United States Department of Agriculture

NRCS Natural Resources Conservation Service

Plant Materials Program

THE BOONEVILLE PLANT MATERIALS CENTER

About the PMC

The plant materials program operates under the USDA, Natural Resources Conservation Service (NRCS). The Booneville Plant Materials Center (PMC) is one of 25 PMCs, strategically located throughout the nation, that are working to deliver state-of-the-art plant science technology to meet identified conservation needs. The Booneville Plant Materials Center (ARPMC) is co-located with the Agricultural Research Service at the Dale Bumpers Small Farms Research Center 6 miles south of Booneville Arkansas on state highway 23. The ARPMC develops plants and plant science technology to address conservation issues in areas from the rugged Ozarks to the western coastal plain. The Center serves portions of Arkansas, Missouri, and Oklahoma. The area is characterized by small family farms. Forage, poultry, and timber production are the major land uses. The soils are most often shallow, stony, and erosive. The Booneville Plant Materials Center has developed improved conservation plants, including Hampton Germplasm big bluestem, 'Bumpers' eastern gamagrass, and Wynia Germplasm Indiangrass.

PMC STAFF

Stephen Haller
Study Leader/Acting Manager

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Biological Science Technician

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PMC STAFFING CHANGES

In recent years, many of the long-time employees of the PMC became eligible for retirement and did so accordingly. In 2019, Aaron Pettit was hired to fill the manager vacancy. This year Aaron was offered an opportunity he couldn't refuse and accepted another position with NRCS as the Data Collection Coordinator at the East Remote Sensing Laboratory in Greensboro, NC. Stephen (Steve) Haller was hired as the PMC Study Leader in October 2020 and is currently serving as the acting manager. Steve comes to us from the Agricultural Research Service. He worked for several years developing ways for farmers to make better use of fertilizer nutrients applied to pastures and cropland. He is co-inventor of a patented farm implement called the "Subsurfer". The Subsurfer utilizes a no-till system to apply dry poultry litter or inorganic fertilizers under the soil surface, reducing nutrient losses to runoff and volatilization. Ben Holleman joined the PMC as the Biological Science Technician in August 2021. Before joining the PMC, Ben worked for the Agriculture Research Service and Served in the U.S. Navy.

Aaron Pettit

Ben Holleman

Stephen Haller

2021 COVER CROP STUDY

BIOMASS

Cover Crop Biomass Study

Cover crops have been shown to reduced fertilizer costs, reduced herbicide costs, improve yields and reduced soil erosion. Studies were conducted at PMCs nationwide to identify potential species and varieties best adapted for cover cropping. Further characterization of the best performing varieties will maximize cover crop benefits and allow NRCS planners to recommend the most appropriate species and variety to meet the resource concern. Biomass production is the key for achieving many of the cover crop benefits such as erosion control, weed suppression, nutrient retention, soil crusting prevention and increasing soil organic matter. For instance, if the goal of the cover crop planting is weed suppression, studies have shown that greater than 75% inhibition of weed emergence is consistently achieved when mulch biomass exceeds >7,000 lb/acre. Understanding which species and varieties have the potential to meet or exceed 7,000 lb/acre will narrow down the available options for the planner and increase the probability the cover crop will meet the conservation need.

In the spring, we collected biomass data on 42 cultivars of 10 cover crop species including: black oats, purple top turnup, winter pea, daikon radish, cereal rye, berseem clover, crimson clover, balansa clover, red clover, and hairy vetch. The same study was planted this fall, evaluations are being taken and we plan to report our findings in summer 2022.

Planting the Cover Crop

Cover Crop Harvest

2021 COVER CROP STUDY

SEEDING RATE

Cover Crop Seeding Rate Study

Another study in the second year at the PMC is the cover crop seeding rate study. We are evaluating biomass yield of cool season cover crop varieties grown at different seeding densities at multiple PMC locations. Cool season legume cover crop seeding rates are evaluated for biomass yield with and without cereal rye at 4 different seeding rates: lowest rate (1/4), low rate (1/2), recommended rate (SARE rates), and high rate (1-1/2) Refer to the table below for species/cultivar planting rates. Another part of the study involves planting one-half of the recommended rate of 'Wren's Abruzzi' cereal rye in combination with the different legume seeding rates to evaluate a small grain and legume seed mix on biomass yield and ground cover. All PMCs are using a standard data collection protocol to better compare data among several locations. The results of this effort will help us update cover crop seeding rate information for NRCS field offices and aid farmers with cost effective measures for incorporating cover crops into their cropping systems.

Cover Crop	SARE recommended Drilled lb/acre	Lowest ¼ x	Low ½ x	SARE Full	High 1.5 x
'AU Merit' hairy vetch	15-20	5	10	20	30
common vetch	15-20	5	10	20	30
'Frosty' berseem clover	8-12	3	6	12	18
'Dixie' crimson clover	15-20	5	10	20	30
'Wyo' winter pea	50-80	20	40	80	120
'Wren's Abruzzi' cereal rye	60 – 120 (1/2 for mix)		30		

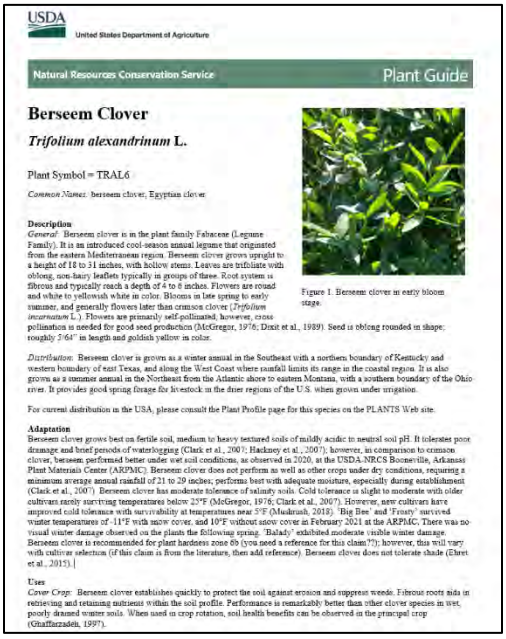
TRAINING, PUBLICATIONS, AND INFORMATION

Written Products:

- 'Bumpers' eastern gamagrass brochure
- Establishing 'Halifax' maidencane to control shoreline erosion on irrigation reservoir banks in Arkansas
- Berseem clover plant guide

Training Videos:

- Conducting a controlled burn on native warm season grasses
- Establishing bermudagrass no-till vs conventional till



USDA
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Natural Resources Conservation Service — Plant Guide

Berseem Clover

***Trifolium alexandrinum* L.**

Plant Symbol = TRAL6

Common Names: berseem clover, Egyptian clover

Figure 1. Berseem clover in early bloom stage.

Description

General: Berseem clover is in the plant family Fabaceae (Legume Family). It is an introduced cool-season annual legume that originated from the eastern Mediterranean region. Berseem clover grows upright to a height of 18 to 31 inches, with hollow stems. Leaves are trifoliate with oblong, non-hairy leaflets typically in groups of three. Root system is fibrous and typically reach a depth of 4 to 6 inches. Flowers are round and white to yellowish white in color. Blooms in late spring to early summer, and generally flowers later than crimson clover (*Trifolium incarnatum* L.). Flowers are primarily self-pollinated; however, cross pollination is needed for good seed production (McGregor, 1976; Dixit et al., 1989). Seed is oblong rounded in shape; roughly 5/64" in length and goldish yellow in color.

Distribution: Berseem clover is grown as a winter annual in the Southeast with a northern boundary of Kentucky and western boundary of east Texas, and along the West Coast where rainfall limits its range in the coastal region. It is also grown as a summer annual in the Northeast from the Atlantic shore to eastern Montana, with a southern boundary of the Ohio river. It provides good spring forage for livestock in the drier regions of the U.S. when grown under irrigation.

For current distribution in the USA, please consult the Plant Profile page for this species on the PLANTS Web site.

Adaptation

Berseem clover grows best on fertile soil, medium to heavy textured soils of mildly acidic to neutral soil pH. It tolerates poor drainage and brief periods of waterlogging (Clark et al., 2007; Hackney et al., 2007); however, in comparison to crimson clover, berseem performed better under wet soil conditions, as observed in 2020, at the USDA-NRCS Booneville, Arkansas Plant Materials Center (ARPMC). Berseem clover does not perform as well as other crops under dry conditions, requiring a minimum average annual rainfall of 21 to 29 inches; performs best with adequate moisture, especially during establishment (Clark et al., 2007). Berseem clover has moderate tolerance of salinity soils. Cold tolerance is slight to moderate with older cultivars rarely surviving temperatures below 25°F (McGregor, 1976; Clark et al., 2007). However, new cultivars have improved cold tolerance with survivability at temperatures near 5°F (Mashriah, 2018). 'Big Bee' and 'Frosty' survived winter temperatures of -11°F with snow cover, and 10°F without snow cover in February 2021 at the ARPMC. There was no visual winter damage observed on the plants the following spring. 'Balady' exhibited moderate visible winter damage. Berseem clover is recommended for plant hardiness zone 6b (you need a reference for this claim??); however, this will vary with cultivar selection (if this claim is from the literature, then add reference). Berseem clover does not tolerate shade (Ehret et al., 2015).

Uses

Cover Crop: Berseem clover establishes quickly to protect the soil against erosion and suppress weeds. Fibrous roots aids in retrieving and retaining nutrients within the soil profile. Performance is remarkably better than other clover species in wet, poorly drained winter soils. When used in crop rotation, soil health benefits can be observed in the principal crop (Ghaffaradeh, 1997).

Berseem Clover Plant Guide

Controlled Burn

PMC Information is available online at:
http://www.plant-materials.nrcs.usda.gov/arpmc/
Booneville Plant Materials Center | NRCS Arkansas (usda.gov)