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**EVALUATION OF SEX SELECTION ACTIVITY AND SAFETY OF
VERNONIA AMYGDALINA (DEL), *RUBIA CORDIFOLIA* (LINN), AND
ASPARAGUS RACEMOSUS (WILLD), IN RATS**

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APPLIED SCIENCES OF KENYATTA UNIVERSITY**

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*Evaluation of sex
selection activity and*



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DECLARATION

I, Wambugu Enoc Njoroge, declare that this thesis is my original work and has not been presented for a degree in any other university or any other award.

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DEDICATION

This thesis is dedicated to my father and mother; Mrs. and Mrs. Julius Wambugu Munyiri, my brothers and my sisters, and all my beloved friends. This work would have not been completed without your support, encouragement, and goodwill.

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LIST OF ABBREVIATIONS AND ACRONYMS

ALB	Albumin
ALP	Alkaline phosphatase
ALT	Alanine transaminase
AMYL	Amylase
ANOVA	Analysis of variance
AST	Aspartate transaminase
BAS	Basophils
CPK	Creatinine phosphokinase
CREAT	Creatinine
D-BIL	Ddirect bilirubin
EDTA	Ethylenediaminetetraacetic acid
EOS	Eosinophils
GABA	Gamma-aminobutyric acid
GC-MS	Gas chromatography linked to mass spectrometry
GGT	γ -glutamyltransferase
GLU	Glucose
Hb	Haemoglobin
HDL-c	High-Density Lipoprotein Cholesterol
HIV	Human Immunodeficiency Virus
MCH	Mean Corpuscular Hemoglobin
MCHC	Mean corpuscular hemoglobin concentration
MCV	Mean Corpuscular Volume
MON	Monocytes
MPV	Mean platelet volume
NEU	Neutrophils
NMDA	N-methyl D-aspartate
OECD	Organization for Economic Co-operation and Development
PCV	Packed Cell Volume
PDW	Platelet distribution width

PTZ	Pentylentetrazol
RBCs	Red blood cells
RDA	Recommended daily allowance
RDW	Red cell distribution width
RNA	Ribonucleic acid
ROS	Reactive oxygen species
T-BIL	Total bilirubin
TP	Total protein
UA	Uric acid
V: R: A	<i>Vernonia: Rubia: Asparagus</i>
WBCs	White Blood Cells
WHO	World Health Organization

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ABSTRACT

The plants: *Vernonia amygdalina*, *Rubia cordifolia*, and *Asparagus racemosus* have been used in Kenya by the Kalenjins and the Samburu people to select for a boy child but there have been no scientific studies to establish evidence on these claims. Therefore, this study aimed at screening for the sex selection potential of these herbs before and during conception. Clean plant roots were obtained, processed before methanol extraction, and orally administered to *Rattus norvegicus* rats before and after mating for one week. Extract doses of 50, 86.7, and 150 mg/kg body weight for efficacy assays and 150, 260, and 450 mg/kg for the toxicity assays. The plants were administered individually and also in a mixture of the ratios of 1:1:1, 2:1:1, 1:2:1, and 1:1:2. In female rats, the effects of the extracts on vaginal pH, estrogen and cortisol levels were evaluated while in males the effects on sperm count and morphology were evaluated alongside testosterone and cortisol hormone levels. After parturition, the sex ratio of the pups was determined. The plant extracts were also subjected to phytochemical and mineral analysis to identify and quantify present phyto-compounds. Sub-acute toxicity assays were also carried out on the extracts using rats. Results were expressed as mean \pm standard deviations and subjected to various statistical tests while the level of statistical significance was set to $p < .05$. Quantitative phytochemical and mineral analysis showed that some of the mineral elements in the administered plants' extracts doses to rats singly and in combination were above the recommended daily allowances. These plants' extracts contained phytochemicals which could have been responsible for sex selection. Sex selection assays results indicated that the plant extracts significantly increased the ratio of male to female pups when the females were treated with the extracts unlike when only the males were treated. Vaginal pH and testosterone levels were significantly elevated upon treatment with the 86.7 mg/kg and 150 mg/kg body weight doses of *R. cordifolia* and *A. racemosus*. Estrogen levels were significantly elevated in females while in both males and females the cortisol levels were significantly lowered. Administration of *A. racemosus* and the 1:1:1 mixture of the extracts exhibited increased sperm count and the percentage of normal spermatozoa. Further, these plant extracts demonstrated mild toxicity in the subacute toxicity study when administered singly but less toxic effects were recorded in the rats treated with the combined doses. In conclusion, these results validated the use of the plants by herbalists for the preselection of a male child at conception which could be attributed to the phytochemicals and mineral elements present. Further studies are recommended to establish the phytochemicals responsible for these effects and their mechanisms of action.