TECHNICAL NOTES

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE
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PLANT MATERIALS TECHNICAL NOTE NO. 71 (Final Revision)

Pollinator Plant Recommendations for New Mexico

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In recent years, the phenomenon known as Colony Collapse Disorder and the resultant declines in domesticated honey bee populations (both in the U.S. and elsewhere) have prompted increasing concern over the long-term sustainability of crop pollination services. In many cases, however, it has been shown that native (wild) bee species can provide pollination services equal, or superior to, those of hive bees (Garibaldi et al., 2013), provided that their habitat requirements (such as nesting sites and alternative forage sources) are met. Consequently, there has been considerable interest in creating habitat that will help conserve both native wild bees and domesticated honeybees. Until recently, however, there have been no state-specific guidelines for those wishing to install pollinator plantings appropriate to New Mexico conditions. To address this need, staff from the Los Lunas Plant Materials Center and the NMSU Agricultural Science Center at Los Lunas conducted field trials from 2010-2015 to develop the current recommendations for plants that will sustain bees (and other beneficial insects) throughout the growing season. During the project, a total of 380 plant species were tested, including 260 herbaceous perennials (215 native and 45 introduced), 85 annuals and biennials (60 natives and 25 introduced), and 35 native shrubs. Additional details of the pollinator project, including the trial sites, are given in Dreesen and Grasswitz (2013).

For producers, funding for on-farm pollinator plantings and related conservation practices (such as installing hedgerows and herbaceous wind barriers) is available under the cost-share programs administered by the NRCS (e.g., the EQIP program for both organic and conventional producers). Examples of such conservation practices can be found in National Plant Data Center Technical Note No. 78 (*Using Farm Bill Programs for Pollinator Conservation*) (Vaughn and Skinner 2008); this document was based on the 2008 Farm Bill programs, but the 2014 Farm Bill retains many of these programs and practices.

In most of the arid and semi-arid Southwest, establishing plantings of native species on non-irrigated sites by broadcasting or drilling seeds is fraught with difficulty due to the low likelihood of appropriate precipitation patterns. The high likelihood of seeding failures precludes recommending this practice under non-irrigated conditions because of the high cost of both native wildflower seed and seeding operations.

Sites with reliable irrigation supplies offer a much better opportunity for establishing pollinator plantings by seeding. However, there are still significant obstacles that can substantially impede the establishment of pollinator habitat under irrigated conditions. Some of these difficulties include the following:

1. Competition from weeds common in agricultural settings which can significantly reduce the chances of obtaining a good stand of pollinator plants from seeding.
2. Weather conditions during the spring in the Southwest can pose many impediments to direct seeding and include hot, dry, windy conditions which can rapidly desiccate the soil surface, windblown sand that can abrade newly germinating seedlings or bury the seeds, and wind erosion that can expose newly planted seeds. Extreme temperature fluctuations and late frosts can also reduce establishment. These difficulties suggest that seeding after the spring winds have subsided might increase establishment probabilities despite the higher temperatures that

would generally be encountered. However, seeding in late June or later will restrict blooming to the late summer and fall during the first growing season.

3. Irrigation by flooding or overhead sprinklers can displace surface-applied or slightly buried seed from the seedbed.
4. Soil properties including texture, low organic matter, and sodium content can enhance the chances of soil crusts forming, which in turn can restrict the emergence of smaller or less vigorous seedlings.

For these reasons, we do not currently recommend direct seeding of pollinator plants, even on irrigated ground. Until a more successful methodology is developed for direct seeding, our recommendation is to try to establish pollinator habitat from transplanted seedlings on irrigated sites. Even relatively small sites established in this way can benefit a wide variety of native bees (as well as domesticated honeybees and other beneficial insects), provided that the plantings are sufficiently diverse (i.e., they include a range of species with different bloom periods and floral structures so as to benefit the maximum number of insect species for as long a part of the growing season as possible). In this regard, it is particularly important to try to include plants that bloom in early spring and fall, when forage for floral visitors may be scarce.

The following tables summarize the recommended annual, herbaceous perennial, and shrub species which attracted appreciable pollinator activity at the Los Lunas Plant Materials Center (LLPMC) or in at least one of the other three experimental sites established during the project. In each table, the order of species is based on the estimated start of the bloom period. The tables include the species name and common name (as reported in the USDA PLANTS Database), an estimate of commercial availability, approximate season of bloom, ease of greenhouse seedling propagation, information on seed propagation protocols, propensity to self-seed on irrigated sites, notes regarding nearest native state, invasive nature, and suitability for non-irrigated situations.

Recommended Native Annuals											
			Bloom Season				Propagation Protocol[1]				
Genus Species	**Common Name**	**Commercially Available Seed**	**Spring**	**Summer**	**Fall**	**Greenhouse propagation**	**Cover or Light**	**Cold or Warm**	**Weeks of Cold**	**Self-Seeds**	**Notes[2]**
Lesquerella gordonii	Gordon's bladderpod	Yes				Fairly easy	Light	Cold	2-4	Very readily	(NM), Dry, host of beet leafhopper[3]
Dimorphocarpa wislizeni	touristplant (spectacle pod)	Occasionally				Difficult	Cover	Cold	3	Very readily	(NM), Dry, host of beet leafhopper[3]
Gaillardia pulchella	firewheel (wild annual)	Occasionally				Very easy	Cover	Warm [6–10]		Very readily	(NM), Dry
Phacelia integrifolia	gypsum phacelia	Occasionally				Difficult	Cover	Cold	5	Very readily	(NM), Dry
Gilia capitata	bluehead gilia	Yes				Easy	Cover	Warm [8]		Readily	(NM)
Nama hispidum	bristly nama	Not Currently				Easy	Light	Warm [3]		Readily	(NM), Dry
Machaeranthera tanacetifolia	tanseyleaf tansyaster	Yes				Easy	Light	Warm [7]		Very readily	(NM), Dry
Baileya multiradiata	desert marigold	Yes				Fairly easy	Cover	Warm [6-10]		Readily	(NM), Dry
Gaillardia pulchella	firewheel (domesticated)	Yes				Very easy	Cover	Warm [6-8]		Very readily	(NM)
Thelesperma filifolium	Stiff greenthread	Yes				Easy	Light (Cover)	Cold	3-5	Very readily	(NM), Dry
Cleome serrulata	Rocky Mountain beeplant	Yes				Fairly easy	Cover	Cold	4-5	Very readily	(NM), host of harlequin bug
Helianthus petiolaris	prairie sunflower	Occasionally				Easy	Cover	Cold	3-4	Very readily	(NM), Weedy?
Monarda citriodora	lemon beebalm	Yes				Easy	Cover	Cold (Warm [10])	4-6	Very readily	(NM)
Verbesina encelioides	golden crownbeard	Yes				Easy	Light	Warm [19]		Very readily	(NM)

1. **Propagation Protocol**: Cover or Light – seed covered with media or sown on surface of coarse media; Cold or Warm – imbibed seed in moist media either put into cold stratification or directly into warm greenhouse at 70° F day temperatures [days to emergence in greenhouse]; Weeks of Cold – approximate cold stratification period in weeks at 35° to 40° F; (alternative successful protocol in parentheses)
2. **Notes**: (native state – NM or closest state), Weedy=probably invasive, Dry = probably suitable for dry-land situations, "?" = possibly instead of probably
3. (Cook 1967)

Recommended Native Perennials											
			Bloom Season				Propagation Protocol[1]				
Genus Species	**Common Name**	**Commercially Available Seed**	**Spring**	**Summer**	**Fall**	**Greenhouse propagation**	**Cover or Light**	**Cold or Warm**	**Weeks of Cold**	**Self-Seeds**	**Notes[2]**
Physaria newberryi	Newberry's twinpod	Occasionally				Fairly easy	Light	Cold	3		(NM), Dry
Erigeron pulcherrimus	basin fleabane	Yes				Fairly easy	Light	Cold	4		(NM)
Penstemon eatonii	firecracker penstemon	Yes				Difficult	Light (rub)	Cold	4-6		(NM)
Zizia aptera	meadow zizia	Yes				Fairly easy	Cover	Cold	8		(CO)
Hedysarum boreale	Utah sweetvetch	Yes				Fairly easy	Cover (scar.)	Warm [3]			(NM)
Angelica atropurpurea	purplestem angelica	Yesl				Fairly easy	Light	Cold	6		(IA)
Achillea millefolium	common yarrow	Yes				Very easy	Light	Warm [5-10]		Rarely	(NM), variety *occidentalis* native
Gaillardia aristata	common gaillardia	Yes				Very easy	Cover	Warm [6-10]		Readily	(NM)
Gaillardia pinnatifida	red dome blanketflower	Yes				Very easy	Cover	Warm [7-10]		Very readily	(NM)
Heliomeris multiflora var. multiflora	showy goldeneye	Yes				Fairly easy	Light (Cover)	Cold (Warm [11])	2	Readily	(NM), Dry?
Dalea candida	white prairie clover	Yes				Easy	Cover (scar.)	Warm [5-6]		Rarely	(NM)
Dalea purpurea	purple prairie clover	Yes				Easy	Cover (scar.)	Warm [6]		Rarely	(NM)
Thelesperma subnudum	Navajo tea	Yes				Fairly easy	Light	Cold	5		(NM), Dry
Psilostrophe cooperi	whitestem paperflower	Yes				Fairly easy	Light	Cold (Warm[11])	3		(NM), Dry

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Recommended Native Perennials											
			Bloom Season				Propagation Protocol[1]				
Genus Species	**Common Name**	**Commercially Available Seed**	**Spring**	**Summer**	**Fall**	**Greenhouse propagation**	**Cover or Light**	**Cold or Warm**	**Weeks of Cold**	**Self-Seeds**	**Notes[2]**
Symphyotrichum laeve var. geyeri	Geyer's aster	Yes				Fairly easy	Light	Warm [10-12]			(NM)
Sphaeralcea ambigua	desert globemallow	Yes				Difficult	Light (scar.)	Cold	3-6	Rarely	(AZ), Dry
Machaeranthera pinnatifida	lacy tansyaster	Occasionally				Fairly easy	Light	Warm		Rarely	(NM), Dry
Senecio flaccidus	threadleaf ragwort	Yes				Easy	Light	Cold	2	Rarely	(NM), Dry?
Coreopsis lanceolata	lanceleaf tickseed	Yes				Easy	Cover	Warm 8-15]		Readily	(NM)
Melampodium leucanthum	plains blackfoot	Yes				Fairly easy	Cover	Warm [8-12]			(NM), Dry
Monarda fistulosa	wild bergamot	Yes				Fairly easy	Cover	Cold	4	Rarely	(NM),
Penstemon strictus	Rocky Mountain penstemon	Yes				Difficult	Light (rub)	Cold	6		(NM)
Scrophularia lanceolata	lanceleaf figwort	Occasionally				Difficult	Light	Cold	8		(NM)
Agastache pallidiflora ssp. neomexicana	Bill Williams Mountain giant hyssop	Occasionally				Fairly easy	Light	Warm [10-12]			(NM)
Heterotheca camporum	lemonyellow false goldenaster	Yes				Fairly easy	Cover	Cold	3		(MO)
Silphium integrifolium	wholeleaf rosinweed	Yes				Fairly easy	Cover	Cold	8		(NM)
Silphium laciniatum	compassplant	Yes				Fairly easy	Cover	Cover	8		(NM)
Argemone pleiacantha	southwestern pricklypoppy	Occasionally				Fairly easy	Cover	Cold	5-8	Readily	(NM)
Eupatorium altissimum	tall thoroughwort	Yes				Fairly easy	Light	Cold	4		(TX)
Verbena macdougalii	MacDougal verbena	Yes				Easy	Cover (Light)	Cold	4-8		(NM)

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Recommended Native Perennials											
			Bloom Season				Propagation Protocol[1]				
Genus Species	**Common Name**	**Commercially Available Seed**	**Spring**	**Summer**	**Fall**	**Greenhouse propagation**	**Cover or Light**	**Cold or Warm**	**Weeks of Cold**	**Self-Seeds**	**Notes[2]**
Verbena stricta	hoary verbena	Yes				Easy	Light (Cover)	Cold	5-8		(NM), Weedy?
Agastache rupestris	threadleaf giant hyssop	Yes				Fairly Easy	Light	Warm	12		(NM)
Oligoneuron rigidum	stiff goldenrod	Yes				Fairly easy	Cover	Cold (Warm [6])	8		(NM)
Symphyotrichum ericoides	white heath aster	Yes				Fairly easy	Light	Warm [12]			(NM)
Scrophularia californica	California figwort	Yes				Difficult	Light	Cold	4		(CA)
Ratibida columnifera	upright prairie coneflower (yellow)	Yes				Easy	Cover	Warm [6-10]		Rarely	(NM), Dry?
Ratibida columnifera	Mexican hat (brown)	Yes				Easy	Cover	Warm [6-10]		Readily	(NM), Dry?
Sphaeralcea laxa	caliche globemallow	Occasionally				Difficult	Light (scar.)	Cold	3-6	Rarely	(NM), Dry
Thymophylla pentachaeta	fiveneedle pricklyleaf	Occasionally				Fairly easy	Light	Warm	6-12		(NM), Hardy?
Helianthus maximiliani	Maximilian sunflower	Yes				Easy	Cover	Warm [7]		Very readily	(NM), Large!
Solidago petiolaris	downy ragged goldenrod	Yes				Fairly easy	Cover	Warm [7]			(NM)
Eupatorium perfoliatum	common boneset	Yes				Fairly easy	Light	Cold	4		(TX)
Pycnanthemum verticillatum var. pilosum	whorled mountainmint	Yes				Fairly easy	Light	Warm [13]			(OK)

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			Bloom Season				Propagation Protocol[1]				
Genus Species	**Common Name**	**Commercially Available Seed**	**Spring**	**Summer**	**Fall**	**Greenhouse propagation**	**Cover or Light**	**Cold or Warm**	**Weeks of Cold**	**Self-Seeds**	**Notes[2]**
Solidago nemoralis	gray goldenrod	Yes				Fairly easy	Light	Cold (Warm [8])	4		(NM)
Solidago speciosa	showy goldenrod	Yes				Fairly easy	Light	Cold (Warm [21])	7-8		(NM)
Helenium autumnale	common sneezeweed	Yes				Easy	Cover	Warm [6]			(NM), Weedy?
Symphyotrichum oblongifolium	aromatic aster	Yes				Fairly easy	Light	Warm	7-12		(NM)

Recommended Native Shrubs and Trees										
			Bloom Season				Propagation Protocol[1]			
Genus Species	**Common Name**	**Commercially Available Seed**	**Spring**	**Summer**	**Fall**	**Greenhouse propagation**	**Seed**	**Cold or Warm**	**Weeks of Cold**	**Notes[2]**
Salix irrorata	dewystem willow	Not Currently				Fairly easy	Light, Fresh seed required	Warm		(NM)
Salix lasiolepis	arroyo willow	Not Currently				Fairly easy	Light, Fresh seed required	Warm		(NM)
Forestiera pubescens var. pubescens	stretchberry (New Mexico olive)	Yes				Fairly easy	Cover	Cold	6-8	(NM), Dry?
Prunus americana	American plum	Yes				Difficult	Cover, Fruit Trt.[3]	Cold	8-12	(NM)
Prunus pumila L. var. *besseyi*	western sandcherry	Yes				Difficult	Cover, Fruit Trt.[3]	Cold	8-12	(NM)

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3. Remove pulp from fruit then keep seed moist and warm until cold scarification is initiated

Recommended Native Shrubs and Trees										
			Bloom Season				Propagation Protocol[1]			
Genus Species	Common Name	Commercially Available Seed	Spring	Summer	Fall	Greenhouse propagation	Seed	Cold or Warm	Weeks of Cold	Notes[2]
Rhus trilobata	skunkbush sumac	Yes				Difficult	Cover, Seed Trt.[4]	Cold	8	(NM), Dry?
Lycium torreyi	Torrey wolfberry	Not Currently				Fairly easy	Cover	Cold	4	(NM), Dry?
Ribes aureum	golden currant	Yes				Fairly easy	Cover	Cold	8	(NM)
Purshia stansburiana	Stansbury cliffrose	Yes				Difficult	Cover, Seed Trt.[5]	Cold	4	(NM), Dry
Amorpha canescens	leadplant	Yes				Fairly easy	Cover (scar.)	Warm		(NM), Dry?
Poliomintha incana	frosted mint	Occasionally				Difficult	Cover	Warm		(NM), Dry
Fallugia paradoxa	Apache plume	Yes				Fairly easy	Cover, Seed Trt.[5]	Warm		(NM), Dry
Chamaebatiaria millefolium	desert sweet	Yes				Fairly easy	Cover	Cold	2-4	(AZ), Dry?
Parthenium incanum	mariola	Not Currently				Fairly easy	Cover	Warm		(NM), Dry
Sapindus Saponaria var. drummondii	western soapberry	Not Currently				Difficult	Cover, Seed, Trt.[6]	Cold	12	(NM), Host of soapberry bug
Eriogonum corymbosum	crispleaf buckwheat	Occasionally				Difficult	Light	Warm		(NM), Dry
Ericameria nauseosa	rubber rabbitbrush	Yes				Easy	Cover	Warm		(NM), Dry, Weedy
Baccharis emoryi	Emory's baccharis (male)	Occasionally				Easy	Cover	Warm		(NM)
Dalea bicolor var. argyrea	silver prairie clover	Occasionally				Fairly easy	Cover (scar.)	Warm		(NM), Dry

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3. Remove pulp from fruit then keep seed moist and warm until cold scarification is initiated
4. Seed treated with concentrated sulfuric acid for 60 minutes, WARNING HAZARDOUS MATERIAL
5. Seed treated with 3% hydrogen peroxide for 10 minutes
6. Remove pulp, soak seed in water for 1 week, seed that swell do not require scarification, keep seed warm and moist until cold stratification in initiated

Introduced Annuals, Biennials, Perennials, and Shrubs (all commercially available as seed)											
			Bloom Season				Propagation Protocol[1]				
Genus Species	**Common Name**	**Annual or Perennial**	**Spring**	**Summer**	**Fall**	**Greenhouse propagation**	**Cover or Light**	**Cold or Warm**	**Weeks of Cold**	**Self-Seeds**	**Notes[2]**
Linum perenne	blue flax	Perennial				Easy	Cover	Warm [9]		Rarely	
Salvia officinalis	kitchen sage	Perennial				Easy	Cover	Warm [13]			
Nepeta racemosa	raceme catnip	Perennial				Fairly easy	Cover	Warm [7]			
Angelica atropurpurea	purplestem angelica	Perennial				Fairly easy	Light	Cold	6		
Levisticum officinale	garden lovage	Perennial				Easy	Cover	Warm [14]			
Melilotus officinalis	sweetclover	Biennial				Very easy	Cover (scar.)	Warm [7]		Readily	Weedy
Petroselinum crispum var. tuberosum	Hamburg turnip-rooted parsley	Biennial				Fairly easy	Light	Warm [13]		Rarely	
Ammi visnaga	toothpickweed	Biennial				Fairly easy	Light	Cold	4		
Daucus carota	Queen Anne's lace	Biennial				Easy	Light	Warm [6]		Readily	Weedy?
Origanum marjorana	sweet marjoram	Perennial				Easy	Cover	Warm [10]			
Origanum vulgare	oregano	Perennial				Easy	Cover	Warm [10]			
Lavandula angustifolia	English lavender	Shrub				Fairly easy	Cover	Warm [11}			
Anethum graveolens	dill	Annual				Easy	Cover	Warm [16]		Rarely	
Foeniculum vulgare var. azoricum	sweet fennel	Annual				Fairly easy	Cover	Warm		Rarely	
Scabiosa atropurpurea	mourningbride	Perennial				Fairly easy	Cover	Warm [16]			
Tithonia rotundifolia	clavel de muerto	Annual				Very easy	Cover	Warm		Rarely	

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References

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