

Green Manure and Cover Crops

FOR IRRIGATED LAND



EXTENSION SERVICE

STATE COLLEGE OF WASHINGTON

Pullman, Washington

Green Manure and Cover Crops For Irrigated Land

by K. J. Morrison, Frank G. Viets, Jr., and C. E. Nelson¹

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¹ Extension Agronomy Specialist; and Soil Scientist and Agronomist, respectively, Soil and Water Conservation Research Branch, Agricultural Research Service, U.S. Department of Agriculture.

Our cover shows: Plowing under a crop of hairy vetch for green manure to add nitrogen and organic matter to the soil.

Photo Courtesy U.S. Bureau of Reclamation

Green manure and cover crops are musts on new land in the Columbia Basin. In well-planned rotations, green manure crops control wind and water erosion and maintain organic matter and soil fertility. Cover crops help control wind erosion when the soil is ordinarily unprotected—after harvest or during the winter and early spring. Crops following legume green manure crops need less fertilizer than when they follow nonlegume green manure crops.

Green manure and cover crops must be handled properly to return top benefits. This means: 1. select the right crop for your conditions; 2. use fertilizer if needed; 3. inoculate legumes; 4. seed at the right time.

The following crops are recommended as a result of research in the area.

Alfalfa is one of the best crops for improving the physical condition of your soil and adding nitrogen. Plow under a good hay crop to obtain the most benefit from alfalfa as a green manure crop. Turning under regrowth after harvesting two years' crops of alfalfa hay is as good as turning it under after three or four years. About one-half the nitrogen required by corn is furnished by a two-year-old stand of alfalfa.

Wireworms infest potatoes or sugar beets less if those crops follow alfalfa in the rotation than if they follow sweet clover. If you follow alfalfa with sugar beets, plow under a good crop of hay in the fall. Plowing alfalfa stands in the spring does not leave enough time for top growth and for you to prepare the land for sugar beets after plowing. Alfalfa may be plowed under in the spring before planting corn. It has more time to grow before plowing under, if you plant late potatoes in June.

Irrigate alfalfa before plowing it under in the spring or fall. This helps decompose the green manure and makes the soil easier to work. If you delay seeding after you plow under the green manure crop, irrigate again before you prepare the seedbed.

Ranger is the alfalfa recommended for the Columbia Basin.

Hairy vetch is a winter annual. Seed hairy vetch between August 15 and September 15. Use 30 to 35 pounds of seed per acre. Early seeding makes more growth to plow under than late seeding and makes more nitrogen available to the crops that follow.

Hairy vetch must grow until at least May 1 if you expect it to pay for its production. Any growth after this date is profit, because vetch fixes nitrogen rapidly. Hairy vetch is superior to Austrian winter peas, wheat, or rye or a combination of these, because it makes more nitrogen available. Irrigate the crop before plowing. Be sure moisture is adequate before seeding. These are necessary to prevent temporary reduced growth from turning under the green manure crop.

Sweet clover should be used on new land only. Madrid, a yellow blossom biennial, is the only sweet clover recommended for green manure in the Columbia Basin. Hubam, an annual sweet clover, is not recommended. Do not use sweet clover in legume seed-producing areas because volunteer plants from hard seed will contaminate the seed fields.

Broadcast sweet clover, 15 pounds per acre, when spring wheat is about 8 inches high. Early seeded clover in wheat often grows as tall as the wheat, preventing direct combining. If sweet clover and wheat are seeded at the same time it is necessary to mow and windrow the crop when the wheat matures and to use a "pickup" attachment on the combine. After wheat is harvested, sweet clover can be seeded in the stubble.

It is too late in the spring for planting most crops if sweet clover is plowed under at the proper time. Sweet clover should be plowed under when 18 to 24 inches tall. Its nitrogen content decreases if it is plowed under later than this stage but the organic matter increases. Sweet clover more than 24 inches tall is very difficult to turn under and prevents the preparation of a good seedbed.

Disease and insects can be problems on crops following sweet clover on older lands. Wireworms can be serious in potatoes following sweet clover on new land. It is safer to use other crops such as hairy vetch for cover and green manure crops on irrigated land.

Austrian winter peas are winter annual legumes not sufficiently winter hardy to be generally recommended. The peas do not produce as much nitrogen or top growth as hairy vetch.

If you plant Austrian winter peas, seed at the rate of 70 pounds per acre.

Winter cereals, such as winter wheat or rye, should be used as cover crops on land seeded after October 1. In late summer or early fall following row crops, cereals give quick protection to sandy soils where wind erosion is a problem. Wheat or rye plowed under furnish only about 20 pounds of nitrogen per acre. About 40 pounds of nitrogen should be used to establish the crop for quick cover.

Brevor and Elmar are the only two winter wheat varieties recommended.

Rye should be used only in rotation with row crops. Other cereal crops will be graded down on the market if they contain rye. Abruzzi is the recommended rye variety. It should be seeded at 60 to 90 pounds per acre.

Sudan grass is a summer annual that can be used as a cover or green manure crop. Sudan grass should be used only when water arrives on the land in midsummer. Apply 30 to 40 pounds of available nitrogen per acre



Photo Courtesy U.S. Bureau of Reclamation

Rye crop planted on land prepared too late for cropping. This prevents blowing during fall and winter and adds organic matter to the soil.

before seeding. Nonlegumes that follow a Sudan green manure crop should receive about 40 pounds more nitrogen than the usually recommended rate.

Sudan should be mowed before seed set or frost and plowed under in the spring. Seed Sudan grass at the rate of 30 to 40 pounds per acre.

Soybeans are summer annual legumes that grow best in midsummer. They make good growth but have a low nitrogen percentage. Weeds are a problem if soybeans are seeded in solid stands. Row seedings must be cultivated to control weeds. Soybeans are not recommended as a green manure or cover crop for Washington.

A large number of crops not grown in the Columbia Basin have been tested in the area. They have been rejected because they lacked sufficient growth or were not winter hardy. Crops that have been unsuccessful are sesbania, guar, Korean lespedeza, crimson clover, Willamette vetch, common vetch, and purple vetch.

Typical Yields and Nitrogen Content of Tops of Green Manure Crops Grown in the Columbia Basin*

Green manure crop	Dry weight	Nitrogen content
	pounds per acre	pounds per acre
Rye	2,740	22
Sudan grass†	3,780	25
Hairy vetch and rye	4,220	69
Austrian winter peas and rye	3,100	30
Austrian winter peas	2,650	84
Hairy vetch	4,750	160
Sweet clover	2,820	87

* From Agricultural Experiment Stations Bulletin 520, *Soil, Water, and Crop Management Investigations in the Columbia Basin*, Washington Agricultural Experiment Stations. November 1950.

† Sudan grass grown with 40 pounds nitrogen per acre.

The table shown above gives the dry weight and nitrogen in tops of green manure and cover crops.

A number of the crops listed will return good yields of organic residue and give adequate soil protection if properly handled. Legumes produce nitrogen and save you the cost of buying nitrogen for the crops following in the rotation.

Sudan grass and soybeans are not practical because the land is not available for crop production while the green manure crop is being produced.

Your county Extension agent can give you further information on cover and green manure crops.