

Natural Resources  
Conservation Service

East National  
Technology  
Support Center

Plant Materials  
Program

May 2020

Plant Materials Technical Note No. 2

---

# Evaluation of Cool Season Cover Crops in the Northeast Region



---

# Acknowledgements

---

Issued May 2020

Plant Materials Technical Note No. 2 was prepared by: David Kidwell-Slak, Manager, R. Jay Ugiansky, Resource Conservationist, Dan Daniel Dusty, Farm Manager, Norman A. Berg National PMC, Beltsville, MD; Shawna Clark, Manager, Mallory Barrow (former employee), Biological Science Technician, Big Flats, NYPMC; John Vandevender, Manager (retired), Randall Lester, Soil Conservationist, Warren Haynes, Biological Science Technician, Alderson, WV Plant Materials Center (PMC); Joel Douglas, Plant Materials Specialist, Fort Worth, TX; Ramona Garner (retired), Plant Materials Specialist, Greensboro, NC; Virginia Moore, USDA-Agricultural Research Service, Beltsville, MD and North Carolina State University, Raleigh, NC; Steven Mirsky, Research Ecologist, USDA-Agricultural Research Service, Beltsville, MD.

The technical note benefitted from review and comments on draft versions from NRCS technical staff.

All photos are credited to the USDA, Natural Resources Conservation Service, Plant Materials Program.

Suggested citation: U.S. Department of Agriculture, Natural Resources Conservation Service. 2020. Plant Materials Technical Note no. 2: Evaluation of Cool Season Cover Crops in the Northeast Region. East National Technology Support Center, Greensboro, NC.

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotope, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at [How to File a Program Discrimination Complaint](#) and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: [program.intake@usda.gov](mailto:program.intake@usda.gov).

USDA is an equal opportunity provider, employer, and lender.

---

# Preface

---

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 Beltsville, MD; Big Flats, NY; and Alderson, WV conducted a 2-year evaluation of 56 commercially available varieties of cereal rye, hairy vetch, crimson clover, red clover, winter/field pea, black oats, black seeded oats, and daikon radish to assess their adaptation and performance as cover crops in the Northeast 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 Northeast 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. This technical note represents two years of data collected from PMCs in the region, performance may vary in other locations and years. 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 Beltsville, MD, Big Flats, NY, and Alderson, WV 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 <235=Early, 236-250=Mid, >250=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 for Beltsville, MD, Big Flats, NY and Alderson, WV.

Plant Materials Center	Soil type	Average Yearly Rainfall (inches)	Average Frost Date	Low Temperature (F)	
				2016-2017	2017-2018
Beltsville, MD	Downer-Hammonton complex; Christiana-Downer complex	42	Oct 31	8	11
Big Flats, NY	Tioga/Unadilla silt loam	35	Oct 10	0	-3
Alderson, WV	Lobdell loam; Monongahela silt loam	38	Oct 10	2	-9

Table 2. Planting date/year and planting method in Beltsville, MD, Big Flats, NY and Alderson, WV.

Plant Materials Center	Planting Date (Year)		Planting Method
	2016	2017	
Beltsville, MD	16 Sept	14 Sept	Drill
Big Flats, NY	15 Sept	12 Sept	Broadcast
Alderson, WV	22 Sept	20 Sept	Drill

Table 3. Cover crop planting rates at PMCs in Beltsville, MD, Big Flats, NY and Alderson, WV.

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 2.5 to 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	Good	Yes	Excellent <sup>a</sup>	Mid	Low	None
Soil Saver	Good	Yes	Poor	Mid	NA	NA

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting for MD and NY only: 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 for MD only: <235=Early, 236-250=Mid, >250=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High. NA=not applicable due to poor stand.

<sup>a</sup>Excellent winter survival in MD only.

**Expected Adaptation:** Soil Saver (black oats) and Cosaque (black seeded oat) provided good fall cover in Beltsville, MD and Big Flats, NY, but more data is needed from Alderson, WV to verify adequate fall cover. Both varieties provided acceptable fall stand quality in all locations except Alderson. Cosaque exhibited favorable winter survival in Beltsville but winterkilled both years in Big Flats.



*Cosaque and Soil Saver provided quick fall cover in Maryland and New York prior to first killing frost.*

Soil Saver exhibited marginal winter survival in 2016-2017 in Beltsville but completely winterkilled in 2017-2018. Soil Saver and Cosaque may be good choices for producers in New York who need quick growing cover crops with acceptable fall stand quality that requires no chemical or mechanical termination prior to planting a cash crop in the spring. Cosaque is a good choice as an overwintering, annual grass for Maryland producers.

## 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 performs 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 varieties at Beltsville, MD.*

### 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	Good	Yes	Excellent	Mid	None	Low
Bates	Good	Yes	Good/Marginal <sup>a</sup>	Mid	Low	Low
Brasetto	Good	Yes	Good	Mid	Low	Low
Elbon	Good	Yes	Good	Mid	Low	Low
FL 401	Good	Yes	Marginal/Poor <sup>b</sup>	Early	None	None
Guardian	Good	Yes	Excellent	Late	Low	Low
Hazlet	Good	Yes	Good	Mid	Low	Low
Maton	Good	Yes	Good	Mid	Low	Low
Maton II	Good	Yes	Good	Mid	Low	Low
Merced	Good	Yes	Good/Poor <sup>b</sup>	Early	None	None
Oklon	Good	Yes	Good	Mid	Low	Low
Rymin	Good	Yes	Good	Mid	Low	Low
Wheeler	Good	Yes	Good	Mid	Low	Low
Wintergrazer 70	Good	Yes	Good	Mid	None	Low
Wrens Abruzzi	Good	Yes	Excellent/Marginal <sup>a</sup>	Mid	Low	Low

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting for MD and NY only: 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: <235=Early, 236-250=Mid, >250=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Good to excellent winter survival in MD and WV, marginal in NY; <sup>b</sup>Good/marginal winter survival in MD and WV, poor winter survival in NY.

**Expected Adaptation:** Cereal rye varieties produced a good, quick fall cover in Beltsville, MD and Big Flats, NY, but failed to produce a respectable fall cover in Alderson, WV both years. All varieties produced acceptable fall stand quality and had low disease and insect problems with varying maturity dates at all locations. All the varieties generally exhibited good to marginal winter survival in Beltsville and Alderson except for FL 401 and Merced. These reached maturity earlier than other varieties but winterkilled in Big Flats. Wrens Abruzzi and Bates also suffered significant winter damage at Big Flats. For New York producers seeking a cereal rye variety that produces a quick fall cover with acceptable fall stands requiring no chemical or mechanical termination in the spring, good choices include FL 401 and Merced.



*Merced (center) and FL 401 (upper right) winter killed in Big Flats, New York and suffered winter damage in Maryland and West Virginia.*

## 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 honeybees, 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	Good/Poor <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Early	None	Low
AU Sunrise	Good/Poor <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Early	None	Low
AU Sunup	Poor/Fair <sup>b</sup>	No	Excellent/Marginal <sup>c</sup>	Early	Low	Low
Contea	Poor/Fair <sup>b</sup>	No	Excellent/Marginal <sup>c</sup>	Mid	None	Low
Dixie	Good/Poor <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Mid	Low	Low
Kentucky Pride	Good/Poor <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Mid	None	Low

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting in MD and NY only: 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: <235=Early, 236-250=Mid, >250=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Good to excellent quick fall cover in MD, fair to poor in NY and WV; <sup>b</sup>Poor quick fall cover across all locations and years, fair in MD in 2017; <sup>c</sup>Excellent winter survival in MD, marginal to poor in NY and WV, winterkilled in WV the second year.

**Expected Adaptation:** Most of the crimson clover varieties had good quick fall cover in Beltsville, MD and fair to poor in Big Flats, NY and Alderson, WV. AU Sunup and Contea generally lacked acceptable fall stand quality across locations except in Beltsville in 2017. All varieties had excellent winter survival both years in Beltsville and marginal winter survival both years at Big Flats. All varieties had good to excellent winter survival in Alderson in 2016-2017 except for Kentucky Pride which performed poorly. The following year, most varieties, with the exception of Kentucky Pride, winterkilled in Alderson. AU Robin, AU Sunrise and AU Sunup were the earliest maturing varieties across all locations. All varieties exhibited none to low disease and insect problems.



*Contea and Kentucky Pride blooming in late spring in Beltsville, MD.*

## 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 to 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, pollinator habitat.



*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	Poor	WK	WK	WK
Concorde	Good	Yes	Poor	WK	WK	WK
Control	Good	Yes	Poor	WK	WK	WK
Defender	Fair	Yes	Poor	WK	WK	WK
Driller	Good	Yes	Poor	WK	WK	WK
Eco-Till™	Good	Yes	Poor	WK	WK	WK
Graza	Poor	No	Poor	WK	WK	WK
Groundhog™	Good	Yes	Poor	WK	WK	WK
Lunch	Fair	Yes	Poor	WK	WK	WK
Nitro™	Good	Yes	Poor	WK	WK	WK
Sodbuster	Good	Yes	Poor	WK	WK	WK
Tillage®	Good	Yes	Poor	WK	WK	WK

<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 in MD only: <235=Early, 236-250=Mid, >250=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High. WK=winterkilled.

**Expected Adaptation:** Daikon radish varieties generally provided good quick fall cover and acceptable fall stand quality except Graza, which rated poor for both attributes. All varieties winterkilled in Big Flats, NY and Alderson, WV both years and in Beltsville, MD, they overwintered poorly the first year and winterkilled the second year. These varieties are good choices for producers who need a quick fall cover susceptible to winterkill.



*Daikon radish varieties provided good, quick fall cover in Maryland and New York and good stand quality at all PMCs.*

## 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	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent/Good <sup>c</sup>	Mid	None	Low
Lana	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent/Poor <sup>c</sup>	Mid	None	Low
Purple Bounty	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent/Good <sup>c</sup>	Mid	None	Low
Purple Prosperity	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent/Good <sup>c</sup>	Mid	None	Low
TNT	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent/Good <sup>c</sup>	Late	None	Low
Villana	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent	Late	None	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: <235=Early, 236-250=Mid, >250=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Excellent quick fall cover in MD, poor in NY and WV; <sup>b</sup>Acceptable fall stand quality in MD and WV, unacceptable in NY; <sup>c</sup>Excellent winter survival in MD and WV; good to poor in NY.

**Expected Adaptation:** None of the hairy vetch varieties provided early fall cover in Big Flats, NY and Alderson, WV but they did produce acceptable fall stand quality in Alderson. In contrast, all varieties performed exceptionally well in Beltsville, MD providing both excellent fall cover, acceptable fall stands and excellent winter survival. Villana exhibited excellent winter survival across all years and locations. None of the varieties exhibited disease or insect problems.



Early spring growth (left) and flowering (right) of hairy vetch in Beltsville, MD.

## 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	Excellent/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Cyclone II	Excellent/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Dynamite	Excellent/Good <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Freedom	Excellent/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Kenland	Good/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Mammoth	Good/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Starfire II	Fair	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Wildcat	Excellent/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting for MD and NY only; 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: <235=Early, 236-250=Mid, >250=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Quick fall cover ranged from excellent to fair in MD, good to fair in NY in 2017-2018; <sup>b</sup>All varieties provided acceptable fall stand quality in MD, unacceptable both years in NY and WV; <sup>c</sup>Excellent winter survival in MD, marginal in NY in 2017-2018, winterkilled in WV both years.

**Expected Adaptation:** With the exception of Starfire II, all red clover varieties performed exceptionally well in Beltsville, MD providing quick fall cover, acceptable stand quality and winter hardiness. Winter survival for most varieties in Big Flats, NY was generally unacceptable in 2016-2017. Better winter survival in Big Flats is likely with earlier planting dates. There were no insect or disease issues noted. Additional evaluation of red clover varieties is needed in West Virginia and New York.



*Red clover evaluation plot in bloom.*

## 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	Excellent/Good <sup>a</sup>	Yes/No <sup>b</sup>	Poor	NA	NA	NA
Dunn	Excellent/Good <sup>a</sup>	Yes/No <sup>b</sup>	Poor	NA	NA	NA
Frost Master	Excellent/Fair <sup>a</sup>	Yes/No <sup>b</sup>	Marginal <sup>c</sup>	Late	High	None
Lynx	Good/Fair <sup>a</sup>	Yes/No <sup>b</sup>	Good/Poor <sup>d</sup>	Late	High	None
Maxum	Excellent/Fair <sup>a</sup>	Yes/No <sup>b</sup>	Poor	NA	NA	NA
Survivor 15	Excellent	Yes/No <sup>b</sup>	Good/Poor <sup>d</sup>	Late	Moderate	None
Whistler	Excellent/Fair <sup>a</sup>	Yes/No <sup>b</sup>	Good/Poor <sup>d</sup>	Mid	High	None
Windham	Excellent/Fair <sup>a</sup>	Yes/No <sup>b</sup>	Good/Poor <sup>d</sup>	Late	High	None

<sup>1/</sup>Quick fall cover—Emergence at 14 days after planting for MD and NY only: 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: <235=Early, 236-250=Mid, >250=Late; and <sup>5/</sup>Disease and insect ranking for MD only—Damage observed was None, Low, Moderate, or High.

<sup>a</sup>Excellent to good quick fall cover in MD, good to fair in NY in 2017-2018; <sup>b</sup>Acceptable stand quality both years in MD and in NY and WV in 2017-2018, unacceptable in NY and WV in 2016-2017; <sup>c</sup>Marginal winter survival in MD only; <sup>d</sup>Good winter survival in MD, poor in NY in 2017-2018. NA=not applicable due to poor stand.

**Expected Adaptation:** Most field pea varieties provided excellent quick fall cover and stand quality in Beltsville, MD both years, and good to excellent stand quality in 2017-2018 in Alderson, WV and Big Flats, NY. Survivor 15 was the only variety to provide a quick fall cover in 2017 in Big Flats. None of the peas produced acceptable fall cover or stand quality in Alderson and Big Flats in 2016-2017. Lynx, Survivor 15, Whistler and Windham showed good winter survival both years in Beltsville but had significant disease issues the following spring. No insect damage was observed on surviving varieties. The maturity date of Whistler was the earliest of the varieties.



*Spring growth of Survivor 15 field pea.*

## Comparison of Cool Season Cover Crops and Varieties in the Northeast Region

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	Good	Yes	Poor	Mid	NA	NA
<b>BLACK SEEDED OATS</b>						
Cosaque	Good	Yes	Excellent <sup>a</sup>	Mid	Low	None
*Excellent winter survival in MD only.						
<b>CEREAL RYE</b>						
Aroostook	Good	Yes	Excellent	Mid	None	Low
Bates	Good	Yes	Good/Marginal <sup>a</sup>	Mid	Low	Low
Brasetto	Good	Yes	Good	Mid	Low	Low
Elbon	Good	Yes	Good	Mid	Low	Low
FL 401	Good	Yes	Marginal/Poor <sup>b</sup>	Early	None	None
Guardian	Good	Yes	Excellent	Late	Low	Low
Hazlet	Good	Yes	Good	Mid	Low	Low
Maton	Good	Yes	Good	Mid	Low	Low
Maton II	Good	Yes	Good	Mid	Low	Low
Merced	Good	Yes	Good/Poor <sup>b</sup>	Early	None	None
Oklon	Good	Yes	Good	Mid	Low	Low
Rymin	Good	Yes	Good	Mid	Low	Low
Wheeler	Good	Yes	Good	Mid	Low	Low
Wintergrazer 70	Good	Yes	Good	Mid	None	Low
Wrens Abruzzi	Good	Yes	Excellent/Marginal <sup>a</sup>	Mid	Low	Low
*Good to excellent winter survival in MD and WV, marginal in NY; <sup>b</sup> Good/marginal winter survival in MD and WV, poor winter survival in NY.						
<b>CRIMSON CLOVER</b>						
AU Robin	Good/Poor <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Early	None	Low
AU Sunrise	Good/Poor <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Early	None	Low
AU Sunup	Poor/Fair <sup>b</sup>	No	Excellent/Marginal <sup>c</sup>	Early	Low	Low
Contea	Poor/Fair <sup>b</sup>	No	Excellent/Marginal <sup>c</sup>	Mid	None	Low
Dixie	Good/Poor <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Mid	Low	Low
Kentucky Pride	Good/Poor <sup>a</sup>	Yes	Excellent/Marginal <sup>c</sup>	Mid	None	Low
*Good to excellent quick fall cover in MD, fair to poor in NY and WV; <sup>b</sup> Poor quick fall cover across all locations and years, fair in MD in 2017; <sup>c</sup> Excellent winter survival in MD, marginal to poor in NY and WV, winterkilled in WV the second year.						
<sup>1/</sup> Quick fall cover—Emergence at 14 days after planting for MD and NY only: 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 for MD only: <235=Early, 236-250=Mid, >250=Late; and <sup>5/</sup> Disease and insect ranking—Damage observed was None, Low, Moderate, or High. NA=not applicable due to poor stand.						

## Comparison of Cool Season Cover Crops and Varieties in the Northeast Region (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	Poor	WK	WK	WK
Concorde	Good	Yes	Poor	WK	WK	WK
Control	Good	Yes	Poor	WK	WK	WK
Defender	Fair	Yes	Poor	WK	WK	WK
Driller	Good	Yes	Poor	WK	WK	WK
Eco-Till™	Good	Yes	Poor	WK	WK	WK
Graza	Poor	No	Poor	WK	WK	WK
Groundhog™	Good	Yes	Poor	WK	WK	WK
Lunch	Fair	Yes	Poor	WK	WK	WK
Nitro™	Good	Yes	Poor	WK	WK	WK
Sodbuster	Good	Yes	Poor	WK	WK	WK
Tillage®	Good	Yes	Poor	WK	WK	WK
<b>HAIRY VETCH</b>						
CCS Groff	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent/Good <sup>c</sup>	Mid	None	Low
Lana	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent/Poor <sup>c</sup>	Mid	None	Low
Purple Bounty	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent/Good <sup>c</sup>	Mid	None	Low
Purple Prosperity	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent/Good <sup>c</sup>	Mid	None	Low
TNT	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent/Good <sup>c</sup>	Late	None	Low
Villana	Excellent/Poor <sup>a</sup>	Yes/No <sup>b</sup>	Excellent	Late	None	Low
<sup>a</sup> Excellent quick fall cover in MD, poor in NY and WV; <sup>b</sup> Acceptable fall stand quality in MD and WV, unacceptable in NY; <sup>c</sup> Excellent winter survival in MD and WV; good to poor in NY.						
<b>RED CLOVER</b>						
Cinnamon Plus	Excellent/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Cyclone II	Excellent/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Dynamite	Excellent/Good <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Freedom	Excellent/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Kenland	Good/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Mammoth	Good/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Starfire II	Fair	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
Wildcat	Excellent/Fair <sup>a</sup>	Yes <sup>b</sup>	Excellent/Marginal <sup>c</sup>	Late	None	None
<sup>a</sup> Quick fall cover ranged from excellent to fair in MD, fair to poor in NY in 2017-2018; <sup>b</sup> All varieties provided acceptable fall stand quality in MD, except Starfire II, unacceptable both years in NY and WV; <sup>c</sup> Excellent winter survival in MD, marginal in MD in 2017-2018, poor in WV both years.						
<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: <235=Early, 236-250=Mid, >250=Late; and <sup>5/</sup> Disease and insect ranking—Damage observed was None, Low, Moderate, or High. WK=winterkilled, NA=not applicable due to poor stand.						

## Comparison of Cool Season Cover Crops and Varieties in the Northeast Region (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	Excellent/Good <sup>a</sup>	Yes/No <sup>b</sup>	Poor	NA	NA	NA
Dunn	Excellent/Good <sup>a</sup>	Yes/No <sup>b</sup>	Poor	NA	NA	NA
Frost Master	Excellent/Fair <sup>a</sup>	Yes/No <sup>b</sup>	Marginal <sup>c</sup>	Late	High	None
Lynx	Good/Fair <sup>a</sup>	Yes/No <sup>b</sup>	Good/Poor <sup>d</sup>	Late	High	None
Maxum	Excellent/Fair <sup>a</sup>	Yes/No <sup>b</sup>	Poor	NA	NA	NA
Survivor 15	Excellent	Yes/No <sup>b</sup>	Good/Poor <sup>d</sup>	Late	Moderate	None
Whistler	Excellent/Fair <sup>a</sup>	Yes/No <sup>b</sup>	Good/Poor <sup>d</sup>	Mid	High	None
Windham	Excellent/Fair <sup>a</sup>	Yes/No <sup>b</sup>	Good/Poor <sup>d</sup>	Late	High	None
<p><sup>a</sup>Excellent to good quick fall cover in MD, good to fair in NY in 2017-2018; <sup>b</sup>Acceptable stand quality both years in MD and in NY and WV in 2017-2018, unacceptable in NY and WV in 2016-2017; <sup>c</sup>Marginal winter survival in MD only; <sup>d</sup>Good winter survival in MD, poor in NY in 2017-2018. NA=not applicable due to poor stand.</p> <p><sup>1/</sup>Quick fall cover—Emergence at 14 days after planting for MD and NY only: Excellent &gt;90%, Good 61-90%, Fair 25-60%, Poor &lt;25%; <sup>2/</sup>Fall stand quality—Yes is &gt;65% emergence at 28 days after planting; <sup>3/</sup>Winter survival—Plant survival rating of Excellent &gt;75%, Good 50-75%, Marginal 25-50%, Poor &lt;25%; <sup>4/</sup>Maturity date—Days after planting to 50% bloom for MD only: &lt;235=Early, 236-250=Mid, &gt;250=Late; and <sup>5/</sup>Disease and insect ranking—Damage observed was None, Low, Moderate, or High. NA=not applicable due to poor stand.</p>						

## 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:

Beltsville, Maryland

[https://www.nrcs.usda.gov/Internet/FSE\\_PLANTMATERIALS/publications/mdpmcsr13605.pdf](https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/mdpmcsr13605.pdf)

Big Flats, New York

*Coming soon*

Alderson, West Virginia

*Coming soon*