

## Lime Kilns Ethnobotany in Lower Sindh

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### Abstract

*In fragile ecosystems, the prolonged use of wood for economic reasons may have important long-lasting consequences on the environment. Two lime production areas south of Kotri have been briefly investigated, in order to assess the importance of wood used in the kilns. Only two bushy species (Prosopis and Tamarix) are currently exploited in large quantity, due to the shortage of mature trees in the region. Their availability in the future may be the limiting factor of the productive sector.*

### 1. Preface

In the course of the 2010 survey of the Italian Archaeological Mission in Sindh, traveling south from Hyderabad to Jhimpir, we daily crossed two distinct areas where some kilns for the production of lime were constantly active.

As one of our purposes was to evaluate the relationship between plants and man in past and present times, and in order to assess the importance of this wood-consuming economy, we planned a visit to the local workers, as the surrounding environment looked rather unsuitable for a large firewood collection.

The visited sites are placed along the route south of Kotri. The first (*Site A*), larger productive unit, is located few kms south of Bholari (25°17'694N; 68°12'328E). Here at least 15-20 kilns have been built over an area of about two hectares, but only two or three were active when we stopped for an interview on January the 29<sup>th</sup>.

The other site (*Site B*) is further south, in the Ongar region, and close to Jerruck (Jhirak) road (25°09'760N; 68°14'242E). Here again two kilns were being prepared for the same purpose, and we had the opportunity to enquire workers about the whole lime-producing process.

### 2. The Kilns

This flat region, between the western side of the Indus River, and the eastern borders of Kirthar range on the west, has a rather monotonous vegetation of spiny bushes, mainly *Prosopis juliflora*, *Acacia* spp.,

*Euphorbia caducifolia*, and others such as *Tamarix* spp. along the ditches and river banks. In general, one is struck by the almost total lack of trees (apart from the cultivated plants in some orchards close to villages) or large shrubs (Fig. 1), an absence which is by no means to be observed in other parts of the country further north (for instance, from Amri to Ranikot).

In the course of a preliminary survey around some abandoned kilns in the Ongar area, we took some notes of one of these structures (Fig. 2 and Fig. 3).

The kiln was made of carefully placed large stones, about 4-5 m high. The inner walls are then covered with plaster (usually reddish, due to the high temperatures during combustion). The upper and anterior parts of the kiln (the latter is never made of stones, but only of clay) have been partially damaged during the lime retrieval. In view of its re-use, after every period of activity the kiln is emptied out, and the filling residues, consisting of charcoal, chalk and small stones, have been accumulated around the tower-like kiln, probably as a convenient solution to avoid heat dispersion (Fig. 4).

To our surprise, the layers produced by this repeated operation were consistently made of carbonized branches, usually small (the diameter not exceeding 3-4 cms) and not, as expected, of large pieces of a trunk (Fig. 5). At a later analysis all samples collected in these layers turned out to be cut from some bushy Leguminosae (*Acacia/Prosopis*) and *Tamarix*.

Few days after these preliminary observations, we stopped at the site *A* where some workers were attending to the reconstruction of the upper part of a kiln. We had the confirmation that the wood employed in lime production consisted solely of branches of the local vegetation. Some hundred bundles of freshly cut branches of *Prosopis* and/or *Tamarix* were accumulated in perfect order along the path leading to the front of the kiln, which proves that the use of this kind of fuel is traditional in this region.

### 3. The Interviews

In arid and semi-arid regions the search for and consumption of wood may pose obvious problems, particularly where economic needs urge upon part of the local population whenever a larger amount of firewood is required. For this reason, we decided to submit a series of questions related to the collection of wood, the catchment area, the quantities involved in the whole calcination process to two separate groups of workers.

The submitted form was twofold:

About production:

1. How many kilns are present in a particular area?
2. Do many kilns work at the same time?
3. Which is the mean duration of activity for a kiln?
4. Does the production of lime run by specialists, belong to any specific caste?

About wood use:

1. Is there any kind of wood selection for this specific activity?
2. Where does firewood come from? How large is the catchment area?
3. Can depletion of wood cause problems in the future for the local inhabitants?
4. How much wood is necessary for the whole production cycle?

In both sites we received rather similar answers, but also some contradictory indications.

#### 4. Preliminary Results

It appears that in the Ongar region chalk production is only run by specialists belonging to few Sindhi tribes, namely Babar (most frequent), Khaskheli and Solangi. In the *A* site, out of 15-20 kilns, only 5-8 are kept in function, but only one works at any particular moment, while the others undertake the necessary restorations. It seems that nowadays the activity must be limited because of the shortage of fuel, in spite of the number of functional kilns. In the course of one year a kiln should not work more than 4 or 6 times.

In both sites the favorite firewood is *Prosopis juliflora* (local name *devi*) and, secondly, *Tamarix dioica* (called *lei*). The former species is prized for its high heating value (4200-4800 kcal/kg), but when less available, *lei* and branches of other plants (for instance of *Eucalyptus camaldulensis*) were also observed.

Branches are collected by people living in the surrounding villages, one bundle being worth 5 rupees. Around Ongar about 100-150 persons are involved in the wood gathering, providing a sufficient fuel for three-day operation. There is a certain degree of standardization in making bundles, each weighing approximately 10 kgs and sold for 5 rupees. The current unit employed is the *man* (37, 2 kgs). In site *A* our informers gave the enormous feature of about 50-65 *mans*, corresponding to 1850-2400 kgs of wood, for the whole three-day combustion. In the site *B* the figures are similar, with the employ of 50 *mans*.

In site *B*, the day before the ignition, we could count approximately 150 bundles (therefore about 1500 kgs), each of them containing a mean of 35-40 branches (Fig. 6).

Unexpectedly, branches are burned still without any seasoning period, with their green leaves in place. The reason is that *Prosopis*' wood burns very well when dry, releases a large amount of heat also when freshly cut. Drying is therefore not essential for high output (PASIECZNIK *et alii* 2001). In any case, local workers do not make use of charcoal or *Acacia* wood, due to high costs.

As all of this wood is locally collected, it appears that continuous cutting of trees and bushes would quickly cause a severe reduction in the vegetation cover of the area. In fact, as already noticed, trees are quite rare, but we had no possibility to relate this almost total absence of mature woody plants to the old practice of lime production.

In site *A* the workmen call *devi* two different forms of *Prosopis*: one is a small tree, the other is a bush, but they only use the bushy form. It seems that these two forms relate to the same species *P. juliflora*, the tree probably growing in patches along some streams, where it should be protected against cutting.

According to local people, the bush will grow again in one year at the suitable dimension for a new cut without apparent damage, according to the availability of water. This prolonged exploitation will certainly limit the availability of foliage and pods for animals, as the plant matures in 3-4 years. On the other hand, this protracted use of the branches limits the spread of the plant, whose dangerous diffusion as a weed has been frequently observed in many tropical regions (BERHANU and TESFAYE 2006).

We could not find any indication about the wood utilization in this pre-industrial technique before the introduction of *Prosopis*, dating between 1878 and 1912 (PASIECZNIK *et al ii* 2001). In late XVIII and early XIX century the Mirs' policy promoted the plantation of over 25,000 acres of forests in the Jerruck area, the revenue of which was "made up mostly from grazing fees, firewood, babul pods, charcoal and cultivation" (HUGUES 1876, p. 301). We can only suspect some important changes in the region at least since the construction of the railway between Karachi and Kotri (1858-61), which certainly required massive quantities of timber, firewood and fuelwood. Moreover, in the first years of the British Rule a large amount of wood was also needed for steam boats and ships, as well as for military

cantonments. For this reason, forest irrigation was introduced by the British Administration in order to avoid the exhaustion of the territory. Only in 1895 the railways switched over to coal and oil (WWF 2008) thus reducing the enormous pressure on the endangered environment.

### Acknowledgments

The author is very grateful to Prof. Paolo Biagi (Ca' Foscari University, Venice) for funding the Mission and to Mir Ahmed Farooq Talpur for his help in the interviews and support during the survey.

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Fig.1: General aspect of the vegetation in the Ongar area, 2010  
(*Author's photograph*).



Fig.2: A recently used kiln for lime production, *site B*  
(*Author's photograph*).

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Fig.3: The kiln on the left is ready for ignition. In the foreground on the right, bundles of *lei* and *devi* ready for use (*site A*) (*Author's photograph*).



Fig.4: Layers of charcoal from previous burning cycles, *site B* (*Author's photograph*).





Fig.5: Carbonized branches of *Prosopis* around the kiln (*site B*)  
(*Author's photograph*).



Fig.6: Bundles of *lei* (on the left) and *devi* (*site B*)  
(*Author's photograph*).