Dana *et al*., 2017. *Colocasia esculenta* (L.) Schott (Araceae), an expanding invasive species of aquatic ecosystems in the Iberian Peninsula: new records and risk assessment. **Limnetica 36 (1), 2017: 15-27**

Supplementary information. Information for the risk analysis of *Colocasia esculenta* (L.) Schott (Araceae) following García de Lomas *et al*. (2014) and Gordon *et al*. (2010) in an attempt to contribute to what is requested in Regulation (EU) no. 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species. *Información para el análisis de riesgos de* Colocasia esculenta *(L.) Schott (Araceae), realizado de acuerdo con García de Lomas* et al. *(2014) y Gordon* et al. *(2010), para contribuir al cumplimiento del requisito establecido en la Regulación (EU) no 1143/2014 del Parlamento Europeo y del Consejo de 22 de Octubre de 2014, relativa a la prevención y gestión de la introducción y expansión de especies invasoras.*

Table S1. Answers given to questions of the risk assessment using the proposal made by García de Lomas *et al*. (2014). *Respuestas a las preguntas del análisis de riesgo realizado siguiendo la propuesta de García de Lomas* et al. *(2014).*

1	**Is the alien species a recognized host or vector of parasitic, parasites or pathogens that may affect native taxa?**	**Answer**	**Reference**
c	Unknown	X	-
2	**Can it hybridise with native species?**		
c	No, the genus *Colocasia* is not represented in the native flora.	X	-
3	**Are there available sources reporting the species as invasive, naturalised or casual?.**		
a	Yes, they indicate it is clearly invasive in some area/s of the world	X	Numerous references, e.g. Cufodontis (1953-1972); Kunkel (1975); Henderson (2007); Wester (1992); Visser *et al*. (1999); FLEPPC (2000); Tye (2001); Brown & Brooks (2003); García-Camacho & Quintanar (2003); Kunkel (1975); Henderson (2007); Atkins & Williamson (2008); Silva *et al*. (2008); García de Lomas *et al*. (2012); Ferrer-Gallego *et al*. (2015)
4	**The species is**		
a	Aquatic, therophyte/biannual, geophyte, hemi-cryptophyte	X	Ferrer-Gallego *et al*. (2015)
5	**Does the species alter the natural disturbance regime (e.g. dune fixation, promotes fires, modifies flows regime) of invaded areas?.**		
a	Yes	X	Atkins & Williamson (2008); Brown & Brooks (2003); García de Lomas *et al*. (2012)
6	**Does the species provoke public health problems?**		
b	No	X	-
7	**Does the species provoke social-economic damages?**		
c	Unknown	X	-
8	**According to models based on niche and climate for the studied area, is the species classified as likely invasive?**		
c	Yes	X	this work
9	**Allelopathic?**		
d	Yes	X	Pardales *et al*. (1992)
10	**Main type of propagation in the wild**		
c	Only by vegetative means	X	Pardales *et al*. (1981); Lebot *et al*. (2004); García de Lomas *et al*. (2012)
11	**Time needed to develop capability for propagation**		
a	< 1 year	X	Field observation; Onweme (1999)
12	**Size of seeds, spores or vegetative dispersal units.**		
c	1-5 cm	X	Field observation; Onweme (1999)
13	**Time for which propagule remain viable**		
e	Several months	X	Onweme (1999)
14	**Does it show animal, wind, or water dispersal?**		
a	Yes	X	Acevedo-Rodríguez *et al*. (2005); García de Lomas *et al*. (2012)
15	**Does it show other mechanisms for unintentional dispersal through human activities? (Vehicles, agriculture, etc.)**		
b	No	X	-
16	**Is it a N-fixing species?**		
b	No	X	-
17	**Does the species shadow soil or benthos, beyond the characteristic level of the native habitat invaded (e.g.**		

	by encroachment, or by forming monospecific carpets, or by accumulating decayed leaves, etc.)		
a	**Yes**	X	Langeland *et al*. (2008); Silva *et al*. (2008); García de Lomas *et al*. (2012); Ferrer-Gallego *et al*. (2015); see also review in this paper
18	**Does it show a trend to form mono-specific populations in invaded areas?**		
a	Yes	X	Many references: e.g. Brown & Brooks (2003); Atkins & Williamson (2008); Langeland *et al*. (2008); Silva *et al*. (2008); García de Lomas et al. (2012); Ferrer-Gallego *et al*. (2015); see also review in this paper
19	**Does it invade natural habitats?**		
a	Yes	X	Many references, e.g.: Atkins & Williamson (2008); Brown & Brooks (2003); Royo (2007); Curcó (2006); García de Lomas *et al*. (2012); localities and information discussed in present work
	Extra points due to mode of introduction:	2	(ornamental with greater water requirements)
	Output		**Reject**
	Final score		72.2

Table S2. Answers given to questions of the risk assessment according to Gordon *et al.* (2010). *Respuestas a las preguntas del análisis de riesgo realizado siguiendo la propuesta de Gordon* et al.*(2010.*

	A.	History/ Biogeography			Answer	Reference
C	**1**	*Domestication/*	1.01	Is the species highly domesticated? If answer is 'no' go to 2.01	N	Loy *et al*. (1992); Onweme, 1999; Mace & Godwin (2002). To answer this question, it is essential to consider the reverse rationale exposed by Gordon *et al*. (2010) in page 58. When a species has been cultivated and traits may have favoured invasiveness the answer must be 'No'. In *C. esculenta*, numerous varieties adapted to stress have been developed (Onweme, 1999).
C		*cultivation*	1.02	Is species naturalised where grown?	-	-
C			1.03	Does the species have weedy races?	-	-
-	**2**	*Climate and*	2.01	Species suited to Iberian Peninsula/Continental Europe climates (0-low; 1-intermediate; 2-high)	2	This work
-		*Distribution*	2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	2	This work
C			2.03	Broad climate suitability (environmental versatility)	Y	This work
C			2.04	Native or naturalised in regions with extended dry periods	Y	Yes, especially in wetlands, channels/river courses (Onweme, 1999; this work)
-			2.05	Does the species have a history of repeated introductions outside its natural range?	Y	Many references; e.g. Atkins & Williamson (2008); Silva *et al*. (2008); references reviewed in García de Lomas *et al*. (2012); Ferrer-Gallego *et al*. (2015)
C	**3**	*Weed*	3.01	Naturalised beyond native range	Y	See answer given to 1.01
E		*Elsewhere*	3.02	Garden/amenity/disturbance weed	N	-
A		*(interacts with 2.01*	3.03	Weed of agriculture/horticulture/forestry	N	-
E		*to give a weighted*	3.04	Environmental weed	Y	See answer given to 1.01
C		*score)*	3.05	Congeneric weed	N	-
-	**B.**	**Biology/Ecology**				-
C	**4**	*Undesirable*	4.01	Produces spines, thorns or burrs	N	-
C		*traits*	4.02	Allelopathic	Y	Pardales *et al*. (1992)
C			4.03	Parasitic	N	-
A			4.04	Unpalatable to grazing animals	?	No reference found
C			4.05	Toxic to animals	?	No reference found
C			4.06	Host for recognised pests and pathogens	?	No data available for Iberian Peninsula nor for Europe
C			4.07	Causes allergies or is otherwise toxic to humans	N	-
E			4.08	Creates a fire hazard in natural ecosystems	N	-
E			4.09	Is a shade tolerant plant at some stage of its life cycle	Y	Paulo Alves (field observation); García de Lomas *et al.* (2012) describes an invasion under canopy

E			4.10	Grows on infertile soils	Y	It can colonise any kind of bank soils (see references in this Risk Analysis such as Atkins & Williamson (2008); Silva *et al.* (2008) for a global overview.
E			4.11	Climbing or smothering growth habit	N	-
C			4.12	Forms dense thickets	Y	Many references: e.g. Brown & Brooks (2003); Atkins &Williamson (2008); Langeland *et al.* (2008); Silva *et al.* (2008); García de Lomas *et al.* (2012); Ferrer-Gallego *et al.* (2015); see also review in this paper
E	**5**	*Plant*	5.01	Aquatic	N	Gordon *et al.* (2010) indicates that this "Applies to obligate aquatic taxa. Wetlands taxa and those that grow on stream banks do not qualify". Hence, *C. esculenta* does not qualify.
C		*type*	5.02	Grass	N	-
E			5.03	Nitrogen fixing woody plant	N	-
C			5.04	Geophyte	Y	Onweme (1999); García de Lomas *et al.* (2012)
C	**6**	*Reproduction*	6.01	Evidence of substantial reproductive failure in native habitat	N	Onweme (1999). Gordon *et al.* (2010) indicates 'Answer 'no' if no data exist on controlling factors (the most frequent case)'. In *C. esculenta* sexual propagation is less important than vegetative propagation. These authors also state that 'Evidence that a taxon has a widespread distribution or is common or weedy, without any evidence of reproductive failure is sufficient for a 'no' answer'. Here, we consider reproduction also in a non-sexual way, since it is the species' most effective mode of dispersal to colonise new areas. Therefore, a 'N' is answered in this question.
C			6.02	Produces viable seed	N	-
A			6.03	Hybridises naturally	N	The genus is alien to Europe and no other *Colocasia* species is naturalised.
C			6.04	Self-fertilisation	Y	Ivancic (2011)
C			6.05	Requires specialist pollinators	Y	Bröderbauer *et al.* (2014)
A			6.06	Reproduction by vegetative propagation	Y	Pardales *et al.* (1981); Lebot *et al.* (2004); García de Lomas *et al.* (2012)
C			6.07	Minimum generative time (years)	1.0	Onweme (1999). The score for this trait uses the following rules: 1 year – score = 1 (this includes any species that produces propagules within 12 months of germination) (Gordon *et al.* 2010).
A	**7**	*Dispersal*	7.01	Propagules likely to be dispersed unintentionally	N	-
C		*mechanisms*	7.02	Propagules dispersed intentionally by people	Y	Yes. It is used as ornamental and offered by the horticultural trade (Ferrer-Gallego *et al.*, 2015; Guillot, 2015).
A			7.03	Propagules likely to disperse as a produce contaminant	N	-
C			704	Propagules adapted to wind dispersal	N	-
E			7.05	Propagules buoyant	Y	García de Lomas *et al.* (2012) and Ferrer-Gallego *et al.* (2015) show how the species colonises wetlands and rivers downstream
E			7.06	Propagules bird dispersed	N	-
C			7.07	Propagules dispersed by other	N	-

				animals (externally)		
C			7.08	Propagules dispersed by other animals (internally)	N	-
C	**8**	*Persistence attributes*	8.01	Prolific seed production	N	-
C			8.02	Evidence that a persistent propagules bank is formed (>1 yr)	N	-
A			8.03	Well controlled by herbicides	N	Since it colonises stream banks, herbicides cannot be considered as a general suitable option according to national legislation.
A			8.04	Tolerates or benefits from mutilation, cultivation or fire	Y	A well known trait, showed in many references, e.g.: Onweme (1999); García de Lomas *et al*. (2012)
C			8.05	Effective natural enemies present in the study area	?	No reference found
				Outcome:	**Reject**	
				Score:	9	
		Statistical summary of scoring		Biogeography	8	
				Score partition: Undesirable attributes	4	
				Biology/ecology	-3	
				Biogeography	8	
				Questions answered: Undesirable attributes	8	
				Biology/ecology	23	
				Total	39	
				Agricultural	3	
				Sector affected: Environmental	9	