



Short communication

Primary photosensitization and contact dermatitis caused by *Malachra fasciata* Jacq. N.V. (Malvaceae) in sheep

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ABSTRACT

Farmers from Paraíba state, Northeast Brazil, claim that *Malachra fasciata* causes cutaneous lesions in sheep. To test its toxicity the plant was harvested daily and fed *ad libitum* for 21 days to 3 sheep as the sole food source (# 1–3). An additional sheep (# 4) was maintained as a control. Cutaneous lesions of photosensitization initiated after 7 days and increased continuously over the next 21 days. The dose ingested varied between 129 g/kg to 175 g/kg. Alopecia, hyperemia and crusting were observed in the animals. On day 22, sheep 3 was euthanized. At necropsy, no gross or microscopic alterations were observed in the liver. Skin biopsies were performed in the remaining animals. Histopathology of skin of the three sheep included acanthosis, orthokeratosis, and multifocal infiltration by lymphocytes, eosinophils and plasma cells around blood vessels and appendages in the dermis. The Splendore-Hoeppli phenomenon was observed in the dermis of sheep 2, due probably by contact dermatitis. After the end of administration Sheep 1 and 2 were protected from sunlight and the lesions regressed within two weeks. This experiment indicates that *M. fasciata* causes primary photosensitization and contact dermatitis in sheep.

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Malachra fasciata, commonly known as “quiabo-bravo”, “malva-brava” and “malva-de-espinho”, is an invasive species that develops in North and Northeast regions of Brazil (Moreira and Bragança, 2010), as well as in low altitude regions of the Philippines (Ragasa et al., 1997). This plant grows in humid environments, such as swamps, flooded areas and watercourse banks, to a maximum height of 2 m (Moreira and Bragança, 2010).

In traditional medicine, leaves of *M. fasciata* are applied on ulcers and abrasions. Roots and leaves are used in the treatment of hemorrhoids, fever and impotence. Leaf decoction is used by people with gonorrhea and rheumatism. Chemical studies indicate that this plant has antimutagenic properties associated with the presence of monoterpenes (Ragasa et al., 1997). However, this plant has been previously mentioned to be undesirable for animal production

due to the skin injuries it may cause to livestock (Moreira and Bragança, 2010).

In the municipality of Alagoa Grande, Northeast Brazil, farmers claim that this plant is responsible for economic losses in sheep production due to skin lesions, probably photosensitization, leading to death. However, there is no scientific evidence of the toxicity of *M. fasciata*. Therefore, this study aimed to evaluate through experimental observation the toxicity of *M. fasciata* in sheep. In addition, we describe the clinical and pathological findings and the pathogenesis of the intoxication.

Four 4-month-old sheep, three females and one male, with white skin or with extended areas of lightly pigmented skin were used in this study. After being clinically evaluated as healthy, the sheep were maintained in a farm located in Alagoa Grande city, Paraíba State. This experiment was approved by the local Ethics Committee for Studies with Animals of the Federal University of Paraíba (UFPB) (protocol number: 085-2016).

The farm in which sheep were maintained possessed an area containing a large quantity of the plant in pasture. Specimens were

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collected, identified and sent to the herbarium in the Agricultural Science Center of UFPB (CCA/UFPB).

To produce the intoxication by *M. fasciata*, a single experimental group was formed (Sheep 1–3) and an additional sheep was used as control (# 4). Sheep 1–3 received a diet provided *ad libitum* composed only by the plant (with leaves, flowers and fruits with seeds), which was collected daily. This diet was maintained for 21 days and the animals were directly exposed to sunlight radiation. Water was also provided *ad libitum*. Sheep 4 did not have access to the plant and was fed Tifton 85 (*Cynodon dactylon*) and water *ad libitum*. Sheep were weighed in the beginning, middle and end of the experiment. In addition, the amount of plant provided was weighted daily before animals started feeding and the remaining was removed at the end of the day to quantify the consumption. The quantity of plant consumed (daily ingestion) was calculated by the difference between the weight of plant provided minus the weight of the plant remaining unconsumed. In addition, the dose consumed for each animal resulted from the relation between the average amounts of plant ingested during 21 days by the average live weight of the animals.

Clinical evaluation of all sheep assessed the general state of each animal (attitude, behavior, mucosal color, lymph node examination) and the vital parameters (cardiac and respiratory frequencies, temperature and ruminal movements). In addition, a detailed inspection for cutaneous lesions was performed.

To evaluate skin lesions, biopsies were performed in sheep 1 and 2. Sheep 3 was submitted to euthanasia followed by necropsy. During the procedure, samples of skin with and without lesions, organs of the abdominal and thoracic cavities and encephalon were fixated in 10% formalin, dehydrated with a series of alcohols (70%, 95%, 100%), clarified with xylene, included in histological paraffin, sliced at 5 μm width and stained with hematoxylin and eosin.

The plant was identified as *Malachra fasciata* Jacq. N.V. (Fig. 1A–C), which was palatable (Fig. 1D) to sheep that ingested large amounts throughout the experiment from 1 to 21 (last) days. A specimen of the plant was pressed, dried, authenticated, and deposited in the herbarium of the Biological Sciences Department,

Federal University of Paraíba (UFPB) (voucher # 23098). The daily amounts of plant ingestion and the dose consumed by each animal, according to the live weight, are displayed in Table 1.

Dermatitis in the non-pigmented skin exposed to sun light suggesting photosensitization was observed in sheep of the experimental group, while the control sheep (# 4) did not present cutaneous lesions. Sheep 1, 2 and 3 developed the first clinical signs seven days after the beginning of plant feeding. Initial foci of alopecia associated with hyperemia and itch were observed in the legs and scrotum. In the next days, lesions appeared around the skin of snout, scrotum, lips and ears, forming serous crusting (Fig. 2A and B). Mostly non-pigmented areas were affected.

Sheep 3 was submitted to euthanasia and necropsy 22 days after the beginning of the experiment. This animal presented apathy and crusting lesions with alopecia in the legs, lips and ears. Histopathological exam of the epidermis revealed moderate acanthosis and accentuated hyperkeratosis associated with orthokeratosis. The superficial layer of keratin presented great amounts of neutrophils and amorphous eosinophilic material. There was presence of lymphocytes, plasma cells and eosinophils in the dermis around skin appendages and blood vessels (Fig. 2C and D). No lesions were observed in liver or other organs.

Sheep 1 and 2 also developed cutaneous lesions with the same characteristics as sheep 3. Histopathological evaluation of samples from skin biopsies revealed similar findings to those observed in sheep 3, characterized by acanthosis and hyperkeratosis, with superficial crusting in the epidermis. However, sheep 1 presented fewer eosinophils in dermis, and abscess formation and dermal edema were observed. Sheep 2 presented a mixed dermal inflammation, with presence of epithelioid macrophages, giant multinucleated cells, plasma cells and eosinophils in the superficial dermis. Foci of Splendore-Hoeppli reactions were observed in the deep dermis (Fig. 2D) surrounded by large amounts of neutrophils and eosinophils. Microabscesses were observed in the deepest portion of the stratum corneum. Sheep 4 (control) did not present gross or microscopic lesions.

Sheep 1 and 2 completely recovered from lesions after two

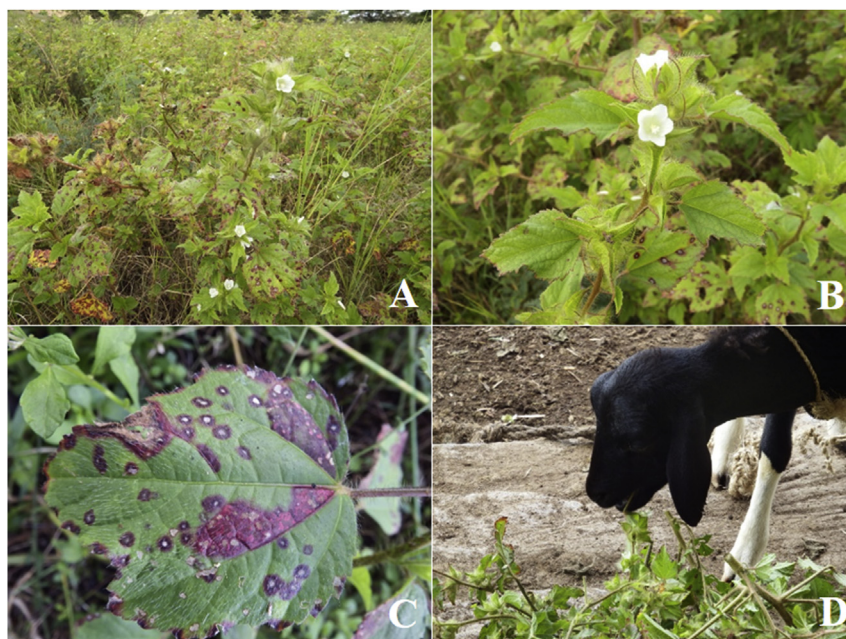


Fig. 1. *Malachra fasciata* Jacq. N.V. from Alagoa Grande city, Paraíba. A) Large amount of this plant species invading pasture. B) Aspects of the plant during inflorescence. C) Close photo of the plant, demonstrating leaf with characteristic purplish spots. D) Sheep 2 ingesting the plant, demonstrating that it is palatable.

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