Mullenax (1957) reported chronic poisoning by leucaena in horses in the Bahamas, manifested by loss of the long hair of the mane, tail and forelocks. Experimental feeding resulted in smaller litters in rabbits and sows (Wayman, Iwanaga and Hugh, 1970), and reproductive failures in rats (Luna, 1963). After being fed on water extracts of leucaena, Joshi (1968) found infertility in female rats, fetal death and resorption, but he did not conduct a systematic pathological investigation. This paper contains the results of such an investigation.

Fresh leucaena leaves were collected on campus, dried, pulverized in a hammer mill (0.5 mm sieve), and mixed at the rate of 25% by weight with standard feed from a government feed meal. Sexually mature Sprague-Dawley rats were bought from ICDDR and randomly divided into three groups (2 experimental and a control group) of 16 (male:female--4:12) of similar body weight. Animals were housed in metal cages of standard dimensions filled with movable metal bottom trays. The test group was brought to pregnancy before the experiment began. After weaning, parents were separated from litters and fed the experimental diet ad lib. The control group received standard rat feed throughout the experiment. The experiment was run for four weeks. Body weight gain was recorded every week and clinical observations were made daily.

Animals were killed by Di-ethyl ether immediately after the experiment. After careful search for any gross abnormality in the G.I. tract and other visceral organs, blocks of tissues were collected and fixed in 10% buffered neutral formalin. Gonadal tissues were fixed in Bouin's fluid. After being passed through graded alcohol and xylol, blocks of tissues were embedded in paraffin, cut at 6 microns and stained with Hematoxylin-Eosin (H & E).

Females on the experimental diet lost weight in the first week and gained after the second. Males did not gain weight throughout the experiment. Experimental animals became pregnant. There were no gross lesions in the G.I. tract, liver, kidneys, supra renal glands and spleen. The ovary was atrophied and the horn of the uterus appeared as a thread-like structure. The vagina was thin and transparent. Testes appeared hemorrhagic and doughy in consistency. The control group did not have gross abnormalities in the ovary and uterus. Microscopically, representative sections of ovary appeared to contain no oocytes in the graffian and as well there had been no formation of corpus leuteum. In the uterine horn, the myometrium had fewer smooth muscle fibers and blood vessels were not active. The epithelial surface was covered by simple, low-columnar cells. Uterine glands were scanty and had no secretion in the accini. The vaginal surface lacked a cornified layer and was smooth. There was no evidence of estrus.

In the testes, the epithelium of the seminiferous tubules were degenerated, desquamated and devoid of any spermatozoa. Severe edema was noticed in the interstitial spaces. The control group showed evidence of active spermatogenesis. The liver showed mild hepatitis. Kidneys suffered interstitial nephritis with hemorrhages in the interstitial tissues. Desquamation of the epithelial lining of the descending loop of Henlee and collecting tubules were present. In the control, representative sections of uterus and ovary showed normal estrus. The control group’s ovaries had corpus leuteum and there was keratinization of the epithelial surfaces of the vagina.

In experimental animals, representative sections from the gingiva, tongue, esophagus, stomach, small intestine, large intestine, spleen, lungs, and supra renal glands appeared to be normal.
The appreciable reduction in the number of growing follicles, disappearance of oocytes (germ cells) from the ovary and spermatozoa in the seminiferous tubules, as well as no corpus luteum formation, indicates that leucaena might contain anti-estrogenic and anti-spermatogenic effects. Isolation and identification of these anti-gonadotrophic factors is an important area for future research. In addition, more control studies using known anti-estrogenic agents along with leucaena feeding are needed. The appearance of the uterine changes and subsequent microscopic alterations produced after leucaena feeding is consistent with previous studies (1968). However, it is assumed that mimosine was not held responsible for these lesions.

References: