

CULTIVATION METHODS AND CULTURAL MOTIVES FOR GROWING “FLOR DE MUERTO” (*Tagetes erecta* L.)

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ABSTRACT

The cultivation and traditional use of cempoalxóchitl flowers (*Tagetes erecta* L.) for “Day of the Dead” is a little studied subject. In this essay, information about festive activities and use of the cempoalxóchitl, as well as cultivation practices and cultural motives were qualitatively analyzed, using interviews undertaken in Mexican communities, direct observations, ethnohistorical sources and scientific publications from a 19 year period. The festivity manifests certain aspects in common, while others such as cultivation vary. Sowing is carried out by seedbed-transplant, or directly in tilled soil, either without a furrow or in a furrow; the first two of these practices being pre-Hispanic in origin. Traditional planting, from mid-June to mid-August, coincides with the months of the Mexica calendar, when cempoalxóchitl flowers were used. Concerning varied methods and planting times, associated with environmental and ethnic diversity, the emergence of immature flower buds occurs at the end of September, beginning of flowering and full flowering in the middle and at the end of October, respectively, corresponding to pre-Hispanic months when the dead were not celebrated and nor was cempoalxóchitl used. In the pre-Hispanic funerary area and current pantheon of Mitla, the presence of the cross is considered as a symbol of life and death, associated with the sun and cempoalxóchitl flowers.

Keywords: Ethno Agronomy, syncretism, pre-Hispanic festivals, archaeoastronomy, planting dates, culture.

INTRODUCTION

In Mexico, the theme of death and the descriptions of cultural manifestations related to it, take on special significance on “Day of the dead” and numerous writings on this festivity highlight anthropological, ethnographic, historical, archaeological and philosophical aspects (Arqueología Mexicana, 1999; Vela, 2017). From the broad cultural polychrome that distinguishes our country, the celebration of “Day of the Dead”, “All Saints” or “All soles”, is recognized as a distinctive aspect of national identity, fully corroborated by the native terms that refer to it: Miccailhuitl (nahuatl), Ninín (Totonaco), Xantolo (Huasteco) and Animechakejztakuca (Purepecha) (Serrato, 2004); this is a traditional celebration that manifests profound religious syncretism, resulting from the Catholic and indigenous attitudes to death (Sierra, 2002). The current celebration of “Day of the Dead” in the region of our country in Mesoamerica is accompanied by the use of various symbolic elements that Mexicans bring together to evoke, remember and celebrate those who have already died.

The use of plant offerings in the altars of the house or on the tombs in the pantheon, especially the offering of cempoalxóchitl flowers (*Tagetes spp.*) known as “cempasúchil”, “flower of the dead”, “flower with 400 petals” or “twenty flowers”, represents one of these symbolic elements. This plant resource, as an offering in the grave yard and on the house

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altar, is accompanied by other offerings, including: various flowers, fruits, drinks, prepared foods, photographs, candles and copal to burn. Prior to the arrival of the Spaniards, the Nahuatl-speaking indigenous people recognized that the cempoalxóchitl plant comprised several species, known as female and male cempoalxóchitl (*Tagetes erecta* L., the largest flower and the most used), macuilxóchitl (*T. lunulata* Ort.), tepecempoalxóchitl (*T. patula* L.), oquichtli, tlapalcozatli, tlapaltecacayac, tzitziquilitl, yiahutli (*T. lucida*) and zacaxochitlcoztic (Castro, 1994; Vázquez *et al.*, 2002; Serrato, 2014); this range of species was linked to the solar star due to its shape and color (Vázquez *et al.*, 2002; Serrato, 2014), and a reminiscence of that past is found in the word tonalxóchitl (flowers of the sun), which is the name given to some cempoalxóchitl species that grow in the countryside in Malinalco, State of Mexico, (Vázquez *et al.*, 2002).

The path of the Sun through the celestial dominions was conceived as “a path planted with flowers that bloom during the dry season and give off pleasant aromas” (Dupey, 2015). In Sahagún’s accounts (1999), he mentioned that Aztec religious rituals, coordinated with the position of the sun in the celestial dominion and its coloration during the day, and throughout the year, were reproduced at dawn, noon and dusk; moments that correlated particularly with the notions of initiation, ripeness and end of life. Hence, the bright colors (yellow, orange and red), heliacal shape and particular aroma of the flowers of cempoalxóchitl (*T. erecta*), predisposed its use to create bouquets, canes, garlands, necklaces, crowns, as well as providing flowers and loose petals during various pre-Hispanic religious rituals depicted in the Aztec solar calendar (Florentine Codex, 1980); therefore, these formed the basis for their cultivation and selection, as evidenced by graphic representations of these plants, their cultivation and their use, in illustrations from the Florentine Codex (1990).

According to information portrayed in works from the 16th century by Fray Bernardino de Sahagún (Sahagún, 1999) and Fray Diego Durán (Durán, 1995) concerning the use of cempoalxóchitl flowers during the Aztec year of 18, 20 day months and five additional days, these were not used in celebrations related to the dead at the end of October or the beginning of November (Serrato, 2004). The 1st and 2nd of November in Mexico correspond to a Catholic festival of great syncretism, in which the abundance of offerings, food and vegetable products, both in the cemetery and on the altar of the house, are symbolically related to the end of harvests (Broda, 2000), although proposals to improve understanding of this syncretism are not ruled out, Serrato (2004) states that because the traditional cultivation of cempoalxóchitl is scheduled to provide flowers for the first two days of November, the traditional use of these flowers on these dates, varies from those referred to by Durán (1995) and Sahagún (1999).) meaning that the use of these flowers may be explained by a masterful syncretism, for which after the Spanish conquest, the pre-Hispanic cultivation of cempoalxóchitl underwent changes or adaptations in its agronomic management, in particular, the modification of the planting date, in order to produce flowers during a single period (end of October), as opposed to the months Tecuilhuitontli, Uey Tecuilhuitl, Tlaxochimaco, Xocotl Huetzi and Ochpaniztli of the Mexica calendar, when Cempoalxóchitl flowers were used.

Current traditional management of this crop, in order to obtain these flowers at the end of October, is a pre-Hispanic cultural remnant of great syncretism, but little recognized,

which was adjusted to the Catholic celebration of the “All saints”, brought from Spain (Vela, 2015), for which the use of the aforementioned plant species remained as a very distinctive indigenous cultural trait. If the proposal that there were adjustments to the agronomic management of *cempoalxóchitl* to achieve a syncretic effect with the Spanish celebration of the Day of the Dead is adhered to, then: what aspects of the indigenous cultural corpus were cared for or preserved with the new management scheme implemented by the indigenous population, whose moments of planting and use of the plant were very different from the pre-Hispanic dates of planting and use of this species? The floral characteristics that guided the use of *cempoalxóchitl* in pre-Hispanic times (Florentine Codex, 1980), for 3000 years in Mesoamerica (Souleé, 1996), continue to be valid as a result of traditional knowledge that, among other aspects, highlights the importance of the color of these flowers, as if it were the sun that guides the souls that are in the dark on their journey back to their material home, or concerning the case of the aroma, which is ethereal, invisible and attractive; as though these particular qualities facilitate communication with the essence or spirit of the dead.

Unpublished field notes indicate a somewhat different panorama than what is frequently asserted concerning the motives for the use of *cempoalxóchitl* and its importance for “Day of the dead”. This indicates the necessity for a more profound study of the cultural contexts that are implicated in the preference for these flowers in this religious celebration with syncretic origins. In this regard, empirical information obtained in the area of Mitla, Oaxaca reveals complementary elements to those referred to in the works of González (1997) and Flores (1999) on the Day of the Dead in the aforementioned locality, a panorama that is convenient to discuss, due to the relationship between this religious festivity and the use of *cempoalxóchitl* flowers; a topic that has only been addressed in a limited way (Castro, 1994; Jiménez *et al.*, 2001) with few updates (Serrato, 2004).

Considering that few available works discuss the previously mentioned topics (Castro, 1994; Jiménez *et al.*, 2001; Serrato, 2004), the objective of this essay was to describe for the first time, traditional knowledge concerning the celebration of the Day of the Dead, cultivation and use of *cempoalxóchitl* by the Mixtecs of Oaxaca and Totonac-Nahuatl from Puebla, ethnoagronomy of cultivation in various indigenous communities, providing context from ethnohistorical information, as well as information from Mitla related to possible cultural motives for the celebration of the Day of the Dead and *cempoalxóchitl*. All this intended to expand information concerning the culture surrounding the traditional use of this plant and specific aspects of management practices by different ethnic groups in Mexico, in addition to generating explanatory approaches on the syncretism that favored the indigenous population to continue using the flowers from this plant, after the arrival of the Spaniards in Mesoamerica.

MATERIALS AND METHODS

To compile this essay, we systematized information recovered from different field work experiences, carried out from 1999 to 2017, in addition to reviewing different significant documents on the subject; even though these were scarce, with most published around

the year 2000. Topics to be analyzed corresponded to: 1) general description of the Day of the Dead festivity in two contrasting indigenous communities, including the traditional management and use of *cempoalxóchitl*, thereby seeking to highlight aspects of similarity or difference, particularly in relation to cultivation, in order to subsequently further investigate ethnoagronomic knowledge pertaining to *cempoalxóchitl*; 2) describe cultivation practices that persist in different geographical and cultural regions, linking these with ethnohistoric sources and specialized works, and; 3) recapitulate with reference to field experiences and consultation of ethnohistoric sources, as a means of discerning other cultural motives linked to the use of *cempoalxóchitl* flowers.

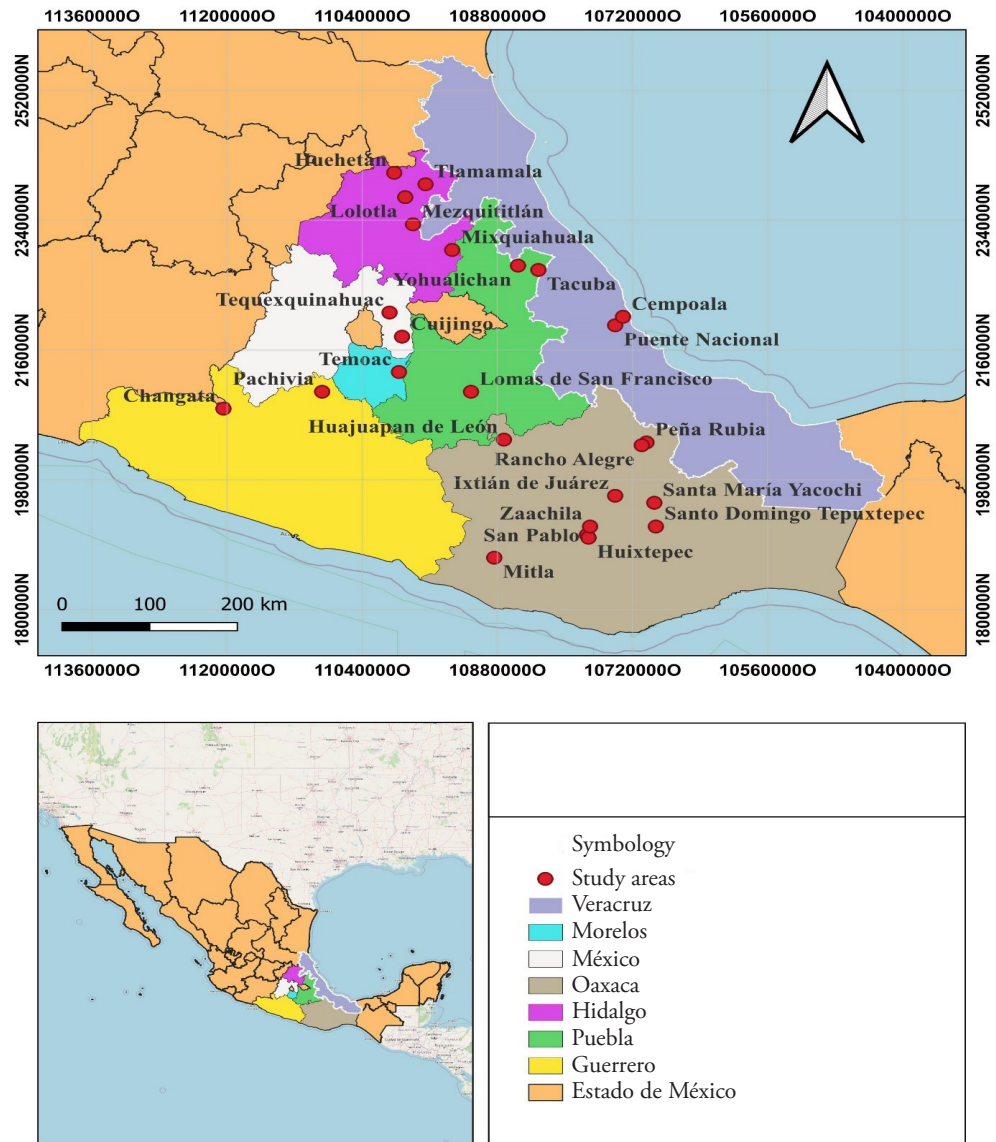
Celebration, cultivation and traditional use. In the period from 2000 to 2002, Nicolás Julián Péres Gallardo (Oaxaca) and René Martínez Arriero (Puebla), students from the Phytotechnics Department of the Autonomous University of Chapingo (UACH), who originated from contrasting communities in terms of environment and culture, obtained information concerning the Day of the Dead festival by means of interviews, as well as the cultivation and use of *cempoalxóchitl* flowers; ethnographic work that sought to respect the local language. The target communities were: Guadalupe Cuauhtepac, San Juan Bautista Suchitepec, Huajuapán de León, Oaxaca in the Mixteca Alta region, pertaining to the Mixtec cultural group; Tacuba, Hueytamalco, Puebla in the Sierra Madre Oriental, pertaining to the Totonac-Nahuatl group (Figure 1). A descriptive analysis was obtained from this information.

Cultivation practices

Information was collected on the traditional management of *cempoalxóchitl* in various localities and among different cultural groups in Mexico (Table 1; Figure 1) with help from undergraduate students pertaining to the Department of Phytotechnics (UACH), during the first days of November from 1999 to 2017. Particular reference was made to the form and date of establishment of plants in the field (Table 3) and their phenology in terms of qualitative aspects. This field information was compared with the scarce ethnohistoric documentation available on the subject (Florentine Codex, 1980; Durán, 1995; Sahagún, 1999) and other documents (Anonymous 1944; Serrato-Cruz and Rivera-Méndez, 2002; Vela, 2015 and 2020) to elucidate on the syncretism of the use of *cempoalxóchitl* for “Day of the Dead”.

Cultural motivations

Besides reviewing information on the ethnobotany of *cempoalxóchitl* (Kaplan, 1960; Neher, 1968), ethnohistorical sources (Durán, 1995; Sahagún, 1999), pertinent scientific information on the aroma (Dupey, 2015; García, 2015; Houston and Newman, 2015; Salehi et al., 2018) and background context, concerning the central valleys of Oaxaca and Mitla (Fernández, 1997; Winter, 1997; Flores, 1999; Matos, 1999; Robles, 1999), field information related to ethnography of the Day of the Dead festivity and use of the *cempoalxóchitl* in the town of Mitla, Oaxaca was assessed (Figure 1), as were basic aspects of archaeoastronomy related to the archaeological area at this location, in the custody of the Instituto Nacional de Antropología e Historia; all this, taking advantage of short stays



Source: own elaboration.

Figure 1. Exploration sites on some agricultural practices and cultural mobiles of the cempoalxochitl (*Tagetes erecta* L.) in Mexico.

in this locality during cempoalxóchitl seed collection trips, in October and November from 2002 to 2005.

RESULTS AND DISCUSSION

Traditional knowledge about cempoalxóchitl for Day of the Dead

Mixteca alta. The sowing of cempoalxóchitl takes place from June 19 to 24. The seed bed is established at the edge of the milpa or on the family land. Sowing can be achieved

Table 1. Ethnic groups and environmental characteristics of communities in Mexico, for which field and documentary information were obtained concerning cempoalxóchitl (*T. erecta*) management practices.

State, Municipality, Community	Ethnic group	Location		Altitude (m)	Climate	Chief land form
Guerrero						
Ixcateopan, Pachivia	Chontal- Nahuatl	18°33' 99°36'	N W	1700	Sub warm- Sub humid	Sierra
Ajuchitlán, Changata	Cuitlateco	18°21' 100°39'	N W	300	Semi warm- semi humid	Depression
Hidalgo						
Huejutla, Huehuetán	Huasteco- Nahuatl	21°07' 98°50'	N W	172	Extreme warm	Abrupt hill
Huazalingo, Tlamamala	Huasteco- Nahuatl	20°59' 98°30'	N W	1600	Warm sub-warm	Sierra
Lolotla	Huasteco- Nahuatl	20°50' 98°43'	N W	1600	Warm sub-warm	Sierra
Sn Agustín, Mezquititlán	Otomi	20°31' 98°38'	N W	1380	Cold Temperate	Glen
Mixquiahuala	Otomi	20°13' 98°13'	N W	2100	Temperate	Plateau
México						
Amecameca, Cuijingo	Nahuatl	19°29' 98°53'	N W	2300	Temperate	Valley and light hill
Texcoco, Tequexquihuahac	Nahuatl	19°47' 98°82'	N W	2300	Temperate	Foot mountain and lomerio
Morelos						
Temoac	Nahuatl	18°50' 90°10'	N W	1760	Temperate sub-humid	Valley
Puebla						
Tepexi de Rodríguez Lomas de Sn Francisco	Popoloca	18°34' 98°01'	N W	1750	Dry Temperate	Plateau- Lomerio
Hueytamalco, Tacuba	Totonaco- Nahuatl	19°98' 97°30'	NW	1900	Wet Temperate	Abrupt Lomerio- Sierra
Cuetzalan, Yohualichan	Totonaco- Nahuatl	20°02' 97°31'	N W	600	Semi-warm Humid	Abrupt Lomerio
Oaxaca						
Chiltepec, Peña Rubia	Zapoteco	17°98' 96°18'	N W	20	Semi-warm humid	Plain
Jacatepec, Rancho Alegre	Zapoteco	17°87' 96°20'	N W	60	Semi-warm humid	Plain
Zimatlán, La Ciénega	Zapoteco	16°51'	NW	1976	Semi warm- semi-humid	Valley
Zimatlán, San Pablo	Zapoteco	96°47'			Valley	
Huixtepec, San Pablo	Zapoteco	16°49' 96°46'	NW	1484	Temperate-hot summer	Valley

Table 1. Continuation.

State, Municipality, Community	Ethnic group	Location		Altitude in m	Climate	Topography
Huajuapán de León,	Mixteco	17°59'	N	1987	Sub-humid	Sierra Lomerio
San Juan Bautista Suchitepec, Guadalupe Cuauhtemoc		97°40'	W		Summer rains	
Ixtlán de Juárez	Zapoteco	17°19' 96°29'	N W	1420	Temperate	Sierra
Zaachila	Zapoteco	16°57' 96°45'	N W	1521	Semi warm- Semi humid	Valley
Tlahuilotepéc, Santa María Yacochi	Mixe	17°14' 96°04'	N W	2271	Cold Temperate	Sierra
Santo Domingo Tepuxtepec	Mixe	16°57' 96°03'	N W	2067	Semi-warm Humid	Sierra
Veracruz						
Puente Nacional	Zapoteco	19°20' 96°29'	N W	100	Intermediate Warm	Plain
Cempoala	Totonaco	19°26' 96°24'	N W	25	Semi-warm Humid	Plain

Source: elaborated from own data.

by random surface sprinkling or by placing row of seeds along a furrow; then this is swept with jarilla branches or some other shrub to cover the seeds. Later, this is watered using a bucket with small holes pierced at the bottom, so that the water falls like rain. The seedling nursery is covered with some twigs or branches, so that it does not dry out quickly and that animals, such as birds and chickens, do not scratch it. The quantity of seeds used for sowing is measured according to the number of double heads (individual ray florets). The emergence of the plants becomes apparent five to seven days after sowing. When the seedlings are large, the branches are removed so that they can develop fully. The nursery plants are only watered if it doesn't rain; when they have already developed (after approximately a month), the leafy seedlings are uprooted or separated for their transplant. Transplanting is undertaken into furrows separated by approximately 50 cm; in the furrow, two to three plants are placed every 30 cm (separation between plants). Unselected plants are left in the nursery, so they can continue to develop.

As for the type of soil selected for the transplant, this can be of any type, but deep enough for the roots to develop. Fertilizer or some kind of organic compost is applied at this point, such as goat manure. Earthing up, or bringing the earth closer to the base of the plant is done with a hoe, and at this moment it is also weeded manually. Weeds that compete with the crop include: secondary vegetation and acahuals (small sunflowers). This is the only laborious practice that is undertaken; from now on, the crop is only cared for and watered as required. The first unopened flower buds begin to appear in the last week of September and the first flowers (open) in the first week of October; It is evident that plants are in full bloom as from the 20th of this last month. In this community, there are no pests or diseases in the plots with cempoalxóchitl, but heavy rains or hail can destroy the entire

crop. On October 31, most people go to their cultivated plot and cut bunches of about 30 cm in length; choosing branches that have double heads; at the same time, the flower for the dead (*T. lunulata*); a species related to cempoalxóchitl that grows naturally, is cut from the plots and these are used to decorate the altar.

The dry double heads are kept in plastic bags and hung on the ceiling or walls of the “troje” (agricultural product store) or in some part of the kitchen for the following year’s planting. The grandparents describe how the sowing of cempoalxóchitl was previously undertaken, directly on a slope in the maize plot, and when the latter was earthed up, this was also carried out for the cempoalxóchitl because the two were associated; they also recount that the furrows were formed using the plow pulled by the team (oxen) and that the women let their hair down and planted the maize seed and cempoalxóchitl, because they believed that only in that way would double flowers be produced; they also say that one or two red rags were hung over the crop to “prevent an eclipse or evil eye from occurring”. Cempoalxóchitl flowers are used as an offering on altars in the house and in the graveyard. As of October 30, the people in this community begin to create their altars. In the afternoon, they cut the reeds and fruits, among other components. First, in front of the altar they place a small table, form an arch with the reeds and tie these to the supports of the table; immediately after this, the arch is covered with the stems of day of the dead flowers (*T. lunulata*), and completed with some cempoalxóchitl flowers.

Later, from the arch they hang loaves of bread, created in the form of animals and humans, oranges, tangerines, sugar figures, etc. On October 31, most people who go to the graveyard, only place flowers for children who died. As for the altar of the house, a table is installed, on which foods such as boiled corn cobs, pumpkin, chayote, honey, mole, beans, tortillas, atole (maize gruel), water and candles are arranged, along with copal incense. On the first of November, at five in the morning, a group of people gather in the graveyard to accompany the souls that come “from beyond.” People form lines and in their hands they carry cempoalxóchitl flowers and candles and they pray in front of the church. Starting at three in the afternoon, the sextons ring the church bells with a double toll. Some women go to decorate the altar of the church with cempoalxóchitl and other flowers.

At night, starting at nine o’clock, one of the sextons goes out accompanied by other young people to go from house to house collecting offerings, and although this is not compulsory, everyone cooperates by donating something from what is on the house altar. The sextons and young people consume what has been gathered that night. At the same time, these sextons continue to ring the bells with the double toll. On November 2, the people from the community, and those who come from elsewhere, go up to the graveyard in the morning when the sun is not strong, or in the afternoon, carrying their cempoalxóchitl and other flowers, as well as candles and water. In the graveyard, visitors place bunches on the graves in this order: first, they visit their closest relatives who are also offered candles; pray for them and sprinkle holy water on the grave; then they visit distant relatives, friends, godparents and close friends, among others. At three in the afternoon, the sextons stop ringing the church bells with the double toll and a group of people leave the sacred precinct towards the graveyard to “take leave of the souls”. The return from

the graveyard to the church is carried out in the same way that it was undertaken in the morning.

Sierra Madre Oriental. The dry heads (double) that were harvested during the previous cycle are shredded manually, separating seeds to be saved so that they can be easily distributed during planting. These seeds are stored in plastic containers or bags, until the planting date approaches (one week before). The seeds are prepared by taking them out into the sun and cleaning them of impurities, such as the remains of dried petals or flower heads. This work is left to the parents or grandparents. Sowing takes place between June 24 and 30, in order to harvest at the end of October and have flowers on October 31 and November 1 to 2. In the field or on the family plot, sowing is undertaken directly without furrows; the land for planting is located among the milpas, as an individual crop along with other species that are also used for adorning the altar, such as Mano de león (*Celosia argentea* var. *Cristata*) and Cimpitela. Land for planting is almost always flat, measuring approximately 10 square meters with soil of a loamy clay texture.

Land is prepared by clearing with a machete to remove weeds; hoes are also used to break up the soil and prepare it adequately for seed growth. Sowing is carried out by the father or the grandfather, and seed is randomly scattered by hand. Later, the planted land is covered with some sticks or tree branches to protect it from biotic and abiotic factors. The first seedlings appear approximately 10 days after sowing, and the seedlings that emerge correspond to 70% of that sown. Twenty days after the plants are established, the area is cleaned with a hoe to eliminate weeds, but earthing up is not carried out. In this community, the cempoalxóchitl plants hardly ever present any kind of pests or diseases, but other detrimental effects, such as too much sun, wind or hailstorms, can destroy the crop. The first immature flower buds appear on the plant at the end of September, the first flowers in mid-October and full bloom by the end of October. Flowering plants can be either female or male (double or single heads, respectively). For the offerings, plants with double heads, yellow or orange in color, are selected; they are cut with a stem length of 30 cm, in order to gather them together to form bunches.

The “Day of the Dead” celebration begins on October 31 with the decoration of altars in the houses, where bunches of flowers are commonly placed in an arch or a square. Arrangements are started very early with the establishment of a square table to place the food and to fix the frame that is going to be decorated with the cempoalxóchitl flowers; these are cut in the morning so that they are fresh when it is time to arrange them. The father of the family and the children are in charge of arranging the flowers, consisting of 8 or 10 bunches of cempoalxóchitl, which are tied to the frame; Other flowers are also used, such as the Mano de león, which is placed at the center and on the edges of the arrangement, to brighten up the house offering and the one in the graveyard. Underneath the altar a cross is formed with petals from flower heads and double heads of cempoalxóchitl and a path of petals is formed that leads to a main road or street, where a cross is also placed; all this so that the souls can follow the trail by the color and smell of the flowers and thus reach the offerings arranged in the houses. On October 31, people collect flowers, either bought or planted on their land, to offer them to people who have died by accident and deceased children (little angels).

On the offering or altar are placed tamales, sweets, atole, fruits, bread, candles and copal incense, among other things. On this day, consumption of food from the altar of the house is not permitted and even less so that from the front of the offering; not until the next day, because the souls “consume” the food prepared for them during the day. On the first day of November, at eight in the morning, a group of people gather in the graveyard to accompany the souls. They also decorate the altar of the chapel with *cempoalxóchitl* flowers, as an offering from the entire community, together with other adornments such as paper cutouts, etc. On November 2, the principal day of Todos Santos, after attending a mass at 10 in the morning in the chapel dedicated to loved ones who have already left us, the residents go to the graveyard to leave floral offerings on the tombs of relatives and distant relatives. This consists of *cempoalxóchitl* or other flowers, candles and holy water, and prayers are dedicated to deceased relatives.

The description of production and use of *cempoalxóchitl* flowers in the context of Day of the Dead in the Totonac-Nahuatl and Mixtec communities, corresponds to ethnographic passages that describe a similar sequence (use of double-headed seeds for planting, work to protect the plant, morphological changes associated with specific periods, offerings in the house and the graveyard, among others), although distinctive aspects referring to culture and geographical location, highlight the method of planting and date of establishment, the composition of the offering, how the *cempoalxóchitl* flowers are used and the organization of the religious festivity that takes contemplates the beginning, middle and end of the first two days of November. These coincident or different aspects have also been found in other communities, whose respective specificities are presented in Table 2. However, aspects that may be either generic or particular are poorly explained, so in the following, an attempt is made to address one of these: management for establishing *cempoalxóchitl*, looking for plausible reasons for the way it is undertaken.

Cultivation practices

When grouping the localities studied into geographical regions with their associated cultures (Table 2), there seem to be three predominant ways of sowing *cempoalxóchitl* plants: 1) sowing in seedbeds and then transplanting; 2) direct scattering of seeds in the field without furrows and 3) direct sowing in the field with furrows. These all concur in that the formation of immature flower buds, flowers beginning to open and full bloom occur, respectively, at the end of September, and mid and end of October; this phenological response on the part of the plant can be discerned in the context of general management, described previously.

The practice of sowing in nurseries to obtain seedlings which are subsequently transplanted into the earth to produce flowers, has been practiced since pre-Hispanic times, as stated in a page of the Florentine Codex, which depicts a seed nursery and a *xochimanque* (official who produces flowers) shown removing seedlings of *cempoalxóchitl* from a seedbed for transplanting, an activity that was rigorous, bearing in mind that during five Aztec celebrations: *Tecuilhuitontli*, *Hueytecuilhuitl*, *Tlaxochimaco*, *Xocotl Huetzi* and *Ochpanaztli*, flowers from these plants were used (Sahagún, 1992; Castro, 1994;

Table 2. Sowing form and seeding and transplanting date for cempoalxochitl (*T. erecta*) in different communities and regions from Mexico.

Region and Community	Sowing form	Seedling date	Transplanting date
Gulf Coast Plain region			
Puente Nacional, Ver.	Seedling bed (plantel)	16 July	16-18 August
Cempoala, Ver.	Seedling bed	17 July	17 August
Sierra Madre Oriental			
Huejutla, Hgo.	Direct without row	24 June	
Tlamamala, Hgo.	Direct without row	24 June	
Lolotla, Hgo.	Direct in row	Beginning June	
Yohualichan, Pue.	Direct without row	24, 25 June	
Tacuba, Pue.	Direct without row	24-30 June	
Central Plateau region			
Mezquital Valley			
Meztlán, Hgo.	Seedling bed	20 July	15-20 August
Mixquiahuala, Hgo.	Seedling bed	15-16 July	15 August
Mexico Valley			
Tequesquinahuac	Seedling bed	1 to 24 June	
Chalco Valley			
Ocotitlán	Seedling bed	Beginning June	
Trans-Mexican Volcanic Belt			
Amecameca, Méx.	Seedling bed	Beginning June	
Cuijingo, Méx.	Seedling bed	13 June	20-28 July
Cautla-Cuernavaca Valley			
Temoac, Mor.	Seedling bed	20-22 July	24 August
Central-South región			
Highland/Lowland Mixteca			
Chila, Pue.	Direct in row	15 August	
San Francisco, Pue.	Direct in row	15-18 August	
Cuatepec, Oax.	Seedling bed	9-24 June	19-24 July
Oaxaca Central Valleys			
Zaachila	Seedling bed	15 July	15 August
Chiltepec	Direct in row	10, 16, 24 July	
Jacatepec	Direct in row	24-30 June 5-15 July	
Sierra de Oaxaca			
Ixtlán	Direct in row	June-July	
Zimapán	Seedling bed	Ending June-15	1-15 August
Huixtepec	Seedling bed	July	1-15 August
Western región			
Sierra Madre del Sur			
Pachivia, Gro.	Seedling bed	14 July	14 August
Balsas Depression			
Changata, Ajuchitlán, Gro.	Seedling bed (pachol)	19 July	19 August

Source: elaborated from own data.

Serratus, 2004). Considering that the information contained in the Florentine Codex comes mainly from indigenous informants, who lived in the Valley of Mexico, it can be

deduced that the pre-Hispanic practice of preparing the nursery in the Central Altiplano coincides with the practices that are currently observed in localities situated in that region (Table 2) and also in localities in other regions that have a temperate climate and where frosts occur (Tables 1 and 2), along with flat topography (Table 1). Why sow in a nursery? There are four possible explanations: a) To obtain more vigorous plants, as out of the many seeds that are sown in the nursery, not all of these emerge quickly. According to Serrato *et al.* (2000), rapid and homogeneous germination are characteristics, which have not yet been produced among traditional populations of *T. erecta* that have been domesticated. Germinated and emerged seeds, do not all manifest the same strength. It is thus the most vigorous seedlings, which have the greatest chance of surviving transplant.

b) Better control of the establishment of the seedlings on cultivated land (transplantation) considering that three plants per bush are required; likewise, with this number of plants per bush, ample production of flowers is achieved (González and Serrato, 2002) and, likewise, it would be more work to sow several seeds in the bush to then only leave three plants, by eliminating surplus plants and weeds. c) Ensure the development of plants during adverse environmental periods such as when rain is lacking, or when temperatures are high or low, security that can be achieved through irrigation or establishing seedling on dates of that will not alter the flowering schedule for the day required. This is particularly important in the altiplano environment (Valles del Mezquital, México and Chalco, Table 1), where rainfall is a critical factor, due to its distribution (short rainy season) and quantity (600 to 800 mm).

When the environment is warm, then the establishment of the nursery can be undertaken on a date that helps the plant to be ready to flower when required, as Serrato-Cruz and Rivera-Méndez (2002) have observed, when testing different dates of transplant, and as can also be seen in the seedbed preparation dates presented in Table 2. d) Cultural motivations related to the community organization for transplantation. This point is corroborated by written information from the oral tradition about the celebrations for the planting and cutting of the rose (cempoalxóchitl) in communities of the Tierra Caliente region of Guerrero (Depresión del Balsas) collected by an anonymous priest from Ajuchitlán, Guerrero, around 1944. In this anonymous document, it is stated that in the communities of Ayavitle, Changata, Zacahuaje, Cacahuananche, Camichi, Tepehuaje and Nanche; Cuitlatecan communities in the municipality of Ajuchitlán, Guerrero, “where they did not permit the imposition of calendar saints as ordered by the Spaniards until 1943, they celebrated the following festivities: Adoration of the Cross on May 3; Planting of the Rose, Cutting of the Rose, Washing of the Saints’ Clothes, Putting away of Brooms and Sanctuary for the Christ child on December 24” (Anonymous, 1944); In this case, information is presented for the festivity of Planting and cutting the Rose (cempoalxóchitl). “The prosecutor asks for land and delineates the pachol” (seed nursery), “and when it rains”, “he invites the neighbors to come and plant accompanied by music and songs. The neighbors come with their oxen to clear the land, where the rose known as Simpasúchil; yellow, very aromatic, is going to be transplanted. The land is blessed and when this has been adequately administered, the third celebration takes place: the Cutting of the

Rose. The Guananchas from the guild, church officials, including the Mayordomo, the Prosecutor, the notary, the Teopixque, the First Lady and all the women from the Mayordomo go to the field. The flowers are cut and carried in sacks to the church, where they are stored until the next day, when endless chains are made, arches are erected and the strings of flowers are taken to the altars of the cross, which is the central point of devotion. In the afternoon they pray and the church is decorated beautifully. Then they go the Chiquihuiteada (offerings in baskets). Large chiquihuites (baskets), full of fruit, bananas, bread, flowers and with some figures, representing the officer who is going to receive the chiquihuite. He also carries a chiquihuite, which is full of fruit and contains an analogous figure, however, if on the contrary he is a drunk, he will have his bottle or if he is a smoker, his cigar will be between his lips. All these figures are made of bread; they are large, weighing between 2 and 3 kilos. There is laughter and the thunder of hand claps for each portrait imitating the officers and huananchas (female officials)! The gifts are distributed among the recipients, and everyone dances in the Mayordomo's house "(Anonymous, 1944).

Information obtained from 1999 to 2002 in the community of Changata, in Ajuchitlán, Guerrero complements this information. The preparation of the "pachol" (seed nursery) is carried out by the Tepixque or Teopixque (church official), and takes place on July 19 or 25 (Santiago Apostol) on his land. The planting or transplanting takes place approximately one month (August 19 to 25) after sowing the nursery. The planting is regarded as a party with music, previously with traditional music and food provided by the teopixque and by the guananchas (female officials). For the transplanting, the community is notified of the time and place of celebration. It is said that the custom consisted of the boys inviting the girls who they fancied as girlfriends, to participate in the Rose planting together. There is a belief that when the man and woman carry out the transplant, plants with double-headed flowers (females) will germinate, but if the man plants alone, then only plants with single flower heads (male) will emerge, which is reminiscent of the story recorded in the community of Huajuapán de León, Oaxaca concerning the participation of women in the sowing of *cempoalxóchitl* seeds that promotes the fertility of plants with double flowers. Correspondingly, it was also believed that if the plants produced many roses, it meant that the pair had a good hand and that they were compatible as a couple and that they might get married, hence the transplant is undertaken by a couple at this party. The woman makes a braid with three seedlings and deposits them in the hole, which is dug by the man, and he himself covers it with earth (three plants per bush). Undoubtedly, this information and that of the previously mentioned anonymous document represents valuable information that deserves further analysis.

Another way to sow *cempoalxóchitl* is directly onto the land without furrowing, as described for the community of Tacuba, Hueytamalco, Puebla, which comprises steep slopes, where flat plots scarcely exist, and where rainfall is intense, as in the lee of the Sierra Madre Oriental, where the communities of Tacuba, Yohualichan and Huejutla are located (Tables 1 and 2). This planting method coincides with the beginning of the rainy season, which occurs in the fourth week of June, generally on June 24, the day of San Juan, a few

days after the summer solstice. Usually, these are small plots. This way of planting that is practiced in the community of Tacuba is different from the planting of maize, which is undertaken using a coa (pointed planting stick) at this location. Direct sowing without furrows has strong cultural roots in the Huasteca of Hidalgo, where no other way of sowing is considered.

Although the people of this region know that planting is done differently in other parts of Hidalgo near the Huasteca, such as Lolotla (Sierra) and Mezquititlán (High plateau) (Table 2), the Huasteca peasants do not contemplate these methods. There is a strong ethnic presence in the Huasteca, and a different planting method, as would be the case of planting before or after June 24, might modify the development of the plants and risk the production of flowers by the end of October. This planting date in the Huasteca region is also associated with the full moon phase; planting outside of this period, according to the inhabitants of Huazalingo, Hidalgo, would cause problems for the plant, or as peasants from Mixquiahuala, Hidalgo, in the Altiplano also mentioned, who wait for a new moon to perform the transplant because otherwise the plant will develop worms.

Direct sowing in furrows, when the climate is cold-temperate, as in Ixtlán, Oaxaca (Zapotec) and Lolotla, Hidalgo (Náhuatl-Huastec), is carried out at the beginning of June and between June-July, respectively (Tables 1 and 2); whereas in San Francisco, in Tepexi de Rodríguez, Puebla (popoloca), a warmer area, the date is August 15-18 (Tables 1 and 2). Earlier or later plantings may relate to particular climate characteristics, as well as to domesticated types of *cempoalxóchitl*. Considering that the practice of furrowing is of Hispanic origin, and that sowing with a coa or sowing stick is of autochthonous origin, then the sowing in a furrow employing instruments similar to the coa (shovel, hoe or wooden sticks) to break up the soil and deposit seeds, is an example of mixed technology, as implemented in the traditional system of maize and bean cultivation, which involves breaking up the soil and forming furrows, in addition to planting in bushes using instruments to break up the soil and deposit the seeds.

Concerning different traditional techniques for establishing *cempoalxóchitl*, environmental conditions play an important role; referring to cultural connotations of the agronomic management of *cempoalxóchitl*, little has been documented, so the information presented about the cultural context for preparing seedbed and transplanting, constitutes valuable information.

The decision to plant *cempoalxóchitl* during the rainy season takes into account this seasonal climatic event, which varies depending on the geographic region (Table 1). Planting during the rainy season in June coincides with the establishment of other crops of pre-Hispanic origin such as maize, beans and squash, a period associated with the summer solstice; this extraordinary astronomical event with reference to the lunar phase to program opportune sowing and harvest of the *cempoalxóchitl*, was recorded for Huejutla, Mezquititlán and Mixquiahuala, in Hidalgo, and definitely framed by pre-Hispanic calendric knowledge, whose main computational component, refers to the relative movements of the sun and phases of the moon, especially in terms of their relationship with the biological responses of *cempoalxóchitl*, to ensure flowering at the expected moment, while also curtailing environmental risks.

All forms of traditional planting of *cempoalxóchitl* take place between the third week of June and the third week of August (Table 2); that is, a period of approximately 65 days, a period of time that according to Vela (2015), corresponds to the months Etzalcualiztli (last five days of the twenty day month: June 21-25), Tecuilhuitontli (June 26-July 15), Uey Tecuilhuitl (July 16-August 4) and Tlaxochimaco (August 5-24) of the Aztec calendar, with emphasis on the use of *cempoalxóchitl* flowers during the last three (Durán, 1995; Sahagún, 1999); the twenty day months Xocotl Huetzi (August 25-September 13) and Ochpaniztli (September 14-October 3), during which *cempoalxóchitl* flowers were also used (Durán, 1995; Sahagún, 1999), remain outside the current period of traditional direct sowing, either with a furrow or without one (Table 2), with transplant (Tables 2 and 3) of this plant species for ceremonial use. Possible pre-Hispanic dates of transplantation, in order to obtain flowers for the previously mentioned months of the Aztec calendar, were obtained, assuming that the means of establishing *cempoalxóchitl* in pre-Hispanic times involved the use of a seedbed (Florentine Codex, 1986). Table 3 was prepared, combining information from Serrato-Cruz and Rivera-Méndez (2002) in order to assess the effect of the date of transplantation of *cempoalxóchitl* on the flowering period, evaluated experimentally in the Valley of Mexico, and then compared with the Aztec months proposed by Vela (2015), when flowers from this plant were used.

According to the proposal (Table 3), only the Ochpaniztli festivity (September 14-October 3) would require a transplant in June (seedling planting in May), for example, around June 21 to 24 (summer solstice on the 21st), a period, which may coincide with the full moon phase and when the rainy season is established; hence, the date of direct sowing is June 24 in the Huasteca of Hidalgo (but for flowering at the end of October), or sowing in a seedbed in June (with transplant in July) in the valleys of Chalco and Mexico, a throwback to pre-Hispanic times because in this month, which corresponds to the end of Etzalcualiztli, there were preparatory transplant activities, aimed at producing *cempoalxóchitl* flowers (for Ochpaniztli), similar to those currently carried out with the sowing of seedlings from June 19 to 24, in order to produce flowers at the end of October. The Ochpaniztli celebration

Table 3. Analogy among aztec months (Vela, 2015) in which *cempoalxóchitl* flowers (Sahagún, 1992) were used and possible transplanting dates according to experimental essays (Serrato y Rivera, 2002) for transplanting date and their respective flowering date in Mexican Valley conditions.

Transplanting date [†]	Flowering date	Period included (days)	Aztec month	Period included
10 March	18 July	120	Tecuilhuitontli/Uey Tecuilhuitl	26 June-15 July/16 July-4 August
12 April	7 August	110	Tlaxochimaco	5-24 August
11 May	16 August	95	Xocotl-Huetzi	25 August-13 September
17 June	30 August	75	Ochpaniztli	14 September-3 October
26 July	13 October	75	Teotleco	4-23 October

[†]Sowing date of seedling bed was done 30 days before transplanting: February 10, March 12, April 11, May 17 and June 26, respectively.

Source: own elaboration.

was intended to celebrate the arrival of the parents of the Aztec deities or as their welcome (Castro, 1994). Another important and very valuable analogy derived from Table 3 is the following: the three morphological changes experienced by the cempoalxóchitl plant (regardless of traditional sowing dates, or natural and cultural environment) coincide with the Ochpaniztli festivities (September 14-October 3), Teotleco (October 4-23) and Tepeilhuitl (October 24-November 12).

The formation of immature flower buds, which is the first noticeable change in the development of the plant, occurs at the end of September, especially on the 29th (Ochpaniztli); the beginning of flowering in mid-October (Teotleco) and full flowering at the end of October (Tepeilhuitl); these are changes that may have some syncretic meaning, due to the date they occur, along with relevant religious aspects of the Aztec month with which they are associated. In Ochpaniztli, which coincides with the appearance of immature flower buds that occurs on the same date in all current traditional planting modalities, this is an indicator that announces the arrival of the creator deities. In Teotleco, the opening of flower buds initiates, in order to welcome their principal deities.

During Tepeilhuitl, which includes the dates of November 1 and 2, while full flowering takes place at the end of October; however with no pre-Hispanic history of use of this flower, this represented a strategic opportunity for indigenous wisdom to make a masterful link between the previous celebrations for the dead (Miccailhuitl and Huey Miccailhuit) within the twenty day month of Quecholli, during which the dead were celebrated and remembered in the graveyard by bringing food and arrows, among other offerings, but not cempoalxóchitl flowers. The event marking the beginning of flowering (Ochpaniztli-end of September) and the opening of flowers (Teotleco-second week of October) by means of cempoalxóchitl monoculture, would represent pleasant events that would induce a preparatory atmosphere for the subsequent reception that would be given to loved ones, who have now left us (in the Christian celebration); with full flowering (Tepeilhuitl), the offering of fragrant and large flowers, yellow or orange (*T. erecta*), as well as smaller red ones (*T. patula*), or even a combination of red and yellow (*T. patula* and *T. lunulata*), placed both on graves and on household altars, together with a variety of vegetable and food offerings.

The phenological changes in *T. erecta* corresponding to any planting date (Table 2) are similar to those observed in *T. erecta* wild populations reported by Serrato *et al.* (2000) found on the Ixcateopan-Teloloapan-Arcelia route in the State of Guerrero; that is to say, the wild form of *T. erecta*, known regionally as “Flower or Rose of the Dead”, manifests the same phenological behavior as the cempoalxóchitl that is cultivated in those places. An important difference regarding the use of these plants (the rose and the cempoalxóchitl) in that region of Guerrero is the meticulous use that is made of the “Rose of the Dead” for the “Day of the Dead” festivity, when cempoalxóchitl is little used. This phenological similarity seems to find a response in the environment, which is distinguished by the fact that the first rains begin in June and become fully established in July. On those dates, the duration of light seems to be a determining factor in the flowering process, according to results from Serrato-Cruz and Rivera-Méndez (2002) (Table 3); *T. erecta* is sensitive

to the photoperiod (Zimmer, 1989). Thus, the phenology of cultivated *T. erecta*, with the expression of full flowering at the end of October, is due to environmental factors, provided that the plants are established between June and August, months during which cempoalxóchitl flowers were used in pre-Hispanic times, but which did not involve the same planting practices.

Cultural reasons for using cempoalxóchitl

Cempoalxóchitl (*T. erecta*) is a species from the *Tagetes* genus that is notable for its aroma and because of its wide morphological diversity found in Mexico, it is considered to represent the center of origin and diversity of the genus (Kaplan, 1960; Neher, 1968; Serrato, 2014). Among the chemical compounds contained in the essential oils of the aromatic species of *Tagetes*, are: tagetone, dihydrotagetone, ocimenone, methyl chavicol, limonene, caryophyllene, terpinolene, piperitone, citrol, citronellol, indole and estragole (Salehi *et al.*, 2018). *T. erecta* or cempoalxóchitl is characterized by the presence of dihydrotagetone, tagetone, tagetenone, piperitone and terpinolene that comprise principal compounds in the essential oil, conferring the peculiar aroma (Salehi *et al.*, 2018) of Day of the Dead. The fragrance of the flowers, like ethereal spirals of smoke, odor or steam were considered by Mesoamerican groups to represent food for the ancestors, deities and the dead (Houston and Newman, 2015). Thus, the cempoalxóchitl flower was an integrated symbol in terms of color, shape and smell “providing an appreciable offering for the gods and acting as a vehicle to send them a fragrant request” (Dupey, 2015); for example, in the Tlaxochimaco festival, garlands of cempoalxóchitl flowers were offered to Tezcatlipoca and Huitzilopochtli (Sahagún, 1999). Yahutli (*T. lucida*), along with the cempasuchil, were considered flowers of the dead, especially for those who died from lightning and whose spirit would go to Tlalocan (García, 2015).

The little ethnohistorical information available concerning cempoalxóchitl comes from the Mesoamerican post-classic period and little is known about the processes that in the past led to the use of plants that were initially found in their wild state. In this regard, the Depresión de Balsas, a region where a wild form of cempoalxóchitl (perhaps one of its ancestors) grows along with other wild plants such as cotton, epazote, beans, papalo, teosinte and zinnia, offers the possibility of addressing central questions such as: For what purpose would pre-Hispanic man have used the wild species of cempoalxóchitl (and later the domesticated plant) to produce garlands, bunches, necklaces or canes? Undoubtedly, this question requires solid evidence to provide an answer, although some approximations can be made based on: a) The description of its use in Aztec festivities referred to in the 16th century works by Durán, Sahagún and De la Cruz-Badiano; b) Consultation and analysis of codices and sculptures (such as Xochipilli and Coyolxauqui, Guatemalan funerary urns, etc.), among others, where cempoalxóchitl plants are depicted; c) Indigenous cultural remnants indicating the use of these plants in indigenous communities, in contexts other than the celebration of November 1 and 2; d) Traditional use of the plant on the Day of the Dead among ethnic groups in Mexico; e) Natural distribution of the plant and its chemical content; f) Quantitative-experimental analysis of the effect of the aroma on

human biology and in the cultural context; g) Archaeobotanical evidence to date the appearance and use of the plant in the context of the evolution of man in Mesoamerica; h) Experimental domestication studies in order to understand its evolution and; g) Archaeoastronomical studies in the context of association with pre-Hispanic agricultural activities, in this case, linked to *cempoalxóchitl*.

Although this work has limitations in terms of answering the question raised, some aspects of oral tradition are described below; from Mitla, Oaxaca during the celebration of the Day of the Dead; these can help integrate a general perception of other cultural motives related to the use of the *cempoalxóchitl* and this traditional celebration. In the case of Zapotecs and Mixtecs, the culture encompassing death in pre-Hispanic times was highly developed (Matos, 1999), which surely connects with the prehistoric evolution of man in the Central Valleys of Oaxaca, where agriculture has been practiced for about 10,000 years (Fernández, 1997; Winter, 1997) with possible rituals related to death (Robles, 1999), antecedents that make Mitla attractive for the study of this topic. Mitla or Mictlan, a Nahuatl word that means “place of the dead” and in Zapotec Lyobáa, as “place of rest”, “grave”, “tomb”, “place abundant in corpses” or “cemetery”, indicates that this is a funerary city (Flores, 1999) to the East of the Central Valleys of Oaxaca. The town is located to the north and south of the river by the same name; the pre-Hispanic funerary area is located towards the north of the river. In Mitla, the construction of the church on a pre-Hispanic foundation is notable, in addition to other buildings of pre-Hispanic origin in the archaeological area.

The church, with its large patio, presumably a pre-Hispanic ceremonial area, has an East-West orientation if one considers the position of the main entrance to the religious site. Observations from 2002 to 2005, from this location looking east, revealed a mountainous horizon with distinctive conical hills as reference markers for sunrise-to-dawn viewing, suggesting the astronomical role of the location where the church now stands; a fact corroborated by Sprajc and Sánchez (2015), also highlighting the importance of ethnographic information for providing contextual data concerning the archaeoastronomical alignment of the site. In the pre-Hispanic construction, adjacent to the church and in the architectural structures known as the Group of Columns, separated from the church, fretwork with symbols or figures can be seen on the walls; one of these represents a cross, similar to the one that can be seen on the tombs in the Mitla pantheon, a symbol of the Catholic influence that the Spanish imposed, but also recognized by the Zapotec population in the pre-Hispanic cultural context.

In patio F of the Group of Columns, there are tombs arranged in a cross, corridors that form a cross, and in one part of it, rest the remains of individuals who were important at that time, in addition to their respective offerings; in this courtyard, cross tombs are to the north and east. Contrastingly, in the Mitla cemetery, the pantheon has an East-West orientation and the inhabitants recount that, when a grave corresponds to an adult person, who lived and dedicated his entire life, he is buried with his head facing West, sunset point of the Sun; if they are children (of up to 15 years old), who did not live or who were just beginning to live, they are buried with their heads facing East, where the Sun

rises or appears. Considering homes of the residents of Mitla, the beds are arranged in an E-W orientation, with the headboard in the Easterly position, the birth point of the Sun, because residents think that, if the headboard is to the West, then “death may come for them”, especially during the celebration of Day of the Dead. In this regard, it seems that the entire town has had its own and other references concerning the appearance of spirits, the dead or ghosts, experiences that they narrate in detail; it is also often commented that when scratching or digging, without fail remains of human bones will appear: the town rests on the pre-Hispanic funerary area.

Returning to the cross, this is represented in the patterns on the pre-Hispanic temples and in the cruciform tombs of the individuals buried in the Temple of the Columns, probably representing the apparent movements of the Sun. In one sense, the North-South line of the cross concurs with the apparent movement of the Sun throughout the year, especially that marked by the solstices; the summer solstice (June 21) to the North, with more heat and longer duration of light, more life; to the South, the winter solstice (December 22), cold, death, darker; at the center of the cross, in the middle part of the N-S line (between the solstices), are the equinoxes, or rather, the two zenith passages of the sun, a watershed between life and death. These changes definitely correspond to the translational movement of the Earth. The perpendicular line of the cross, that is, the line perpendicular to the apparent movement of the Sun N-S, corresponds to the rotational movement of the Earth, and is equivalent to the East-West movement; the first point (East), marking the birth of the Sun at dawn, and the second point (West), marking the death and sunset of the star king. Consequently, the central point of the apparent trajectory of the Sun is noon, the transition, the neutral point that, together with the equinox, and especially with the two passages of the sun at the zenith, in the celestial vault at noon, mark the center of the cross.

Taking into account this symbolism of the cross, the North and East points where the tombs of important pre-Hispanic individuals from Mitla are found, may have some significance: North and East represent life, they do not die. Among the Huastecas of Hidalgo, Veracruz and Potosí, the arch adorned with cempoalxóchitl flowers presented on the household altar on Day of the Dead, represents, both the passage of the sun during a day or during the year, the path of man on earth: the beginning of the arch, located to the East, as the point of sunrise and birth of man; his ascent to the middle of the arch as the summit or plenitude of life, the sun to the middle of the celestial vault; and finally, to the extreme West, death, the sunset that gives way to night, and once again the cycle initiates with another generation of humans, the children of the deceased. Thus, the flower of cempoalxóchitl must symbolize the human and his wisdom, as if it were the sun itself and its light; human consciousness. For the people of Mitla, while the first of November evokes the young dead, the second of November is the great celebration of the dead. On this second day, the celebration consists of bringing flowers to the graveyard (among them cempoalxóchitl) and food to the grave before noon; in this place a mass is celebrated for which a special atmosphere is created with copal smoke.

Prior to 12 noon and early enough to give time to leave the cemetery and return to the house, copal is burned on the grave and, lit and smoking, it is taken to the house, bringing

with it the spirit of the relatives to their old home: it is believed that the dead person is being carried together with the copal smoke. At home, there is an atmosphere of copal smoke and offerings of food or local products (bread, guava, orange, chocolate, drinks) that are placed on the house altar, against the background of religious images and red flowers, known as velvet or rooster comb, at the two corners of the offering. At the foot of the offering, on the ground, the “flowers of the dead” called *gui gu laj* (not from the genus *Tagetes*), with a sweet aroma, and *gui to go* (*T. tenuifolia*) with a not so strong but very sweet aroma, are placed to help create an environment of pleasant aromas for the spirits who are visiting (it would not be advisable to receive them with strong aromas). At 12 noon, it is felt that the loved one is present with the living, and great emotion is experienced because they are intensely remembered and mourned, as if they were actually present. In times past, during the celebration of the dead at Mitla, in the town there was a solemn, silent atmosphere, no noise was heard, just as now; even the wind, characteristic of these dates that mark the beginning of the cold season, generated sounds resembling the voice of the deceased. The offering on the altar of the house is to please the family spirits; the aromas of their food.

In the graveyard, the flower of the dead, is the food for the deceased, it is the aroma they prefer. It seems that in the cemetery the return of the spirits (personal desire) is invoked by a propitious environment of copal smoke and aroma of cempoalxóchitl. According to the work of Fran Diego Durán and taking into account the chronology of the pre-Hispanic festivals described by Vela (2015), the Aztec perceived the months of Tlaxochimaco (Miccailhuitl, August 5-24) and Xocotl Huetzi (Huey Miccailhuitl, August 25-13 September), when cempoalxóchitl flowers were used, to be dedicated to the young dead and the great festival of the dead, respectively; in the Quecholli festival (November 13-December 2) the dead were also celebrated and remembered on their graves, but for none of these, was cempoalxóchitl used. Teotleco (October 4-23); after Ochpaniztli (September 14-October 3) and before Tepeilhuitl (October 24-November 12), was dedicated to celebrating the visit or return of the gods but neither was cempoalxóchitl used at this time.

By integrating the main elements of these festivities, the following sequence would be formed: beginning of the celebration of the dead and food was prepared for this celebration (Miccailhuitl) and immediately afterwards, the great celebration of the older dead invoking their return (Huey Miccailhuitl); then, the welcome, with deep respect, to the progenitor gods and other main gods, as visitors to the earth (Ochpaniztli and Teotleco); and finally, located in the second week of November (Quecholi), celebrations to remember the dead on their graves. This scenario bears a certain resemblance to several of the aspects frequently addressed in works concerning the Day of the Dead in Mexico and with what has been described in this regard for the previously mentioned communities of Tacuba and Hueytamalco. Among the similarities are: celebration of the young dead on November 1st, and November 2nd considered as the principal day, dedicated to the older dead; on both days using cempoalxóchitl, but with abundance on the second day. Particularly, on the main day, it is believed that the souls of the dead return to their former

abode and there is an emotional atmosphere for this return, having as a stage, the place where the altar is placed in the house, in addition to celebrating in the graveyard with offerings on the graves. The oral tradition and direct observations in Mitla, in addition to the ethnohistorical information about the celebrations of Aztec rituals in relation to the religious celebration of the dead and of *cempoalxóchitl*, expand knowledge about the traditional use of the *cempoalxóchitl* for the dead, a little further.

Notwithstanding the information dealt with in the three sections of this essay, the need to deepen the analysis of pre-Hispanic religious motives during each month of the ritual calendar (which was little dealt with in this work) when *cempoalxóchitl* flowers were used, especially in order to assess whether there was actually a loss of the cultural cosmos for each pre-Hispanic month associated with the *cempoalxóchitl*, or whether in fact the religious cosmos has been retained through current traditional practices of cultivation and use of the plant, as suggested by the information that has been presented here; in this sense, this essay proposes a starting point for future research.

CONCLUSIONS

The celebration, cultivation and use of *cempoalxóchitl* flowers on the Day of the Dead tradition in many regions of Mexico, has similar characteristics, although others are different, for example in terms of the method and time of establishment of the plants in the field. The way of sowing manifests different technological levels, of pre-Hispanic origin or of Spanish introduction. The time of establishment coincides with the use of these flowers in pre-Hispanic celebrations, indicating that the pre-Hispanic planting period became the flower harvest period, and with it, a new phenology of *cempoalxóchitl*, to schedule flowering, in a new cultural context with great syncretism, towards the end of October, as is currently the case.

In Mitla, whose pre-Hispanic constructions have an astronomical function, the cross present in pre-Hispanic buildings and in the current pantheon of the town, is related to the sun in terms of the notions of life and death that were held in the pre-Hispanic world; in turn, the sun is linked to the traditional use of *cempoalxóchitl* flowers whose color, shape and aroma in particular, allow us to perceive a supernatural existence that can be invoked by (the dead) and brought to the earthly world (revived) during this special time of the year.

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