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COVER CROP VARIETY TRIAL RESULTS

Cover Crop [CC] variety trials have been conducted with forage species to determine which varieties/species offer the greatest weed suppression, biomass yield, and nitrogen [N] accumulation, the primary reasons for growing CCs. However, it is assumed that an individual species will not exhibit the maximum of each attribute—i.e., grasses will likely accumulate the most biomass and legumes will likely accumulate the most N.

The primary reasons for and details about growing CCs in the off-season between summer crops are outlined in a [White Paper](#) on this website. The White Paper also contains links to resources that pertain to CCs' issues and considerations.

Once a producer decides to include CCs in a cropping system, the major decision will be which species and which variety within a species should be grown. As outlined in the above White Paper, this will depend on the reason for including a CC in the system.

CC variety trials have been conducted in southern U.S. states to provide data that will aid in making this decision. Summaries of the conduct of and results from those trials follow.

[Mississippi Cover Crop Variety Trials, 2018-19, Info. Bull. 542, Nov. 2019, by Joshua White and Brett Rushing.](#)

- Testing during the fall 2018–spring 2019 period was conducted at the North Miss. Branch Expt. Station in Holly Springs, the Leveck Animal Res. Center on the MSU campus, and the Coastal Plain Expt. Station in Newton.
- Trials were planted at all locations in the first week of Oct. 2018.
- Cereal rye and annual ryegrass, and legume and brassica species were included in the tests.
- Plots were harvested on Mar. 15 and Apr. 1.
- Predicted N availability was greatest with varieties of legume species at Starkville and Newton [plots at Holly Springs not harvested because of wildlife grazing pressure] at 2 weeks, 3 weeks, and 3 months after termination of those varieties.
- Weed suppression and ground cover were greatest with cereal rye and ryegrass varieties at Starkville and Newton.
- Delaying termination from Mar. 15 to Apr. 1 resulted in an increase in N production in the aboveground biomass. In general, legumes benefitted the most when termination was delayed.
- Varieties within each species differed in measured traits,

indicating that variety selection is an important component of CC selection.

[Mississippi Cover Crop Variety Trials, 2019-20, Info. Bull. 559, May 2021, by Joshua White.](#)

- Testing during the fall 2019–spring 2020 period was again conducted at the Starkville and Newton locations, plus the NE Branch Expt. Station in Verona.
- Trials were planted at all locations in the first week of Nov. 2019.
- Cereal rye and annual ryegrass, and legume and brassica species were included in the tests.
- Due to stand failure and poor germination at Newton and Verona, only results using the Starkville data are reported.
- Plots were harvested on Mar. 15 and Apr. 1.
- Overall, weed suppression by all species was increased when termination was delayed.
- Weed suppression by and dry matter yields from cereal rye and ryegrass were the greatest.
- Legume species produced the most total N on the Apr. 1 termination date.
- As in the 2018-2019 trials, varieties within each species differed in measured traits, again indicating that variety selection is an important component of CC culture.

[Mississippi Cover Crop Variety Trials, 2020-21, Info. Bull. 562, Sept. 2021, by White, Rushing, and Kuykendall.](#)

- Testing during the fall 2020–spring 2021 period was conducted at Starkville, Newton, and Brooksville.
- Trials at all locations were planted during Oct. 2020.
- Cereal rye and legume and brassica species were included in the tests [See Table 1 in the publication].
- Plots were harvested on Mar. 15 and Apr. 1 and 15.
- Dry matter yields from cereal rye were the greatest at all locations.
- Dry matter production by all species was greatest when harvest [termination date] was delayed to Apr. 15. The Mar. 15 harvest date was much too early for significant dry matter accumulation of all species.
- Legume species generally produced the most total N on the Apr. 15 termination date.
- As in previous years, varieties within each species differed in measured traits, again indicating that variety selection is an important component of CC culture.

[Cover Crop Variety Tests in Tennessee, 2019-20, by Virginia Sykes et al.](#)

- Testing during the fall 2019–spring 2020 period was conducted at the East Tenn. [Knoxville, ETREC], Middle Tenn. [Spring Hill, MTREC] and Milan [Milan, RECM]



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AgResearch and Education Centers.

- Trials were planted at all locations in early to mid-October.
- 60 varieties within the cereals [20 varieties], legumes [29 varieties], and brassicas [11 varieties] were included in the tests.
- Species performance across the locations was generally similar.
- Across all entries in the tests, cereal rye and hairy vetch were the top performers for biomass production. There were differences in biomass production among varieties within a species.
- In February, varieties of hairy vetch provided the most canopy cover.
- Cereal rye varieties were the tallest in all evaluations.
- Cereals had the lowest N content, and varieties of cereal rye had the greatest N deficits.
- Legumes had the highest N content and N release, but there were differences among species. Varieties of vetches stood out as top performers for estimated N release.

[Cover Crop Variety Tests in Tennessee, 2020-21, by Virginia Sykes et al.](#)

- Testing was conducted during the fall 2020–spring 2021 period at the East Tenn. [Knoxville, ETREC] and Middle Tenn. [Spring Hill, MTREC] AgResearch and Education Centers.
- Trials were planted on two dates at both locations to simulate following corn [early October] and following soybeans/cotton [early November]. April and May CC terminations were also included in the trials.
- 36 varieties [12 cereals, 18 legumes, and 6 brassicas] were included in the October-planted tests. 18 varieties [7 cereals, 8 legumes, and 3 brassicas] were included in the November-planted tests. Both plantings also included 8 cereal/legume mixes.
- Top performing species tended to be consistent across locations.
- In the October plantings, varieties of cereal rye and triticale produced the most biomass, varieties of hairy vetch and winter pea provided the most fall and winter cover, and varieties of cereal rye + hairy vetch produced biomass yields that were statistically equivalent to yield of monoculture cereals.
- In the November plantings, varieties of cereal rye produced the most biomass, and fall and winter cover. However, this biomass production was well below that in the October plantings.
- November-planted legumes and brassicas produced low fall and winter cover and low biomass.
- As expected, potential available N was highest from the

legume cover crops, and it was highest when termination was delayed from April to May.

- Mixes containing hairy vetch generally had the highest potential N release at both termination times.

[Cover Crop Variety Tests in Tennessee, 2021-2022, by Virginia Sykes et al.](#)

- Testing was conducted during the fall 2021–spring 2022 period at the East Tenn. [Knoxville, ETREC] and Middle Tenn. [Spring Hill, MTREC] AgResearch and Education Centers.
- Trials were planted on two dates at both locations to simulate following corn [early October] and following soybeans/cotton [early November]. April and May CC terminations were also included in the trials.
- 13 varieties [3 cereals, 9 legumes, and 1 brassica] were included in both the October- and November-planted tests. Both plantings also included 8 cereal/legume mixes.
- Top performing species tended to be consistent across locations.
- In the October plantings, a cereal rye + legume mixture produced the most biomass, and a cereal rye + hairy vetch mixture produced winter cover that was among the greatest on all sample dates.
- In the November plantings, cereal rye and cereal rye + hairy vetch mixtures produced the most biomass. Mixtures of cereal rye + hairy vetch produced the most winter cover.
- As expected, potential available N was highest from the legume cover crops and mixtures that contained a legume. It was highest when CC termination was delayed from April to May.
- Hairy vetch and mixtures containing hairy vetch generally had the highest potential N release after both termination times.

[Southern Cover Crop Variety Trial 2023, Sep. 2023, by Virginia Sykes et al., UT Ext. Var. Testing & Agroecology.](#)

- Testing of 20 CC varieties [3 cereals–2 cereal rye varieties and 1 triticale variety; 12 legumes–8 clover varieties and 4 vetch varieties; and 5 brassicas–1 radish variety and 4 turnip varieties] was conducted at 12 sites in a 10-state region in the Southern U.S. Planting date at most locations was in mid-Oct.
- Measurements were made in the **Fall** [late Nov./early Dec.], **Winter** [early Feb.], **Pre-Corn** [~2 weeks prior to normal corn planting dates], and **Pre-Soy** [~2 weeks prior to normal soybean planting dates].
- Measurements included 1) CC canopy cover and weed canopy cover, 2) CC plant height, 3) CC biomass, and 4) CC forage quality.



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- There were significant differences among varieties within a species for all traits, and these differences depended on location.
- Varieties of legumes and brassicas exhibited high rates of winter-kill.
- Varieties of cereal rye and hairy vetch dominated for high biomass across all locations.
- Cereal rye species dominated for canopy cover in both **Fall** and **Winter** evaluation periods across all locations.
- Hairy vetch varieties had the most canopy cover in the **Pre-Corn** and **Pre-Soybean** evaluation periods across all locations.
- Cereal rye varieties were the tallest in all four evaluation periods across all locations.
- Nitrogen release was highest from the terminated vetch CCs across all locations.
- Weed cover and weed biomass were greatest in the clover CCs across all locations.

[Southern Cover Crop Variety Trial 2024, Sep. 2024, by Virginia Sykes et al., UT Ext. Var. Testing & Agroecology.](#)

- Testing of 20 CC varieties [9 cereals–2 cereal rye varieties, 1 triticale variety, and 6 oat varieties; 10 legumes–8 clover varieties and 2 vetch varieties; and 1 brassica–1 radish variety] was conducted at 15 sites in 10 states in the Southern U.S.
- Planting date at most locations was in October.
- Measurements were made at **establishment** [1 month post planting], in the **Fall** [late Nov./early Dec.] and **Winter** [early Feb.], and at **Pre-Corn** [~2 weeks prior to normal corn planting dates for each state] and **Pre-Soy** [~2 weeks prior to normal soybean planting dates for each state] planting.
- Measurements included 1) CC canopy cover and weed canopy cover, 2) CC plant height, 3) CC biomass, and 4) CC forage quality.
- There were significant differences among legume and grass species for all traits.
- Grass CCs had the greatest establishment across all locations.
- Grass species dominated for high biomass production across all locations.
- Grass species dominated for canopy cover in both **Fall** and **Winter** evaluation periods across all locations.
- Among the legumes, hairy vetch had the most canopy cover in the **Pre-Corn** and **Pre-Soy** evaluation periods across all locations.
- Cereal rye varieties were the tallest CCs in the **Pre-Corn** and **Pre-Soy** evaluation periods across all locations.
- Nitrogen release was highest from the terminated hairy vetch CC across all locations.
- Weed cover and weed biomass were greatest in the

clover CCs across all locations.

Several general conclusions can be drawn from the results of the above CC variety trials.

- Cover crop planting date, establishment, and development will be affected by weather vagaries just like for the summer crops that are grown in the Midsouth.
- All of the above results generally indicate that:
 - Cereals, particularly cereal rye, will produce the most biomass and therefore should be the best at weed suppression.
 - Legumes will accumulate the most N and thus provide more available N to a following summer grain crop.
 - A cereal such as rye or triticale should be planted as a CC before soybean and a legumes such as vetch or a clover species should be planted as a CC before a summer grain crop.
 - Both choice of CC species and variety selection within a CC species are important considerations when choosing which CC to plant for an intended purpose at a given location.

As stated in the above-linked White Paper, producers who are considering inserting a CC into a production system must first decide the main reason for this decision—i.e., is it for 1) preventing or controlling erosion in the off-season; 2) increasing water infiltration into the soil; 3) suppressing or preventing winter and early-season weeds; 4) biomass production to increase soil organic matter and/or increase CC residue to enhance soil health; and 5) N accumulation for a following summer grain crop? Once this decision has been made, then the information in the above publications can be used to select the best CC variety within a species to accomplish the intended purpose.

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