

Cardiac glycoside intoxication

Author: Prof Christo Botha

Licensed under a [Creative Commons Attribution license](#). 

INTRODUCTION

Poisoning of livestock by cardiac glycoside-containing plants has the greatest economic impact of all plant-associated poisonings in South Africa. Collectively they are held responsible for 33 % of all mortalities from plant poisonings of cattle and 10 % of those in small stock.

Poisonous principles

Cardiac glycosides are organic molecules consisting of a genin or aglycone with one or more sugars attached. Chemically, two major groups of cardiac glycosides, namely the cardenolides and bufadienolides, are recognized. The cardenolides contain a single unsaturated, 5-membered lactone ring attached to C-17 and the bufadienolides a double unsaturated, 6-membered lactone ring attached to C-17 (Fig. 1). It is interesting to note that certain toads that occur in South Africa (11 *Bufo* species) secrete bufadienolides, catecholamines and tryptamine alkaloids in body fluids to protect themselves against predators.

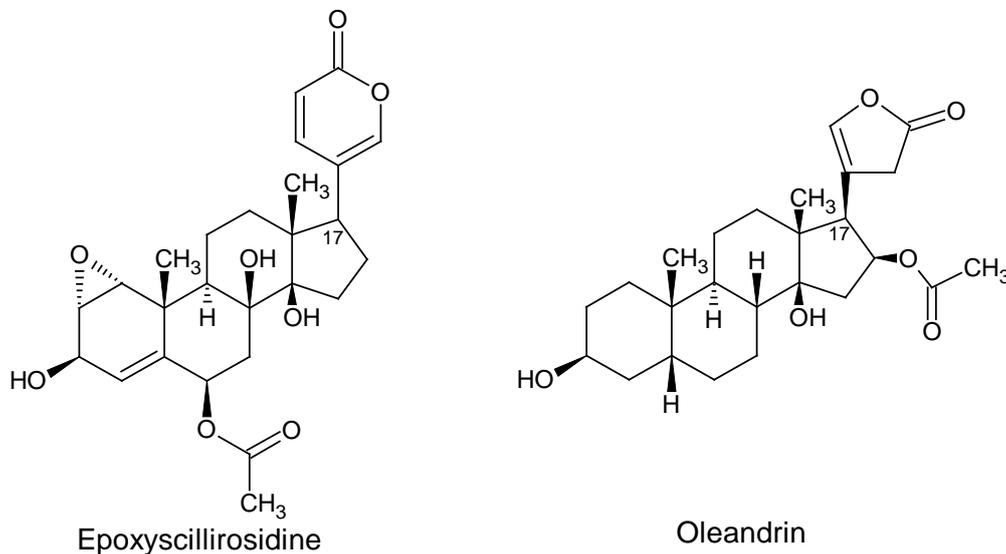


Fig 1: The chemical structure of the aglycones of epoxyscillirosidine, a non-cumulative bufadienolide, contained by *Moraea pallida* (yellow “tulip”) and oleandrin, a cardenolide type of cardiac glycoside, isolated from *Nerium oleander* (oleander).

Epidemiology

Poisoning of livestock by bufadienolide-containing plants, which surpasses cardenolide-induced poisonings in importance, may either be acute or chronic. “Tulp” poisoning (induced by various *Moraea* species) and “slangkop” poisoning (caused by various *Drimia* species) induce only acute intoxication as these species contain non-cumulative bufadienolides. “Tulp” poisoning is the most important plant-associated poisoning in cattle in South Africa and occurs throughout the country. Poisoning occurs predominantly in newly introduced or hungry stock and in young, naive animals. An important feature of yellow “tulp” (*Moraea pallida*) poisoning is that stock that grows up on “tulp”-infested veld can learn to avoid the plant. “Tulp” is an important hay contaminant as it remains toxic upon desiccation. Livestock are frequently poisoned following ingestion of hay or milled hay contaminated by “tulp”. Intoxication has also been reported where horses were exposed to *Eragrostis* hay and lucerne contaminated with “tulp”.

On the other hand, members of three genera of the Crassulaceae (*Cotyledon*, *Tylecodon* and *Kalanchoe*), generally referred to as “plakkies”, contain cumulative, neurotoxic bufadienolides and may cause either acute or chronic poisoning. The chronic form of the poisoning is colloquially referred to as “krimpsiekte” and is primarily a disease of small stock.

