Article

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Three new naturalized alien *Poaceae* in Morocco: *Dinebra panicea* subsp. *mucronata*, *Diplachne fusca* subsp. *fascicularis*, and *Oryza punctata*

Abstract

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During weed surveys in irrigated crops in the Kenitra province of Morocco in 2024 and 2025, we found three new *Poaceae* weeds: *Dinebra panicea* subsp. *mucronata*, *Diplachne fusca* subsp. *fascicularis*, and *Oryza punctata*. At present, the three semi-aquatic taxa are naturalized and adapted to water-saturated conditions prevailing in rice and sugarcane fields. To facilitate their identification, this note provides a brief morphological description of each taxon, photographs, a distribution map, and data on ecology and habitats. These taxa are considered new alien records for the flora of Morocco.

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

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Introduction

With 142 genera and 399 specific and subspecific taxa, the *Poaceae* is one of the richest plant families in the flora of Morocco (Fennane & al. 2014). Furthermore, several naturalized weeds have been recently identified and documented, such as *Avena strigosa* Schreb**.,** *Cenchrus longispinus* (Hack.) Fernald**,** *Dactyloctenium aegyptium* (L.) Richt., *Digitaria ciliaris* (Retz.) Koeler, *Dinebra retroflexa* (Vahl) Panz., *Eragrostis curvula* (Schrad.) Nees, *Moorochloa eruciformis* (Sm.) Veldkamp, *Panicun capillare* L., and *Setaria palmifolia* (J. König) Stapf **(**Tanji & Taleb 1997; Tanji 2020, Fennane & al. 2014; Léger & al. 2025; Romero-Zarco & al. 2025). Despite these existing records, the identification and distribution of non-native plants in Morocco remain incompletely documented.

In 2024 and 2025, weed surveys were carried out in the historically rice- and sugarcane-producing Kénitra province, Morocco. According to FAO (https://www.fao.org/faostat), a total of 9317, 6753, and 6453 hectares of sugarcane (*Saccharum officinarum* L.) were cultivated in the country for sugar production in 2022, 2023, and 2024, respectively. In addition, 6,320, 7,027, and 924 hectares of rice (*Oryza sativa* L.) were planted for local

consumption in 2022, 2023, and 2024, respectively, using direct-seeding techniques with continuous flooding for five months (May to September). In fact, the total rice area in Morocco as well as most of the land devoted to sugarcane crop are located in the Kenitra province. During fieldwork, live specimens of *Dinebra panicea* subsp. *mucronata* (Michx.) P.M.Peterson & N.Snow, *Diplachne fusca* subsp. *fascicularis* (Lam.) P.M.Peterson & N.Snow, and *Oryza punctata* Kotschy ex Steud. were collected from rice and sugarcane fields. The thorough bibliographic research conducted, along with the verification of herbaria (specifically, RAB, P, MPU, MA) (herbarium acronym according to Thiers 2026), revealed that these taxa have not been previously documented for the country. Therefore, this note regarding their occurrence in rice and sugarcane fields represents a new distributional record for Morocco. A brief description, information on habitat and distribution, and photos of these three new grass weeds have been provided in the present note.

Materials and methods

Fieldwork was done in sugarcane and rice fields in the Kenitra province, Morocco, in 2024 and 2025 to determine the distribution and severity of weeds in these crops. For accurate weed identification, field surveys were conducted in early autumn (September and October), before sugarcane harvest, and after the water level had receded in the rice paddies, before harvest. Usually at this time, most summer weeds were generally in flowering and/or fruiting stages. Relevant literature (e.g. Smith 2005; Snow & al. 2008; Peterson & al. 2012; Snow & Peterson 2012; Tison & de Foucault 2014; Snow & al. 2018; Gallaher & al. 2022; FNA 2026) and photos of type collections available on JSTOR Global Plants (https://plants.jstor.org/) were used for identification, comparison, and confirmation of the taxa. Information regarding the geographic distribution, habitat, photographs, and phenology of each plant specimens were taken at each site during fieldwork. Voucher herbarium specimens were prepared and deposited at the national herbarium of the Scientific Institute in Rabat (RAB).

The new floristic records

Dinebra panicea subsp. ***mucronata*** (Michx.) P.M.Peterson & N.Snow
≡ *Dinebra panicea* var. *mucronata* (Michx.) P.M. Peterson & N. Snow
= *Eleusine mucronata* Michx.
= *Leptochloa mucronata* (Michx.) Kunth
= *Leptochloa panicea* subsp. *mucronata* (Michx.) Nowack

Description

Within its entire distribution range, *Dinebra panicea* is represented by three subspecies, namely subsp. *brachiata* (Steud.) P.M.Peterson & N.Snow (a plant native to America), subsp. *panicea* (a plant native to Tropical & Subtropical Asia), and subsp. *mucronata* (Snow & Davidse 1993; Peterson & al. 2012; POWO 2026). Although the differences between these three taxa are minor, they are primarily quantitative (Snow & Davidse 1993;

FNA 2026). Thus, the subspecies *mucronata* can be distinguished morphologically as follows: Glumes linear to narrowly lanceolate, exceeding the florets; lemmas 0.9-1.2 mm long; caryopses 0.8-0.9 mm, without a ventral groove, often somewhat coarsely rugose, the apices broadly obtuse (Fig. 1).

Chorology, habitat, and ecology worldwide

Native to the Americas (POWO 2026), this taxon distribution includes the southern third of the United States, the West Indies, and a significant portion of Mesoamerica and South America (Snow & Davidse 1993; FNA 2026). It was reported to be introduced to the Mediterranean area, where it is located in Egypt, Palestine, and Cyprus (Danin & Fragman-Sapir 2026; POWO 2026). It was also found in Africa (e.g. Ghana, Nigeria), Asia (e.g. Cambodia, China, Japan, Laos, Malaysia, Palestine, the Philippines, and Vietnam) (Nowack 1994; APD 2026; POWO 2026; Qinwen & al. 2022), and Central and South Americas (Bolivia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Peru) (POWO 2026). Within its entire distribution range, this subspecies is found most commonly in cultivated fields (viz. rice fields), gardens, waste places, swampy areas, and along roadsides, and it attains its most robust growth in humid climates (Snow & Davidse 1993, Waterhouse & Mitchell 1998). Indeed, it is considered a weed in corn fields in Mexico (Vibrans 1998), in citrus groves in Mexico (Leopardi-Verde

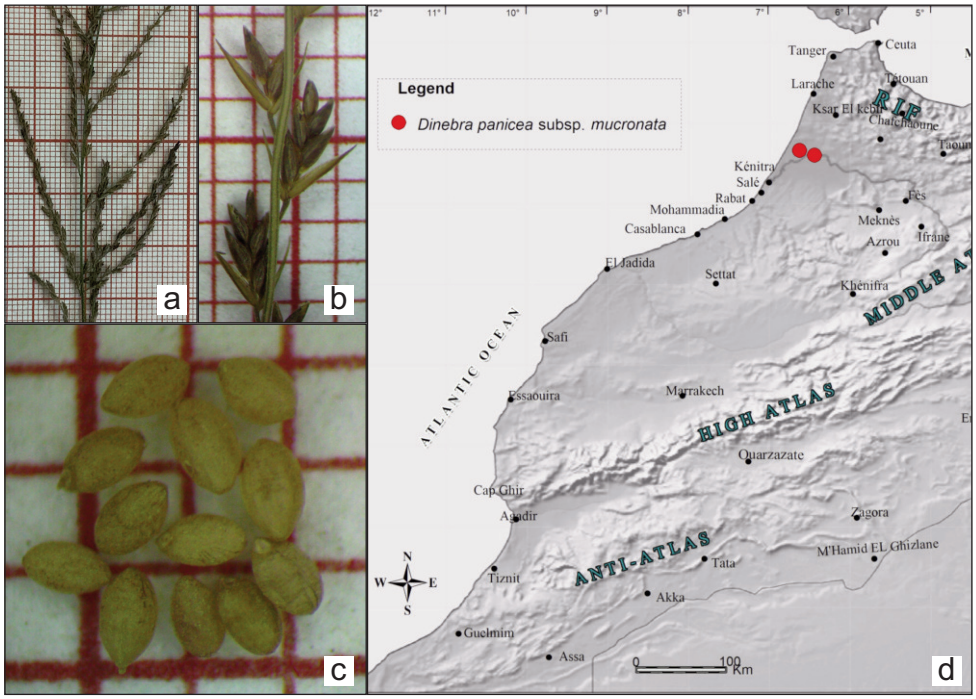

Fig. 1. *Dinebra panicea* subsp. *mucronata*: a) panicle; b) spikelets; c) seed; d) geographical distribution in the map of Morocco.

& al. 2021), in sugarcane in Costa Rica (Leon & al. 2017), and in various habitats in the United States (Baskin & al. 1999).

Distribution and ecology in Morocco

Mature specimens, at the flowering and fruiting stages were approximately 1 m tall. They were collected from two localities in the Kenitra province : in October 2024 from a sugarcane field in Mograne area (34°30'41"N / 6°20'6"W, 9 m a.s.l.) (RAB115056) and in September 2025 from a rice field in Sidi El Kamel area (34°31'20"N / 6°13'25"W, 10 m a.s.l.) (RAB115057) (Fig. 1). In total, more than 20 individuals were found, distributed across the two prospected localities. An introduction, as a contaminant, involving rice seeds imported from elsewhere seems feasible. Additionally, our field observations and the literature consulted indicate that these Moroccan collection sites meet all the ecological criteria necessary for the germination of this plant, compared to what can be found in regions within both its native and introduced distribution areas (Snow & Davidse 1993).

Diplachne fusca subsp. ***fascicularis*** (Lam.) P.M.Peterson & N.Snow
≡ *Cynodon fascicularis* (Lam.) Raspail
≡ *Diplachne fascicularis* (Lam.) P. Beauv.
≡ *Diplachne fusca* var. *fascicularis* (Lam.) P.M. Peterson & N. Snow
≡ *Festuca fascicularis* Lam.
≡ *Leptochloa fascicularis* (Lam.) A.Gray
≡ *Leptochloa fusca* subsp. *fascicularis* (Lam.) N. Snow

Description

Morphologically, this taxon is characterized, as noted by Snow & al. (2018), Vladimirov & Delcheva (2016), and FNA (2026), and supported by our observations, particularly by its annual growth, with culms 5–110(130) cm tall and 1–5(8) mm wide at the base, round, ascending to erect. Leaf sheaths glabrous on sides and margins, ligules (2–)5–7 mm long, membranous, becoming lacerate at maturity; blades usually sparsely scabrous above and below; uppermost blades often exceed the inflorescence. Panicles 10–72 cm, usually partially enclosed in the uppermost leaf sheaths; branches 3–12(22) cm, often spreading. Spikelets subsessile, 5–12 mm long, 5–11-flowered. Lower glumes 2–3 mm, lanceolate, sometimes asymmetric; upper glumes 2.5-5 mm, elliptic to ovate. Lemmas lanceolate, 3.5–4(5) mm, 3-veined, smoky white, often with a dark spot on the basal half, sometimes entirely dark; tips acute, mucronate, or awned; lemma awns 0–3.5 mm, paleas elliptic, generally subequal to lemma, sericeous along nerves, apex acute to obtuse. Anthers yellow, 1-3, 0.2-0.5 mm. Caryopses 0.8–2 mm elliptic to obovate in hilar profile (Fig. 2).

Chorology, habitat, and ecology worldwide

This subspecies is native to the New World (Vladimirov & Delcheva 2016; Snow & al. 2018), with its distribution extending from southern British Columbia in the USA and Ontario in Canada to various countries in South and Central America, including Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, the Dominican Republic, Haiti, Honduras, Jamaica, Mexico, Paraguay, and Venezuela (FNA 2026; POWO 2026). It is considered one

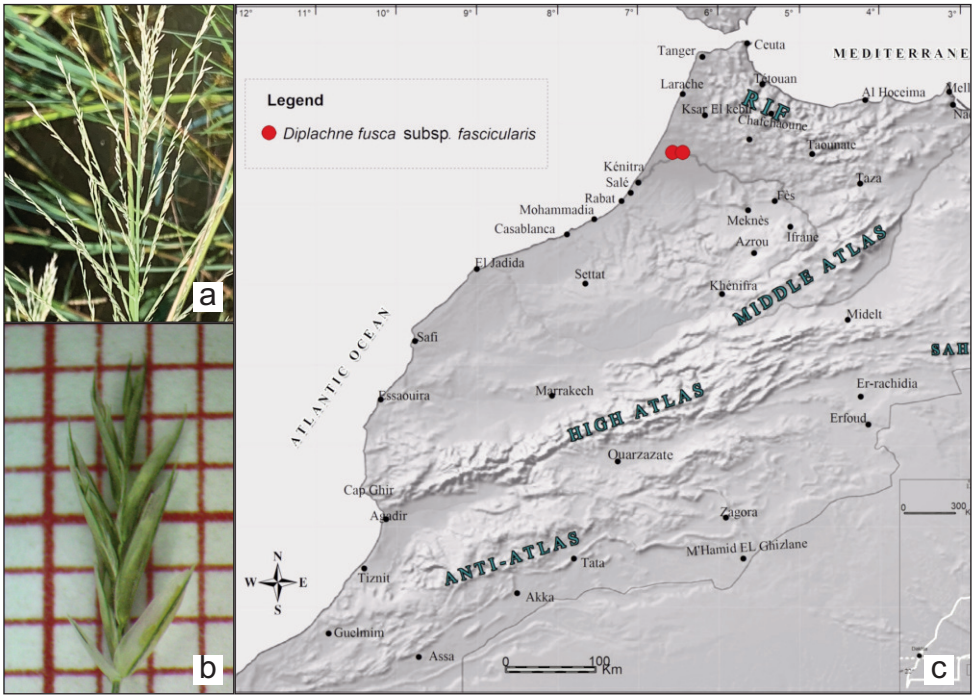

Fig. 2. *Diplachne fusca* subsp. *fascicularis*: a) panicle; b) spikelet; c) geographical distribution in the map of Morocco.

of the most common and competitive semi-aquatic weeds in rice paddy fields in Spain (Osca 2013), Portugal (Calha & al. 2023), France (Tison & de Foucault 2014), Belgium (Verloove 2006), Italy (Galasso & al. 2024), Turkey (Altop & al. 2015), Bulgaria (Vladimirov & Delcheva 2016), Hungary (Suveges & al. 2021), Senegal (Mbow & al. 2021), China (Qinwen & al. 2022), and the USA (Driver & al. 2020 & 2024). Elsewhere, it has been reported in Java (Indonesia) and Japan (POWO 2026). This taxon grows in open mesic places, brackish marshes, agricultural lands, ruderal sites along roads, and saline flats, at elevations ranging from sea level to 2300 m (Snow & al. 2018). Additionally, it demonstrates tolerance to flooding (Driver & al. 2020), resistance to salt (Driver & al. 2020; Suveges & al. 2021), and resistance to herbicides (Unan & al. 2024). This plant, aided by its symbiotic bacteria, is capable of fixing nitrogen (Reinhold-Hurek & al. 1993).

Distribution and ecology in Morocco

Samples of this annual taxon were collected from rice fields in September 2025 in the Kenitra province at Rmilate (34°29’26”N / 6°13’49”W, 10 m a.s.l.) (RAB115058) and in the Sidi El Kamel area (34°31’20”N, 6°13’25”W, 10 m a.s.l.) (RAB115059) (Fig. 2). A total of 15 individuals are estimated to be present across the two surveyed sites, with 9 observed in the first and 6 in the second. This plant was observed thriving in conditions similar to those of *D. panicea* subsp. *mucronata*, reported above, leading to its classification as a

semi-aquatic summer plant. Apparently, this current note constitutes the first record of this taxon in both Morocco and North Africa. As for how this plant arrived in Morocco, there is no doubt that contaminated rice seed was the vehicle for this plant's introduction. This route is identified as the primary means of introduction and propagation for the species in Spain (Del Monte & Cortés 2000), Italy (Romani & Tabacchi 2000), and Bulgaria (Vladimirov & Delcheva 2016).

Oryza punctata Kotschy ex Steud.
= *Oryza sativa* var. *punctata* (Kotschy ex Steud.) Kotschy
= *Oryza eichingeri* var. *longearistata* Peter
= *Oryza schweinfurthiana* Prodoehl

Description

Based on the terminology used in various floras (e.g. Akoègninou & al. 2006; e-Flora of South Africa 2022; FNA 2026; Hyde & al. 2026) and on the morphological characteristics observed on fresh plant samples, the description of this species is presented as follows: Annual or perennial, tufted herb. Culms up to 120 (150) cm tall, spongy. erect or geniculately ascending, branched, terete, striate, smooth, glabrous. Leaf-blades 5–45 × 0.5–2.5 cm, linear to very narrowly elliptic, acuminate, glabrous, ± rough on both surfaces. Ligule of basal leaves 3–10 mm long, rounded, truncate or somewhat acute, sometimes lacerate, glabrous, lobed at maturity. Panicle 15–35 × 3–17 cm, loose, with spreading branches. Spikelets elliptic, 4.6–9.2 mm long, 2-2.5 mm wide, hispidulous, deciduous, transversely attached to pedicel. Glumes reduced to a membranous whitish narrow rim. Sterile lemmas 1–1.5 mm long, lanceolate to lanceolate-deltate, acuminate, glabrous. Fertile lemmas slightly shorter than the spikelet, semi-elliptic-oblong in lateral view, keel and margins stiffly ciliate, awned for 1–7.5 cm. Paleas usually slightly shorter than the lemmas, apex acute or tapering into a short acute point. Caryopsis 4-4.8 × 1.5-1.8 mm, oblong, glabrous, light brown (Fig. 3).

Chorology, habitat, and ecology worldwide

This species is originally found in various countries throughout Tropical and South Africa, such as Angola, Benin, Cameroon, the Central African Republic, Chad, Congo, the Democratic Republic of the Congo, Ethiopia, Ghana, Ivory Coast, Kenya, Madagascar, Malawi, Mozambique, Nigeria, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe, and also Thailand (Akoègninou & al. 2006; POWO 2026). *O. punctata* exhibits both diploid ($2n = 24$) and tetraploid ($2n = 48$) forms, which demonstrate ecological differences in Africa (Sano 1980). Thus, diploid forms are present in the savanna, while the tetraploid ones are located in the forested areas. This *Poaceae* is typically located in swampy areas, along stream banks, at pond margins, and in pools, as well as in seasonally inundated regions; it can thrive at elevations reaching up to 1200 m (https://tropical.theferns.info).

Distribution and ecology in Morocco

This species was observed co-occurring with *D. panicea* subsp. *mucronata* and *D. fusca* subsp. *fascicularis* in the Sidi Allal Tazi area in Kenitra province (34°35'25"N /

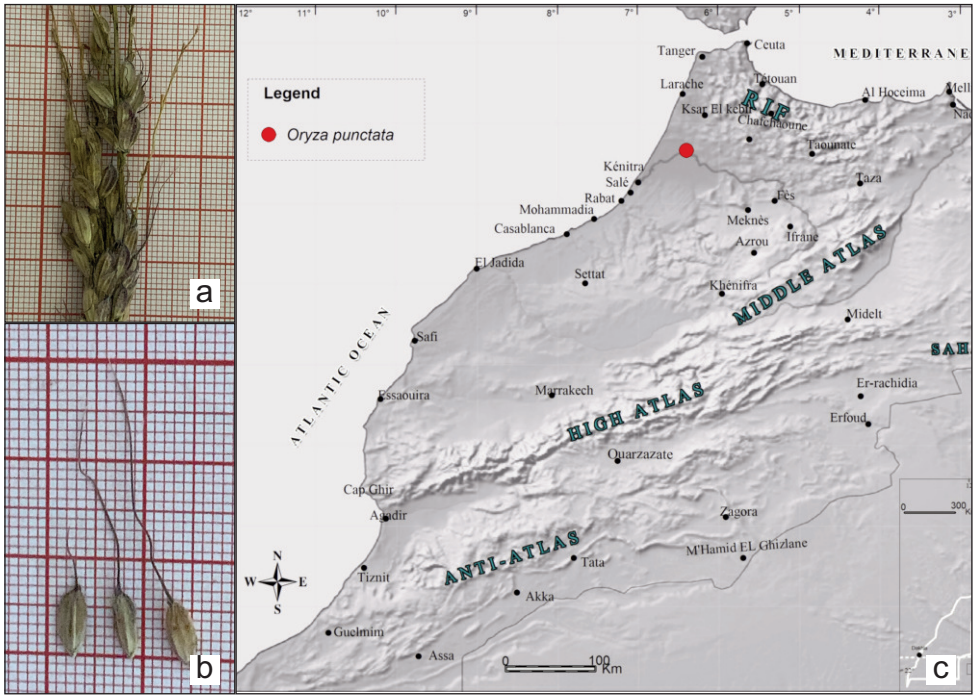

Fig. 3. *Oryza punctata***:** a) inflorescence; b) florets; c) geographical distribution in the map of Morocco.

6°15’43”W, elevation: 10 m a.s.l.) (RAB115060) (Fig. 3). Specimens of this species were gathered in October 2025 from a flooded rice (*Oryza sativa*) field. The fact that this species is found in paddy rice suggests that the pathway of introduction into the country is associated with rice seeds imported from elsewhere.

Note

In some parts of the world, this plant is considered as an important weed in rice farming and poses a risk of seed contamination in rice varieties (Freeman & al. 2004; Leon & al. 2008; Munene & al. 2008; FNA 2026). However, it is utilized in breeding programs to enhance cultivated rice (*O. sativa*), as it serves as a source of resistance to bacterial blight and brown plant hoppers that impact *O. sativa* (Kumar & al. 2019). In Africa, this *Poaceae* is sometimes harvested from the wild for local use of its seeds as a potential food supplement; yet, it is currently experiencing genetic erosion due to grazing and the expansion of agricultural activities (Kiambi & al. 2005). The most recent assessment for The IUCN Red List of Threatened Species was conducted in 2017 (https://www.iucnredlist.org).

Conclusion

This paper reports the discovery of three new semi-aquatic summer grass weeds (*Dinebra panicea* subsp. *mucronata*, *Diplachne fusca* subsp. *fascicularis*, and *Oryza punctata*) in flooded rice and irrigated sugarcane. Several plants of these taxa were observed in various sites, which suggest that they are well established. However, although these three introduced species currently show limited invasive behavior in the different regions studied in Morocco, it is essential to regularly monitor their naturalization process. Imports of contaminated seeds and the effects of climate change could positively influence their future dynamics and their invasion of the country. In addition, these newly introduced plant taxa indicate that the country needs more thorough botanical explorations. They inevitably enrich the flora of Morocco but pose a significant global threat to biodiversity, sustainable agriculture, food security, and human livelihoods.

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