

Virginia NRCS Plant Establishment Guide (PEG), Section Eb (Cropland) Cover Crop Establishment Specifications (340)

October 2015

INTRODUCTION:

This document is part of the Virginia NRCS Plant Establishment Guide.

The purpose of this document is to provide establishment specifications for implementation of the Virginia NRCS 340 Cover Crop Practice Standard.

This document contains tables of cover crop establishment specifications for six seasonal niches. It also provides a diagram explaining those seasonal niches, as well as brief descriptions of each recommended cover crop species for each niche.

All tables and diagrams in this document were derived from the current version of the Virginia NRCS Cover Crop Planning Manual (i.e., that manual contains the same tables found in this document).

Consult the Manual if needed for guidance on how to use these tables or additional recommendations for planning cover crops to meet the VA-340 Standard.

The Virginia NRCS Cover Crop Planning Manual may be obtained from Section I of the eFOTG or from the following link: http://efotg.sc.egov.usda.gov/references/public/VA/VA_TN10_Agronomy.pdf

Cover Crop Seasonal Niche Calendar & Matrix of Recommended Species

| Winter | | Spring | | | Summer | | | Fall | | | Winter | | Spring | | | | | |
|--------------------------------------|-----|---|-----|---|--|-----|---------------------------------------|--|-----|--------------------|--------------------|-----|--------------------|--------------------|-----------------------------|-----|-----|--|
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | |
| | | | | | | | | Niche 1: Fall Seed Winter Hardy | | | | | | | | | | |
| | | | | | | | | Planting Period | | | | | | Termination Period | | | | |
| | | | | | | | Niche 2: Fall Seed Winter Kill | | | | | | | | | | | |
| | | | | | | | Planting Period | | | | | | Termination Period | | | | | |
| | | | | | Niche 3: Summer Seed Frost Kill | | | | | | | | | | | | | |
| | | | | | Planting Period | | | | | | Termination Period | | | | | | | |
| | | | | Niche 4: Summer Seed Summer Kill | | | | | | | | | | | | | | |
| | | | | Planting Period | | | | | | Termination Period | | | | | | | | |
| | | Niche 5: Spring Seed Frost Hardy | | | | | | | | | | | | | | | | |
| | | Planting Period | | | | | | Termination Period | | | | | | | | | | |
| Niche 6: Biennial / Perennial | | | | | | | | | | | | | | | (Termination Period varies) | | | |
| | | Spring Planting Period | | | | | | Fall Planting Period | | | | | | | | | | |

| Niche Name | Description | Functional Groups & Recommended Species | | |
|----------------------------|--|---|--|---|
| | | Grass | Broadleaf / Forb | Legume |
| 1. Fall Seed Winter Hardy | Winterhardy cool-season annual planted in fall and terminated in spring. | annual ryegrass; small grains (barley, oat, wheat, triticale, rye) | rapeseed; forage turnip | red clover; crimson clover; Austrian winter pea; woollypod vetch; hairy vetch |
| 2. Fall Seed Winter Kill | Fast-growing, frost-hardy annual seeded in early fall. Expected to freeze-kill mid-winter (at 15 to 20° F.) | spring oat | forage radish; mustard, phacelia | Canadian spring pea |
| 3. Summer Seed Frost Kill | Frost-tender, warm-season annual planted in mid to late summer. Expected to winterkill at first frost. | sorghum-sudangrass; pearl millet; foxtail millet | buckwheat; black oil sunflower | forage soybean; cowpea; sunnhemp |
| 4. Summer Seed Summer Kill | Frost-tender, warm-season annual seeded early summer. Terminated in time to plant back another crop in summer or fall. | sorghum-sudangrass; pearl millet; foxtail millet | buckwheat; black oil sunflower | forage soybean; cowpea; sunnhemp |
| 5. Spring Seed Frost Hardy | Fast-growing, frost-hardy cool-season annual planted in late winter/early spring. | spring oat; winter (or spring) small grains (barley, wheat, triticale, rye) | forage radish; mustard; phacelia; rapeseed; forage turnip; | Canadian spring pea; Austrian winter pea; woollypod vetch; hairy vetch |
| 6. Biennial / Perennial | Biennial or perennial, grown at least one summer, typically 18 months | tall fescue; orchardgrass | | alfalfa; red clover; white clover; yellow blossom sweetclover |

Cover Crop Species List A, Part 1: Recommended Fall-Seeded Species (*Seasonal Niches 1 & 2*)

| Species | Key Characteristics & Considerations |
|----------------------|---|
| Grasses | <p>Spring Oat <i>Avena sativa</i></p> <p>Compare to winter oat below. Goal here is winterkill (Niche 2): select varieties accordingly, plant early for lush growth. Oat is least hardy small grain (SG), but may not winterkill in SE VA. Grows very fast in mild fall/spring. Much lower C:N, shorter-lived residue vs. typical SG. Needs good fertility. Good weed suppressor, moderate N scavenger, high forage quality. No vernalization required; may head out in fall but viable seed unlikely. Top nurse crop for fall legumes (use low rate). Mix with radish, peas. See also Niche 5.</p> |
| | <p>Annual Ryegrass <i>Lolium multiflorum</i> aka Italian Ryegrass</p> <p>Popular cover in Corn Belt, much less in VA. Major weed in small grain (SG). Do not allow to set seed. Can be hard to kill with herbicides – timing is key. Dense fibrous root system, top soil conditioner, good weed suppresser, good N scavenger, top quality forage. Establishes well in tough conditions, but needs good fertility. Tolerates wet feet better than any SG. Not good in heat or drought. Winter-hardiness can vary – select cultivars accordingly. Shorter than SG, lower C:N, mixes well with crimson clover. See also Niche 5.</p> |
| | <p>Winter Oat <i>Avena sativa</i></p> <p>Compare to spring oat above. Goal here is overwintering (Niche 1): select varieties accordingly. Winter oat not common in VA. Unlikely to overwinter in western VA; best fit is Coastal Plain. Needs vernalization for heading. Planted early (like barley), but last SG to mature in spring. Good weed suppressor, ok N scavenger, high forage quality. Good rotation for other SG – not host for take-all disease. Good nurse crop. Compared to other SG: lowest biomass producer, slightly lower C:N, lower tolerance for extremes of dry and wet.</p> |
| | <p>Barley <i>Hordeum vulgare</i></p> <p>Widely used in VA. More winterhardy than oat, less than wheat/rye. Planted earlier in fall, matures earlier in spring than wheat. Best small grain (SG) for drought, heat, salty or alkaline soils. Quick growth & high biomass if fertility good. Good weed suppressor, N scavenger, forage. Retains feed quality after heading. Not for wet or acid soils. Good nurse for legumes. Timing, height match crimson clover, rapeseed. Poor choice for rolling. Not good for rotations with SG cash crops (will host same diseases and pests).</p> |
| | <p>Wheat <i>Triticum aestivum</i></p> <p>Versatile & widely used in VA. Compared to barley: planted later in fall, matures later in spring, tolerates wetness better (but not flooding), higher spring biomass potential (but requires high fertility). Very good N scavenger. Top quality forage – after multiple grazings can still produce high spring biomass or grain. Fine nurse crop for legumes. Mixes well with winter peas, hairy vetch. Shorter, slower to head means residue easier to manage than rye. Not good for rotations with SG cash crops (will host same diseases and pests).</p> |
| | <p>Triticale <i>Triticum secale</i></p> <p>A cross between rye and wheat, with characteristics intermediate between the two. High biomass yield potential is similar to wheat and rye. Matures later than rye, a little later than wheat. Plant height at heading shorter than rye. Therefore, spring residue is easier to manage than rye and (assuming same kill date) C:N ratio will be lower than rye. Triticale feed quality generally better than rye, but not as good as wheat (i.e., chop triticale for silage at boot stage).</p> |
| | <p>Rye <i>Secale cereale</i> aka Cereal Rye</p> <p>Top winter cover for many purposes, most winterhardy, best on poor/acid soils. Top SG for N scavenging, biomass, seed suppression, tolerance of wet soils. Can plant later than any SG in fall, but matures early in spring – only barley is earlier. Rye allelopathy inhibits weeds, but maybe also next crop if small-seeded. Height, biomass, high C:N at maturity can be overwhelming. Top choice for rolling. Potential weed if sets seed; caution in SG crop system. Good forage, but low quality after heading. Mix with vining vetch, pea.</p> |
| Brassicas (B) | <p>Forage Radish (B) <i>Raphanus sativus</i> aka Daikon; Daichon; Fodder Radish</p> <p>Top Niche 2 (winterkill) option. May overwinter in SE VA. Early plant + mid seed rate = large lush plants, better winterkill. Late plant + high seed rate = smaller plants, more hardy. With good fertility, fastest-growing fall cover option. Top biomass, subsoiler, N scavenger, forage. Winterkilled residues disappear, N releases fast. Top weed suppressor (competition + allelopathy). Good in mixes, caution not to out-compete companions. Different growth pattern if spring seed, see Niche 5. Can substitute oilseed radish.</p> |
| | <p>Mustard (B) White/Yellow: <i>Sinapis alba</i> Brown/Indian: <i>Brassica juncea</i> Black: <i>B. nigra</i> (L.)</p> <p>Similar to other brassicas (see above, below), but best use in VA probably pest suppression, adding diversity to mixes. The brassica with most biotoxic compounds, best for biofumigation (requires soil incorporation, etc.). With fertility, potential for very fast fall growth, high biomass, good N scavenging. Not known for subsoiling, some varieties may not have taproot. Winter-hardiness, day length responses, other characteristics may vary by cultivar. Research & match varieties to your need. See also Niche 5.</p> |

continued on next page

Cover Crop Species List A, Part 2: Recommended Fall-Seeded Species (Seasonal Niches 1 & 2)

| Species | Key Characteristics & Considerations |
|------------------------------|---|
| Brassicas (B) / Forbs | <p>Phacelia <i>Phacelia tanacetifolia</i> aka Lacy Phacelia</p> <p>Unique crop with fernlike biomass. Fibrous shallow roots tops for soil aggregation. Not a brassica, adds diversity. Widely used in Europe. New to VA, info limited, seed costly. Fast growth in mild fall conditions, moderate biomass, residue not long-lasting. Winterkill expected in most of VA; may overwinter in SE VA; manage for lush growth to increase winterkill potential. Appears to have daylength response: in fall vegetative growth only; in spring goes to flower. Showy blue blooms tops for pollinators. See also Niche 5.</p> |
| | <p>Forage Turnip (B) <i>Brassica rapa var. rapa</i></p> <p>Similar to radish (above) or rapeseed (below), but less impressive taproot – instead makes bulb on surface. Good forage, probably fit best where cover will be grazed. With fertility, potential for fast fall growth, high biomass, good N scavenging. Big varietal differences possible, including major differences in bulb vs. top (leaf) ratios. Winter-hardiness, day length responses may vary also. Research cultivars to match your need. Big bulbs can be slow to break down, not ideal for subsequent planting or field operations. See also Niche 5.</p> |
| | <p>Rapeseed (B) <i>Brassica rapa</i> aka Canola; Rape</p> <p>Top brassica option for Niche 1. Winter-hardy cousin to forage radish (see above), similar characteristics. Reliably winter-hardy if seeded on time, except maybe highest VA elevations. With fertility, gives biomass, forage, deep branched taproot, N scavenging, weed suppression. Spring flowers attract pollinators. Low cost to seed. Range of choices (canola for seed, hybrids for grazing, etc.), characteristics may differ. Good in mixes, but caution not to outcompete companions. Spring termination sometimes tricky. See also Niche 5.</p> |
| Legumes | <p>Canadian Spring Pea <i>Pisum sativum subsp. Arvense</i> aka Yellow Field Pea</p> <p>Compare with winter pea below. Goal here is winterkill (Niche 2); rarely used this way in VA. Aim for lush growth – plant early! May not reliably winterkill in Coastal Plain. Select fastest growing spring types. Some contradictory info in literature about winterkill potential of peas. If fails to winterkill, easy to kill with other methods. Expect lower biomass & total N fixation compared to overwintered peas. Mixes well with spring oat, forage radish. Inoculate! Cross inoculates with vetch. See also Niche 5.</p> |
| | <p>Red Clover <i>Trifolium pratense</i></p> <p>Short-lived perennial, rarely used in this niche. Slow growing, must be seeded earlier, killed later than other annual legumes choices. Establishes readily, shade tolerant, very winter-hardy, inexpensive, resistant to some nematodes. Moderate N fixation. Best on good soils with high fertility; tolerates some wetness. For this niche, use multi-cut medium or one-cut mammoth varieties. Consider spring oat nurse crop or wheat/triticale companion. Inoculate! Cross inoculates with crimson or white clover. See also Niche 6.</p> |
| | <p>Crimson Clover <i>Trifolium incarnatum</i></p> <p>Popular in VA. May not reliably overwinter at very high elevations in VA. Earlier seeded, more fall growth, earlier spring bloom than hairy vetch. Short, upright growth habit. Good forage & weed suppressor. Good N fixer with slower residue breakdown & N release than vetch. Shade tolerant. Showy blooms, good for pollinators. Can reseed quickly & become weed. Host to some problem nematodes. Mixes esp. well with barley, annual ryegrass. Inoculate! Cross-inoculates with red or white clover.</p> |
| | <p>Austrian Winter Pea <i>Pisum sativum subsp. Arvense</i> aka Black Field Pea</p> <p>Compare to spring pea above. Goal here is overwintering (Niche 1): select winterhardy accordingly, avoid planting too early or late. May not reliably overwinter at very high elevations in VA. Top N fixer, good biomass & forage. Succulent residues disappear & release N faster than vetch. Low reseeding & weed risk. Vining habit, mix with small grain to climb. Caution: Sclerotinia crown rot can take out whole field, risk increases with more peas in rotation. Inoculate seed! Cross inoculates with vetch. See also Niche 5.</p> |
| | <p>Woollypod Vetch <i>Vicia villosa ssp. dasycarpa</i> aka Lana Vetch</p> <p>One of multiple vetch choices similar to hairy vetch (HV) – see below for HV description. Compared to HV, woollypod generally grows faster, produces more biomass, fixes more N, is less winterhardy. Likely to overwinter ok in eastern VA most years; limited info on winter survival in western VA. Caution: looks like HV, some vendors caution that not all seed sold as woollypod is woollypod. Common vetch (<i>Vicia sativa</i>) is possible substitute (increase seed rate 10%), might have less biomass potential. See also Niche 5.</p> |
| | <p>Hairy Vetch <i>Vicia villosa</i></p> <p>Reliable & widely used, but avoided by some due to weed concerns. Very winterhardy. Little fall growth, but fast vining spring growth makes it tops for N fixation, biomass. Residues release N fast. Good forage. Climbs well in mixes, also wraps up in equipment! Rye-vetch is top mix, or match with triticale, etc. Up to 20% of planted seed is hard, will germinate in future as weed. Host to some problem nematodes. Inoculate seed! Cross inoculates with peas. See above for other vetch types. See also Niche 5.</p> |

Establishment Specifications A: Fall-Seeded Cover Crops *(Seasonal Niches 1 & 2, Winter-Hardy & Winterkill)*

| Species <small>(gray shading indicates Niche 2 – expected to winterkill)</small> | Winterkill probability | Seeding rates <small>(lb/ac, for monocultures)</small> | | | | Seed depth <small>(inch)</small> | Seeding dates | | | | | | | | Approx. maturity <small>MB = max. biomass; VS = viable seed (use as general guideline only)</small> | |
|---|--|---|----------------|------------------|----------------|-------------------------------------|---|------------------|---|------------------|---|------------------|--|--------------------|--|-----------------------------|
| | | Base / default | | Acceptable range | | | Mountain & Valley <small>(based on Oct 10 average first frost)</small> | | Piedmont (PM) <small>(based on Oct 20 average first frost)</small> | | Coastal Plain (CP) <small>(based on Nov 1 average first frost)</small> | | Before or after avg first frost in fall <small>(DBFF or DAFF)</small> | | | |
| | | Drill | Bcast + incorp | Drill | Bcast + incorp | | Preferred | Possible | Preferred | Possible | Preferred | Possible | Preferred | Possible | | |
| Grasses | Spring Oat | high to mid | 80 | 110 | 65 to 125 | 100 to 165 | 0.5 to 1.5 | Aug 1 to Aug 20 | Jul 20 to Sep 5 | Aug 10 to Sep 1 | Aug 1 to Sep 15 | Aug 20 to Sep 10 | Aug 10 to Sep 25 | 70 to 50 DBFF | 80 to 35 DBFF | Winterkills before VS |
| | Annual Ryegrass | low | 15 | 25 | 10 to 20 | 20 to 30 | 0.25 to 0.5 | Aug 10 to Sep 1 | Aug 1 to Sept 20 | Aug 20 to Sep 10 | Aug 10 to Oct 1 | Sep 1 to Sep 20 | Aug 20 to Oct 10 | 60 to 40 DBFF | 70 to 20 DBFF | Similar timing to barley |
| | Winter Oat <i>PM & CP only</i> | low to mid | 80 | 110 | 65 to 125 | 100 to 165 | 0.5 to 1.5 | not suited | not suited | Sep 10 to Sep 30 | Sep 5 to Oct 5 | Sep 20 to Oct 10 | Sep 15 to Oct 15 | 40 to 20 DBFF | 45 to 15 DBFF | Similar timing to wheat |
| | Barley | very low | 100 | 140 | 50 to 150 | 75 to 200 | 0.75 to 2.0 | Aug 10 to Sep 10 | Aug 1 to Oct 10 | Aug 20 to Sep 20 | Aug 10 to Oct 20 | Sep 1 to Oct 1 | Aug 20 to Nov 1 | 60 to 30 DBFF | 70 to 0 DBFF | Earlier to head than wheat |
| | Wheat | very low | 120 | 160 | 60 to 180 | 90 to 240 | 0.5 to 1.5 | Aug 25 to Sep 25 | Aug 15 to Oct 25 | Sep 5 to Oct 5 | Aug 25 to Nov 5 | Sep 15 to Oct 15 | Sep 5 to Nov 15 | 45 to 15 DBFF | 55 DBFF to 15 DAFF | Heads late Apr to early May |
| | Triticale | very low | 110 | 145 | 60 to 170 | 90 to 225 | 0.75 to 2.0 | Aug 25 to Sep 25 | Aug 15 to Nov 1 | Sep 5 to Oct 5 | Aug 25 to Nov 10 | Sep 15 to Oct 15 | Sep 5 to Nov 20 | 45 to 15 DBFF | 55 DBFF to 20 DAFF | Later to head than wheat |
| Rye | very low | 110 | 145 | 60 to 170 | 90 to 225 | 0.75 to 2.0 | Aug 15 to Oct 1 | Aug 5 to Nov 10 | Aug 25 to Oct 10 | Aug 15 to Nov 20 | Sep 5 to Oct 20 | Aug 25 to Dec 1 | 55 to 10 DBFF | 65 DBFF to 30 DAFF | Earlier to head than barley | |
| Brassicas (B) / Forbs | Forage Radish (B) | high | 8 | 14 | 6 to 12 | 12 to 18 | 0.25 to 0.5 | Aug 1 to Aug 20 | Jul 10 to Sep 10 | Aug 10 to Sep 1 | Jul 20 to Sep 20 | Aug 20 to Sep 10 | Aug 1 to Oct 1 | 70 to 50 DBFF | 90 to 30 DBFF | Winterkills before VS |
| | Mustard (B) | high to mid | 8 | 12 | 5 to 12 | 10 to 18 | 0.25 to 0.5 | Aug 1 to Aug 20 | Jul 10 to Sep 10 | Aug 10 to Sep 1 | Jul 20 to Sep 20 | Aug 20 to Sep 10 | Aug 1 to Oct 1 | 70 to 50 DBFF | 90 to 30 DBFF | Winterkills before VS |
| | Forage Turnip (B) | mid | 5 | 10 | 2 to 8 | 8 to 12 | 0.25 to 0.5 | Aug 1 to Aug 20 | Jul 10 to Sep 10 | Aug 10 to Sep 1 | Jul 20 to Sep 20 | Aug 20 to Sep 10 | Aug 1 to Oct 1 | 70 to 50 DBFF | 90 to 30 DBFF | Spring VS or winterkills |
| | Phacelia | high to mid | 8 | 12 | 7 to 12 | 10 to 14 | 0.25 to 0.5 | Aug 1 to Aug 20 | Jul 20 to Sep 1 | Aug 10 to Sep 1 | Aug 1 to Sep 10 | Aug 20 to Sep 10 | Aug 10 to Sep 20 | 70 to 50 DBFF | 80 to 40 DBFF | Winterkills before VS |
| | Rapeseed (B) | low | 6 | 12 | 4 to 10 | 8 to 14 | 0.25 to 0.5 | Aug 10 to Sep 1 | Jul 20 to Sep 20 | Aug 20 to Sep 10 | Aug 1 to Oct 1 | Sep 1 to Sep 20 | Aug 10 to Oct 10 | 60 to 40 DBFF | 80 to 20 DBFF | MB late Apr / early May |
| Legumes (inoculate!) | Canadian Spring Pea | high to mid | 60 | 90 | 50 to 80 | 75 to 120 | 1.5 to 2.5 | Aug 1 to Aug 20 | Jul 20 to Sep 1 | Aug 10 to Sep 1 | Aug 1 to Sep 10 | Aug 20 to Sep 10 | Aug 10 to Sep 20 | 70 to 50 DBFF | 80 to 40 DBFF | Winterkills before VS |
| | Red Clover | very low | 10 | 12 | 8 to 10 | 10 to 12 | 0.25 to 0.5 | Aug 5 to Aug 25 | Jul 25 to Sep 5 | Aug 15 to Sep 5 | Aug 5 to Sep 15 | Aug 25 to Sep 15 | Aug 15 to Sep 25 | 65 to 45 DBFF | 75 to 35 DBFF | MB late May to mid June |
| | Crimson Clover | low | 15 | 25 | 15 to 20 | 20 to 30 | 0.25 to 0.5 | Aug 10 to Sep 1 | Aug 1 to Sept 20 | Aug 20 to Sep 10 | Aug 10 to Oct 1 | Sep 1 to Sep 20 | Aug 20 to Oct 10 | 60 to 40 DBFF | 70 to 20 DBFF | MB late April to early May |
| | Austrian Winter Pea | low | 50 | 75 | 50 to 80 | 75 to 120 | 1.5 to 2.5 | Aug 20 to Sep 10 | Aug 10 to Oct 1 | Sep 1 to Sep 20 | Aug 20 to Oct 10 | Sep 10 to Oct 1 | Sep 1 to Oct 20 | 50 to 30 DBFF | 60 to 10 DBFF | MB early to mid May |
| | W.pod Vetch <i>PM & CP only</i> | low to mid | 20 | 30 | 15 to 25 | 25 to 40 | 0.5 to 1.0 | not suited | not suited | Sep 1 to Sep 20 | Aug 20 to Oct 10 | Sep 10 to Oct 1 | Sep 1 to Oct 20 | 50 to 30 DBFF | 60 to 10 DBFF | MB early to mid May |
| | Hairy Vetch | very low | 20 | 30 | 15 to 25 | 25 to 40 | 0.5 to 1.0 | Aug 20 to Sep 10 | Aug 1 to Oct 1 | Sep 1 to Sep 20 | Aug 10 to Oct 10 | Sep 10 to Oct 1 | Aug 20 to Oct 20 | 50 to 30 DBFF | 70 to 10 DBFF | MB early to mid May |

Cover Crop Species List B: Recommended Summer-Seeded Species (Seasonal Niches 3 & 4)

| Species | | Key Characteristics & Considerations |
|----------------|--|--|
| Grasses | Sorghum-Sudangrass <i>Sorghum bicolor</i> x <i>S. bicolor</i> var. <i>sudanese</i> aka Sudex, Sudax | Top grass choice. Heat-loving, fast-growing, 6-12 ft tall, big biomass potential, but needs lots soil N. Top weed suppressor thru competition, allelopathy (caution on next crop if small seeded). Top subsoiler with thicker roots than most grasses. Good forage, but caution on prussic acid, nitrates. Improved forage types available, cultivars may vary widely. Regrows well after mow/graze. Huge biomass, reseeding potential can overwhelm: mow or kill timely! Mix with cowpea, sunnhemp. Can swap in forage sorghum or sudangrass. |
| | Pearl Millet <i>Pennisetum glaucum</i> aka Cattail Millet | Heat-loving, fast-growing, high-biomass option very similar to sorghum-sudangrass (see above). Compared to sorghum-sudangrass: slightly lower biomass potential; better on acid & droughty soils; less allelopathy potential; less reputation for subsoiling; no prussic acid forage toxicity (but nitrates still a concern). Some contradictory info on pearl millet regrowth potential, but generally expected to regrow well if mow/graze high. Improved forage types available, cultivars may vary widely. Mix with cowpea, sunnhemp. |
| | Foxtail Millet <i>Setaria italica</i> (aka German or Hay Millet) | Much shorter, finer-stemmed, lower-biomass option compared to sorghum-sudan & pearl (see above). Key difference: foxtail is reliably killed with single mowing. Also foxtail matures faster, not as good on weeds or drought. Some report foxtail grows little in 2 nd half of summer due to photoperiod, other don't – maybe a cultivar issue? Mix with cowpeas, soybeans. Japanese and browntop millet are similar, but might not mow kill as well and may mature faster/reseed more easily; substitute these species if foxtail not available. |
| Forbs | Black Oilseed Sunflower <i>Helianthus annuus</i> | Rarely used in VA, primarily for adding diversity to mixes. Blooms very attractive to people, pollinators, wildlife. Very low cost seed. Deep branched taproot, good reputation for pulling up nutrients (but not necessarily subsoiling). Good heat & drought tolerance once established. OK weed suppressor. Seems to do well in mixes – some report it grows tall in tall mix, short in short mix. Varying reports on cold tolerance; most sources say more cold tolerant than other summer covers, but still winterkills at 28° F. |
| | Buckwheat <i>Fagopyrum esculentum</i> | Popular summer cover. Top weed suppressor due to very fast growth (not allelopathy). Blooms & extrafloral nectaries tops for pollinators, beneficials. High risk of reseeding: terminate or mow within 7 to 10 days of first bloom. Matures faster than all other covers – if reseeding a concern, don't grow in mixes. Needs warm conditions, but very low tolerance to drought or high heat. Fine root system good for topsoil conditioning, but not subsoiling. Easy to kill. Books say excellent for unlocking soil phosphorous (P). |
| Legumes | Forage Soybean <i>Glycine max</i> | Similar to cowpea (see below) for cover crop use. Compared to cowpea: more tolerant of cool weather, wet soils; less tolerant of drought, pests, poor soil fertility. Good N fixation, biomass, and forage potential. Many varieties available; use late-maturing or forage cultivars for high biomass. Bushy growth habit, mixes better with short grasses like foxtail. Not good rotation for grain systems with cash crop soybeans. Low reseeding & weed risk. Inoculate! Does not cross inoculate with other legumes. |
| | Cowpea <i>Vigna unguiculata</i> aka Crowder or Southern or Blackeyed Pea | Top summer legume. Very heat & drought tolerant once established, deep taproot, tolerates low fertility. Grows fast, good biomass & forage, high N fixation potential, good weed suppressor. Extrafloral nectaries great for beneficial insects. Some pest nematode suppression. Many cultivars; select forage or cover types. Some shade tolerance = good for mixes. Use bush types for short mixes, vine for tall mixes. Needs heat, caution in VA mountains. Low reseeding & weed risk. Inoculate! Cross-inoculates with peanut, sunnhemp. |
| | Sunnhemp <i>Crotalaria juncea</i> L. aka Sunn Hemp | Tall tropical legume new to VA. Grows well in late summer, vendors encourage using it for winterkill (Niche 4). Reported to fix lots of N in short time. Spindly growth habit with narrow leaves = better choice for mixes than monoculture. Becomes very stemmy as matures. Low forage potential. Interesting yellow blooms; very low risk of reseeding and becoming weed. Mix with sudex, pearl millet, sunflower. Inoculate seed! Cross-inoculates with cowpea, sunnhemp. |

Cover Crop Establishment Specifications B: Summer-Seeded Species (Seasonal Niches 3 & 4)*

| Species | Seeding rates (lb/ac, for monocultures) | | | | Seed depth (inch) | Seeding dates | | | | | | | | Probability crop regrows after mowing | Approx. maturity* MB = max. biomass; VS = viable seed (use as general guideline only) | |
|---------|--|------------------|---------------------|------------------|----------------------|---|----------------------|---|---------------------|---|--------------------|--|-----------------------|--|--|--|
| | Base / default | | Acceptable range | | | Mountain & Valley <i>(based on May 1 last frost, Oct 10 first frost)</i> | | Piedmont <i>(based on Apr 20 last frost, Oct 20 first frost)</i> | | Coastal Plain <i>(based on Apr 10 last frost, Nov 1 first frost)</i> | | Days after last spring frost (DALF) & before first fall frost (DBFF) | | | | |
| | Drill | Bcast+ incorp | Drill | Bcast+ incorp | | Preferred | Accept- able | Preferred | Accept- able | Preferred | Accept- able | Preferred | Accept- able | | | |
| Grasses | Sorghum- Sudangrass | 35 | 45 | 20 to 50 | 30 to 70 | 0.5 to 1.0 | Jun 20 to Aug 10 | Jun 1 to Aug 25 | Jun 10 to Aug 20 | May 20 to Sep 5 | Jun 1 to Sep 1 | May 10 to Sep 15 | 50 DALF to 60 DBFF | 30 DALF to 45 DBFF | very high | MB: 45 to 65 days after plant (DAP) |
| | Pearl Millet | 20 | 30 | 10 to 30 | 20 to 40 | 0.5 to 1.0 | Jun 20 to Aug 10 | Jun 1 to Aug 25 | Jun 10 to Aug 20 | May 20 to Sep 5 | Jun 1 to Sep 1 | May 10 to Sep 15 | 50 DALF to 60 DBFF | 30 DALF to 45 DBFF | high | MB: 45 to 70 days after plant (DAP) |
| | Foxtail Millet | 20 | 30 | 15 to 30 | 20 to 40 | 0.25 to 0.75 | Jun 20 to Jul 20 | Jun 1 to Aug 20 | Jun 10 to Aug 1 | May 20 to Sep 1 | Jun 1 to Aug 10 | May 10 to Sep 10 | 50 DALF to 80 DBFF | 30 DALF to 50 DBFF | very low | MB: 40 to 60 VS: 60 to 75 DAP |
| Forbs | Black Oil Sunflower | 5 | 10 | 3 to 6 | 6 to 12 | 0.75 to 1.75 | May 20 to July 25 | May 10 to Aug 10 | May 10 to Aug 5 | May 1 to Aug 20 | May 1 to Aug 15 | Apr 20 to Sep 1 | 20 DALF to 75 DBFF | 10 DALF to 60 DBFF | very low | MB: 80 DAP VS: 120 DAP |
| | Buckwheat | 60 | 80 | 40 to 100 | 60 to 120 | 0.5 to 1.5 | May 25 to Aug 10 | May 15 to Aug 25 | May 15 to Aug 20 | May 5 to Sep 5 | May 5 to Sep 1 | Apr 25 to Sep 15 | 25 DALF to 60 DBFF | 15 DALF to 45 DBFF | low | MB as fast as 30 DAP; VS as fast as 45 DAP |
| Legumes | Forage Soybean | 60 | 90 | 40 to 100 | 60 to 130 | 0.75 to 1.5 | Jun 10 to July 15 | May 20 to Aug 1 | Jun 1 to July 25 | May 10 to Aug 10 | May 20 to Aug 5 | May 1 to Aug 20 | 40 DALF to 85 DBFF | 20 DALF to 70 DBFF | low | MB: 50 to 75 days after plant (DAP) |
| | Cowpea | 50 | 80 | 30 to 90 | 50 to 120 | 1.0 to 1.5 | Jun 20 to Jul 25 | Jun 1 to Aug 10 | Jun 10 to Aug 5 | May 20 to Aug 20 | Jun 1 to Aug 15 | May 10 to Sep 1 | 50 DALF to 75 DBFF | 30 DALF to 60 DBFF | low | MB: 50 to 90 VS: 90 to 120 DAP |
| | Sunnhemp | 20 | 30 | 15 to 45 | 25 to 60 | 0.5 to 1.0 | Jun 20 to Jul 25 | Jun 1 to Aug 10 | Jun 10 to Aug 5 | May 20 to Aug 20 | Jun 1 to Aug 15 | May 10 to Sep 1 | 50 DALF to 75 DBFF | 30 DALF to 60 DBFF | very low | MB: 90 DAP Season too short for VS |

*Use maturity information to estimate whether cover will reach maturity prior to frost. If not, use timely mowing to retard seed set and/or terminate using other methods.

Cover Crop Species List C: Recommended Spring-Seeded Frost-Hardy Species *(Seasonal Niche 5)*

| Species | Key Characteristics & Considerations |
|------------------------------|--|
| Grasses | <p>Spring Oat <i>Avena sativa</i></p> <p>See fall-seeded species table for details on oat. Top spring small grain (SG) choice. Select spring types that head/ seed without overwintering. At maturity, lower C:N than most SGs. At low rate, a good nurse crop option for spring seeded perennials. Oat/pea is classic mix. Use same types for Niche 2 (fall seed winterkill).</p> |
| | <p>Small Grains (barley, wheat, triticale, rye)</p> <p>See fall-seeded species table for details on small grain (SG). Winter SG typical in VA – needs overwintering for heading/seed set. Winter SG seeded in spring might not vernalize; if not, stays short, no stalk. Might be good or bad – depends on purpose. If stems/residue needed, seed winter types early or use spring oat/SG.</p> |
| | <p>Annual Ryegrass <i>Lolium multiflorum</i></p> <p>See fall-seeded species table for details on ryegrass. Likely to provide good cover if seeded in spring; total biomass production, if and when will start reproductive phase, etc. less certain. Control before seed set. If still vegetative, will fade out fast in heat of summer.</p> |
| Brassicas (B) / Forbs | <p>Forage Radish (B) <i>Raphanus sativus</i></p> <p>See fall-seeded species table for details on radish. For typical VA varieties, spring seeding gives very different result from fall seeding. Much less root and top growth, bolts and flowers very quickly. Attractive white flowers. Thus spring use primarily to add fast bloom, diversity to mixes. Some varieties may differ.</p> |
| | <p>Mustard (B) <i>Sinapis alba; Brassica juncea; B. nigra (L.)</i></p> <p>See fall-seeded species tables for details on mustard. Spring growth pattern may vary by cultivar; research & match varieties to meet needs. Initial observations in VA indicate spring results similar to radish – much less biomass, bolts & flowers very fast. Thus spring use mainly for adding diversity, fast blooms in mixes.</p> |
| | <p>Phacelia <i>Phacelia tanacetifolia</i></p> <p>See fall-seeded species tables for details on phacelia. Initial observations indicate only spring seeding produces blooms; biomass is modest, but longer growth period before flowering than radish, mustard. Showy blue blooms very good for pollinators, probably key purpose for growing this in spring.</p> |
| | <p>Forage Turnip (B) <i>Brassica rapa var. rapa</i></p> <p>See fall-seeded species tables for details on turnip. Spring seeding likely provides similar results to radish and mustard (see above) – limited biomass, fast flowering. Spring results may be highly cultivar-specific. Research & match varieties to your needs.</p> |
| | <p>Rapeseed (B) <i>Brassica rapa</i> aka Canola; Rape</p> <p>See fall-seeded species tables for details on rapeseed. Like small grain, winter & spring types are available. Initial observations with spring-seeded winter rape suggest more growth than radish or mustards before flowering, but still less biomass than if fall seeded. May vary by cultivar; research & match seed to needs.</p> |
| Legumes | <p>Canadian Spring Pea <i>Pisum sativum</i></p> <p>See fall-seeded species tables for details on spring peas. Top legume choice for early spring seeding. Select fastest-growing spring types. Expect lower biomass & total N fixation compared to overwintered peas. Mixes well with spring oat. Inoculate! Cross inoculates with vetch. Use same types as for See also Niche 2.</p> |
| | <p>Austrian Winter Pea <i>Pisum sativum</i></p> <p>See fall-seeded species tables for details on winter peas. Expect slightly slower growth and less biomass than with spring pea (see above), but typically similar results. Much lower total biomass potential if spring seeded compared to standard fall seeding. Inoculate! Cross inoculates with vetch. See also Niche 1.</p> |
| | <p>Woollypod Vetch <i>Vicia villosa ssp. dasycarpa</i></p> <p>See fall-seeded species tables for details on woollypod. 2nd choice behind peas for short-term spring N fixation. One of multiple specialty vetches similar to hairy vetch (HV). Likely to be less winter-hardy, but faster growth, more biomass than spring-seeded HV. Common vetch (<i>Vicia sativa</i>) option is larger seeded, increase rate by 25%. Rare in VA are purple vetch and chickling vetch – likely low winterhardiness, but maybe better spring options. Research & select seed to meet needs. Inoculate! Cross-inoculates with pea.</p> |
| | <p>Hairy Vetch <i>Vicia villosa</i></p> <p>See fall-seeded species tables for details on hairy vetch. May not grow as well spring seeded as woollypod or other specialty vetches (see above), but readily available. Inoculate! Cross-inoculates with peas.</p> |

Cover Crop Establishment Specifications C: Spring-Seeded, Frost-Hardy Species *(Seasonal Niche 5)*

| Species | Seeding rates (lb/ac, for monocultures) | | | | Seed depth (inch) | Seeding dates | | | | | | | | Approx. maturity MB = max. biomass; VS = viable seed <i>(use as general guideline only)</i> | |
|-------------------------------|--|--|------------------|----------------|----------------------|---|------------------|---|------------------|--|------------------|--|---------------|--|--|
| | Base / default | | Acceptable range | | | Mountain & Valley <i>(based on May 1 average last frost)</i> | | Piedmont <i>(based on Apr 20 average last frost)</i> | | Coastal Plain <i>(based on Apr 10 average last frost)</i> | | Days before average last spring frost <i>(DBLF)</i> | | | |
| | Drill | Bcast + incorp | Drill | Bcast + incorp | | Preferred | Acceptable | Preferred | Acceptable | Preferred | Acceptable | Preferred | Possible | | |
| --- Grasses --- | Spring Oat | 80 | 110 | 65 to 125 | 100 to 165 | 0.5 to 1.5 | Mar 15 to Apr 5 | Mar 5 to Apr 20 | Mar 5 to Mar 25 | Feb 25 to Apr 10 | Feb 25 to Mar 15 | Feb 15 to Apr 1 | 45 to 25 DBLF | 55 to 10 DBLF | MB 60 to 75 days after planting (DAP) |
| | Barley, Wheat, Triticale, Rye | Obtain seeding rate and depth for selected small grains from Establishment Specs A (fall seeded) | | | | | Mar 15 to Apr 5 | Mar 5 to Apr 20 | Mar 5 to Mar 25 | Feb 25 to Apr 10 | Feb 25 to Mar 15 | Feb 15 to Apr 1 | 45 to 25 DBLF | 55 to 10 DBLF | Winter types should head out if use preferred dates |
| | Annual Ryegrass | 15 | 25 | 10 to 20 | 20 to 30 | 0.25 to 0.5 | Apr 1 to Apr 20 | Mar 20 to May 1 | Mar 20 to Apr 10 | Mar 10 to Apr 20 | Mar 10 to Apr 1 | Mar 1 to Apr 10 | 30 to 10 DBLF | 40 to 0 DBLF | Uncertain; consult local experts |
| --- Brassicas (B) / Forbs --- | Forage Radish (B) | 8 | 14 | 6 to 12 | 12 to 18 | 0.25 to 0.5 | Apr 1 to Apr 20 | Mar 20 to May 1 | Mar 20 to Apr 10 | Mar 10 to Apr 20 | Mar 10 to Apr 1 | Mar 1 to Apr 10 | 30 to 10 DBLF | 40 to 0 DBLF | MB 50 to 60 DAP; little root; quick to bloom |
| | Mustard (B) | 8 | 12 | 5 to 12 | 10 to 18 | 0.25 to 0.5 | Apr 1 to Apr 20 | Mar 20 to May 1 | Mar 20 to Apr 10 | Mar 10 to Apr 20 | Mar 10 to Apr 1 | Mar 1 to Apr 10 | 30 to 10 DBLF | 40 to 0 DBLF | MB 50 to 60 DAP; quick to bloom; cultivars vary |
| | Forage Turnip (B) | 5 | 10 | 2 to 8 | 8 to 12 | 0.25 to 0.5 | Apr 1 to Apr 20 | Mar 20 to May 1 | Mar 20 to Apr 10 | Mar 10 to Apr 20 | Mar 10 to Apr 1 | Mar 1 to Apr 10 | 30 to 10 DBLF | 40 to 0 DBLF | Uncertain; cultivars may vary |
| | Phacelia | 8 | 12 | 7 to 12 | 10 to 14 | 0.25 to 0.5 | Apr 1 to Apr 20 | Mar 20 to May 1 | Mar 20 to Apr 10 | Mar 10 to Apr 20 | Mar 10 to Apr 1 | Mar 1 to Apr 10 | 30 to 10 DBLF | 40 to 0 DBLF | MB 60 to 80 DAP; very attractive blue blooms |
| | Rapeseed (B) | 6 | 12 | 4 to 10 | 8 to 14 | 0.25 to 0.5 | Apr 1 to Apr 20 | Mar 20 to May 1 | Mar 20 to Apr 10 | Mar 10 to Apr 20 | Mar 10 to Apr 1 | Mar 1 to Apr 10 | 30 to 10 DBLF | 40 to 0 DBLF | MB 60 to 80 DAP; slower to bolt and bloom than radish or |
| Legumes <i>(inoculate!)</i> | Canadian Spring Pea | 60 | 90 | 50 to 80 | 75 to 120 | 1.5 to 2.5 | Mar 20 to Apr 10 | Mar 10 to Apr 20 | Mar 10 to Apr 1 | Mar 1 to Apr 10 | Mar 1 to Mar 20 | Feb 20 to Apr 1 | 40 to 20 DBLF | 50 to 10 DBLF | MB 60 to 90 days after planting (DAP) |
| | Austrian Winter Pea | 50 | 75 | 50 to 80 | 75 to 120 | 1.5 to 2.5 | Mar 20 to Apr 10 | Mar 10 to Apr 20 | Mar 10 to Apr 1 | Mar 1 to Apr 10 | Mar 1 to Mar 20 | Feb 20 to Apr 1 | 40 to 20 DBLF | 50 to 10 DBLF | MB 60 to 90 days after planting (DAP) |
| | Woolypod Vetch | 20 | 30 | 15 to 25 | 25 to 40 | 0.5 to 1.0 | Apr 1 to Apr 20 | Mar 20 to May 1 | Mar 20 to Apr 10 | Mar 10 to Apr 20 | Mar 10 to Apr 1 | Mar 1 to Apr 10 | 30 to 10 DBLF | 40 to 0 DBLF | MB 60 to 90 days after planting (DAP) |
| | Hairy Vetch | 20 | 30 | 15 to 25 | 25 to 40 | 0.5 to 1.0 | Apr 1 to Apr 20 | Mar 20 to May 1 | Mar 20 to Apr 10 | Mar 10 to Apr 20 | Mar 10 to Apr 1 | Mar 1 to Apr 10 | 30 to 10 DBLF | 40 to 0 DBLF | MB 60 to 90 days after planting (DAP) |

Cover Crop Species List D: Recommended Biennial/Perennial Species (*Seasonal Niche 6*)

| Species | | Key Characteristics & Considerations |
|----------------|---|---|
| Grasses | Tall Fescue <i>Festuca arundinacea</i> | <p>Most competitive, persistent perennial cool-season grass in VA, especially in warmer regions. Top choice for low-maintenance cover, erosion control, organic matter building. Low cost; deep roots; high biomass esp. in spring/fall with ample soil N; tolerant of drought, wet soils, poor soils. Most VA fescue infected with endophyte fungus – lowers forage value, but plants more durable. Forage and turf types available. Improved, endophyte-free cultivars are better forage, less persistent stands. Hay, graze, or clip to minimize seed set, keep stand vegetative. Mow high to maintain root reserves. If managed like hay, mix with red clover, alfalfa. If kept low with mowing (turf types) or grazing, mix with white clover. Best if fall-seeded, but spring works. Consider seeding with small grain that will be harvested/mowed to “release” perennial.</p> |
| | Orchardgrass <i>Dactylis glomerata</i> | <p>Widely-adapted perennial cool-season grass in VA, esp. in cooler regions. Higher forage quality than tall fescue (see above), but not as tolerant of heat, drought, heavy grazing, low mowing, poor soils. Tops for forage, biomass production, erosion control, soil building on with good fertility & management. Not long-lived in warmer regions of VA, but can fill perennial cover crop window of 1 to 3 summers anywhere in state. Hay, graze, or clip to minimize seed set, keep stand vegetative. Mow high/rotationally graze to maintain root reserves. Mix with red clover, alfalfa. Fall seeding is best, esp. in eastern VA. Consider seeding with small grain nurse crop that will be harvested/mowed off to “release” perennial understory.</p> |
| Legumes | Alfalfa <i>Medicago sativa</i> | <p>Top legume hay crop, very deep taproot, top N fixer. Expensive, best for longer windows (2 to 4 summers) and double-duty as forage & soil builder. Needs high soil pH, good fertility; not for wet soils. Super deep roots = drought tolerant. Dormant in winter; mix with hay-type grass (orchardgrass, etc.) for winter cover and to moderate C:N ratio at termination. Cut for hay or clip high to keep vegetative and maintain stand. For hay, 1st cut at bud stage, next cuts every 30-40 days (late bud to ¼ bloom), last cut in fall in time for 8” regrowth. Consider seeding with nurse of spring oats at low rate or small grains that will be harvested/mowed off to “release” perennial understory. Inoculate! Cross-inoculates with sweetclover.</p> |
| | Red Clover <i>Trifolium pratense</i> | <p>Short-lived perennial, often lasts two years. Multi-cut “medium” types best for this niche. Upright plant often used for hay, very winter-hardy, inexpensive, resists some nematodes, good taproot. Top N fixation, forage, blooms. Needs good soils & fertility; tolerates some wetness. Keep hayed (¼-½ bloom) or clipped high to avoid seed set, keep stand vegetative. Mix with grasses like orchardgrass or fescue to moderate C:N ratio at termination. Consider seeding with spring oat at low or small grain that will be harvested/mowed to “release” clover understory. Inoculate! Cross inoculates with crimson or white clover. See also Niche 1.</p> |
| | White Clover <i>Trifolium repens</i> aka Intermediate, Common, or Dutch White Clover | <p>Low-growing perennial, most tolerant clover for shade, traffic, tight mowing/grazing, acid/poor soil. As cover crop, a top use is as mowed living mulch in walkways, alleyways, understory. Shallow roots, spreads by lateral-growing stolons. Good N fixer, pollinator-friendly blooms. Persists and competes best if mowed low; can last many years. Two other types available: “wild white” is shorter; Ladino white is taller (for orchardgrass-type pastures). To make a mix with common white clover, use low-growing, mowing-tolerant fescue or other shorter grasses. Inoculate! Cross inoculates with crimson or red clover.</p> |
| | Yellow Blossom Sweetclover <i>Melilotus officinalis</i> | <p>Biennial known for deep subsoiling, N fixation. Prefers mild conditions, but most drought-tolerant legume once established. Note good on wet soil. Historically a top green manure. Now rarely grown, so practical info hard to find in VA – do your research and start small! Suggested use: plant early spring, growth 1st season is mostly underground, should not flower, avoid mowing. After overwintering, 2nd-season growth is above-ground – high biomass & N fixation, sweet-smelling blooms. Hard-seeded, some planted seed may germinate in future seasons. Lots of small seed, control before they are viable. Inoculate! Cross-inoculates with alfalfa. Option: Hubam annual white sweetclover; also seeded in spring, but doesn’t overwinter.</p> |

Cover Crop Establishment Specifications D: Biennial/Perennial Species *(Seasonal Niche 6)*

| Species | Seeding rates (lb/ac, for monocultures) | | | | Seed depth (inch) | Seeding dates | | | | | | | | | |
|--------------------------------|--|-------------------|------------------|-------------------|----------------------|---|--------------------------|---|--------------------------|---|----------------------------|--|---|-----------------------|----|
| | Base or default | | Acceptable range | | | Mountain & Valley <i>(based on May 1 last avg. frost, Oct 10 first avg. frost)</i> | | Piedmont <i>(based on Apr 20 last avg. frost, Oct 20 first avg. frost)</i> | | Coastal Plain <i>(based on Apr 10 last avg. frost, Nov 1 first avg. frost)</i> | | Days before first fall frost (DBFF), days before last spring frost (DBLF) | | | |
| | Drill | Bcast + incorp | Drill | Bcast + incorp | | Preferred | Possible | Preferred | Possible | Preferred | Possible | Preferred | Possible | | |
| Grasses | Tall fescue | 20 | 25 | 15 to 20 | 20 to 25 | 0.25 to 0.50 | Fall: Aug 15 to Sep 10 | Fall: Aug 1 to Oct 5 | Fall: Aug 25 to Sep 20 | Fall: Aug 10 to Oct 15 | Fall: Sep 5 to Oct 1 | Fall: Aug 20 to Oct 25 | Fall: 55 to 30 DBFF | Fall: 70 to 5 DBFF | |
| | | | | | | | Spring: Mar 15 to Apr 5 | Spring: Mar 1 to Apr 25 | Spring: Mar 5 to Mar 25 | Spring: Feb 20 to Apr 15 | Spring: Feb 25 to Mar 15 | Spring: Feb 10 to Apr 5 | Spring: 45 to 25 DBLF | Spring: 60 to 5 DBLF | |
| | Orchardgrass | 12 | 16 | 8 to 15 | 12 to 20 | 0.25 to 0.50 | Fall: Aug 15 to Sep 5 | Fall: Aug 5 to Oct 1 | Fall: Aug 25 to Sep 15 | Fall: Aug 5 to Oct 10 | Fall only: Sep 5 to Sep 25 | Fall: Aug 25 to Oct 20 | Fall: 55 to 35 DBFF | Fall: 65 to 10 DBFF | |
| | | | | | | | Spring: Mar 15 to Apr 1 | Spring: Mar 5 to Apr 15 | Spring: Mar 5 to Mar 20 | Spring: Feb 25 to Apr 5 | NA | Spring: Feb 15 to Mar 25 | Spring: 40 to 30 DBLF <i>(not C.Plain)</i> | Spring: 55 to 15 DBLF | |
| Legumes <i>(inoculate!)</i> | Alfalfa | 20 | 25 | 15 to 20 | 20 to 25 | 0.25 to 0.50 | Fall: Aug 10 to Sep 1 | Fall: Aug 1 to Sep 20 | Fall: Aug 20 to Sep 10 | Fall: Aug 10 to Oct 1 | Fall: Sep 1 to Sep 20 | Fall: Aug 20 to Oct 10 | Fall: 60 to 40 DBFF | Fall: 70 to 20 DBFF | |
| | | | | | | | Spring: Mar 20 to Apr 10 | Spring: Mar 1 to Apr 20 | Spring: Mar 10 to Apr 1 | Spring: Mar 1 to Apr 10 | Spring: Mar 1 to Mar 20 | Spring: Feb 20 to Apr 1 | Spring: 40 to 20 DBLF | Spring: 50 to 10 DBLF | |
| | Red clover | 10 | 12 | 8 to 12 | 10 to 15 | 0.25 to 0.50 | Fall: Aug 10 to Sep 1 | Fall: Aug 1 to Sep 20 | Fall: Aug 20 to Sep 10 | Fall: Aug 10 to Oct 1 | Fall: Sep 1 to Sep 20 | Fall: Aug 20 to Oct 10 | Fall: 60 to 40 DBFF | Fall: 70 to 20 DBFF | |
| | | | | | | | Spring: Mar 20 to Apr 10 | Spring: Mar 1 to Apr 20 | Spring: Mar 10 to Apr 1 | Spring: Mar 1 to Apr 10 | Spring: Mar 1 to Mar 20 | Spring: Feb 20 to Apr 1 | Spring: 40 to 20 DBLF | Spring: 50 to 10 DBLF | |
| | White clover | 5 | 10 | 3 to 9 | 5 to 14 | 0.25 to 0.50 | Fall: Aug 10 to Sep 1 | Fall: Aug 1 to Sep 20 | Fall: Aug 20 to Sep 10 | Fall: Aug 10 to Oct 1 | Fall: Sep 1 to Sep 20 | Fall: Aug 20 to Oct 10 | Fall: 60 to 40 DBFF | Fall: 70 to 20 DBFF | |
| | | | | | | | Spring: Mar 20 to Apr 10 | Spring: Mar 1 to Apr 20 | Spring: Mar 10 to Apr 1 | Spring: Mar 1 to Apr 10 | Spring: Mar 1 to Mar 20 | Spring: Feb 20 to Apr 1 | Spring: 40 to 20 DBLF | Spring: 50 to 10 DBLF | |
| | Yellow blossom sweetclover | 10 | 15 | 6 to 12 | 10 to 20 | 0.25 to 0.50 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | | | | | Spring: Apr 1 to Apr 20 | Spring: Mar 20 to May 1 | Spring: Mar 20 to Apr 10 | Spring: Mar 10 to Apr 20 | Spring: Mar 10 to Apr 1 | Spring: Mar 1 to Apr 10 | Spring: 30 to 10 DBLF | Spring: 40 to 0 DBLF | |