

PHARMACOGNOSTIC AND TOXICOLOGICAL INVESTIGATION
OF CORN SILK

THESIS

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GENERAL INTRODUCTION AND AIM OF WORK

Corn Silk has been known to have a diuretic effect from ancient times. The plant was regarded as a native medicine commonly prescribed by laymen and even it has been advised in some of the old arabic literature. Its infusion was generally used in poor urinary excretion states of bilharzial or other nature.

Although this activity of corn silk has been known since long time, yet it has not been adequately investigated to the level of a definite scientific conclusion. To ascertain the nature of the diuretic element and to uncover other properties of corn silk, this work has been done as a first step along the long route of scientific investigations of corn silk, so as to prove the nature by which the plant produces its diuretic action.

Aqueous extract as well as alcoholic extract of corn silk have been used. Although these are not the only possible methods of extraction to obtain the active principle, but the work has cleared up several points which assures its medicinal value, and time will come to arrive at the preparation of the active principle in the most purified state.

Although this is not the proper place to state facts, but we can say with good conscience proved by elaborate techniques firstly; that the aqueous and alcoholic extracts of corn silk are diuretics or have a diuretic action. Secondly; that the extract has no toxicological effect as long proved by its native use and as proved by previous workers, (Mosolapoff, 1954)⁽²⁴⁾. Thirdly that the increase of the urinary electrolytes (sodium and potassium) after treatment with corn silk is statistically insignificant in most of our experiments. The augmented water excretion on the other hand is statistically valid, a condition which points to the safe use of the drug in any form.

The diuretic activity of corn silk extract is now well established as compared with other diuretics of proved nature. This activity opens the field for more vast and meticulous work to be done in the future so as to reach at a definite purified active principle which a qualified medical practitioner may not have enough chemical basis to follow in its preparation.

I may conclude that the subject is crude, not adequately investigated to a descisive scientific level and my work in the presented thesis is just a start on the line which may be followed by myself and by others to obtain more data of medicinal value.

REVIEW OF LITERATURE

BOTANICAL REVIEW :

The Corn Plant (*Zea Maize*) has been described by Tapley and Eseltine⁽⁵⁵⁾ as a highly specialized grass with many of the characteristics of other grasses, particularly the fibrous root system, the parallel veined leaves and the typical floral structures. (Fig. 1).

The Primary Roots of the germinating seed are soon followed by the secondary roots from the first node of the stem. These in turn are followed by longer and more extensive roots which arise from successively higher nodes. As the plant grows it develops the so called "Brace or Prop Roots" which commonly arise from the first few nodes above the soil level.

The Stem is divided into nodes and internodes with the leaves arising from the upper end of each internode. The internodes are solid, not hollow as in many of the grasses, and are filled with pitch which carries the scattered fibrovascular bundles.

The Inflorescences (arrangement of flowers on the stem) of the corn plant are separated with male flowers



Fig. 1

"Zea Mays Plant".

on the terminal part of the stalk and female flowers lower down on a developed bud that arises from a node. The male flowers are commonly referred to as "The Tassels" and the female flowers as "The Rudimentary Ears". The staminate flowers in the tassel produce the pollen (fine yellowish powder) which is carried by gravity and air movement to the silks of the pistillate flowers (Flowers producing the seeds). The silk corresponds to the style of the simple flower.

Each kernel of corn is a fruit with the entire ear classed on a compound fruit. The kernels are of great importance in the classification of corn varieties since their significant characters are bases for differentiation. (Fig. 2, shows the principal types of corn with special reference to those cultivated in Egypt).

BOTANICAL CLASSIFICATION :

Although very different in appearance from wheat, oats and barley, corn like these plants, is a member of the great grass family. The accepted scientific name of corn is "ZEA MAIZE", given to the plant by the great swedish taxonomist Linnaeus⁽³⁰⁾.

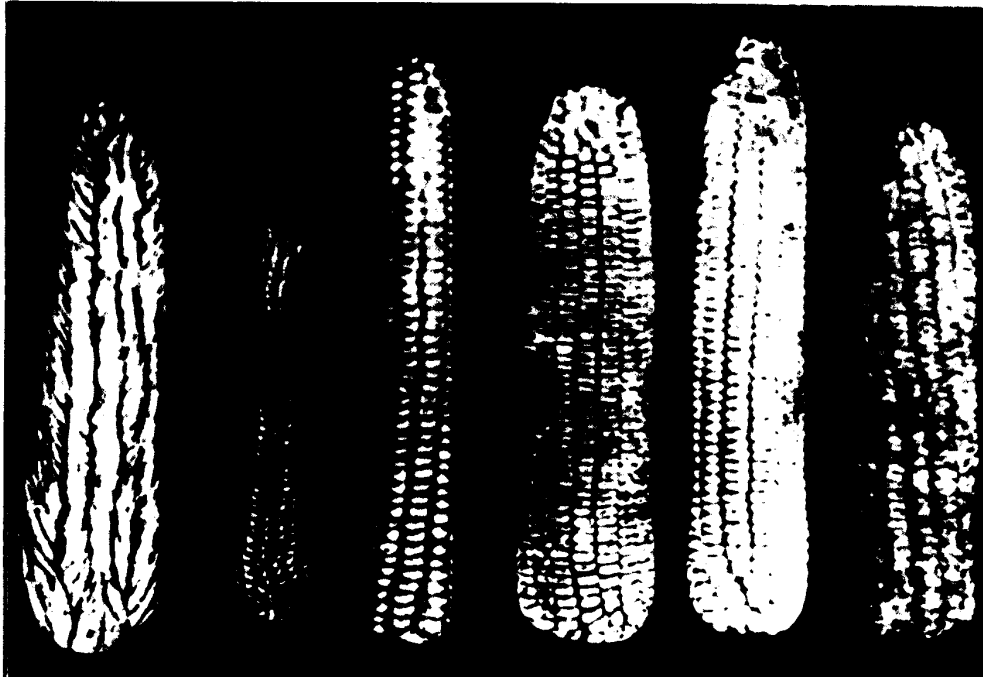


Fig. 2.

Showing the principal types of corn. From left to right,
pod corn, pop corn, flint corn, dent corn, soft
corn and sweet corn.
(Pop, flint and dent corn are those cultivated
in Egypt).

The word ZEA is from the greek word for cereal which according to Weatherwax⁽⁵⁹⁾, was derived from the verb meaning to live. In recent years evidence has been presented to show that the old system of classifying the various types of corn, as was done by Sturtevant⁽⁵⁴⁾, is no longer tenable. Hayes, Immer and Smith⁽²¹⁾ presented an excellent discussion of the modern view point.

Zea Maize L. has a normal chromosome complement of ten pairs. Each of the subspecies described by Sturtevant is dependent upon a single factor pair. It seems therefore more proper to consider these as agronomic groups rather than as subspecies. On this basis the following groups are rather worthy of consideration :

POD CORN (Zea Maize Tunicata).

In Pod Corn each is enclosed in a pod (Shell) or husk and the ear formed is also enclosed in husks. The plants are frequently very leafy and the tassels are often heavy and inclined to bear kernels. Pod corn is sometimes known as Cow Corn, Forage Corn or Primitive Corn.

POP CORN (Zea Maize Everta).

Pop Corn is characterized by a very hard corneous endosperm and small kernels. The ability to pop is due

to the explosion of moisture upon the application of heat. There are two main types of pop corn; rice with pointed kernels and pearl with rounded kernels. The kernels vary greatly in colour and size from white and yellow to deep purple.

FLINT CORN (Zea Maize Indurata).

The endosperm in flint is soft and starchy in the centre and is completely enclosed by a very hard outer layer. The kernels are usually rounded but are sometimes short and flat. The flint corns are early maturing and for this reason they are suitable for growing in cool climate and altitude. In the united states, the flint grown there, are not greatly different from those grown by the Indians many years ago since they have not received the attention of the breeders accorded to the important Dent type.

DENT CORN (Zea Maize Indentata).

The indentation is the result of the shrinkage of the soft or crown starch as the kernel dries at maturity. The hard starch extends on the sides and the soft starch is in the centre and extends to the top of the kernels.

This group is the most widely cultivated group of corns and it is by far the most common one in the corn belt. The plants vary in height from the dwarf hybrids, scarcely three feet tall, to the giant varieties of about eighteen feet high. The ears vary in length from six to twelve or even fourteen inches and the rows on the ears from eight to twenty four.

FLOUR CORN (Zea Maize Amylacea).

All the starch in the kernels of flour corn is soft. Kernels of all colours exist but white and blue are the most common and they are like flint kernels in shape. This group is also known as "Soft Corn or Squaw Corn".

SWEET CORN (Zea Maize Saccharata).

The kernels of sweet corn are translucent, horny and more or less wrinkled in appearance. It has a sweeter taste than other corns, as the endosperm contains sugar as well as starch.

WAXY CORN

The term waxy refers to the wax like appearance of the endosperm of the kernel when it is cut or broken. This waxy starch stains red when treated with iodine, while ordinary starch stains blue.

Waxy corn starch is used chiefly for making adhesives for articles in which tapioca starch is ordinarily used and for textile and paper sizings. The carbohydrate elaborated from waxy corn differs from that found in the starchy varieties.

CORN SILK

Corn Silk is the dried styles and stigmas of the flowers of Zea Mays Linne (Fam. Gramineae). It occurs as loose matted masses with slight odour and slight sweet taste. The styles are slender filaments 5-30 centimeter long, about 0.1 mm. thick, more or less translucent, light green, yellow, light brown or purplish red, each occasionally ending in a bifid stigma 0.5 - 3 mm. long.

Microscopically the styles are formed mainly of parenchyma, traversed by two parallel vascular bundles with narrow spiral or annular vessels; epidermal cells rectangular, frequently extending into non glandular hairs 200-500 microns long, multicellular pluriserrate usually ending in a single cell. The marginal cells of the hairs sometimes ending in a protruding conical tip. Pollen grains are numerous, either adhering to the style or upon the stigmatic surface (the surface which receives the pollen).

Corn silk has been regarded from early decades as a valuable native medicine. In the last few years various investigations on corn silk have been done but on a contracted scale. In an attempt to clear up the medicinal