



Barley

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Barley (*Hordeum vulgare*) is a fast growing, cool season, annual grain crop that can be used as a forage or as a cover crop to improve soil quality. This Old World plant has many valuable features. Barley seed is readily available and is relatively cheap. The plant has a deep, fibrous root system, a desirable feature for erosion control and soil quality improvement. Barley quickly produces large volumes of biomass for improving the soil organic matter content. It provides weed and insect suppression by helping to break pest life cycles. Barley is drought tolerant and can be used in rain-fed agriculture. It is best used in Hawaii in cooler, drier areas at elevations above 1500 ft.

Crop characteristics

Barley reaches 24–48 inches (60–120 cm) in height. It has alternate leaves about 10 inches (25 cm) long. Barley's flower spikes are notched on opposite sides, with three spikelets at each notch, each spikelet containing a small, individual flower, or floret, that develops a kernel. Barley roots reach a depth of as much as 6–7 ft (1.8–2.1 m) in deep soils.

Environmental requirements

Barley can be grown on many soil types including well drained, fertile loams and lighter clay soils. It tolerates loamy to heavy soils but will not do well in waterlogged soils. It has very good heat and drought tolerance, making it a valuable plant for semiarid areas. Barley is also the most salt-tolerant among cereal crops. It grows at soil pH between 5.0 and 8.3. It thrives in cool, dry conditions. In Hawaii, barley grows year-round at elevations above 1500 ft. At lower elevations, planting should be limited to the fall-winter season, according to the USDA Natural Resources Conservation Service (NRCS).

Benefits provided by barley

EXCELLENT for erosion control by providing a lasting crop residue

VERY GOOD for taking up and storing excess nitrogen, increasing organic matter and improving soil structure, and suppressing weed growth

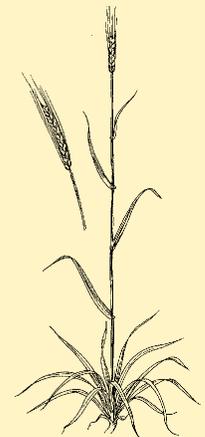
GOOD for attracting beneficial insects

TOLERATES heat, moderate drought, and saline soils

GOOD feed source for all classes of livestock, offering good production, nutritional quality, and palatability

SUITABLE for cool seasons, higher elevations, winter production at low elevation sites

USE IN annual production systems with vegetables, herbs, cut flowers and ornamentals, dryland taro



Cultivars

Cover crop variety trials conducted by CTAHR researchers on Hawaii, Molokai, and Lanai identified the 'Wysor' variety as promising in terms of vigor, rapid cover establishment, weed suppression, low plant height, and lack of flowering. The variety 'Solon' is popular in California for its drought tolerance.

Establishment

Seeding rate

Drill at 50–100 lb/acre pure live seed (1–2 bu/acre). Broadcast at 80–125 lb/acre pure live seed (1.6–2.5 bu/acre). The Hawaii NRCS recommends a minimum seed planting rate of 70 lb/acre.

Seeding methods

Broadcast and disk over, or drill to a depth of $\frac{3}{4}$ –2 inches. Barley does not self-reseed very well, which is an advantage when it is used as a cover crop in rotations. Barley can be mown and irrigated to postpone flowering.

Uses

Soil improvement

Barley produces about 1 ton/acre of dry matter and takes up about 18 lb of N per ton of dry matter (NRCS). Summer fresh weight biomass barley yields at low elevation in Waimanalo were about 4300 lb/acre at 2 months after planting with plants mown when 10 inches tall. The tissue N content is about 1.2%. For optimal decomposition of barley residues, apply 20 lb N per ton of dry matter at plow-down. The addition of this nitrogen fertilizer will promote microbial decomposition of the crop residues and will also prevent the decomposing plant material from tying up soil N needed by the following crop. Alternatively, plant a mixed cover crop stand of barley and a legume to minimize any potential problems of N immobilization after cover crop plow-down. To allow time for residue decomposition, allow 2–3 weeks after cover crop incorporation before planting the cash crop.

Barley is useful as a reservoir of nutrients for the following crop in rotations. Barley's extensive root system also helps to minimize leaching of nitrates into aquifers, improving watershed water quality. The N taken up by the plant will become available for the following crop, resulting in less fertilizer costs for the farmer.

Incorporating barley into the soil also improves soil "health" by improving soil structure, enhancing soil tilth and water infiltration. Although its roots can reach as far as 6 ft down, most farmers will see soil improvement in the top soil layer. The organic matter additions, as the residues decompose, will also encourage the formation of a rich, beneficial microbial soil "food web."

Indicator crop

Barley is commonly used as a cover crop to protect the soil in plantings of vegetables such as carrot, cucumber, and onion. Barley can also be used as an indicator of growth problems that may affect other crops in the rotation. While a uniform growth of barley is a positive sign, uneven growth, or spots in the field where the growth is abnormal, is an indication that part of the field may be suffering from compaction, a pH problem, or a nutrient imbalance.

Weed control

A fast growing cover crop such as barley provides nonchemical weed suppression. Barley will shade and smother weeds, or outcompete them for soil moisture and nutrients. In addition, barley has an allelopathic effect on weed germination; that is, its roots release compounds that suppress the growth of other plants.

Attract beneficial insects

Some studies report that barley can reduce the incidence of leafhoppers, aphids, armyworms, and other pests in the agroecosystem by harboring populations of beneficial insects.

Pest problems

Cutworms and other pests of small grains can attack barley. It is prone to fungal disease when seeded in cold, damp soils. If soil moisture is adequate for germination, shallow seeding can help reduce incidence of root rot. Whenever possible, select disease-resistant cultivars. Barley is a host for the root-knot nematode *Meloidogyne javanica*. Thus, avoid growing barley in fields infested with this nematode species. However, barley is not a host for *M. hapla* and *M. chitwood*, making it an effective rotation crop in fields where these nematode species attack the cash crop.

For assistance:

Contact your nearest Cooperative Extension Service office for additional assistance in selecting appropriate cover crops and green manures for your farm and cropping situation. Help can also be obtained from the USDA Natural Resources Conservation Service field offices located on each island.

Visit CTAHR's Sustainable Agriculture for Hawaii Program Website at <<http://www.ctahr.hawaii.edu/sustainag>> to find additional information about green manure and cover crops. The site also includes references and links to other useful on-line resources.

**Sustainable Agriculture in Hawaii . . .**

. . . integrates three main goals—environmental health, economic profitability, and social and economic equity. Sustainable farms differ from conventional ones in that they rely more on management practices such as crop diversification and crop rotation, agroforestry, integrated pest management, rotational grazing, and innovative marketing strategies. For further information on Sustainable Agriculture in Hawaii, contact:

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