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 Statues 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 percent of the aggregate of pure live seed (PLS) (percent germination x percent 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, 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.

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

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.

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.

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.

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. 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.

6. Irrigation

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

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 and chemical applications.

b. Control 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 such as freezing.

Whenever possible, plan cover crop plantings 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. 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 re-growth to provide the necessary cover during the time critical to 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 during the time critical to the intended purpose of the practice.

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 when specified on Form KS-ECS-4.

Measures and methods that enhance fish and wildlife values, protect visual resources, and maintain key shade, food, and den trees shall be performed when specified on Form KS-ECS-4.

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. Wheat, rye, oats, or barley 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. Refer to Table 2 for liming rates. 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.

Crop substitutions. Sorghum-sudan grass may be substituted with pearl, proso, or foxtail millet or grain sorghum.

Rows shall not exceed 20 inches except grain sorghum rows can be 30 inches. In Major Land Resource Areas (MLRAs) 72, 73, 77, 78, and 79 where conditions do not permit the establishment of narrow row spacing, forage and grain sorghum in 40-inch rows may be used on sandy soils.

Seeding specifications will be documented with Form KS-ECS-4.

The following charts are reprinted from *Managing Cover Crops Profitably*, 2nd Edition, with permission from the Sustainable Agriculture Network (SAN). 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.

9. Cover Crop requirements for seedbed preparation with 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.

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

a. Standing cover crop. The cover crop 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.

Small grains are excluded as a standing cover crop option on soils with an "I" value greater than 86.

b. 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.

"I" Soil Factor	Minimum Lbs. Residue/Acre at Seeding Time
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.

c. 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.

d. 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.)

(3) Clean tilled - Just prior to planting, the seedbed shall be prepared by using tillage implements, which penetrate the soil surface 2 to 3 inches and leave a firm but friable seedbed. It may be necessary to repack the soil surface after this tillage operation to provide a firm seedbed.

Chart 2

PERFORMANCE AND ROLES

	Species	Legume N Source	Total N (lb./A)[1]	Dry Matter (lb./A/yr.)	N Scavenger[2]	Soil Builder[3]	Erosion Fighter[4]	Weed Fighter	Good Grazing[5]	Quick Growth
NONLEGUMES	Annual ryegrass			2,000–9,000	◕	●	●	◕	◕	●
	Barley			3,000–10,000	◕	◕	●	◕	◕	◕
	Oats			2,000–10,000	◕	◑	◕	●	◑	●
	Rye			3,000–10,000	●	●	●	●	◑	●
	Wheat			3,000–7,000	◕	◕	◕	◕	◕	◑
	Buckwheat			2,000–3,000	○	◑	◔	●	○	●
	Sorghum-sudan.			8,000–10,000	●	●	●	◕	◕	●
LEGUMES	Berseem clover	●	75–220	6,000–10,000	◕	◕	◕	●	●	●
	Cowpeas	●	100–150	2,500–4,500	◔	◑	●	●	◑	◕
	Crimson clover	◕	70–130	3,500–5,500	◑	◕	◕	◕	●	◔
	Field peas	●	90–150	4,000–5,000	◔	◑	◕	◑	◕	◕
	Hairy vetch	●	90–200	2,300–5,000	◔	◕	◕	◕	◑	◔
	Medics	◑	50–120	1,500–4,000	◔	◑	◑	◕	◕	●
	Red clover	◕	70–150	2,000–5,000	◑	◕	◑	◕	●	◔
	Subterranean clover	●	75–200	3,000–8,500	◔	◕	◕	●	◕	◑
	Sweetclovers	●	90–170	3,000–5,000	◔	●	◕	◕	◕	◑
	White clover	●	80–200	2,000–6,000	◔	◑	◕	◕	●	◔
	Woollypod vetch	●	100–250	4,000–8,000	◑	●	◑	●	◑	◕

[1]Total N—Total N from all plant. [2]N Scavenger—Ability to take up/store excess nitrogen. [3]Soil Builder—Organic matter yield and soil structure improvement. [4]Erosion Fighter—Soil-holding ability of roots and total plant. [5]Good Grazing—Production, nutritional quality and palatability.

○ =Poor; ◔ =Fair; ◑ =Good; ◕ =Very Good; ● =Excellent

Chart 2

PERFORMANCE AND ROLES continued

	Species	Lasting Residue[1]	Duration[2]	Harvest Value[3] F*	Harvest Value[3] S*	Cash Crop Interseed[4]	Comments
NONLEGUMES	Annual ryegrass	◕	◑	◑	◔	●	Heavy N and H_2O user; cutting boosts dry matter significantly.
	Barley	●	◑	◕	◑	◕	Tolerates moderately alkaline conditions but does poorly in acid soil < pH 6.0.
	Oats	◑	◔	◑	◑	●	Prone to lodging in N-rich soil.
	Rye	●	◕	◔	◔	◕	Tolerates triazine herbicides.
	Wheat	◕	◕	◑	◕	◔	Heavy N and H_2O user in spring.
	Buckwheat	○	◔	○	◔	◕	Summer smother crop; breaks down quickly.
	Sorghum-sudangrass	◕	●	●	○	○	Mid-season cutting increases root penetration.
LEGUMES	Berseem clover	◑	●	●	◕	◑	Very flexible cover crop, green manure, forage.
	Cowpeas	◔	●	◑	◑	◑	Season length, habit vary by cultivar.
	Crimson clover	◑	◔	●	◕	●	Established easily, grows quickly if planted early in fall; matures early in spring.
	Field peas	◔	◑	●	◕	●	Biomass breaks down quickly.
	Hairy vetch	◔	◕	◔	◕	◑	Bi-culture with small grain expands seasonal adaptability.
	Medics	◑	◕	◑	◑	◑	Use annual medics for interseeding.
	Red clover	◔	◑	●	◕	●	Excellent forage, easily established; widely adapted.
	Subterranean clover	◕	◕	◕	○	●	Strong seedlings, quick to nodulate.
	Sweetclovers	◕	◕	◕	◑	◑	Tall stalks, deep roots in second year.
	White clover	◔	●	◕	◑	◕	Persistent after first year.
	Woollypod vetch	◔	◕	◔	◕	◑	Reseeds poorly if mowed within 2 months of seeddrop; overgrazing can be toxic.

[1]**Lasting Residue**—Rates how long the killed residue remains on the surface. [2]**Duration**—Length of vegetative stage.
[3]**Harvest Value**—Economic value as a forage (F) or as seed (S) or grain. [4]**Cash Crop Interseed**—Rates how well the cover crop will perform with an appropriate companion crop.

○ =Poor; ◔ =Fair; ◑ =Good; ◕ =Very Good; ● =Excellent

Chart 3A

CULTURAL TRAITS

	Species	Aliases	Type[1]	Hardy through Zone[2]	Tolerances: heat	drought	shade	flood	low fert.	Habit[3]	pH (Pref.)	Best Established[4]	Min. Germin. Temp.
NONLEGUMES	Annual ryegrass	Italian ryegrass	WA	6	◔	◔	◕	◕	◔	U	6.0–7.0	Esp, LSu, EF, F	
NONLEGUMES	Barley		WA	7	◕	◕	◑	◔	◕	U	6.0–8.5	F,W, Sp	
NONLEGUMES	Oats	spring oats	CSA	8	◔	◔	◔	◑	◑	U	4.5–6.5	LSu, ESP W in 8+	
NONLEGUMES	Rye	winter, cereal, or grain rye	CSA	3	◑	◕	◕	◑	●	U	5.0–7.0	LSu-F	34F
NONLEGUMES	Wheat		WA	4	◑	◑	◑	○	◑	U	6.0–7.5	LSu, F	
NONLEGUMES	Buckwheat		SA	NFT	◑	○	◔	◔	◔	U to SU	5.0–7.0	Sp to LSu	50F
LEGUMES	Sorghum–sudan.	Sudax	SA	NFT	●	●	◑	◑	◑	U	6.0–7.0	LSp, ES	65F
LEGUMES	Berseem clover	BIGBEE, multicut	SA, WA	7	◕	◑	◕	◑	◑	U to SU	6.2–7.0	ESp, EF	42F
LEGUMES	Cowpeas	crowder peas, southern peas	SAL	NFT	●	◕	◑	◔	●	SU/C	5.5–6.5	ESu	58F
LEGUMES	Crimson clover		WA, SA	7	◑	◔	◕	◔	◑	U/SU	5.5–7.0	LSu/ESu	
LEGUMES	Field peas	winter peas, black peas	WA	7	◔	◑	◔	◔	◔	C	6.0–7.0	F, ESp	41F
LEGUMES	Hairy vetch	winter vetch	WA/CSA	4	◔	◑	◑	◔	◔	C	5.5–7.5	EF, ESp	60F
LEGUMES	Medics		SP/SA	4/7	●	◕	◕	◔	◑	P/Su	6.0–7.0	EF, ESp, ES	45F
LEGUMES	Red clover		SP, B	4	◔	◔	◕	◑	◔	U	6.2–7.0	LSu; ESp	41F
LEGUMES	Subterranean cl.	subclover	CSA	7	◑	◕	◕	◑	●	P/SP	5.5–7.0	LSu, EF	38F
LEGUMES	Sweetclovers		B/SA	4	◕	●	◔	◔	●	U	6.5–7.5	Sp/S	42F
LEGUMES	White clover	white dutch ladino	LP/WA	4	◑	◑	◕	◕	◑	P/SU	6.0–7.0	LW, E to LSp, EF	40F
LEGUMES	Woollypod vetch	Lana	CSA	7	◕	◕	◑	◑	◕	SP, C	6.0–8.0	F	

[1]B=Biennial; CSA=Cool season annual; LP=Long-lived perennial; SA=Summer annual; SP=Short-lived perennial; WA=Winter annual
[2]See USDA Hardiness Zone Map, inside front cover. NFT=Not frost tolerant. [3]C=Climbing; U=Upright; P=Prostrate; SP=Semi-prostrate; SU=Semi-upright. [4]E=Early; M=Mid; L=Late; F=Fall; Sp=Spring; Su=Summer; W=Winter
○ =Poor; ◔ =Fair; ◑ =Good; ◕ =Very Good; ● =Excellent

Esp	Sp	Lsp	Esu	Su	Lsu	Ef	F	Lf
2/15-5/15	4/15-5/20	5/10-6/10	6/1-7/1	6/15-8/15	8/1-9/15	9/1-10-15	10/1-11/15	11/1-12/1

Chart 3B

PLANTING

	Species	Depth	Seeding Rate: Drilled lb./A	Seeding Rate: Drilled bu/A	Seeding Rate: Broadcast lb./A	Seeding Rate: Broadcast bu/A	Seeding Rate: Broadcast oz./100 ft²	Cost ($/lb.)[1]	Cost/A (median)[2] drilled	Cost/A (median)[2] broadcast	Inoc. Type	Reseeds[3]
NONLEGUMES	Annual ryegrass	0–1/2	5–10	.2–.4	15–30	.6–1.25	1	.50	3.75	11.25		R
	Barley	3/4–2	50–100	1–2	80–125	1.6–2.5	3-5	.05–.20	9.38	12.81		S
	Oats	1/2–2	80–110	2.5–3.5	110–140	3.5–4.5	4–6	.10–.20	14.25	18.75		R
	Rye	3/4–2	60–120	1-2	90–160	1.5–3.0	4–6	.05–.20	6.75	9.38		R
	Wheat	1/2–1 1/2	60–120	1–2	60–150	1–2.5	3–6	.05–.25	13.50	15.75		S
	Buckwheat	1/2–1.5	48–70	1–1.4	60–96	1.2–1.5	3–4	.28–.70	29–	38–		R
	Sorghum-sudangrass	1/2-1.5	35	1	40–50	1–1.25	2	.21–.66	15.05	19.35		S
LEGUMES	Berseem clover	1/4–1/2	8–12		15–20		2	1.50	15.00	27.00	crimson, berseem	N
	Cowpeas	1–1 1/2	30–90		70–120		5	.50	30	47.50	cowpeas, lespedeza	S
	Crimson clover	1/4–1/2	15-20		22–30		2–3	1.50	26	39	crimson, berseem	R
	Field peas	1 1/2–3	50–80		90–100		4	.25	16.25	26.25	pea, vetch	S
	Hairy vetch	1/2-1 1/2	15–20		25–40		2	1.25	22	41	pea, vetch	S
	Medics	1/4–1/2	8–22		12–26		2/3	1.50	22.50	28.50	annual medics	R
	Red clover	1/4–1/2	8–10		10–12		3	1.85	16.65	20.35	red cl, wht cl	S
	Subterranean clover	1/4–1/2	10–20		20–30		3	2.50	37.50	62.50	clovers, sub, rose	R
	Sweetclovers	1/4–1.0	6–10		10–20		1.5	.70	5.60	10.50	alfalfa, swt cl	R
	White clover	1/4–1/2	3–9		5–14		1.5	3.10	18.60	29.50	red cl, wht cl	R
	Woollypod vetch	1/2–1	10–30		30–60		2-3	1.05	21	47.25	pea, vetch	R,S

[1]Per pound in 50-lb. bags as of summer/fall 1997; legumes especially subject to price changes due to supply variability. To locate places to buy seed, see *Seed Suppliers* (p. 166). [2]Mid-point price at mid-point rate, seed cost only. [3]R=Reliably; U=Usually; S=Sometimes; N=Never (reseeds).

Chart 4A

POTENTIAL ADVANTAGES

		Soil Impact			Soil Ecology				Other		
	Species	subsoiler	Frees P&K	Loosen Topsoil	nematodes	disease	allelopathic	choke weeds	attract beneficials	bears traffic	short windows
NONLEGUMES	Annual ryegrass	◑	◑	●	◑	◑	◑	●	◔	●	●
	Barley	◑	◑	◕	◔	◔	◕	◕	◑	◑	●
	Oats	○	◔	◕	○	◑	◕	●	○	◑	●
	Rye	◔	◕	●	◑	◑	●	●	◔	◕	●
	Wheat	◑	◕	◕	◔	◔	◔	◕	◔	◑	◑
	Buckwheat	○	●	◕	◔	○	◕	●	●	○	●
	Sorghum-sudangrass	●	◑	◑	◕	◕	●	●	◑	◑	●
LEGUMES	Berseem clover	◔	◕	◕	○	○	◔	◕	◑	◔	◕
	Cowpeas	◑	◑	◕	○	○	○	●	◕	○	●
	Crimson clover	◔	◑	◑	◔	◑	◔	◑	◕	◔	◑
	Field peas	◔	◔	◕	◑	◕	◔	◕	◕	◔	◕
	Hairy vetch	◑	◑	◕	◔	◑	◑	◕	●	○	○
	Medics	◑	◔	◔	◑	◑	◔	◕	◔	◔	●
	Red clover	◕	◕	◑	◔	◔	◑	◑	◕	◑	◑
	Subterranean clover	○	◔	◑	◔	◔	◕	●	◕	◕	◕
	Sweetclovers	●	●	●	◔	◔	◔	◑	◕	◑	○
	White clover	◔	◔	◕	○	○	◑	◕	◑	●	◑
	Woollypod vetch	◕	◑	◕	◔	◔	◑	●	◕	◔	◑

○ =Poor; ◔ =Fair; ◑ =Good; ◕ =Very Good; ● =Excellent

Chart 4B

POTENTIAL DISADVANTAGES

	Species	Increase Pest Risks: weed potential	Increase Pest Risks: insects/ nematodes	Increase Pest Risks: crop disease	Management Challenges: hinder crops	Management Challenges: establish	Management Challenges: till-kill	Management Challenges: mow-kill	Management Challenges: mature incorp.	Comments Pro/Con
NONLEGUMES	Annual ryegrass	○[1]	◕	◕	◑	●	●	●	◑	If mowing, leave 3-4" to ensure regrowth.
NONLEGUMES	Barley	◔	◔	◔	◑	●	●	●	○	Can be harder than rye to incorporate when mature.
NONLEGUMES	Oats	●	◑	◕	◑	●	●	◔	◑	Cleaned, bin-run seed will suffice.
NONLEGUMES	Rye	○	◑	◕	◔	◕	◕	●	○	Can become a weed if tilled at wrong stage.
NONLEGUMES	Wheat	◑	◔	◔	◑	●	●	◕	◑	Absorbs N and H_2O heavily during stem growth, so kill before then.
NONLEGUMES	Buckwheat	○	◕	●	●	●	●	●	●	Buckwheat sets seed quickly.
NONLEGUMES	Sorghum-sudangrass	◑	◕	●	◔	●	◕	◕	◔	Mature, frost-killed plants become quite woody.
LEGUMES	Berseem clover	●	◑	◕	●	●	◔	◔	◕	Multiple cuttings needed to achieve maximum N.
LEGUMES	Cowpeas	●	◑	◕	●	●	●	●	●	Some cultivars, nematode resistant.
LEGUMES	Crimson clover	◑	○	◕	●	◕	◕	◕	◕	Good for underseeding, easy to kill by tillage or mowing.
LEGUMES	Field peas	●	◑	◔	●	●	●	●	◕	Susceptible to *sclerotinia* in East.
LEGUMES	Hairy vetch	◑	◑	●	●	◑	◔	●	◑	Tolerates low fertility, wide pH range, cold or fluctuating winters.
LEGUMES	Medics	◑	◔	●	◕	◕	◔	◕	◕	Perennials easily become weedy.
LEGUMES	Red clover	◑	◔	◕	●	◕	◑	◔	◕	Grows best where corn grows well.
LEGUMES	Subterranean clover	◑	○	◑	◑	●	◔	○	◕	Cultivars vary greatly.
LEGUMES	Sweetclovers	◔	◔	●	◑	●	◑	◕	◔	Mature plants become woody.
LEGUMES	White clover	◑	◑	◕	◔	◕	○	◑	◕	Can be invasive; survives tillage.
LEGUMES	Woollypod vetch	◑	◑	◔	◑	◑	◕	●	◔	Hard seed can be problematic; resident vegetation eventually displaces.

[1]Symbols, this page only: ○ =Could be a major problem. ◔ =Could be a moderate problem. ◑ =Could be a minor problem. ◕ =Occasionally a minor problem. ● =Rarely a problem