

Standardization and Formulations of Calotropis Procera

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ABSTRACT

Plants growing in arid regions have elicited increased attention, because the hostile environment, in which these plants survive, forces them to develop chemical protective systems through adaptation which is rarely found in vegetation of other ecosystems. Furthermore, many of the plants grow in areas, where the dependence on traditional, plant-based medicines over industrially produced pharmaceuticals persists to this day. The two plants, Calotropis Procera (giant milkweed, also named C. Persica) and Calotropis gigantea (crown flower), have been used widely in traditional medicine in North Africa, the Middle East, and South and South-East Asia. This has led to extensive research on the chemical constituents of the plants. Both plants are known to be sources of cardenolides, and newer research has yielded a number of interesting cancer-active constituents. In addition, extracts of both plants have remarkable nematocidal, molluscidal and insecticidal activities. In many regions, the wood of Calotropis plants has been used as a building material and as a source of fuel. In addition, certain parts of the plants have been used as feed for livestock. In other regions, Calotropis plants are seen as invasive species that threaten local plant life and that due to their toxicity also pose a threat to grazing field animals.

KEYWORDS: Uses of Calotropis Procera, Adaptation, cancer-active constituents, species, Synonyms, Use as fuel, Toxicity

INTRODUCTION

CALOTROPIS PROCERA is a species of flowering plant in the family of Apocynaceae. It is mostly found in semi-arid and arid inland areas, as well as in the drier parts of tropical and sub-tropical regions. Calotropis Procera is widespread in tropical Africa, including the Indian Ocean islands and the northern parts of South Africa. In the past, it was cultivated as a Garden Plant but that changes aGer noticing it to be poisonous. In many regions, the wood of Calotropis plants has been used as a building material and as a source of fuel. In addition, certain parts of the plants have been used as feed for livestock. In other regions, Calotropis plants are seen as invasive species that threaten local plant life and that due to their toxicity also pose a threat to grazing field animals. The complexity of the plants' properties and chemical constituents combined with the wide geographic distribution and regional use of C.procera and C.gigantea has led to a fast-growing body of research on the two plants. For C.gigantea alone, approximately 120 research entries have appeared in

2006 (Australian New Crop Website), while in 2018, the database Web of Knowledge listed 55 research papers for C.procera and 30 research papers for C.gigantea. Short reviews on the two plants have appeared previously. Two more comprehensive reviews have been given on the ethnopharmaceutical aspects of C.gigantea . The currentreview provides a comprehensive, up-to-date picture of the uses and chemical constituents of both plants. The review comes in two parts, where the current part focuses on the usage of the plants for building materials, natural pesticides, animal feed and bioremediation purposes.

SYNONYMS

Common names for the plant include Apple of Sodom, Sodom apple, etc. crown, rubber bush, and rubber tree. The name Apple of Sodom and Dead Sea Apple comes from the fact that the ancient authors Josephus and Tacitus described it as growing in the area of biblical Sodom. Its common name is arka.

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BIOLOGICAL SOURCE

Calotropis Procera is a species of flowering plant in the family Apocynaceae that is native to North Africa, tropical Africa, Western Asia, South Asia, and Indochina.

The green fruits contain a toxic milky sap that is extremely bitter and turns into a gluey coating that is resistant to soap.

Species: *C. Procera*

Family: Apocynaceae

ORIGIN

Calotropis Procera is widespread in tropical Africa, including the Indian Ocean islands and the northern parts of South Africa. It is very common throughout the drier parts of West and East Africa, but much less common towards southern

Africa. It also occurs naturally from northern Africa east throughout continental Asia to South-East Asia. It is occasionally planted outside its natural distribution area; e.g. in subtropical America and Australia where it was introduced possibly as ornamental but it has since escaped and naturalized.

CULTIVATION

This species was cultivated as a garden plant (i.e. ornamental) in the past, but it is now out of favour because it is poisonous and generally regarded as a weed.

HABITAT

Found mostly in semi-arid and arid inland areas, as well as in the drier parts of tropical and sub-tropical regions. A weed of disturbed sites, roadsides, waste areas, near inland watercourses, coastal sand dunes, grasslands, open woodlands and pastures.

STEMS AND LEAVES

The stems and leaves have a waxy appearance and contain a milky white sap (i.e. latex). Branching occurs from the base of the plant upwards. Younger stems are greyish-green in colour, smooth in texture, and have a covering of whitish coloured hairs (i.e. they are hoary). Mature stems have a deeply fissured, cork-like, bark that is light brown in colour. The large, relatively thick, leaves (5-30 cm long and 4-15 cm wide) are also greyish-green in colour and have entire margins. They are oppositely arranged and have stem-clasping bases (i.e. they are sessile) or very short stalks (i.e. petioles) 3-4 mm long. These leaves are rounded (i.e. orbicular) or egg-shaped in outline (i.e. ovate) with shortly-pointed tips (i.e. acute apices). Their upper surfaces are mostly hairless (i.e. glabrous), while their undersides may be densely

covered in tiny white hairs or have a tuG of stiff hairs at the base of the central vein (i.e. midrib).

FLOWERS AND FRUIT

The flowers (15-25 mm across) are borne in clusters, each containing 3-15 flowers, in the forks of the uppermost leaves (i.e. in axillary inflorescences). The main stalk of these flower clusters (i.e. peduncle) is 20-55 mm long and each flower has a stalk (i.e. pedicel) about 15-25 mm long. These flowers have five spreading petals (7-10 mm long and 6-10 mm wide) that are white or pinkish in colour, with much darker purple or purplish-brown tips, and a crown-like centre (i.e. corona) that is also purplish in colour. They also have five sepals (about 5 mm long and 3 mm wide) that are oval (i.e. elliptic) or egg-shaped in outline (i.e. ovate) and five stamens. Flowering occurs mostly during winter. The fruit is a large (6-12 cm long and 3-7 cm wide) bladder pod (i.e. follicle) that is greyish-green in colour and rounded (i.e. sub-globose) to somewhat egg-shaped (i.e. obliquely ovoid). These fruits have thick and spongy skins which split open at maturity. Each fruit contains numerous brown, flattened seeds (about 6 mm long and 4 mm wide) that are topped with a tuG (i.e. coma) of long, white, silky hairs (35-50 mm long)

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