



Buckwheat

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Buckwheat (*Fagopyrum esculentum*) is a moisture loving, cool climate, annual grain with many potentials for use in sustainable tropical cropping systems. Buckwheat has been grown as a grain crop in China for over 1000 years. It is one of the quickest growing green manures crops, taking only 4–5 weeks from seeding to flowering. It is used to suppress weeds, protect the soil from erosion, attract beneficial insects, and build soil organic matter. Buckwheat can also increase phosphorus and micronutrient availability in the root zone for the following cash crop in a rotation.

Characteristics

Buckwheat is a broadleaf, annual crop that reaches 2–5 ft (60–150 cm) in height. It has a single, succulent stem with several branches. Its flowers vary from white or light green to pink or red. It forms a dense, fibrous root system with a deep taproot. Most of its roots are concentrated in the top 10 inches of the soil.

Environmental requirements

Buckwheat grows on a wide variety of soil types, including infertile and acidic soils (pH 4–6). It does not do well in compacted, dry, or excessively wet soils. Buckwheat thrives in cool, moist climates. It often wilts during the hottest part of the day, but it quickly recovers in the damp evening air. In Hawaii, buckwheat grows year-round at elevations ranging from sea level to 4000 ft, according to the UDSA Natural Resources Conservation Service (NRCS). The plant is not tolerant of shade.

Benefits provided by buckwheat

EXCELLENT for suppressing weeds because of its quick growth and establishment

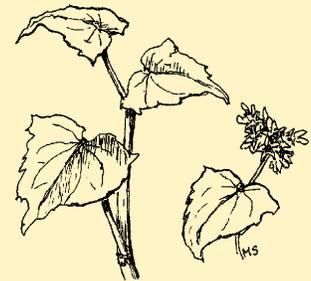
EXCELLENT for attracting beneficial insects

GOOD for increasing soil organic matter content and improving soil structure

TOLERATES acidic and low fertility soils.

USEFUL to increase phosphorus availability in the soil

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



Cultivars

Buckwheat cultivars recommended by the Hawaii NRCS include 'Japanese' and 'Common'.

Establishment

A sowing rate of 60–135 lb/acre (65–150 kg/ha) pure live seed is recommended.

The seed can be broadcast or drilled. Drilling requires less seed and produces a more uniform stand. The higher seeding rates should be used when the seed is broadcast. For best results, seed into a weed-free, well prepared field. After seeding, irrigate as necessary to establish the crop. Seedlings emerge 3–5 days after sowing.

Broadcast seed can be incorporated by raking, rolling, or light disking. Care should be taken to cover the seed with soil but not to bury the seed too deeply.

Drill seeds $\frac{1}{2}$ –1 inch deep. Shallower depths are preferred if the soil is moist and loose. Seeds may also be drilled into existing residue or into a killed sod, but good contact of the seed with the soil is important.

Uses

Weed control

A fast growing cover crop such as buckwheat is most useful for reduced-chemical or nonchemical weed suppression. Buckwheat will shade and smother weeds or outcompete them for soil moisture and nutrients.

Both living buckwheat plants and buckwheat residues have an allelopathic effect on weed germination. Allelopathy means that buckwheat contains compounds that suppress the growth of other plants. The best way to take advantage of allelopathy is to cut or mow buckwheat at flowering, managing it as a mulch instead of incorporating it into the soil. Research shows that the allelopathic effects of buckwheat can last about 30–60 days.

In Hawaii, evaluation trials showed that a buckwheat cover crop effectively suppressed spiny amaranth (*Amaranthus spinosus*) and narrowleaved plantain (*Plantago lanceolata*), two troublesome weeds for farmers.

To suppress weeds, a cover crop of buckwheat should be planted 30–50 days before planting the cash crop. Two consecutive plantings of buckwheat will have a greater effect on weeds than a single planting. One week after flowering, buckwheat can be cut or mowed, and crops can be directly planted into the buckwheat mulch. If tillage is necessary, buckwheat can be mowed and strips tilled for crop planting.

To prevent buckwheat from becoming a weed in the following crop, kill it within 7–10 days after flowering begins, before the first seeds harden and turn brown. However, buckwheat does not re-seed very well.

Buckwheat can also be used effectively as a nurse crop, planted before or along with a slower growing cover crop, such as a legume. Buckwheat's rapid establishment will smother weed growth, and it will then die back as the legume cover crop becomes established.

Soil improvement

Buckwheat produces about 1.5 tons/acre dry matter and takes up about 18 lb of nitrogen (N) per ton of dry matter (NRCS). Buckwheat has a tissue content of about 1.2% N. Buckwheat is often called a phosphorus (P) "scavenger" because it can take up soil P more efficiently than other plants. In its growing stage, the roots of buckwheat exude substances that help to solubilize P that may otherwise be unavailable to plants. The roots of buckwheat were also found to have a high storage capacity for inorganic P. As a result, when buckwheat plants are incorporated in the soil, they decay quickly, making phosphorus and other nutrients available to the succeeding crop.

Incorporating buckwheat into the soil improves soil "health" by enhancing the soil structure of the topsoil, making it more friable, improving its tilth, and increasing the water infiltration rate. However, unlike some other green manures (such as sorghum-sudangrass), buckwheat's root system is not very effective in loosening subsoil hardpans. Most benefits from the use of buckwheat will be observed in the topsoil layer. The incorporation of organic matter in its residues also encourages the formation of a beneficial microbial soil "food web."

Attracting beneficial insects

Flowering buckwheat provides a food source for beneficial insects such as hover flies, predatory wasps, minute pirate bugs, insidious flower bugs, tachinid flies, and lady beetles. These insects are predators of common insect pests and can help reduce their populations. To provide a beneficial insect habitat, allow buckwheat to flower for at least 20 days to allow beneficials such as minute pirate bugs to breed a next generation. Buckwheat may also be grown in strips, windbreaks, or patches when used as an insectary crop.

On Molokai, buckwheat has been observed to reduce damage by wireworm (click beetle larva) to sweet potatoes.

Management cautions

Buckwheat should be incorporated in the soil 7–10 days after flowering. Do not allow it to set seed—it can reseed and become a weed problem if not incorporated into the soil before seed set. Planting from spring to fall is recommended in Hawaii; planting during the short days of winter may result in premature flowering and little top growth.

Pest problems

Buckwheat is relatively free of serious insect and disease problems. Some of the more common problems include leaf spot caused by the fungus *Ramularia* and a *Rhizoctonia* root rot. On occasion, buckwheat can be attacked by aphids, birds, and rodents. Buckwheat can harbor particularly high numbers of root lesion nematodes (*Pratylenchus penetrans*) and is susceptible to root-knot nematodes, according to NRCS. To minimize nematode problems in a following cash crop, do not grow buckwheat in fields when these nematodes are present.

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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