

Taxon: <i>Celosia trigyna</i> L.	Family: Amaranthaceae
Common Name(s): cock's comb silver spinach woolflower	Synonym(s): <i>Celosia digyna</i> Suess. <i>Celosia laxa</i> Schumach. & Thonn.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 12 May 2021
WRA Score: 12.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Tropical Herb, Naturalizes, Crop Weed, Edible, Annual

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	y
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
409	Is a shade tolerant plant at some stage of its life cycle		

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	n
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	1
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	y
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	y
704	Propagules adapted to wind dispersal	y=1, n=-1	n
705	Propagules water dispersed	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut		
801	Prolific seed production (>1000/m ²)		
802	Evidence that a persistent propagule bank is formed (>1 yr)		
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	Is the species highly domesticated?	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[No evidence of domestication] "Diversity within <i>Celosia trigyna</i> is considerable, but there is no information on attempts to collect, conserve and characterize the diversity. Improved cultivars are not available. There is no threat of genetic erosion in wild populations because <i>Celosia trigyna</i> is widespread and common in disturbed habitats."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	NA

Qsn #	Question	Answer
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	High
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Celosia trigyna</i> occurs almost throughout tropical Africa, also in South Africa and southern Arabia, often as a weed. It is recorded as a leafy vegetable in Benin and southern Nigeria, but also in South Africa. <i>Celosia trigyna</i> has been introduced in the United States, where it is locally naturalized."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 7 May 2021]	"Native Africa NORTHEAST TROPICAL AFRICA: Ethiopia, Sudan, Somalia EAST TROPICAL AFRICA: Kenya, Tanzania, Uganda WEST-CENTRAL TROPICAL AFRICA: Cameroon, Democratic Republic of the Congo, Equatorial Guinea, Rwanda WEST TROPICAL AFRICA: Ghana, Guinea, Gambia, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo SOUTH TROPICAL AFRICA: Mozambique, Malawi, Zambia, Zimbabwe SOUTHERN AFRICA: Botswana, Namibia, Eswatini, South Africa [Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga] WESTERN INDIAN OCEAN: Madagascar Asia-Temperate ARABIAN PENINSULA: Yemen Naturalized REGION: Africa MACARONESIA: Cabo Verde"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 7 May 2021]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Elevation range >1000 m] " <i>Celosia trigyna</i> occurs in forest clearings and grassland, along roadsides and rivers, and as a weed in fields, up to 1500(–2000) m altitude. It requires up to 2500 mm annual rainfall and maximum temperatures of 25–30°C for optimum growth, and does not tolerate temperatures below 15°C."

204	Native or naturalized in regions with tropical or subtropical climates	y
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Qsn #	Question	Answer
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Celosia trigyna</i> occurs almost throughout tropical Africa, also in South Africa and southern Arabia, often as a weed. It is recorded as a leafy vegetable in Benin and southern Nigeria, but also in South Africa. <i>Celosia trigyna</i> has been introduced in the United States, where it is locally naturalized."
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Celosia trigyna</i> occurs almost throughout tropical Africa, also in South Africa and southern Arabia, often as a weed. It is recorded as a leafy vegetable in Benin and southern Nigeria, but also in South Africa. <i>Celosia trigyna</i> has been introduced in the United States, where it is locally naturalized."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 11 May 2021]	"Naturalized REGION: Africa MACARONESIA: Cabo Verde"

301	Naturalized beyond native range	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Celosia trigyna</i> occurs almost throughout tropical Africa, also in South Africa and southern Arabia, often as a weed. It is recorded as a leafy vegetable in Benin and southern Nigeria, but also in South Africa. <i>Celosia trigyna</i> has been introduced in the United States, where it is locally naturalized."
	USDA, Agricultural Research Service, National Plant Germplasm System. (2021). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 11 May 2021]	"Naturalized REGION: Africa MACARONESIA: Cabo Verde"
	Imada, C. (2019). Hawaiian Naturalized Vascular Plants Checklist (February 2019 update). Bishop Museum Technical Report 69. Bishop Museum, Honolulu, HI	No evidence in the Hawaiian Islands

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Weed of: Cereals, Cotton, Orchards & Plantations, Pastures, Vegetables"
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Celosia trigyna</i> often becomes weedy in other crops. It can be controlled fairly easily both mechanically and with herbicides."

303	Agricultural/forestry/horticultural weed	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Celosia trigyna</i> often becomes weedy in other crops. It can be controlled fairly easily both mechanically and with herbicides."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[<i>Celosia trigyna</i>] "Weed of: Cereals, Cotton, Orchards & Plantations, Pastures, Vegetables"
	Chikoye, D., Lum, A. F., & Udensi, U. E. (2010). Efficacy of a new glyphosate formulation for weed control in maize in southwest Nigeria. <i>Crop Protection</i> , 29(9), 947-952	[Controlled as a crop weed] "At 4 WAT in both years, glyphosate-TF at doses of 0.75 to 1.25 kg a.i./ha provided 73e83% control of <i>I. cylindrica</i> which was not significantly different from glyphosate-RP (78%) (Table 1). Glyphosate-TF at 0.25 and 0.50 kg a.i./ha and glyphosate-TD controlled <i>I. cylindrica</i> by 61-65%. All formulations provided over 80% control of <i>Platostoma africanum</i> P. Beauv. (82e89%), <i>Phyllanthus amarus</i> Schum & Thonn. (85-93%), <i>Ageratum conyzoides</i> L. (86-98%), <i>Celosia trigyna</i> L. (88-99%), <i>Commelina benghalensis</i> L. (89-100%), <i>Schwenkia americana</i> L. (89-97%), <i>Ipomoea involucrata</i> P. Beauv. (82-98%), <i>Brachiaria comota</i> [Hochst ex A. Rich] stapf (96-99%), and <i>Acalypha ciliata</i> Forssk (97-99%) except glyphosate- TD which gave 78% control of <i>P. africanum</i> . Glyphosate-RP, glyphosate- TD, and Glyphosate-TF at all doses except 0.25 kg a.i./ha gave over 70% control of sedges (seedlings of <i>Mariscus alternifolius</i> Vahl., <i>Kyllinga squamulata</i> Thonn. Ex Vahl., and <i>Cyperus</i> spp.) (72-78%). All formulations provided 74-83% control of <i>Oldenlandia corymbosa</i> L."

304	Environmental weed	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Celosia trigyna</i> often becomes weedy in other crops. It can be controlled fairly easily both mechanically and with herbicides."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[No evidence] "Weed of: Cereals, Cotton, Orchards & Plantations, Pastures, Vegetables"

305	Congeneric weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	Inamdar, A., & Kamble, A. B. (2009). Allelopathic Effects of the Plant <i>Celosia argentea</i> L. on Seed Germination and Seedling Growth of <i>Vigna mungo</i> L. <i>Journal of Nature Environment & Pollution Technology</i> , 8(1), 57-61	" <i>Celosia argentea</i> is a predominant weed of leguminous crop fields and has been reported to reduce the yield of pearl millet, maize and pulse legumes. It was, thus, thought that the reduction in yields of these crops was not due to only competition but also because of allelopathic inhibition of growth and development of these crop plants."
	Ravindra, G. M., Sridhara, S., Girijesh, G. K., & Nanjappa, H. V. (2008). Weed biology and growth analysis of <i>Celosia argentea</i> L., a weed associated with groundnut and finger millet crops in southern India. <i>Communications in Biometry and Crop Science</i> , 3(2), 80-87	" <i>Celosia argentea</i> L. is an herbaceous annual weed found in many crops such as Groundnut (<i>Arachis hypogaea</i> L., Finger Millet (<i>Eleusine coracana</i> L. Gaertn) and Maize (<i>Zea mays</i> L.). It is erect plant and grows to a height of 1.0 to 1.6 m under favorable condition. It has numerous lateral roots below the soil surface. These enable it to efficiently absorb nutrients from the soil. Lately it has become a troublesome weed to control in field crops as it emerges several times during a cropping cycle and escapes weed control measures."
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	[<i>Celosia argentea</i>] "Weed of: Bananas, Cereals, Cotton, Orchards & Plantations"

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). <i>Plant Resources of Tropical Africa. Volume 2. Vegetables</i> . PROTA, Wageningen, Netherlands	[No evidence] "Erect annual herb up to 120(–180) cm tall; stem simple or branched, grooved or striate, glabrous or with few hairs, usually pinkish brown. Leaves alternate, simple, without stipules; petiole up to 5(–8) cm long; blade broadly ovate to narrowly lanceolate, (1–)2–8.5(–10) cm × (0.5–)1–4(–5) cm, tapering to truncate at base, acute to acuminate at apex, entire, glabrous or slightly shortly hairy below, pinnately veined. Inflorescence an axillary and terminal simple or branched spike 6.5–35 cm long, formed of distant or approximate clusters of flowers, bracteate, silvery to pink. Flowers small, bisexual, regular, 5-merous; tepals free, ovate-elliptical, 2–3 mm long, shortly mucronate; stamens fused at base; ovary superior, 1-celled, style very short, stigmas 2–3. Fruit an ovoid capsule c. 2 mm long, circumscissile, few-seeded. Seeds lenticular, c. 1 mm long, black and shining, shallowly reticulate."

402	Allelopathic	
	Source(s)	Notes

Qsn #	Question	Answer
	Saritha, P., & Sreeramulu, A. (2013). Allelopathic effects of <i>Celosia argentea</i> L. leaf extracts on crop plant seed germination. <i>International Journal of Life sciences Biotechnology and Pharma Research</i> , 2(1): 1-9	[Unknown. Other species demonstrate allelopathic effects] "Cocks comb (<i>Celosia argentea</i> L.) is one of the most famous allelopathic plants. The present study was conducted to investigate the allelopathic effects of different concentrations of <i>Celosia argentea</i> L weed on seed germination and seedling growth of surrounding crop plants <i>Sorghum bicolor</i> , <i>Phaseolous aureus</i> , <i>Arachis hypogaea</i> , <i>Dolichos lab lab</i> and <i>Vigna unguiculata</i> . The average growths of plumule and radicle was measured and compared. 1%, 2%, 3% and 5% aqueous extracts of leaf inhibited seed germination and seedling growth of crop plant seeds. The percentage seed germination and seedling growth of crop plant seeds decreased with concentration of leaf extracts used. The reduction of germination percentage may be due to the presence of allelochemicals of <i>Celosia argentea</i> L. which is reported to contain hyaluronic acid, celosianin, betanin and isocelosianin. Among the five crop plant seeds, <i>C. argentea</i> leaf extract showed more inhibitory effect on growth of seedlings of groundnut (8.96%)."

403	Parasitic	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). <i>Plant Resources of Tropical Africa. Volume 2. Vegetables.</i> PROTA, Wageningen, Netherlands	"Erect annual herb up to 120(–180) cm tall; stem simple or branched, grooved or striate, glabrous or with few hairs, usually pinkish brown." [Amaranthaceae. No evidence]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Quattrocchi, U. (2012). <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology.</i> CRC Press, Boca Raton, FL	"plant eaten by livestock, fodder for rabbits, tender leaves used as vegetable"
	Abubakar, S., Ogbadu, G. H., Usman, A. B., Segun, O., Olorode, O., & Samirah, I. U. (2012). The underutilized vegetable plants of the federal capital territory (FCT) Abuja of Nigeria. <i>International Journal of Development and Sustainability</i> , 1(3), 34-643	"Table 1. The Underutilized Vegetable Plants Collected" [<i>Celosia Trigyna</i> - Part Used = Leaves; Other Uses = Fodder]
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). <i>Plant Resources of Tropical Africa. Volume 2. Vegetables.</i> PROTA, Wageningen, Netherlands	"The plant is eaten by livestock, but reports on its acceptability are contradictory."

405	Toxic to animals	n
	Source(s)	Notes
	Tropical Plants Database, Ken Fern. (2021). <i>Celosia trigyna</i> . http://tropical.theferns.info/viewtropical.php?id=Celosia +trigyna . [Accessed 11 May 2021]	"Known Hazards: None known"

Qsn #	Question	Answer
	Abubakar, S., Ogbadu, G. H., Usman, A. B., Segun, O., Olorode, O., & Samirah, I. U. (2012). The underutilized vegetable plants of the federal capital territory (FCT) Abuja of Nigeria. <i>International Journal of Development and Sustainability</i> , 1(3), 34-643	"Table 1. The Underutilized Vegetable Plants Collected" [<i>Celosia Trigyna</i> - Part Used = Leaves; Other Uses = Fodder]
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). <i>Plant Resources of Tropical Africa. Volume 2. Vegetables.</i> PROTA, Wageningen, Netherlands	"The plant is eaten by livestock, but reports on its acceptability are contradictory."

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). <i>Plant Resources of Tropical Africa. Volume 2. Vegetables.</i> PROTA, Wageningen, Netherlands	"Disease incidence is not common in <i>Celosia trigyna</i> and no records of serious diseases are available. Pests recorded include millipedes and the adults and larvae of the tortoise beetle (<i>Cassida tosta</i>), which feed on the leaves. In south-western Nigeria, a few destructive insects have been recorded on the plant. Adults of <i>Gasteroclisus rhomboidalis</i> attack the stem, and the leaves are attacked by adults of <i>Anacatantops notatus</i> . The larvae of <i>Sceliodes laisalis</i> and <i>Hymenia recurvalis</i> are destructive to the leaves."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Tropical Plants Database, Ken Fern. (2021). <i>Celosia trigyna</i> . http://tropical.theferns.info/viewtropical.php?id=Celosia +trigyna . [Accessed 11 May 2021]	"Known Hazards: None known"
	Quattrocchi, U. (2012). <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology.</i> CRC Press, Boca Raton, FL	"plant eaten by livestock, fodder for rabbits, tender leaves used as vegetable"
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). <i>Plant Resources of Tropical Africa. Volume 2. Vegetables.</i> PROTA, Wageningen, Netherlands	[No evidence. Used as a food and medicine] " <i>Celosia trigyna</i> leaves are consumed as a vegetable, finely cut in soups, stews and sauces. The slightly bitter leaves are popular amongst the Yoruba people in south-western Nigeria, where the plant is known as 'aje fo wo'. The plant is used in traditional medicine. In Sierra Leone it is used for the treatment of heart complaints, whereas in northern Nigeria it is used to treat pustular skin eruption. In Ghana it is applied to sores and boils. Pulped leaves are used to treat costal pains, chest troubles, stomach-ache and urethral disorders. The plant is included in several medicinal preparations used to treat women's disorders and diseases, including ovarian troubles in DR Congo and excessive menstruation in Ethiopia. The leaves and flowers are used to treat diarrhoea. The plant is eaten by livestock, but reports on its acceptability are contradictory."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes

Qsn #	Question	Answer
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[No evidence. Occurs in wetter habitats] "Celosia trigyna occurs in forest clearings and grassland, along roadsides and rivers, and as a weed in fields, up to 1500(–2000) m altitude. It requires up to 2500 mm annual rainfall and maximum temperatures of 25–30°C for optimum growth, and does not tolerate temperatures below 15°C. "

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	Tropical Plants Database, Ken Fern. (2021). <i>Celosia trigyna</i> . http://tropical.theferns.info/viewtropical.php?id=Celosia+trigyna . [Accessed 11 May 2021]	"For best leaf production, the plant requires a fertile, moisture-retentive but well-drained soil in a sunny sheltered position"
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Shade tolerance unknown, but occurs in more open, presumably higher light environments] "Celosia trigyna occurs in forest clearings and grassland, along roadsides and rivers, and as a weed in fields"

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"It grows on a wide range of soils, but prefers fertile well-drained loamy soils."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Erect annual herb up to 120(–180) cm tall; stem simple or branched, grooved or striate, glabrous or with few hairs, usually pinkish brown."

412	Forms dense thickets	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[A weed, but no description or evidence that this species forms dense cover or dense stands] "Celosia trigyna occurs in forest clearings and grassland, along roadsides and rivers, and as a weed in fields, up to 1500(–2000) m altitude."

501	Aquatic	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Terrestrial] "Celosia trigyna occurs in forest clearings and grassland, along roadsides and rivers, and as a weed in fields, up to 1500(–2000) m altitude."

Qsn #	Question	Answer
502	Grass	n
	Source(s)	Notes
	ITIS. (2021). Integrated Taxonomic Information System. http://www.itis.gov/ . [Accessed 7 May 2021]	"Family Amaranthaceae – pigweed, amaranthes"
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	ITIS. (2021). Integrated Taxonomic Information System. http://www.itis.gov/ . [Accessed 7 May 2021]	"Family Amaranthaceae – pigweed, amaranthes"
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Annual] "Erect annual herb up to 120(–180) cm tall; stem simple or branched, grooved or striate, glabrous or with few hairs, usually pinkish brown."
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Diversity within <i>Celosia trigyna</i> is considerable, but there is no information on attempts to collect, conserve and characterize the diversity. Improved cultivars are not available. There is no threat of genetic erosion in wild populations because <i>Celosia trigyna</i> is widespread and common in disturbed habitats."
602	Produces viable seed	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Celosia trigyna</i> is propagated by seed, which is either broadcast or drilled directly on plant beds. The seeds are small, the 1000-seed weight being about 0.3 g. A seed rate of 8 kg/ha is recorded as adequate. Before sowing, the seed is mixed with sand or finely sieved soil to achieve a uniform spread and good plant establishment. Broadcasting the seed is preferred for leaf production. Plants are thinned to a spacing of about 15 cm; they become very bushy with overhanging branches at wider spacings. Drilling in rows spaced 0.8–1.0 m apart is more suitable for seed production."
603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	Unknown. No evidence found
604	Self-compatible or apomictic	

Qsn #	Question	Answer
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Possibly] "Flowers small, bisexual, regular, 5-merous; tepals free, ovate-elliptical, 2–3 mm long, shortly mucronate; stamens fused at base; ovary superior, 1-celled, style very short, stigmas 2–3"
605	Requires specialist pollinators	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"The flowers are pollinated by insects."
606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[No evidence. Seed propagated annual] "Erect annual herb up to 120 (–180) cm tall; stem simple or branched, grooved or striate, glabrous or with few hairs, usually pinkish brown." ... "Celosia trigyna is propagated by seed, which is either broadcast or drilled directly on plant beds."
607	Minimum generative time (years)	1
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Seed germinates 4–5 days after sowing. The growing period is 90–120 days from planting to seed maturity."
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Latham, P. & Konda ku Mbuta, A. (2014). Useful Plants of Bas-Congo Province, Democratic Republic of Congo Volume 1. Paul Latham & Augustin Konda ku Mbuta, Blairgowrie, UK	[Probably yes, due to presence in heavily trafficked areas] "Widespread at low altitudes as a weed in abandoned cultivation, forest clearings, along tracks and roadsides."
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Probably yes. Common along roadsides] "Widespread at low altitudes as a weed in abandoned cultivation, forest clearings, along tracks and roadsides."
702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	"Celosia trigyna occurs almost throughout tropical Africa, also in South Africa and southern Arabia, often as a weed. It is recorded as a leafy vegetable in Benin and southern Nigeria, but also in South Africa. Celosia trigyna has been introduced in the United States, where it is locally naturalized. "

Qsn #	Question	Answer
703	Propagules likely to disperse as a produce contaminant	y
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	[Presence as a crop weed suggests seed contamination can or will be a recurring problem] "Major Pathway/s: Contaminant, Crop, Herbal Dispersed by: Humans, Cattle, Livestock Weed of: Cereals, Cotton, Orchards & Plantations, Pastures, Vegetables"

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Kubitzki, K., Rohwer, J.G. & Bittrich, V. (eds.). 1993. The Families and Genera of Vascular Plants: Volume II. Flowering Plants. Dicotyledons: Magnoliid, Hamamelid and Caryophyllid Families. Springer-Verlag, Berlin, Heidelberg, New York	[Generic description] "In genera such as Amaranthus, Celosia and Chamissoa this accomplished by free fall of a large number of seeds produced by the multiovulate ovary, often facilitated by a circumscissile lid to the capsule; plants of this type naturally often occur in considerable stands, and frequently colonise disturbed ground."
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[No evidence. Dispersal of small seeds may be facilitated by wind, but there are no specific morphological adaptations to wind dispersal] "Fruit an ovoid capsule c. 2 mm long, circumscissile, few-seeded. Seeds lenticular, c. 1 mm long, black and shining, shallowly reticulate."

705	Propagules water dispersed	y
	Source(s)	Notes
	Latham, P. & Konda ku Mbuta, A. (2014). Useful Plants of Bas-Congo Province, Democratic Republic of Congo Volume 1. Paul Latham & Augustin Konda ku Mbuta, Blairgowrie, UK	[Small seeds likely moved by water when occurring near aquatic habitats] "Widespread at low altitudes as a weed in abandoned cultivation, forest clearings, along tracks and roadsides. Also found in damp ground beside water."
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Water may facilitate dispersal of plants growing along rivers] "Celosia trigyna occurs in forest clearings and grassland, along roadsides and rivers, and as a weed in fields"

706	Propagules bird dispersed	n
	Source(s)	Notes
	Kubitzki, K., Rohwer, J.G. & Bittrich, V. (eds.). 1993. The Families and Genera of Vascular Plants: Volume II. Flowering Plants. Dicotyledons: Magnoliid, Hamamelid and Caryophyllid Families. Springer-Verlag, Berlin, Heidelberg, New York	[General description] "In genera such as Amaranthus, Celosia and Chamissoa this accomplished by free fall of a large number of seeds produced by the multiovulate ovary, often facilitated by a circumscissile lid to the capsule; plants of this type naturally often occur in considerable stands, and frequently colonise disturbed ground."
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[No evidence. Not fleshy-fruited] "Fruit an ovoid capsule c. 2 mm long, circumscissile, few-seeded. Seeds lenticular, c. 1 mm long, black and shining, shallowly reticulate."

Qsn #	Question	Answer
707	Propagules dispersed by other animals (externally)	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Cattle, Livestock" [Mechanism of dispersal undetermined. Small seed size may facilitate attachment to mud stuck to animals, but seeds otherwise lack obvious means of external attachment]

708	Propagules survive passage through the gut	
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Dispersed by: Humans, Cattle, Livestock" [Means of dispersal by livestock not determined]
	Quattrocchi, U. (2012). CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	"plant eaten by livestock, fodder for rabbits, tender leaves used as vegetable" [Unknown. Possible that some seeds are ingested and internally dispersed by animals browsing on plants]

801	Prolific seed production (>1000/m²)	
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	[Unknown. Few-seeded capsules may result in low densities] "Fruit an ovoid capsule c. 2 mm long, circumscissile, few-seeded. Seeds lenticular, c. 1 mm long, black and shining, shallowly reticulate."

802	Evidence that a persistent propagule bank is formed (>1 yr)	
	Source(s)	Notes
	Royal Botanic Gardens Kew. (2021) Seed Information Database (SID). Version 7.1. http://data.kew.org/sid/ . [Accessed 12 May 2021]	"Storage Behaviour: Orthodox Storage Conditions: No problem for long-term storage under IPGRI preferred conditions (SSLR)"
	Kadereit, G., Newton, R. J., & Vandeloos, F. (2017). Evolutionary ecology of fast seed germination—A case study in Amaranthaceae/Chenopodiaceae. <i>Perspectives in Plant Ecology, Evolution and Systematics</i> , 29, 1-11	[Longevity unknown] "Ruderal species, on the other hand, germinated more slowly when growing in tropical and seasonally dry areas. Especially tropical weeds, such as <i>Achyranthes aspera</i> , <i>Celosia trigyna</i> and <i>Amaranthus retroflexus</i> , had high MTG values. These species started to germinate at the earliest after 2.5 weeks, suggesting they have a primary dormancy to avoid immediate germination, which increases chances of becoming buried in the soil seed bank."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). Plant Resources of Tropical Africa. Volume 2. Vegetables. PROTA, Wageningen, Netherlands	" <i>Celosia trigyna</i> often becomes weedy in other crops. It can be controlled fairly easily both mechanically and with herbicides."

Qsn #	Question	Answer
	Chikoye, D., Lum, A. F., & Udensi, U. E. (2010). Efficacy of a new glyphosate formulation for weed control in maize in southwest Nigeria. <i>Crop Protection</i> , 29(9), 947-952	[Effectively controlled as a crop weed] "At 4 WAT in both years, glyphosate-TF at doses of 0.75 to 1.25 kg a.i./ha provided 73e83% control of <i>I. cylindrica</i> which was not significantly different from glyphosate-RP (78%) (Table 1). Glyphosate-TF at 0.25 and 0.50 kg a.i./ha and glyphosate-TD controlled <i>I. cylindrica</i> by 61-65%. All formulations provided over 80% control of <i>Platostoma africanum</i> P. Beauv. (82e89%), <i>Phyllanthus amarus</i> Schum & Thonn. (85-93%), <i>Ageratum conyzoides</i> L. (86-98%), <i>Celosia trigyna</i> L. (88-99%), ..."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	Source(s)	Notes
	Grubben, G.J.H. & Denton, O.A. (ed.). (2004). <i>Plant Resources of Tropical Africa. Volume 2. Vegetables.</i> PROTA, Wageningen, Netherlands	[Probably No. Easily controlled mechanically] " <i>Celosia trigyna</i> often becomes weedy in other crops. It can be controlled fairly easily both mechanically and with herbicides."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2021). Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Elevation range exceeds 1000 m, demonstrating environmental versatility
- Thrives, and able to spread in regions with tropical climates
- Naturalized in the continental US and Cabo Verde islands, but no evidence in the Hawaiian Islands to date
- A crop weed of cereals, cotton, orchards, plantations, pastures, and vegetables
- Other *Celosia* species are invasive
- Tolerates many soil types
- Reproduces by seeds
- Annual life cycle, reaching maturity in 90-120 days
- Seeds dispersed by gravity, water, and people (intentionally and accidentally)

Low Risk Traits

- Despite common reports of weediness, impacts appear to be manageable
- Unarmed (no spines, thorns, or burrs)
- Provides fodder for livestock
- Non-toxic
- Despite weediness, also valued as a vegetable and medicinal plant
- Not reported to spread vegetatively
- Herbicides may provide effective control