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Plant Materials Technical Note No. 3

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# Evaluation of Cool Season Cover Crops in the Southeast Region



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# Acknowledgements

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# Preface

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The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Plant Materials Program has been involved in the evaluation of conservation plants and planting technology for more than 80 years.

Plant Materials Centers (PMCs) in Brooksville, FL; Americus, GA; and Coffeerville, MS conducted a 2-year evaluation of 56 commercially available varieties of black oats, black seeded oats, cereal rye, crimson clover, daikon radish, hairy vetch, red clover, and winter/field pea to assess their adaptation and performance as cover crops in the Southeast PMC region. Information from the study will assist conservation planners and farmers in selecting varieties to meet the cover crop objectives of their production systems.

For additional information on specific species of plants mentioned in this publication, please see the USDA PLANTS database at: (<http://plants.usda.gov/java/>) or contact the nearest Plant Materials Center or plant materials specialist (<http://plant-materials.nrcs.usda.gov/contact/>) and/or the Land Grant Universities that serve the State. For specific information on soils and soil health, please see USDA NRCS soils website at: (<http://www.nrcs.usda.gov/wps/portal/nrcs/site/soils/home/>). Also, see technical resources on the National Plant Materials Program Web site at: (<http://www.plant-materials.nrcs.usda.gov/>).

## USDA NRCS Plant Materials Centers Southeast Region



## INTRODUCTION

Farmers rely on the latest crop variety trials to make informed decisions on planting the best adapted crop variety to maximize yield given their soils and production practices. With the ever-growing interest in planting cover crops, the USDA-Natural Resources Conservation Service (NRCS) Plant Materials Program initiated a nationwide study to identify adapted varieties of cool season annual species for cover cropping. With input from State Agronomists and State Soil Health Specialists, seven cool season annual cover crop species were identified for comparative evaluations using the network of NRCS Plant Materials Centers (PMCs). The PMCs assembled commercially available varieties of black oats, black seeded oats, cereal rye, crimson clover, daikon radish, hairy vetch, red clover, and winter/field pea to evaluate their performance and adaptation to different soils and geographical regions in the U.S. Information from this study along with local research from university extension and other research entities can assist farmers and conservation planners in selecting adapted cool season annual varieties for their crop production systems. Additional information for each PMC location, including plant height and biomass (where collected), can be found in their final study reports hyperlinked at the end of this document.

## CHOOSING VARIETIES FOR CONSERVATION PLANTINGS

Commodity crops are chosen to fit local climate and soil conditions, and producers select varieties of commodity crops carefully to maximize performance and returns. For the producer, variety selection is a dynamic process that takes advantage of the many options available when deciding which varietal attributes best meet their needs. When choosing cover crop varieties, the producer may also take advantage of differences among varieties to best meet the goals of their production system.



When a cover crop species is chosen to meet a resource concern, a variety from that species may be selected to meet needs such as: 1) production of early or late cover, 2) early or late maturity, or 3) winter survival. By choosing varieties based on the production system, cover crop plans and systems can be developed to:

- time planting and termination dates to fit within the cropping system,
- develop mixes with species that mature at similar times to facilitate mechanical termination,
- use winterkill as a method of termination,
- use moderate levels of winterkill to manage competition of aggressive species, and
- use maturity dates to regulate the amount of cover crop residue.

Through selection of varieties that fit production systems, producers may overcome obstacles that discourage the use of cover crops.

## PROCEDURE

Cool season, annual, cover crop varieties were evaluated at NRCS PMCs in Brooksville, FL; Americus, GA; and Coffeeville, MS in 2016-2017 and 2017-2018 (Table 1). Replicated plots were drilled in the fall using the pure live seed planting method (Table 2), and seeding rates were determined by averaging the recommended seeding rates from NRCS cover crop standards and specifications for uniform data analysis (Table 3). Legumes were inoculated with appropriate rhizobia prior to planting. Non-legumes were fertilized with 40 lbs. N/acre, and all entries received 60 lbs. P/acre and 30 lbs. K/acre both years. Cover crop varieties were evaluated for:

- Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%,
- Fall stand quality—Yes is >65% emergence at 28 days after planting,
- Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Marginal 25-50%, Poor <25%,
- Maturity date—Days after planting to 50% bloom, data was grouped over the region by <140=Early, 141-160=Mid, >160=Late to identify varietal differences, and
- Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

Table 1. Soil type, long-term yearly rainfall, average frost date, and low temperatures in Brooksville, FL; Americus, GA; and Coffeeville, MS.

Plant Materials Center	Soil type	Average Yearly Rainfall (inches)	Average Frost Date	Low Temperature (F)	
				2016-2017	2017-2018
Brooksville, FL	Sparr/Electra fine sand	53	Jan 15	29	23
Americus, GA	Orangeburg loam sand	49	Nov 26	25	17
Coffeeville, MS	Oaklimeter silt loam	57	Nov 10	9	5

Table 2. Planting date/year and planting method in Brooksville, FL; Americus, GA; and Coffeeville, MS.

Plant Materials Center	Planting Date (Year)		Planting Method
	2016	2017	
Brooksville, FL	26 Oct	10 Jan	Drill
Americus, GA	13 Oct	3 Nov	Drill
Coffeeville, MS	14 Oct	16 Oct	Drill

Table 3. Cover Crop planting rates at NRCS Plant Materials Centers in Brooksville, FL; Americus, GA; and Coffeeville, MS.

Common Name	Species	PLS lbs./Acre
black oats	<i>Avena strigosa</i>	60
black seeded oats	<i>Avena sativa</i>	60
cereal rye	<i>Secale cereale</i>	100
crimson clover	<i>Trifolium incarnatum</i>	18
daikon radish	<i>Raphanus sativus</i>	9
hairy vetch	<i>Vicia villosa</i>	18
red clover	<i>Trifolium pratense</i>	9
winter/field pea	<i>Pisum sativum</i>	70

## COVER CROP PERFORMANCE AND RESULTS

### BLACK OATS/BLACK SEEDED OATS

**Description:** upright, winter annual grass. Height from 2 ½–5 feet. Black oats are not cold hardy and will winterkill at temperatures less than 19°F depending on growth stage. Black seeded oats are more cold tolerant than black oats, but susceptible to winter damage in northern locations. Prefers sandy or loamy soils but can also grow in heavy clay. It is used as a rotational cover crop either seeded alone or in a mixture.

**Benefits:** N scavenger, improves organic matter and soil structure, erosion control, weed suppressor, livestock forage.



*Black oats*

#### Performance of Black Oats/Black Seeded Oats Varieties

Cover Crop	Quick Fall Cover <sup>1/</sup>	Fall Stand Quality <sup>2/</sup>	Winter Survival <sup>3/</sup>	Maturity Date <sup>4/</sup>	Disease Ranking <sup>5/</sup>	Insect Ranking <sup>5/</sup>
Cosaque	Excellent	Yes	Excellent	Mid	Low/High <sup>b</sup>	None
Soil Saver	Excellent	Yes	Excellent/Poor <sup>a</sup>	Mid	Low	None

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%; <sup>2/</sup>Fall stand quality—Yes is >65% emergence at 28 days after planting; <sup>3/</sup>Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Marginal 25-50%, Poor <25%; <sup>4/</sup>Maturity date—Days after planting to 50% bloom: <140=Early, 141-160=Mid, >160=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Excellent winter survival in FL and GA, fair to poor in MS. <sup>b</sup>Low disease issues in MS and FL; moderate to high in GA.

**Expected Adaptation:** Soil Saver (black oats) and Cosaque (black seeded oats) rated excellent for quick fall cover and had acceptable stand quality at all locations except Americus, GA in 2016-2017 due to dry conditions after planting. Cosaque and Soil Saver also exhibited excellent winter survival at all locations except in Coffeerville, MS where winter survival for Soil Saver was marginal to poor. Foliar disease was notably high in Americus, GA and moderate to low in Brooksville, FL and Coffeerville, MS. Cosaque is a good choice as an overwintering cover crop in Brooksville, FL, Americus, GA and Coffeerville, MS while Soil Saver is a good choice as an overwintering cover crop in Brooksville, FL and Americus, GA.



*Soil Saver black oats in Americus, GA.*

## CEREAL RYE

**Description:** upright, cool season, annual grass. Height from 3 to 6 feet. Grows in a wide variety of climate and soil conditions but grows best in light loams or sandy soils. It also does well in clay soils.

**Benefits:** N scavenger, improves organic matter and soil structure, erosion control, weed suppressor, livestock forage.



*Cereal rye plots in Americus, GA. Wheeler (middle plot) and Merced (foreground).*

### Performance of Cereal Rye Varieties

Cover Crop	Quick Fall Cover <sup>1/</sup>	Fall Stand Quality <sup>2/</sup>	Winter Survival <sup>3/</sup>	Maturity Date <sup>4/</sup>	Disease Ranking <sup>5/</sup>	Insect Ranking <sup>5/</sup>
Aroostook	Excellent	Yes	Excellent	Mid	Low	Low
Bates	Good	Yes	Excellent	Early	Low	Low
Brasetto	Good	Yes	Excellent	Late	Low/High <sup>i</sup>	Low
Elbon	Excellent	Yes	Excellent	Mid	Low	Low
FL 401	Excellent	Yes	Excellent	Early	Low	Low
Guardian	Good/Poor <sup>a</sup>	No/Yes <sup>g</sup>	Excellent	Late	Low/High <sup>i</sup>	Low
Hazlet	Excellent/Poor <sup>b</sup>	Yes	Excellent	Mid	Low/High <sup>i</sup>	Low
Maton	Excellent	Yes	Excellent	Mid	Low	Low
Maton II	Good/Fair <sup>c</sup>	Yes	Excellent	Mid	Low	Low
Merced	Excellent	Yes	Excellent	Early	Low	Low
Oklon	Good	Yes	Excellent	Mid	Low	Low
Prima	Excellent <sup>d</sup>	Yes	Excellent	Late	Low/High <sup>i</sup>	Low
Rymin	Good/Poor <sup>e</sup>	Yes	Excellent	Late	Low/High <sup>i</sup>	Low
Wheeler	Good/Poor <sup>f</sup>	Yes/No <sup>h</sup>	Excellent	Late	Low/High <sup>i</sup>	Low
Wintergrazer 70	Excellent	Yes	Excellent	Mid	Low	Low
Wrens Abruzzi	Good	Yes	Excellent	Mid	Low	Low

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%; <sup>2/</sup>Fall stand quality—Yes is >65% emergence at 28 days after planting; <sup>3/</sup>Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Marginal 25-50%, Poor <25%; <sup>4/</sup>Maturity date—Days after planting to 50% bloom: <140=Early, 141-160=Mid, >160=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Good to excellent fall cover at all locations in 2016-2017; poor to fair at all locations in 2017-2018; <sup>b</sup>Poor fall cover in FL in 2017-2018 only; <sup>c</sup>Fair fall cover in FL and MS in 2017-2018; <sup>d</sup>Only planted in FL(2016-2017) and GA; <sup>e</sup>Poor in FL in 2017-2018;

<sup>f</sup>Poor in FL and MS in 2017-2018; <sup>g</sup>Unacceptable fall stand quality in FL, GA, and MS in 2017-2018; <sup>h</sup>Unacceptable fall stand quality in FL and MS in 2017-2018; <sup>i</sup>High disease damage in GA in 2016-2017.

**Expected Adaptation:** Cereal rye varieties generally had good to excellent, quick fall cover, stand quality and winter survival at all locations both years. Bates, FL 401 and Merced reached maturity sooner than the other varieties across all locations. Disease ranking was low for all varieties and locations except in Americus, GA where Brasetto, Guardian, Hazlet, Prima, Rymin and Wheeler showed fair to high susceptibility to foliar diseases.

## CRIMSON CLOVER

**Description:** cool season annual legume. Plants are generally densely hairy with a rosette of upright, usually unbranched stems, reaching 1 to 3 feet tall supported by a central taproot and many fibrous roots. Flowers produce nectar and pollen that attract European honey bees, as well as a wide variety of native bees.

**Benefits:** N source, improves organic matter and soil structure, erosion control, weed suppressor, livestock forage, pollinator habitat.



*Crimson clover*

### Performance of Crimson Clover Varieties

Cover Crop	Quick Fall Cover <sup>1/</sup>	Fall Stand Quality <sup>2/</sup>	Winter Survival <sup>3/</sup>	Maturity Date <sup>4/</sup>	Disease Ranking <sup>5/</sup>	Insect Ranking <sup>5/</sup>
AU Robin	Fair/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Mid	Low	Low
AU Sunrise	Good	Yes/No <sup>f</sup>	Excellent	Mid	Low	Low
AU Sunup	Fair/Poor <sup>b</sup>	No/Yes <sup>g</sup>	Excellent	Early	Low	Low
Contea	Fair/Poor <sup>c</sup>	No	Excellent	Mid	Low	Low
Dixie	Good/Fair <sup>d</sup>	Yes/No <sup>h</sup>	Excellent	Mid	Low	Low
Kentucky Pride	Good	Yes	Excellent	Late	Low	Low

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%; <sup>2/</sup>Fall stand quality—Yes is >65% emergence at 28 days after planting; <sup>3/</sup>Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Marginal 25-50%, Poor <25%; <sup>4/</sup>Maturity date—Days after planting to 50% bloom: <140=Early, 141-160=Mid, >160=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Poor fall cover in FL and GA in 2017-2018; fair cover at other locations; <sup>b</sup>Poor fall cover in FL both years, GA in 2016-2017 and MS in 2017-2018; <sup>c</sup>Poor in FL and MS in 2017-2018; fair at other locations; <sup>d</sup>Good to fair fall cover, poor FL in 2016-2017; <sup>e</sup>Acceptable stand quality in MS both years only; <sup>f</sup>Unacceptable in GA 2016-2017; <sup>g</sup>Acceptable fall stand quality in MS 2016-2017 only; <sup>h</sup>Unacceptable in FL and GA 2016-2017.

**Expected Adaptation:** Some crimson clover varieties provided good to fair, quick fall cover with variance across locations. AU Sunrise and Kentucky Pride provided good, quick fall cover and acceptable stand at most or all locations both years. Lack of soil moisture at planting attributed to low germination and field emergence in Americus, GA in 2016-2017. Winter survival for all varieties was excellent both years. AU Sunup reached maturity (50% bloom) sooner than the other varieties. Disease and insect damage were low.



*Early spring growth of crimson clover varieties in Americus, GA.*

## DAIKON RADISH

**Description:** winter annual with stiff, straight hairs near the base of the leaves. Seed stalks elongate from the rosette. Flowers in the spring with four pink, white, or lavender petals. Fruit resemble small bean pods. Radish develops a unique taproot which may reach depths of 24 inches or more. The upper 12-20 inches of the taproot thicken and can grow to 2 inches or more in diameter. Concorde, Control and Defender are oilseed radishes while other radishes are daikon/forage varieties.

**Benefits:** N scavenger, improves organic matter and soil structure, erosion control, weed suppressor, livestock forage.



*Daikon radish taproot*

### Performance of Daikon Radish Varieties

Cover Crop	Quick Fall Cover <sup>1/</sup>	Fall Stand Quality <sup>2/</sup>	Winter Survival <sup>3/</sup>	Maturity Date <sup>4/</sup>	Disease Ranking <sup>5/</sup>	Insect Ranking <sup>5/</sup>
Big Dog™	Good	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Concorde	Good	Yes	Excellent/Good <sup>c</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Control	Good	Yes	Excellent/Good <sup>c</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Defender	Good	Yes/No <sup>a</sup>	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Driller	Good	Yes	Good/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Eco-Till™	Good	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Graza	Poor	No	Excellent/Good <sup>c</sup>	Mid	Low <sup>d</sup>	Low <sup>d</sup>
Groundhog™	Good	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Lunch	Fair	Yes/No <sup>a</sup>	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Nitro™	Good	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Sodbuster	Fair	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Tillage®	Good	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%; <sup>2/</sup>Fall stand quality—Yes is >65% emergence at 28 days after planting; <sup>3/</sup>Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Marginal 25-50%, Poor <25%; <sup>4/</sup>Maturity date—Days after planting to 50% bloom: <140=Early, 141-160=Mid, >160=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High. WK= winterkilled.

<sup>a</sup>Acceptable fall stand quality at all locations except FL in 2017-2018 and GA in 2016-2017; <sup>b</sup>Excellent to good winter survival in FL and GA (2017-2018), marginal-poor or winterkilled in MS; <sup>c</sup>Excellent winter survival in FL and GA (2017-2018); good in MS; <sup>d</sup>Low to moderate disease and insect rankings for GA and surviving varieties in MS.

**Expected Adaptation:** Most daikon radish varieties provided good, quick fall cover and acceptable fall stand quality at all locations both years. Varieties exhibited good to excellent winter survival in Brooksville, FL and Americus, GA, but most varieties winterkilled in Coffeeville, MS or were severely winter damaged (<20% survival). Only Concorde, Control and Graza had good to excellent winter survival across locations. Winter surviving varieties all reached maturity (50% bloom) in Brooksville, FL an average of 75 days after planting. In Americus, GA and Coffeeville, MS, Concorde, Control, Defender, and Graza were consistently later maturing than other varieties. Winter surviving varieties generally exhibited low disease or insect damage.



*Daikon radish varieties generally provided good, quick fall cover in FL, GA, and MS but winterkilled in MS.*

## HAIRY VETCH

**Description:** trailing or climbing, winter annual, legume with stems 2 to 5 feet. Leaves are terminated by branched tendrils. Stems and leaves are usually covered with soft woolly fuzz. Flowers in clusters of 10 to 40 and usually violet to purple colored. Lana is a variety of woollypod vetch (*Vicia villosa* ssp. *dasycarpa*) included in this study because of its similarity in usage to hairy vetch.

**Benefits:** N source, weed suppressor, improves organic matter, soil structure, pollinator habitat.



Hairy vetch flowers

### Performance of Hairy Vetch Varieties

Cover Crop	Quick Fall Cover <sup>1/</sup>	Fall Stand Quality <sup>2/</sup>	Winter Survival <sup>3/</sup>	Maturity Date <sup>4/</sup>	Disease Ranking <sup>5/</sup>	Insect Ranking <sup>5/</sup>
CCS Groff	Good/Poor <sup>a</sup>	Yes/No <sup>c</sup>	Excellent	Mid	Low	Low
Lana	Good/Poor <sup>a</sup>	Yes/No <sup>d</sup>	Excellent	Mid	Low/Moderate <sup>f</sup>	Low
Purple Bounty	Good/Poor <sup>b</sup>	Yes/No <sup>c</sup>	Excellent	Mid	Low	Low
Purple Prosperity	Good/Poor <sup>a</sup>	Yes/No <sup>d</sup>	Excellent	Mid	Low	Low
TNT	Good/Poor <sup>a</sup>	Yes/No <sup>d</sup>	Excellent	Mid	Low/Moderate <sup>f</sup>	Low
Villana	Good/Poor <sup>a</sup>	Yes/No <sup>c</sup>	Excellent	Late	Low	Low

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%; <sup>2/</sup>Fall stand quality—Yes is >65% emergence at 28 days after planting; <sup>3/</sup>Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Marginal 25-50%, Poor <25%; <sup>4/</sup>Maturity date—Days after planting to 50% bloom: <140=Early, 141-160=Mid, >160=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Poor fall cover in GA in 2016-2017; good to fair in other locations; <sup>b</sup>Poor fall cover in FL and GA in 2016-2017, good to fair in other locations; <sup>c</sup>Unacceptable fall stand quality in FL 2017-2018 and GA in 2016-2017, acceptable at all other locations;

<sup>d</sup>Unacceptable fall stand quality in GA in 2016-2017, acceptable at all other locations; <sup>e</sup>Unacceptable fall stand quality in GA and FL in 2016-2017, acceptable at all other locations; <sup>f</sup>Moderate disease in GA.

**Expected Adaptation:** Hairy vetch varieties provided mostly good to fair, quick fall cover, favorable fall stand quality and excellent winter survival except in Americus, GA in 2016-2017 where dry conditions at planting slowed germination. While varieties emerged quickly, growth through the fall and early spring was minimal in Americus, GA. Villana matured (50% bloom) late across all locations. All varieties generally had low disease and insect damage.



Spring growth of hairy vetch varieties at the Jamie. L. Whitten Plant Materials Center, Coffeeville, MS.

## RED CLOVER

**Description:** biennial or short-lived perennial that grows as one of two types: medium (double-cut) or mammoth (single-cut). Plants grow from crowns with hollow, hairy stems and branches. Stem lengths of medium and mammoth types average 18 inches and 24 to 30 inches, respectively. Each leaf consists of a slender stalk bearing 3 leaflets. Flowers borne in compact clusters or heads and are usually rose-pink in color.

**Benefits:** N source, improves organic matter and soil structure, erosion control, weed suppressor, livestock forage, pollinator habitat.



*Red clover*

### Performance of Red Clover Varieties

Cover Crop	Quick Fall Cover <sup>1/</sup>	Fall Stand Quality <sup>2/</sup>	Winter Survival <sup>3/</sup>	Maturity Date <sup>4/</sup>	Disease Ranking <sup>5/</sup>	Insect Ranking <sup>5/</sup>
Cinnamon Plus	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Cyclone II	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Dynamite	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Freedom	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Kenland	Good/Poor <sup>b</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Mammoth	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Starfire II	Good/Poor <sup>b</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Wildecot	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%; <sup>2/</sup>Fall stand quality—Yes is >65% emergence at 28 days after planting; <sup>3/</sup>Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Marginal 25-50%, Poor <25%; <sup>4/</sup>Maturity date—Days after planting to 50% bloom: <140=Early, 141-160=Mid, >160=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Good to fair fall cover in GA and FL in 2017-2018 and MS both years, poor in FL and GA in 2016-2017; <sup>b</sup>Good to fair fall cover in GA 2017-2018 and MS in 2016-2017 only; <sup>c</sup>Unacceptable fall stand quality in FL both years and GA in 2016-2017; acceptable stand quality at all other locations; <sup>d</sup>Maturity based on GA and MS.

**Expected Adaptation:** Red clover varieties generally provided good to fair quick fall cover, with acceptable fall stand quality and excellent winter survival. Poor performance in Americus, GA and Brooksville, FL were mainly related to dry conditions at planting. All varieties in Americus, GA and Coffeeville, MS reached maturity on average between 190 and 200 days after planting. Disease and insect damage were low.



*Late spring growth of Mammoth red clover in Mississippi.*

## WINTER/FIELD PEA

**Description:** winter annual, legume with bluish-green waxy vines. Vines can reach 9 ft long, but modern varieties have shorter vines, about 2 feet long. Stems are hollow and leaves alternate, pinnately compound. Flowers white, purple or pink. Winter pea varieties include Frost Master, Lynx, Survivor 15, Whistler, and Windham. Spring pea varieties include Arvica 4010, Dunn, and Maxum.

**Benefits:** N source, improves organic matter and soil structure, erosion control, weed suppressor, livestock forage, pollinator habitat.



*Field pea*

### Performance of Winter/Field Pea Varieties

Cover Crop	Quick Fall Cover <sup>1/</sup>	Fall Stand Quality <sup>2/</sup>	Winter Survival <sup>3/</sup>	Maturity Date <sup>4/</sup>	Disease Ranking <sup>5/</sup>	Insect Ranking <sup>5/</sup>
Arvica 4010	Good <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Early	Moderate	Low
Dunn	Good <sup>a</sup>	Yes	Excellent-Marginal <sup>d</sup>	Early	Moderate	Low
Frost Master	Good <sup>b</sup>	Yes	Excellent	Mid	Moderate/High <sup>f</sup>	Low
Lynx	Good <sup>b</sup>	Yes	Excellent/Marginal <sup>c</sup>	Mid	Moderate	Low
Maxum	Good <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Early	Moderate	Low
Survivor 15	Good <sup>b</sup>	Yes	Excellent	Late	Moderate/High <sup>f</sup>	Low
Whistler	Good <sup>b</sup>	Yes	Excellent	Mid	Moderate	Low
Windham	Good <sup>a</sup>	Yes	Excellent	Early	Moderate	Low

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%; <sup>2/</sup>Fall stand quality—Yes is >65% emergence at 28 days after planting; <sup>3/</sup>Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Marginal 25-50%, Poor <25%; <sup>4/</sup>Maturity date—Days after planting to 50% bloom: <140=Early, 141-160=Mid, >160=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Good quick fall cover at all locations except fair in MS in 2017-2018; <sup>b</sup>Good quick fall cover at all locations except fair in MS and FL in 2017-2018; <sup>c</sup>Marginal in MS both years; <sup>d</sup>Marginal in MS both years and good in GA in 2017-2018; <sup>e</sup>Marginal in MS in 2017-2018; <sup>f</sup>High disease damage in GA in 2017-2018.

**Expected Adaptation:** Field pea varieties had good, quick fall cover and acceptable fall stand quality at all locations. Winter survival was excellent in Brooksville, FL and Americus, GA and varied by variety in Coffeeville, MS. Maturity date varied among varieties and locations. Maturity dates for all varieties in Brooksville, FL averaged 73 days after planting. In Americus, GA and Coffeeville, MS, Arvica 4010, Dunn, and Maxum were earliest while Front Master and Survivor 15 were latest. Disease damage was noted in all locations while insect damage was generally low.



*Field pea blooming in the spring in Americus, GA.*

## Comparison of Cool Season Cover Crops and Varieties in the Southeast

Cover Crop	Quick Fall Cover <sup>1/</sup>	Fall Stand Quality <sup>2/</sup>	Winter Survival <sup>3/</sup>	Maturity Date <sup>4/</sup>	Disease Ranking <sup>5/</sup>	Insect Ranking <sup>5/</sup>
<b>BLACK OATS</b>						
Soil Saver	Excellent	Yes	Excellent/Poor <sup>a</sup>	Mid	Low	None
<sup>a</sup> Excellent winter survival in FL and GA, fair to poor in MS.						
<b>BLACK SEEDED OATS</b>						
Cosaque	Excellent	Yes	Excellent	Mid	Low/High <sup>a</sup>	None
<sup>a</sup> Low disease issues in MS and FL; moderate to high in GA.						
<b>CEREAL RYE</b>						
Aroostook	Excellent	Yes	Excellent	Mid	Low	Low
Bates	Good	Yes	Excellent	Early	Low	Low
Brasetto	Good	Yes	Excellent	Late	Low/High <sup>i</sup>	Low
Elbon	Excellent	Yes	Excellent	Mid	Low	Low
FL 401	Excellent	Yes	Excellent	Early	Low	Low
Guardian	Good/Poor <sup>a</sup>	No/Yes <sup>g</sup>	Excellent	Late	Low/High <sup>i</sup>	Low
Hazlet	Excellent/Poor <sup>b</sup>	Yes	Excellent	Mid	Low/High <sup>i</sup>	Low
Maton	Excellent	Yes	Excellent	Mid	Low	Low
Maton II	Good/Fair <sup>c</sup>	Yes	Excellent	Mid	Low	Low
Merced	Excellent	Yes	Excellent	Early	Low	Low
Oklon	Good	Yes	Excellent	Mid	Low	Low
Prima	Excellent <sup>d</sup>	Yes	Excellent	Late	Low/High <sup>i</sup>	Low
Rymin	Good/Poor <sup>e</sup>	Yes	Excellent	Late	Low/High <sup>i</sup>	Low
Wheeler	Good/Poor <sup>f</sup>	Yes/No <sup>h</sup>	Excellent	Late	Low/High <sup>i</sup>	Low
Wintergrazer 70	Excellent	Yes	Excellent	Mid	Low	Low
Wrens Abruzzi	Good	Yes	Excellent	Mid	Low	Low
<sup>a</sup> Good to excellent fall cover at all locations in 2016-2017; poor to fair at all locations in 2017-2018; <sup>b</sup> Poor fall cover in FL in 2017-2018 only; <sup>c</sup> Fair fall cover in FL and MS in 2017-2018; <sup>d</sup> Only planted in FL(2016-2017) and GA; <sup>e</sup> Poor in FL in 2017-2018; <sup>f</sup> Poor in FL and MS in 2017-2018; <sup>g</sup> Unacceptable fall stand quality in FL, GA, and MS in 2017-2018; <sup>h</sup> Unacceptable fall stand quality in FL and MS in 2017-2018; <sup>i</sup> High disease damage in GA in 2016-2017.						
<b>CRIMSON CLOVER</b>						
AU Robin	Fair/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Mid	Low	Low
AU Sunrise	Good	Yes/No <sup>f</sup>	Excellent	Mid	Low	Low
AU Sunup	Fair/Poor <sup>b</sup>	No/Yes <sup>g</sup>	Excellent	Early	Low	Low
Contea	Fair/Poor <sup>c</sup>	No	Excellent	Mid	Low	Low
Dixie	Good/Fair <sup>d</sup>	Yes/No <sup>h</sup>	Excellent	Mid	Low	Low
Kentucky Pride	Good	Yes	Excellent	Late	Low	Low
<sup>a</sup> Poor fall cover in FL and GA in 2017-2018; fair cover at other locations; <sup>b</sup> Poor fall cover in FL both years, GA in 2016-2017 and MS in 2017-2018; <sup>c</sup> Poor in FL and MS in 2017-2018; fair at other locations; <sup>d</sup> Good to fair fall cover, poor FL in 2016-2017; <sup>e</sup> Acceptable stand quality in MS both years only; <sup>f</sup> Unacceptable in GA 2016-2017; <sup>g</sup> Acceptable fall stand quality in MS 2016-2017 only; <sup>h</sup> Unacceptable in FL and GA 2016-2017.						
<sup>1/</sup> Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%; <sup>2/</sup> Fall stand quality—Yes is >65% emergence at 28 days after planting; <sup>3/</sup> Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Marginal 25-50%, Poor <25%; <sup>4/</sup> Maturity date—Days after planting to 50% bloom: <140=Early, 141-160=Mid, >160=Late; and <sup>5/</sup> Disease and insect ranking—Damage observed was None, Low, Moderate, or High.						

## Comparison of Cool Season Cover Crops and Varieties in the Southeast (Cont.)

Cover Crop	Quick Fall Cover <sup>1/</sup>	Fall Stand Quality <sup>2/</sup>	Winter Survival <sup>3/</sup>	Maturity Date <sup>4/</sup>	Disease Ranking <sup>5/</sup>	Insect Ranking <sup>5/</sup>
<b>DAIKON RADISH</b>						
Big Dog™	Good	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Concorde	Good	Yes	Excellent/Good <sup>c</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Control	Good	Yes	Excellent/Good <sup>c</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Defender	Good	Yes/No <sup>a</sup>	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Driller	Good	Yes	Good/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Eco-Till™	Good	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Graza	Poor	No	Excellent/Good <sup>c</sup>	Mid	Low <sup>d</sup>	Low <sup>d</sup>
Groundhog™	Good	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Lunch	Fair	Yes/No <sup>a</sup>	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Nitro™	Good	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Sodbuster	Fair	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
Tillage®	Good	Yes	Excellent/WK <sup>b</sup>	Early	Low <sup>d</sup>	Low <sup>d</sup>
<sup>a</sup> Acceptable fall stand quality at all locations except FL in 2017-2018 and GA in 2016-2017; <sup>b</sup> Excellent to good winter survival in FL and GA (2017-2018), marginal-poor or winterkilled in MS; <sup>c</sup> Excellent winter survival in FL and GA (2017-2018); good in MS; <sup>d</sup> Low to moderate disease and insect rankings for GA and surviving varieties in MS.						
<b>HAIRY VETCH</b>						
CCS Groff	Good/Poor <sup>a</sup>	Yes/No <sup>c</sup>	Excellent	Mid	Low	Low
Lana	Good/Poor <sup>a</sup>	Yes/No <sup>d</sup>	Excellent	Mid	Low/Moderate <sup>f</sup>	Low
Purple Bounty	Good/Poor <sup>b</sup>	Yes/No <sup>c</sup>	Excellent	Mid	Low	Low
Purple Prosperity	Good/Poor <sup>a</sup>	Yes/No <sup>d</sup>	Excellent	Mid	Low	Low
TNT	Good/Poor <sup>a</sup>	Yes/No <sup>d</sup>	Excellent	Mid	Low/Moderate <sup>f</sup>	Low
Villana	Good/Poor <sup>a</sup>	Yes/No <sup>c</sup>	Excellent	Late	Low	Low
<sup>a</sup> Poor fall cover in GA in 2016-2017; good to fair in other locations; <sup>b</sup> Poor fall cover in FL and GA in 2016-2017, good to fair in other locations; <sup>c</sup> Unacceptable fall stand quality in FL 2017-2018 and GA in 2016-2017, acceptable at all other locations; <sup>d</sup> Unacceptable fall stand quality in GA in 2016-2017, acceptable at all other locations; <sup>e</sup> Unacceptable fall stand quality in GA and FL in 2016-2017, acceptable at all other locations; <sup>f</sup> Moderate disease in GA.						
<b>RED CLOVER</b>						
Cinnamon Plus	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Cyclone II	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Dynamite	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Freedom	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Kenland	Good/Poor <sup>b</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Mammoth	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Starfire II	Good/Poor <sup>b</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
Wildcat	Good/Poor <sup>a</sup>	No/Yes <sup>c</sup>	Excellent	Late <sup>d</sup>	Low	Low
<sup>a</sup> Good to fair fall cover in GA and FL in 2017-2018 and MS both years, poor in FL and GA in 2016-2017; <sup>b</sup> Good to fair fall cover in GA 2017-2018 and MS in 2016-2017; poor in FL both years and GA in 2016-2017 and MS 2017-2018; <sup>c</sup> Unacceptable fall stand quality in FL both years and GA in 2016-2017; acceptable stand quality at all other locations; <sup>d</sup> Maturity based only on GA and MS.						
<sup>1/</sup> Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%; <sup>2/</sup> Fall stand quality—Yes is >65% emergence at 28 days after planting; <sup>3/</sup> Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Marginal 25-50%, Poor <25%; <sup>4/</sup> Maturity date—Days after planting to 50% bloom: <140=Early, 141-160=Mid, >160=Late; and <sup>5/</sup> Disease and insect ranking—Damage observed was None, Low, Moderate, or High. WK=winterkilled.						

## Comparison of Cool Season Cover Crops and Varieties in the Southeast (Cont.)

Cover Crop	Quick Fall Cover <sup>1/</sup>	Fall Stand Quality <sup>2/</sup>	Winter Survival <sup>3/</sup>	Maturity Date <sup>4/</sup>	Disease Ranking <sup>5/</sup>	Insect Ranking <sup>5/</sup>
<b>WINTER/FIELD PEA</b>						
Arvica 4010	Good <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Early	Moderate	Low
Dunn	Good <sup>a</sup>	Yes	Excellent-Marginal <sup>d</sup>	Early	Moderate	Low
Frost Master	Good <sup>b</sup>	Yes	Excellent	Mid	Moderate/High <sup>f</sup>	Low
Lynx	Good <sup>b</sup>	Yes	Excellent/Marginal <sup>c</sup>	Mid	Moderate	Low
Maxum	Good <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Early	Moderate	Low
Survivor 15	Good <sup>b</sup>	Yes	Excellent	Late	Moderate/High <sup>f</sup>	Low
Whistler	Good <sup>b</sup>	Yes	Excellent	Mid	Moderate	Low
Windham	Good <sup>a</sup>	Yes	Excellent	Early	Moderate	Low
<sup>a</sup> Good quick fall cover at all locations except fair in MS in 2017-2018; <sup>b</sup> Good quick fall cover at all locations except fair in MS and FL in 2017-2018; <sup>c</sup> Marginal in MS both years; <sup>d</sup> Marginal in MS both years and good in GA in 2017-2018; <sup>e</sup> Marginal in MS in 2017-2018; <sup>f</sup> High disease damage in GA in 2017-2018. <sup>1/</sup> Quick fall cover—Emergence at 14 days after planting: Excellent >90%, Good 61-90%, Fair 25-60%, Poor <25%; <sup>2/</sup> Fall stand quality—Yes is >65% emergence at 28 days after planting; <sup>3/</sup> Winter survival—Plant survival rating of Excellent >75%, Good 50-75%, Fair 25-50%, Poor <25%; <sup>4/</sup> Maturity date—Days after planting to 50% bloom: <140=Early, 141-160=Mid, >160=Late; and <sup>5/</sup> Disease and insect ranking—Damage observed was None, Low, Moderate, or High.						

## References

Clark, A., editor. 2012. Managing cover crops profitably, 3rd Edition. Sustainable Agriculture Research and Education. Handbook Series Book 9.

USDA, NRCS. 2019. The PLANTS Database (<http://plants.usda.gov>, 30 September 2019). National Plant Data Team, Greensboro, NC 27401-4901 USA.

## For More Information

Analysis of the data used for compiling the tables in this regional report can be found at:

[https://www.nrcs.usda.gov/Internet/FSE\\_PLANTMATERIALS/publications/natpmtnccatsupp.pdf](https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/natpmtnccatsupp.pdf)

Final study reports with more details on the performance of the cover crop varieties at each PMC location can be found at:

Brooksville, Florida  
*Coming soon*

Americus, Georgia  
[https://www.nrcs.usda.gov/Internet/FSE\\_PLANTMATERIALS/publications/gapmcsr13639.pdf](https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/gapmcsr13639.pdf)

Coffeeville, Mississippi  
[https://www.nrcs.usda.gov/Internet/FSE\\_PLANTMATERIALS/publications/mspmcsr13607.pdf](https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/mspmcsr13607.pdf)