

Flora of *Solanum rostratum* Dunal. (Family-Solanaceae) in Libya: A New Record

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Abstract A new invasive species, *Solanum rostratum* (Solanaceae) is reported for the first time for the flora of Libya. The specimens were collected from Gabes about 80 km east of Tobruk city in North East part of Libyan coast for two seasons 2013 – 2014, morphological data were given to ascertain its determination.

Keywords Solanaceae, *Solanum rostratum*, Buffalobur nightshade, Invasive species

1. Introduction

Solanum, with approximately 1500 species, is the largest genus in the family Solanaceae and one of the largest genera of flowering plants [1]. In general, *Solanum* flowers are easily recognized by their five-merous, radially symmetrical flowers with equal (isanthrous) stamens that dehisce by terminal pores [2].

Solanum rostratum Dunal. is an annual weed with strong ability for invasion. The species is native to the neotropics and southwestern United States, but it is now widely distributed throughout much of the world. *S. rostratum* is an occasional weed in open disturbed sites such as roadsides, waste dump sites, and overgrazed pastures. *S. rostratum* is an exotic noxious weed with potential harm, and has a strong capability of propagation and adaptation. As a kind of exotic poisonous weeds, it is toxic to the local crops and plants and has the potential to destroy the local ecological structure [3, 4] It exerts its influence on crops and pastures through competition for water, nutrients, and light throughout the growing season of the species. It is a nuisance because the sharp spines stick to skin, hair, and mucous membranes of livestock, and thus lower the quality of their skin and hair. Leaves, berries, and roots of *S. rostratum* contain cholinesterase inhibitory substances, which can cause livestock poisoning and even death. In addition, plant diseases and insect pests on the *S. rostratum* can also spread as the plant spreads [5, 6].

Buffalobur is a native North American species, its range extending from central Mexico northward across the Great Plains of the United States. It is widely introduced elsewhere, including the U.S.S.R. and Australia. Repeatedly introduced

into the Pacific Northwest, buffalobur usually appears in gardens, where it was planted with flower or vegetable seeds. Land managers found it near Penticton, British Columbia, following reseeding of rangeland. Occasionally, plants sold as tomato seedlings have matured into buffalobur. The name "buffalobur" dates back to the time of settlement of the Great Plains when the plant grew abundantly in the disturbed soil of buffalo wallows [7].

In this paper *Solanum rostratum* is collected and recorded for the first time for the flora of Libya as an invasive weed in Cucurbita crop fields.

2. Materials and Methods

Plant specimens were collected from Gabes about 80 Km east of Tobruk city in the North East part of Libyan coast (fig 6). Monitoring the plant and gathering of plant specimens were conducted within two consecutive years between 2013 – 2014. The identification of the species was authenticated by Dr. Mohammed Mahklouf, Department of Botany, Faculty of Sciences, Tripoli University, with the aiding of data from the following literature [2, 5, 8-16]. A detailed taxonomic and morphological description based on many field trips and collections within the two consecutive years 2013 – 2014 were done, then figures of the plant and locality are given here to facilitate its easy identification in the field. The present report represents the first record of *Solanum rostratum* in the flora of Libya.

The plant specimens were deposited at the national herbarium of the Department of Botany, Faculty of Sciences, Tripoli University, Libya.

Description of species

Solanum rostratum Dunal., Hist. d. Solan. 234. 1813; et in DC. Prodr. 13, 1: 329. 1852; Fedch & Fler., Fl. Europ. Ross.: 842; Grossg., Fl. Kavk. 3: 355; Vznachn., Rosl. URSS: 370. Abrams., Ill. Fl. Pacific. Stat. 3: 681, fig. 4503.

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1951; Komarov et al., Fl. USSR. 22: 43.1955; Li in Fl. Liaoning. II: 273, pl. 123: 1, 2. 1992. — *Androcera rostrata* Rydb. in Bull. Torr. Bot. Club. 33: 150. 1906. -lc.: Dun., tab. 24. 1813.; Gleason, "The New Britton & Brown", Fl. North. US & Canada. III: 200, fig. 1960. *S. cornutum* Lam., Ill. 2: 25. 1793. *Androcera lobata* Nutt., Gen. Am. I: 129. 1818.



Figure 1. *Solanum rostratum* in *Cucurbita* field



Figure 2. Inflorescence

Annual herbs, 20 - 60 cm tall, spreadinly branched, abundantly armed, covered with stipitate stellate and simple hairs intermixed with unequal yellow shap prickles, these sometimes more than 1 cm long on fruiting calyces. Leaves petiolate, alternate, elliptic to broadly ovate in outline, up to 12 cm long, deeply pinnatefeded to pinnatisect near the base, the lobes irregular with rounded or obtuse apices; stellate-pubescent on both surfaces, prickly along main veins; petioles up to 8 cm long. Inflorescences raceme-like monochasial cymes, to 15 cm long, 3 - 10 flowered; peduncles 1-4 cm long; pedicel to 1 cm long; calyx 5-12 mm

long, the lobes lanceolate, usually at least 2 times as long as the tube; corolla rotate, yellow, 15-25 mm in diam., stellate-pubescent on the outer surface, lobes short; stamens yellow, unequal; anthers 2 times longer than filaments, four of them nearly equal, the fifth much longer and curved above; style curved, equal to or exceeding the long anther. Fruits berry, globular, 9-12 mm in diam, erect, closely invested by the densely prickly, accrescent calyx tube; seeds flattened, ovoid, dark brown, alveolate. (Fig 1, 2, 3, 4, 5)

Fl. June - October.



Figure 3. Flower showing larger and curved stamen



Figure 4. Right (Closed fruits), Left (Dehiscent fruits)

3. Results and Discussion

The identification of this species was done using the data from the literature [2, 5, 8-16].

In addition, it is easily recognized by its yellow showy rotate flowers, longer curved fifth stamen, long yellow sharp prickles, and stellate hairs.



Figure 5. Herbarium specimen

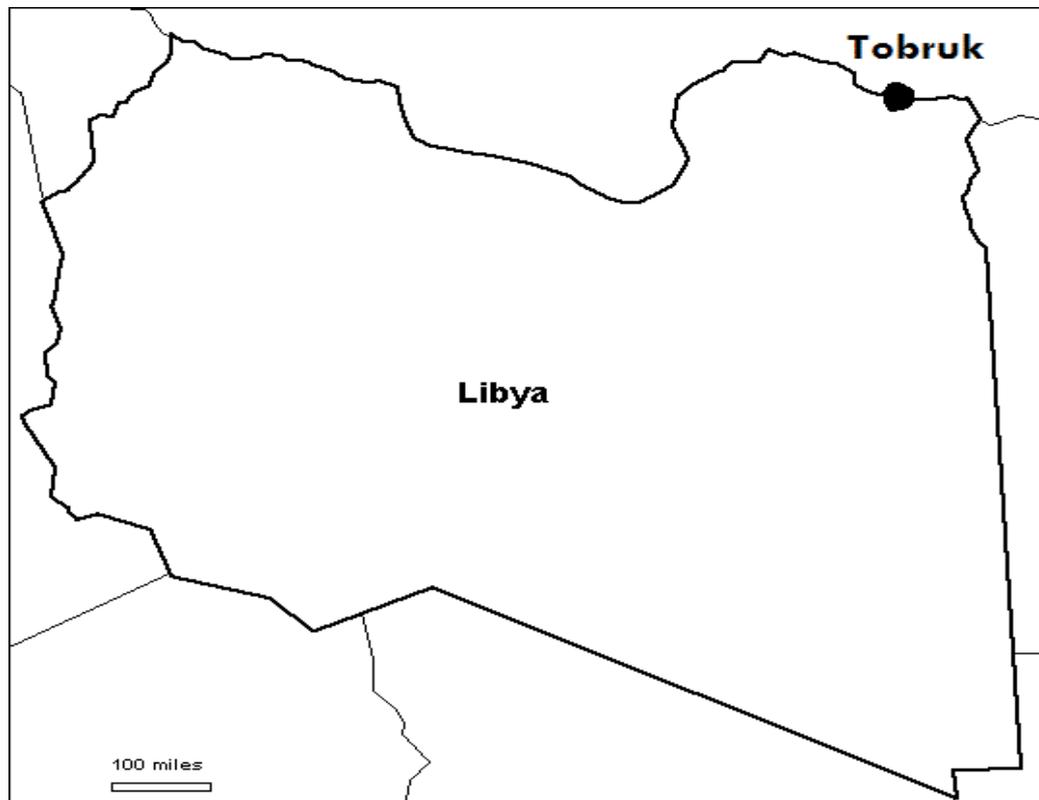


Figure 6. A map of Libya showing locality

Solanum rostratum is a hard-to-handle, spinescent plant with sharp prickles covering fruits and all parts of the shoot. It has large, very attractive, bright yellow flowers, but has the potential of becoming an unwanted invasive if not removed whenever it is discovered. In addition to this being the only yellow-flowered *Solanum* in the range, it is also distinctive because one stamen is much larger than the others. The spines easily penetrate the skin, and commonly leave their tips in skin, thereby they can cause infection. [17] *S. rostratum* is an occasional weed in open disturbed sites such as roadsides and waste places, especially in western Canada. In the United States, it has been reported in overgrazed pastures in Kansas and Oklahoma. It has been introduced as seed, contaminating garden and forage crops [18]. Now it has been disseminated through much of the world including U.S.S.R. and Australia [19]. According to [8] it recently introduced and spread in Israel in Sharon plain, Esdraelon plain, and Ran alley and Jordan in upper Jordan valley, this the only record in Mediterranean area. According to [10, 14] *S. rostratum* recorded only in South Africa is introduced as noxious weed and regarded as toxic to livestock. It is listed in the geographical atlas of the world as common in South Africa [20].

S. rostratum is not recorded in the Flora of Libya [21], therefore our collection is the first to the flora of Libya and North Africa, and the second collection in Africa.

According to local people and farmers, it invaded, adapted and naturalized the region and spread in Cucurbita fields in Gabes region belong to Tobruk city within five to seven years ago.

The chromosome number of *S. rostratum* $n = 12$ has been determined in Canada [22], Mexico [19] and in the United States [13].

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REFERENCES

- [1] Frodin, D.G. 2004. History and concepts of big plant genera. *Taxon* 53:753–776.
- [2] Bohs, L; Weese, T; Myers, N; Lefgren, V; Thomas, N; Wagenen A. and Stern, S. 2007. Zygomorphy and Heteranthery in *Solanum* in a Phylogenetic Context. VIth International Solanaceae Conference. *Acta Hort.* 745, 201 – 224.
- [3] Wei, S.H., C.X. Zhang, Y. Liu, H.J. Huang, Q.H. Meng, H.L. Cui and X.J. Li, 2007. Invasive Weed Species Buffalobur (*Solanum rostratum*) and nRisk Assessment. *Chinese Agricultural Science Bulletin*, 23(3): 347-351.
- [4] Wang, C; Zhao, D; Chen, X; Wang, L; Fu, W; Zhang, G and Qu, B. A Preliminary Study on the Inhibitory Substances in Seeds of *Solanum rostratum* Dun. *Middle-East Journal of Scientific Research* 8 (1): 10-15, 2011.

- [5] TAN Dun-Yan, L. The potential and exotic invasive plant: *Solanum rostratum*. Acta Phytotaxonomica Sinica. 45 (5): 675–685.
- [6] Evers, Robert A., and Roger P. Link. Poisonous Plants of the Midwest and Their Effects on Livestock, 1972. Special Publication 24, College of Agriculture, University of Illinois at Urbana-Champaign.
- [7] Rushing D.W., D.S. Murray and L.M. Verhalen. 1985. Weed interference with cotton (*Gossypium hirsutum*). I. Buffalobur (*Solanum rostratum*). Weed Sci. 33:810-814.
- [8] Danton, N. F. Flora palaestina. The Israel Academy of Science and Humanities. Jerusalem. 1978; 3: 164-67.
- [9] Bitter, G. (1913) *Solana africana* I. (Morellae novae vel minus cognitae) Bot. Jb. 49: 560-569.
- [10] Bitter, G. (1917) *Solana africana* II. Bot. Jb. 54: 416-506.
- [11] Bitter, G. (1921) *Solana africana* III. Bot. Jb. 57: 248-286.
- [12] Bitter, G. (1923) *Solana africana* IV. Beih. Repert. nov. Spec. Regni veg, 16 1-320.
- [13] Jaeger, P. 1985. Systematic Studies In The Genus *Solanum* In Africa. Ph. D theses. Department of Plant Biology, Faculty of Science, University of Birmingham.
- [14] Laster, C. 2011. *Solanum* in Africa, (Bitter, I – IV). Birmingham. UK.
- [15] Amy. W. Solanaceae of Ohio. Ohio Journal of Science: 1914. Volume 14, Issue 3.
- [16] Bates, S.T; Farruggia, F ; Gilbert, E. ; Gutierrez, R.; Jenke, D; Makings, E; Manton, Newton, D; and Landrum, L.R. Solanaceae Potato Family, Part Two: Key To The Genera And *Solanum* L. *CANOTIA* 5 . 2009. (1): 1–16.
- [17] Prigge, B.A. and Gibson, A.C., 2007. "Researching a new flora of the Santa Monica Mountains and Simi Hills, California", In: Flora and Ecology of the Santa Monica Mountains, Proceedings of the 32nd Annual Southern California Botanists Symposium, D. Knapp (ed.) (Eds.), Fullerton, CA Southern California Botanists Special Publication 4 55 (1): 29-34.
- [18] Bassett, I. J., and Munro, D. B. The Biology Of Canadian Weeds. 78. *Solaunum carolinense* L. and *Solanum rostratum* Dunal. Can. J. Plant Sci. 1986. 66:977-99.
- [19] Whalen, M.D. 1979. Taxonomy of *Solanum setion androceras*. Gentes Herbarum 11 (6):359- 426.
- [20] Holm, L., J. Pancho, J. Herberger, and D. Plucknett. 1979. A Geographical Atlas of World Weeds. John Wiley and Sons, New York. xlix + 391 pp.
- [21] Jafri. S & El-Gadi. A. 1977. *Flora of Libya (Solanaceae; Siddiqi, 1978)*. Al-Faateh University- Faculty of Science. (62).
- [22] Crompton, C. W. and Bassett, I. J. 1976. In A. L<ive. ed. IOPB chromosome number reports LIV. Taxon 25:631-649.