

Biological and Ecological Review of an Exotic Grass *Chloris gayana* kunth. (Poaceae) From Libya

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Received: April 20, 2020, Accepted: May 16, 2020, Published: May 16, 2020.

ABSTRACT

Chloris gayana Kunth. (Rhodes grass) is an exotic species native to tropical and subtropical Africa. This introduced species has limited distribution in Libya, it is presented in this paper with updated nomenclature, taxonomic description, habitats, local and international geographical distribution, ecology and feeding value.

Keyword: *Chloris gayana*, Poaceae, Rhodes grass, invasive species, Exotic species

INTRODUCTION

Exotic perennial grasses are those that are not native, moved and established outside their native range, and have a life-span of more than one growing season, Increasing evidence that some perennial grass species have significant adverse impacts on biodiversity has led to the listing of “Invasion of native plant communities by exotic perennial grasses” as a key threatening process, they may forming an almost complete monoculture and replacing native grass and wildflower species, and has several features which give it a competitive advantage over many native species, such as its ability to produce a large, long-living seed bank, high survival of seedlings, tolerance to drought and effective animal-borne and water-borne dispersal mechanisms for seeds. (Anon, 2001; Muylt, 2001).

On the other hand, some exotic perennial grasses such as are important components of pastures in many areas of the tablelands and higher rainfall areas of the western slopes. They are valued because of their productivity under grazing, and the amount and nutritional value of the herbage they produce. When grown in swards containing one or more complementary species, for example, annual or perennial legumes, they also resist invasion by weed species (Blood, 2001).

Pastures containing perennial grasses have important environmental benefits – in comparison with pastures and crops based on annual species they reduce deep drainage (groundwater recharge), and thereby reduce the development of dryland salinity. Pastures based on perennial grasses also have reduced the rates of soil acidification. Rhodes grass is an invasive plant that can disrupt native flora communities and ecosystems (Csurhes and Edwards, 1998).

METHOD

Chloris gayana kunth. recorded as a new addition to the flora of Libya as a cultivated forage grass in Brak agricultural project southwestern Libya by Erteeb and Sharashi (2015). These species was then reported from Mallaha wetland in Mitiga airport about 10 Km east of Tripoli (54° 32' 17.64 N, 17° 13' 09.43" E) and Gasr Ben-Geshir (38° 32' 40.38' N, 09° 13' 54.45" E) about 40 Km south of Tripoli growing wild (Fig.1 and 2). Furthermore, it has been recorded as an alien potentially invasive species by Mahklouf (2018), although it still limited in distribution. Specimens were collected from Mitiga airport and Qasr Ben-Geshir, brought to Herbarium of the Department of Botany, Faculty of Sciences, University of Tripoli and treated with the ordinary herbarium techniques. Plant identification and

authentication were done using the data from the following literature (Sherif & Siddiqi, 1988; Bixing & Phillips, 2006; Peterson, 2013), finally the voucher specimens were deposited in the Herbarium.

BIOLOGY

Accepted name: *Chloris gayana* kunth.

Synonyms: *Chloris abyssinica* Hochst. ex A. Rich.,

Chloris glabrata Anderss.

Eustachys gayana (Kunth) Mundy.

Common names: Rhodes grass, hunyani grass, Rhodes chloris, Rhodes grass, Rhodesian blue grass.

Description

Perennial, stoloniferous. Culms erect or ascending, usually rooting at lower nodes, 1–1.5(–2) m tall. Leaf-sheaths glabrous except mouth; leaf blades flat, 15–35 cm, 2–10 mm wide, scabrous; ligule 0.5 mm, with long hairs behind. Racemes digitate, 5–20, ascending to spreading, 4–11 cm, green when young, become brown at maturity brown; rachis scabrous. Spikelets with 3–4 florets, 2-awned; lower glume 1.5–2.5 mm; upper glume 2.5–4 mm including awn-point; lemma of fertile floret elliptic to oblanceolate in side view, 2.5–3.5 mm, shortly appressed-sericeous lower margins, usually a tuft of hairs 0.5–1.5 mm on upper margins, keel glabrous or sparsely to densely sericeous; awn 2–6 mm; second floret usually male, narrowly lanceolate or cuneate, lemma ciliate on margins, body and awn a little shorter than fertile floret; third (and fourth) florets reduced to oblong or clavate awnless scales, less than 1 mm. **2n** = 20, 30,40. (Figure. 3, 4, 5, 6) (Bixing & Phillips, 2006).

Flowering time: From July to October.

Type: Senegal, *Herb. Gay* 21 & 40 (K).

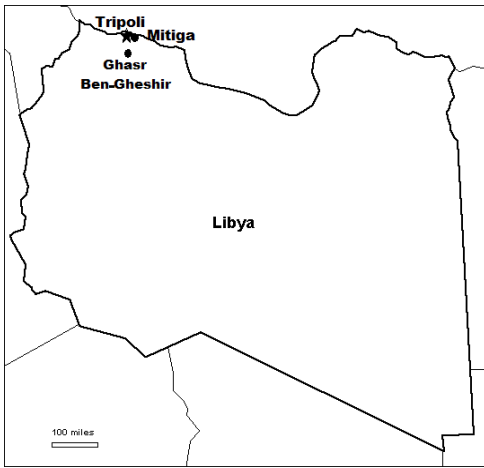


Figure 1: Map of Libya Showing *C. gayana* distribution



Figure 2: Tripoli district showing locality



Figure 3: *C. gayana* habit.



Figure 4: *C. gayana* inflorescence



Figure 5: *C. gayana* spike

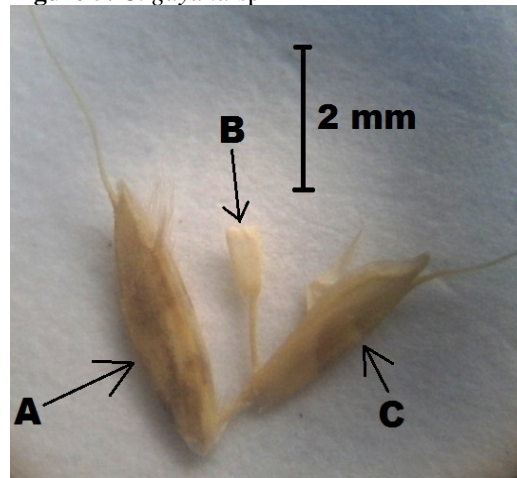


Figure 6: *C. gayana* spikelet, A. fertile floret, B & C. sterile florets

LOCAL DISTRIBUTION

Tripoli (Mallaha wetland in Mitiga airport), Qasr Ben-Geshir district about 40 km south of Tripoli, cultivated in Brak agricultural project southwestern Libya as a forage grass.

NATIVE RANGE AND DISTRIBUTION

This is a forage grass, described from Senegal and native to Tropical and Subtropical Africa (e.g. Ethiopia, Somalia, Sudan, Kenya, Tanzania, Uganda, Mali, Niger, Senegal, Mozambique, and Zimbabwe), where it remained one of the main C4 forage grasses, but now introduced and naturalized throughout the tropics and subtropics as a pasture species in open grassland and Savannah (Osman et al, 2014). It is recorded in many Mediterranean countries as an invasive weed of waste places. (Land Protection, 2007; Bixing &Phillips, 2006). The natural distribution of Rhodes grass through much of Africa and the extensive sowing and naturalized stands elsewhere demonstrate the wide environmental adaptation of the species as a whole. (Osman et al, 2014)

HABITAT

C. gayana is an occasional weed in open disturbed sites such as roadsides, waste places, railways, parks, gardens, orchards, vineyards, cultivation (e.g. plantation crops, cotton, sown pastures and summer crops), grasslands, open woodlands, floodplains and waterways (i.e. riparian areas) in tropical, subtropical, semi-arid and warmer temperate regions (Biosecurity Queensland, 2016).

Its wide tolerance of a range of conditions and its ability to rapidly invade areas such as rainforest fringes makes it a known weed of environmental areas. Rhodes grass produces 3–4 million seeds per kilogram and can reproduce by several methods to smother native ground cover species and form almost pure stands (Land Protection, 2007).

Rhodes grass can be used as pasture, hay and ley crop. It is also can be used to stabilize disturbed sites. It is found in open grassland, or in grassland with scattered bush and trees, lake margins or seasonally waterlogged plains up to 2000 m altitude, rarely higher (Bogdan, 1969; Bogdan, 1977).

ECOLOGY

It is suitable for tropical and subtropical areas with rainfall ranging from 600–1600 mm annually (up to 2000 mm). It is relatively drought and salt tolerant, it best grows in temperature between 25 – 35°C, ; can grow in a wide range of soils, but prefers sandy loams of volcanic origin. It grows well under direct sunlight and does not grow well in shade, recovers very well after a fire (Biosecurity Queensland, 2016; Land Protection, 2007).

PRODUCTION POTENTIAL (FEEDING VALUE)

Nutritive value; Crude Protein content about 8.6% at 50% flowering, but declines as the plant matures. Very palatable/acceptable to animals at when young but after seeding it is less attractive.

Dry matter Yield; 15 tons per ha per year (833 hay bales per ha per year)

Animal production; Studies were done at Mariakani, optimum stocking rate is 1.2 tropical livestock unit per ha.(300-350kg live-weight) (KARI, 2014)

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Citation: Mohammed H. Mahklouf (2020). Biological and Ecological Review of an Exotic Grass *Chloris gayana* kunth. (Poaceae) From Libya. *J. of Advanced Botany and Zoology*, V7I4.03. DOI: 10.5281/zenodo.3830211.

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