**Family:** Chenopodiaceae  
**Taxon:** Chenopodium quinoa  
**Synonym:** quinoa, ajara, quinua, arroz del Peru  

| Questionnaire | Status: Assessor Approved | Assessor: Patti Clifford | Data Entry Person: Patti Clifford | Designation: EVALUATE  
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>101</strong> Is the species highly domesticated?</td>
<td></td>
<td></td>
<td></td>
<td>WRA Score 5</td>
</tr>
<tr>
<td><strong>102</strong> Has the species become naturalized where grown?</td>
<td>y=1, n=-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>103</strong> Does the species have weedy races?</td>
<td>y=1, n=-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>201</strong> Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute &quot;wet tropical&quot; for &quot;tropical or subtropical&quot;</td>
<td>(0-low; 1-intermediate; 2-high) (See Appendix 2)</td>
<td>High</td>
<td></td>
<td></td>
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<tr>
<td><strong>202</strong> Quality of climate match data</td>
<td>(0-low; 1-intermediate; 2-high) (See Appendix 2)</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>203</strong> Broad climate suitability (environmental versatility)</td>
<td>y=1, n=0</td>
<td></td>
<td>y</td>
<td></td>
</tr>
<tr>
<td><strong>204</strong> Native or naturalized in regions with tropical or subtropical climates</td>
<td>y=1, n=0</td>
<td></td>
<td>y</td>
<td></td>
</tr>
<tr>
<td><strong>205</strong> Does the species have a history of repeated introductions outside its natural range?</td>
<td>y=2, ?=1, n=0</td>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td><strong>301</strong> Naturalized beyond native range</td>
<td>y = 1*multiplier (see Appendix 2), n= question 205</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>302</strong> Garden/amenity/disturbance weed</td>
<td>n=0, y = 1*multiplier (see Appendix 2)</td>
<td></td>
<td>y</td>
<td></td>
</tr>
<tr>
<td><strong>303</strong> Agricultural/forestry/horticultural weed</td>
<td>n=0, y = 2*multiplier (see Appendix 2)</td>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td><strong>304</strong> Environmental weed</td>
<td>n=0, y = 2*multiplier (see Appendix 2)</td>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td><strong>305</strong> Congeneric weed</td>
<td>n=0, y = 1*multiplier (see Appendix 2)</td>
<td></td>
<td>y</td>
<td></td>
</tr>
<tr>
<td><strong>401</strong> Produces spines, thorns or burrs</td>
<td>y=1, n=0</td>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td><strong>402</strong> Allelopathic</td>
<td>y=1, n=0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>403</strong> Parasitic</td>
<td>y=1, n=0</td>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td><strong>404</strong> Unpalatable to grazing animals</td>
<td>y=1, n=-1</td>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td><strong>405</strong> Toxic to animals</td>
<td>y=1, n=0</td>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td><strong>406</strong> Host for recognized pests and pathogens</td>
<td>y=1, n=0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>407</strong> Causes allergies or is otherwise toxic to humans</td>
<td>y=1, n=0</td>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td><strong>408</strong> Creates a fire hazard in natural ecosystems</td>
<td>y=1, n=0</td>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td><strong>409</strong> Is a shade tolerant plant at some stage of its life cycle</td>
<td>y=1, n=0</td>
<td></td>
<td>n</td>
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<tr>
<td><strong>410</strong> Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)</td>
<td>y=1, n=0</td>
<td></td>
<td>y</td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
<td>Value</td>
<td></td>
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<td>-----------------------------------------------------------------------------</td>
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<td></td>
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<tr>
<td>411</td>
<td>Climbing or smothering growth habit</td>
<td>y=1, n=0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>412</td>
<td>Forms dense thickets</td>
<td>y=1, n=0</td>
<td></td>
<td></td>
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<tr>
<td>501</td>
<td>Aquatic</td>
<td>y=5, n=0</td>
<td></td>
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<tr>
<td>502</td>
<td>Grass</td>
<td>y=1, n=0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>503</td>
<td>Nitrogen fixing woody plant</td>
<td>y=1, n=0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>504</td>
<td>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</td>
<td>y=1, n=0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>601</td>
<td>Evidence of substantial reproductive failure in native habitat</td>
<td>y=1, n=0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>602</td>
<td>Produces viable seed</td>
<td>y=1, n=-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>603</td>
<td>Hybridizes naturally</td>
<td>y=1, n=-1</td>
<td></td>
<td></td>
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<tr>
<td>604</td>
<td>Self-compatible or apomictic</td>
<td>y=1, n=-1</td>
<td></td>
<td></td>
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<tr>
<td>605</td>
<td>Requires specialist pollinators</td>
<td>y=-1, n=0</td>
<td></td>
<td></td>
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<tr>
<td>606</td>
<td>Reproduction by vegetative fragmentation</td>
<td>y=1, n=-1</td>
<td></td>
<td></td>
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<tr>
<td>607</td>
<td>Minimum generative time (years)</td>
<td>1 year = 1, 2 or 3 years = 0, 4+ years = -1</td>
<td></td>
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<tr>
<td>701</td>
<td>Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)</td>
<td>y=1, n=-1</td>
<td></td>
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<tr>
<td>702</td>
<td>Propagules dispersed intentionally by people</td>
<td>y=1, n=-1</td>
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<tr>
<td>703</td>
<td>Propagules likely to disperse as a produce contaminant</td>
<td>y=1, n=-1</td>
<td></td>
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<tr>
<td>704</td>
<td>Propagules adapted to wind dispersal</td>
<td>y=1, n=-1</td>
<td></td>
<td></td>
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<tr>
<td>705</td>
<td>Propagules water dispersed</td>
<td>y=1, n=-1</td>
<td></td>
<td></td>
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<tr>
<td>706</td>
<td>Propagules bird dispersed</td>
<td>y=1, n=-1</td>
<td></td>
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<tr>
<td>707</td>
<td>Propagules dispersed by other animals (externally)</td>
<td>y=1, n=-1</td>
<td></td>
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<tr>
<td>708</td>
<td>Propagules survive passage through the gut</td>
<td>y=1, n=-1</td>
<td></td>
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<tr>
<td>801</td>
<td>Prolific seed production (&gt;1000/m2)</td>
<td>y=1, n=-1</td>
<td></td>
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<tr>
<td>802</td>
<td>Evidence that a persistent propagule bank is formed (&gt;1 yr)</td>
<td>y=1, n=-1</td>
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<tr>
<td>803</td>
<td>Well controlled by herbicides</td>
<td>y=-1, n=1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>804</td>
<td>Tolerates, or benefits from, mutilation, cultivation, or fire</td>
<td>y=1, n=-1</td>
<td></td>
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<tr>
<td>805</td>
<td>Effective natural enemies present locally (e.g. introduced biocontrol agents)</td>
<td>y=-1, n=1</td>
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</tbody>
</table>

**Designation:** EVALUATE  
**WRA Score:** 5
**Supporting Data:**


[Is the species highly domesticated? Yes] "Quinoa has a long and distinguished history in South America. Quinoa has been cultivated in the Andean highlands since 3,000 BC. In the Quechua language of the Incas, quinoa is the chisiya mama or "mother grain," in Spanish, it is quinoa, trigo inca, or arroz del Peru. Its adaptation to cold, dry climates, seed processing similarity to rice, and excellent nutritional qualities make quinoa a crop of considerable value to highland areas around the world which are currently limited as far as crop diversity and nutritional value."


[Is the species highly domesticated? Yes] "The quinoa is a food plant which was extensively cultivated in the Andean region by pre-Columbian cultures some 5000 years ago and was used in the diet of the settlers both of the inter-Andean valleys. which are very cold high areas, and of the high plateaus. After maize, it has occupied the most prominent place among Andean grains." Cultivated quinoas exhibit great genetic diversity, showing variability in the colouring of the plant, inflorescence and seeds, types of inflorescence, protein content, saponin content, beta-cyanine and calcium oxalate crystals in the leaves, so that a wide adaptation to different agro-ecological conditions may be seen (soils, precipitation, temperature, altitude, resistance to frost, drought, salinity or acidity)."

102 2012. WRA Specialist. Personal Communication. [Has the species become naturalized where grown?] The Global Compendium of Weeds states that Chenopodium quinoa has naturalized in several areas. [information unattainable]


[Does the species have weedy races?] "Quinoa has received a considerable amount of attention in the Andean region by pre-Columbian cultures some 5000 years ago and was used in the diet of the settlers both of the inter-Andean valleys. which are very cold high areas, and of the high plateaus. After maize, it has occupied the most prominent place among Andean grains." Cultivated quinoas exhibit great genetic diversity, showing variability in the colouring of the plant, inflorescence and seeds, types of inflorescence, protein content, saponin content, beta-cyanine and calcium oxalate crystals in the leaves, so that a wide adaptation to different agro-ecological conditions may be seen (soils, precipitation, temperature, altitude, resistance to frost, drought, salinity or acidity)."


[Does the species have weedy races?] Chenopodium quinoa Willd. Includes both domesticated grain cultivars (subsp. Quinoa) and free-living, weedy types (subsp. milleanum (Aellen) Aellen.)


[Does the species have weedy races?] According to Gordon et al. (2010), "only answer this question if the species you are assessing is a sub-species, cultivar or registered variety of a domesticated species. If the taxon is a less weedy subspecies, variety or cultivar, then there must be good evidence that it does not retain the capacity to revert to a weedy form."

103 2012. WRA Specialist. Personal Communication. [Does the species have weedy races?] NA


[Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"? 2 - High] Native range: Bolivia; Colombia; Ecuador; Peru; Chile.


[Quality of climate match data? 2 - High] Native range: Bolivia; Colombia; Ecuador; Peru; Chile.


[Broad climate suitability (environmental versatility)? Yes] Tapia et al. (1980) described five ecotypic groups of Chenopodium quinoa in Columbia, Ecuador, northern Peru, and at lower elevations (2,400 - 3,600 m) in southern Peru, Bolivia, Argentina; an Altiplano group found at higher elevations in Peru, Bolivia, Argentina, and northern Chile; a Yungas group adapted to relatively low elevations (1,800 - 2,300 m) of the eastern Andean slopes of Bolivia.
<table>
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<th>Page</th>
<th>Reference</th>
<th>Text</th>
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</table>
| 203  | 1994. Hernando Bermejo, J.E./Leon, J. (eds.). Neglected crops: 1492 from a different perspective. Plant Production and Protection Series No. 26. FAO, Rome. | [Broad climate suitability (environmental versatility)?] "Chenopodium quinoa's traditional cultivation area extends from lat. 8°N to lat. 30°S, as the plant adapts to different conditions of humidity, altitude and topography. Its requirements are: Precipitation. This depends on the agro-ecological zone and the genotype to which it belongs. It varies from 250 mm (the area of salt deposits in Bolivia) to 1 500 mm in the inter-Andean valleys. Although it shows strong resistance in periods of drought, it requires sufficient humidity at the commencement of cultivation. Temperature. It tolerates down to -5°C in the branching phase, depending on the ecotype and the duration of the minimum temperature. Its ontogenic resistance to cold and drought is very variable. Ecotypes exist which are resistant to temperatures of down to -8°C and survive for 20 days (mean monthly temperature)."
| 203  | 2012. Oelke, E.A./Putnam, D.H./Teynor, T.M./Oplinger, E.S. Quinoa - Alternative field crops manual. University of Wisconsin-Extension Cooperative Extension, University of Minnesota: Center for Alternative Plant & Animal Products and the Minnesota Extents | [Broad climate suitability (environmental versatility)?] "Quinoa requires short day lengths and cool temperatures for good growth. Areas in South America where it is still produced tend to be marginal agricultural areas that are prone to drought and have soils with low fertility. Cultivated quinoa will flower and produce seed at high elevations between 7,000 and 10,000 ft in Colorado since it requires a cool temperature for good vegetative growth. Research conducted in Colorado reported that temperatures which exceeded 95°F tended to cause plant dormancy or pollen sterility. In several years of trials near the Twin Cities, Minnesota, quinoa plants have failed to set seed; probably due to high temperatures. Quinoa plants are usually tolerant to light frosts (30° to 32°F). Plants should not be exposed to temperatures below 28°F to avoid the 70 to 80% loss that occurred in Colorado during 1985 when plants were in mid-bloom (Johnson and Croissant, 1990). However, plants are not affected by temperatures down to 20°F after the grain has reached the soft-dough stage. Quinoa will flower earlier when grown in areas with shorter day lengths.
Quinoa is generally not a widely adapted crop due to temperature sensitivity. Farmers should experiment first before planting large acreages."
| 204  | 2012. USDA ARS National Genetic Resources Program. Germplasm Resources Information Network - (GRIN). http://www.ars-grin.gov/cgi-bin/npgs/html/index.pl | [Native or naturalized in regions with tropical or subtropical climates? Yes] Native range: Bolivia; Colombia; Ecuador; Peru; Chile.
| 205  | 1994. Hernando Bermejo, J.E./Leon, J. (eds.). Neglected crops: 1492 from a different perspective. Plant Production and Protection Series No. 26. FAO, Rome. | [Does the species have a history of repeated introductions outside its natural range? No] "At present, it continues to be grown in Colombia. Ecuador, Peru, Bolivia, Chile and Argentina. Its marginalization began with the introduction of cereals such as barley and wheat, which eventually replaced it. The reduction in its cultivated area in the Andean countries is also due to technical, economic and social reasons. Harvesting and threshing, which in the majority of cases are done by hand, take a great many days and the grain requires a process to remove its bitter ingredients before consumption. The prices received by farmers often do not justify their labour."
| 301  | 2012. WRA Specialist. Personal Communication. | [Naturalized beyond native range? ] The Global Compendium of Weeds states that Chenopodium quinoa has naturalized in several areas. [Information unattainable]
| 302  | 2012. viarural. Malezas en cultivos - Clasificadas por nombres comunes [Accessed 29 November 2012]. http://www.viarural.com.ar/ | [Garden/amenity/disturbance weed? Yes] Chenopodium quinoa is documented as an agricultural weed in Argentina. However, since there is no information on its productivity losses or costs due to control, it is scored under question 3.02 (garden/amenity disturbance weed), according to protocol.
| 303  | 2012. viarural. Malezas en cultivos - Clasificadas por nombres comunes [Accessed 29 November 2012]. http://www.viarural.com.ar/ | [Agricultural/forestry/horticultural weed? No] Chenopodium quinoa is documented as an agricultural weed in Argentina. However, since there is no information on its productivity losses or costs due to control, it is scored under question 3.02 (garden/amenity disturbance weed), according to protocol.
Chenopodium quinoa (Chenopodiaceae)
Climbing or smothering growth habit? No] [Herbs, annual or perennial [rarely suffruticose, or small trees. [Genus-level description]

Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes.] "Soil pH requirements: 5.1 to 5.5 (strongly acidic) 5.6 to 6.0 (acidic) 6.1 to 6.5 (mildly acidic) 6.6 to 7.5 (neutral) 7.6 to 7.8 (mildly alkaline) 7.9 to 8.5 (alkaline) 8.6 to 9.0 (strongly alkaline)"

Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes.] "This crop grows well on sandy-loam to loamy-sand soils. Marginal agricultural soils are frequently used in South America to grow quinoa. These soils have poor or excessive drainage, low natural fertility, or very acidic (pH of 4.8) to alkaline (8.5) conditions."

Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)? Yes.] "Soil. It prefers easily worked, semi-deep soils, with good drainage and a supply of nutrients. It is suited to acid soils with a pH of 4.5 (in Cajamarca, Peru) and alkaline soils with a pH of up to 9.5 (in Uyuni, Bolivia), depending on the ecotype. Acceptable production is also obtained both on sandy and clayey soils."

[Causes allergies or is otherwise toxic to humans? No] Chenopodium quinoa is considered native to Columbia, but has not been reported as toxic.

[Causes allergies or is otherwise toxic to humans? No] Grains and leaves are used for food, and the grains, stems and leaves are used medicinally.

Chenopodium quinoa (Chenopodiaceae)


Aquatic? No] "Chenopodium quinoa is an annual herbaceous plant, measuring 0.20 to 3 m in height, depending on environmental conditions and genotype."


[Nitrogen fixing woody plant? No] "Chenopodium quinoa is an annual herbaceous plant, measuring 0.20 to 3 m in height, depending on environmental conditions and genotype."

Aquatic? No] "Chenopodium quinoa is an annual herbaceous plant, measuring 0.20 to 3 m in height, depending on environmental conditions and genotype."


[Nitrogen fixing woody plant? No] "Chenopodium quinoa is an annual herbaceous plant, measuring 0.20 to 3 m in height, depending on environmental conditions and genotype."

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Aquatic? No] "Chenopodium quinoa is an annual herbaceous plant, measuring 0.20 to 3 m in height, depending on environmental conditions and genotype."

Chenopodium quinoa (Chenopodiaceae)


[Hybridizes naturally? Yes] "Introduction of the Andean grain chenopod (Chenopodium quinoa) into North America placed this crop within the distributional range of a related wild species, C. berlandieri. This wild species, native to the North American flora, is cross-compatible with C. quinoa. Isozyme analysis of progeny from C. berlandieri plants growing within and at the periphery of the C. quinoa fields, combined with fertility assessment and phenetic comparison among putative hybrids and parental types, indicates that over 30% of progeny from wild plants growing as weeds with C. quinoa in 1987 were crop/weed hybrids."

[Self-compatible or apomictic? Yes] "Quinoa is primarily an inbreeding species with plants bearing hermaphroditic flowers. Ward (1991) has found the hermaphroditic nature of quinoa to be variable. In a study of male sterility, male fertile plants were found to possess anthers in only 10 to 90% of the inflorescences, with fertile flowers concentrated at the distal ends of the flower cluster. Outcrossing exceeds 10% (D.L. Johnson unpublished). These outcrossing estimates are similar to those reported in South America."


[Requires specialist pollinators? No] "Wind pollination studies of fertile quinoa (CO 407) with an orange panicle by a red-panicled near-isoline (CO 407R) indicate pollen to move 36 cm. Plants samples beyond that distance show no cross pollination to the CO 407R source in any direction. No insect activity in flowers was observed, although various Diptera spp. have been observed to visit quinoa flowers in Colorado's San Luis Valley and may add to wind distribution of pollen."

[Requires specialist pollinators? No] No The root system is deeply-penetrating, with many laterals.

[Evidence of substantial reproductive failure in native habitat? No] "Tapia et al. (1980), using distributional, ecological, agronomic, and morphological criteria, described five ecotypic "groups" of quinoa. These include a Valle group occurring in Colombia, Ecuador, northern Peru, and at lower elevations (2,400-3,600 m) in southern Peru, Bolivia, and Argentina; an Altiplano group found at higher elevations in Peru, Bolivia, Argentina, and northern Chile; a Yungas group adapted to relatively low elevations (1,600-2,300 m) of the eastern Andean slopes of Bolivia; a Salares group cultivated in salt flats of southwestern Bolivia; and a Nivel del Mar group adapted for cultivation near sea level along the south-central coast of Chile. This alignment, based on a diverse array of characters, appears to include the full range of variation among domesticated forms of the species."

[Produces viable seed? Yes] From seed; direct sow outdoors in fall From seed; direct sow after last frost

[Produces viable seed? Yes] "Quinoa prefers cool soil conditions (45° to 50°F). Germination occurs within 24 hours after planting when adequate moisture is present, and seedlings emerge in three to five days. Quinoa seeds, like those of spinach, may not germinate if conditions are warm and may need to be refrigerated for a week (vernalized) to obtain adequate germination."

[Produces viable seed? Yes] "Wind pollination studies of fertile quinoa (Chenopodium quinoa) into North America placed this crop within the distributional range of a related wild species, C. berlandieri. This wild species, native to the North American flora, is cross-compatible with C. quinoa. Isozyme analysis of progeny from C. berlandieri plants growing within and at the periphery of the C. quinoa fields, combined with fertility assessment and phenetic comparison among putative hybrids and parental types, indicates that over 30% of progeny from wild plants growing as weeds with C. quinoa in 1987 were crop/weed hybrids."

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[Requires specialist pollinators? No] No The root system is deeply-penetrating, with many laterals.
**Chenopodium quinoa** (Chenopodiaceae)

Chenopodium quinoa is a domesticated agricultural crop. Some agronomic and breeding work has been undertaken in several European countries, particularly Denmark, the Netherlands and the United Kingdom, where small commercial areas have been grown for several years.

**Reproduction by vegetative fragmentation?** Yes

The taproot is densely branched.

**Minimum generative time (years)?** 1

Most quinoa varieties mature in 3 to 6 months and in some varieties, the plants mature at varying rates.

**Propagules dispersed intentionally by people?** Yes

Some agronomic and breeding work has been undertaken in several European countries, particularly Denmark, the Netherlands and the United Kingdom, where small commercial areas have been grown for several years.

**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)?** Yes

Domesticated agricultural crop. Some agronomic and breeding work has been undertaken in several European countries, particularly Denmark, the Netherlands and the United Kingdom, where small commercial areas have been grown for several years.

**Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)?** Yes

Chenopodium quinoa is not grown widely in the European Union (EU), and there are no reports of the use of quinoa as a feed for livestock. Most quinoa is sold commercially as health food in North America, after removal of the seed coat.

**Propagules dispersed intentionally by people?** Yes

Some agronomic and breeding work has been undertaken in several European countries, particularly Denmark, the Netherlands and the United Kingdom, where small commercial areas have been grown for several years.

**Propagules dispersed as a produce contaminant?** No

Grown as a crop.

**Propagules adapted to wind dispersal?** No

Seeds are generally flattened and lentil-like. The equatorial edge (here called margin) may be rounded, flattened, or grooved. The surface is usually honey combed or smooth. All leaf characteristics refer to primary, well-developed leaves; those often fall early, however, so smaller, upper leaves often are shorter, narrower, and less lobed. [genus-level description]

**Propagules dispersed as a produce contaminant?** No

Once the dry seeds are removed they can be placed into a shallow bowl and swirled around until the large pieces of flowers rise to the top where they are easy to remove. By tipping the bowl you can rake out much of the chaff that is left.

**Propagules water dispersed?** No

Seeds are generally flattened and lentil-like. The equatorial edge (here called margin) may be rounded, flattened, or grooved. The surface is usually honey combed or smooth. All leaf characteristics refer to primary, well-developed leaves; those often fall early, however, so smaller, upper leaves often are shorter, narrower, and less lobed. [genus-level description]

**Propagules bird dispersed?** No

Seeds are generally flattened and lentil-like. The equatorial edge (here called margin) may be rounded, flattened, or grooved. The surface is usually honey combed or smooth. All leaf characteristics refer to primary, well-developed leaves; those often fall early, however, so smaller, upper leaves often are shorter, narrower, and less lobed. [genus-level description]
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"Wild type mechanisms for fruit dispersal and germination dormancy have been lost, fruit size has increased dramatically in grain cultivars and fruit of most cultivars is light colored because of an extreme reduction of the testa." [801]

Chenopodium quinoa seeds can survive in the soil for several years. [802]

"Weed control via herbicides have been effective and several show promise. In England, Metamazide, Propachlor, Linuron, Propyzamide, and aloxium sodium did not significantly reduce plant stands of two quinoa cultivars (Galwey and Risi 1984). In Colorado, preliminary herbicide studies of pre-emerge herbicides with Dual, Furloxe, Sutan, and Antor showed good crop safety and control of grasses and many broadleaf weeds (Westra 1988). Post-emergent control was best for Poast, Tough, and Probe, with Tough and Probe at lower rates (Westra 1988)." [803]

This species has Orthodox seeds - dry to 15-20% eRH and store at -20°C, or as cool as possible. [804]

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Summary of Risk Traits

High Risk / Undesirable Traits
- Chenopodium quinoa is native to tropical/sub-tropical regions and at higher elevations
- Hybridization ability within the species and genus
- Self-compatible (doesn’t require pollinators)
- Congeneric invasive species (several species in this genus are highly invasive)
- Possible herbicide tolerance
- Seed bank longevity is not well-understood at this time
- Partially bred for prolific seed production
- Short life-cycle
- Unclear in the literature if seeds are bird-dispersed
- Probable accidental dispersal from agricultural fields

Low Risk / Desirable Traits
- Limited dispersal ability, perhaps by humans purposefully and accidentally
- Palatable to animals
- Non-toxic to humans and animals
- Requires full sun to thrive