

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/332892547>

The first record of *Abutilon theophrasti* (Malvaceae) in the flora of Libya

Article in *Phytotaxa* · May 2019

DOI: 10.11646/phytotaxa.402.5.5

CITATIONS

0

READS

28

2 authors:



Mohamed Makhoulouf
University of Tripoli

26 PUBLICATIONS 14 CITATIONS

[SEE PROFILE](#)



Sh-hoob Mohamed El-ahmir
Curtin University

3 PUBLICATIONS 8 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Botany View project



The first record of *Abutilon theophrasti* (Malvaceae) in the flora of Libya

MOHAMMED. H. MAHKLOUF^{1*} & SH-HOUB. M. EL-AHAMIR²

¹ Botany Department, Faculty of Science, Tripoli University. Tripoli. Libya

² Botany Department, Faculty of Science, Gharyan University. Gharyan. Libya

* Author for correspondence: E-mail: mahklouf64@yahoo.com

Abstract

A new record for *Abutilon theophrasti* is recorded for the first time in the flora of Libya. This widespread agricultural weed was collected from El-Hamra region (El-Qabel) in the Nafusa Mountain south of Tripoli. To facilitate further identification and future detection, a full description, habitat information, distribution map and distribution data are provided. A brief discussion about the most important threats posed by this species is presented.

Keywords: Gharyan, new record, taxonomy, velvetleaf

Introduction

Abutilon theophrasti Medikus (1787: 28) (Malvaceae) is native to Asia, specifically China and India. In China, *A. theophrasti* naturally occurs in the Southern China belt, starting in the north along the southern side of the Qin Ling Range in the west. *Abutilon theophrasti* has been introduced into Europe, particularly in southeastern Europe where it occurs as a weed of cultivated land, the Mediterranean region, the Middle East, and the Americas (Spencer *et al.* 1985). It was originally introduced in many parts of the world as a potential fiber crop and has later been accidentally imported as a seed contaminant (Suominen 1979, Warwick & Black 1988, Jäger 1991, Holt & Boose 2000, Follak *et al.* 2014). The current paper presents the first report of *A. theophrasti* being naturalized in Libya. It is also the first record of the genus *Abutilon* Miller (1754: 23) for the flora of Libya. The Malvaceae in Libya was previously represented by 10 genera (three native and seven cultivated) and 28 species (12 native and 16 cultivated).

Materials and methods

Plant material were collected from the El-Hamra region (El-Qabel) about 8 km northwest of Gharyan city, and 3.8 km west of Qawasim (32.209039° N, 13.006949° E) in the Nafusa Mountain south of Tripoli, Libya. (Fig. 1). The material was brought to the National Herbarium (ULT) of the Department of Botany, Faculty of Sciences, Tripoli University, Libya (acronym follows Thiers 2019), and subjected to standard herbarium procedures (drying, pressing and mounting).

The plant specimen was examined carefully, characterized, described, and morphological data was taken. Identification of the specimen to species level was done using data from several references (Cullen 1967, Boliotes 1984, Warwick & Black 1986, Tanji & Taleb 1997). It was then given a voucher number (7410111) and deposited at the ULT herbarium, with a duplicate sent to the herbarium of the Botany Department, Gharyan University, Gharyan, Libya.

Species treatment

Abutilon theophrasti Medikus (1787: 28)

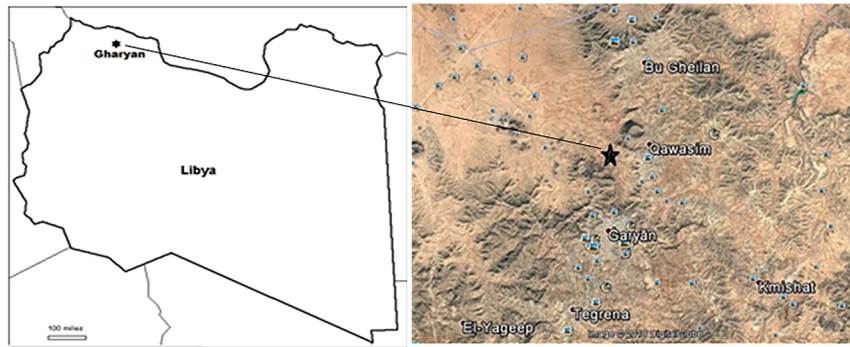


FIGURE 1. Map of Libya (left) and detailed map of the Gharyan district (right) showing the locality where *Abutilon theophrasti* (black star) was collected.

Synonyms:—*Sida abutilon* Linnaeus (1753: 685); *Abutilon avicennae* Gaertner (1791: 251).

English names:—Velvetleaf, abutilon, butterprint, elephant ears, Indian mallow, piemarker (Alex & Switzer 1970), buttonweed (Reed 1970), cottonweed (Roeth 1987), China jute, abutilon hemp, Manchurian jute, American jute (Spencer 1984).



FIGURE 2. *Abutilon theophrasti*. A. Habit of plant showing large, cordate, velvety leaves. B. Flower showing small size and yellow to yellow-orange colour. C. Fruit with many scabrous mericarps bearing two long awns at the apex. Photographs by S.M. El-Ahamir.

Annual subshrub, 1–2 m high. Stem and twigs pubescent with fine hairs. Leaves simple, long petioled, alternate, broadly heart-shaped, round to cordate at base, apex acuminate, ca. 50–200 mm long, velvety, densely stellate pubescent on both surfaces, margin minutely crenate; petiole 30–120 mm long, with stellate hairs. Flowers single or in small clusters from leaf axils; peduncles shorter than petioles; pedicel 10–30 mm long, pubescent, with thickening near apex; flowers yellow, calyx cup-shaped, densely puberulous, with five ovate lobes ca. 6 mm long; petals obovate, ca. 10 mm in length, slightly notched at apex. Stamens many, monodelphous, united to form central column. Ovary many (10–15) carpelled. Fruits semi-globose capsules, 12–25 × 20–25 mm, with 12–20 scabrous mericarps bearing two long awns at apex; carpels open with vertical slit along outer edge, contain 1–3 seeds. Seed purplish-brown, reniform, notched, stellately puberulous, flattened, 2–3 × 1 mm. (Fig. 2, 3).



FIGURE 3. Herbarium specimen of *Abutilon theophrasti* collected in the Gharyan district of Libya.

Habitat:—Meadows, ditches and field margins. Range from altitudes of 200–500 m above sea level, the soil ranges from gray-brown, sandy clay soil, and sandy to clay loams.

Flowering time:—April–September.

Fruiting time:—May–October.

Chromosome number:—*Abutilon theophrasti* is hexaploid with $2n = 6x = 42$ (Bolkhovskikh *et al.* 1969, Warwick & Black 1986, 1988).

Voucher specimen:—LIBYA, Abohamra region, 3.8 km west of Qwasim [Qawasim] city (32.209039° N, 13.006949° E), 29-5-2018, S. El-Ahmir & H. Abugafer s.n. (ULT!, Gharyan University!) (Fig. 3).

Results and Discussion

The native origin of *Abutilon theophrasti* includes both India (Reed 1970, Shaw *et al.* 1974, Flint *et al.* 1983) and China (Spencer 1984). It has initially been introduced into many countries worldwide, especially in Europe, Korea, and North America, by cultivation as a fiber crop. During recent years, it was accidentally imported as a contaminant of crop seeds and grains (Spencer 1984).

Abutilon theophrasti was probably introduced to Japan and Korea in the 10th century (Enomoto 1997) and is now widely distributed in these countries (Shimizu *et al.* 1994). It is also recorded as introduced plants from Afghanistan, Pakistan, India and Nepal (Spencer 1984). It was originally introduced into Europe, where it occurs as a weed of cultivated land and waste places, particularly in southeastern Europe (Spencer 1984), and as a contaminant of bird seed into Britain (Hanson & Mason 1985), and as a grain contaminant into Finland (Suominen 1979). Its mode of introduction into Turkey is unknown (Cullen 1967). In addition, it was reported in the Netherlands in 1981 (Rotteveel 1981) and continues to spread throughout Europe (Warwick & Black 1988). *Abutilon theophrasti* has later been introduced into the United States and has spread across almost the entire North American continent (Webb 1968, Mitich 1991). In Canada, it commonly occurs in maize and soybean fields (Doyon *et al.* 1986, Warwick & Black 1986). In the African Mediterranean region, it was first introduced into Morocco in 1980 (Tanji & Taleb 1997). Moreover, recent research listed *A. theophrasti* in the alien flora of Tunisia (Sayari & Mekki 2016) and Egypt (El-Ghani & El-Sawaf 2004).

Abutilon theophrasti is here reported for the first time from the El-Hamra region (El-Qabel) in Libya. This collection also constitutes the first record of the genus *Abutilon* in the flora of Libya. The species is easily recognized by its erect tall growth habit, large, alternate, heart-shaped leaves, which are soft and velvety to the touch, small yellow to yellow-orange flowers, and distinct capsules with many scabrous mericarps bearing two long awns at the apex.

The species is one of the most noxious weeds in agricultural fields (Spencer 1984, Kurokawa *et al.* 2003), causing serious economic damage due to major yield losses during the agricultural production of particularly maize, soybeans, sugar beets, and cotton. Its allelopathic effects on crops depresses germination and growth of alfalfa, maize, radish, soybean, and turnip seedlings (Spencer 1984, Mitich 1991, Kurokawa *et al.* 2003). Apparently, *Abutilon theophrastii* has not yet been reported as an invasive plant in natural vegetation in any area, and therefore its impact on biodiversity is considered to be small. Subsequently, the Invasive Species Specialist Group (ISSG 2003; <https://www.cabi.org/isc/datasheet/1987>) does not list it as a global invasive species.

The mode and time of its introduction and arrival to Libya remains unknown. It may have been introduced as a seed contaminant. Its presence in cultivated fields as well as in natural vegetation in Libya is an alert to its probable invasiveness, and to a possible emerging problem that can have serious impacts. Speedy implementation of an appropriate management plan, including quarantine and potential eradication, is required.

Control options should include the prevention of introducing *Abutilon theophrasti* into previously uninfested fields and environments, by avoiding the spread of seeds via contaminated soil and harvesting. In fields, management should target surveillance of incipient infestations and subsequent uprooting of small populations before seed set (Follak *et al.* 2014).

Acknowledgments

We are grateful to Mr Hisham Ali Abo-Jafer for assistance in collecting material for examination; and to two anonymous reviewers for suggesting improvements to the manuscript.

References

- Alex, J.F. & Switzer, C.M. (1970) *Ontario weeds*. Ontario Ministry of Agriculture and Food Publication 505. Ontario Agricultural College, Guelph, 200 pp.
- Boliotis, D. (1984) The wild flowers of Greece. *Zizaniologia* 1: 183–200.
- Bolkhovskikh, Z., Grif, V., Matvejeva, T. & Zakhareyna, O. (1969) *Chromosome numbers of flowering plants*. V.L. Komarov Botanical Institute, Academy of Sciences of the USSR, Leningrad, 927 pp.
- Cullen, J. (1967) Malvaceae: 2. *Abutilon*. In: Davis, P.H. (Ed.) *Flora of Turkey and the East Aegean Islands*, Vol. 2. Edinburgh University

Press, Edinburgh, p. 403.

- Doyon, D., Bouchard, C.J. & Neron, R. (1986) Geographic distribution and importance in crops of four adventitious weeds of Quebec: *Abutilon theophrasti*, *Amaranthus powellii*, *Acalypha rhomboidea* and *Panicum dichotomiflorum*. *Naturaliste Canadien* 113: 115–123.
- El-Ghani, M.M.A. & El-Sawaf, N. (2004) Diversity and distribution of plant species in agro-ecosystems of Egypt. *Systematics and Geography of Plants* 74: 319–336.
- Enomoto, T. (1997) The first record and the origin of naturalized plants in Japan. (In Japanese). *Journal of Weed Science and Technology* 41(Supplement): 204–205.
- Flint, E.P., Patterson, D.T. & Beyers, J.L. (1983) Interference and temperature effects on growth of cotton (*Gossypium hirsutum*), spurred anoda (*Anoda cristata*), and velvetleaf (*Abutilon theophrasti*). *Weed Science* 31: 892–898.
- Follak, S., Aldrian, U. & Schwarz, M. (2014) Spread dynamics of *Abutilon theophrasti* in Central Europe. *Plant Protection Science* 50: 157–163.
<https://doi.org/10.17221/55/2013-PPS>
- Gaertner, J. (1791) *De fructibus et seminibus plantarum*, Vol. 2. G.H. Schramm, Tübingen, pp. 249–253.
- Hanson, C.G. & Mason, J.L. (1985) Bird seed aliens in Britain. *Watsonia* 15: 237–252.
- Holt, J.S. & Boose, A.B. (2000) Potential for spread of *Abutilon theophrasti* in California. *Weed Science* 48: 43–52.
[https://doi.org/10.1614/0043-1745\(2000\)048\[0043:PFSOAT\]2.0.CO;2](https://doi.org/10.1614/0043-1745(2000)048[0043:PFSOAT]2.0.CO;2)
- Invasive Species Specialist Group (ISSG) (2003) Global Invasive Species Database. Available online at <http://www.issg.org> (accessed 18 April 2019)
- Jäger, E.J. (1991) Verbreitung, Biologie und Wuchsform von *Abutilon theophrasti*. *Wissenschaftliche Zeitschrift der Universität Halle-Wittenberg* 40: 37–48.
- Kurokawa, S., Shimizu, N., Uozumi, S. & Yoshimura, Y. (2003) Intra-specific variation in morphological characteristics and growth habit of newly and accidentally introduced velvetleaf (*Abutilon theophrasti* Medik.) into Japan. *Weed Biology and Management* 3: 28–36.
<https://doi.org/10.1046/j.1445-6664.2003.00078.x>
- Linnaeus, C. (1753) *Species plantarum*, Vol. 2. Impensis Laurentii Salvii, Stockholm, 1200 pp.
- Medikus, F.K. (1787) *Über einige künstliche Geschlechter aus der Malven-Familie*. Neuen Hof- und Academischen Buchhandlung, Mannheim, p. 158.
- Miller, P. (1754) (Ed.) *The Gardeners Dictionary, Abridged*, 4th ed., Vol. 3. John & James Rivington, London, 580 pp.
- Mitich, L.W. (1991) Intriguing world of weeds—Velvetleaf. *Weed Technology* 5: 253–255.
<https://doi.org/10.1017/S0890037X00033674>
- Reed, C.F. (1970) *Selected weeds of the United States*. Agriculture Handbook No. 366. United States Department of Agriculture, Washington D.C., 463 pp.
- Roeth, F.W. (1987) Velvetleaf—coming on strong. *Crops & Soils Magazine* 39: 10–11.
- Rotteveel, A.J.W. (1981) Alien weeds, a danger to the Netherlands? Yearbook of the Plant Protection Service, Wageningen, pp. 145–149.
- Sayari, N. & Mekki, M. (2016) Inventory of the spontaneous alien flora in Tunisia. *Tunisian Journal of Plant Protection* 11: 229–237.
- Shaw, J.E., Pitblado, R.E. & Brown, R.H. (1974) Velvetleaf. *OMAF Factsheet AGDEX* 642. 4 pp.
- Shimizu, N., Uozumi, S., Nishida, T., Harashima, T., Matoba, K. & Tamura, Y. (1994) Recent situation of emergence of alien weeds invading grasslands and forage crop fields. *Weed Research of Japan* 39 (Supplement): 228–229.
- Spencer, N.R. (1984) Velvetleaf, *Abutilon theophrasti* (Malvaceae), history and economic impact in the United States. *Economic Botany* 38: 407–416.
<https://doi.org/10.1007/BF02859079>
- Spencer, N.R., Sankaran, T. & Delfosse, E.S. (1985) Prospects for biological control of velvetleaf (*Abutilon theophrasti*). In: E.S. Delfosse (ed.), *Proceedings of the VI International Symposium on Biological Control of Weeds*, University of British Columbia, Vancouver, Canada, 19–25 August 1984. Department of Agriculture, Canada, pp. 167–175.
- Suominen, J. (1979) The grain immigrant flora of Finland. *Acta Botanica Fennica* 111: 1–108.
- Tanji, A. & Taleb, A. (1997) New weed species recently introduced into Morocco. *Weed Research* 37: 27–31.
<https://doi.org/10.1111/j.1365-3180.1997.tb01819.x>
- Thiers, B. (2019) *Index Herbariorum*: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available from: <http://sweetgum.nybg.org/science/ih/> (accessed March 2019)
- Warwick, S.I. & Black, L.D. (1986) Genecological variation in recently established populations of *Abutilon theophrasti* (velvetleaf). *Canadian Journal of Botany* 64: 1632–1643.
<https://doi.org/10.1139/b86-219>

- Warwick, S.I. & Black, L.D. (1988) The biology of Canadian weeds: 90. *Abutilon theophrasti*. *Canadian Journal of Plant Science* 68: 1069–1085.
<https://doi.org/10.1139/b86-219>
- Webb, S.A. (1968) Malvaceae: *Abutilon*. In: Tutin, T.G., Heywood, V.H., Burges, N.A., Moore, D.M., Valentine, D.H., Walter, S.M. & Webb, D.A. (Eds.) *Flora Europaea*, Vol. 2. Cambridge University Press, Cambridge, pp. 254–255.