

NATURAL RESOURCES CONSERVATION SERVICE
CONSTRUCTION SPECIFICATIONS
COVER CROP

1. Scope

The work shall consist of furnishing all materials and performing cultural operations necessary to grow and maintain the cover crop to protect soil, improve soil conditions, conserve moisture, provide temporary protection for permanent vegetative cover, add biomass to the soil, improve infiltration and tilth, reduce compaction, manage pests and nutrients, and/or provide supplemental forage.

2. Materials

Seed. Seed used in this specification will meet the requirements as stated in Kansas Noxious Weed Law (Kansas Statutes Annotated [K.S.A.] 2-1314) and the Kansas Agriculture Seed Law (K.S.A. 2-1415).

When seed is purchased, the seed tags will be evidence of the purity and germination of the seed. Time since date of seed test shall not exceed 9 months.

Seed shall be of a quality that weed seed shall not exceed 0.5% of the aggregate of pure live seed (PLS) (% germination x % purity) and other material.

Fertilizer. All fertilizer shall be labeled in accordance with applicable state regulations and bear the warranty of the producer for the grade furnished.

Inoculants. The inoculants for treating legume seeds shall be a pure culture of Nitrogen fixing bacteria prepared specifically for the plant species and shall not be used later than the date indicated on the container. A mixing medium, as recommended by the manufacturer or approved substitute shall be used to bond the inoculant to the seed. For non-sandy soils with a pH greater than 6.0 and that have previously grown well-nodulated crops of the same species within the last 5 years inoculation is usually not necessary. When planting legumes in sandy soil, inoculant treatment shall be applied if the species has not been grown within the last 3 years.

Chemicals. All pesticides used in performing this practice shall be federally, state, and locally registered and shall be applied strictly in accordance with authorized and registered uses, directions on the label, and other federal or state policies and requirements. Chemical containers shall be properly stored and disposed of in a safe manner.

3. Seeding Mixture and Planting Date

The seed(s) and rate(s) specified on Form KS-ECS-4, Grass Seeding, and/or Form KS-ECS-6, Cover Crop Design Worksheet, shall be used.

The seeding rate(s) shall be the weight exclusive of any coating material. Any legume seed used shall be inoculated. Based on bag tags, seeding rates shall be adjusted to ensure the required amounts of pure live seed.

Multi-species cover crop mixes should include adequate species diversity to compliment cash crops grown in rotation and to meet the purpose of the cover (e.g., erosion, organic matter, compaction, forage). No fewer than three species should be included in a mix.

Cover crop mixes should be planned to contain 750,000 seeds per acre. In semi-arid climates and/or under drought conditions, consider reducing seed density, but no less than 500,000 seeds per acre.

Rye may be used, but be aware of the potential allelopathic effects. Rye should be completely dead prior to planting subsequent crops. While allelopathic effects may be beneficial for weed control, they may also inhibit establishment and growth of the following crop.

Specific cover crop species not contained within species tables may be utilized as long as the species is within the desired family (legume, brassica, grass) and is not considered locally invasive or invasive as per Kansas Noxious Weed Law. Species will be documented on Form KS-ECS-4 and/or Form KS-ECS-6.

Planting shall be performed during the period that is specified on Form KS-ECS-4 and/or Form KS-ECS-6.

4. Seedbed Preparation

The area to be planted shall be weed free and have a firm seedbed which has previously been roughened by scarifying, disking, harrowing, chiseling, or otherwise worked to a depth of 2 to 4 inches, except when planting no-till or otherwise specified on Form KS-ECS-4 and/or Form KS-ECS-6.

Seedbed preparation shall be suspended when soil moisture conditions are not suitable for obtaining a satisfactory seedbed.

When planting legumes requiring inoculation in soils with a pH lower than 6.0, amend the soil pH by liming according to soil test recommendations, prior to planting the legume.

5. Fertilizing and Seeding

Fertilizing. Fertilizer shall be distributed uniformly over the seedbed and applied according to a soil test within the criteria of Conservation Practice Standard 590, Nutrient Management, and as specified on Form KS-ECS-4 and/or Form KS-ECS-6.

Fertilizer shall be applied in any way that will result in uniform distribution. The fertilizer shall be incorporated into the soil. Incorporation may be as part of the seedbed preparation or as part of the seeding operation unless otherwise specified on Form KS-ECS-4 and/or Form KS-ECS-6.

Seeding. Seed shall be drilled or broadcast by hand, mechanical hand seeder, or power operated seeder. Seed shall be incorporated into the soil, but not more than one-inch deep unless otherwise specified on Form KS-ECS-4 and/or Form KS-ECS-6. Drilling is preferred, but the use of row crop equipment may be used for row widths between 20 and 40 inches. Seed may be broadcast if covered with a drag or harrow.

When seeding in standing or growing row crops by air or during the last cultivation, increase seeding rate 1.5 times.

Where wind erosion is a consideration, cover and temporary cover crops planted in rows greater than 20 inches will be planted perpendicular to the prevailing wind during the critical wind erosion management period.

Seeding shall be performed as nearly as practical across the slope unless otherwise specified on Form KS-ECS-4 and/or Form KS-ECS-6.

6. Irrigation

When specified, irrigation water shall be applied during the establishment period at the times and rates listed on Form KS-ECS-4 and/or Form KS-ECS-6.

7. Additional Cultural Operations

Managing cover crops.

- a. Suppression may be necessary to maintain the practice objectives during the period critical to the practices intended purpose and may be accomplished by mowing, light tillage, rolling, grazing, and chemical applications.
- b. Management of the cover crop will be necessary and should be planned for prior to planting the covers.

- (1) Natural termination will be when climatic or growing conditions naturally terminate the cover crop.

Whenever possible, cover crop plantings will be planned to take advantage of natural termination by way of freezing. Time the plantings to obtain the desired plant height or physiological development prior to the normally occurring killing frost date.

- (2) Mechanical controls will be mowing, tillage, rolling, or grazing.

- (i) Mowing should be done prior to seed development, unless cover crop reseeding is a planned purpose. Height may be determined by other practices being implemented in a conservation plan.

- (ii) Tillage may not provide complete control without repeating the application and may need to be used in a combination with other controls. Consideration should be given to timing and effects of tillage on moisture conservation and the rest of the crop rotation.
 - (iii) Rolling will be conducted in a way that will terminate the vascular transport functions of the cover crop. Rollers will be outfitted with horizontal knives or angle irons that are no more than 12 inches apart on the circumference of the roller. Knives or angle irons should not be sharp enough to chop the cover crop but the intended design is to lie over and crimp the plant stalks.
 - (iv) Grazing should be conducted at rates to allow adequate re-growth to provide the necessary cover for the intended purpose of the practice. Termination may require the application of herbicides or other treatment to control additional growth of the grazed cover crop.
- (3) Chemical termination will be through the lethal application of herbicides. Herbicides used to terminate growth shall be applied according to the herbicide label and/or the KSU Extension Bulletin "Chemical Weed Control for Field Crops, Pastures, Rangeland and Non-cropland" prior to seed development or when the cover has accomplished the planned objective and will not create detrimental effects to the crop following, unless required for control of noxious weeds. Follow herbicide labels to determine crop compatibility for the crop following the cover crop.
- (4) Grazing should be conducted at rates to allow re-growth to provide the necessary cover for the intended purpose of the cover crop. Refer to Conservation Practice 528, Prescribed Grazing, for grazing of cover crops to ensure adequate forage balance is achieved for the intended purpose of the cover crop and the nutritional needs of the livestock are met (refer to Cover Crop Table, Performance and Roles). Grazing of cover crops used for sole purpose of establishing permanent herbaceous cover is not recommended unless managed to meet minimum height and cover requirements.

Caution is needed when grazing a cover crop (single specie or a mix) after a period of drought or a series of frosts due to the potential of prussic acid poisoning. The amount of prussic acid is affected by soil fertility such as soils high in available nitrogen and low in phosphorus. It is recommended that feed be tested prior to grazing.

8. Other Requirements

Other details for the establishment and maintenance of the plants including, but not limited to, the need for livestock and traffic control shall be applied as specified on Form KS-ECS-4 and/or Form KS-ECS-6.

Measures and methods that enhance fish and wildlife values, protect visual resources, and maintain or establish key habitats shall be performed when specified on Form KS-ECS-4 and/or Form KS-ECS-6.

For critical or highly erodible areas, increase seeding rates 1.5 times the recommended rate to obtain an effective stand that will control erosion.

For temporary cover for acid sites. For a period of 1 to 3 years after land shaping, a temporary cover of a winter annual is to be used. Rye, triticale, or oats may be seeded at the rate of 80 pounds per acre. Apply needed nutrients as indicated by a soil test.

Prior to planting the second year temporary cover crop, soil tests will be taken as needed to determine lime requirements. Apply nutrients as indicated by the soil test for the second year cover.

Specific soil tests should be conducted on areas of poor establishment of the first year cover to obtain a representative sample of problem areas. Retreat with recommended soil amendments as needed.

A third-year temporary cover, nutrient, and soil amendment application may be used if need to obtain an adequate seedbed for permanent vegetation.

The owner, operator, contractor, or other persons shall conduct all work and operations in accordance with proper safety codes for the type of equipment and operations being performed with due regards to safety of all persons and property.

Seeding specifications will be documented with Form KS-ECS-4 and/or Form KS-ECS-6.

9. Cover Crop requirements for permanent vegetative cover establishment

A standing cover or surface mulch is important for the success of any seeding in Central and Western Zones. Cover crop residue helps maintain surface soil moisture that is critical to seed germination and permanent root system development.

A standing cover crop or surface mulch is required for any seeding on soils where erosion or moisture conservation is a concern. For additional information, refer to Conservation Practice 484, Mulching.

A standing cover crop or surface mulch is required for MLRAs 72, 73, 74, 75, 77, 78, 79, and 80A.

Single or multi-species cover crops can be utilized. Cover crops should be managed to prevent the production of viable seed.

Maintain a minimum of 12-inch stubble height. A cover crop with growth exceeding 12 inches may be removed by mowing, haying, or grazing.

Cover crop mixes should contain 5 species or more; of which 1 is a legume and have a carbon/nitrogen ratio of >35. Cover crop goal is 80 to 100 percent ground cover.

- a. **Sorghums.** Sorghums may be planted as late as August 1 where sufficient moisture exists to establish a quick stand. Sorghum seed formation can be limited or controlled by use of male sterile (non self-pollinating) hybrids and by planting late so that sorghums are not able to mature and form seed.

- (1) **Forage sorghum**—Seed forage sorghum (includes Sudan grass) during the summer prior to the planting of the range planting mix. Row spacing shall not exceed 20 inches. The seeding rate will be 3 to 12 pounds per acre.
- (2) **Grain sorghum**—Seed grain sorghum the summer prior to planting the range planting mix. Row spacing will not exceed 30 inches. The seeding rate will be 3 to 8 pounds per acre.
- (3) **Exception**—Forage and grain sorghum in 40-inch rows may be used on sandy soils in MLRAs 72, 73, 77, 78, and 79 where conditions do not permit the establishment of narrower row spacing. To have adequate cover of forage and grain sorghums, the following actual residue amounts are required at seeding time. The “I” factor from the Wind Erodibility Index is used to determine minimum residue levels.

<u>“I” Soil Factor</u>	<u>Minimum Lbs. Residue/Acre at Seeding Time</u>
56 or lower	1,750
86	2,000
134	2,250
220 and higher	2,250*

*If adequate sorghum residue cannot be produced or maintained, additional mulch will be applied until the listed minimum amounts are achieved.

- b. **Small grain.** A minimum residue amount of 1,500 pounds per acre of flat small grain equivalent will be present at range planting time. If adequate flat small grain equivalent residue cannot be produced or maintained, additional mulch will be applied until the 1,500 pounds is achieved.
- (1) **Oats**—Oats may be planted until September 15 in the fall prior to planting the range planting mix. Row spacing will not exceed 20 inches. The seeding rate will be 40 to 60 pounds per acre.

Cover crops of oats will be killed, using the Surface Mulch, chemical method, from the fifth or sixth leaf stage until boot stage and prior to the emergence of the seeded range planting mix.

- (2) **Winter wheat**—Seed winter wheat in the fall prior to planting the range planting mix. Row spacing will not exceed 20 inches. The seeding rate will be 40 to 60 pounds per acre.

Wheat cover crops will be killed, using the Surface Mulch, chemical method, from the fifth or sixth leaf stage until the boot stage and prior to the emergence of the seeded range planting mix.

Seeding into growing wheat that will be grazed-out by May 1 is an acceptable method. Do not graze when fields are wet and subject to compaction.

- (3) **Rye**—Rye or rye hybrids are not approved for use as a cover crop due to the potential allelopathic effects.

c. Surface mulch.

- (1) **Tillage**—Prepare a seedbed by use of tillage operations that leaves a seedbed free of growing vegetation with crop stubble, weeds, or other vegetative material left on the surface. No inversion type of tillage operation is allowed. It may be necessary to repack the soil surface after this tillage operation to provide a firm seedbed.
- (2) **Chemical**—Prepare a seedbed by use of herbicides that suppress existing vegetation and leave mulch which will be seeded into without additional tillage. (Chemicals used must be federally and locally registered and must be applied strictly in accordance with registered uses, directions on label, and other federal or state policies and requirements.)

Cover Crop Table—Performance and Roles

Species	Crop Type ¹	Winter Hardiness ²	Total N (lbs/A) ³	Dry Matter (lbs/A/yr)	N Scavenger ⁴	Soil Builder ⁴	Erosion Fighter ⁴	Weed Fighter ⁴	Good Graze ⁴	Break Compact Layers ⁴
Non-Legumes										
Annual Ryegrass	CG	Statewide		2,000-9,000	VG	VG	VG	VG	VG	G
Spring or Winter Barley	CG	Statewide		2,000-10,000	VG	VG	E	VG	VG	G
Spring Oats	CG	NFT		2,000-10,000	VG	G	VG	E	G	P
Spring or Winter Rye	CG	Statewide		3,000-10,000	E	E	E	E	G	F
Spring or Winter Wheat	CG	Statewide		3,000-8,000	VG	VG	VG	VG	VG	G
Spring or Winter Triticale	CG	Statewide		3,000-10,000	VG	VG	VG	E	G	G
Corn	WG	NFT		3,000-12,000	VG	G	G	F	G	G
Grain Sorghum	WG	NFT		6,000-10,000	VG	G	G	F	G	E
Sorghum-Sudangrass	WG	NFT		8,000-10,000	E	E	E	VG	VG	E
Pearl Millet	WG	NFT		4,000-8,000	VG	G	G	G	G	F
Proso Millet	WG	NFT		2,000-6,000	F	F	G	F	G	P
Safflower	CB	NFT		2,000-4,000	VG	G	F	F	P	F
Turnip	CB	NFT	30-120	3,000-6,000	E	VG	VG	E	G	E
Oilseed Radish	CB	NFT	50-200	4,000-7,000	E	VG	VG	E	G	E
Mustard	CB	NFT	30-120	3,000-9,000	G	VG	VG	VG	G	G
Rapeseed	CB	NFT	40-160	2,000-5,000	VG	G	VG	VG	G	VG
Buckwheat	WB	NFT		2,000-4,000	P	G	F	E	P	P
Legumes (produces soil nitrogen when properly inoculated)										
Cowpeas	WB	NFT	100-150	2,500-4,500	F	G	E	E	G	G
Crimson Clover	WB	Southern KS	100-200	3,500-5,500	G	VG	VG	VG	E	F
Soybean	WB	NFT	30-70	4,000-8,000	G	G	F	F	G	F
Sunnhemp	WB	NFT	60-120	2,000-6,000	G	VG	F	F	F	G
Hairy Vetch	CB	Statewide	90-200	2,300-5,000	F	VG	G	G	G	G
Red Clover	CB	Statewide	70-150	2,000-5,000	G	VG	G	VG	E	VG
Subterranean Clovers	CB	NFT	75-200	3,000-8,500	F	VG	VG	E	VG	P
Sweetclover	CB	Statewide	90-170	3,000-5,000	F	E	VG	VG	VG	E
White Clover	CB	Statewide	80-200	2,000-6,000	F	G	VG	VG	E	F
Woollypod Vetch	CB	NFT	100-250	4,000-8,000	G	E	G	E	G	VG
Field Pea	CB	NFT	90-150	4,000-5,000	F	G	VG	G	VG	F
Alfalfa	CB	Statewide	70-120	4,000-8,000	G	VG	G	G	E	G

Species	Quick Growth ⁴	Lasting Residue ⁴	Duration ⁴	Harvest Values ⁴		Cash Crop Interseed ⁴	Comments
				F*	S*		
Non-Legumes							
Annual Ryegrass	VG	VG	VG	G	F	E	Heavy N & water use; likes wet soils.
Spring or Winter Barley	VG	E	F	VG	F	VG	Tolerates moderately alkaline conditions but does poorly in acid soil pH<6.0.
Spring Oats	E	G	F	G	G	E	Prone to lodging in N-rich soil.
Spring or Winter Rye	E	E	VG	F	F	VG	Tolerates triazine herbicides; may be allelopathic to corn.
Spring or Winter Wheat	VG	VG	VG	G	VG	VG	Heavy N and water user in spring.
Spring or Winter Triticale	VG	VG	VG	F	G	F	
Corn	VG	E	VG	VG	VG	P	
Grain Sorghum	G	VG	VG	G	G	P	
Sorghum-Sudangrass	E	VG	E	E	P	P	Mid-season cutting increases yield and root penetration.
Pearl Millet	VG	VG	VG	F	G	P	
Proso Millet	F	F	F	G	F	P	Heavy seed producer for later competition.
Safflower	F	F	F	P	F	P	
Turnip	VT	F	G	G	F	P	
Oilseed Radish	VG	F	G	VG	F	F	Good N scavenging and weed control; N released rapidly; does not like acid soils.
Mustard	VG	F	G	P	F	P	
Rapeseed	VG	G	VG	F	E	P	
Buckwheat	E	P	F	P	VG	VG	Summer smother crop; breaks down quickly.
Legumes							
Cowpeas	VG	F	E	G	G	G	Season length, habit varies by cultivar.
Crimson Clover	G	G	F	E	VG	E	Establishes easily, grows quickly if planted early in fall; matures early in spring; avoid wet soils.
Soybean	G	P	G	P	VG	G	
Sunnhemp	G	G	VG	P	P	P	Will not set seed.
Hairy Vetch	F	F	VG	F	VG	G	Bi-culture with small grain expands seasonal adaptability.
Red Clover	F	F	G	E	VG	E	Excellent forage, easily established; widely adapted.
Subterranean Clovers	G	VG	VG	VG	P	E	Strong seedlings, quick to nodulate.
Sweetclover	G	VG	VG	VG	G	G	Tall stalks, deep roots in second year.
White Clover	F	F	E	VG	G	VG	Persistent after first year.
Woollypod Vetch	VG	F	VG	F	VG	G	Reseeds poorly if mowed within 2 months of seeddrop; overgrazing is harmful.
Field Pea	F	F	G	G	P	F	Needs small grain crop for climbing vines.
Alfalfa	F	F	VG	VG	F	E	Perennial cover for longer cover.

Species	Tolerances ⁴					Habit ⁵	pH (Pref.)	Establishment Periods	Min. Germ. Temp.(F)
	Heat	Drought	Shade	Flood	Low Fert.				
Non-Legumes									
Annual Ryegrass	F	F	VG	VG	F	U	6.0-7.0	Spring/Fall	40
Spring or Winter Barley	VG	VG	G	F	VG	U	6.0-8.5	Fall/Spring	38
Spring Oats	F	F	F	G	G	U	4.5-7.5	Late summer/Spring	38
Spring or Winter Rye	G	VG	VG	G	E	U	5.0-7.0	Late summer/Fall	34
Spring or Winter Wheat	G	G	G	P	G	U	6.0-7.5	Late summer/Fall	38
Spring or Winter Triticale	G	G	G	F	G	U	5.0-7.0	Spring/Fall	38
Corn	VG	F	P	P	F	U	5.6-7.5	Late Spring	55
Grain Sorghum	VG	G	P	F	G	U	5.6-7.5	Summer	65
Sorghum-Sudangrass	E	E	G	G	G	U	6.0-7.0	Summer	65
Pearl Millet	VG	F	F	P	G	U	5.0-7.0	Summer	65
Proso Millet	G	P	P	P	G	U	5.6-7.5	Summer	65
Safflower	F	F	F	P	F	U	6.5-7.5	Spring/Summer	40
Turnip	G	F	G	F	F	U	6.0-7.5	Spring/Summer	45
Oilseed Radish	G	F	G	F	F	U	6.0-7.5	Spring/Summer	45
Mustard	G	VG	G	F	F	U	5.5-7.5	Spring/Summer	40
Rapeseed	F	G	G	F	F	U	5.5-8.0	Spring/Fall	41
Buckwheat	G	P	F	F	F	U/SU	5.0-7.0	Spring/Summer	50
Legumes									
Cowpeas	E	VG	G	F	E	SU/C	5.5-6.5	Summer	58
Crimson Clover	G	F	VG	F	G	U/SU	5.5-7.0	Summer	60
Soybean	VG	F	F	F	G	U/SU	5.5-7.5	Summer	60
Sunnhemp	E	G	F	F	VG	U	6.0-7.0	Summer	60
Hairy Vetch	F	G	G	G	F	C	5.5-7.5	Summer	60
Red Clover	F	F	VG	G	F	U	6.2-7.0	Summer	60
Subterranean Clovers	G	VG	VG	G	E	P/SP	5.5-7.0	Late summer	38
Sweetclover	VG	E	F	F	E	U	6.5-7.5	Spring/Summer	42
White Clover	G	G	VG	VG	G	P/SU	6.0-7.0	Spring/Fall	40
Woollypod Vetch	VG	VG	G	G	VG	SP/C	6.0-8.0	Summer/Fall	40
Field Pea	F	P	F	F	G	C	5.5-6.5	Spring/Summer	40
Alfalfa	G	F	F	P	G	U	6.0-7.5	Spring-Fall	40

Planting						
Species	Seeds/Pound (average)	Drilled (lbs/A)	Broadcast (lbs/A)	Depth (inches)	Inoculant Type	Reseeds
Non-Legumes						
Annual Ryegrass	190,000	10-20	20-30	0-0.5		Reliably
Spring or Winter Barley	18,000	50-100	80-125	0.75-2		Sometimes
Spring Oats	15,000	80-110	110-140	0.5-1.5		Reliably
Spring or Winter Rye	12,000	60-120	90-160	0.75-2		Reliably
Spring or Winter Wheat	14,000	60-120	60-150	0.5-1.5		Sometimes
Spring or Winter Triticale	11,000	60-120	60-150	0.5-1.5		Reliably
Corn	2,500	20-40	30-50	0.75-2		Usually
Grain Sorghum	20,000	3-25	6-50	0.5-1.5		Usually
Sorghum-Sudangrass	18,000	3-25	6-50	0.5-1.5		Sometimes
Pearl Millet	80,000	5-15	10-30	0.5-1		Sometimes
Proso Millet	120,000	5-15	10-30	0.5-1		Usually
Safflower	15,000	5-20	10-40	1-1.5		Sometimes
Turnip	170,000	1-4	2-5	0.25-0.5		Usually
Oilseed Radish	25,000	8-13	10-20	0.25-0.5		Sometimes
Mustard	100,000	5-12	10-25	0.25-0.75		Usually
Rapeseed	175,000	5-10	8-14	0.25-0.75		Sometimes
Buckwheat	18,000	30-70	50-90	0.5-1.5		Reliably
Legumes						
Cowpeas	4,100	30-90	70-120	1-1.5	Cowpeas/Lespedeza	Sometimes
Crimson Clover	107,200	15-20	22-30	0.25-0.5	Crimson/Berseem	Usually
Soybean	3,000	45-60	60-80	1-1.5	Soybean	Usually
Sunnhemp	15,000	30-60	50-70	1-1.5	Cowpea	Never
Hairy Vetch	12,000	15-20	25-40	0.5-1.5	Pea/Vetch	Sometimes
Red Clover	184,250	8-10	10-12	.025-0.5	Red clover/White Clover	Sometimes
Subterranean Clovers	70,000	10-20	20-30	0.25-0.5	Clovers/sub, rose	Usually
Sweetclover	174,200	6-10	10-20	0.25-1	Alfalfa/Sweet Clover	Usually
White Clover	502,500	3-9	5-14	0.25-0.5	Red Clover/White Clover	Reliably
Woollypod Vetch	10,000	10-30	30-60	0.5-1	Pea/Vetch	Sometimes
Field Pea	3,200	50-80	70-120	1.5-3	Pea/Vetch	Sometimes
Alfalfa	147,400	8-15	12-20	0.25-0.5	Alalfa	Sometimes

¹ **Crop Type:** **CG**=Cool-Season grass, **WG**=Warm-Season grass, **CB**=Cool-Season Broadleaf, **WB**=Warm-Season Broadleaf

² **Winter Hardiness:** Either adapted to climate statewide, southern Kansas or not frost tolerant (**NFT**)

³ **Total N:** Total N benefit from entire plant. Grasses not considered N source

⁴ **P**=Poor **F**=Fair **G**=Good **VG**=Very Good **E**= Excellent

⁵ **Habitat:** **C**=Climbing; **U**=Upright; **P**=Prostrate; **SP**=Semi-prostrate; **Su**=Semi-upright

References:

For additional information about cover crops refer to *Managing Cover Crops Profitably*, 3rd Edition. Sustainable Agriculture Network (SAN) is the national outreach arm of the USDA Cooperative State Research, Education, and Extension Service (CSREES) Sustainable Agriculture Research and Education (SARE) program. For more information, see www.sare.org.