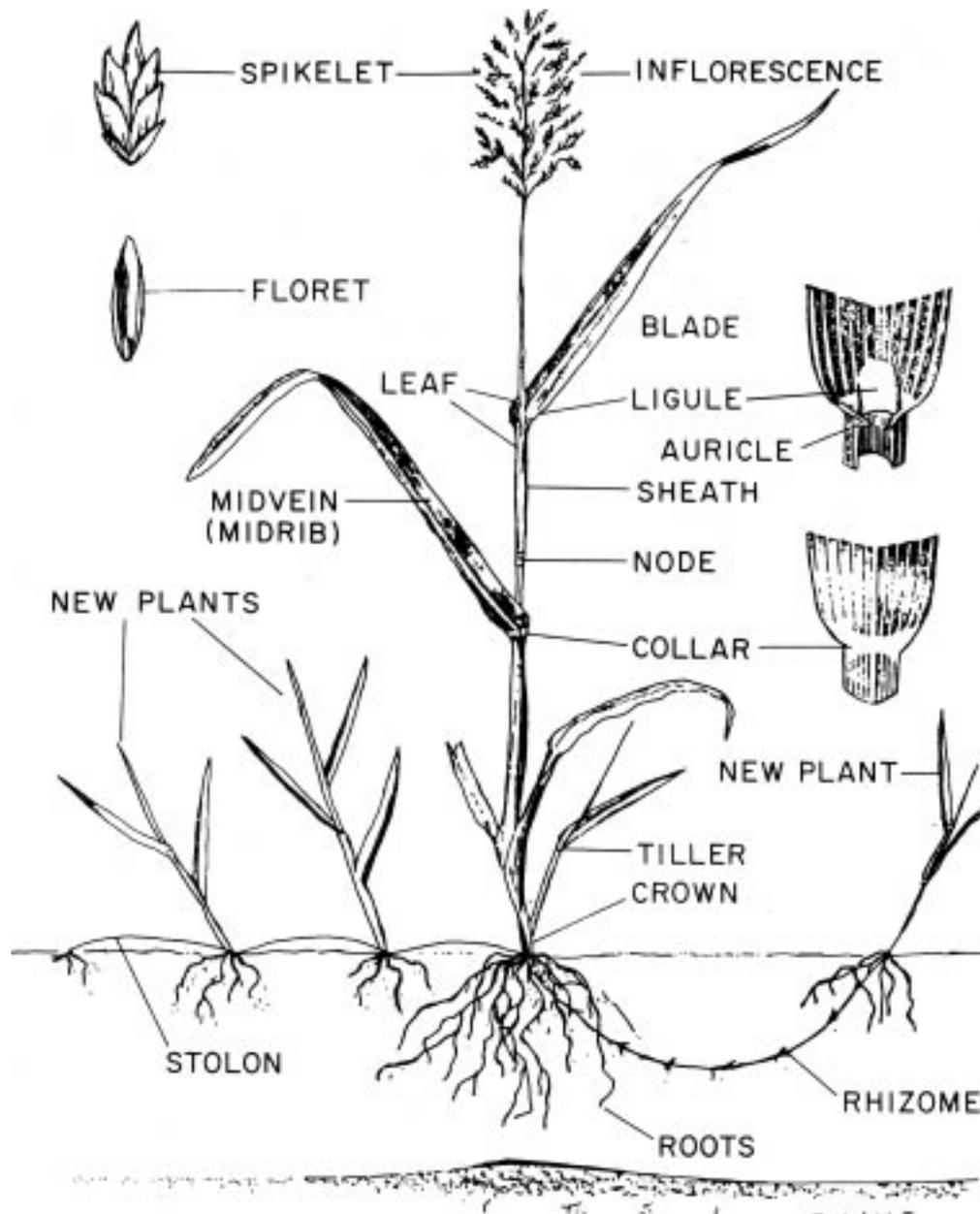


PART I

Crop Description

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This section provides basic, detailed information about most plants used for cropping in Virginia. All values are generalizations which may vary with specific conditions. Rates of fertilizer application depend, to a large extent, on initial soil test levels and the productive potential of the soil. The fertilizer recommendations presented assume an average or medium soil test level and soils that are average to above average in productivity. For more specific recommendations, rely on soil test results. **Fertilizer application rates and crop yields in this section are expressed on a per acre basis.**



Parts of the grass plant used for field identification.

Alfalfa – Perennial – (*Medicago sativa*)

Description:	Distinct deep tap root; erect stems 2-3' tall from woody crown; purple flowers for most improved varieties; stem and leaves smooth; leaves arranged alternately on stem; each leaf has 3 leaflets with smooth edges.
Uses:	Hay, pasture, and silage
Varieties:	Consult varietal information published annually by Virginia Cooperative Extension.
Weight per bushel:	60 lbs
Seeds per lb:	220,000
Germinating time:	7 days
Fertilizer:	At seeding, Zero N, 110-140 lbs P ₂ O ₅ , 110-140 lbs K ₂ O at medium soil test levels. Use borate fertilizers (2-4 lbs B) annually. For top-dressing 70-90 lbs P ₂ O ₅ and 220-360 K ₂ O annually for medium soil test levels. Split application: half in fall and half in spring. Lower levels required for pasture.
pH Range:	6.8-7.0
Soil Adaptation:	Deep, well drained soils, with sandy clay loam to clay subsoils.
Inoculation:	<u>Essential</u> . Use commercial inoculants. Cross inoculates with sweet and bur clover.
Time of Planting:	30-60 days before first killing frost in fall or 30 days before last killing frost in spring at 15-25 lbs alone, or 10-20 lbs with 3- 5 lbs of orchardgrass.
Method of Planting:	6"-8" rows or solid seeded. Conventional seeding – cover no deeper than 1/4" – 1/2", preferably with cultipacker. A firm and compact seedbed is essential. No-till seeding (graze or mow to have sod short). Kill all vegetative competition with herbicide, use insecticide, plant 1/2" – 3/4" deep with no-till drill.
Harvesting:	Harvest at late bud to 1/4 bloom, except first cutting. First cutting should be made in (hay or silage) bud stage or when orchardgrass begins to head. Alfalfa may be cut 3-5 times/year at 30-40 day intervals, depending upon location in state and average rainfall. Make last cutting 3-4 weeks before average date of first killing frost in fall or in time to allow 6-8" of regrowth. Allow at least one harvest to reach 1/10 bloom to help persistence.
Harvesting (pasture):	Use grazing-tolerant varieties under continuous stocking. Hay-type varieties should be rotationally stocked with 1-7 day grazing periods and 25-40 day rest periods. Avoid bloat by seeding with grass, turning cattle into new paddock only after forage is dry (no dew), and not allowing cattle to get too hungry prior to turn in.
Approximate Yield:	3-6 tons hay/A

Alsike Clover – Perennial – (*Trifolium hybridum*)

Description:	Tillers from crown and stem, leaves smooth; pink or white blooms; stems do not terminate in a flower.
Uses:	Hay and pasture; however, it does not make sufficient recovery after the first cutting for a second hay crop.
Weight Per Bushel:	60 lbs
Seeds per lb:	680,000
Germination time:	7 days
Fertilizer:	At medium soil test levels apply 40-60 lbs P ₂ O ₅ and 85-110 lbs K ₂ O per season
pH Range:	5.8-6.5
Soil Adaptation:	Well-drained to somewhat poorly drained soils. More tolerant to a high water table and acid soils than other clovers.
Inoculation:	Important. Cross-inoculates with red, crimson, ladino, and white clover
Planting:	30-60 days before last killing frost in spring, or 30-45 days before first killing frost in fall at 3-4 lbs in mixtures; 5-8 lbs alone

Alsike Clover – Perennial – (*Trifolium hybridum*) (cont.)

Harvesting (hay):	1/2 to full bloom about June 1-20
Harvesting (seed):	When about 3/4 of the heads are ripe. Handle as other clover.
Approximate Yield:	1-2 tons hay/A

Austrian Winter Pea – Annual – (*Pisum areense*)

Description:	Winter annual with purple flowers. Plants resemble garden pea.
Uses:	Forage or cover crop
Weight Per Bushel:	60 lbs
Seeds per lb:	5,000
Germinating time:	8 days
Fertilizer:	Zero N. Apply 60-80 lbs P ₂ O ₅ and 60-90 lbs K ₂ O on medium testing soils. Adjust rates based on soil test levels.
pH Range:	6.0-6.5
Soil Adaptation:	Well drained soils
Inoculation:	Cross inoculates with garden peas, vetch, and Canadian field peas.
Planting:	Fall, September 15-October 15; Spring, March 1-April 15 in 6-8" rows or solid seeded at 20-30 lbs with small grains; 30-40 lbs alone.
Harvesting (hay):	When barley or other small grain is in soft dough for silage or in full bloom for hay. Difficult to cure for hay.
Harvesting (seed):	When pods begin to turn brown.
Approximate Harvest Dates:	Hay- May 1 – June 1
Approximate Yield:	Hay, 1 1/2 to 2 tons, Silage, 6-9 tons, or Seed, 300-500 lbs./acre

Barley– Annual – (*Hordeum vulgare*)

Description:	Leaves are green with long clasping auricles and a long ligule. Seed usually contains the husk (lemma and palea) that gives the seed a wrinkled appearance. Newer varieties may be "hulless" since the lemma and palea are removed at harvest.
Uses:	Grain is used for animal feed in Virginia. Also used for silage and in mixtures with other small grains for cover crops and winter grazing. Limited use in human food.
Weight Per Bushel:	48 lbs (Hulled); 57.6 lbs (Hulless-for feed); and 60.0 lbs (Hulless-for human consumption)
Seeds per lb:	13,000
Germination Time:	6-7 days
Fertilizer:	20 lbs of N in the fall plus 40-80 lbs each of P ₂ O ₅ and K ₂ O. Top dress with 80 lbs of nitrogen in February or early March. These rates assume no carry over N from the previous crop. In general, a high yielding crop will take up to 20-25 lbs/A fall N plus at least 80 lbs in the March-May period. For best results the winter-early spring N should be split into an application in February and one in late March.
pH Range:	6.0-6.5. Barley is very sensitive to low pH.
Soil Adaptation:	Any well drained soil. Barley will not tolerate poor drainage.
Time of Planting:	About 2 weeks before first average frost in Fall: September 15-October 10 west of the Blue Ridge and Northern Piedmont; October 1-November 1 in Eastern and Southern Piedmont Virginia. Aphids should be controlled if they build up in the fall or early winter.
Rate of Seeding:	120 lbs/A (Hulled) or approximately 30 seeds/sq ft (18 seeds/drill foot in 7" rows)

4 Crop Descriptions

Barley– Annual – (*Hordeum vulgare*) (cont.)

Method of Planting:	Planting with a grain drill is best; but broadcast disk-in to a depth of 1-1 1/2 inches can be successful.
Harvesting:	Combine grain when fully ripe and 12-14% moisture. Cut for silage in the soft dough stage or boot stage depending on forage requirements.
Approximate Harvest Dates:	Grain: June 1-June 20; Silage: May 1-June 1
Approximate Yields:	80–120 bushels grain or 6-12 tons 35% dry matter silage/acre

Bentgrass – Creeping – Perennial (*Agrostis paulustris*)

Description:	A stoloniferous grass used for golf greens; high maintenance is required; some varieties can be seeded while others must be vegetatively planted.
Seeds per lb:	7,800,000
Rate of Seeding:	Seeds 1/2 to 1 lb
Germination time:	10-14 days
pH Range:	6–6.5
Stolonized Bents:	2-7 bushels of stolons per 1,000 sq ft
Time of Planting:	Early spring or late summer

Bermudagrass – Perennial – (*Cynodon dactylon*)

Description:	Spreads by soil surface runners (stolons) and underground modified stems (rhizomes); stems 6-12 in tall; flowers are slender spikes, usually with 3 per cluster, similar to crab-grass; ligule a fringe of hairs.
Uses:	A warm-season grass which makes most of its growth during June, July, and August in Virginia; pasture, hay, silage, and turf. Greatest forage potential in the Southern Piedmont and Coastal Plain.
Types and strains:	Common—Occurs naturally in Virginia and throughout the South. Propagated by sprigs (rhizome and stolon pieces) and seed. Can be major weed in crop fields. Hybrid Forage Types—Improved strains which are high yielding, leafy, and cold-tolerant enough for use in Southern Piedmont and Coastal Plain. Midland, Tifton 44, and Quickstand have more cold tolerance than Coastal. All must be established using vegetative sprigs. Fine-Textured Bermudagrass—Developed for athletic fields, lawns, golf greens, fairways, etc. All improved varieties propagated by sprigs or sod. Seed is available for common bermudagrass.
Seed weight per bushel:	35-36 lbs
Seeds per lb:	1,800,000
pH Range:	6.0-6.5
Soil adaptation:	Will grow on all types of soil, but is better suited to sandy and droughty soils than other grasses. Prefers well drained soils.
Time of planting:	April 1-June 1
Rate of planting:	For pasture use 15-20 bushels of sprigs per acre, in rows or 30-40 bu/acre if broadcast. For turf, use 1 lb of seed, or 2-7 bushels of sprigs per 1,000 sq ft
Fertilizer:	At planting, 70 lbs N, plus 70-90 lbs. P ₂ O ₅ , and 70-90 lbs K ₂ O for medium testing soil. For turf, see Turfgrass Section. For Hay, 175-300 lbs N, 80 lbs P ₂ O ₅ and 80-205 lbs K ₂ O annually, based on soil test levels. Lower rates required when used as pasture.

Bermudagrass – Perennial – (*Cynodon dactylon*) (cont.)

Method of planting:	Seed broadcast by hand or seeder. Sprigs planted in rows manually or with planter. May be broadcast, disked in, and cultipacked. Cover sprigs with 2-4" of soil.
Harvesting (hay):	Cut when 8-12" tall before heading, or every 35-45 days.
Harvesting (pasture):	Can be continuously stocked if grazed no shorter than 2-3". Rotational stocking is preferred; turn in at 6-8"; move cattle at 2-3". Minimize seed production to maintain quality and growth rate. Don't graze during establishment year; cut for hay instead.
Approximate yield:	4-8 tons hay/A
Uses:	A warm-season grass which makes most of its growth during June, July, and August in Virginia; pasture, hay, silage, and turf. Greatest forage potential in the Southern Piedmont and coastal Plain.

Birdsfoot Trefoil – Perennial – (*Lotus cornicalatus*)

Description:	A fine-stemmed legume with a branching taproot. Adapted to higher elevations in Virginia. Grows 12-30" or more in length from a branching crown; flowers are orange-yellow in groups of 4-8 at end of stems; leaves consist of 5 leaflets alternately arranged, two are at the base near the stem; several seed pods attached to a single point give appearance of bird toes. Short-lived perennial that can reseed.
Uses:	Hay or pasture (non-bloating)
Varieties:	No varieties have been developed for Virginia conditions. The erect or European types have been most satisfactory. These varieties include Viking, Granger, Cascade, and Mansfield. The Empire variety is a decumbent pasture type.
Weight Per Bushel:	60 lbs
Seeds Per lb:	375,000
Germinating Time:	7 days
Fertilizer:	Zero N—medium soil test levels; apply 40-70 lbs P ₂ O ₅ and 50-80 lbs K ₂ O.
pH Range:	5.8-6.5
Soil Adaptation:	Does best on well drained soil, but can be grown with impervious subsoils.
Inoculation:	Essential. Does not cross-inoculate with other legumes.
Planting:	March 1-April 15 or August 1-September 1. Should be sown with a grass such as orchardgrass or Kentucky bluegrass. In mixtures 4-8 lbs; alone 8-10 lbs.
Method of Seeding:	6-8" rows or solid seeded. Well prepared, compact seedbed is needed. Cover not more than 1/2" deep. Use cultipacker if surface-seeded. Can also be no-till drilled or frost seeded on killed sod. Poor seedling vigor.
Management:	Permit seedlings to become well established before grazing or harvesting. Clip weeds. Use rotational or moderate continuous grazing for pastures.
Harvesting (hay):	When in-bloom. Avoid clipping close if extremely dry.

Bluegrass – Kentucky – Perennial (*Poa pratensis*)

Description:	A low-growing, sod-forming, perennial grass that spreads by underground rhizomes; the narrow leaves have tips shaped like the bow of a boat and reach a length of 7"; sheath flattened; short ligule.
Uses:	Permanent pasture and lawns. Requires several years to become well established. Good early grazing, goes dormant in summer, revives in fall to furnish good grazing.
Weight Per Bushel:	14 lb
Seeds/lb:	2,200,000
Germinating Time:	14 days

Bluegrass – Kentucky – Perennial (*Poa pratensis*) (cont.)

Fertilizer:	With white clover at seeding, 20 lbs N; at medium soil test levels apply 90-120 lbs P ₂ O ₅ and 60-90 lbs K ₂ O. For pasture topdressing every 3 or 4 years, 40-125 lbs P ₂ O ₅ and 40-125 lbs K ₂ O at medium soil test levels. For turf, see turfgrass section.
pH Range:	6.0-6.5
Soil Adaption:	Best suited to fine-textured, well drained soils.
Planting:	late summer or early spring at 4-5 lbs in mixture for forage.

Bluegrass—Canada-perennial—(*Poa compressa*)

Description:	Sod-forming from underground rhizomes; blue-green foliage; sheath distinctly flattened, with a short, compact seed head; short ligule.
Uses:	Pasture, but not recommended for Virginia. Makes very little regrowth when grazed.
Weight per bushel:	14 lb
Seeds per lb:	2,500,000
pH Range:	5.0-6.5
Soil adaptation:	Best suited to fine-textured, well drained soils. Will dominate Kentucky bluegrass on acid, droughty or low-fertility soils.

Bromegrass – Smooth – Perennial – (*Bromus inermis*)

Description:	Sod-forming since it spreads by underground rhizomes; leafy and grows to height of 3-4 feet; head is an open panicle; stem smooth and round; short ligule, fused leaf sheath.
Uses:	Hay and pasture-drought tolerant
Varieties:	Historically, not well adapted to Virginia because of diseases. However, newer varieties may have potential.
Weight Per Bushel:	14 lbs
Seeds Per lb:	137,000
Germinating:	14 days
Fertilizer:	100-200 lbs N. Lower levels required when used as pasture in split applications, 40-90 lbs P ₂ O ₅ , and 85-185 lbs K ₂ O annually on soils testing medium.
pH Range:	5.8–6.7
Soil adaptation:	Well drained, fertile soils
Planting:	Early spring, or with small grain in fall, Seeded at 10 lbs in mixture. Do not seed alone.
Harvesting :	Early bloom stage. Do not graze or cut during stem elongation.

Buckwheat – Annual – (*Fagopyrum esculentum*)

Description:	Erect plant, 2-4' tall; single stem may have several branches; flowers light green, pink, or red in color.
Uses:	Grain used for livestock, especially poultry; ground into flour (middlings for livestock). Good honey and green manure crop.
Weight per bushel:	48 lbs
Seeds /lb:	15,000
Germinating time:	6 days
pH Range:	5.5-6.0
Fertilizer:	20-30 lbs N, at medium soil test levels apply 40-50 lbs P ₂ O ₅ and 40- 50 lbs K ₂ O
Soil adaptation:	Any well drained soil. Will grow on infertile, acid soils better than most crops, but responds well to proper treatment.
Depth of Planting:	1/2"-2". Do not plant deeper than 2".
Planting:	Latter part of May to middle of July. Seeds do not set well in warm weather. Likes cool, moist climate. Seed at 48-72 lbs in 6-8" rows or solid seeded. No-till can work well.

Buckwheat – Annual – (*Fagopyrum esculentum*) (cont.)

Harvesting (grain):	Combine when the maximum number of seeds have matured and plants have lost most of their leaves. Drying may be necessary for safe storage.
Approximate harvest dates:	September 1-15
Approximate Yield:	20-25 bushels/A

Caucasian Bluestem (*Bothriochloa caucasica*) Warm-season Perennial

Description:	Long lived perennial bunch grass. It is an erect, fine-stemmed, leafy bunch grass which produces many seedheads above the leaf base throughout the summer. Begins growth two to three weeks later than switchgrass in spring.
Uses:	Primarily for pasture, but also for hay
Seeds Per lb:	1,000,000
Germination Time:	3-30 days
Fertilizer:	Responds to N, apply 60-120 lbs N/A/Yr. in split applications. Maintain P and K at medium levels.
pH Range:	5.5-6.2
Soil Adaptation:	Adapted to wide range of soils. It performs better on the finer textured soils such as loams, clay loams, and silty loams but will also grow well on sandy loam soils. Caucasian bluestem does not do well on extremely sandy soils, and wetland soils.
Time of Planting:	After soil temperature reaches 65°F in late May or early June.
Rate of Planting:	2-3 lbs/A pure live seed.
Method of Planting:	Plant into a prepared, firm seedbed no deeper than 1/4 inch. However, no-till seeding can be done if plant residue is not thick enough to prevent seed to soil contact.
Harvesting (hay):	Harvest in boot stage.
Harvest (pasture):	Maintain in vegetative stage. Losses palatability after seedhead emergence. Tolerates close grazing. Rotational stocking best.
Approximate Yields:	3-5 tons hay/A

Comfrey, Quaker (also called Russian Comfrey) – Perennial – (*Symphytum peregrinum*)

Description:	Grows to a height of 3-4 feet; very large leaves feel somewhat sticky; large, fleshy roots that grow to 8-10 feet deep; purple or red-purple flowers borne in clusters at tips of stems.
Uses:	Green manure-can be fed as forage.
Fertilizer:	60 lbs N; Apply 60 lbs P ₂ O ₅ and 60 lbs K ₂ O at medium soil test levels.
pH Range:	6.0-6.5
Soil Adaptation:	Wide range
Planting:	Fall or early spring. Root cuttings in rows 3 feet apart in prepared seedbed.
Harvesting:	Cut to a 2" stubble when leaves reach a length of 18-24 inches.
Approximate Yield:	Hay, 3-5 tons/A

Corn – Field Corn – Annual - (*Zea mays*)

Description:	Often referred to as maize. Leaves are arranged alternately on the stem. The tassel or male part of the flower is at the top of the plant, and the ear located below the tassel is the female portion. Even number of rows of kernels on each ear.
Uses:	Grain and silage
Weight Per Bushel:	Shelled, 56 lbs; ear corn, 70 lbs at 15.5% moisture.

Corn – Field Corn – Annual - (*Zea mays*)(cont.)

Seeds Per lb:	1,200-1,400
Germinating Time:	7 days
Fertilizer:	For grain, 125-150 lbs N; Apply 40-60 lbs P ₂ O ₅ and 40-60 lbs K ₂ O at medium soil test levels. For silage, increase the amount of P ₂ O ₅ applied by 1/3, and double the amount of K ₂ O. Follow soil sample results for zinc and manganese and use tissue analysis to evaluate other micronutrient needs. Consideration should be given to nitrogen and phosphorus residual from previous crops or organic sources.
pH Range:	5.8 – 6.2
Soil Adaptation:	Well drained to somewhat poorly drained soils
Time of Planting:	Full-season corn should be planted one week before to one week after average date of last killing frost in spring. Corn will germinate at 50°F, but growth rate is slow until temperatures reach 60°F. Double-crop corn can be planted up to July 1.
Rate of Planting:	On soils with high production potential, where good production practices are followed, plant 22,000 to 26,000 kernels per acre. If planted on droughty soils, the rate of planting should be decreased by 10-15%.
Pesticides:	Herbicides are used on almost all corn grown in Virginia and insecticides are used on considerable acreage. For pesticide recommendations, contact your Extension agent.
Cultivation:	Cultivation may aid in weed control and reduce surface compaction on some soils, but most of the corn currently grown in Virginia is not cultivated.
Reduced-tillage or No-till Corn:	An annual cover such as small grain or permanent sod or a mulch from a previous crop is important for success with no-till. Herbicides are used to kill existing vegetation and reduce weed competition throughout the season. A specially designed planter is used to plant the corn in the mulch with no soil preparation. Research has shown that yields of no-till corn average higher than corn grown on plowed land. Other advantages are water conservation and reduction in soil erosion.
Harvesting (silage):	Hard dough stage when kernels are dented and a black layer is formed at their bases; lower leaves and husks are turning brown. Dry matter content should be 35-42%.
Harvesting (grain):	Corn is mature at 30-35% moisture. A black layer of cells is formed at the base of the kernel at maturity. If corn is harvested with picker and cribbed, the moisture content should be no more than 20%. The optimum moisture for field shelling is between 18% and 26%. It should be dried to 13% moisture before storage.
Approximate Harvest Dates:	Silage, August 15-October 1; Grain, September 1-November 1.
Approximate Yields:	Silage, 14-25 tons of 35% dry matter; Grain, 75-225 bushels/A

Corn – Popcorn – Annual – (*Zea mays everta*)

Description:	<i>See field corn</i>
Uses:	Confection and meal
Fertilizer:	Same as field corn
pH Range:	Same as field corn
Planting:	1-2 weeks after date of last killing frost at 22,000-28,000 seeds per A.
Seeds Per lb:	3,000-6,000, depending on grade
Germinating Time:	7 days
Isolation:	Do not plant where it will cross with other corn. Crossing reduces popping qualities.
Harvesting (grain):	Yields from 1/3 to 2/3 as much grain per acre as ordinary field corn. Shuck from standing stalks after it is thoroughly ripe. Do not put in crib until well cured. Maximum popping expansion is reached when kernel moisture is about 13-14%.
Cultivation:	Refer to field corn for information on fertilization and weed control.
Rotation:	Same as field corn when grown commercially.

Cotton—Annual — (*Gossypium hirsutum*)

Uses:	Grown primarily for fiber; seed used for stock feed, fertilizer, and oil; primarily adapted to the eastern shore and southeastern area of the state.
Weight Per Bushel:	30 lbs
Seeds per lb:	4,800 acid-delinted
Germinating time:	12 days
Fertilizer:	50-70 lbs N; At medium soil test levels apply 60-120 lbs P ₂ O ₅ and 10-80 lbs K ₂ O. Side-dress with 25-75 lbs N.
pH Range:	5.8-6.2
Soil Adaptation:	Well drained sandy loams and loams, but does well on some fine-textured upland soils.
Time of Planting:	After soil begins to warm, usually about April 5-May 1

Crimson Clover – Annual – (*Trifolium incarnatum*)

Description:	Central taproot with many fibrous roots; 3 leaflets per leaf; stem and leaves hairy; pointed, conical flower at top of stem is bright crimson color; plants 1-3' tall.
Uses:	Green manure, hay and pasture crop
Weight Per Bushel:	60 lbs
Seeds Per lb:	150,000
Germinating Time:	7 days
Fertilizer:	Zero N; 40-120 lbs P ₂ O ₅ and 60-90 lbs K ₂ O at medium soil test levels
pH Range:	5.8-6.5
Soil Adaptation:	Well drained and moderately well drained soils; best suited to the Coastal Plain and Eastern Piedmont.
Inoculation:	Important--Cross-inoculates with red, alsike, ladino, and white clovers.
Planting:	In the fall, 30-60 days before frost. Plant 20-30 lbs hulled seed alone; 15 lbs in mixtures.
Harvesting (hay):	Cut when most advanced heads are beginning to show faded flowers at base. <i>Dangerous as horse feed if cut when ripe.</i>
Approximate Yield:	Hay, 1-2 tons/A
Seed Yield:	6-10 bushels; shatters easily when ripe
Approximate Harvest Dates:	Hay, May 15-June 1; seed June 15-July 1. For green manure, spray or till 20-30 days before planting succeeding crop

Crownvetch – Perennial – (*Coronilla varia*)

Description:	Creeping underground roots; stems are leafy, hollow, and weak, reaching a height of 2-4' if supported; flowers white with shading to rose or violet; blooms all summer; seed pods break apart at maturity.
Uses:	Ornamental, erosion control, and stabilization; limited potential for pasture and hay because of limited regrowth after defoliation.
Weight Per Bushel:	55 lbs
Seeds per lb:	110,000
Fertilizer:	Zero N; 90-120 lbs P ₂ O ₅ and 60-90 lbs K ₂ O at medium soil test levels.
pH Range:	5.5 – 6.5
Soil Adaptation:	Does best on well drained soils, but will persist on moderately acid, rather infertile soils.
Inoculation:	Important. Specific inoculum required
Planting:	Late winter or early spring at 5-10 lbs scarified seed. Plant in rows or solid seeded. Rhizomes can be planted.

Dallisgrass—Perennial—(*Paspalum dilatatum*)

Description:	Leaves broad and flat; grows in clumps of a few to many stems; extremely short rhizomes; stems slender and usually drooped from weight of flower clusters; flowers arranged in 2 rows along tip of seed stalk. Grows 10-20" tall.
Uses:	Dallisgrass is a hay and pasture grass in the more southern states, but is not generally recommended for Virginia. It is a slow-starting grass and usually takes 2 or more years to establish a stand.
Weight per bushel:	12-15 lbs
Seed per lb:	340,000
germinating time:	21 days
Fertilizer:	40-60 lbs N, 30-40 lbs P ₂ O ₅ and 30-60 lbs K ₂ O at medium soil test levels.
pH Range:	5.8-6.2
Soil adaptation:	Well drained to somewhat poorly drained soils.
Planting:	Spring at 10-15 lbs per A alone; 3-5 lbs in mixtures

Eastern Gamagrass (*Tripsacum dactyloides*) Warm-season Perennial

Description:	3 to 8 feet tall, erect bunch grass. Stem flattened at the purplish base and growing from stout, scaly rhizomes. The blades are wide with rough and sharp margins. The inflorescence with 1-3 spikes, sometimes a foot long. It has both male and female parts in the same spike (male spikelets above and female spikelets below the spike). Crowns of established plants can be 3 feet across.
Uses:	Primarily for grazing, but also for hay, silage, erosion control and wildlife.
Fertilizer:	Responds well to N. Apply 100-150 lbs N/A/Yr, in split applications. Maintain P and K in medium range.
pH Range:	5.8-6.5
Soil Adaptation:	Grows in fertile bottomland, swamps, and along stream banks.
Time of Planting:	Seed dormancy is high, so special treatment is needed before planting. Plant wet chilled seed about 1 to 1.5" deep after the soil temperatures reaches 60 to 65°F. Alternatively, dormant seed can be sown in November-December.
Rate of Planting:	8-10 lbs/A
Method of Planting:	Best stands are obtained when planted in 6 to 10 inch rows using conventional or no-till drill. Alternatively, a corn planter can be used to seed in 30-36" rows.
Harvesting:	Harvest 2-3 times per year in vegetative to early head stages. Can harvest to 5" (hay and silage) stubble.
Harvest (pasture):	Use rotational stocking; turn in at 18-24", graze to 8" residual.
Approximate Yield:	3-7 tons hay/A

Fescue—Meadow—Perennial—(*Festuca Elatior*)

Description:	Tufted, deep rooted, long lived, with dark green leaves; no rhizome but forms strong sod; small auricles; short ligule.
Uses:	Pasture. Found in many native pastures in Virginia, but not usually seeded.
Weight per bushel:	10-15 lbs
Seeds per lb:	230,000
Germinating time:	21 days
Soil adaptation:	Prefers rich, moist soils; does not do well on sandy soil.

Fescue—Creeping Red—Perennial—(*Festuca rubra*)

Description:	Narrow leaves that are folded with a very short ligule; base of stem is usually red.
Uses:	Primarily for lawns in shade. Very similar to sheep's fescue except leaves are bright green instead of bluish and it spreads by underground-modified stems (rhizomes).
Weight per bushel:	10-15 lbs
Seeds per lb:	400,000
Germinating time:	14 days
Fertilizer:	See <i>Turfgrass section</i> .
pH Range:	5.0-6.2
Soil adaptation:	Well drained to moderately well drained soils. Does best on sandy soils. Will tolerate shade and low pH better than ryegrass or bluegrass.
Planting:	September or early spring at 3-5 lbs per 1000 sq ft for turf.

Fescue—Sheep's—Perennial—(*Festuca ovina*)

Description:	A long-lived bunch grass which forms dense turf; numerous stiff, rather sharp, nearly erect, bluish-gray leaves; a tough grass, eaten eagerly by sheep but to a lesser degree by cattle.
Uses:	Pastures, seldom seeded.
Weight per bushel:	10-15 lbs
Seeds per lb:	530,000
Germinating time:	21 days
Fertilizer:	40-60 lbs N, 30-40 lbs P ₂ O ₅ and 30-60 lbs K ₂ O
pH Range:	5.0-6.2
Soil adaptation:	Most well drained soils. Does better than most grasses on sandy soils.
Planting:	August or early fall is best, but may be sown in spring at 25 lbs along; 10-12 lbs in mixtures.

Note: Commercial seed comes from Europe.

Fescue—Tall—Perennial—(*Festuca arundinacea*)

Description:	Long lived, tufted, deep-rooted; noted for early spring and late fall growth; leaves are dark green, shiny, and barbed along the edges, making them feel rough; leaves rolled in bud, very short ligule, sheath reddish pink below ground. Most existing tall fescue stands are infected with a fungal endophyte that induces fescue toxicosis in cattle. Varieties: Endophyte-free varieties are somewhat less hardy than endophyte-infected tall fescue, requiring more careful management. Modern endophyte-free varieties are stronger than earlier varieties. Endophyte-enhanced varieties have potential.
Uses:	Pasture, hay, and turf. Excellent when seeded at high rates for turf. Widely used for winter grazing.
Weight per bushel:	24 lbs
Seeds per lb:	220,000
Germinating time:	14 days
Fertilizer:	Establishment – 40 lbs N, 120-140 lbs P ₂ O ₅ and 120-140 lbs K ₂ O at medium soil test levels. Pasture topdressing 30 lbs P ₂ O ₅ and 30-60 lbs K ₂ O annually or 40-125 lbs P ₂ O ₅ and K ₂ O every 3-4 years. (For winter grazing, apply 60-75 lbs N in mid-august). Hay topdressing –120-200 lbs N, 40-90 lbs P ₂ O ₅ and 85-185 lbs K ₂ O. For turf, see <i>Turf section</i> .

Fescue—Tall—Perennial—(*Festuca arundinacea*) (cont.)

pH Range:	5.6-6.2
Soil adaptation:	Adapted to practically all tillable soils. Tolerant to both dry and wet soils.
Planting:	Early fall or spring at 15-25 lbs when seeded alone, and 6-12 lbs in mixtures for pasture; 4-6 lbs per 1,000 sq ft for turf.
Harvesting (hay):	1 st cut when heads begin to emerge. Stems and seedheads of <u>endophyte-infected fescue</u> are <u>Highly Toxic</u> . Approximate yields: 2-6 tons hay/acre
Harvesting (seed):	When field takes on yellowish-brown cast and heads droop.
Harvesting (pasture):	Tolerant of continuous stocking. With rotational stocking, turn in at 8", remove cattle at 2-3". Keep vegetative to reduce potential problems with endophyte. <u>Remove pregnant mares from endophyte-infected fescue during last 3 months of gestation.</u>

Field Peas — Canadian — Annual — (*Pisum arvense*)

*(See Austrian Winter Pea)***Johnsongrass – Perennial – (*Sorghum halepense*)**

Description:	A coarse, tall-growing grass of the sorghum group that spreads by seed and strong underground stems; used as hay and pasture in some of the southern states, but is considered a serious pest in crop fields in Virginia and most of the eastern U.S.
Grazing precautions:	Johnsongrass is considered a NOXIOUS weed in Virginia and is prohibited as a seed contaminant. It is also against the law to seed this plant. It spreads easily by seeding to other fields. Precautions are similar to sudangrass.

Kudzu– (Perennial) – *Pueraria thunbergiana*

Description:	Legume, deep-rooted, long lived, coarse-growing vine with runners which often grow 50-100' per season. Produces few seeds, but once established can be a serious pest.
Uses:	For reclaiming gullies and wasteland. Tolerates medium acidity. May be used for pasture and hay.
Fertilizer :	At 3-yr intervals, 60-100 lbs P ₂ O ₅ and 60-100 lbs K ₂ O
pH Range:	5.5-6.2
Inoculation:	Cross-inoculates with cowpeas, peanuts, and lespedezas. Method of planting: Plant crown in holes or trench 15" deep and 18" wide. On gullied areas, plant in hole 15" deep and 18" wide on 20' squares. On wasteland, plant in deep furrows 20' apart and space crowns 4' in furrow.

Lespedeza – Bicolor – Perennial – (*Lespedeza bicolor*)

Description:	Bushy shrub; grows 3-6 ft tall; strongly ridged and grooved stems.
Uses:	Primarily as food for game birds and for erosion control. Not adapted to high altitudes because seed will not ripen in short season. Not adapted to wet areas.
Weight per bushel:	60 lbs
Seeds per lb:	85,000
Germination time:	21 days.
Fertilizer:	Zero N, 60-90 lbs P ₂ O ₅ and 30-60 lbs K ₂ O
pH Range:	5.5-6.2
Planting:	In spring after frost
Rate of Planting:	Seed in rows 3' apart at rate of 10 lbs per A, or set plants 2' apart in rows spaced 3' apart. Use scarified seed.

Lespedeza – Annual – Korean – (*Lespedeza stipulaceae*) – Common – (*Lespedeza striata*)

Description:	Warm-season reseeding legume. Slender, branched stems; branched taproot; three leaflet stipules at base of leaf; stipules very prominent on Korean. Non-bloating.
Uses:	Hay, pasture, and wildlife cover. Killed by frost and furnishes poor winter cover. Seed in mixtures with grasses or other legumes; or, if seeded alone, use winter cover crop. May not reseed above 2,500' elevation.
Weight per bushel:	Kobe, 30 lbs; Korean, 45 lbs
Seeds per lb:	Kobe 185,000; Korean 240,000
Germinating time:	14 days
Fertilizer :	At seeding, zero N, 60-90 lbs P ₂ O ₅ and 60-90 lbs K ₂ O
pH Range:	5.5-6.2
Soil adaptation:	Will grow on almost any well drained soil. Korean adapted to all areas of Virginia. Kobe adapted to southeastern section. Tolerant of acidity and low soil P. Cross-inoculates with perennial lespedezas, peanuts, and cowpeas.
Planting:	February and March at 15-25 lbs alone; 10 lbs in mixtures. Plant in 6-8" rows or solid seeded in small-grain fields. Harrow grain before seeding if soil is hard on top. Can be frost seeded in late winter.
Harvesting (Hay):	Early bloom stage
Harvesting (seed):	Combine in fall when ripe
Approximate harvest dates:	Hay: August 1-September 1; seed: September 15-November 1
Approximate yield:	Hay, 1-2 tons, seed, 200-500 lbs/A

Lespedeza –Sericea– Perennial – (*Lespedeza cuneata*)

Description:	Growth habit similar to alfalfa; stems grow from crown buds in a height of 2-4"; deep branched taproot. Warm season, drought tolerant, non-bloating.
Varieties:	High- and low-tannin types. Low-tannin varieties AV-Lotan and AV-Donnelly more palatable but less persistent.
Uses:	Erosion control, hay, pasture, and cover for wildlife.
Weight per bushel:	60 lbs
Seeds/lb:	335,000
Germination time:	28 days
Fertilizer:	Zero N, 60-90 lbs P ₂ O ₅ and 30-60 lbs K ₂ O
pH Range:	5.0-6.2
Inoculation:	Cross-inoculates with annual lespedezas, cowpeas, and peanuts.
Soil adaptation:	Will grow on almost any well drained soil. Very tolerant of acid soil and low fertility.
Planting:	Unhulled seed, late fall or early spring; scarified seed, March or April. Plant unhulled seed, 30-40 lbs; scarified seed, 15-20 lbs in 6-8" rows or solid seeded. Slow establishment.
Harvesting (hay):	When plants are about 15-24" tall. High tannin levels drop when harvested for hay, improving palatability and digestibility.
Harvesting (seed):	Direct combined. Second growth produces seed more uniformly and is easier to thresh than first crop, but yield of first crop usually higher.
Harvest (pasture):	Begin grazing at 8-10", do not graze lower than 4".
Approximate harvest dates:	Hay, June 15-July 1; seed, August 15-September 15.
Approximate yield:	Hay, 2-3 tons; seed, 300-600 lbs/A

Matua Prairie Grass – (Kunth) – Perennial – (*Bromus willdenowii*)

Description:	Matua, also known as “rescuegrass” is a cool-season, short-lived perennial grass. Matua is an erect growing plant with bunch-type growth habit. It grows up to 2-3 feet, including the inflorescence. It looks like orchardgrass except that basal leaf sheaths of prairie grass are densely covered with fine hairs and the ligule is shorter and has no auricles. Additionally, matua grass leaves are light green to green rather than bluish green like orchardgrass.
Uses:	Suited for hay, greenchop, or silage and can be used for dairy or beef pastures under rotational stocking management. It is not suited for continuous grazing.
Seeds per lb:	90,000
Fertilizer:	Requires high level of nitrogen; 40 lbs N/A at seeding recommended. For high level of production apply 50-60 lbs N/A following mechanical harvest or 30-40 lbs N/A following each grazing. Apply 40-90 lbs P ₂ O ₅ /acre and 85-185 lbs K ₂ O/A annually. Lower P and K amounts needed on pasture.
pH Range:	6.0 to 7.0
Soil adaptation:	Adapted to well drained, high fertility soils.
Planting:	May be seeded in the fall or spring when the soil temperatures are at least 55°F. Seed treatment with fungicide prior to seeding may control head smut.
Rate of planting:	25 lbs/acre for drilled plantings; 30-40 lbs/acre for broadcast seeding; and 10-15 lbs/acre in mixture.
Method of planting:	No-till or conventional planing methods may be used. Seed must be planted no more than 1/4-1/2” deep.
Harvesting (hay):	Mechanical harvest for hay or grazing should begin at the boot stage for best quality, yield and longevity. A regrowth/rest period of 30-42 days depending on the season is essential. Matua has a yield potential of 3-6 tons/year/acre. One regrowth per year must be allowed to set seed to maintain the stand.
Seeds per lb:	335,000
Germinating time:	28 days

Millet – Pearl – Annual – (*Pennisetum glaucum*)

Description:	Erect growth habit; thick stems that grow 3’-7’ tall; spike head. Regrows after cutting/ grazing.
Uses:	Supplemental pasture, hay crop, green chop. Requires 60-70 days to mature.
Weight per bushel:	40-55 lbs
Seeds per lb:	86,000
Germination time:	10 days
Fertilizer:	At seeding, 60-80 lbs N, 70-90 lbs P ₂ O ₅ and 70-90 lbs K ₂ O at medium soil test level; after each cutting, 40-60 lbs N
pH Range:	5.5-6.5
Planting:	May 1-July 1 at 25-40 lbs alone, 15-20 lbs in mixtures in 6-8” rows or solid seeded.
Harvesting (hay):	Cut when heads begin to emerge from boot or at 30-40”.
Harvesting (pasture):	Requires high stocking rate, preferably with rotational stocking.
Approximate first harvest date:	July 1-July 15.
Approximate yield:	Hay, 2-4 tons/A

Millet – Foxtail – Annual – (*Setaria italica*)

Description:	Erect growth; slender, leafy stems 2'-5' tall; spike-like head.
Uses:	Supplemental pasture and hay crop, nurse crop for late spring and early summer forage seedings, smother crop prior to late summer no-till forage seedings. Requires 60-70 days to mature. Lower yield and regrowth than pearl millet.
Weight per bushel:	40-55 lbs
Seeds per lb:	220,000
Germinating time:	10 days
Fertilizer:	60-80 lbs each of N, P ₂ O ₅ and K ₂ O, at medium soil test levels.
pH Range:	5.8-6.2
Planting:	May 1-July 1 at 15-30 lbs along; 15-30 lbs in mixtures in 6-8" rows or solid seeded.
Harvesting (hay):	Cut at seedhead emergence. <u>Do not feed to horses.</u>
Approximate yield:	Hay, 1-3 tons/A

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(Please see sorghum, grain)

Oats-Annual – (*Avena sativa*)

Description:	Panicle type head; long ligule, auricles absent; leaf margins are heavy; seed usually retains the husk (lemma and palea), which has a very smooth surface; seed color varies with variety from white, yellow, gray to somewhat red. Winter oats require a period of cold temperature to initiate heading. Spring oats have no temperature requirement.
Uses:	For grain, hay, and grazing. Excellent rotational crop for wheat or barley because it is not susceptible to the same species of diseases. Does not get "take all".
Weight per bushel:	32 lbs
Seeds per lb:	14,000
Germinating time:	10 days
Fertilizer:	20 lbs of N in the fall plus 40-90 lbs each of P ₂ O ₅ and K ₂ O at medium soil test levels. Topdress with 60-80 lbs of N in February or early March. These rates assume no carry over N from the previous crop.
pH Range:	6.0-6.5
Soil Adaptation:	Well drained loams and silt loams are best.
Planting:	<u>Winter oats:</u> (Not recommended west of the Blue Ridge.) Fall, September 25-October 15 in eastern Virginia, and September 1-October 1 in Piedmont; midwinter: February 1-March 1 for the entire State. <u>Spring oats:</u> March 5-April 1 in Piedmont; March 15- April 10 west of the Blue Ridge. Spring oats not recommended in eastern Virginia. Plant at 65-80 lbs or 12-15 seeds/drill foot in 6-8" rows or solid seeded.
Harvesting (hay):	Cut in boot to early dough stage.
Harvesting (seed):	Combine when fully ripe at 10-15% moisture.
Approximate harvest dates:	Winter, June 20-July 15, Spring, July 1-July 15
Approximate yield:	80-120 bushels or 2 tons hay/A

Orchardgrass – Perennial – (*Dactylis glomerata*)

Description:	Long-lived, deep-rooted bunch grass; leaves light green and folded and flat at the base; tufted seed heads; long ligule. Flowers only in spring. Regrowth is vegetative with no stem or seedhead production.
Uses:	Pasture, hay, and silage.
Weight per bushel:	14 lbs
Seeds per lb:	590,000 unhulled, 625,000 hulled
Germinating time:	10 days
Fertilizer:	At medium soil test levels. <u>Establishment</u> —When seeded alone, 40-50 lbs N, 120-140 lbs P ₂ O ₅ and 120-140 lbs K ₂ O. <u>Maintenance (hay)</u> —120-200 lbs N applied 1/2 in early spring and the other 1/2 after 1 st cutting plus 40-90 lbs P ₂ O ₅ and 85-185 lbs K ₂ O. When seeded with clover, nitrogen rate should be reduced to 20 lbs. For maintenance where there is more than 35% clover, no nitrogen is needed.
pH Range:	5.8-6.2
Soil adaptation:	Does best on well drained, loam soil.
Planting:	In eastern Virginia, seed after first good rain in September and up to October 15, or during February or early March. In the Piedmont and west of the Blue Ridge, seed after first good rain in August and up to September 15, or from March 1-April 15. Plant 8-12 lbs alone; 3-6 lbs in mixtures
Harvesting : (hay and silage)	Cut in boot to early head stage. Fiber percentage increases rapidly after blooming.
Harvesting (pasture):	Do not graze below 3". Rotational stocking with 1-4 day grazing periods is best.
Approximate first harvest dates:	Hay, May 15-June 1, seed, June 1-July 1
Approximate yield:	Hay, 2-5 tons/A/year; seed, 200-600 lbs/A

Peanuts – Annual – (*Arachis hypogaea*)

Description:	Legume plant native to South America. Growth habit varies from prostrate to upright. Bright yellow flowers on either the main stem or lateral branches. Flowers contain both male and female parts and are self-fertile. Following fertilization a “peg” bearing ovaries in its top elongates from the leaf axil and penetrates the soil. The peg then turns horizontally and pod and seed formation takes place. Seed per pod varies from 1-5 depending on market type. A pod will most often have two seeds.
Uses:	Food for humans and livestock.
Weight per bushel:	18-22 lbs in shell; 48-52 lbs shelled
Seeds per lb:	Virginia-type, 500-800; runner-type, 700,000; Spanish-type, 1,000-1,400 lbs in shell
Germinating time:	7-10 days
Fertilizer:	Direct fertilization not recommended. Increase the fertilizer application on the crop that precedes peanuts in rotation by 50-100 lbs P ₂ O ₅ and 10-60 lbs K ₂ O. Apply 900 lbs gypsum broadcast or 600 lbs banded over the row as plants begin to bloom.
pH Range:	5.8-6.5
Inoculation :	Cross-inoculates with lespedezas, cowpeas, and kudzu.
Soil adaptation:	Best quality peanuts are produced on well drained, light, sandy soils. May be produced anywhere east of mountains, but yield and quality are usually poor on heavier soils. Rotate peanuts with other non-legume crops.
Planting:	April 20-May 10. Soil temperature should be at least 65°F for three consecutive days.
Rate of planting:	Peanuts should be planted 3-4” apart in 30-36” rows. This requires approximately 75-175 lbs of shelled nuts, depending on seed size. Plant 1 1/2-2” deep.

Peanuts – Annual – (*Arachis hypogaea*) (cont.)

Weed control:	Herbicides and cultivation may be used. Cultivation should be shallow and often enough to control weeds until pegs enter the ground. Do not cover any portion of the vine with soil. Rotary hoeing when crust forms can be beneficial.
Harvesting:	Dig when about 70% of the shells turn brown on the inside, usually 130-170 days after planting.
Approximate harvest date:	September 15-November 1
Approximate yield:	2,500-5,000 lbs/A
Storage:	Contain about 50% moisture when dug; must be dried to 10% moisture for storage.

Rape – Annual – (*Brassica napus*)

Description:	Cool-season plant in the mustard family. Closely resembles kale with large, dark green leaves. At maturity it reaches a height of 3-6' with brilliant yellow flowers and pods that produce 15-40 small black seeds. Winter and spring varieties are available
Uses:	Pasture and as oil crop. Usually ready for grazing about 8 weeks after seeding. Sometimes causes bloating in sheep.
Weight per bushel:	50 lbs
Seeds per lb:	160,000
Germinating time:	7 days
Fertilizer:	60-80 lbs N, 30-50 lbs P ₂ O ₅ and 30-50 lbs K ₂ O at medium soil test levels.
pH Range:	5.2-6.2
Soil adaptation:	Well drained and moderately well drained loams and silt loam soils.
Planting:	February and March, or August and September at 2-3 lbs in rows; 6-9 lbs broadcast ; 4-6 lbs when seeded with oats.

Red Clover – Perennial – (*Trifolium pratense*)

Description:	Numerous leafy stems arising from a crown growing to a height of about 2' ; stems and leaves are hairy; flowers reddish purple on heads at tips of branches; branched taproot. Short-lived perennial that often behaves as biennial.
Varieties:	New varieties are more persistent.
Uses:	Hay, pasture, silage, and commercial seed production
Weight per bushel:	60 lbs
Seeds per lb:	260,000
Germinating time:	7 days
Fertilizer:	At seeding, 120-140 lbs P ₂ O ₅ and 120-140 lbs K ₂ O; for topdressing, 40-90 lbs P ₂ O ₅ and 85-185 lbs K ₂ O at medium soil test levels. Lower amounts needed when used as pasture.
pH Range:	5.8-6.5
Soil adaptation:	Well drained to moderately well drained loams and silt loam soils properly limed and fertilized.
Inoculation:	<u>Important.</u> Cross-inoculates with alsike, crimson, ladino, and white clovers.
Planting:	45 days before last killing frost in spring, or 30 days before first killing frost in fall. Plant at 8-10 lbs alone; 2-6 lbs in mixtures. Plant in 6-8" rows or solid seeded usually with a grass. Broadcast or drill on small grain or closely grazed grass pasture in later winter or early spring.
Harvesting (hay):	1/4-1/3-bloom stage. Early harvesting for hay favors good seed yield by second crop. Second cutting of hay may cause slobbering in livestock.

Red Clover – Perennial – (*Trifolium pratense*) (cont.)

Harvesting (seed):	Cut with combine when heads have turned brown, flowers and stalks are deep yellow, and seeds have begun to show a distinct violet color. Will shatter badly if cut later. May use a dessicant to aid in drying plant.
Approximate first harvest dates:	<u>Hay</u> , June 1 – June 20. <u>Seed</u> , August 15-September 1.
Approximate yield:	<u>Hay</u> 2-4 tons over season. <u>Seed</u> , 120-240 lbs/A

Redtop (Herdgrass) – Perennial – (*Agrostis alba*)

Description:	Produces numerous stems from a well-developed base; spreads by rhizomes but does not produce a strong sod; flat, light green, sharp-pointed leaves; lacks leafiness under close grazing; long prominent ligule.
Uses:	Primarily for erosion control and soil stabilization.
Seeds per lb:	5,100,000
Weight per bushel:	14 lbs
Germinating time:	10 days
Fertilizer:	40-60 lbs N, 60-100 lbs P ₂ O ₅ and 60-100 lbs K ₂ O. The N is for annual applications, the P ₂ O ₅ and K ₂ O are rates for 3-4 years
pH Range:	5.8-6.2
Soil adaptation:	Well drained and moderately well drained loams and silt loams. Tolerant to wet conditions.
Planting:	August and September. May be seeded in spring. Plant at 3-5 lbs alone; 3 lbs in mixtures. Plant in 6-8" rows or solid seeded.
Harvesting (hay):	Shortly before full bloom.

Reed Canarygrass – Perennial – (*Phalaris arundinacea*)

Description:	Tall, coarse, sod-forming cool-season grass; grows 2'-5' tall; spreads underground by short, scaly rhizomes; semi-dense, spike-like panicle.
Uses:	Hay, pasture, and silage. Conservation cover in wet areas and areas irrigated for disposal of liquid wastes.
Weight per bushel:	45 lbs
Seeds per lb:	430,000
Germinating time:	21 days
Fertilizer:	<u>Establishment</u> - 50 lbs N, 120-140 lbs P ₂ O ₅ and 120-140 lbs K ₂ O. <u>Maintenance (pasture)</u> —40-60 lbs N, 30-40 lbs P ₂ O ₅ , and 30-60 lbs K ₂ O. <u>Maintenance (hay)</u> —120-200 lbs N applied 1/2 in early spring and the other 1/2 after 1 st cutting plus 40-90 lbs P ₂ O ₅ and 85-185 lbs K ₂ O. <u>When seeded with clover</u> -nitrogen rate should be reduced to 20 lbs. For maintenance where there is more than 35% clover, no nitrogen is needed.
pH Range:	5.8-6.2
Soil adaptation:	Tolerates poorly drained soils. More drought tolerant than many other cool-season plants.
Planting:	Early fall or spring. Often slow to establish. Plant 12-14 lbs alone; 6-8 lbs in mixtures. Plant in 6-8" rows or solid seeded.
Harvesting:	1 st cut when heads begin to emerge.
Approximate harvest dates:	Hay, May 15-June 15.
Approximate yield:	Hay, 2-4 tons/A

Rye – Annual – (*Secale cereale*)

Description:	The most winter-hardy of small grains. Seedlings often have a reddish coloration; leaves have small auricles with short ligules; seeds are round with the germ-end distinctly pointed; seed color varies from greenish gray and tan to dark brown or black.
Varieties:	Abruzzi types provide earlier grazing in late winter-early spring.
Uses:	Cover crop, grain, silage, winter and spring pasture.
Weight per bushel:	56 lbs
Seeds per lb:	18,000
Germinating time:	7 days
Fertilizer:	20 lbs of N in fall plus 40-80 lbs each of P ₂ O ₅ and K ₂ O. Topdress with 60 lbs of nitrogen in February or early March.
pH Range:	5.8-6.2
Soil adaptation:	Any well drained soil. Will do better on poor soils than wheat, oats, or barley.
Planting:	60-90 lbs; 90-100 lbs for grazing. Plant 2 weeks before to 4 weeks after first killing frost. Plant in 6-8" rows or solid-seeded.
Harvesting (yield):	Combine when fully ripe at 10-15% moisture. Rye ripens slowly and seed is easily damaged during harvesting.
Harvesting (silage):	Harvest at the boot stage
Harvesting (pasture):	Earlier fall planting allows some late fall grazing. Stock heavily and rotationally to maintain leafy growth.
Approximate harvest date:	Grain: June 20-July 10; silage: April 10-May 1
Approximate yield:	25-50 bushels grain; 5-8 tons 35%-dry-matter silage/A

Ryegrass – Annual (Italian) – (*Lolium multiflorum*)

Description:	Shiny, smooth leaves rolled in the bud, auricles narrow and long; short ligule; spikelets edgewise on stem with awns on seed. Bunchgrass
Uses:	Grows rapidly and in bunches to height of 3'. Used for hay and pasture, especially as a supplementary pasture mixed with crimson clover and/or small grain. Also used for green manure, winter turf and over-seeding bermudagrass. An annual that can volunteer in small-grain fields to become a pest.
Weight per bushel:	24 lbs
Seeds per lb:	227,000
Germinating time:	7 days
Fertilizer:	Pasture, 20 lbs N in fall and 30-50 lbs each of P ₂ O ₅ and K ₂ O. Add 50-70 lbs N top dressed in spring.
pH Range:	5.8-6.2.
Soil adaptation:	Will grow well on most soils used for crops in Virginia.
Planting:	August 15 to November 15. Use the earlier seeding date for Northern Piedmont and west of the Blue Ridge. Plant <u>for pasture</u> , 10-15 lbs in mixtures, 20-30 lbs alone. <u>For turf</u> , 3-5 lbs/1,000 sq ft
Harvesting (pasture):	Tolerates close, continuous stocking

Ryegrass – Perennial – (English Ryegrass) – (*Lolium perenne*)

Description:	Similar to Italian in use, adaptability, and all other ways, but can be distinguished from Italian by flowers being awnless and leaves folded in the bud, not rolled. Special varieties adapted for turf purposes.
Use:	Pasture. High yielding during first year, but decreased yields in subsequent years due to poor persistence.
Planting:	In mixtures, 10 lbs; alone, 20-30 lbs
Approximate yield:	2-6 tons hay/A

Sorghum, forage – Annual – (*Sorghum bicolor*)

Description:	Sorghum is very similar to corn in the vegetative stage. Leaves tend to be more narrow than for corn. Heavily covered with a white waxy coating that can be rubbed off the leaf sheath. Flowers are perfect in that both male and female parts are produced in a panicle type head on top of the plant. Forage sorghum is 6'-10' tall with large stem, medium-size grain head.
Uses:	silage, hay, grazing.
Weight per bushel:	56 lbs
Seeds per lb:	13,000-20,000
Germinating time:	10 days
Fertilizer:	60-80 lbs each of N, P ₂ O ₅ and K ₂ O
pH Range:	5.8-6.2
Soil adaptation:	Well drained to somewhat poorly drained soils
Planting:	1-2 weeks after corn. Soil needs to be warm (at least 60° F). Plant 5-20 lbs in rows with a drill or corn planter.
Harvesting:	Do not graze until 30" tall. Cut for hay or wilted silage no later than early head emergence. Cut in dough stage for direct ensiling.
Approximate yield:	Hay or wilted silage, 3-5 tons dry matter. Silage, 14-18 tons 35% dry matter/A

Sorghum, Grain – Annual – (*Sorghum bicolor*)

Description:	See forage sorghum. Same genus and species except plant types that are shorter and produce lighter grain have been bred. Plant height 3-5' with high grain yield. Will recover from high temperature and drought better than corn.
Uses:	Grain and silage
Weight per bushel:	56 lbs
Seeds per lb:	13,000-20,000
Germinating time:	10 days
Fertilizer:	Apply approximately the same amount that would be applied to corn when grown under comparable conditions.
pH Range:	5.8-6.2
Soil adaptation:	Well drained to somewhat poorly drained soils
Planting:	1-2 weeks after corn. Early-medium maturing hybrids can be planted following small grain harvest in eastern Virginia. Plant for grain at 5-7 lbs in rows; forage alone, 7-10 lbs. Increase seeding rate 10-20% with late seedings. Grain sorghum should be planted in rows as narrow as possible. Seed 1-1 1/2" deep.
Harvesting:	Harvest grain with combine when seed is mature and shells easily from head. Chop for silage when grain is in the dough stage. Artificial drying can be a problem because the small seed size reduces air flow through the grain.
Approximate yield:	Grain, 80-90% of adapted hybrid corn yield. Silage, 11 tons 35% dry matter/A

Sorghum, Sweet– Annual – (*Sorghum bicolor var saccharum*)

Description:	Similar in appearance to forage sorghum
Uses:	Syrup
Weight per bushel:	45-60 lbs
Seeds per lb:	28,000-40,000
Germinating time:	10 days
Fertilizer:	30-50 lbs N, 60-90 lbs P ₂ O ₅ and 60-90 lbs K ₂ O. Side-dress with N to make a total of no more than 70 lbs N when plants are 25-35 days old.
pH Range:	5.8-6.2
Soil adaptation:	Any well drained soil suited for corn.
Planting:	2-4 weeks after corn at 3-5 lbs in rows 30-36” apart. Plant 1-1 1/2” deep.
Cultivation:	Shallow, level, and often enough to keep down weeds. Chemical control also practiced.
Harvesting (syrup):	When seeds are in hard-dough stage.
Approximate harvest date:	September 1-October 1
Approximate syrup yield:	100-300 gallons/A

Soybean – Annual – (*Glycine max*)

Description:	Legume 2-4’ tall. Broad trifoliolate leaves with small white or purple flowers. Flower initiation is very sensitive to day length, but all plants do not respond the same way. Some cultivars bloom under relatively short days while others bloom under longer days. In Virginia, shorter-day cultivars are classified as maturity group 3 or 4; longer-day cultivars are classified as maturity groups 5 and 6. Two types of growth habit -- determinate and indeterminate. Indeterminate cultivar’s terminal bud continue to grow several weeks after flowering; determinate cultivar’s terminal bud cease to grow when the plant starts to flower. Tan or brown seedpod contain 2 to 3 round yellow seed. Stems, leaves, and pods are covered with gray or tawny hairs.
Uses:	Seed, hay, and silage.
Weight per bushel:	60 lbs
Seeds per lb:	Small-3,600; medium-3,000; large-2,500; extra large-1,600
Germination time:	3-6 days
Fertilizer:	Zero N, 40-60 lbs each of P ₂ O ₅ and K ₂ O
pH Range:	5.8-6.5
Inoculation:	Use soybean inoculum where soybeans are not grown regularly. Does not cross-inoculate with other legumes.
Soil adaptation:	Well drained to somewhat poorly drained soils. Rotate with other non-legume crops.
Planting:	Two weeks after corn planting time for the area (full-season); double-cropped with small grain, generally after June 15. Planting prior to June 10 results in maximum potential yield. Yield declines rapidly if planted later due to lack of time to develop adequate growth. Planting in 20-inch rows or less is recommended in order to meet canopy requirements and maximize yield. No-tillage planting requires the use of a “burndown” herbicide to kill existing vegetation either mixed together with a preemergence herbicide or followed approximately two to three weeks later by a postemergence herbicide.
Pest Management:	An integrated approach with cultural, biological, and chemical controls is necessary. Control weeds by three weeks after planting and maintain control until canopy closure. Rotation with non-host crops become necessary to prevent buildup of several nematode species. Several insect pest species are occasionally a problem in Virginia. Frequent scouting is needed to detect infestations. Control measures should be implemented when pests exceed economic thresholds.

Soybean – Annual – (*Glycine max*) (cont.)

Harvesting: (hay and silage)	When lower leaves begin to turn yellow and pods are about half-filled.
Harvesting (seed):	When leaves have fallen and pods are brown and dry, seed moisture will be 10-15 %.
Approximate harvest dates:	Hay, August 15-October 1 Seed, September 20-December 1
Approximate yield:	Hay, 2-4 tons; Seed, 25-70 bushels/A

Sudangrass – Annual – (*Sorghum sudanense*) or Sorghum—Sudangrass Hybrid—Annual

Description:	Smooth, erect stems reach height of 5'-7'; open panicle head; large leaves
Uses:	Supplemental pasture in 40-45 days.
Weight per bushel:	25-40 lbs
Seeds per lb:	Sudangrass, 55,000; Sorghum-Sudangrass hybrids, 20,000
Germination time:	10 days
Fertilizer:	60-80 lbs each of N, P ₂ O ₅ and K ₂ O; plus 40-60 lbs N after each cutting
pH Range:	5.8-6.2
Soil adaptation:	Well drained to somewhat poorly drained soils.
Planting:	Two weeks after corn. Sudangrass, 25-35 lbs broadcast, 15-20 lbs in rows. Sorghum-Sudangrass, 30-40 lbs broadcast, 20-30 lbs in rows. Plant in narrow rows or solid seeded.
Precaution:	<i>Do not graze or harvest for green chop until plants are 24"-30" tall to reduce danger of prussic-acid poisoning</i>
Harvesting (hay):	Cut just as heads emerge.
Harvesting (silage):	Cut direct when grain is in dough stage, or as heads emerge and wilt.
Approximate harvest dates:	Hay or silage, July 1-July 15
Approximate yield:	Hay or wilted silage, 2-5 tons dry matter. Silage, 12-15 tons 35% dry matter/A

Sugar Beets – Biennial – (*Beta vulgaris*)

Description:	Same species as the red garden beet but grows much larger. Leaves are large and shiny; white roots averaging 1-3 lbs. Sugar content 14-16%.
Uses:	Sugar production and livestock feed.
Seeds per lb:	72,000
Germination time:	10-14 days
Fertilization:	40 lbs N, 100 lbs P ₂ O ₅ and 100 lbs K ₂ O prior to seeding. An additional 40 lbs N will be needed 4-6 weeks later. Use a borated fertilizer.
pH Range:	6.0-6.5
Soil adaptation:	Well drained silt or silty loam soil free of stones and roots.
Planting:	Late winter or early spring. If field is to be thinned, drop one seed per inch of row. Thin when plants have 4-6 leaves, spacing plants 10-12" apart.
Approximate harvest dates:	October-December.
Approximate yield:	20-30 tons/A

Sunflower – Annual – (*Helianthus annuus*)

Description:	Plants with large leaves and bright yellow flowers. Young leaves and flowers tend to face the sun. Very susceptible to bird damage.
Uses:	Oil crop, bird feed, snack food.
Weight per bushel:	26-30 lbs
Seeds per lb:	5,000-8,000
Germination time:	10-14 days
Fertilization:	100 lbs of N plus 40-60 lbs each of P ₂ O ₅ and K ₂ O
pH Range:	5.8-6.0
Soil adaptation:	Any well drained soil
Planting date:	Tolerates freezing temperatures better than most crops. Can plant 2-3 weeks prior to last killing frost. Because of early maturity, planting can continue until August 1 in eastern Virginia.
Planting rate:	Plant 19,000-20,000 plants/A
Cultivation:	1-2 cultivations will usually be necessary to control weeds. Herbicide selection limited.
Harvesting:	110-120 days required from planting to harvest. Mature when the backs of heads turn yellow. Special attachments necessary on small grain combine headers to prevent shatter loss.
Approximate yield:	Seed, 1,200-2,000 lbs/A

Sweet Clover – Biennial – (*Melilotus alba*; *Melilotus officinalis*)

Description:	Erect with many branches; deep taproot; stems grow from crown second year; yellow or white flowers; 2-5' tall, leaflets notched on edges toward tips (unlike alfalfa with smooth edges). Plants and flowers have a sweet vanilla odor.
Varieties:	Biennial white sweet clover preferred. Stems of the biennial yellow are finer and plant does not grow so high. Yellow blooms 10 days earlier.
Uses:	Pasture, hay, and green manure. <u>Poorly cured hay can result in hemorrhaging in livestock due to accumulation of dicoumarin.</u>
Weight per bushel:	60 lbs
Seeds per lb:	250,000
Germinating time:	10 days
Fertilizer:	Zero N, 40-70 lbs P ₂ O ₅ and 50-80 lbs K ₂ O
pH Range:	6.5-7.0
Soil adaptation:	Well drained to moderately well drained soils.
Inoculation:	Important. Cross-inoculates with alfalfa and bur clover.
Planting:	February, using unhulled seed. Use scarified seed in late March or April. Hulled, 15 lbs; unhulled, 25 lbs. Drill on grain in February or March, or sow on frozen ground.
Harvesting (hay):	Cut in bud stage before any bloom appears.
Approximate harvest dates:	Hay, May 10-June 1
Approximate yield:	Hay, 2-3 tons/A

Switchgrass – Perennial – (*panicum virgatum*)

Description:	Native warm-season sod-forming tall grass (3-6') that produces an open panicle seed head. Scaly creeping rhizomes. Can be identified by the cluster or nest of hair at the base of the blade where it joins the sheath.
Uses:	Summer pasture or hay. Will not persist under close or frequent grazing.
Seeds per lb:	330,000

Switchgrass – Perennial – (*panicum virgatum*) (cont.)

Germinating time:	14-21 days
Fertilizer:	Generally low fertility requirement. At establishment, zero N, 80 lbs each of K ₂ O and P ₂ O ₅ . Maintain K ₂ O and P ₂ O ₅ test in the medium soil test range. Apply 40-60 lbs N annually if legumes are not present.
pH Range:	5.5-6.5
Soil adaptation:	Deep, well drained to moderately well drained soils.
Planting:	May 15-July 15 using 6-8 lbs pure live seed.
Harvesting (hay):	Cut prior to seed head emergence.
Harvesting (pasture):	Begin grazing when 18”-24” tall. Do not graze below 8”.
Approximate first harvest dates:	July 15- August 1.
Approximate yield:	Hay, 2-5 tons /A

Tall Meadow Oatgrass – Perennial – (*Arrhenatherum elatius*)

Description:	Bunchgrass that grows 3-5’ tall; open panicle head likes oats.
Uses:	Hay and pasture. Makes early spring growth but very little aftermath growth.
Weight per bushel:	10-15 lbs
Seeds per lb:	150,000
Germinating time:	14 days
Fertilizer:	40-60 lbs N, 30-40 lbs P ₂ O ₅ and 30-60 lbs K ₂ O
pH Range:	5.8-6.2
Soil adaptation:	Well drained to moderately well drained sandy loam to silt loam soils.
Planting:	Late summer or fall using 15-20 lbs alone or 10-12 lbs in mixtures.
Harvesting (hay):	Cut at early heading stage.
Approximate harvest dates:	Hay, May 15 – June 1
Approximate yield:	Hay, 1-2 tons/A

Timothy – Perennial – (*Phleum pratense*)

Description:	Semi-bunch grass; erect and dull green leaves gradually tapering to a point; in late spring, the lower joint swells to form a small bulb; spike-like head; shallow fibrous roots; round stem with prominent ligule.
Uses:	Primarily hay; best adapted to the northern United States, but does fairly well in northern Piedmont and western Virginia. Makes very little regrowth after spring cutting compared to orchardgrass or tall fescue.
Weight per bushel:	45 lbs
Seeds per lb:	1,230,000
Germinating time:	10 days
Fertilizer:	40-60 lbs N, 30-40 lbs P ₂ O ₅ and 30-60 lbs K ₂ O
pH Range:	5.8-6.2
Soil adaptation:	Well drained to somewhat poorly drained, fine-textured soils.
Planting:	8-10 lbs alone; 2-8 lbs in mixtures. Usually seeded in mixtures with clovers or alfalfa.
Harvesting (hay):	When alone, in full bloom; in mixtures, when legume is in early bloom.
Approximate harvest dates:	Hay, June 1-July 1
Approximate yield:	Hay, 1-3 tons/A

Tobacco– Burley – Annual – (*Nicotiana tabacum*)

Description:	See flue-cured tobacco. Plants typically larger than flue-cured. Stalk and leaf midribs are light green to cream-colored. Typical culture is for 18-22 leaves that are lighter green than flue-cured. The crop is grown from transplants historically produced in plant beds but now typically produced in greenhouses.
Uses:	Primarily cigarette blends with a small amount used in the manufacture of pipe and chewing tobacco products. Approximately 30% is exported.
Seeds per oz:	330,000
Germinating time:	7 - 12 days
Viability of seed:	6-8 years under proper conditions (temperature in °F and relative humidity should add to 100).
Fertilizer:	175-200 lbs of N, 60-120 lbs of P ₂ O ₅ and 150-300 lbs of K ₂ O per acre. Follow soil test recommendations.
pH range:	When checked in the spring, a pH of 5.8-6.2 is preferred. If the pH <u>drops to 4.9 during the season, there is a danger of manganese toxicity.</u>
Soil adaptation:	Fertile silt loam soils that have good internal and surface drainage.
Planting:	Transplant from seed beds May 15 – June 1 using 6,225-8,300 plants per acre in 3.5' rows with plants spaced 18"-24" in the row.
Disease control:	The most successful disease management program utilizes multiple control strategies. Crop rotation and the use of disease resistant varieties should be used in combination with chemical control methods.
Weed control:	Herbicides alone will not control certain weeds closely related genetically to tobacco. Tobacco benefits from some soil aeration, so always cultivate tobacco at least one time, usually at lay-by time, even though weeds are not a problem.
Insect control:	The Integrated Pest Management (IPM) approach to insect control recognizes that a certain amount of insect damage will not reduce tobacco yield or quality enough to pay for the cost of treatment. Natural control should be promoted by delaying insecticide applications until a pest insect reaches an economic threshold level and by using the insecticides that are least harmful to beneficial insects.
Sucker control:	Top the tobacco when the 50% bloom stage has been reached. Growth of suckers is controlled through the use of plant growth regulators. Typical control is through backpack sprays of maleic hydrazide or a combination of maleic hydrazide and a local systemic material.
Method of harvest:	Hand-harvest plants by stalk cutting. Spear 5-6 plants onto each stick according to size of tobacco. Leave tobacco in the field on standing sticks long enough to wilt sufficiently to handle without breakage of the leaves.
Method of curing:	Air-cure in ventilated barns by placing sticks of speared tobacco 9" apart on the tier rails. Any temperature from 65°F to 95°F is satisfactory as long as the daily average relative humidity is between 65% and 70%. An alternative curing methods utilizes labor saving field curing structures covered with black plastic.
Approximate harvest date:	August 15-October 1.
Approximate yield:	2,400-2,800 lbs/A of cured leaves.

Tobacco – Dark-fired – Annual – (*Nicotiana tabacum*)

Description:	<i>See flue-cured tobacco</i>
Uses:	The majority is exported for the manufacture of smoking tobacco, chewing tobacco, and cigars. The domestic use is for dry snuff.
Seeds per oz:	330,000
Germination time:	7-12 days

Tobacco – Dark-fired – Annual – (*Nicotiana tabacum*) (cont.)

Viability of seed:	6-8 years under proper conditions (temperature in °F and relative humidity should add to 100).
Fertilizer:	135 lbs N, 40-100 lbs P ₂ O ₅ and 100-175 lbs K ₂ O
pH Range:	5.6-6.0
Soil adaptation:	Well drained loams and silt loams.
Planting:	May 1-June 1 using 5,000-5,300 plants/A. Rows, 42-48” apart; plants, 24-30” in row
Topping and sucker control:	Plant should be topped at 12-14 leaves, depending on the vigor of the plant after the bud has formed, before the flowers begin to open. Growth of suckers is controlled through the use of plant growth regulators. Foliar sprays of contact fatty alcohols and maleic hydrazide (in sequential applications) are effective with minimal hand labor. Alternative control utilizes treatment of individual plants with local systemic plant growth regulators.
Method of harvest:	Cutting stalk.
Method of curing:	Numerous small smoldering fires on barn floor. Hardwood or sawdust may be used to generate smoke. Smoke several times during 6 week curing period.
Approximate harvest date:	August 15-September 1
Approximate yield:	1,200-2,500 lbs cured leaf.

Tobacco– Flue-cured – Annual – (*Nicotiana tabacum*)

Description:	Central taproot with numerous short lateral roots. Single round stem 4-8’ tall when not topped. Leaves are alternate, forming an ascending spiral up the stem. Leaves are 1’ or more in width and 3-4’ long with a unique ability to accumulate nicotine. All green parts of the plant are covered with sticky hairs. Flowers are pink or rose colored and self-pollinated. The crop is grown from transplants historically produced in plant beds but now typically produced in greenhouses.
Uses:	Primarily used in cigarettes. Approximately 40% is exported as unmanufactured leaf.
Seeds per oz:	330,000
Germinating time:	7-12 days
Viability of seed:	6-8 yrs under proper conditions (temperature in °F and relative humidity should add to 100).
Fertilizer:	50-80 lbs N, 40-100 lbs P ₂ O ₅ and 100-150 lbs K ₂ O. If necessary to topdress, use nitrate source of N. Use materials low in chlorine (less than 2%).
pH Range:	5.5-6.0
Soil adaptation:	Well drained soils with sandy loam surface and sandy clay loam subsoils.
Time of planting:	Transplant between April 25-May 20
Rate of Planting:	6,000-6,500 plants per acre; 44-48” rows, plant 20-24” in row. The optimal number of leaves per acre is 110,000-120,000.
Side-dressing:	Preplant fertilizer rates should not exceed 40 lbs of N and 120 lbs K ₂ O per acre. Additional N and K ₂ O can be applied as a side application to obtain the total amount of nutrients desired. Side-dressing applications of the base rate of nutrients should be made as soon as the stand is established. When leaching occurs, N and K ₂ O in addition to the base amounts recommended may be necessary. The quality of N and K ₂ O required would depend on the amount of water that percolates through the plow layer, and the stage of plant growth at the time this occurs.
Topping:	Plants should be topped at the button to early flower stage of development that is about the time harvest begins. Plants should be topped at 17-22 leaves depending upon plant vigor and weather conditions.

Tobacco– Flue-cured – Annual – (*Nicotiana tabacum*) (cont.)

Suckering:	After topping, suckers develop in the leaf axils and should be removed or controlled. Growth and suckers is controlled through the use of plant growth regulators. Foliar sprays of contact fatty alcohols and maleic hydrazide (in sequential applications) are effective with minimal hand labor. Alternative control utilizes treatment of individual plants with local systemic plant growth regulators.
Method of harvest:	Leaves harvested individually by removing or priming as ripening begins at the bottom of the stalk and progresses upward.
Method of curing:	Typically in bulk curing barns following a schedule lasting 6-7 days regulating temperature and drying rate. Supplemental heat (maximum (165-170°F) is required to first yellow the leaf, than dry the lamina, and finally dry the leaf midrib.
Approximate harvest date:	Typically three harvests or primings as leaves ripen. Harvest period may last 8-12 weeks, beginning as early as mid-July and ending as late as October.
Approximate yield:	2,000–3,000 lbs of cured leaves/A

Tobacco – Sun-cured – Annual – (*Nicotiana tabacum*)

Description:	See Flue-cured tobacco. Smaller plants than flue cured.
Uses:	Primarily exported for making smoking and chewing tobacco. A small portion is used domestically for plug chewing tobacco.
Seeds per oz.:	330,000
Germination time:	7-12 days
Viability of seed:	6-8 yrs under proper conditions (temperature in °F and relative humidity should add to 100).
Fertilizer:	125 lbs N, 40-100 lbs P ₂ O ₅ and 100-175 lbs K ₂ O
pH Range:	5.6-6.0
Soil adaptation:	Well drained loams and silt loams.
Planting:	May 1 – June 1
Rate of planting:	5,000-5,300 plants/A. Rows, 3 1/2'; plants 28-30" in row
Topping and sucker control:	Plants should be topped at 12-14 leaves, depending on the vigor of the plant after the bud has formed, before the flowers begin to open. Growth of suckers is controlled through the use of plant growth regulators. Typical control is from hand application of a local systemic plant growth regulator to individual plants.
Method of harvest:	Cutting Stalk.
Method of curing:	Air-cured in barns constructed to permit good ventilation. Heat needed only in periods of extremely high humidity.
Approximate harvest date:	August 15-September 1
Approximate yield:	1,000-2,000 lbs/A

Tobacco Greenhouses

Production system:	Transplants typically grown in styrofoam plug trays floating in shallow plastic-lined pools containing a nutrient solution. An overhead watered production system utilizing plastic plug trays is an alternative production system.
Plant density:	80-157 plants per sq ft in trays containing 200-392 plants.
Seeding time:	Seed greenhouse with highest quality pelletized seed approximately 7-8 wks before expected transplanting.

Tobacco Greenhouses (cont.)

- Fertilization:** Use a complete (N-P₂O₅-K₂O) water-soluble fertilizer. Greater than 50% of fertilizer nitrogen should be derived from nitrate nitrogen. Fertilizer is added to the nutrient solution at a concentration of 100-150 ppm N.
- Clipping:** Clipping with a rotary mower is used to increase transplant uniformity, remove excess foliage, and regulate seedling growth. Clipping should begin when seedlings are 2-2 1/2 inches tall to the bud and clip 1-1 1/2 inches above bud. Clip 4-6 times before transplanting, raising blade height with successive clippings. Proper sanitation is critical for disease prevention.

Tobacco Plant Beds

- Seeding:** Use 1/8-1/6 oz. of seed per 100 sq yds of bed.
- Plant bed space:** 75-100 sq yds/A to be transplanted
- Fertilizer:** 1/2-3/4 lb of 12-6-6 to each sq yd
- Soil adaptation:** Locate beds near a source of clean water on well drained sandy loams or loams. Do not locate beds in a shady area or in low lying areas along creeks or rivers.

Vetch – Hairy – Annual – (*Vicia villosa*)

- Description:** Semi-viney legume with tendrils; plants hairy; stems 3-5' long; flowers bluish violet and white.
- Uses:** Hay, pasture and winter cover. Sometimes called winter vetch. Because of the hardness of the seed, it often becomes a weed in small grain crops that follow.
- Weight per bushel:** 60 lbs
- Seeds per lb:** 21,000
- Germinating time:** 14 days
- Fertilizer:** 90-120 lbs P₂O₅, and 60-90 lbs K₂O
- pH Range:** 6.0-6.5
- Inoculation:** *Important.* Cross-inoculates with garden peas and field peas.
- Soil adaptation:** Well drained to moderately well drained sandy loams to clay loams.
- Planting:** August 1 – November 1, depending upon location. Plant 20-30 lbs alone; 10-15 lbs in mixtures; usually mixed with 1/2-1 bushel of small grain. Plant in 6-8" rows with small grains or solid seeded.
- Harvesting (hay):** When seeds in lower half of the plants are half developed.
- Harvesting (seed):** Cut when first pods are well developed.
- Approximate harvest dates:** Hay, May 1-June 1
- Approximate yield:** Hay 1-2 tons or seed, 200-600 lbs/A

Weeping Lovegrass – Perennial – (*Eragrostis curvula*)

- Description:** A warm season perennial bunchgrass. Long slender drooping leaves that grow to a height of 2'-5' but usually do not remain upright. Seed head is an open panicle 6"-10" long. Produces relatively poor quality pasture and hay. Several varieties available. Virginia is northern limit of adapted area.
- Uses:** Limited hay and pasture, relatively low in palatability. Its primary use in Virginia is for soil stabilization and critical areas.
- Seeds per lb:** 1,500,000
- Germination time:** 14 days
- Fertilizer:** 40-50 lbs N, 60-70 lbs P₂O₅ and 40-50 lbs K₂O
- pH Range:** 4.5-6.2. Tolerance to low pH enhances its value for soil stabilization.
- Soil adaptation:** Best adapted to sandy soils, but will grow in heavier soil types.

Weeping Lovegrass – Perennial – (*Eragrostis curvula*) (cont.)

Planting:	April 15-June 1 is best but can also be seeded June 1-August 15, 1-2 lbs in rows, 2-3 lbs solid seeded.
Harvesting:	Cut for hay before seed head forms. For grazing, stock at high rates to utilize all forage and then rotate as needed.

Wheat – Annual – (*Triticum aestivum*)

Description:	Dark green leaves with short hairy auricles and long ligule. Seeds thresh free of their husks and are caramel colored with smooth surface and a whitish brush on the end opposite the germ. Soft red wheat is the traditional class of wheat grown in Virginia.
Uses:	Grain, grazing, and cover crops.
Weight per bushel:	60 lbs
Seeds per lb:	13,000-16,000
Germinating time	7 days at 65°F. 14 days at 50°F
Fertilizer:	20 lbs of N in the fall plus 40-80 lbs each of P ₂ O ₅ and K ₂ O at medium soil test levels. Topdress with 30-50 lbs of N in February if the stand is thin or shows obvious nitrogen deficiency. Additional nitrogen should be applied in late March (40-80 lbs).
pH Range:	5.8-6.2
Soil adaptation:	Any moderately well drained or well drained soil.
Planting:	One week before to one week after the first killing frost, October 15-November 15 in eastern Virginia; October 1-November 1 in the Piedmont; October 1-October 25 west of the Blue Ridge. Plant 120-150 lbs per acre (36 seeds per sq ft or 20 seeds per drill ft in 7" rows). Plant in 6-8" rows or solid seeded.
Harvesting:	Combine when fully ripe at 10-15 % moisture. Cut for silage in the soft dough stage.
Approximate harvest dates:	June 20-July 10
Approximate yield:	50-100 bushels grain; 8-12 tons 35% dry matter silage/A

White Clover – Common – Perennial – (*Trifolium repens*)

Description:	Low growing, short-lived legume; smooth leaves with 3 leaflets; shallow rooted; spreads by soil surface stolons that root at nodes; white flower.
Uses:	Pastures, especially with bluegrass. Tolerates close, continuous grazing.
Weight per bushel:	60 lbs
Seeds per lb:	700,000
Germinating Time:	10 days
Fertilizer:	With bluegrass at seeding, 0-20 lbs N, 90-120 lbs P ₂ O ₅ and 60-90 lbs K ₂ O. For topdressing, 60-100 lbs each of P ₂ O ₅ and K ₂ O every 3-4 years.
pH Range:	5.8-6.5
Inoculation:	Cross-inoculates with alsike, crimson, ladino, and red clover.
Soil adaptation:	Well drained and moderately well drained loams and silt loams.
Planting:	45 days before last killing frost in spring or 30 days before first killing frost in fall using 1-2 lbs in mixtures.

White Clover -- Ladino – Perennial – (*Trifolium repens latum*)

Description:	Giant variety of white clover which resembles white clover in every respect except size.
Uses:	Primarily for pasture with tall growing grasses such as orchardgrass. May be used for silage and hay, but hay is difficult to cure. Less persistent and grazing tolerant than common white clover.

White Clover -- Ladino – Perennial – (*Trifolium repens latum*) (cont.)

Weight per bushel:	60 lbs
Seeds per lb:	700,000
Germinating Time:	10 days
Fertilizer:	Alone at seeding, zero N, 90-120 lbs P ₂ O ₅ and 60-90 lbs K ₂ O. Topdressing, no N, 30-40 lbs P ₂ O ₅ and 30-60 lbs K ₂ O annually.
pH Range:	6.0-6.5
Soil adaptation:	Well drained and moderately well drained loams and silt loams.
Inoculation:	<i>Important.</i> Cross-inoculates with alsike, crimson, red and white clovers.
Planting:	30-60 days before average date of the first killing frost in fall or 30-45 days before the average date of the last killing frost in spring. Fall seedings are preferred, especially in the Tidewater area. Plant 1-2 lbs with grasses. May be seeded alone at rate of 3-5 lbs when used for hog or poultry pasture.

Zoysia – Perennial — Japanese lawn grass – *Zoysia japonica Steud.*) – Korean or Matrella lawn grass – (*Zoysia matrella L.*)

Description:	Closely resembles bermudagrass. Spreads by stolons and short rhizomes. Turns brown with frost but greens up earlier than bermuda in the spring. Ligule is a fringe of hairs with some hairs found on upper surface of leaf blade. Forms a dense turf with leaves upright, which provides more cushion than bermuda. Flower is a weak spike and seldom branched.
Uses:	General lawn areas. Sometimes used for lawns, athletic fields, and play areas.
Growth habit:	Often sod-forming with both stolons and rhizomes. Slow growing, particularly in areas having cold nights. <i>Matrella</i> similar to <i>Japonica</i> except finer texture.
Climatic adaptation:	Both species have low moisture requirements. <i>Japonica</i> adapted best intermediate zone between cool humid and warm humid regions. <i>Matrella</i> is a warm season grass best adapted to warmer sections of warm humid regions. Severely injured by cold weather. Becomes dormant early in fall and starts late in spring.
Soil adaptation:	Grows best on soils of medium or good fertility. Will survive at low fertility levels. Tolerates medium acidity, but needs good drainage. Moderately shade-tolerant.
Fertilizer:	For fertilizer and other management practices, see Turfgrass section.
Method of establishment:	Sod, sprigs, and plugs. The latter two are slow to establish, usually requiring at least 2 seasons.
Planting:	Spring: 4-7 bu/100 sq ft from May 15-July 1 in Northern Piedmont and mountains, and April 30-July 15 in Coastal Plains and Southern Piedmont. Plugs: 4,000 on 6" centers/1000 sq ft. Plant from May 1-July 15 in Northern Piedmont and mountains, and April 15-August 1 in Coastal Plains and Southern Piedmont.