

PHYTOCHEMICAL AND TOXICOLOGICAL STUDIES OF SOME BOTSWANAN PLANTS USED IN TRADITIONAL MEDICINE

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ABSTRACT: In developing countries traditional medicine is used widely as an alternative to conventional medicine; sometimes as the only form of therapy as modern health facilities may not be adequate to reach everybody. The recent introduction of forensic science facilities in Botswana has led to a number of investigations into whether some of the plants used are poisonous or not as they have been implicated in cases of fatal poisoning. Though such prescriptions are often obtained willingly and are given in good faith, when complications arise, the traditional healer often finds himself having to assist the police in their investigations. In this study a selection of these plants is being investigated phytochemically and toxicologically. These include *Jatropha seineri* pax., *Cassia italica* Lam. Ex., *Asclepias fruticosa* L., *Albizia harveyi* fourn, *Argemone mexicana* L. and *makgonatsotlhe* (vernacular name). *Argemone mexicana* L. was the first plant to be investigated. Preliminary results indicate the presence of protopine-type alkaloids, which are being isolated and identified by spectroscopic methods. Following identification, toxic properties of the compounds will be investigated.

KEYWORDS: *Argemone Mexican L.; Cassia italica Lam. Ex.; Albizia harveyi foun;*
Asclepias fruticosa L.; Jatropha seineri pax; Makgonatsotlhe.

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INTRODUCTION

The use of traditional medicine in Botswana is as old as the history of Botswana people. Even after so many years since the introduction of conventional medicine, herbal medicine is still being used a lot as an alternative where such facilities are not available or as a choice over modern forms of therapy by those who hold a firm belief in its effectiveness. Hedberg and Staugard [5] in their compilation of plants that are used as traditional medicine in Botswana made an observation that about two thirds of Botswana population utilise traditional healing.

Traditional healers are consulted for a variety of ailments such as sexually transmitted diseases, coughs, tuberculosis, diarrhea, liver problems, procurement of abortion etc. The administration of herbal medicine in most cases is done without due care as to how much one should take. While with modern medicine there is always an indication of adverse effects, which are in most cases clearly stated, such information is normally not availed to users of traditional medicine, mainly because the healers may not be aware of these. There have been incidents where patients have developed complications or even died after consulting traditional healers – whether from the medication or other causes would not be clear at this particular time. The police are normally involved at this stage and therefore the forensic toxicologist, who would be expected to establish whether the plant material is poisonous or not and whether it has contributed to the death of the patient. The toxicologist has to address the questions raised by the investigator regarding toxicity and the levels at which toxicity is manifested.

THE STUDY

In this study a number of plants that have been encountered as exhibits in cases of suspected poisoning by traditional medicine in the Botswana Police Forensic Science Laboratory are being investigated phytochemically and toxicologically. These include: *Cassia italica* Lam. Ex. (*Leguminosae*, Figure 1), *Albizia harveyi* foun (*Leguminosae*, Figure 2), *Jatropha seineri* pax. (*Euphorbiaceae*, Figure 3), *makgonatsotlhe* (vernacular name, Figure 4), *Argemone mexicana* L. (*Papaveraceae*, Figure 5) and *Asclepias fruticosa* L. (*Asclepiadaceae*, Figure 6).

THE AIM

1. Isolate and identify secondary metabolites from these plants;
2. Investigate the toxicity of the isolated secondary metabolites.



Fig. 1. *Cassia italica*
(Mill) Lam. Ex.



Fig. 2. *Albizia harveyi*
fourn.



Fig. 3. *Jatropha seineri*
Pax.



Fig. 4. *Makgonatsotlhe*.

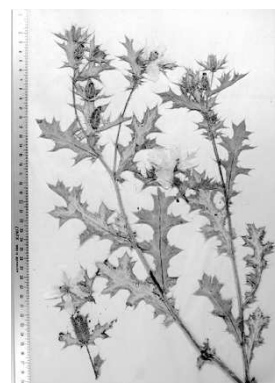


Fig. 5. *Argemone*
mexicana L.



Fig. 6. *Asclepias*
fruticosa L.

EXPERIMENTAL WORK

The first plant to be investigated was *Argemone mexicana*, which is used medicinally for the treatment of sexually transmitted diseases, skin diseases, eye conditions, dropsy, wounds, warts, respiratory disorders and constipation [1]. This plant is reported to contain alkaloids including berberine (Figure 7), sanguinarine (Figure 8) and protopine alkaloids (Figure 9) amongst other secondary metabolites [2, 3, 4, 5, 6, 7, 8, 9, 10]. The toxicity of some of these alkaloids is not currently fully documented.

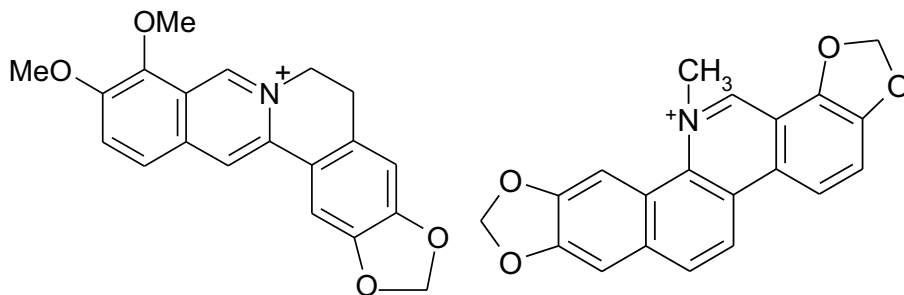


Fig. 7. Chemical structure of berberine. Fig. 8. Chemical structure of sanguinarine.

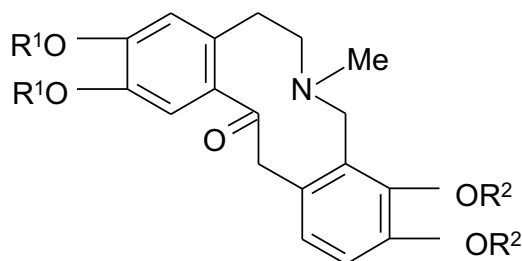


Fig. 9. Chemical structure of protopine.

Our study has shown that *A. Mexicana* contains protopine and a number of related alkaloids, which are currently being identified. Further work is continuing on isolating, identifying and studying the toxicity of secondary metabolites from this plant and the other specified species.

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