# Evidence for a Cultivar and a Chronology from Patterned Wetlands in Central Veracruz, Mexico

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**The patterning found in certain wetlands of lowland Mesoamerica has added an important element to the subsistence system that may be attributed to pre-Hispanic inhabitants of the region. The form of the remains, largely expressed in terms of surface vegetation, suggests agriculture on planting platforms, separated by canals. The physical and chemical aspects of the stratigraphy have clarified depositional environments but have not indicated agricultural horizons. Maize phytoliths at about 1 meter below the surface in two Central Veracruzan wetlands do confirm the practice of agriculture. Associated ceramics indicate wetlands agriculture was practiced by A.D. 500 and perhaps earlier.**

RECTILINEAR PATTERNS OCCUR IN many coastal Veracruzan wetlands between Laguna Tamiahua and the Papaloapan River system (Figs. 1 and 2). These, and similar patterns in wetlands on the Yucatan Peninsula, have been interpreted as surficial expressions of the subsurface remains of platforms and canals used in pre-Hispanic wetland agriculture and as indicators of intensification beyond shifting cultivation. They have greatly facilitated the explanation of pre-Hispanic lowland subsistence (*1–10*).

The form and environmental context of the remains have stimulated hypotheses regarding their function, development, and chronology—even the cosmography of the builders (*7, 11*). However, the agriculture inferred has been difficult to confirm (*12*). The evidence reported here shows clearly, for the first time, that *Zea mays* was in fact cultivated in some of the wetlands of lowland Mesoamerica a millennium before contact with Europeans, and perhaps earlier.

The San Juan Basin has about 1700 hectares of patterned wetland in some ten clusters of more or less discrete complexes; it is the largest concentration along the Veracruzan coast. The basin is surrounded by numerous substantial pre-Hispanic settlement sites and dotted with smaller sites on islands of firm ground. The region was largely abandoned for many centuries, then reoccupied in historic times. The basin eventually played an important role in early colonial ranching; it provides the key microenvironments for large transhumant ranching operations today. The study of this cultural landscape of successive superimpositions is promising substantively and methodologically.

Several physical environmental considerations help explain the disposition of patterned wetland. It occurs typically in the small basins of lowland streams with water level fluctuations of 1 or 2 m, such as that of the San Juan River, rather than in the floodplains of through streams, which fluctuate 5 m or more (*13*). The climatic regime of the lowland Central Veracruz, and other Mesoamerican lowland regions with patterned wetland, is strongly seasonal. Most of the basin's average of about 1250 mm of precipitation is received from June to September (*14*). In such a context, wetlands with moderate, manageable water level fluctuations will have been an important resource for early agriculturalists. Crops could be obtained here in the dry season, especially with canalization, complementing wet season cultivation on neighboring firm ground.

The actual remains of wetland agriculture, as well as the environmental complementarity, are expressed largely in terms of vegetation (Fig. 3) (*15*). Moreover, some of the floral microfossils associated with early wetland agriculture are echoed on the present surface.

The natural vegetation of the basin proper is indicated by remnants of a partly deciduous tropical forest of medium height (*selva mediana subcaducifolia*), together with various hydrophytic communities and their successional species. Striking specimens of the palm *Roystonea dunlapiana* ("yagua") persist. They are interpreted as evidence of intensive human perturbation (*16*). On the surrounding hills low deciduous tropical forest (*selva baja caducifolia*) or its successional species predominate (*17*) (Fig. 3).

During the wet season, vegetation is exuberant or flooded and the remains may be difficult to see. In the dry season, the traces are clearer; the platforms bear the light tones of grasses such as *Leersia hexandra* and *Cyperus* spp., the canals the darker tones of various hydrophytes.

However, because of erosion and sedimentation the patterns cannot be satisfactorily mapped by simply tracing vegetational tones. The platforms in use will have had steeper sides and larger surfaces than the degraded remnants. Wetland stratigraphy does not help much to specify this difference, as will be developed. Therefore, it is difficult to quantify the areas of platforms and canals, to say nothing of labor requirements and carrying capacity.

Midlines of canals, on the other hand, can be derived fairly accurately from vertical or rectified oblique air photography, because degradation was probably accordant throughout a given complex. Such lines allow calculation of the total areas of complexes; their orientation vis-à-vis topography and hydrography are diagnostic of certain aspects of function (*11*).

**Fig. 1.** Surface expression of the remains of pre-Hispanic agriculture in the wetland of "El Yagual" (after "yagua"—*Roystonea dunlapiana*). The line indicates the location of the profile shown in Fig. 3 and the diamond symbol shows the sources of data for Table 1.

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In four of the complexes thus outlined, exploratory coring was undertaken across the grain of platforms and canals in central and peripheral locations. In two particularly clear and discrete complexes, "Mata de Chile" and "El Yagual" (Fig. 2), test pits were dug over platforms and canals in the centers and on the margins. The results obtained from analyses of materials taken out of central platform excavations in the two are emphasized in the following. There are plans to continue these analyses and to undertake tests on comparable samples from all the main concentrations of patterned wetlands in Veracruz.

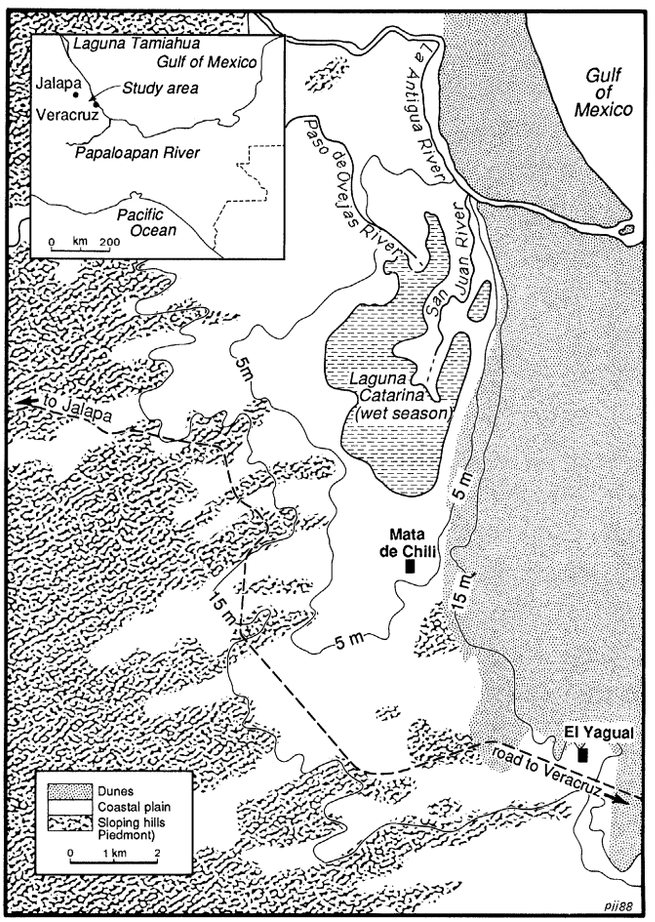


**Fig. 2.** Landforms of the San Juan Basin and surroundings. Patterning is found within the coastal plain; it cannot be mapped satisfactorily at this scale. The rectangular symbols locate cores of "El Yagual" and "Mata de Chile."

The remains of platforms and canals cannot be traced visually on pit profiles, because of the manner in which sediments are normally laid down among hydrophytes in wetlands, as well as perturbation by soil fauna, by the agriculturalists themselves, and subsequently by cattle. The "stratigraphy" that is helpful is that expressed in the phytolith and ceramic counts (Table 1).

Analyses (*18, 19*) of samples from the remains of a platform in "El Yagual" indicate that from as deep as 120 cm below the surface to near the top of the profile there are only minor variations in organic matter, calcium, magnesium, potassium, phosphorus, and carbonate, as well as neutral to slightly alkaline *p*H levels, and minor changes in grain-size distributions. Samples from 60 to 120 cm below the surface, the zone within which evidence for an agricultural horizon was found, exhibit no change in sediment type and depositional process—mostly the movement of sediment carried in suspension in channels draining distant uplands and spilling into the wetlands during flooding. A similar homogeneity obtains in the profile of the adjacent canal.

Significant changes appear in the upper levels of both platform and canal remains; an increase in phosphorus in the top 30 cm, as well as an abrupt increase in the percentage of organic carbon. Several historic carbon-14 dates were obtained from this horizon. They probably represent the detritus of repeated forest cutting and burning in aid of ranching.

Samples taken at regular 10-cm and strat-

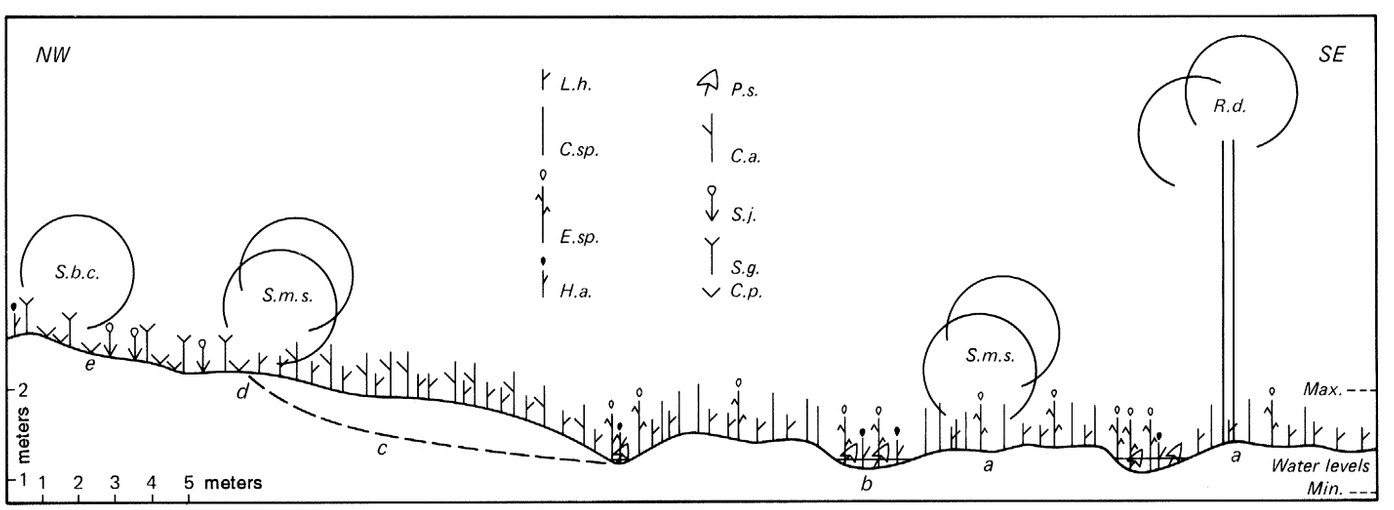


**Fig. 3.** A schematic profile from the middle of the wetland of "El Yagual" to neighboring firm ground, showing microtopography, seasonal water levels, and related vegetation: (a) platforms surrounded by canals, (b) canals, (c) platforms surrounded by canals on three sides, (d) margin of wetland, (e) firm ground; S.b.c., *selva baja caducifolia*; S.m.s., *selva mediana subcaducifolia*; R.d., *Roystonea dunlapiana*; L.h., *Leersia hexandra*; C.sp. *Cyperus* sp.; E.sp., *Echinochloa* sp.; H.a., *Hymenachne amplexicaulis*; P.s., *Pontederia sagitatta*; C.a., *Cyperus articulatus*; S.j., *Sporobolus jacquemontii*; S.g., *Setaria geniculata*; C.p., *Cynodon plectostachycus*. See Fig. 1 for approximate location.

**Table 1.** Ceramic counts from remains of platform in "El Yagual." Full type designations in text.

| Levels (cm) | Ceramic types | | | | | | | | | Total | Percent |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 1– 20 | | | | 1 | | | 3 | 9 | 5 | 18 | 8.7 |
| 20– 40 | 1 | | | | 1 | | 3 | 8 | 6 | 19 | 9.2 |
| 40– 60 | | | | | | | | | | | |
| 60– 80 | 6 | | | | 2 | 2 | 2 | 12 | 9 | 33 | 15.9 |
| 80–100 | 4 | | | 1 | 3 | 3 | 9 | 25 | 28 | 73 | 35.3 |
| 100–120 | 8 | 1 | 1 | | 2 | | | 22 | 30 | 64 | 30.9 |
| Total | 19 | 1 | 1 | 2 | 8 | 5 | 17 | 76 | 78 | 207 | |
| Percent | 9.2 | 0.5 | 0.5 | 1.0 | 3.9 | 2.4 | 8.2 | 36.6 | 37.7 | | 100.0 |

igraphic intervals from platform and canal remains at "Mata de Chile" and "El Yagual" were analyzed for phytoliths—microscopic silica particles with diagnostic shapes formed within cells of living plants (*20*). A strong concentration of cross-shaped phytoliths identifiable as maize was found at 90 to 110 cm below the surficial expression of the platforms sampled at both complexes. They occur in extremely high numbers, reaching 13 to 16% of the fine silt fraction content. This is the highest concentration yet found in archeological deposits, exceeding by a factor of 6 the levels of cross-shaped phytoliths recorded from habitation sites in Lower Central America (*20, 21*) and vestiges of wetland agriculture in the Calima Valley of Colombia (*20, 22*). Phytoliths of any kind are rare to absent above that in platform samples and in all of the canal samples examined. High numbers of spherical palm phytoliths occur in association with maize.

In platform samples, counts of aquatic silica are high in upper deposits and decrease rapidly downward beginning at about 30 cm. These low counts associated with maize phytoliths suggest that agriculture was carried out on a canalized surface, the basis for the present surficial patterning, preserved in spite of almost a meter of intervening sedimentation.

Maize pollen, conforming to established criteria (*23*), was found under both platform and canal remains in "Mata de Chile." In the first it occurs between 125 and 135 cm from the surface, in the second at 140 to 150 cm, where it reaches a concentration of 7% of total pollen and spores. These data may indicate seasonal cultivation of maize in the wetlands prior to canalization or simply its earlier cultivation in immediately adjacent hill lands. Further sampling in this and other wetlands should clarify the relation of the occurrence of phytoliths and pollen, two chemically different and differently deposited plant remains.

The ceramics to be found in agricultural areas are normally few and eroded. However, the 1-$m^2$ excavation unit on platform remains in "El Yagual" that yielded phytoliths also yielded 207 shards in association with them, 53 (25.6%) of which were diagnostic (Table 1) (*24*).

Absolute dates ascribed to periods in Central Veracruz vary, but it seems most acceptable here to place the beginning of the Late Preclassic at about 500 B.C., the transition from Late Preclassic to Classic at the B.C. to A.D. division, and the end of the succeeding Early Classic, or Proto- plus Early Classic period at somewhere between A.D. 450 and 600 (*25, 26*).

Ceramic types 1 (Rojo Arenoso), 2 (Vertederas), 3 (Fragmentos de Figuras), and 4 (Café Claro Pulido) pertain to the Late Preclassic. Type 5 (Rojo sobre Blanco) is taken as a particularly clear indicator of Early Classic in Central Veracruz. Types 6 (Rojo Firme) and 7 (Apaztle) have been assigned to the same period. Type 8 (Ollas), as well as the indeterminable shards (*9*), cannot be assigned to a specific period. Late Preclassic and Early Classic shards are distributed between 60 and 120 cm below the surface. A hiatus appears between 40 and 60 cm below the surface followed by some limited indications of pre-Hispanic occupancy above that. An adjacent meter square excavation in canal remains yielded no ceramics.

It appears that agriculture was practiced in the wetlands of the San Juan Basin by about A.D. 500 and perhaps earlier, before the time of Christ. The Central Veracruzan culture of the time is often labeled Totonac (*27*). Our data considerably postdate the Olmec presence in this area (*26*) but coincide with much of the trajectory of highland Teotihuacan, which was an important presence in the lowlands (*27*).

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