



HAWAII COOPERATIVE EXTENSION SERVICE

College of Tropical Agriculture and Human Resources

University of Hawaii

GENERAL HOME GARDEN SERIES No. 39

CARE FOR YOUR GARDEN--USE GREEN MANURE AND COVER CROPS

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Soils require organic matter to improve physical condition, increase water infiltration and retention, improve soil tilth, decrease erosion loss, permit easier penetration by plant roots, increase activity of soil microorganisms, and supply plant nutrients. Organic matter may be added to the soil by using composts or waste organic products, turning under organic mulches after use, turning under crop residues, and using green manure and cover crops, which are soil-building crops.

What Are Green Manure and Cover Crops?

Green manure and cover crops are grown to supply additional organic matter and to protect the soil from erosion. Green manure crops are grown to be plowed under, into the soil, while they are still green and succulent. This promotes more rapid decomposition in the soil and reduces the tie-up of plant nutrients during the decomposition process.

Cover crops are grown to protect the soil surface from raindrops and wind, which loosen the soil and promote erosion, and to reduce water runoff. Both green manure and cover crops are grown during the period when vegetable crops do not occupy the soil. The difference between these two types of crops is indistinct, as green manure crops also protect the soil from erosion during their growing period. Cover crops add organic matter to the soil when they are plowed down. Both are soil-building crops.

Which Crops May Be Used?

Both legumes and nonlegumes may be used as green manure and cover crops.¹ They should germinate and grow rapidly to protect soil from erosion and provide a maximum amount of organic matter.

Legumes, such as sunn hemp,² fix nitrogen from the air and add it to the soil for the use of later crops. The legume seeds should be inoculated with the proper strain of *Rhizobium* bacteria to improve their ability to fix nitrogen from the air. Legumes supply the needed nitrogen and prevent nitrogen

stress in the following crop. When green, immature plants are turned under, they decompose more quickly and release nitrogen sooner than a mature plant would.

Nonlegumes, such as annual ryegrass, do not fix the nitrogen; they require the addition of nitrogen fertilizers to increase their rate of growth and to produce adequate organic matter. When nonlegumes are plowed into the soil, the soil microorganisms will temporarily tie up 25 to 30 pounds of nitrogen per ton of dry matter added to the soil. Thus, nitrogen should be added at the time the material is plowed under. This hastens decomposition, lessens nitrogen tie-up, and prevents the stress of early nitrogen deficiency on the following vegetable crop.

Legumes and nonlegumes may be mixed; e.g., sunn hemp may be mixed with annual ryegrass. This reduces the nitrogen requirement of the nonlegume and results in an excellent green manure or cover crop.

How Are the Crops Started?

Fertilizers should be applied and pH adjusted, if necessary, before the green manure and cover crops are planted, except for the additional nitrogen needed for the decomposition of nonlegumes. This should be applied when the crop is plowed down.

Seed should be broadcast over a weed-free, well-prepared seedbed, and covered lightly. Seedbed preparation should be the same as for vegetables. The amount of seed you should use depends on the purity of the seed and its germination percentage.

Irrigate as necessary to establish and maintain the crop.

Fertilize according to the soil, crop, and cropping history of the garden. Have the soil tested and follow the recommendations for rapid establishment. Fertilize as needed to maintain a vigorous cover that can compete favorably with weeds.

Green manure and cover crops will release their plant nutrients gradually to the vegetable crops as they decompose. The additional nitrogen necessary to decompose

the nonlegumes becomes part of the nitrogen available to the following vegetable crop.

How Are the Crops Managed?

Plow down green manure crops while they are still immature: at the bud or early bloom stage for legumes, and when the seedhead first begins to emerge from stems of grasses (or before) for nonlegumes. If the crop is tall, mow before plowing under. The soil moisture should be favorable for cultivation, neither too wet nor too dry. Irrigate as necessary, especially during periods of low rainfall.

Control weeds and undesirable growth by cultivating, using herbicides, or weeding by

hand. If weeds are given a chance to form seeds, these will cause problems later.

Use the green manure or cover crop after each cycle of the garden, or at least once during the year, to help maintain adequate organic matter and good conditions for growth.

Where Can One Get Help?

Your county agricultural extension agent or the local district conservationist of the USDA Soil Conservation Service can help you get seeds and legume inoculants. They can also help you plan and manage your green manure and cover crops.

¹For a list of specific crops suitable for green manure and cover crops, see General Home Garden Series No. 40, "Care for Your Garden--Use Plants Suitable for Windbreaks, Green Manure, and Cover Crops."

²Available at the Horticulture Department Seed Laboratory, Room 112, St. John Plant Science Building, 3190 Maile Way, Honolulu, HI 96822.