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Warm Season Cover Crops and Planting Specifications

Plant Materials Technical Note

Background

Ancient cultures utilized cover crops to provide benefits to subsequent crops. Chinese, Greek and Roman cultures improved their soil condition and crop yields using cover crops. In the United States, cover crops were regularly used as part of crop rotations through the 1950's. However, the use of longer crop rotations with grasses and legumes was reduced as commercial fertilizers became more popular (Magdoff and Van Es. 2009, USDA-NRCS 2010a).

A warm season cover crop planting of peas and sorghum.

With increased fertilizer costs and water restrictions, the use of warm season cover crops is becoming popular again for improving soil health. Some of the economic and environmental benefits of using warm season cover crops include:

- Increases soil organic matter which enhances activity of earth worms, insects, nematodes, and microorganisms (soil microbes). Increased activity by soil microbes improves soil tilth and structure, water infiltration, along with reducing soil compaction and soil crusting.
- Reduces soil erosion from wind and rain. Cover crops protect the soil by providing a mulch cover after cover crop termination.
- The cover crop mulch shades the soil surface to reduce or suppress weed seed germination and may provide an allelopathic effect as it decomposes after termination (Weston 1996).

- Nutrient cycling. Deep rooted species take up nitrogen and excess nutrients otherwise lost through leaching out of the soil profile.
- Reduce infestations of insects, diseases, nematodes, and weeds.
- Cover crops and mulches shade the soil surface thereby reducing soil temperature and conserving soil moisture.

Purpose

The purpose of this technical note is to provide conservation planners with a list of warm season cover crops for soil health application in eastern Texas, western Louisiana, southwestern Arkansas, and southeastern Oklahoma (Table 1). The list is broken into grasses, legumes and forbs and provides cultural specification on planting rate, depth and date and a remarks section with general information on soils, pH requirements, and management considerations. Information for Table 1 was compiled from the USDA-Natural Resources Conservation Service (NRCS) Field Office Technical Guide (Texas) Appendix 1-Planting rates for seeding and sprigging in Texas, Zone 4 and additional sources in the references section at the end of this technical note.

Planning, Establishment, and Termination of the Cover Crop

The first step in planning a cover crop is deciding which benefits or goals (additional organic matter, weed suppression, grazing, nutrient recycling, reducing soil compaction, etc.) are most important and refer to the USDA-NRCS Practice Standard Code 340-Cover Crop for additional guidelines. During the planning process take soil samples to conduct a Haney soil test. A Haney soil test measures inorganic and organic N and P, along with K and nutrient values per acre. It measures the soil's biological and chemical properties and gives a representation of overall soil health along with providing current baseline soil conditions and a starting point for selecting the appropriate cover crop grasses, legumes, or forbs (Haney 2016). Consult with your NRCS agronomist or local agricultural extension agent for plant species compatibility, adaptation, and varieties when choosing cover crop species.

Always purchase good quality seed of cover crop species adapted to local growing conditions (Bodner et al. 2010) with a known germination percent from a reputable company. For further information about pure live seed and seeding rates, refer to the USDA-NRCS Plant Materials Technical Note No. 11 – Understanding Seeding Rates, Recommended Planting Rates, and Pure Live Seed (PLS), (July 2009) (Louisiana state).

Cover crops are seeded either by a conventional seed drill, no till drill or broadcasting the seed onto the surface of a seedbed. Drilling is the preferred planting method because the seed is placed directly into the soil, provides better planting depth control and enhances seed to soil contact. For more information concerning seeding and seedbed preparation, refer to the following publications; USDA-NRCS Plant Materials Technical Note - Seedbed Preparation – TX-

PM-10-07 (August 2010) (Texas state) and USDA-NRCS Agronomy Technical Notes-Recommended Cover Crop Seeding Methods and Tools (February 2012).

Cover crop termination is accomplished by herbicide application, using a roller crimper, high density livestock grazing or a combination of these methods. Which method(s) to use will depend upon compatibility with the land manager's cropping or grazing system. For further information concerning cover crop termination, refer to the handout USDA-NRCS Cover Crop Termination Guidelines-Version 3-(September 2014).

Table 1. Warm Season Cover Crops and Planting Information

Common name	Scientific name	Planting depth (in.)*	Planting rate (lbs. PLS/acre)**	Planting date	Remarks
Grasses					
Browntop millet	*Urochloa ramosa*	1"	20	4/1-8/1	Adapted to a wide variety of soils, best on well drained loamy, does not do well on calcareous soils. Grows from 0.75 to 4 ft. tall. 1*
Foxtail millet	*Setaria italica*	1"	20	4/1-8/1	Adapted to a wide range of soils, best on well drained loamy. Grows 3 to 17 ft. tall.1*
Japanese millet	*Echinochloa esculenta*	1"	20	4/1-8/1	Used primarily for wildlife, adapted to wet soils. 1*
Pearl millet	*Pennisetum glaucum*	1"	12 to 20	4/1-8/1	Adapted to a wide variety of soils, best on well drained loamy, does not do well on calcareous soils. Grows 6.5 to 10 ft. tall. 1*
Proso millet	*Panicum miliaceum*	1"	15	4/1-8/1	Adapted to a wide range of soils, best on well drained loamy. Matures about 60 days after emergence. Grows to 3.5 ft. tall. 1*
Forage sorghum (grass type)	*Sorghum bicolor*	0.75" - 1.25"	10 to 15	3/1-8/1	Adapted to a wide variety of soils, needs pH of 5.5 or greater. Highly productive and responsive to nitrogen. Nitrate or prussic acid poisoning can occur under some circumstances. Mature height varies from 5 to 15 ft. 1*
Forage sorghum (other)	*Sorghum bicolor*	0.75"-1.25"	20 to 30	3/1-8/1	Adapted to a wide variety of soils, needs pH of 5.5 or greater. Highly productive and responsive to nitrogen. Nitrate or prussic acid poisoning can occur under some circumstances. Mature height varies from 5 to 15 ft. 1*
Grain sorghum	*Sorghum bicolor* subsp. *bicolor*	1"-2"	20	3/1-6/15	Adapted to a wide variety of soils, needs pH of 5.5 or greater. Highly productive and responsive to nitrogen. Nitrate or prussic acid poisoning can occur under some circumstances. Mature height varies from 2 to 4 ft. 1*
Teff	*Eragrostis tef*	0.5"	5 to 8	4/1-5/15	Upright plant architecture. Medium water use. Poor salinity tolerance. Suppresses weeds. Tolerates dry conditions better than buckwheat or Sudangrass. Does not tolerate frost or establish well in cool soils. 2*
Corn	*Zea mays*	1"-2"	8 to 20	3/15-5/1	Upright plant architecture. High water use. Poor salinity tolerance. 2*

Common name	Scientific name	Planting depth (in.)*	Planting rate (lbs. PLS/acre)**	Planting date	Remarks
Legumes					
Cowpea	*Vigna unguiculata*	0.75”-1”	40	4/1-6/15	Adapted to well drained soils pH range of 5.5 -7.0. Drought tolerant. Red Ripper better adapted to sandier soil than Iron and Clay. Does not bloat. 1*
Lablab bean	*Lablab purpureus*	1”-4”	30 to 50	3/15-5/1	Adapted to moderately well to well drained soils pH range of 4.5 to 7.8. Not as drought tolerant as cowpea, does not bloat. 1*
Common lespedeza	*Kummerowia striata*	0.25”	25	3/15-4/30	Adapted to well drained soils throughout east and southeast Texas. Optimum pH range is 5.0 to 6.5. Tends to be squeezed out by vigorously growing warm season grasses in highly fertilized situations. Korean less tolerant of soil acidity. 1*
Soybean	*Glycine max*	0.75”-1”	50 to 60	3/1-6/1	Adapted to well drained soils, pH range is 5.5 -8.0. 1*
Sunn hemp	*Crotalaria juncea*	1”	30 to 50	4/1-5/15	Annual legume that grows 3 to 9 feet tall. Grown in tropical, subtropical, and temperate locations. Adapted to well drained soils with pH of 5.0 to 7.5. Allelopathic suppression of plant parasitic nematodes such as root knot and soybean cyst. Use variety ‘Tropic Sun’ if cover crop is to be grazed. This variety is nontoxic to grazing animals. 2*
Velvet bean	*Mucuna pruriens* var *utilis*	1” -3”	20 to 40	4/1-5/30	Vining legume good for weed control. Excellent at suppressing root knot and reniform nematode activity. Produces up to 270 lb/N per acre. Tall sturdy crops (sorghums, sunflower, pearl millet, etc.) can support velvet bean vines. Tolerates a wide pH range of 5.0 to 8.0. 2*
Alyce clover	*Alysicarpus ovalifolius*	0.25”	3 to 10.1	3/1-4/30, 3/15-5/16	Best adapted to Gulf Coast and other areas of high summer rainfall. Well drained sandy soils. Tolerant of low pH. Not competitive with weeds at seedling stage. 2*
Sweet clover	*Melilotus officinalis*	o.25”	12	3/15-4/1	Both white and yellow sweetclovers are biennial. Adapted to well drained clay to clay loam, optimum pH range 6.5 to 7.5. The use of low coumarin varieties is recommended to reduce problems associated with this plant. 1*

Common name	Scientific name	Planting depth (in.)*	Planting rate (lbs. PLS/acre)**	Planting date	Remarks
Chickpea	*Cicer arietinum*	1.5”-2”	100-140 (kabuli) and 80-95 (desi)	4/15-5/15	Also known as garbanzo bean. Broadleaf legume. Low water use. Poor salinity tolerance. Flowers attract bees. Plant when soil temperature at 2 to 3 inch depth is 45F and rising. 2*
Mung bean	*Vigna radiata*	1.5”-3”	40 to 50	4/1-5/15	Broadleaf legume. Low to medium water use. Poor salinity tolerance. Upright and spreading plant architecture. Adapted to soils with pH 6.2-7.2. Perform poorly on heavy clay soils with poor drainage. 2*
Bigpod sesbania	*Sesbania herbacea*	0.75”	10 to 25	4/1-5/15	Sprawling legume that needs upright support when grown in a mix. Produces 90 to 130 lbs. N/acre in aboveground biomass. Grows in soils with a pH from 4.5 to 7.2. However, may easily become an invasive, troublesome weed in commodity crops. Although native to the U.S., it is considered a noxious weed in some states. 2*
Joint vetch	*Aeschynomene* sp.	0.5”-1.5”	5 to 8 (dehulled) 20 to 25 (non-hulled)	4/1-5/30	Grows best on soils with pH of 5.0 to 6.5. Joint vetch reseeds and this should be a consideration when determining crop termination. Produces 40-100 lbs. soil N/acre and 4,000 to 8,000 lbs. biomass/acre. Tolerant of poorly drained conditions. 2*
Forbs					
Buckwheat	*Fagopyrum esculentum*	0.5”-1.5”	50 to 60	4/1-5/15	Provides quick soil cover, suppresses weeds, provides nectar for pollinators, and scavenges phosphorus. Plant after danger of frost has passed. Can become a weed, terminate within 7 days after flowering begins, before seeds start to mature. 2*
Okra	*Abelmoschus esculentus*	0.5”-0.75”	5 to 6	when soil temp is >75F	Prefers well drained sandy loam or slightly alkaline soils with a pH range of 5.8 to 6.5. 2*
Amaranth	*Amaranthus* sp.	0.5”	2	4/1-5/15	Low water use. Tolerant of heat and drought. Upright plant architecture. Self-pollinated, but flowers may attract pollinators. 2*
Chicory	*Cichorium intybus*	0.5”or less	3 to 5	9/1-10/15	Best on deep well drained soils with pH 6.1 to 7.3 in areas that receive 14” to 27” annual rainfall with good summer rainfall potential. Pollinator habitat: blooms May to October. 2*

Common name	Scientific name	Planting depth (in.)*	Planting rate (lbs. PLS/acre)**	Planting date	Remarks
Safflower	*Carthamus tinctorius*	1”-1.5”	12	4/15-5/15	Upright plant architecture with deep roots. Produces a taproot able to take up nutrients deep in the soil profile. High water use. Good salinity tolerance. Flowers attract pollinators. 2*
Sunflower	*Helianthus annuus*	0.5”	10	4/1-5/15	Upright plant architecture with deep roots able to take up nutrients in the soil profile. Fair salinity tolerance. High water use. Flowers attract pollinators. 2*
*Use deeper planting depth for sandy soils.	**Seeding rates are for broadcast unless otherwise noted.	1* = USDA-NRCS TX FOTG Appendix 1	2*=Sources in reference section		

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