

Jennifer E. Andreas¹, Michael J. Pitcairn², and Paul D. Pratt³

¹Washington State University Extension, ²California Department of Food and Agriculture, ³USDA ARS

SYNONYMS

Broom, broomtops, common broom, European broom, English broom, Irish broom, Scot's broom, *Sarothamnus scoparius* (L.) Wimm. ex W.D.J. Koch

CLASSIFICATION

RANKING	SCIENTIFIC NAME	COMMON NAME
Kingdom	Plantae	Plants
Subkingdom	Tracheobionta	Vascular plants
Superdivision	Spermatophyta	Seed plants
Division	Magnoliophyta	Flowering plants
Class	Magnoliopsida	Dicotyledons
Subclass	Rosidae	
Order	Fabales	
Family	Fabaceae (Leguminosae)	Pea family
Genus	<i>Cytisus</i>	Broom
Species	<i>Cytisus scoparius</i> (L.) Link	Scotch broom

HISTORY AND DISTRIBUTION

Scotch broom is native to Europe. It was introduced to North America in the 1800s (first Virginia and California) as an ornamental, fodder for domestic sheep, and erosion control. It was first reported invasive by 1860. Scotch broom is currently present in 29 U.S. states (Fig. 1) and three Canadian provinces.

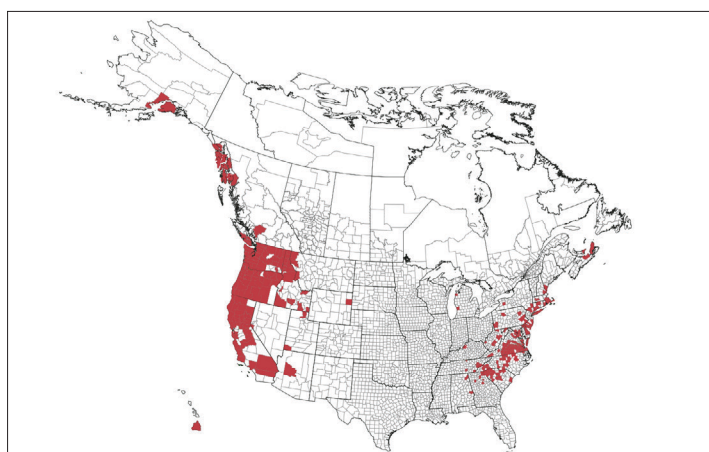


Figure 1. Scotch broom reported distribution in North America (Credit: Andreas et al. 2017; EDDMapS, www.eddmaps.org; USDA PLANTS Database, plants.usda.gov, both accessed 24 August 2022)

IMPACT

Scotch broom competes aggressively with other plants for nutrients, light, and water. It displaces native and/or more desirable species, reducing range, pasture, and commercial forest production. Older growth is unpalatable to grazing animals, and toxic compounds in seeds have resulted in livestock death. Although goats, sheep, and wildlife will browse young growth and flowers, the negative impacts outweigh the positive because dense stands of Scotch broom form impenetrable thickets that block access to water and more desirable forage. The high oil content of Scotch broom foliage and seeds and the large amount of dead growth beneath their canopies make Scotch broom an extreme fire hazard.

IDENTIFICATION

AT A GLANCE

Scotch broom (Fig. 2) is a shrub typically growing 3–10 ft (1–3 m) from a forked taproot. Stems are green, star-shaped in cross section, and hairy when young, but less hairy as the plant ages. Leaves are alternate, divided into three segments, and are deciduous. Flowers are usually yellow, up to 1 in (2½ cm) long, and are characteristic of the pea family with petals forming a banner and keel (similar to a boat). Seed pods can grow up to 3 in (7½ cm) long; they are flattened and have hair on the margins, turning brown at maturity. This plant reproduces only by seed.



Figure 2. Scotch broom plant (Eric Coombs, Oregon Department of Agriculture Bugwood.org, CC BY-3.0 US)

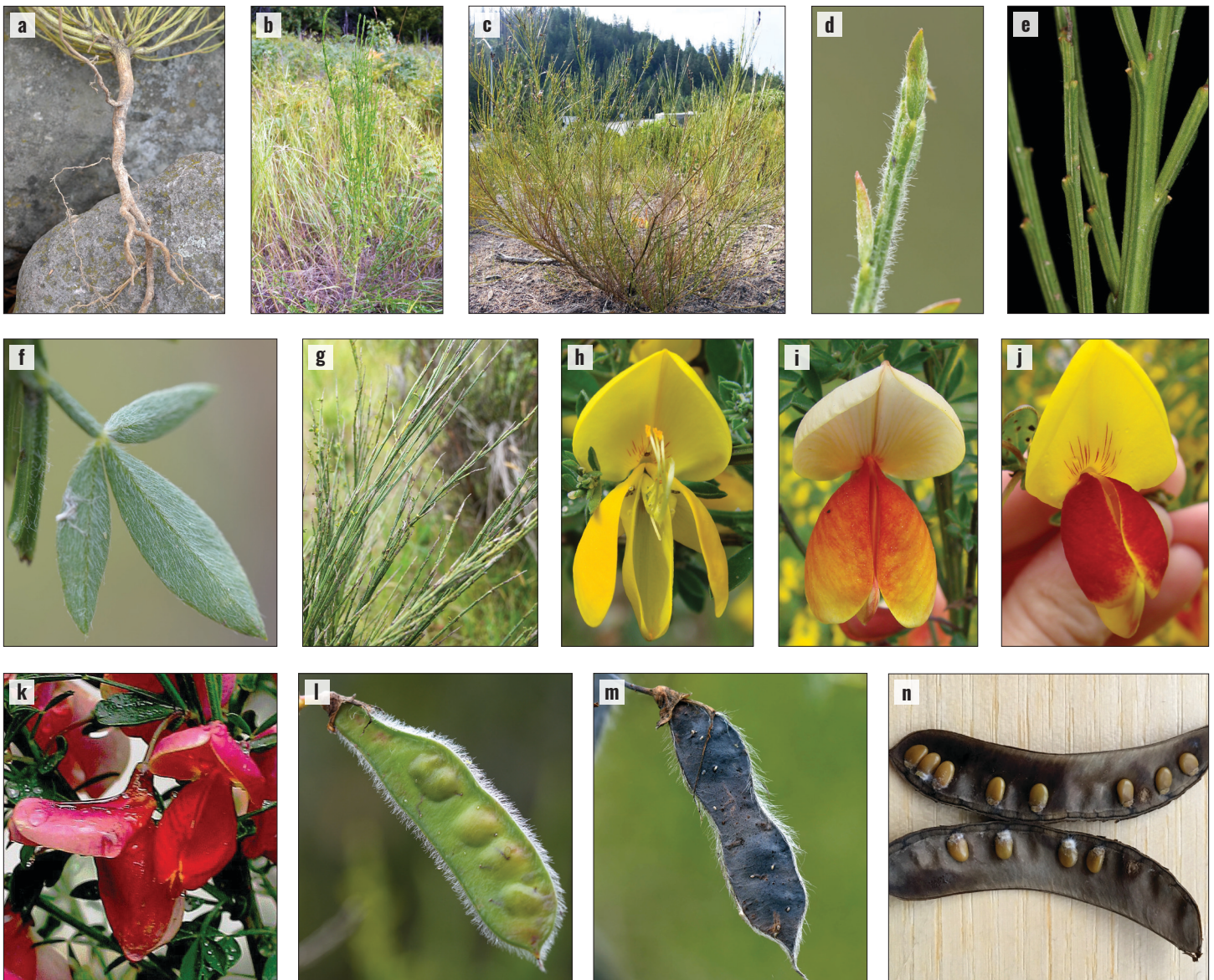


Figure 3. Scotch broom grows (a) forked taproots with multiple branching lateral roots just beneath the soil surface. Plants may grow (b) upright with one main stem in locations with dense vegetation, or (c) produce multiple densely branched stems at more open sites. Stems are (d) hairy when young but become (e) woody, hairless, and 5-angled with maturity. Leaves (f) are 3-parted and hairy on their undersides, but are (g) deciduous; remaining green stems photosynthesize. Flowers are typically yellow (h) but may vary from cream to deep red (i–k). Seed pods are (l) green at first but turn dark brown (m) and are flattened with hairs along the margins. They each produce (n) 3–12 dark brown seeds (a–d, f, g, l, m: Travis McMahon, MIA Consulting; e: Robert Vidéki, Doronicum Kft., Bugwood.org, CC BY-3.0 US; h–j, n: Jennifer Andreas, Washington State University Extension; k: Eric Coombs, Oregon Department of Agriculture, Bugwood.org, CC BY-3.0 US)

Roots

Scotch broom develops a large, forked taproot over 2 ft (60 cm) long (**Fig. 3a**) with multiple branching lateral roots growing shallowly just beneath the soil surface. All roots have numerous nodules that contain nitrogen-fixing bacteria, allowing broom to colonize nutrient-poor soils and outcompete other plant species.

STEMS AND LEAVES

Plants may grow prostrate or erect. Prostrate plants typically occur in exposed, windy locations. Erect plants grow 3–10 ft (1–3 m) tall and are often as wide as they are tall (**Fig. 2**). When growing in locations with dense vegetation or shade,

Scotch broom produces a single main stem (**Fig. 3b**); at more open sites, it produces multiple densely branched stems (**Fig. 3c**). Stems of young plants are hairy (**Fig. 3d**). As the plants age, stems become woody, hairless, and 5-angled or star-shaped in cross section (**Fig. 3e**). All stems are green and used in photosynthesis. Leaves appear in early spring and are small, alternate, and divided into three leaflets; however, upper stem leaves are sometimes simple (undivided). Each leaflet is elliptical and $\frac{1}{3}$ – $\frac{2}{3}$ in (5–20 mm) long. The bottom sides of leaflets are often fuzzy with short hairs (**Fig. 3f**). Leaves are deciduous early in the growing season and in times of stress. When leaves fall from the plant, the remaining bare green plant stems are the primary source of photosynthesis (**Fig. 3g**).

FLOWERS

Flowers occur either singly or in clusters of two in leaf axils or in numerous clusters on the ends of older branches. Flowers are usually yellow (**Fig. 3h**) but may occasionally be off-white to red (**Fig. 3i-k**). They are $\frac{1}{2}$ –1 in (1–2 $\frac{1}{2}$ cm) long and are characteristic of the pea family with petals forming a banner and keel, similar to a boat (**Fig. 3h**).

FRUITS AND SEEDS

Seed pods (legumes) are green when young (**Fig. 3l**) but turn dark brown with age. They are flattened with hairs along the margins (**Fig. 3m**). Seed pods grow 1–2 $\frac{1}{2}$ in (2 $\frac{1}{2}$ –7 cm) long and $\frac{1}{8}$ – $\frac{1}{2}$ in (8–13 mm) wide, and each contains 3–12 seeds. The oval seeds are up to $\frac{1}{8}$ in (3–4 mm) long, hard, smooth, and brown (**Fig. 3n**). A mature plant can produce up to 15,000 seeds annually.

ECOLOGY

Scotch broom spreads only by seed, but it can also regenerate from the root crown if the stem is damaged. Most seeds germinate in spring or early summer. Germination rates are highest after seed scarification, in moist soil, and in open, disturbed soils with limited competing vegetation. Seedlings are sensitive to shading from other plants and survive better in areas with little competition for light. Scotch broom leaves are deciduous early in the growing season and after stress,

leaving the bare green plant stems as the sole source for photosynthesis. Plants begin flowering at 18 months to three years of age and continue to grow for up to 30 years, though most plants only live for 15 years. Flowering usually occurs in early spring, although an occasional plant may bloom throughout the year. When seed pods mature, they dry out and burst open with an audible popping sound (called dehiscing). This action helps scatter seeds short distances, though most fall within 3.2 ft (1 m) of the parent plant. Seeds are transported by insects, birds, humans, other animals, waterways, and vehicles/equipment. Due to their thick seed coats, seeds can remain viable in the soil for up to 30 years.

HABITAT

Dense Scotch broom infestations can be found in a variety of habitat types and plant communities, including timber clear-cuts, hillsides, pastures, roadsides, river banks, dry river beds, chaparral, grasslands, degraded coastal dunes, forest edges, and fallow fields (**Fig. 4a-d**). Scotch broom seedling establishment is facilitated by soil disturbance, and plants regularly invade areas that have been logged, flooded, or burned. The weed does best in cool, temperate regions, but is able to survive Mediterranean climates if summer droughts are not extensive. Scotch broom performs best in sandy, well-drained, dry to semi-moist soils with low fertility and in areas without significant competing vegetation. Severe

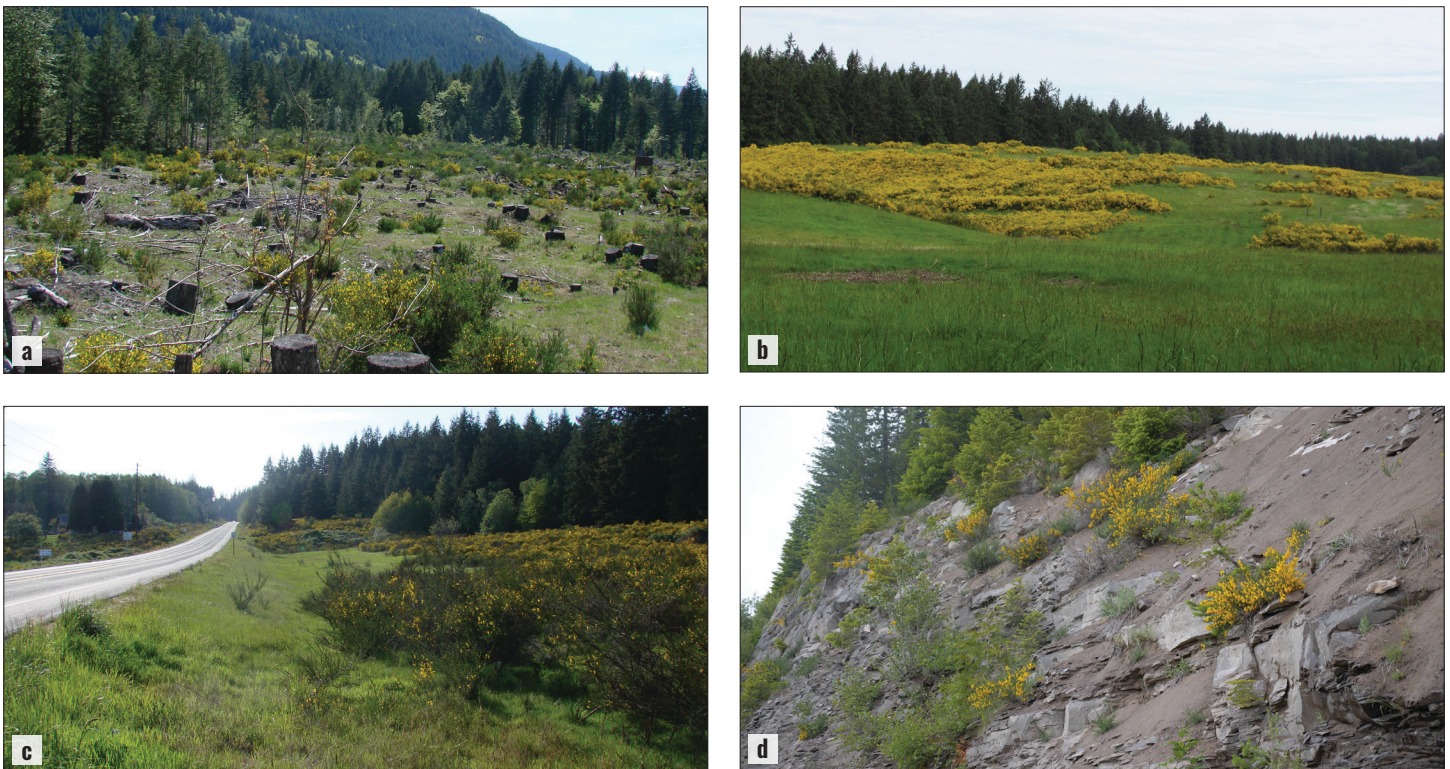


Figure 4. Scotch broom infestations: (a) in a logging clear cut; (b) in a pasture; (c) on a roadside/forest edge; (d) on an open, eroded hillside (a–c: Jennifer Andreas, Washington State University Extension; d: Travis McMahon, MIA Consulting)
















winter temperatures, extensive summer drought, and heavy shading limit its distribution.

SIMILAR SPECIES

Several species present in North America have yellow, pea-like flowers similar to Scotch broom, including native goldenbanners (*Thermopsis* spp.) and exotic birdsfoot trefoil

(*Lotus corniculatus*), which all may be mistaken for young Scotch broom. Goldenbanners, birdsfoot trefoil, and most other potential look-alikes are not shrubs so can be readily differentiated. The exotic gorse (*Ulex europaeus*) resembles Scotch broom with its similar shrub habit, yellow pea-like flowers, legume fruit, and green stems. Gorse differs in that mature plants are covered with sharp spines rather than

Table 1. Key traits for differentiating Scotch broom from similar related broom species and gorse. All species listed below are also exotic and weedy in North America.

SPECIES	SIMILARITIES	DIFFERENCES	PLANT	FLOWER	SEED PODS
Bridal veil broom <i>Retama monosperma</i> Fabaceae	Similar height and habitat; leaves hairy on undersides, deciduous; stems slender, green; flowers with banner and keel	Often drier conditions; leaves single, hairy above and below; stems drooping; flowers white, ½ in (1¼ cm), clusters 2–20 along stems; flowering occurs early summer; seed pods circular, up to ½ in diameter (1¼ cm), inflated, smooth			
French broom <i>Genista monspessulana</i> Fabaceae	Similar height and habitat; leaves 3-parted, hairy on undersides; young stems slender, green, ridged; flowers yellow, with banner and keel; seed pods linear	Often found in soil with higher pH; leaves hairy above and below, on plant year-round; mature stems round; flowers ≤½ in (1¼ cm), bloom into summer, clusters at branch ends; seed pods ≤1 in (2½ cm) long, covered in dense hair			
Portuguese broom <i>Cytisus striatus</i> Fabaceae	Similar height and habitat; leaves 3-parted, smooth above, hairy below, deciduous early; young stems slender, green; mature stems woody; flowers yellow, similar size, with banner and keel, in clusters of 1–2 in leaf axils; seed pods linear	Some leaves single, smaller; flowers paler yellow, bloom into summer; seed pods ≤1½ in (4 cm) long, inflated, covered in dense hair			
Spanish broom <i>Spartium junceum</i> Fabaceae	Similar habitat; leaves deciduous early; young stems slender, green; mature stems woody; flowers yellow, similar size, with banner and keel; seed pods linear	Often drier conditions; plant up to 15 ft (4½ m) tall; leaves single, oval, smooth-margined; young and mature stems smooth and round in cross section; several flowers clustered at branch ends; flower keel pointed; seed pods up to 4 in (10 cm) long, only slightly flattened, covered in dense hair			
Gorse <i>Ulex europaeus</i> Fabaceae	Similar habitat; young leaves 3-parted; young stems green, hairy; mature stems woody, hairless; flowers yellow, similar size and location, with banner and keel produced in early spring; seed pods linear	Plant up to 13 ft (4 m) tall; young leaflets smaller; mature leaves reduced to spines 1¾–2½ in (4½–6½ cm), ending in yellow point; spines on plant year-round; young stems soft; mature stems terminate in spine; seed pods ½–¾ in (1¼–2 cm) long, inflated, covered in dense hair			

Photos: bridal veil broom plant, leaves (Javier Martin, Wikipedia.org CCO), seed pods (František Pleva, iNaturalist.org, CC BY-NC 4.0); French broom plant (Philipp Weigell, Wikipedia.org CC BY-3.0), flowers (Calibas, Wikipedia.org CC BY-SA 4.0), seed pods (A. Barra, Wikipedia.org CC BY-3.0); Portuguese broom plant, flowers (Teknikdma, iNaturalist.org CC BY-NC-ND 4.0), seed pods (Andyjones1, iNaturalist.org CC BY-NC 4.0); Spanish broom plant, flowers (Jennifer Andreas, Washington State University Extension), seed pod (Travis McMahon, MIA Consulting); gorse plant, seed pods (Forest and Kim Starr, Starr Environmental CC BY 4.0), flowers (Jennifer Andreas, Washington State University Extension)

leaves. It is other exotic broom species that most closely resemble Scotch broom. **Table 1** lists key characteristics useful for differentiating these species from Scotch broom and each other.

REFERENCES

- Andreas, J. 2016. Pest Watch: Biological Control of Scotch Broom, FS203E. Washington State University Extension. 6 pp.
- Andreas, J.E., R.L. Winston, E.M. Coombs, T.W. Miller, M.J. Pitcairn, C.B. Randall, S. Turner, and W. Williams. 2017. Biology and Biological Control of Scotch Broom and Gorse. FHTET-2017-01. USDA Forest Service, Forest Health Technology Enterprise Team, Morgantown, West Virginia.
- DiTomaso, J.M. 1998. The biology and ecology of brooms and gorse. *Proceedings, California Weed Science Society*. 50: 142–148.
- DiTomaso, J.M., G.B. Kyser et al. 2013. Weed Control in Natural Areas in the Western United States. Weed Research and Information Center, University of California. 544 pp.
- Mack, R.N. 2003. Plant naturalizations and invasions in the eastern United States: 1634–1860. *Annals of the Missouri Botanical Garden* 90(1): 77–90.
- Peterson, D.J. and R. Prasad. 1998. The biology of Canadian weeds. 109. *Cytisus scoparius* (L.) Link. *Canadian Journal of Plant Science* 78(3): 497–504.
- Waloff, N. 1966. Scotch broom (*Sarothamnus scoparius* (L.) Wimmer) and its insect fauna introduced into the Pacific Northwest of America. *Journal of Applied Ecology* 3: 293–311.
- Zouhar, K. 2005. *Cytisus scoparius*, *C. striatus*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <https://www.fs.fed.us/database/feis/plants/shrub/cytspp/all.html>.

ACKNOWLEDGMENTS

The authors thank two anonymous reviewers for providing helpful comments on earlier versions of this publication. This fact sheet was produced by the North American Invasive Species Management Association (NAISMA) with financial support from USDA Forest Service. The layout was designed by Rachel Winston, MIA Consulting.

NAISMA is a network of professionals challenged by invasive species: land managers, water resource managers, state, regional, and federal agency directors and staff, researchers, and nonprofit organizations. NAISMA's members are a diverse group of individuals and organizations who are involved in implementing invasive species management programs at all scales. Our mission is to support, promote, and empower invasive species prevention and management in North America. Our vision is to have North America's lands and waters protected from invasive species. NAISMA's programs aim to provide the support, training, and standards needed by the professional invasive species management community.

SUGGESTED CITATION

Andreas, J.E., M.J. Pitcairn, and P.D. Pratt. 2022. Scotch Broom (*Cytisus scoparius*): History and Ecology in North America. In: R.L. Winston, Ed. *Biological Control of Weeds in North America*. North American Invasive Species Management Association, Milwaukee, WI. NAISMA-BCW-2022-7-SCOTCH BROOM-P.

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.