

Scientific Studies on *Sporobolus spicatus* Kunth**Mohammad Kamil*, F Ahmad and MT Abdalla**

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Corresponding Author:** Mohammad Kamil, Former TCAM Research, ZCHRTM, DOH, Abu Dhabi, UAE. **Email:** drkamil55@hotmail.com.**Received:** May 19, 2021**Published:** September 30, 2021© All rights are reserved by **Mohammad Kamil, et al.*Abstract**

Sporobolus spicatus (Salt grass) locally known as Dhafrem, Rashad, Half Barri, Abu Rakbah and Sbat Rakb in Arabic belongs to the family Poaceae.

It possesses a wide spectrum of medicinal properties, especially the extract caused moderate contraction on the detrusor muscle indicating medium anti-urolithic effect. The heart rate was decreased indicating (negative chronotropic effect). The aqueous extract of the plant decreased Alanine transaminase significantly as compared to the control.

This original article has comprehensive laboratory studies on the aerial parts of *Sporobolus spicatus* covering the botanical, physico-chemical, macroscopic, microscopic, spectroscopic, phytochemical pharmacological and toxicological aspects in detail. These data will lay the ground for its correct identification and distinguishing it from other *Sonchus* species specially *Sporobolus spicatus*. These studies will also be useful to promote its clinical application as an antioxidant and antiseptic medicine. The data of standardization parameters and distinguishing characters enlisted in this study will ensure the efficacy, safety and will also be helpful for the preparation of a monograph of this herb.

Keywords: *Sporobolus spicatus* (Salt grass); Alanine Transaminase; Herb

Sporobolus spicatus (Salt grass) locally known as Dhafrem, Rashad, Half Barri, Abu Rakbah and Sbat Rakb in Arabic belongs to the family Poaceae.

Perennial to 40 cm with creeping stolons, often forming extensive mat-like clumps, variable in appearance. Much-branched from base and rooting nodes; base often white and rest of foliage bluegreen. Leaves narrow, rough on upper surface, younger ones flat, older ones rolled and narrowly pointed. Flowering stems very thin, erect, with 4 - 6 narrowly-cylindrical equal spikes to 6 cm, pointed and very pale, often powdery. Perhaps common weed of towns, plantations and lowland farms; can tolerate high salinity. A local but sometimes abundant grass found from sea level to 2000m on hard clay and alluvial plain made periodically or permanently moist with salty water [11,12].



Figure 1: Aerial part.

Habitat and distribution

Perhaps commonest weed of towns, plantations and lowland farms, found in Abu Dhabi old sewage farm; can tolerate high salinity. In dry months not rooting at nodes, and stolen growth minimal [11].

Pharmacognosy and phytochemistry

Plant parts of interest: Dried stem and branches.

General appearance: The stem and branches are slender, glabrous, yellow or yellowish green in colour. The stem gives rise to erect branches which are brittle and easily broken into hollow parts but some branches do not break easily.

Microscopic characteristics: A surface view of the epidermal layer of the branch exhibits the character of the Graminae (Poaceae) family namely the long and short cells together with the stomata

that have dumb-bell shapes; the long cells have characteristic sinuous walls. A transverse section through the stem shows its cylindrical outline with broad outer ridges and also its monocotyledonous character of scattered closed vascular bundles. The epidermis consists of a layer of nearly rounded small cells. As the circumference of the branch consists of about 18 broad arches, each arch represents a unit of repeated zones. Studying the layers from the periphery inwards, each epidermal layer of an arch is underlain by about two layers of small anticlinal light yellow cells followed by a layer of comparatively larger oval dark yellow cells that surround groups of lightly lignified fibers with thick walls and narrow lumens.

These are followed by the moderately lignified vascular tissues with their wide xylem pitted tracheids. The pith occupies a wide central zone and it consists of rounded parenchyma cells.

Parts studied: Dried stem and branches.

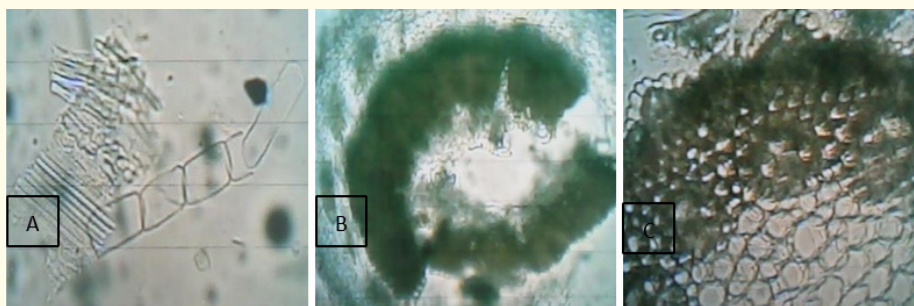


Figure 2: A: A fragment of the surface of the stem from below showing the characteristic long and short cells of the epidermis with stomata having the dumb-bell shape (to the left) together with isolated groups of wide xylem pitted tracheids (to the right).
 B: TS of the stem showing its different layers without the epidermal layer: light yellow cortical cells, groups of lightly lignified fibers, moderately lignified vascular tissues (dark areas) and central pith.
 C: Detailed TS of the stem near the periphery showing two of the broad arches, the outer epidermal layer of each is composed of nearly rounded small cells followed by yellow cortical cells. The pith consists of rounded parenchyma cells.

Chemical constituents

The following chemical studies have been carried out (Quality Control Methods, 1998; Evans, 1996) on the plant *Sporobolus spicatus* [6].

Betain; N, N-Dimethyl glycine; 2-Nitro acetamide; isobornyl acetate; ascorbic acid 2,6-dihexadecanoate; beta sitosterol; isobornyl thiocyno acetate; D-sucrose.

Physicochemical constants (%):

Loss of weight in drying at 105°C: 9.50.

Absolute alcohol solubility: 1.60.

Water solubility: 13.20.

Successive extractives (%):

Petroleum ether (60 - 80°C): 1.30.

Chloroform: 1.60.

Absolute alcohol: 8.20.

Ash values (%):

Total ash: 12.17

Water soluble ash: 3.50

Acid insoluble ash (10% HCl): 4.17

pH Values (aqueous solution):

pH of 1% solution: 6.364 - 6.459.

pH of 10% solution: 5.814 - 5.820.

Elemental analyses

| Ash values [2] | | | | | |
|---|---------------------------------|-------------------|--------------------|-------------------|------------------|
| Assay and identification of element [8] | | | | | |
| Apparatus | (AA-6800 Shimadzu-Flame method) | | | | |
| Element | Std. conc. µg/ml (ppm) | Sample conc.mg/ml | Samples absorbance | Actual conc.mg/ml | Actual conc. (%) |
| Cr | 1, 2, 4 | 10 | 0.000 | <0.0001 | <0.00001 |
| Zn | 0.25, 0.5, 1 | 10 | 0.2421 | 0.0727 | 0.00727 |
| Cu | 1, 2, 4 | 10 | 0.0122 | 0.0146 | 0.00146 |
| Fe | 1, 2, 4 | 0.909 | 0.1516 | 0.27948 | 0.027948 |
| K | 1, 2, 4 | 0.909 | 0.3562 | 2.71687 | 0.271689 |
| Pb | 1, 2, 4 | 10 | 0.0000 | <0.0001 | <0.00001 |
| Cd | 0.125, 0.25, 0.5 | 10 | 0.0000 | <0.000125 | <0.000012 |
| Ca | 5, 10, 20 | 0.0826 | 0.0415 | 13.28701 | 1.3287 |
| Mg | 0.25, 0.5, 1 | 0.0826 | 0.2838 | 2.92215 | 0.292215 |
| Na | 1,2,4 | 0.909 | 0.2823 | 6.4583 | 0.64583 |

Table 1: 1ppm conc. = 1 µg/ml; Actual conc.(%) =Actual conc.(ppm)x0.0001 [1ppm=0.0001%].

UV spectral studies

| Ultraviolet Spectrum (USP reference) | | | | |
|--------------------------------------|--|--------------|-----------|------------------------|
| Apparatus | Beckman DU 520 general purpose UV/VIS spectrophotometer. | | | |
| Sample conc. (mg/ml) | Solvent | λmax (nm) | λmin (nm) | Abs.(λmax - λmin) |
| 0.996 | Intestinal fluid simulated without pancreatic pH = 7.5 ± 0.1 | 204 273.5 | 260 | 1.362 0.321 - 0.310 |
| 0.838 | Gastric fluid simulated without pepsin pH = 1.2 ± 0.1 | 203.5 272 | 259.5 | 0.981 0.218 - 0.208 |

Table 2

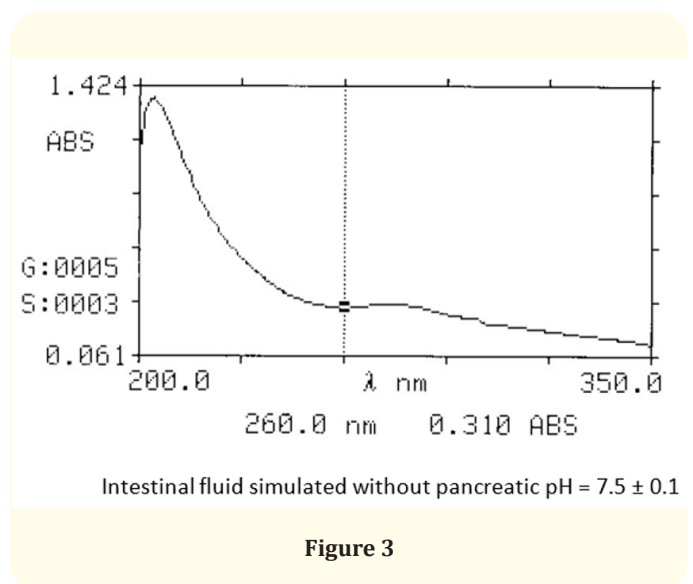


Figure 3

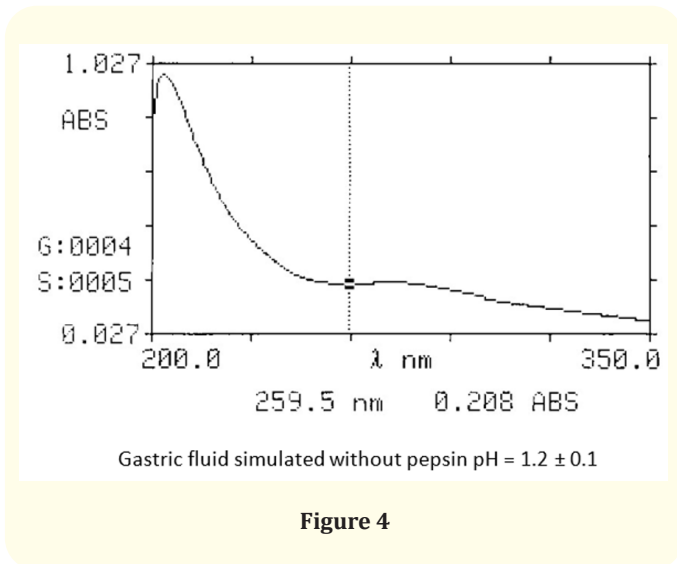


Figure 4

Thin layer chromatography (TLC) [10]

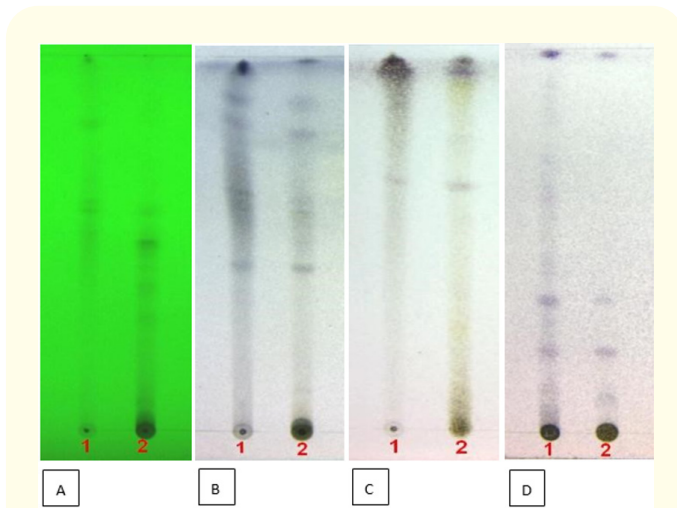


Figure 5: TLC fingerprint of Petroleum ether -60-800 (track 1) and MeOH extract (track 2).

Mobile phase figure A and B: Toluene, ethyl formate, formic acid (5:4:1).

C: Ethyl acetate, methanol, water (100:13.5:10).

D: Toluene, ethyl acetate (93:7).

Detection A: UV 254 nm.

Derivatization B, C and D: Vanillin- Sulphuric acid-vis.

Pharmacological and toxicological studies

Literature and reported information about the plant: The important pharmacological and toxicological activities of the plant *Sporobolus sp.* reported in various scientific journals have been presented in the present brief review.

Martinelli [7] reported for the first time that describes sucrose localization in dehydrating leaf tissues of a “resurrection” plant. We conclude that, during dehydration stress, sucrose accumulates in all viable tissues; these results are in agreement with the previously proposed theories about its function as a cellular protective.

The effect of feeding *Sporobolus* and Rhodes hay on phenyl butazone (4g) relative absorption was examined in six camels for phenyl butazone in serum. It was concluded that the phasic absorption of phenyl butazone was a particular feature of hay feeding in camels, and the *Sporobolus* hay can be fed to camels without any effect on the rate and extent of phenyl butazone absorption compared to Rhodes grass hay [1].

The following pharmacological and safety evaluation studies were carried out [3,5] on the *Sporobolus spicatus* plant aqueous extract.

| Activity | Results | | | |
|---|---------|----------|------|----------|
| | Strong | Moderate | Mild | Negative |
| Analgesic (writhing) | | | | v |
| Analgesic (hot plate) | | | | v |
| Antidepressant (TST) | v | | | |
| Anti-inflammatory (rat paw edema) | | | | v |
| Anticonvulsant activity | | | | v |
| Antithrombotic activity (PT + FIB) | | | | v |
| Effect on guinea pig tracheal chain | | | | v |
| Effect on rat detrusor muscle | | v | | |
| Effect on guinea pig ileum | | | | v |
| Effect on rat fundus | | | v | |
| Effect on rat atria (HR) ↓ | | v | | |
| Biochemical studies (ALT) ↓ | v | | | |
| Hematological studies (RBC, HGB, HCT and MCV) ↑ | | | v | |

| | | | | |
|-------------------------------------|--|--|---|---|
| Acute toxicity | | | | v |
| Locomotor activity test | | | v | |
| Motor co-ordination (rota rod) test | | | v | |
| Rectal temperature | | | | v |
| Body weight | | | | v |
| Mortality | | | | v |
| LD ₅₀ = > 10 g/kg | | | | |

Table 3

Conclusion

The extract caused moderate contraction on the detrusor muscle indicating medium anti-urolithic effect. The heart rate was decreased indicating (negative chronotropic effect). The aqueous extract of the plant decreased Alanine transaminase significantly as compared to the control. The extract increased the animal’s activity and did not exhibit any toxic effects at the dose tested [6].

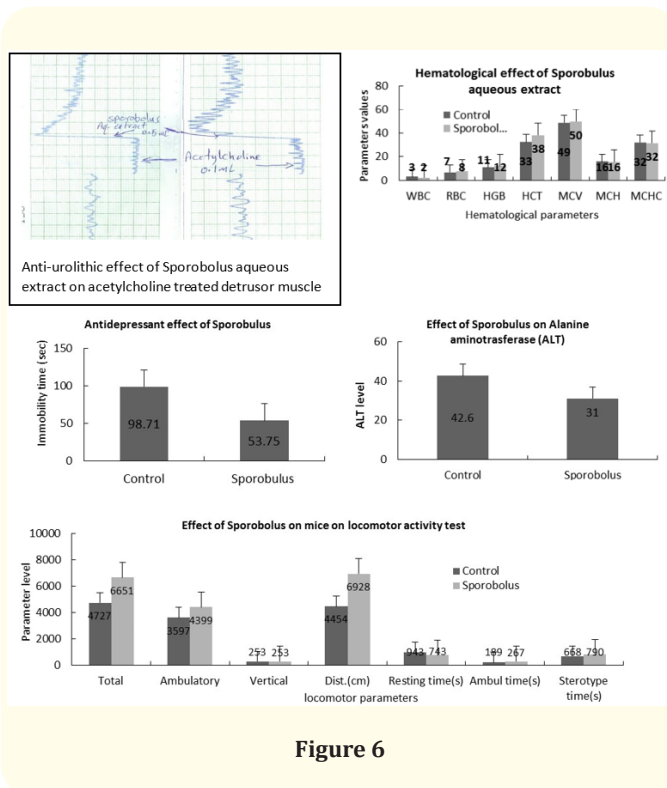


Figure 6

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