



Ethnobotanical Leaflets



Cyperus papyrus: From the Nile to Modern Times

By Matt Burmeister

Cyperus papyrus, commonly called papyrus or paper plant, is a member of the sedge family (Cyperaceae). It is a monocot that is native to riverbanks and other wet soil areas in Egypt, Ethiopia, the Jordan River Valley, and other parts of the Mediterranean basin (1).

Few members of the sedge family hold economic importance as crop plants, but throughout the world these plants hold great regional importance in weaving mats, baskets, screens, and even sandals (3). Though not normally grown for crops sedges do hold economic importance to agriculture. A substantial amount of sedges are noxious weeds, invading crop fields in all climates of the world. These include species that invade rice paddies, grazing pastures, as well as others (3.) Sedges do however have a considerable amount of ecological importance. They are of extreme importance to primary production as well as an integral part of the hydrologic cycle (3.) *C. papyrus* is an aquatic plant that has woody, bluntly triangular stems and grows up to about 15 feet in quietly flowing water up to three feet deep and the stem can grow up to six centimeters in width near the top (4). While the bottom portion of the stem can be up to six inches in width (7). The stem has scattered vascular bundles and no inner pith, like other typical monocots. The stem is composed of cellulose (54-68%) and lignin (24-32%), this helps to provide support for the stem and subsequently helps maintain the plant structure. There are also air ducts in the stem to help the plant stay buoyant; this is an important adaptation since *C. papyrus* grows in wet conditions (1). The roots, which are rhizomes, spread over the water, forming floating mat. These mats can sometimes break apart allowing the plant to colonize new areas in rivers and lakes. This can sometimes cause problems for shipping vessel (1).

The leaves of the paper plant are long and sharp-keeled and have parallel venation (7). The leaves also have an epidermis with no 'long' and 'short' cell differentiation. The leaves usually have silica bodies and stomata are present (6.) The leaves are arranged in umbels, or tufts, on the end of tall, leafless stems (1).

The economic contributions of *C. papyrus* may not be evident to moderns, but its importance to some ancient civilizations is tremendous. The ancient Egyptians were using papyrus to make paper more than five thousand years ago to make the first paper (1.) Papyrus was the most widely used writing material in ancient Egypt. It was also adopted by the Greeks and extensively used by the Roman Empire (4). The

Greeks began using papyrus for writing material as far back as the fourth or fifth century B.C. Its use continued by the Romans and Greeks as recently as the fifth century A.D. The word paper is even derived from the Egyptian 'papyrus.' *C. papyrus* was cultivated and used for writing material by Arabs of Egypt until the eighth and ninth centuries A.D.: when paper from other plant fibers were utilized. By the third century A.D. the less expensive vellum, or parchment, had begun to replaced papyrus in Europe (4).

There has not yet been found a written explanation left by the Egyptians on how they made paper out of the papyrus plant (1). The earliest account of how to make the paper is given by Pliny the Elder, a Roman citizen from the first century B.C. Even though the Egyptians did not leave a record of how they made papyrus it is probably similar to the Roman method of the first century A.D., since the Romans learned how to make papyrus from the Egyptians. Here is the method that modern scientists derived from the ancient manuscript. First, several hundred *C. papyrus* stalks were cut a few feet above their rhizomes and the umbels of leaves were removed. The lower part of the plant is not suited for making papyrus. The green, outer layers were removed and the inner "pith" was soaked in water. The *C. papyrus* stem has no true pith, instead it has an inner cortex with vascular bundles scattered through it. After soaking the inner portion of the stem it is either sliced into thin vertical strips or peeled continuously down to its core. The strips were then laid very close together, even somewhat overlapping, on a flat surface. A second layer was then laid on top of the first layer but it was placed perpendicular to the first. The sheet was then pressed, possibly by a large stone, or rolled to mesh the two layers together. The papyrus was then allowed to dry for about three weeks in the sun (1). The gum-like sap of the stems acted as an adhesive that held the layers together (4). Animal rock, shells, or animal teeth were probably used to flatten irregularities in the sheets (1). The sheets of papyrus, varying from 12.5 by 22.5 cm to about 22.5 by 37.5 cm, were made into rolls approximately six to nine meters in length (7).

C. papyrus has not only been used to manufacture paper. Papyrus has also been used to make sandals, boxes, ropes, mats, cloth, and building materials. The reeds were also bundled to make boats; a scene from an ancient temple also depicts a boatman wearing a collar of papyrus as a life preserver (1). Old papyrus paper was also recycled into mummy wrappings. The pith and rhizomes were also boiled and eaten, and the rhizomes were dried and used for fuel (1).

In modern times papyrus is not used as a paper product. *C. papyrus* has made a come back on the Nile River recently due to fascination by tourists (1). Today the most important uses of papyrus are that of ecological resources. The rhizomes of the plant prevent soil erosion and trap polluted sediments (1). A study from 1997 showed that *C. papyrus* is useful in wastewater treatment. The study showed that papyrus reduced the amount of nitrogen and phosphorus in wastewater by more than fifty percent in seven to eight months (5).

Historically papyrus has been very important in the economics of the world. In ancient times papyrus was important in making paper that was used for many reasons; from books to government documents. Even in modern times papyrus may have an important role in cleaning up the pollution left by modern man.

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