

Cover Crop Species and Mixtures

Potential Benefits

- Build soil organic matter
- Reduce soil erosion
- Enhance nitrogen cycling/reduce nitrate losses
- Suppress weeds
- Reduce disease inoculum

Potential Drawbacks

- Heavy residue – wet/delayed planting
- Heavy residue – slow growth of next crop
- Tie up nitrogen
- Become weeds
- Increase disease inoculum

Table 1. Roles and traits of various species.

Cover Crop	Quick Growth	Biomass Yield	Erosion Reduction	Loosen subsoil	Loosen topsoil	Weed Suppression	Tolerances	
							Heat	Drought
Nonlegumes								
Annual Ryegrass	4	4	4	3	5	4	2	2
Barley	4	4	4	3	4	4	4	4
Buckwheat	5	3	2	1	4	4	3	1
Oats	5	3	4	1	4	5	2	2
Pearl Millet	5	4	4	4	3	4	5	5
Sorghum-Sudangrass	5	5	5	5	3	5	5	5
Sudangrass	5	4	5	4	3	4	5	5
Triticale	4	4	4	3	4	4	3	3
Brassicas								
Radish	4	4	4	5	3	5	3	2
Rapeseed/Canola	4	4	4	3	3	4	2	3
Legumes								
Berseem clover	5	4	4	2	4	4	4	3
Cowpea	4	3	5	3	4	5	5	4
Forage Soybean	4	4	4	4	4	4	4	4
Hairy Vetch	2	4	3	3	4	4	2	3
Lablab Bean (Hyacinth Bean)	4	4	4	3	4	4	4	4
Sunnhemp	5	4	4	4	4	4	5	4
Sweetclover	3	5	4	5	5	3	4	5
Winter Pea	4	3	4	2	4	3	2	3
1 = poor 2 = fair 3 = good 4 = very good 5 = excellent								

Source: Managing Cover Crops Profitably

Table 2. Seeding and production information for various species.

Cover Crop	Seeding Rate	Seeding Depth	Inoc. Type	Total Plant Nitrogen	Biomass Potential	Residue Persistence	Facts
	(lbs/acre)	(inches)		(lbs/acre)	(lbs/acre)		
Annual Ryegrass	10	0-0.5	n/a	n/a	4,700 - 8,500	Very Good	Rapid growth, quick cover, excellent for temporary pasture; cutting boosts dry matter significantly [very small seed, may persist]
Barley	50-100	0.75-2	n/a	n/a	2,000 - 8,000	Excellent	Soil erosion prevention, weed suppression; scavenges nutrients; tolerates moderately alkaline conditions [does poorly when pH < 6]
Buckwheat	48-70	0.5-1.5	n/a	n/a	2,000 - 3,000	Poor	Requires little water to grow; breaks down quickly; quick soil cover, weed suppression, loosens topsoil [may persist]
Oats	80-110	0.5-1.5	n/a	n/a	8,000 - 10,000	Fair	Provide erosion control, weed suppression [prone to lodging in N rich soils]
Pearl Millet	25	0.5-1.5	n/a	n/a	3,000 - 4,500	Good	Good weed-smothering abilities; high organic matter; does well in cold, wet soils
Sorghum-Sudangrass	25	0.5-1.5	n/a	n/a	5,500 - 10,500	Very Good	Organic matter and weed suppression; mid-season cutting can increase yield; builds soil, loosens subsoil [may hinder next crop]
Sudangrass	25	0.5-1.0	n/a	n/a	5,500 - 10,500	Good	Good forage yield potential; smaller stem than sorghum-sudangrass; weed suppression and erosion control [prussic acid potential]
Triticale	60	0.5-1.5	n/a	n/a	3,000 - 8,000	Very Good	Organic matter and weed suppression; potential forage or feed grain; scavenges nutrients and prevents erosion [contamination in wheat]
Radish	10	0.25-0.5	n/a	50-175	4,000 - 7,000	Fair	Good N scavenging and weed control; N released rapidly; Alleviate soil compaction; prevent erosion
Rapeseed/Canola	10	0.5-0.75	n/a	60-100	2,000 - 2,500	Good	Good N scavenging; Decomposes rapidly; grown for organic matter and weed suppression [may persist]
Berseem clover	10-15	0.25-0.5	crimson, berseem	75-175	6,000 - 10,000	Good	Good for suppressing weeds, preventing erosion, chopped forage and grazing; very flexible cover crop
Cowpea	30	1-1.5	cowpea, lespedeza	60-100	3,800 - 4,800	Fair	Heavy or light soils; intolerant of flooding or water logging; good weed suppression, N source, forage and erosion prevention
Forage Soybean	60	1-1.5	soybean	50-80	5,000 - 10,000	Good	Excellent weed suppression due to ability to apply herbicide; erosion control; forage source; organic matter; N fixation [<i>sclerotinia</i> host]
Hairy Vetch	15-20	0.5-1.5	pea, vetch	90-175	2,300 - 5,000	Fair	Seed with small grain; Good N source, weed suppressor, topsoil conditioner, reduces erosion [hard seed, may persist]
Lablab Bean (Hyacinth Bean)	30	1-1.5	cowpea, lespedeza	50-90	2,000 - 4,000	Good	Viny tropical legume; possible allelopathic residue after frost-kill
Sunnhemp	10	0.5-1	cowpea, lespedeza	60-120	8,000 - 12,000	Good	Tolerates poor, sandy, droughty soils; requires good drainage; large biomass good for weed suppression [may be poisonous to livestock]
Sweetclover	15	0.25-1	alfalfa, sweet cl.	90-150	2,200 - 3,500	Very Good	Strong taproot reputed to reduce clay pan problems; tolerates floods and salinity; tall stalks, deep roots in second year [may persist]
Winter Pea	30	1-2	pea, vetch	90-125	4,000 - 5,000	Fair	Biomass breaks down quickly; good weed suppressor, forage source; quick growing; water efficient [<i>sclerotinia</i> host]

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Single Species vs. Mixtures

- Optimize benefits associated with individual cover crop
- Deep-rooted cover crops can be combined with a shallow rooted cover crop to utilize water and resources in more of the soil profile.
- Combining plants with high C:N ratios (mature cereals) with plants that have low C:N ratios (legumes) can influence mineralization of cover crop residues.
- Take advantage of allelopathic potential of cover crop to suppress weeds.
Allelopathic suppression of weeds has been shown to be species specific; therefore, a larger spectrum of weed control may be possible with a mixture of cover crops.

Table 3. Potential cover crop mixtures.

Species	Mix with
Nonlegumes	
Annual Ryegrass	Legumes or grasses
Barley	Annual legumes, ryegrass or other small grains
Buckwheat	Sorghum-sudangrass hybrids or sunnhemp
Oats	Clover, pea, vetch, other legumes or small grains
Pearl Millet	Buckwheat, sunnhemp, forage soybeans or cowpeas
Sorghum Sudangrass	Buckwheat, sunnhemp, forage soybeans or cowpeas
Sudangrass	Buckwheat, sunnhemp, forage soybeans or cowpeas
Triticale	Annual legumes, ryegrass or other small grains
Brassicas	
Forage Radish	Mustards, small grains or crimson clover
Canola	Small grains or crimson clover
Legumes	
Berseem clover	Oats, ryegrass, small grains as nurse crops; as nurse crop for alfalfa
Cowpea	Sorghum-sudangrass or millet
Forage Soybean	Oats, ryegrass, sorghum-sudangrass, piper sudangrass, or pearl millet
Hairy Vetch	Small grains, field peas, bell beans, crimson clover, or buckwheat
Lablab Bean (Hyacinth Bean)	Sorghum-sudanrass or millet
Sunnhemp	Buckwheat, other small grains
Sweetclover	Small grains or red clover
Winter Pea	Strong-stemmed wheat, rye, triticale or barley for vertical support

Source: Managing Cover Crops Profitably

Resources

United States Department of Agriculture website
www.usda.gov/wps/portal/usdahome

Managing Cover Crops Profitably 3rd Edition, Sustainable Agriculture Network, Beltsville, MD (\$19 hard copy)
www.sare.org/publications/covercrops/covercrops.pdf (free)

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