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Notes about two summer annual grass weeds in Morocco: *Dinebra retroflexa* and *Cenchrus longispinus* (Poaceae)**Abstract**

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Dinebra retroflexa was collected for the first time in Gharb in 2015 and 2017, and in Tadla in 2015. *Cenchrus longispinus* has been found in sandy soils in Rabat in 1985 and 1988, and in Larache in 2015. Heavy stands of both species observed at the collection sites in 2015 and 2017 suggested that both grasses are considered troublesome weeds in cultivated crops. This paper gives a brief description, distribution, and biology of both weeds.

Key words: weeds, xenophytes, alien flora, North Africa.

Introduction

With 142 genera and 399 species, the *Poaceae* is one of the richest plant families in the Flora of Morocco (Fennane & al. 2014). Such species richness is due to a great diversity of ecosystems, namely forest, steppe, desert, and aquatic ecosystems. In addition, Moroccan ecosystems extend over a range of bioclimatic levels from arid, semi-arid, sub-humid, to humid (Nassif & Tanji 2017). Fennane & al. (2014) included 3 grass weeds that were naturalized in Morocco: *Brachiaria eruciformis* (Sm.) Griseb., *Dactyloctenium aegyptium* (L.) Willd., and *Panicum capillare* L. (Tanji & Taleb 1997).

After Fennane & al. (2014), two non cited *Poaceae* have been added in Fennane (2018): *Dinebra retroflexa* and *Cenchrus longispinus*. Both grasses have been recently infesting crops in irrigated perimeters of Morocco. This paper gives a brief description, distribution, and biology of these two summer annual grass weeds.

Materials and Methods

This note is based on field observations, analysis of literature, and taxonomic investigations. Live specimens of *Dinebra retroflexa* were collected in 2015 and 2017 from cultivated fields in Gharb and Tadla irrigated perimeters, respectively. For the identification of

this taxon, various references were used including « The Online World Grass Flora » (Clayton & al. 2020), « Grasses of Egypt » (Ibrahim & al. 2016), and « Grasses of Libya » (Sherif 1995).

In 2015, *Cenchrus longispinus* plants were collected from Loukkos irrigated perimeter. For the identification of this species, different sources were used including « The Online World Grass Flora » (Clayton & al. 2020), « Flora Gallica, Flore de France » (Tison & de Foucault 2014), and Verloove & Sánchez Gullón (2012).

Results

Dinebra retroflexa (Vahl) Panz. (1813) (Viper grass)

Bas: Cynosurus retroflexus Vahl (1791)

Dinebra retroflexa (Vahl) Panz. (1813) was not cited in Fennane & al. (2014) and eflo-ramaghreb (2020). However, Dobignard & Chatelain (2010) reported its presence in Mauritania, Libya, and Egypt, and cited a synonym for it which is *Dinebra aegyptiaca* Delile. In 2018, *Dinebra retroflexa* was cited as a weed in Morocco (Fennane 2018). In the African Plant Database (APD 2020), two taxa are mentioned for Africa: *Dinebra retroflexa* (Vahl) Panz. var. *condensata* S.M. Phillips and *Dinebra retroflexa* (Vahl) Panz. var. *retroflexa* which is only mentioned for Egypt, Mauritania, and Libya.

According to « The Online World Grass Flora » (Clayton & al. 2020), *Dinebra retroflexa* has some specific features that can distinguish it from *Digitaria* species. The inflorescence of *Dinebra retroflexa* is linear or elliptic-oblong to pyramidal, composed of numerous racemes distributed along the floral axis, 10 to 35 cm (Fig. 1). The racemes are linear and are 1 to 8 cm long, stiff, ascending when young, reflexing and finally deciduous from the axis at maturity, folded down at maturity. During the spread, the whole raceme is detached with all its spikelets. The racemes bear 2 to 20 fertile spikelets on each raceme. The spikelets are alternate, sessile, 1-3-flowered, arranged in two rows on the lower sides of the rachis. The first flower is subsessile while the following ones are borne by a pedicel 0.5 to 1 mm long. The rachis is flattened, narrowly winged. The glumes are longer than the flowers, 6 to 8 mm long, asymmetric; the lower glume is shorter than the upper glume. They are coriaceous, lanceolate, with slightly recurved minutely scaberulous awns, usually overlapping and obscuring the florets. The lemmas are narrowly ovate, 2 to 2.5 mm long, membranous, acute to emarginate, mucronulate, glabrous or have some fine hairs near the dorsal vein. The paleas are membranous, bicarinated, and finely pubescent along the dorsal veins. The anthers are purplish red. The caryopsis is ellipsoid with adherent pericarp. The grain is ovoid, 1.5 mm long. Chromosome $2n = 20$.

Dinebra retroflexa is an annual *Poaceae* that multiplies by seed during spring (March-May) or summer (June-August). High temperatures and day length trigger germination, growth, and flowering. Moroccan climatic conditions would be suitable for this species to become a troublesome weed in summer crops in irrigated perimeters.

Live specimens of *Dinebra retroflexa* were collected from a corn (*Zea mays* L.) field in July 2015 and again in July 2017 in the same site in Sidi Kacem province, Gharb perimeter (Fig. 1). Plants of the same species were found in a corn field in June 2017 in Souk Sebt Ouled Nemma, Béni Mellal province, Tadla irrigated perimeter. Seed of this plant species were probably introduced with crop seeds, used machinery, or visitors' clothes.



Fig. 1. *Dinebra retroflexa*: detail of the inflorescences. Photo taken by the author in a corn field in Sidi Kacem province, Gharb irrigated perimeter in July 2015.



Fig. 2. Distribution of *Dinebra retroflexa* (triangles) in Morocco : Sidi Kacem, Gharb irrigated perimeter situated in Man 1 “Maroc Atlantique Nord 1” and Béni Mellal, Tadla irrigated perimeter situated in Mam 5 “Maroc Atlantique Moyen 5”.

This new taxon enriches the *Poaceae* family, and botanists should report it as a summer annual grass weed in “Maroc Atlantique Nord 1”, North Atlantic Morocco 1 (“Man 1” sector) and “Maroc Atlantique Moyen 5”, Medium Atlantic Morocco 5 (“Mam 5” sector) (Fig. 2).

Elsewhere, the species is considered an important weed in sugarcane (*Saccharum officinarum* L.), cotton (*Gossypium hirsutum* L.), peanut (*Arachis hypogea* L.), sorghum [*Sorghum bicolor* (L.) Moench], onion (*Allium cepa* L.), and rice (*Oryza sativa* L.) in Sudan (Ghobrial 1981; Ibrahim 1984; Babiker & Ahmed 1986; Karar & al. 2005).

A brief literature review showed that *Dinebra retroflexa* is found in Mauritania (Dobignard & Chatelain 2010), Libya (Dobignard & Chatelain 2010), Egypt (Lebrun 1998; Dobignard & Chatelain 2010; Ibrahim & al. 2016), Ethiopia, Sudan, Kenya, Rhodesia, Tanzania (Lebrun 1998), Somalia, Namibia, Botswana, South Africa, and Madagascar (APD 2020). It is also found in Spain (Valdés & Scholz 2009), Italy (Valdés & Scholz 2009; Domina & al. 2018), Czech republic (Valdés & Scholz 2009; Pysek & al. 2012), Poland (Sowa 1968), Turkey (Gonen & al. 2002), Israel (Valdés & Scholz 2009), Iraq (Lebrun 1998), India (Ibrahim & al. 2016; Clayton & al. 2020), the USA (Riefner & al. 2003), China, Malaysia, and Australia (Clayton & al. 2020).

***Cenchrus longispinus* (Hack.) Fernald (1943) (long spine sandbur)**

Neither Fennane & al. (2014) nor Dobignard & Chatelain (2010) or efloramaghreb (2020) mentioned *Cenchrus longispinus*. However, this species has been cited in Morocco (Verloove & Sánchez Gullón 2012; Fennane 2018; APD 2020).

According to « The Online World Grass Flora » (Clayton & al. 2020), *Cenchrus longispinus* has some particular features that can distinguish it from other *Cenchrus* species. Panicles are terminal, well exerted or partially enclosed in the sheath below, compact, oblong, 4 to 10 cm long, 1 to 2 cm wide (Fig. 3). Flowers are enclosed in round, spine-covered burs, with 2 or 3 spikelets per bur and 1 fertile flower per spikelet. Glumes are unequal in length and shorter than the lemma. Flower styles and stamens poke out from the tip of the bur. Burs are about 6 mm in diameter (excluding the spines) and densely short-hairy; spines are barbed, 3 to 6 mm long, often purplish, becoming very sharp when dried. Burs dry to a light tan and latch onto anything that passes by. Inside burs are 1 to 3 seeds. Chromosome number $2n = 34$ or 36 .

Cenchrus longispinus plants were collected in July 2015 from the sandy soil of the garden at the headquarters of the extension service of the ORMVAL (Subdivision de l'Office Régional de Mise en Valeur Agricole du Loukkos) in Laouamra village, Larache province, Loukkos irrigated perimeter (Fig. 3). Verloove & Sánchez Gullón (2012) reported that *Cenchrus* plants collected by J. Lewalle in sandy soils in Souissi, Rabat, July 1, 1985, and August 7, 1988, would be *Cenchrus longispinus*.

Cenchrus longispinus is an annual *Poaceae* which multiplies by seed during spring (March-May) or summer (June-August). Germination, growth, and flowering may be initiated by high temperatures and day length.

Cenchrus longispinus seed contained in the burs can be divided into two groups. Seeds in the upper spikelet have the largest chance of survival and are likely to totally germinate in the same year they are produced. Seeds in the lower spikelet have a low chance of germination the first year they are produced and often go into dormancy (Twentyman 1974; Boydston 1990). Longspine sandbur seedlings can germinate from depths of 11 cm but emerged most readily from 1- to 3-cm depths (Boydston 1989). In the state of Washington, USA, if *Cenchrus longispinus* is allowed to grow season-long without crop competition, it has the potential to produce up to 133 000 seeds per plant (Boydston 1990).

In July 2015, several plants of *Cenchrus longispinus* were at the fruiting stage in the ORMVAL headquarters at Laouamra village, Loukkos irrigated perimeter (Fig. 3). Under local soil and climatic conditions, longspine sandbur could be one of the most problematic weeds of corn (*Zea mays* L.), sorghum [*Sorghum bicolor* (L.) Moench], peanuts (*Arachis hypogea* L.), alfalfa (*Medicago sativa* L.), sugarcane (*Saccharum officinarum* L.), strawberry (*Fragaria × ananassa* (Weston) Rozier), potato (*Solanum tuberosum* L.), and other crops in Loukkos irrigated perimeter and other locations in Morocco. Longspine sandbur may become a greater problem when it begins to produce seed-forming burs. Alfalfa, corn or sorghum infested with longspine sandbur would be unpalatable. The spines on the burs facilitate attachment to almost anything, including people, animals, machinery, and tires, easily spreading the seed to other areas. Furthermore, hand weeding in various crops would be difficult or even an impossible task. This taxon enriches the *Poaceae* family, and botanists should report it as a summer annual grass weed in “Maroc Atlantique Nord 2 et 3”, North Atlantic Morocco 2 and 3 (“Man 2 and Man 3” sector) (Fig. 4).

Elsewhere, *Cenchrus longispinus* has become a weed that is difficult to control in several crops in irrigated and dryland areas of Australia (Twentyman 1974), Canada (Soltani & al. 2010) and USA (Boydston 1989 & 1990; Anderson 1997; Hennigh & Al Khatib 2010).



Fig. 3. *Cenchrus longispinus*: inflorescence. Photo taken by the author from a sandy soil in Laouamra village, Larache province, Loukkos irrigated perimeter in July 2015.



Fig. 4. Distribution of *Cenchrus longispinus* (squares) in Morocco: Rabat situated in Man 3 “Maroc Atlantique Nord 3” and Larache province, Loukkos irrigated perimeter situated in Man 2 “Maroc Atlantique Nord 2”.

The species is native to North America (Canada, Mexico, and the United States). It is found in sandy soils and beaches of the Corse island and Vaucluse in France (Tison & de Foucault 2014), Romania (Strat & al. 2017), Iran (Naqinezhad 2012), Greece, Italy, Croatia, Hungary, Israel (Valdés & Scholz 2009; Verloove & Sánchez Gullón 2012), Great Britain, Georgia, and Ukraine (Valdés & Scholz 2009), Australia, eastern Canada, and South America (Clayton & al. 2020).

Viper grass (*Dinebra retroflexa*) is a new taxon for the flora of Morocco that has been collected in Gharb in 2015 and 2017, and in Tadla in 2015. Longspine sandbur (*Cenchrus longispinus*) has been found in Rabat in 1985 and 1988, and in Larache in 2015. Both weeds were probably introduced with crop seeds, used machinery, or visitors' clothes. Heavy stands observed at the collection sites in 2015 and 2017 suggested that both species are considered troublesome weeds in cultivated crops.

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