

Pollinators and Natives: **An Ancient Marriage**



Coevolution: When changes in at least two species genetic compositions reciprocally affect each others evolution; the change of one biological object triggered by the change of another object.

Flowering plants, angiosperms, represent 1/6 of ALL described species on Earth. In the terrestrial environment, their interactions with other living organisms are dominant factors in community structure and function; they underpin ALL nutrient and energy cycles by providing food for a vast range of animal herbivores, and the majority of them use animal pollinators to achieve reproduction.

“Among plants, the nuptials cannot be celebrated without the intervention of a third party to act as a marriage priest.” Rothrock 1867

Current worldwide estimate: Approximately 12,000 genera of angiosperms..... 500 bird pollinated, 250 bat pollinated, 875 abiotic (wind, water, etc.) and the remaining 10,375 are insect pollinated.

Salvia: Staminal Lever Mechanism

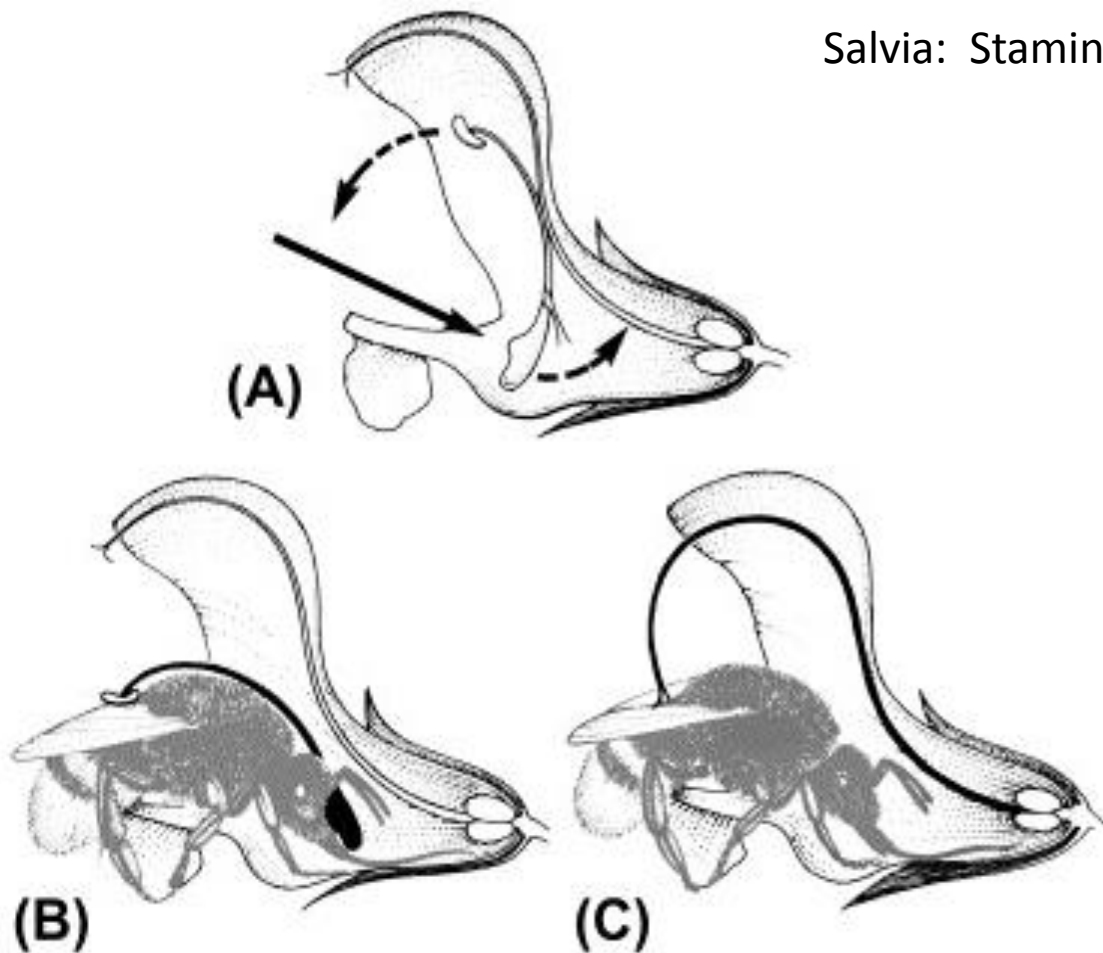


Fig. 1.

Pollen transfer in *S. pratensis* L. (schematic, after Meeuse and Morris 1984). (A) Longitudinal section through the flower, showing one of the two modified, lever-like stamens, and the position of the style at the beginning of anthesis; arrow indicates contact of pollinator with the sterile connective plate, dotted lines illustrate movement of lever arms. (B) An insect looking for nectar in a young flower pushes the platform back, thus triggering pollen loading on its back. (C) In an older flower, in which the style arrests the position of the anthers (the latter not drawn), the insect deposits the pollen on the stigmas.



Eyelash Sage

Salvia blepharophylla – P Mexico





Monkshood

Aconitum spp. -- P





Cutaway of the Aconitum flower showing the internal structure with the nectary located way-up in the 'hood'. Does this look like an accident? It isn't..... This is an excellent example of coevolution. Organism and systems are under constant pressure to adapt, each unique individual offers its own genetic material which adds to the diversity of evolution. Diversity drives evolution, we are losing that diversity at an alarming rate.....



Bees are probably the best and most important group of pollinators because they are **obligate** flower visitors, they rely only on nectar and pollen as both adult and larvae.....





What the heck happened and what can be done now?

*Habitat Loss: From 1997 – 2012 the net loss of ‘working land’ (farm land, open spaces and other non-urbanized areas) was 1.1 million acres. 57% of that occurred in the state’s 25 fastest growing counties..... These include the DFW metroplex, Austin and Houston.
Large projects / Suburbanization

*Habitat Degradation: Primarily due to non-native invasive species....
KR bluestem, Scabiosa, Bermuda grass, Chinese pistache, etc.
These are intentional.

*As are these.... ‘cides’ This suffix means DEATH for something and many times the applications are too large or are ineffective. More ‘cides’ are applied by homeowners than folks who farm or ranch, it’s not even close. Toxins are absorbed (residue or direct contact) and nectar and pollen are tainted.

*Direct competition for resources by non-native species. Sorry EHB.

***Bamberger Ranch. An excellent example of stewardship, find and read their story for inspiration..... It can be done!**







Installing natives in the urban, residential setting is extremely important BUT more important are the bigger, wilder spaces. We need the habitat, the genetics and their mentorship.... Support institutions that buy and preserve land. TNC is good but Ducks/Quail Unlimited are too..... GIVE.





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Where the rubber meets the road, time to stop talking and get busy. Common-sense strategies for turning it around.....

*Go ORGANIC. This is how it all evolved and Mom has already figured things out so let her be your guide. No 'cides', no GMO's and no non-natives that can naturalize. Manage your soil well.

*Remove the non-natives first. Arrest their ability to reproduce and create more unmanageable individuals, this is critical although at times impractical..... How do you get rid of KR???

Each reproducing invasive non-native is a 'nursery' from which others will certainly come.....

*Install native plants like crazy. Ideally you will concentrate on creating 'systems', species like to be around other species with which they evolved but remember that one native is better than none. Get native plants in the ground; the absolute BEST plant will be produced from seed directly sown. Design with diversity at the fore and your instance of SUCCESSION will increase. Hint: 'Effective' diversity cannot be had at most nurseries, best bet is to propagate....



So you are willing to 'Grow Your Own' OK, a few pointers.....

*Collect ethically. Leave some seed, NEVER take all the seed from an individual plant, each one has its own UNIQUE genetic expression, THIS is the driver of evolution.

*Genetics. Whenever possible YOU collect locally, the best results will come when growing plants that are adapted to you soils and climate. 'Shoulder Rule', 'For Sale' and 'No Fence'

*Be patient. See the pictures above. It does no good to harvest too early, wait for the seed to fully mature for the best propagation success. No botanical C-Sections....





Good pollinators exhibit 'Flower Constancy', they like to stay on the same species when foraging so don't make them go too far..... this is efficient for them and effective for the flower, greater chance of correct pollen distribution. Insects cue on scent and color, both are enhanced when you install in large 'blocks' or patches.

A few more philosophical details.....

*Aphids. I love aphids. I love to watch Braconid wasps oviposit inside them and the resulting 'being eaten alive from the inside-out' effect. But Syrphid flies are my favorite, their larvae eat them alive too but it's visible and I like to witness their angst as they perish. Aphids are 'entomological rabbits' they are the staple for many beneficial species. If you have aphids, and are organic, you will have a beneficial insect nursery on your property..... Don't buy them, especially Lady Bugs.

*Don't forget the native grasses and sedges. These give 'structure' to the habitat and often persist through winter with cover and food for pollinators and others.

*Bolting winter veggies. Often the first source of nectar and pollen in the landscape..... Syrphids love



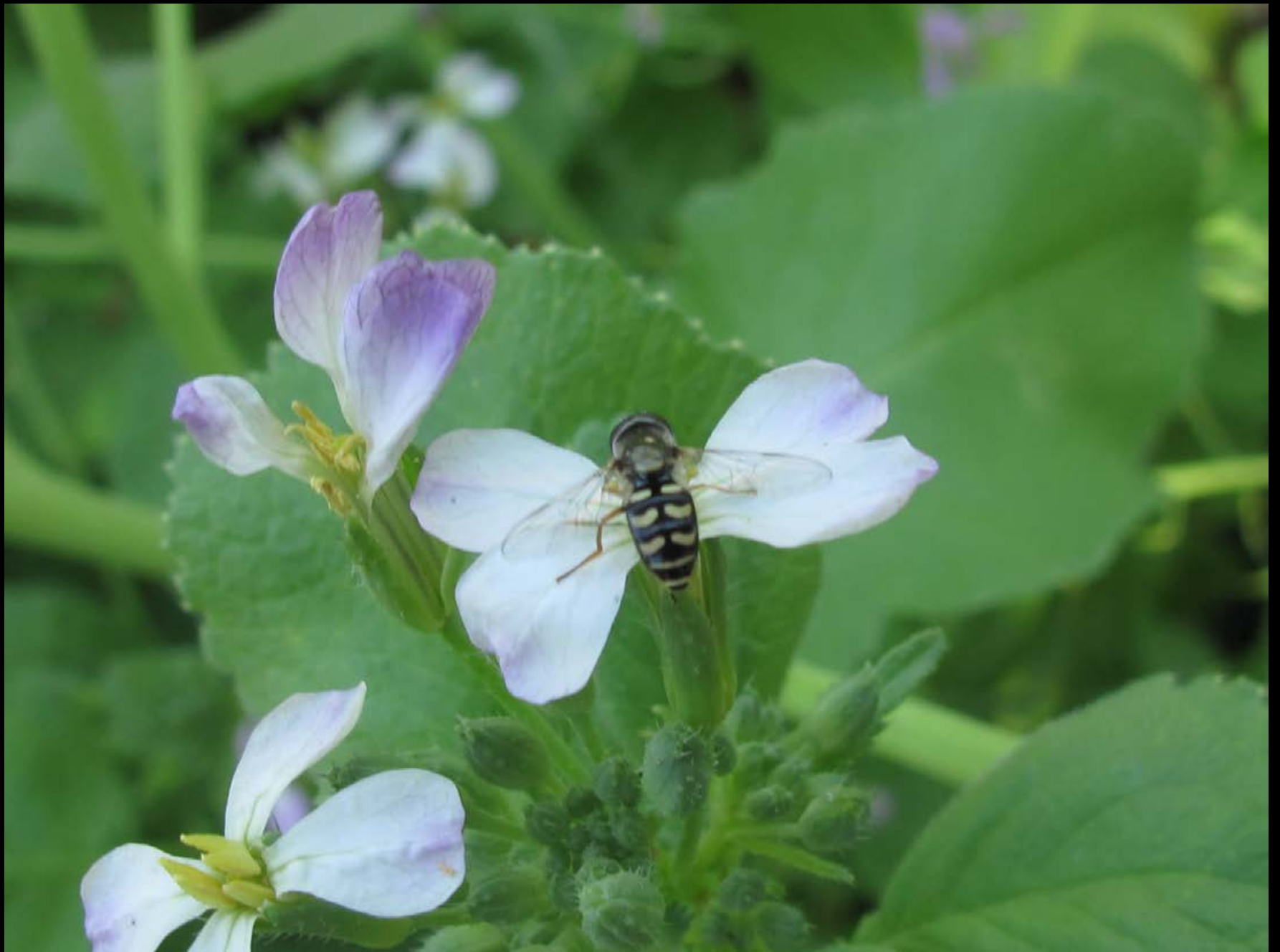
Braconid wasp ovipositing inside and aphid..... I love this stuff.















Syrphid fly pupae on Green milkweed seed pod. ALWAYS check *Asclepias* prior to aphid intervention, let the beneficials have their way; encourage them!!



When aphids are being eaten alive they get the strangest expression on their faces....
Personally, I love this look.

Some guidelines to follow and some species to consider but don't write this down, a list will be provided shortly after this conference, see FB...

- *If they historically occurred where you live, install native *Asclepias*, this is a KEYSTONE genus

- *Design for diversity and succession.

- *Install in the Fall, Summer is a Bummer.

- *In-town there is always a 'Code-Person'. You only have to be smarter than them and that's not too hard, use their own words against them. You don't have any 'weeds' and your grasses are ornamentals. Stay calm but unafraid, these laws are recognized universally as unconstitutional.



Antelope Horns

Asclepias asperula -- P



Butterfly Weed

Asclepias tuberosa -- P



Side-Cluster milkweed *Asclepias oenotheroides* -- P



Crazy-Geometric Flowered milkweed *Asclepias viridiflora* -- P







Frass jettison..... caterpillar poop is an obvious sign of host activity.















Observe the numerous pollinia attached to this *Bombus*, she was tired.



*Native Ground covers instead on non-native turf. Get rid of your 'yard' as fast as you can.

*Vines to maximize efficient use of space.

Vertical space is premium in the urban scene where space and habitat are already smallish.

*Legumes. Soil builders ('fixing' atmospheric nitrogen is cool), 'lawn' replacers and food suppliers to many native species.....

*Woodies. Typically provide consistent structure in a landscape and many are great nectar and pollen sources.

*Cacti. Offer nice diversity and are critical food sources for many species, especially bats.



Yellow Passionflower

Passiflora lutea -- P



Crossvine

Bignonia capreolata -- P



Snapdragon vine

Maurandya antirrhiniflora -- P



Coral Honeysuckle *Lonicera sempervirens* -- P

This species is pollinated primarily by moths, as are Yucca and a few others. Consider them when designing, there are WAY more moth species than butterflies, ALL pollinators are VITAL.



Angel's Trumpet

Datura wrightii -- P



Mexican Hat

Ratibida columnifera -- P



Turk's Cap

Malvastrum drummondii -- P



Mexican sunflower

Tithonia rotundifolia -- A



Pink Evening Primrose

Oenothera speciosa -- P



Maximilian Sunflower

Helianthus maximiliani -- P



Gregg's Mistflower

Eupatorium greggii -- P



Rattlesnake Master *Eryngium yuccifolium* -- P



Eryngo

Eryngium leavenworthii -- A











Partridge Pea

Chamaecrista fasciculata -- A



Blue/Pitcher Sage *Salvia azurea* var *grandiflorum* -- P



Bluebells

Eustoma grandiflorum -- B>



Catchfly Prairie Gentian

Eustoma exaltatum -- P



Four-Nerve Daisy

Tetrameuris scaposa -- P



Fleabane

Erigeron spp. -- P



Bush Sunflower

Semisia calva -- P



Standing Cypress

Ipomopsis rubra -- B







Scarlet Gilia

Ipomopsis aggregata -- B



Big Red Sage

Salvia penstemonoides – P E



Prairie Verbena

Verbena bipinnatifida -- P



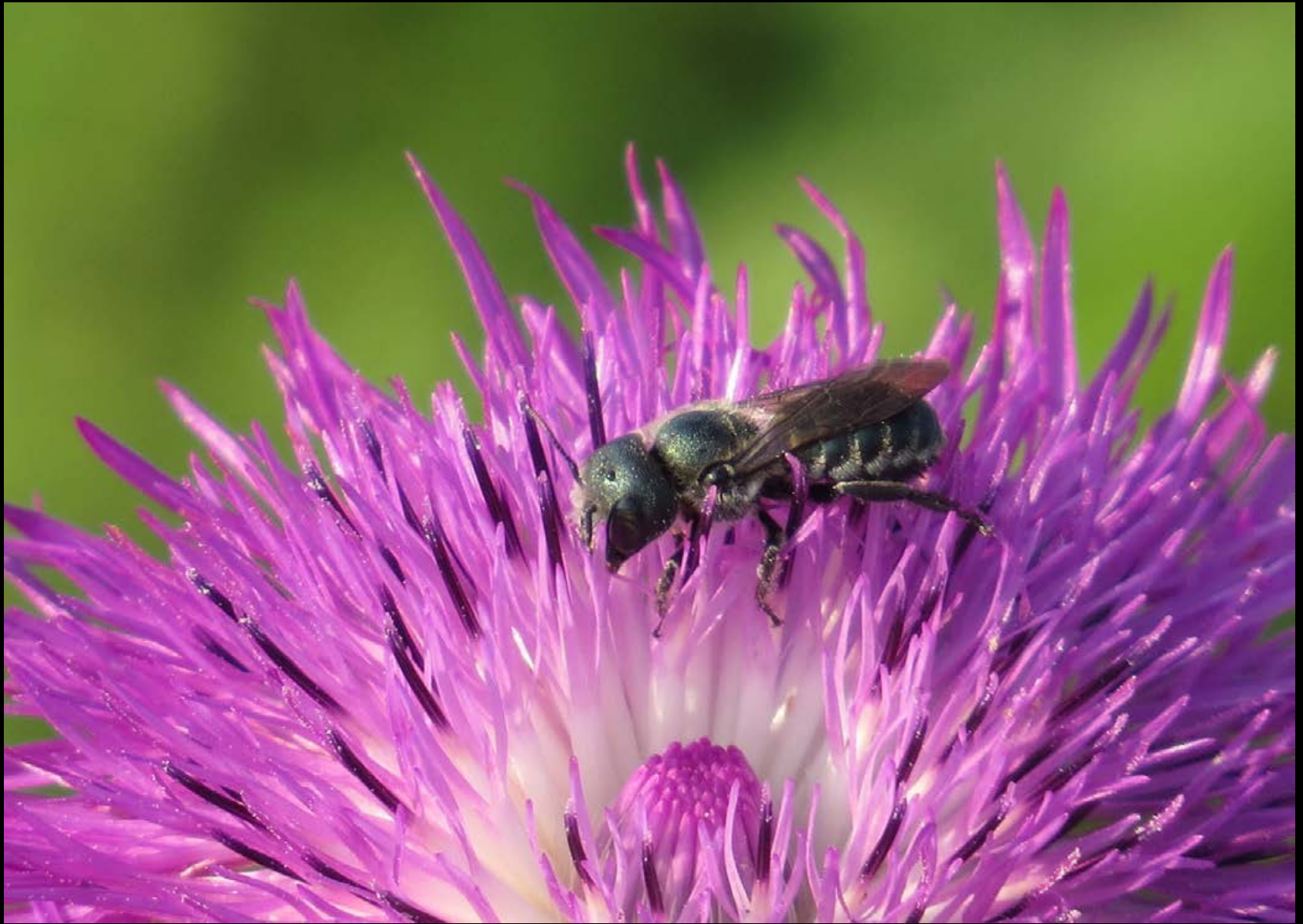
Purple Prairie Clover

Dalea purpurea -- P



Texas Lantana

Lantana urticoides -- P



Basketflower

Centaurea americana -- A



Tall Goldenrod

Solidago altissima -- P



Gray Goldenrod

Solidago nemoralis -- P



Foxglove

Penstemon cobeus -- P



Hill Country Penstemon

Penstemon triflorus -- P



P. baccharifolius – P



P. havardii – P / E



***Frostweed

Verbesina virginica -- P





Zexmenia

Zexmenia hispida -- P



Buffalobur Nightshade

Solanum rostratum -- A



Gayfeather

Liatris mucronata -- P



The Aster family, Asteracea, is probably the most diverse of all the angiosperms. There are many species in TX, get as many as you can find, great fall nectar source.





White Compassplant

Silphium albiflorum – P E



Rough-Stem Rosinweed

Silphium radula -- P



Wild Bergamont

Monarda fistulosa -- P



Lemon Mint

Monarda citriodora -- A





Sensitive Briar

Mimosa spp. -- P



Yellow Puff

Neptunia lutea -- P



Frogfruit

Phyla nodiflora -- P



Prickly pear *Opuntia* spp. -- P (Cacti In-General)











Trompetilla

Bouvardia ternifolia – S



Silver dalea

Dalea bicolor -- S



Black dalea

Dalea frutescens -- S



Texas Mock Orange

Philadelphus texensis – S E



White Honeysuckle

Lonicera albiflora -- S



Agarito

Berberis trifoliata -- S



Texas Barberry

Berberis swaseyi – S E



Cenzino

Leucophyllum spp. -- S



Autumn sage

Salvia greggii -- S



Evergreen Sumac

Rhus virens -- S



Pink Hummingbird bush *Anisacanthus puberulus* --

S



Flame Acanthus

Anisacanthus quadrifidus var. *wrightii* -- S



Bee Brush

Aloysia gratissima – S



Texas Redbud

Cercis canadensis var *texensis* -- T



Desert willow

Chilopsis linearis -- T



Fragrant ash

Fraxinus cuspidata -- T



Mountain Laurel

Sophora secundiflora -- T



Goldenball Leadtree

Leucaena retusa -- T

It's all up to us, each of us can have an impact and we CAN turn this thing around. Every native plant installed or native seed planted makes a difference. What legacy will we leave our children and the generations yet unborn? We decide their fate with our decisions and actions.....

Go Organic and Native, they are the dynamic duo but YOU are the implementer..... MAKE IT HAPPEN!!!

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