



United States Department of Agriculture

Natural Resources Conservation Service

Technical Note No: TX-PM-14-01

January 2014

**Summer Cover Crop Species Adapted to North-Central West Texas
and Southwestern Oklahoma**

Plant Materials Technical Note



Background:

Protecting our soils has been a goal of the NRCS for many years, but recently, improving the overall health of soils has become a central component of that goal. Cover crops have long been used in combination with cash crops to prevent soil erosion from wind and water. Years of research has shown that cover crops can also improve the health and productivity of cultivated soils. Summer and winter cover cropping

provides many advantages when implemented into row crop farming and ranching operations. Some of these advantages include:

- Added organic matter
- Reduce soil erosion
- Provide nitrogen
- Provide weed control
- Reduce disease inoculums (Roozeboom, 2013)
- Improve soil structure (aggregation, infiltration, available water capacity)
- Manage nutrients
- Furnish moisture conserving mulch and lower soil temperature
- Provide habitat for beneficial organisms (Clark, 2007)

Producers must also understand how to manage a cover crop to reap their full benefits. In addition to many of the advantages of cover cropping, there are also potential drawbacks such as:

- Cover crop residue may delay soil warming and drying in the spring, resulting in delayed planting of the cash crop.
- Heavy cover crop residue may interfere with planting operations
- Nitrogen may become tied up and not readily available to cash crop
- Some cover crop species may become weeds
- Disease inoculums may increase (Roozeboom, 2013)
- Planting dates between cash crop harvest and cover crop establishment may be difficult to manage

Sullivan (2003) states that, “cover crops could be considered the backbone of any annual cropping system that seeks to be sustainable”. Taking advantage of cover crops may provide producers the opportunity to continue to produce food and fiber for a growing population while reducing input costs and maximizing precipitation while protecting the soil resources.

These benefits are only achieved if the selected cover crop species are adapted to the environmental conditions in the areas where they are used (Bodner et al., 2009). Growing conditions differ from one region to another and plant species will not perform the same under every environmental condition. For instance, species that require large amounts of water will not thrive in arid, dry regions. A basic understanding of the area's growing condition is critical when choosing cover crops.

Purpose:

The purpose of this technical note is to provide information on commercially available cover crop species evaluated in replicated plots at USDA-NRCS James E. “Bud” Smith Plant Materials Center, Knox City, Texas for soil health improvement in North central Texas and southwestern Oklahoma. Plant growth attributes, compatibility with other cover species, and cultural information are provided for each cover crop to assist producers and NRCS field office personnel with making decisions on which cover crop species are suitable to meet the objective of the cover crop planting (e.g. soil structure

improvement, soil fertility, nutrient management, and weed suppression). Compatibility information was taken from “A Comprehensive Guide to Cover Crop Species Used in the Northeast United States” accessed on-line at:

<http://www.plantmaterials.nrcs.usda.gov/pub/nypmcpu10645.pdf>.

The technical note covers plant growth attributes (e.g. days of 75% emergence, percent ground cover and days to 75% emergence and biomass yield obtained from research plots established at the James E. “Bud” Smith Plant Materials Center), cultural specifications (e.g. planting depth and rate, and seeds per pounds) and other specie attributes, and photographs of each cover crop species at different growth stages to help producers and conservationists with plant identification.

Grasses

Common Name: Forage Sorghum

Scientific Name: *Sorghum bicolor*

Planting Depth: ½ to 1 inch

Planting Rate: 20-35 lb/acre

Seed per Pound: 16,000

Plant Height: 40-48 inches

Residue Persistence: Excellent

Biomass Potential: 12,000-15,000 lb/acre

Facts: prevents soil erosion, quick forage for grazing, improve soil structure, scavenge nutrients, adds organic matter, and suppresses weeds

Mix with: legumes, other grasses



Common Name: Grain Sorghum

Scientific Name: *Sorghum bicolor*

Planting Depth: ½ to 1 inch

Planting Rate: 5-7 lb/acre

Seed per Pound: 16,000

Plant Height: 24-34 inches

Residue Persistence: Excellent

Biomass Potential: 12,000-15,000 lb/acre

Facts: soil erosion prevention, weed suppression, scavenges nutrients, adds organic matter, grazing

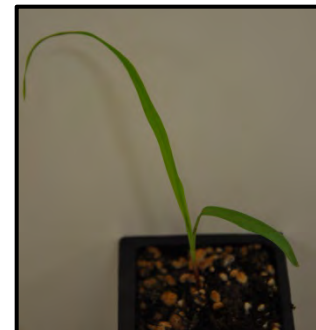
Mix with: legumes, other grasses



Common Name: Sorghum Sudangrass
Scientific Name: *Sorghum bicolor* × *S. bicolor* var. *sudanense*
Planting Depth: ½ to 1½ inches
Planting Rate: 20-40 lb/acre
Seed per Pound: 18,000-22,000
Plant Height: 35-65 inches
Residue Persistence: Excellent
Biomass Potential: 16,000-18,000 lb/acre
Facts: soil builder, weed suppression, prevent erosion, nutrient scavenger, grazing
Mix with: other grasses, legumes



Common Name: Pearl Millet
Scientific Name: *Pennisetum glaucum*
Planting Depth: ½ to 1 inch
Planting Rate: 15-30 lb/acre
Seed per Pound: 82,000
Plant Height: 30-40 inches
Residue Persistence: Good
Biomass Potential: 12,000-13,000 lb/acre
Facts: rapid growth gives quick cover and good weed suppression. Can also be used for erosion control
Mix with: clover, pea, vetch, brassicas, or small grains



Common Name: Browntop Millet

Scientific Name: *Urochloa ramosum*

Planting Depth: ½ to 1 inch

Planting Rate: 10-12 lb/acre

Seed per Pound: 145,000

Plant Height: 30-32 inches

Residue Persistence: Very Good

Biomass Potential: 6,000-8,000 lb/acre

Facts: good organic matter and weed suppression, forage, prevent erosion

Mix with: legumes, other small grains



Common Name: Proso Millet

Scientific Name: *Panicum miliaceum*

Planting Depth: ½ to 1 inch

Planting Rate: 12-15 lb/acre

Seed per Pound: 82,000

Plant Height: 36-38 inches

Residue Persistence: Good

Biomass Potential: 6,000-8,000 lb/acre

Facts: adds organic matter, nutrient scavenger, and weed suppression, can be used to prevent erosion

Mix with: legumes, other small grains



Common Name: Foxtail Millet
Scientific Name: *Setaria italica*
Planting Depth: ½ to 1 inch
Planting Rate: 8-12 lb/acre
Seed per Pound: 213,000
Plant Height: 32-34 inches
Residue Persistence: Fair
Biomass Potential: 4,000-6,000lb/acre
Facts: provides excellent organic matter and weed suppression, forage, prevent erosion
Mix with: small grains and legumes



Common Name: Japanese Millet
Scientific Name: *Echinochloa frumentacea*
Planting Depth: ½ to 1 inch
Planting Rate: 10-12 lb/acre
Seed per Pound: 143,000
Plant Height: 28-30 inches
Residue Persistence: Good
Biomass Potential: 5,000-6,000 lb/acre
Facts: adds organic matter and provides weed suppression, can be used for forage and also used to prevent erosion
Mix with: legumes and other small grains



Common Name: Corn

Scientific Name: *Zea mays*

Planting Depth: 1 to 1½ inch

Planting Rate: 6-10 lb/acre

Seed per Pound: 2,500

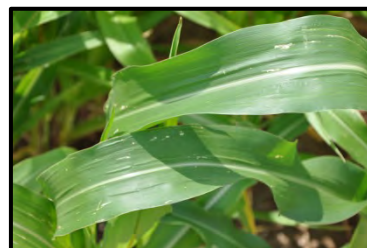
Plant Height: 24-26 inches

Residue Persistence: Good

Biomass Potential: 6,000-8,000 lb/acre

Facts: rapid growth provides excellent organic matter and weed suppression, forage, prevent erosion, nutrient scavenger

Mix with: legumes or other small grains



Common Name: Bengal Rice

Scientific Name: *Oryza sativa*

Planting Depth: 1 to 1½ inch

Planting Rate: 20-30 lb/acre

Seed per Pound: 16,500

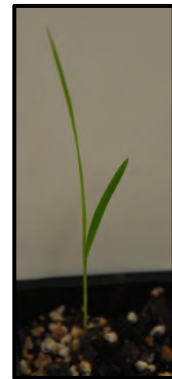
Plant Height: 18-20 inches

Residue Persistence: Poor

Biomass Potential: 2,000-3,000 lb/acre

Facts: organic matter, nutrient scavenger, weed suppression

Mix with: legumes or other small grains



Legumes

Common Name: 'Red Ripper' Cowpea

Scientific Name: *Vigna unguiculata*

Planting Depth: ½ to 1½ inches

Planting Rate: 25-35 lb/acre

Seed per Pound: 16,000

Plant Height: 16-20 inches

Residue Persistence: Very Good

Biomass Potential: 4,000-6,000 lb/acre

Facts: erosion control, weed suppression, nitrogen source, and soil builder

Mix with: small grains, millets, corn, and sorghum



Common Name: 'Iron and Clay' Cowpea

Scientific Name: *Vigna sinensis*

Planting Depth: ½ to 1 inch

Planting Rate: 20-40 lb/acre

Seed per Pound: 16,000

Plant Height: 26-28 inches

Residue Persistence: Very Good

Biomass Potential: 4,000-6,000 lb/acre

Facts: erosion control, nitrogen source, soil builder and weed suppression

Mix with: small grains, millets, corn, sorghum, and other legumes



Common Name: 'California' Black-eyed Cowpea

Scientific Name: *Vigna* spp.

Planting Depth: ½ to 1 inch

Planting Rate: 20-40 lb/acre

Seed per Pound: 12,000

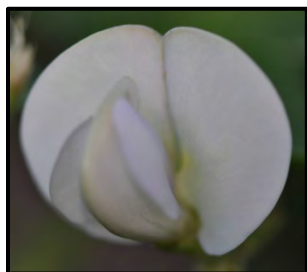
Plant Height: 22-26 inches

Residue Persistence: Good

Biomass Potential: 4,000-5,000 lb/acre

Facts: nitrogen source, weed suppression, erosion prevention, and soil builder

Mix with: corn, sorghum, small grains, millets, and other legumes



Common Name: Guar

Scientific Name: *Cyamopsis tetragonoloba*

Planting Depth: ½ to 1 inch

Planting Rate: 12-15 lb/acre

Seed per Pound: 16,000

Plant Height: 16-20 inches

Residue Persistence: Fair

Biomass Potential: 4,000-6,000

Facts: erosion prevention, weed suppression, soil builder, and nitrogen source

Mix with: other legumes, small grains, grasses



Common Name: Lablab Bean

Scientific Name: *Lablab purpureus*

Planting Depth: ½ to 1 inch

Planting Rate: 10-15 lb/acre

Seed per Pound: 1,800

Plant Height: 18-22 inches

Residue Persistence: Very Good

Biomass Potential: 4,000-5,000 lb/acre

Facts: weed suppression, erosion control, nitrogen source, and soil builder

Mix with: small grains, other legumes, millets



Common Name: Mung Bean

Scientific Name: *Vigna radiata*

Planting Depth: ½ to 1 inch

Planting Rate: 15-20 lb/acre

Seed per Pound: 9,000

Plant Height: 20-24 inches

Residue Persistence: Very Good

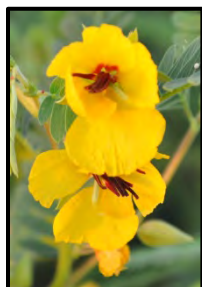
Biomass Potential: 5,000-6,000 lb/acre

Facts: weed suppression, nitrogen source, soil builder, erosion control

Mix with: small grains and other legumes



Common Name: Partridge Pea
Scientific Name: *Chamaecrista fasciculata*
Planting Depth: ¼ to ¾ inch
Planting Rate: 13.4 lb/acre
Seed per Pound: 65,000
Plant Height: 24-28 inches
Residue Persistence: Poor
Biomass Potential: 6,000-7,000 lb/acre
Facts: nitrogen source, weed suppression, soil builder, erosion prevention
Mix with: grasses, brassicas, and other legumes



Common Name: Catjang Pea
Scientific Name: *Vigna* spp.
Planting Depth: ½ to 1 inch
Planting Rate: 20-30 lb/acre
Seed per Pound: 8,000
Plant Height: 22-26 inches
Residue Persistence: Fair
Biomass Potential: 4,000-5,000 lb/acre
Facts: soil builder, erosion prevention, nitrogen source, weed suppression
Mix with: grasses, brassicas, other legumes



Common Name: Peanut
Scientific Name: *Arachis hypogaea*
Planting Depth: 1 to 1½ inches
Planting Rate: 35 lb/acre
Seed per Pound: 800
Plant Height: 10-12 inches
Residue Persistence: Poor
Biomass Potential: 4,000-6,000 lb/acre
Facts: weed suppression, soil builder, erosion prevention, nitrogen source
Mix with: Grasses, small grains, other legumes



Common Name: Soybean
Scientific Name: *Glycine max*
Planting Depth: 1 to 1½ inch
Planting Rate: 20-40 lb/acre
Seed per Pound: 4,500
Plant Height: 18-20 inches
Residue Persistence: Fair
Biomass Potential: 4,000-5,000 lb/acre
Facts: soil erosion prevention, weed suppression, nitrogen source, soil builder
Mix with: other legumes, grasses



Common Name: Sunn Hemp

Scientific Name: *Crotalaria juncea*

Planting Depth: ½ to 1 inches

Planting Rate: 15 lb/acre

Seed per Pound: 9,600

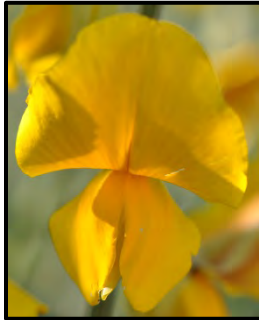
Plant Height: 26-34 inches

Residue Persistence: Fair

Biomass Potential: 5,000-7,000 lb/acre

Facts: weed suppression, erosion prevention, soil builder, nitrogen source

Mix with: small grains, brassicas, other legumes



Brassicas

Common Name: Radish
Scientific Name: *Raphanus sativus*
Planting Depth: ¼ to ½ inch
Planting Rate: 8 lb/acre
Seed per Pound: 23,819
Plant Height: 14-16 inches
Residue Persistence: Fair
Biomass Potential: 3,000-4,000 lb/acre
Facts: prevent erosion, weed suppression, alleviates soil compaction
Mix with: other brassicas, mustards, small grains, or crimson clover



Common Name: Rape
Scientific Name: *Brassica napus*
Planting Depth: ½ to ¾ inch
Planting Rate: 5 lb/acre
Seed per Pound: 134,500
Plant Height: 26-28 inches
Residue Persistence: Good
Biomass Potential: 4,000-5,000 lb/acre
Facts: weed suppression, biomass decomposes quickly
Mix with: small grains, other brassicas, mustards, crimson clover



Common Name: Forage Collards

Scientific Name: *Brassica oleracea*

Planting Depth: ¼ to ½

Planting Rate: 8 lb/acre

Seed per Pound: 194,125

Plant Height: 30-32 inches

Residue Persistence: Fair-Good

Biomass Potential: 3,000-4,000 lb/acre

Facts: prevents erosion, suppress weeds, alleviate soil compaction, scavenge nutrients

Mix with: mustard, other brassicas, small grains, or crimson clover



Forbs

Common Name: Buckwheat

Scientific Name: *Fagopyrum esculentum*

Planting Depth: ½ to 1 inch

Planting Rate: 20-30 lb/acre

Seed per Pound: 20,400

Plant Height: 20-24 inches

Residue Persistence: Poor

Biomass Potential: 2,000-3,000 lb/acre

Facts: Smother crop, weed suppression, bee pasture, scavenge nutrients

Mix with: legumes and other forbs



Common Name: Kenaf

Scientific Name: *Hibiscus cannabinus*

Planting Depth: 1-2 inches

Planting Rate: 20-30 lb/acre

Seed per Pound: 16,000

Plant Height: 34-36 inches

Residue Persistence: Fair

Biomass Potential: 4,000-5,000 lb/acre

Facts: soil builder, suppress weeds, and scavenge nutrients

Mix with: grasses, legumes, and brassicas



Common Name: Sesame

Scientific Name: *Sesamum indicum*

Planting Depth: ½ to ¾ inch

Planting Rate: 3-5 lb/acre

Seed per Pound: 164,000

Plant Height: 48-50 inches

Residue Persistence: Fair

Biomass Potential: 5,000-6,000 lb/acre

Facts: soil builder, weed suppression, scavenge nutrients

Mix with: grasses, legumes, and brassicas



Common Name: Sesbania

Scientific Name: *Sesbania exaltata*

Planting Depth: ½ to ¾ inch

Planting Rate: 25-30 lb/acre

Seed per Pound: 48,000

Plant Height: 50-52 inches

Residue Persistence: Fair

Biomass Potential: 5,000-6,000 lb/acre

Facts: soil builder, suppress weeds, and scavenge nutrients

Mix with: grasses, legumes and brassicas



Common Name: Sunflower
Scientific Name: *Helianthus* spp.
Planting Depth: ½ to 1 inch
Planting Rate: 25-30 lb/acre
Seed per Pound: 16,000
Plant Height: 24-26 inches
Residue Persistence: Fair
Biomass Potential: 3,000-4,000 lb/acre
Facts: soil builder, weed suppression, scavenge nutrients
Mix with: grasses, legumes, and brassicas



Plant Growth Attributes for Cover Crop Adaptability at Knox City PMC

Plots were drilled on June 12, 2013 on 8 inch spacing and harvested 100 days after planting

Test was replicated 4 times

Common Name	% Emergence**				% Cover**			Height (in)**			Yield*
	5	7	11	14	30	60	90	30	60	90	lb/ac
Buckwheat	81	90	91	99	39	69	63	8	22	21	2,596
'Red Riper' Cowpeas	60	75	98	100	56	100	100	9	17	18	5,181
'Iron and Clay' Cowpeas	68	73	85	100	49	100	100	11	23	26	5,765
'California' Black-eyed Cowpeas	34	43	48	71	29	90	90	8	19	20	4,968
Impact Forage Collards	23	41	53	75	51	76	60	9	8	7	662
BMR 84 Grazing Corn	61	74	83	96	60	96	96	16	26	25	*11,607
Guar	61	71	78	99	25	84	84	4	12	18	5,083
HS II Hybrid Forage Sorghum	63	71	83	100	60	100	100	17	38	42	*20,552
Cow Lick Hybrid Forage Sorghum	60	69	76	100	60	100	100	22	34	44	*16,239
Surpass BMR Hybrid Forage Sorghum	76	80	91	100	66	100	100	20	37	42	*18,694
WAC-610 Hybrid Grain Sorghum	73	81	91	100	71	100	100	20	26	26	*18,398
9200Y-White Hybrid Grain Sorghum	20	31	41	80	53	100	100	19	32	32	14,035
W-615 Hybrid Grain Sorghum	64	75	93	100	53	100	100	20	27	28	*18,649
ML 401 BMR Hybrid Pearl Millet	38	50	55	85	68	94	96	20	26	34	10,182
Kenaf	85	88	95	99	65	98	98	11	26	33	5,937
'Rio Verde' Lab Lab Bean	61	73	85	99	19	89	89	4	11	20	4,001
'Ronaai' Lab Lab Bean	49	58	71	95	36	82	91	4	11	18	4,270
Kobe Lespedeza	0	0	5	14	6	15	20	2	7	11	3,043
Browntop Millet	21	36	45	73	61	100	100	10	30	30	6,886
'Dove' Proso Millet	5	5	10	21	18	80	88	14	39	37	8,039
German Foxtail Millet	14	20	21	50	29	81	69	13	32	34	5,340
Japanese Millet	9	26	31	69	35	85	88	8	29	30	6,255
Hybrid Pearl Millet	43	50	55	85	53	90	90	18	30	31	*14,906
Mung bean	70	80	89	100	60	99	99	7	19	21	6,293
'Comanche' Partridge Pea	10	18	30	63	40	100	100	6	22	27	8,072
Catjang Pea	74	81	95	100	60	99	99	7	18	24	3,995
'Tamrun OL02' Peanut	0	14	33	65	26	75	88	4	7	10	4,568
Bengal Rice	0	33	48	85	11	68	65	8	18	19	2,808
Sesame	30	44	55	91	61	89	89	8	21	34	8,777
Sesbania	21	43	59	88	46	69	75	9	34	51	5,987
Egyptian Wheat Sorghum	54	61	74	100	68	100	100	22	43	54	15,734
Early Sumac Sorghum	9	26	38	90	54	100	100	20	48	52	15,041
Bird Magnet Sorghum	71	80	95	100	61	100	100	18	31	29	*21,124
Wild Game Food Sorghum	29	43	48	96	64	100	100	18	28	29	13,195
Sorghum Alnum	16	39	43	91	59	100	100	21	60	61	11,789
Zacate Sorghum Sudangrass Hybrid	46	61	78	100	64	100	100	25	50	56	17,611
Maxi Gain BMR-6 Sorghum Sudangrass Hybrid	84	91	94	100	60	100	100	23	36	38	16,526
Super Graze Ultra Sorgho Sudangrass Hybrid	73	81	96	100	70	100	100	20	42	47	18,673
Sugar Queen Sorgho Sudangrass Hybrid	53	70	86	99	70	100	100	21	49	50	*20,131
'Piper' Sudan Grass	45	60	88	100	54	100	100	24	58	59	17,510
'Laredo' Soybeans	41	50	69	96	30	79	84	4	14	19	4,351
Peredovik Type Sunflower	64	74	79	88	34	66	65	4	23	25	4,284
'Tropic Sun' Sunn Hemp	68	79	95	100	40	83	85	5	18	29	5,164

*Produced seed before harvest, resulting in increased biomass yields compared to other sources

** % Emergence and Cover and Plant Height is shown in days from planting

The one year data represented in this technical note were collected at the James E. "Bud" Smith Plant Materials Center near Knox City, TX. This information is to be used in general comparisons between species and sites and may not reflect actual results at all locations in Texas.

References

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