna was banned upon pain of torture and death, and the positive images of hennaed and

henna-haired women ended. For hundreds of years following, European women with red hair were suspected of being witches, heretics, non-submissive, or at least suspected of dangerous, mysterious, and wanton behavior.

Conclusion:

Henna was a valued part of adornment for Muslims, Jews and Christians in Spain from the period of Moorish conquest until the final expulsion in 1567. Henna thrived in the hot, arid conditions during the Medieval Warm Period, and continued in sheltered southern areas well into the Little Ice Age. Henna may have grown in Spain during periods of climate warming many times during the Holocene and retreated to North Africa in cool periods. Henna could have been imported by human activity as a part of Phoenician, Punic, Jewish or Muslim ethnic tradition, or through avian migration from North Africa. Henna was probably grown in Spain well into the Little Ice Age, as were oranges, in sheltered southern gardens. Spain's climate changes can be read through depictions of the color variation in henna stains through these periods.

Henna was outlawed in Spain because climate changes associated with both the Medieval Warm period and the Little Ice Age created conditions of drought, famine, and epidemic which exacerbated the tensions between Romanized Catholic Spain and Arabicized Moorish Spain who had two different irrigation and land management systems.

The Roman system of water management and agro-ecology was unsuitable for extended drought periods with high evaporation rates because it relied on ground diversion of river water. The Arab system of water management and agro-ecology was suitable for extended drought as it relied on underground cachment systems. Roman irrigation system guaranteed water for landowners. Arab irrigation held water rights separate from land ownership. This caused social strife over water rights and famine, which resulted in increasing tensions along ethnic lines.

Though Christians had used henna in Spain, it was unfamiliar to Europeans immigrating from the north to colonize lands reclaimed by the Catholics. In northern Europe, cold climate prevented henna cultivation. Stained hands, to the northern Catholics, were a symbol of Muslim and Jewish traditions. The Inquisition, driven by northern Catholic zealotry, saw henna as associated with secret, heretical Islamic and Jewish ritual rather than a non-religious cosmetic and celebratory adornment well integrated into the Mozarabic Christian community. The Inquisition targeted henna along with other Arab traditions such as bathing, abstaining from alcohol, and refusal to eat

animals that had died of disease or old age. Nearly all women arrested during the Spanish Inquisition were charged with use of henna. When they protested that henna could be used by Christians without any connection to Jewish or Muslim tradition, they were tortured to determine if henna had been used in conjunction with forbidden acts such as bathing, Id, Ramadan or marriage.

The social tensions, and resulting pogroms, expulsions, and criminalization that arose from the climate changes between 711 and 1567 were more destructive to henna than the climate change itself. Indirectly, droughts and famines, plagues and economic disasters brought by NAO oscillations and a reduction in solar activity resulted in women being arrested and tortured for using henna, and the end of henna body art in continental Europe for over 400 years. Though few documents remain that show henna in medieval Spain, the climate and cultural changes from 900 to 1600 can be read through henna depictions and legislation.

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