

Incorporating Native Grasses and Flowers into the Roadside

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This is our research world

History of Revegetation on Roadsides

- 1950's – Forage Research
 - ◆ Agronomic slant
 - ◆ Fescues, crown vetch, flat pea, weeping lovegrass
 - ◆ Plants commercially available
 - ◆ Natives were the weeds

Use of Native Grasses

- 1960's natives acknowledged
- Recent History
 - ◆ 1970&80's - Prairie Restoration
 - ◆ 1980's - Diversity on Public Lands
 - ◆ 1990's - Alien Invasive Plant Species
 - ◆ Clinton Directive - 1999
- New Direction and Current Status
 - ◆ Agencies encouraged to show intention

Our Roadside Research at VT

- Re-Vegetation Research – 1960's
- Turf Research –1970 to present
- 1993 - Search for adapted species
- 1996 - Demonstrations with native plants
- 1997 – NG Roadside work for VDOT
- 2001 – NG Mine Lands

Wildflowers

Twinflower

Phylogenetic Family	Scutellariaceae
Subfamily	Scutellariaceae
Tribe	Scutellariaceae
Subtribe	Scutellariaceae
Genus	Scutellaria
Species	Scutellaria



The Captains' ...

陳其南、陳其南、陳其南、陳其南、陳其南

Thymus has tiny, rounded leaves with shallow notches at the tips. The leaves occur in pairs along the trailing stems. The tiny, rose-pink flowers, that resemble tiny umbels on short stalks, are borne in the leaf axils at the ends of the stems.

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[illegible]

NAME AND ADDRESS

Plant in humus-rich, moist, well well in soil in shade. Plant
has dense clusters of small white flowers, especially when
they are in flower. Plant has a strong, sweet, spicy
or hot taste. Plant is used in many cuisines. It is
common in the East and is used in many of the world's
cuisines.

PETER'S BAKERY COMPANY

[illegible]

Sp. 3rd mired 80s (i.e. summer australis) has similar
tongue to 1st but has 2nd (very 1st) to 2nd (very 1st) appears
in 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th, 35th, 36th, 37th, 38th, 39th, 40th, 41st, 42nd, 43rd, 44th, 45th, 46th, 47th, 48th, 49th, 50th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th, 59th, 60th, 61st, 62nd, 63rd, 64th, 65th, 66th, 67th, 68th, 69th, 70th, 71st, 72nd, 73rd, 74th, 75th, 76th, 77th, 78th, 79th, 80th, 81st, 82nd, 83rd, 84th, 85th, 86th, 87th, 88th, 89th, 90th, 91st, 92nd, 93rd, 94th, 95th, 96th, 97th, 98th, 99th, 100th, 101st, 102nd, 103rd, 104th, 105th, 106th, 107th, 108th, 109th, 110th, 111th, 112th, 113th, 114th, 115th, 116th, 117th, 118th, 119th, 120th, 121st, 122nd, 123rd, 124th, 125th, 126th, 127th, 128th, 129th, 130th, 131st, 132nd, 133rd, 134th, 135th, 136th, 137th, 138th, 139th, 140th, 141st, 142nd, 143rd, 144th, 145th, 146th, 147th, 148th, 149th, 150th, 151st, 152nd, 153rd, 154th, 155th, 156th, 157th, 158th, 159th, 160th, 161st, 162nd, 163rd, 164th, 165th, 166th, 167th, 168th, 169th, 170th, 171st, 172nd, 173rd, 174th, 175th, 176th, 177th, 178th, 179th, 180th, 181st, 182nd, 183rd, 184th, 185th, 186th, 187th, 188th, 189th, 190th, 191st, 192nd, 193rd, 194th, 195th, 196th, 197th, 198th, 199th, 200th, 201st, 202nd, 203rd, 204th, 205th, 206th, 207th, 208th, 209th, 210th, 211st, 212nd, 213th, 214th, 215th, 216th, 217th, 218th, 219th, 220th, 221st, 222nd, 223rd, 224th, 225th, 226th, 227th, 228th, 229th, 230th, 231st, 232nd, 233rd, 234th, 235th, 236th, 237th, 238th, 239th, 240th, 241st, 242nd, 243rd, 244th, 245th, 246th, 247th, 248th, 249th, 250th, 251st, 252nd, 253rd, 254th, 255th, 256th, 257th, 258th, 259th, 260th, 261st, 262nd, 263rd, 264th, 265th, 266th, 267th, 268th, 269th, 270th, 271st, 272nd, 273rd, 274th, 275th, 276th, 277th, 278th, 279th, 280th, 281st, 282nd, 283rd, 284th, 285th, 286th, 287th, 288th, 289th, 290th, 291st, 292nd, 293rd, 294th, 295th, 296th, 297th, 298th, 299th, 300th, 301st, 302nd, 303rd, 304th, 305th, 306th, 307th, 308th, 309th, 310th, 311st, 312nd, 313th, 314th, 315th, 316th, 317th, 318th, 319th, 320th, 321st, 322nd, 323rd, 324th, 325th, 326th, 327th, 328th, 329th, 330th, 331st, 332nd, 333rd, 334th, 335th, 336th, 337th, 338th, 339th, 340th, 341st, 342nd, 343rd, 344th, 345th, 346th, 347th, 348th, 349th, 350th, 351st, 352nd, 353rd, 354th, 355th, 356th, 357th, 358th, 359th, 360th, 361st, 362nd, 363rd, 364th, 365th, 366th, 367th, 368th, 369th, 370th, 371st, 372nd, 373rd, 374th, 375th, 376th, 377th, 378th, 379th, 380th, 381st, 382nd, 383rd, 384th, 385th, 386th, 387th, 388th, 389th, 390th, 391st, 392nd, 393rd, 394th, 395th, 396th, 397th, 398th, 399th, 400th, 401st, 402nd, 403rd, 404th, 405th, 406th, 407th, 408th, 409th, 410th, 411st, 412nd, 413th, 414th, 415th, 416th, 417th, 418th, 419th, 420th, 421st, 422nd, 423rd, 424th, 425th, 426th, 427th, 428th, 429th, 430th, 431st, 432nd, 433rd, 434th, 435th, 436th, 437th, 438th, 439th, 440th, 441st, 442nd, 443rd, 444th, 445th, 446th, 447th, 448th, 449th, 450th, 451st, 452nd, 453rd, 454th, 455th, 456th, 457th, 458th, 459th, 460th, 461st, 462nd, 463rd, 464th, 465th, 466th, 467th, 468th, 469th, 470th, 471st, 472nd, 473rd, 474th, 475th, 476th, 477th, 478th, 479th, 480th, 481st, 482nd, 483rd, 484th, 485th, 486th, 487th, 488th, 489th, 490th, 491st, 492nd, 493rd, 494th, 495th, 496th, 497th, 498th, 499th, 500th, 501st, 502nd, 503rd, 504th, 505th, 506th, 507th, 508th, 509th, 510th, 511st, 512nd, 513th, 514th, 515th, 516th, 517th, 518th, 519th, 520th, 521st, 522nd, 523rd, 524th, 525th, 526th, 527th, 528th, 529th, 530th, 531st, 532nd, 533rd, 534th, 535th, 536th, 537th, 538th, 539th, 540th, 541st, 542nd, 543rd, 544th, 545th, 546th, 547th, 548th, 549th, 550th, 551st, 552nd, 553rd, 554th, 555th, 556th, 557th, 558th, 559th, 560th, 561st, 562nd, 563rd, 564th, 565th, 566th, 567th, 568th, 569th, 570th, 571st, 572nd, 573rd, 574th, 575th, 576th, 577th, 578th, 579th, 580th, 581st, 582nd, 583rd, 584th, 585th, 586th, 587th, 588th, 589th, 590th, 591st, 592nd, 593rd, 594th, 595th, 596th, 597th, 598th, 599th, 600th, 601st, 602nd, 603rd, 604th, 605th, 606th, 607th, 608th, 609th, 610th, 611st, 612nd, 613th, 614th, 615th, 616th, 617th, 618th, 619th, 620th, 621st, 622nd, 623rd, 624th, 625th, 626th, 627th, 628th, 629th, 630th, 631st, 632nd, 633rd, 634th, 635th, 636th, 637th, 638th, 639th, 640th, 641st, 642nd, 643rd, 644th, 645th, 646th, 647th, 648th, 649th, 650th, 651st, 652nd, 653rd, 654th, 655th, 656th, 657th, 658th, 659th, 660th, 661st, 662nd, 663rd, 664th, 665th, 666th, 667th, 668th, 669th, 670th, 671st, 672nd, 673rd, 674th, 675th, 676th, 677th, 678th, 679th, 680th, 681st, 682nd, 683rd, 684th, 685th, 686th, 687th, 688th, 689th, 690th, 6

GROWING AND PROPAGATION

Plant is rich, constantly moist and in full sun or partial shade. Plants in warmer areas with fluctuating winter temperatures.

Labellia cardinalis
Cardinal Flower

[illegible]

Calceolaria pinnatifida

1994年12月

[illegible]

11. 4. 2008 10: 30

Laminate (vertical flower with lance flag and one verticillate antherium) (*Althaea*, spp.), monkey flower (*Mimulus*, spp.), *Scrophularia* (*Scrophularia* spp.), and *Androsace* (*Androsace* spp.) type plants such as *Epilobium*, *Androsace*, *Scrophularia*, and *Androsace*. Laminate (vertical flower with lance flag and one verticillate antherium) (*Althaea*, spp.), monkey flower (*Mimulus*, spp.), *Scrophularia* (*Scrophularia* spp.), and *Androsace* (*Androsace* spp.) type plants such as *Epilobium*, *Androsace*, *Scrophularia*, and *Androsace*. Laminate (vertical flower with lance flag and one verticillate antherium) (*Althaea*, spp.), monkey flower (*Mimulus*, spp.), *Scrophularia* (*Scrophularia* spp.), and *Androsace* (*Androsace* spp.) type plants such as *Epilobium*, *Androsace*, *Scrophularia*, and *Androsace*.

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Warm vs Cool Season Grass Culture

Warm-Season

- C₄ Plants
 - ◆ Seed in Spring
 - ◆ Thrive in Summer
- Many are very tolerant of acid & low P soils
- Fertilize in Summer

Cool-Season

- C₃ Plants
 - ◆ Seed in Fall
 - ◆ Thrive in Fall/Sp
- A few are tolerant of acid and low P soils
- Fertilize in Fall

Examples of Native Grasses

■ Warm-Season

- ◆ Big bluestem 6-7'
- ◆ Switchgrass
- ◆ Indiangrass
- ◆ Eastern Gama
- ◆ Little Bluestem
- ◆ Sideoats grama
- ◆ Virginia Broomsedge
- ◆ Beardgrass
- ◆ Bluegrama
- ◆ Buffalograss 6-8"

■ Cool-Season

- ◆ Canada wildrye 4-5'
- ◆ Virginia wildrye
- ◆ Western wheatgrass
- ◆ Creeping red fescue
- ◆ Danthonia
- ◆ Junegrass 4-6"



Virginia Switchgrass
Panicum virgatum



Growing Switchgrass in Water



WS

Big Bluestem
Andropogon gerardii

Sorghastrum nutans



WS



Burning & Lodging Potential



Little Bluestem
Schizachyrium scoparium



Virginia Broomsedge
Andropogon virginicus

Beardgrass
Andropogon elliotii

WS

3. 22. 2001



Canada Wildrye
Elymus canadensis

CS



Poverty wild oat grass
Danthonia spicata



Junegrass
Koeleria macrantha

CS



Creeping Red Fescue
Festuca rubra ssp. rubra

DOT Roadside Flowers

History

- **Operation Wildflower Program**
 - **Lady Bird Johnson -1976**
- **In Va, 490 A and 30 A Bulbs**
- **Meadows > Annual Mono-stands**
> Meadows

Direction of Our Research Since 1998

- **Diversity**
- **Sustainable Stands of Perennials**
- **Native Grasses**
- **Relaxed Meadow Plantings**
- **No-Till Planting System
Development**



Plains Coreopsis
Coreopsis tinctoria

Va Native - Annual



Bearded beggarticks
Bidens aristosa

Va Native - Annual



Gloriosa daisy
Rudbeckia hirta 'Gloriosa'

Native - Annual



Clasping Coneflower
Dracopsis amplexicaulis

Native - Annual



Long-head coneflower
Ratibia columnaris

Native - Annual



Lanceleaf Coreopsis
Coreopsis lanceolata

Va Native



Purple Coneflower
Echinacea purpurea


Va Native



Aster

Va Native

10. 24. 2001



Swamp Sunflower *Helianthus angustifolia*

Va Native

Plants In Review

- Maximillian Sunflower
- Ashy Sunflower
- Sawtooth Sunflower
- Ox-eye Sunflower
- Grey Goldenrod
- Showy Goldenrod
- Lupine

Foxtail
Teasel
Thistle
Prickly lettuce

Roadside Challenges

Soil

Weeds

Weather

Ill-boding Forces

WF/NG Site Preparation

- Soil Compaction – Rip
- Adjust pH to 5.5 to 6.5
- P – 200 lb/A of 0-46-0 (test soil)
- N/K -Slowly available N is best
 - ◆ 0.5 to 1 lb / 1000 ft sq
- Use composts to improve H₂O holding capacity

WF/NG Seeding Recommendations

- Total amount should approach 25-35 lb/A pure live seeds (PLS)
- Rate should be adjusted to site pressure and seeding method
- Keep mixes simple
- Use companion plants
 - ◆ Plains Coreopsis (2-4 lb/A)
 - ◆ Creeping red fescue (5-10 lb/A)

Planting Natives

- Choice of 3 Methods
 - ◆ Broadcast & Roll - 5 steps
 - ◆ Slit-Seed - 3 steps
 - ◆ No-Till - 3 steps

Broadcast Method

- Glyphosate 2x
- Mow
- Till
- Broadcast
- Roll



Slit-Seeding Methods

- Glyphosate 2x
- Mow
- Slit-Seeder



No-Till Method

- ◆ Glyphosate 2x
- ◆ Mow
- ◆ Seed



Seeding Tricks

- Breaking Dormancy (moist-chill or winter seeding)
- Fluffy Seed - Soak and Coat (vermiculite) or spray with hair-gel
- Moist Sand / Cat litter / soybean meal
- Graphite Powder

Maintenance of Established Site

- Fertilization – Apply N-P-K @ 0.5 lb/1000 ft² in summer for WS grass and fall for CS and WF
- Weed Control – Choices
 - ◆ Mow 6-8” high
 - ◆ Pre-plant > pre-emergent herbicides
 - ◆ Post-plant > post-emergent herbicides
 - ◆ Burn in winter
- Clipping to reduce height

Convincing Agencies to Use Native Plants

- Erosion Control Issue
- Long-term Persistent Cover (5 years +)
- Cost
- Public Perception



October 2001 Abandoned Coal Mine Refuse Pile Data (DMME) (% Ground Coverage)

Switchgrass + Mix*	75%
Eastern Gama + Mix	68
Big Bluestem + Mix	88
TF+Birdsfoot Trefoil+White Clover+German Millet	97

*Mix = LB-Indiangrass-CRF-Tickseed

Promoting Native Plants

- Erosion Control & Persistence
 - ◆ Support research
 - ◆ Time will provide experience
- Reduce Seed Cost
 - ◆ Court Seed Producers
 - ◆ Work with Va Seed Certification Program
 - ◆ Support Seed Development

Promoting Native Plants

■ Public Perception

◆ Education

- ◆ Elementary Schools
- ◆ Cooperative Extension Network
- ◆ Elder Hostels

◆ Auto Tag Program

◆ Collaborate with Agencies

- ◆ Acknowledge plantings that are favorable – positive reinforcement works!

Incorporating Native Grasses and Flowers into the Roadside

- 1) Select Adapted Plants
- 2) Address Roadside Challenges
- 3) Create Support

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Roadside Flower Web Page
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Encyclopedia of
**WILD
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AN ORGANIC GUIDE TO
CHOOSING AND GROWING OVER 150
BEAUTIFUL WILDFLOWERS



C. COLSTON BURRELL
Coauthor of *Rodale's Illustrated
Encyclopedia of Perennials*

Foreword by ANN LOVEJOY