



In New York State there are a lot of fields growing in with fall flowering goldenrod and asters as well as some early flowering tree and shrub species. It may be more useful to establish wildflowers to enhance pollen production for a different season or to augment the goldenrod with other species in the fall. Conservation practices including cover crop/green manure can provide legumes as good pollen source for some species of bees. Conservation cover for CRP and WHIP, windbreaks, riparian buffers and wildlife hedge plantings offer existing pollinator habitat or opportunities to incorporate pollinator habitat into the landscape. Some forage legumes could be specifically managed for some species of bees.

Methods:

The pollinator study at the Big Flats Plant Materials Center was conducted to determine seeding rates, time and weed control for field scale wildflower establishment, most but not all species evaluated were rated high for pollinator enhancement. We first evaluated 50 species of wildflowers in the greenhouse to observe their ability to germinate with and without stratification (1 or 2 months) and surface sowing. We then established a time of seeding study with 50 species of pollinators and 10 mixes replicated 3 times with 3 seeding dates, 6/5/09, 8/17/09 and 10/26/09. The plots were established on a Unadilla silt loam soil, in 6.33 ft. x 10 ft subplots. The field was rototilled prior to seeding. The seed was hand sown with the aid of sand for distribution, the seed was raked in and cultipacked with an ATV.

Weed control: The area used for the study had been in sod 3 years prior to the study then kept in a mechanical fallow state. We sprayed roundup on quackgrass prior to rototilling the seeding year. On the June 5th seeding there was an annual grass problem (green and yellow foxtail and barnyardgrass) we sprayed on 7/1/09 "Poast" a contact grass herbicide on ½ of all of the plots, obtaining excellent weed control. The rest was mowed in late July later than optimum. Mowing needs to be timely and more than 1x per year. In areas Canada thistle, white clover and birdsfoot trefoil, goldenrod, plantains are still a problem. Some Canada thistle was removed by a wick application of roundup.

Seeding rate: 25 seeds/ft² based on quick germination. (Not the traditional PLS method). This increased the seeding rate 30 - 100% for most species i.e 38 – 50 seeds/ft². Seed was inoculated and scarified as recommended.

The traditional PLS calculation is $PLS = (\% \text{ purity} * (\% \text{ germination} + \% \text{ dormant})) \div 100$, where percent purity = seed wt/ total wt. (includes inert matter and seeds other than what is purchased) The dormant seed is the seed that is left un-germinated but tested viable from a lab procedure. These germination test procedures could allow for stratification or other growth hormone treatments. Therefore the germination rate on the tag may not always reflect actual field conditions. For example $96\% \text{ Purity} \times (40\% \text{ germination} + 40\% \text{ dormant}) \div 100 = 76.8\%$

PLS When you purchase the seed you will receive a bulk weight of seed, Bulk seed = $100 \div \text{PLS}\%$. in the above example $100 \div 76.8\% = 1.3$ bulk lbs to seed 1 lb PLS.

In 2009 we had above average rainfall and first year establishment was excellent of those species not requiring stratification, with more germination following after the first winter.

The second seeding date was 8/17/09 which was within the recommended dates for alfalfa seedings in this area. There were dry conditions following planting and very few weeds emerged there was eventually excellent germination as observed in late September of those species not requiring stratification. This plot did not require mowing in either year, although some horse weed was cut by hand.

The last pollinator date was 10/26/09 chosen as the latest we could get on field prior to fall rains and no drying weather. The field was a bit wetter than optimum for cultivation.

The 2010 growing season had above average temperatures and below normal precipitation during the growing season resulting in slow growth of the forbs from the 8/17/09 planting compared to the 6/5/09 planting date. This could have been due to larger seedlings from the previous years earlier planting date, there could also be soil compaction issues.

We will be observing the competitiveness and invasiveness of these species over time. Some species will be more compatible in mixes than others or their seeding rate may need to be reduced due to eventual size and competitiveness. In some cases may become a problem and should be avoided.

In 2010 ten additional species were evaluated. This year's seeding rate was based on traditional PLS methods. Due to some early observations of some overwinter mortality in last years late summer planting the date was changed to July 20th the recommended date for planting birdsfoot trefoil in this area. This year July 20th was too early due to hot dry weather, annual weeds were a huge problem needing a "Poast" application and mowing. Another dormant planting is planned for late October 2010.

Observations:

Many species germinated readily in the field some did better than greenhouse testing perhaps due to being partially surface sown. The following species germinated without stratification: Swamp, butterfly and common milkweeds, partridge pea, lanced leaved coreopsis, plains coreopsis, showy tick trefoil, purple coneflower, spotted Joe pyeweed round headed lespedeza, marsh blazing star, wild bergamot, purple bergamot, spotted bee balm, gray headed coneflower, black eyed Susan, wild senna, ashy sunflower, hairy white old field aster (heath aster), Ohio spiderwort, lupine, Virginia mountain mint, tall white beardtongue (better after stratification). Many of these species had additional germination following winter.

Most but not all species evaluated were rated high for pollinator enhancement. Some of the lower pollinator ranked species germinated and established easily. These include: blue chickory, lanced-leaved coreopsis, showy tick trefoil, round-headed lespedeza, and black eyed Susan. They could have other conservation benefits.

After the second season the following species have significantly improved stands due to increase emergence after an over wintering stratification; smooth blue aster, flat top white aster, hairy old field aster (heath) New England aster, zigzag aster, wild indigo, Joe pyeweed, tall white beard tongue, ox eye sunflower, tickseed sunflower, early goldenrod, gray goldenrod, showy goldenrod, common sneeze weed, cardinal flower and great blue lobelia.

After the second season most of the species are establishing, those that did not or were marginal were: purple giant hyssop, St. johnswort, Alleghany monkey flower, golden alexanders and Indian hemp.

The spiderworts and vervains are having difficulty with the site conditions, exhibiting poor vigor, The vervains are susceptible to foliar disease.

Note: The cardinal flower, great blue lobelia, wild indigo were seeded at very high rates due to not taking into consideration the very high dormant seed fraction in 2009 and using only the germination rate to calculate and obtain the 25 seedlings/ft².

The dormant seeding planted 10/26/09 did not produce a stand of any of the forbs.

Field Stops:

- 1) Swamp milkweed, provides excellent food for the monarch butterfly, there has been many sightings of larval feeding. Swamp milkweed established well on silt loam soil and tolerated dry conditions in the second year despite being an obligate species. This species germinated well without stratification.
- 2) Butterfly milkweed – For the 8/17/09 planting date, butterfly milkweed had good emergence when evaluated in September of the seeding year. Some seedlings were lost due to winter survival issues, this was also the case for Marsh blazing star (liatris) and common milkweed.
- 3) Some of the plots of the 8/17/09 planting have small seedlings due to emerging this spring after stratification and growing in drought conditions for most of the summer. There is adequate establishment of smooth blue aster, flat top white aster, New England aster.
- 4) Self seeding annuals – Partridge Pea and plains coreopsis. The partridge pea may become a problem being over competitive and spreading by reseeding. Black eyed Susan is a biennial which may also spread and is noted not to be a high value to pollinators.
- 5) Some of the forbs, may have additional or other benefits as low maintenance landscape plants if they do not spread. Lanced leaf coreopsis, gray headed coneflower, round headed lespedeza, showy tick trefoil. Early goldenrod, gray goldenrod, ashy sunflower, purple coneflower may have dual benefit since they have high pollinator value as well. They seem to be able to compete with weeds.
- 6) Conversely there are some of the forbs which start off slow with poor seedling vigor and eventually become large plants like blue false indigo and common milkweed .

- 7) The Joe pyeweed and Boneset are plants which tolerate wet conditions and are classified FACW they are tolerating the silt loam soils and this season's dry conditions so far. This does not seem to be true for the spiderworts (tradescantia) which germinated well but are not persisting.
- 8) Plants which established and persisted well from the 2009 plantings and have high pollinator value are the purple coneflower, wild bergamot, purple bergamot, spotted bee balm, swamp and butterfly milkweeds, tall white beard tongue, gray goldenrod, heath aster, zigzag aster, New England aster, gray goldenrod and early goldenrod and Joe pye weed. The ashy sunflower, gray headed coneflower and wild senna readily established and are ranked as medium in pollinator value.
- 9) There are other species which established moderately well or were inconsistent between replications these include: showy goldenrod, smooth blue aster, big leaf aster, parasol white top aster, grass leaved goldenrod, Virginia mountain mint and marsh blazing star.
- 10) There were some species which germinated well but in this study appear not to be persisting: include blue false indigo, common milkweed, wild indigo the vervains, and spiderworts. The blue false indigo may need another growing season to show its full potential.

We will continue to monitor all of the species for persistence and competitiveness with weeds as well as monitoring the more robust species for their tendency to be overly aggressive.

all information will be available in tabular form as we finalize data collection.

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