NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

CRITICAL AREA PLANTING

(Ac.)

CODE 342

DEFINITION

Establishing permanent vegetation on sites that have, or are expected to have, high erosion rates, and on sites that have physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices.

PURPOSE

Stabilize stream and channel banks, and shorelines.

Stabilize areas with existing or expected high rates of soil erosion by wind or water.

Rehabilitate and revegetate degraded sites that cannot be stabilized using normal establishment techniques.

Stabilize coastal areas, such as sand dunes and riparian areas.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to highly disturbed areas such as:

active or abandoned mined lands;

urban conservation sites;

road construction areas;

conservation practice construction sites;

areas needing stabilization before or after natural disasters such as floods, hurricanes, tornados and wildfires;

eroded banks of natural channels, banks of newly constructed channels, and lake shorelines;

other areas degraded by human activities or natural events.

CRITERIA

General Criteria Applicable To All Purposes

Site Preparation

A site investigation shall be conducted to identify any physical, chemical, or biological conditions that could affect the successful establishment of vegetation.

Necessary site preparation and planting shall be done at a time and manner to insure survival and growth of the selected species.

Areas to be planted will be cleared of unwanted materials and smoothed or shaped, if needed, to meet planting and landscaping purposes.

A suitable seedbed shall be prepared for all seeded species. Compacted layers will be ripped and the soil re-firmed prior to seedbed preparation.

Remove any surface debris that may interfere with conventional cover establishment and/or maintenance operations.

Any necessary federal, state, and local permits will be obtained prior to implementation of this practice.

This practice will be designed to ensure that soil erosion is reduced or maintained at acceptable levels.

All tillage operations shall be performed on the contour to the extent possible.

Seedbed Preparation

No-till seeding may also be used where feasible. Slopes steeper than 3:1 will normally be planted by hand, or with a hydroseeder. The slope surface should be left in a loose, friable, and slightly roughened condition during initial grading. If additional roughness is desired, stair-step grading, grooving, furrowing, or tracking may be accomplished with heavy equipment. Grooves or furrows should be at least two inches deep. Tracking may cause severe surface compaction, and may not be as effective as other forms of roughening. On clayey soils, use this method only if there is no other viable alternative.

Grading of slopes should be performed only to the extent necessary to ensure stability.

When conventional seeding is proposed (normally on slopes with a 3:1 ratio or flatter), the area should be graded or shaped as needed to permit the safe use of equipment during all operations associated with cover establishment and maintenance.

The soil surface should be roughened lightly (minimum depth of 3 inches) by heavy equipment or with suitable farm tillage implements just prior to seedbed preparation.

All required seedbed preparation should be performed just prior to, and in conjunction with planting. If rainfall occurs between the initial seedbed preparation and the seeding operation, the site may need to be reworked.

Seedbed preparation may not be required on newly disturbed areas. If needed, firm the seedbed with a cultipacker or other suitable implement prior to planting to insure good seed to soil contact and to prevent seeds or plants from being deeply buried.

Where site conditions will not permit normal seedbed preparation, loosen the soil surface by tracking and/or back-blading with a bulldozer or other suitable earthmoving equipment, if available.

If seedbed preparation is not feasible, 50% more seed shall be added to the recommended rates shown in Tables 3 - 4.

Sites which prohibit the use of conventional equipment should be prepared in such a manner that the soil surface remains in a loose and friable condition. This may be accomplished with heavy equipment during, and as a part of site preparation.

On sites where the use of conventional equipment is proposed, prepare a proper seedbed by disking, harrowing, or using other suitable tillage implements.

Soil disturbance can also be accomplished with the use of a chain harrow, hand tools, or similar equipment. When hydroseeding, seedbed preparation may not be necessary if adequate site preparation was performed.

Incorporate lime and/or fertilizer into the top 3 to 6 inches of soil as a part of seedbed preparation.

Incorporate the appropriate amount of lime and/or fertilizer in the slurry mix when hydroseeding.

Species Selection.

Species selected for seeding or planting shall be suited to current site conditions and intended uses, and be resistant to diseases or insects common to the site or location.

Selected species will have the capacity to achieve adequate density and vigor to stabilize the site within an appropriate period.

No plants on the Federal or state noxious weeds list shall be planted.

Seed utilized shall be of high quality and meet state minimum standards or other applicable guidelines. Certified seed is preferred.

Species, rates of seeding or planting and the method of establishment shall be specified before application.

Establishment of Vegetation.

Seeds will be planted using the method or methods best suited to site and soil conditions.

Sod placement shall be limited to areas that can naturally supply needed moisture or sites that can be irrigated during the establishment period.

Sod will be placed and anchored using techniques to ensure that it remains in place until established.

Species, rates of seeding or planting, minimum quality of planting stock (e.g. pure live seed (PLS) or stem caliper), method of seedbed preparation, and method of establishment shall be specified before application. Only viable, high quality seed or planting stock will be used.

Seeding or planting shall be done at a time and in a manner that best ensures establishment and growth of the selected species.

Permanent herbaceous cover will be recommended where no further soil disturbance is anticipated or needed to adequately stabilize the site.

Species selection will be based upon the land use planned for the site. Species and seed mixtures recommended for Permanent Herbaceous Cover are found in Table 4.

When renovation is performed outside of the recommended seeding dates for the selected permanent species, and seeding is performed conventionally, the area shall always be seeded to temporary ground cover.

Refer to Tables 1, 3 and 4 for recommended dates to establish vegetative cover and the approved lists of permanent and temporary plant species, and planting rates.

Table 1. *Recommended seeding dates for permanent and temporary cover unless otherwise specified.*

Planting Dates	***Suitability***
March 1 – April 15 August 1 – October 1	***Best seeding periods***
April 15 – August 1	***HIGH RISK - moisture stress likely***
October 1 – Dec. 1	***HIGH RISK - Freeze damage to young seedlings***
Dec. 1 – March 1	***Good seeding period. Dormant seeding.***

Seeding rates will be increased by 50% when seeding is performed during the periods of April 15 – August 1 and October 1 – March 1.

If a nurse or temporary cover was utilized it should be removed if its growth has the potential to adversely affect the establishment of the permanent species. On sites where farm machinery can be safely operated, remove the nurse crop by mowing, etc. Controlled and limited livestock grazing or haying may be an alternative under site-specific conditions.

Legume seeds should be inoculated within one hour prior to planting time with the proper inoculant.

Use the manufacturer's recommended rate of inoculant and bonding medium for each legume type when seeding by conventional methods.

The inoculant and/or the inoculated seed shall be protected from the sun and excessive heat at all times. Inoculants shall not be used beyond their expiration date.

Where conventional equipment is used, apply seed uniformly over prepared seedbed with a drill, cultipacker seeder, or cyclone seeder. Seeding may be done by hand on areas where it is not practical or feasible to use seeding equipment. When seeding by hand, or with a cyclone seeder, sow one-half of the mixture rate in one direction and the remaining half at a right

angle to the first. If desired or needed, incorporate surface applied seed with a spike tooth harrow, or by hand raking on small areas. Firm the seedbed with a cultipacker where feasible.

For most conventional seeding of permanent species, seed should be placed to a depth of ¼ to ½ inch depending on seed size and soil type. Seeding depth should be closer to ½ inch on sandy soils or for larger size seeds.

When hydroseeding, first mix the lime, fertilizer, and hydro-mulch in the recommended amount of water. Mix the seed and inoculant together, and add to the slurry just prior to seeding. Apply the slurry uniformly over the prepared site. Assure that agitation is continuous throughout the seeding operation and that the mix is applied within one hour of initial mixing.

Planting depth for small grains, millet, or Sudan grass should be 1 to 2 inches.

Follow up with permanent seeding at the first available recommended establishment period. When temporary cover has been seeded, a no-till drill may be used to seed permanent species of grasses and/or legumes into the temporary cover. Perform additional seedbed preparation necessary to smooth out rills and/or gullies that may have formed since the initial seedbed preparation.

<u>Soil Fertility and pH</u>

Soil fertility and pH level will be amended to satisfy the needs of the plant species planned. Recommendations for establishment will be determined by a Land Grant University testing laboratory from soil samples collected in the area to be seeded.

Where sampling is impractical or not feasible, an all-inclusive fertilizer recommendation may be used as shown in Table 2 or as indicated in the latest version of the Penn State Agronomy Guide (Penn State Agronomy Guide)

Apply lime to bring soil pH to a range suitable (pH 6.0) for the planned species. In absence of a soils test, 3 tons/acre of lime may be applied (150 lbs/1,000 sq. ft.).

Apply all nutrient requirements immediately prior to seeding. Split applications of nitrogen are acceptable.

Table 2. ***Acceptable fertilization recommendation in absence of a soil test.***

Species	***N*** *(lbs/ac)*	***P_2O_5*** *(lbs/ac)*	***K_2O*** *(lbs/ac)*	***Example Rec.*** *(per acre)*
Cool Season Grass	***40***	***80***	***80***	***400 lbs. 10-20-20***
CS Grass & Legume	***30***	***60***	***60***	***300 lbs. 10-20-20***
Temporary Cover	***40***	***40***	***40***	***200 lbs. 19-19-19***

Lime and fertilizer will be incorporated to a depth of 3 to 6 inches where feasible. Lime and fertilizer may be broadcast without incorporation on slopes too steep for safe operation of tillage equipment or where surface obstructions hinder tillage operations.

<u>Topsoil</u>

Any site that requires renovation and contains significant amounts of topsoil shall have the topsoil removed and stockpiled when feasible. Topsoil should not be added to slopes steeper than a 2:1 unless good bonding to the sub-layer can be achieved.

Topsoil shall be free of trash, stumps, roots, large rocks, noxious weeds, toxic substances, etc.

Topsoil should be applied on any site where adverse soil properties or site conditions exist which will prevent the successful establishment of desired vegetation and where it can be applied properly and safely.

On areas with slopes of 2:1 or flatter, and where ornamental type plants or high maintenance ground covers will be

established, remove and stockpile topsoil (if significantly present) prior to grading or installation of erosion control measures. After initial grading is complete, and any required erosion control measures have been installed, the sub-layer should be scarified to a minimum depth of 3 inches. Topsoil shall be spread evenly over the area. Install any needed additional erosion control measures according to the appropriate West Virginia conservation practice standards.

Mulching

Plantings shall be mulched as necessary to ensure establishment. Other disturbed areas shall be mulched as necessary to prevent erosion.

If needed, mulch will be applied on all sites in accordance with the West Virginia Conservation Practice Standard (484) Mulching.

Depending on site conditions, additional or substitute protective measures may be used if deemed necessary. Examples include jute mesh, silt fences, straw/hay bale barriers, and soil stabilization blankets or erosion mats. Refer to the West Virginia Sediment and Erosion Control Handbook for Developing Areas for information regarding these measures.

Additional Criteria to Stabilize Stream and Channel Banks and Shorelines

When slopes are modified for seeding, topsoil will be stockpiled and spread over areas to be planted as needed to meet planting and landscaping needs.

To address erosion on streambanks and/or the establishment of woody vegetation on streambanks (i.e. willow waddles), refer to West Virginia conservation practice standards (580) Streambank and Shoreline Protection, Channel Bank Vegetation (322) and/or Tree/Shrub Establishment (612) as appropriate.

Bank and Channel Slopes.

Channel side slopes shall be shaped so that they are stable and allow establishment and maintenance of desired vegetation.

Slopes steeper than 2:1 shall not be stabilized using vegetation alone. A combination of vegetative and structural measures will be used on these slopes to ensure adequate stability.

Species Selection

Plant material used for this purpose shall:

be adapted to the hydrologic zone (see Fig. 1) into which they will be planted.

be adapted and proven in the regions in which they will be used.

when mature, produce plant communities that are compatible with those in the area.

protect the channel banks but not restrict channel capacity.

Establishment of Vegetation.

The species used, planting rates, spacing, and methods and dates of planting shall be based on plant materials program trials or other technical guidance, such as local planting guides or technical notes.

Identify, mark, and protect desirable existing vegetation during practice installation.

A combination of vegetative and structural measures using living and inert material shall be used when flow velocities, soils, and bank stability preclude stabilization by vegetative establishment alone.

If the existing vegetation on a site will compete with species to be established vegetatively (e.g. bare-root, containerized, ball-and-burlap, potted), it will be controlled in a manner that ensures the successful establishment of the planted species.

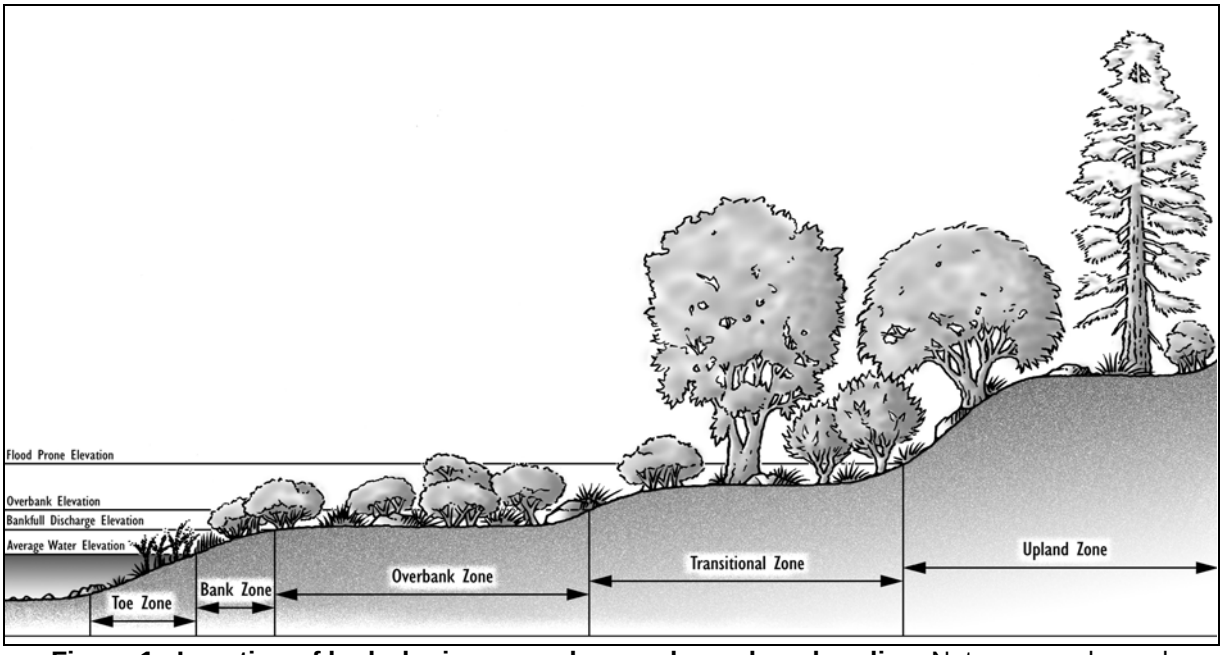

Figure 1. Location of hydrologic zones along a channel or shoreline. Note: some channels or shorelines have fewer than four hydrologic zones because of differences in soils, topography, entrenchment and/or moisture regime.

Definitions and descriptions of hydrologic zones used for channels and shorelines:

- Bankfull Discharge Elevation - In natural streams, it is the elevation at which water fills the channel without overflowing onto the flood plain.
- Bank Zone - The area above the Toe Zone located between the average water level and the bankfull discharge elevation. Vegetation may be herbaceous or woody, and is characterized by flexible stems and rhizomatous root systems.
- Overbank Zone - The area located above the bankfull discharge elevation continuing upslope to an elevation equal to two thirds of the flood prone depth. Vegetation is generally small to medium shrub species.
- Toe Zone - The portion of the bank that is between the average water level and the bottom of the channel, at the toe of the bank. Vegetation is generally herbaceous emergent aquatic species, tolerant of long periods of inundation.
- Transitional Zone - The area located between the overbank zone, and the flood prone width elevation. Vegetation is usually larger shrub and tree species.
- Upland Zone – The area above the Transitional Zone; this area is seldom if ever saturated.

Site Protection and Access Control.

Livestock shall be controlled or excluded as necessary to allow for establishment and maintenance of the desired vegetative cover. Refer to conservation practice standards (472) Access Control.

Grazing animal access to planted areas will be controlled for a minimum of two growing seasons during the establishment period.

All areas to be grazed will have a grazing plan that meets the criteria in the local Field Office Technical Guide.

Grazing shall be permanently excluded on high hazard sites, such as cut banks, areas of seepage or other potentially unstable areas.

Additional Criteria to Rehabilitate and Revegetate Degraded Sites that Cannot Be Stabilized through Normal Farming Practices.

If gullies or deep rills are present, they will be filled and leveled as necessary to allow equipment operation and ensure proper site and seedbed preparation.

Based on a soil test and other appropriate site evaluations, soil amendments will be added as necessary to ameliorate or eliminate physical or chemical conditions that inhibit plant establishment and growth.

CONSIDERATIONS

Consider plant and site characteristics such as:

1. ***climatic conditions such as annual rainfall, seasonal rainfall, growing season length, humidity levels, temperature extremes, and the USDA Plant Hardiness Zones;***
2. ***soil condition and position attributes such as pH, percent slope, available water holding capacity, aspect, drainage class, inherent fertility, alkalinity, flooding and ponding;***
3. ***season of growth, vigor, ease of establishment, longevity of the species, adaptation to soil conditions, growth habit, conservation value; and***
4. ***resistance to diseases and insects common to the site or location.***

Water control and sediment retention structures may be required for control of excessive erosion or sedimentation. Refer to applicable conservation practice standards. Supplemental information may also be found in the West Virginia Sediment and Erosion Control Manual for Developing Areas.

The severity of water erosion and its influence on downstream sedimentation should be assessed to determine appropriate stabilization measures.

On sites with good access for regular fertilization, consider splitting nitrogen applications to improve nitrogen use efficiency. When splitting nitrogen applications, apply no more than 60 percent of the total amount in one application for cool season species.

On remote sites with poor access for regular fertilization, consider applying all nitrogen as slow release compounds such as: ureaformaldehyde, sulfur-coated urea, composted manures, or poultry by-products.

Consider selecting no or low maintenance, long-lived plants adaptable to sites which may be difficult to maintain with equipment.

Consider aesthetics when developing alternatives.

Planners should take into consideration the species makeup of existing pasture and the landowner's future pasture management plans when recommending seed mixtures. For example, tall fescue is shade tolerant, but its management requirements may be different from the existing grasses. Note tall fescue has very little wildlife value.

Consider the use of native plants or locally adapted plants when selecting cover types and species for wildlife habitat. Species or

mixes that have multiple values should be considered.

Consider including beneficial pollinator plants. To benefit pollinators and other wildlife, flowering shrubs and wildflowers with tough root systems and good soil holding capacity also should be considered for incorporation as a small percentage of a larger grass-dominated planting. Where appropriate consider a diverse mixture of legumes and forbs to support pollinator habitat. ***However, the addition of pollinator habitat should not compromise the intended purpose. Refer to the WV Pollinator Handbook for information regarding appropriate species, bloom periods and habitat requirements.***

Areas of vegetation established with this practice can create habitat for various type of wildlife. Maintenance activities, such as mowing or spraying, can have detrimental effects on certain species. Perform management activities at the times and in a manner that causes the least disruption to wildlife.

Consider plant species that may harbor pests. Species diversity should be considered to avoid loss of function due to species-specific pests.

Planning and installation of other conservation practices such as Diversion (code 362), Obstruction Removal (code 500), Subsurface Drain (code 606), or Underground Outlet (code 620) may be necessary to prepare the area or ensure vegetative establishment.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded and filed using the approved specifications, job sheets, narrative statements or other acceptable documentation in the conservation plan.

Prepare plans and specifications for each field or management unit according to the criteria and operation and maintenance sections of this standard. The following elements shall be addressed in the plan, as applicable, to meet the intended purpose.

- Required site preparation
- Topsoil requirements
- Fertilizer application
- Seedbed/planting area preparation
- Methods of seeding/planting
- Time of seeding/planting
- Selection of species
- Seeding rate/plant spacing
- Mulching
- Supplemental water needed for establishment
- Protection of plantings
- ***any relevant environmental documentation including but not limited to the CPA-52 or similar form***
- ***operation and maintenance requirements***

OPERATION AND MAINTENANCE

Use of the area shall be managed as long as necessary to ensure the site remains stabile.

Plantings shall be protected from pests (e.g. weeds, insects, diseases, livestock, or wildlife) as necessary to ensure long-term survival.

Inspections, reseeding or replanting, and fertilization may be needed to ensure that this practice functions as intended throughout its expected life. Observation of establishment progress and success should be performed at regular intervals until the practice has met the criteria for successful establishment and implementation.

Vegetation damaged by machinery, herbicides or erosion should be repaired promptly.

If soil moisture becomes critically deficient, irrigate the site if practical and feasible.

Competitive weed growth should be controlled by mowing and/or with herbicides.

Use of the area shall be managed as long as necessary to stabilize the site and achieve the intended purpose and replacement of vegetation will be continued until the critical area is, or will progress to, a fully functional condition.

Control or exclude pests that will interfere with the timely establishment of vegetation.

Inspections, reseeding or replanting, fertilization, and pest control may be needed to insure that this practice functions as intended throughout its expected life.

As appropriate the following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance):

- ***The critical area planting will be inspected at least twice in the establishment year and then at least annually. The planting will be protected and restored as needed, to maintain the intended purpose from adverse impacts such as vehicular and pedestrian traffic, pest infestations, pesticide use on adjacent lands, livestock damage and fire.***
- ***Evaluate the site within three months of the initial seeding. If the stand is uniform but too thin (50 to 80% ground cover), apply additional seed during the next optimum seeding period with a no-till drill, grain drill, or hydroseeder as site conditions dictate. Sites with an establishment rate of less than fifty percent (50%) will be reseeded in accordance with the original planting plan. Attempts shall be made to determine the reasons for planting failure. Any necessary corrective measures shall be incorporated into the remedial planting.***
- ***For forage, manage and maintain according to the standard and specifications for (528) Prescribed Grazing or (511) Forage Harvest Management. Occasional grazing and/or haying may benefit the stand. If grazing or haying is to be used as a management tool, develop specific management guidelines that stimulate the health and vigor of the vegetation without reducing the erosion control benefits.***
- ***Soil amendments should be applied as required to maintain ground cover density at the desired level (usually 90% or greater). Application of soil amendments will be based upon soil testing laboratory recommendations. At a minimum, test the soil at least once every five years or more often if indicated by periodic inspections of the practice.***
- ***Maintenance practices and activities are not to disturb cover during the primary nesting period from March 15 through July 15 for grassland species. If necessary, mowing may occur during this period in the establishment year.***
- ***Permanent or temporary exclusion of livestock or people may be necessary in sensitive areas or areas prone to recurring disturbance and erosion (e.g. slips).***
- ***To benefit insect food sources for grassland nesting birds, spraying or other control of noxious weeds will be done on a "spot" basis to protect forbs and legumes that benefit native pollinators and other wildlife. At a minimum Win-PST shall be provided when pesticide use is anticipated. Refer to the WV Pollinator Handbook for more information on maintaining pollinator habitat.***
- ***Additional operation and maintenance requirements may be required to be developed on a site-specific basis to assure performance of the practice as intended.***

REFERENCES

Federal Interagency Stream Restoration Working Group. 1998. Stream corridor restoration: principles, processes, and practices. National Engineering Handbook, Part 653.

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Agronomy Guide - Current Edition; The Pennsylvania State University, College of Agriculture, Extension Service, University Park, PA
http://AgGuide.agronomy.psu.edu

West Virginia Erosion and Sediment Control Handbook for Developing Areas, 1993; Soil Conservation Service, Morgantown, West Virginia

**** Bold italics indicate changes made or information added to the national standard by West Virginia.***

TEMPORARY COVER

Table 3. Temporary cover suitable for establishment in West Virginia.

Species	Seeding Rate (lbs/acre)	Optimum Seeding Dates	Drainage	pH Range
Annual Ryegrass	40	3/1 - 6/15 or 8/15 - 9/15	Well - Poorly	5.5 - 7.5
Field Bromegrass	40	3/1 - 6/15 or 8/15 - 9/15	Well – Mod. Well	6.0 - 7.0
Spring Oats	96	3/1 - 6/15	Well - Poorly	5.5 - 7.0
Sudangrass	40	5/15 - 8/15	Well - Poorly	5.5 - 7.5
Winter Rye	168	8/15 - 10/15	Well - Poorly	5.5 - 7.5
Winter Wheat	180	8/15 - 11/15	Well – Mod. Well	5.5 - 7.0
Japanese Millet	30	6/15 - 8/15	Well	4.5 - 7.0
Redtop	5	3/1 - 6/15	Well	4.0 - 7.5
Annual Ryegrass and Spring Oats	26 64	3/1 - 6/15	Well – Poorly	5.5 - 7.5

NOTE: These rates should be increased by 50% if planted April 15 – August 1 and October 1 – March 1.

PERMANANENT COVER

Table 4. Permanent seeding mixtures suitable for establishment in West Virginia.

Species/Mixture	Seeding Rate (lbs/acre)	Soil Drainage Preference	pH Range
Crownvetch Tall Fescue	10 - 15 30	Well - Mod. Well	5.0 - 7.5
Crownvetch Perennial Ryegrass	10 - 15 20	Well - Mod. Well	5.0 - 7.5
Flatpea or Perennial Pea Tall Fescue	**20 20 15**	**Well - Mod. Well**	**4.0 - 8.0**
Ladino Clover Serecia Lespedeza Tall Fescue	30 25 2	Well - Mod. Well	4.5 - 7.5
Tall Fescue *Ladino Clover* *Redtop*	40 3 3	Well - Mod. Well	5.0 - 7.5
Crownvetch Tall Fescue Redtop	10 20 3	Well - Mod. Well	5.0 - 7.5
Tall Fescue Birdsfoot Trefoil Redtop	40 10 3	Well - Mod. Well	5.0 - 7.5
Serecia Lespedeza Tall Fescue Redtop	25 30 3	Well - Mod. Well	4.5 - 7.5
Redtop Tall Fescue Creeping Red	30 3 50	Well - Mod. Well	5.0 - 7.5
Tall Fescue	50	Well - Poorly	4.5 - 7.5
Perennial Ryegrass Tall Fescue 'Lathco' Flatpea' *	**10 15 20**	**Well - Poorly**	**5.0 - 8.0**
KY Bluegrass Redtop Ladino Clover **or** Birdsfoot Trefoil	20 3 2 10	Well – Mod. Well	5.5 - 7.5
Timothy Alfalfa	5 12	Well – Mod. Well	6.5 - 8.0
Timothy Birdsfoot Trefoil	5 8	Well - Poorly	5.5 - 7.5
Orchardgrass *Ladino Clover* *Redtop*	10 2 3	Well - Mod. Well	5.5 - 7.5
Orchardgrass *Ladino Clover*	10 2	Well - Mod. Well	5.5 - 7.5

Table 4. Permanent seeding mixtures suitable for establishment in West Virginia- continued

Species/Mixture	Seeding Rate (lbs/acre)	Soil Drainage Preference	pH Range
Orchardgrass *Perennial Ryegrass*	20 10	Well - Mod. Well	5.5 - 7.5
Creeping Red Fescue ***Perennial Ryegrass***	**30** **10**	**Well - Mod. Well**	**5.5 - 7.5**
Orchardgrass **or** Kentucky Bluegrass	20	Well - Mod. Well	6.0 - 7.5
Birdsfoot Trefoil Redtop Orchardgrass	10 5 20	Well - Mod. Well	5.5 - 7.5
Lathco Flat Pea **Perennial Ryegrass**	**30** **20**	**Well - Mod. Well**	**5.5 - 7.5**
Lathco Flat Pea Orchardgrass	20 20	Well - Mod. Well	5.5 - 7.5

* 'Lathco' Flatpea is potentially poisonous to some livestock

NOTES:

- All legumes should be planted with proper inoculants prior to seeding.
- For unprepared seedbeds or seeding outside the optimum timeframes, add 50% more seed to the specified rate.
- Mixtures in this table highlighted in gray are more wildlife-friendly; those listed in **bold** are suitable for use in shaded woodland settings.
- Mixtures in *italics* are suitable for use in filter strips.