

# Pollinator Friendly Plants

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**Karl Foord**

**Extension Educator & Professor, Horticulture**

**University of Minnesota Extension**



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# Pollinator plants

- **What makes a good pollinator plant?**
- **What makes a poor pollinator plant?**
- **What are the bees looking for and why?**



# Evolution

- Plants & bees evolved together
- They need each other
- Have developed intimate relations and synchronization
- Each of the species involved exerts selective pressure on the other
- Natural selection extreme floral diversity & specialization



# The deal – the plants view

- **Achieve cross fertilization – best genetic structure of populations**
- **Provide attractants smell sight**
- **Provide reward in form of sugar solution – nectar**
- **Produce more pollen than necessary to achieve goal**
- **Need to manage system reward system**



# Management nectar quantity balance

- **Critical factor - amount of nectar**
- **Reward pollinators without satiating them**
- **Too much nectar - pollinator has no need to forage further - pollen not transported**
- **Flowers of similar & different species are competing with one another for pollinators**
- **Those that provide the most nectar are likely to attract the most pollinators**



# Plant

- **Plants via regulation of nectar production**
- **Channels behavior of pollinators**
- **Maximizing fecundity with minimal energetic expenditure**



# **The deal – the insects view**

- **I can be your fertilization/ pollen vector under the following conditions:**
- **I can fly so I need energy – you provide energy in form of sugar - nectar**
- **I need protein for my young – you provide excess pollen so I can do so**
- **I need to be able to find you (the plant/flower)**
- **I need to be able to find the sugar – nectar**



# Management behavior

- I need to have certain behaviors i.e. constancy – I stick to working one species for a while to accomplish plants need taking pollen to flower of same species
- Bees show preference for high sugar nectars 30% to 50%
- In feeding trials, mostly wouldn't drink nectar in the 10% - 20% range
- 





# Pollinator health

- a diversity of nectar and pollen sources appear to be necessary for optimal health.
- In many parts of the country floral diversity is in profoundly short supply
- There are good pollinator plants but they do not function successfully in isolation



**NECTAR**



# Nectar as a reward

- **Quickly & easily produced as demand requires**
- **As a sugar solution:**
  - **Readily digested**
  - **Quickly assimilated as a source of energy**
- **May contain 5 to 75 % sugars**
- **Most nectars in 25 to 40% range**



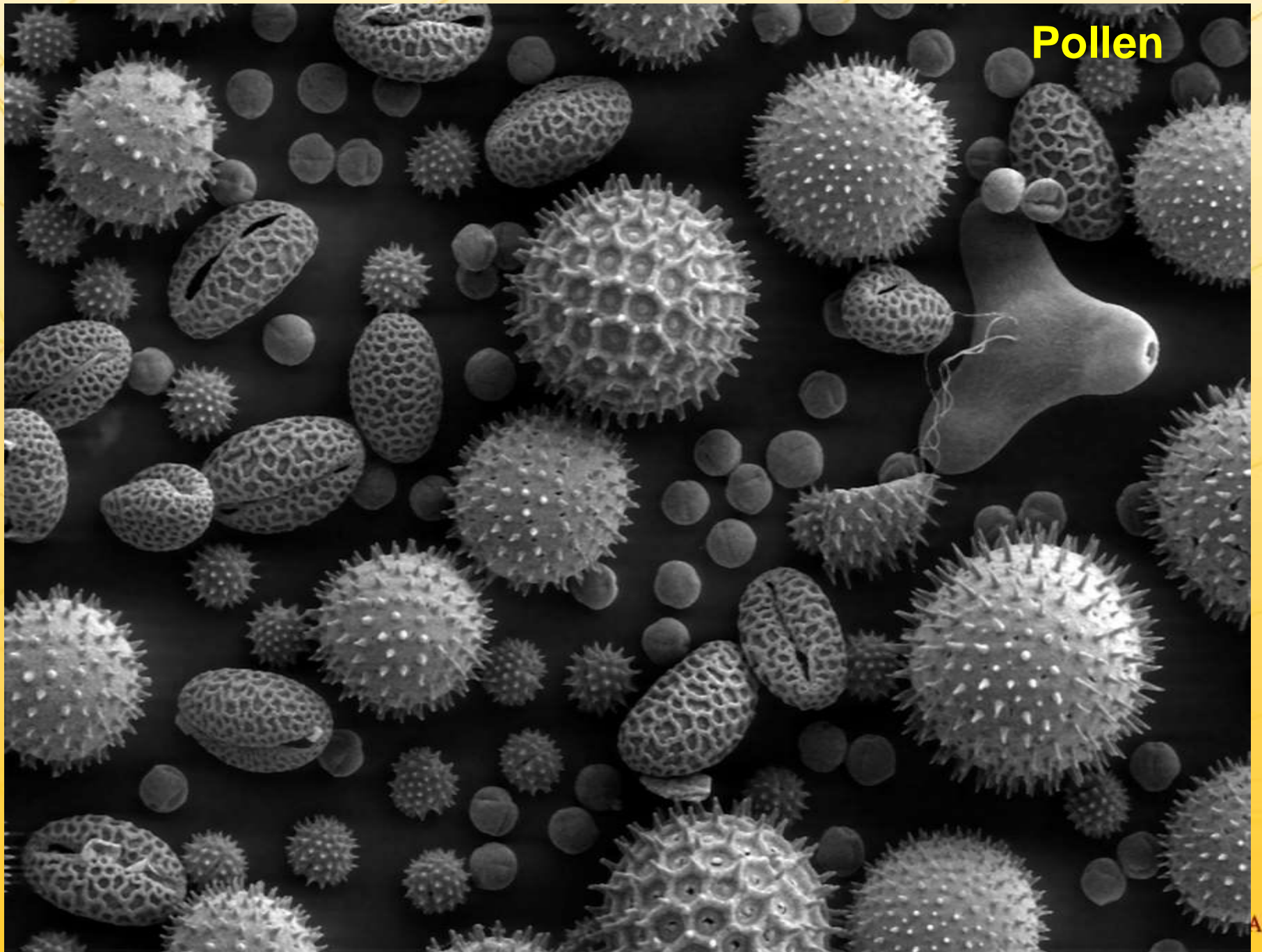


# Nectar production factors

- Environmental
  - Water status: drought, humidity, evaporation, rain
  - Temperature
  - Elevation, latitude
- Species differences i.e. genetics
- Replenishment rates differ



# Pollen





# Pollen – food value

- **Highly nutritious & well-balanced food**
- **Protein, starch, sugars, fat or oil, minerals, antioxidants, vitamins, free amino acids.**
- **Protein concentration varies extensively**
- **2.3% in cypress (*Cupressus arizonica*) and 61.7% in *Dodecatheon clevelandii***
- **Most contain all essential amino acids**
- **Crude N varies from 5% - 60%**



# Ultimate goal

- **To develop a season long pollinator plant strategy**
- **Overarching:**
- **A plant by itself is usually unattractive to pollinators**
- **Pollinators depend on flower volume and variety**
- **Different flowers for different bees**





**Dandelion (*Taraxacum officinale*)**





**Dandelion (*Taraxacum officinale*)**



**Dandelion (*Taraxacum officinale*)**



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# EARLY BLOOMING PLANTS

# Author

- **Karl Foord Ph.D. MBA**
- **Extension Educator & Professor,  
Horticulture**
- **[foord001@umn.edu](mailto:foord001@umn.edu)**
- **(651) 558-1218**





Bee Squad



Bee Lab

## PLANTS FOR MINNESOTA BEES

Bees rely on flowers to supply them with the food they need to survive. Some flowers (e.g. tomatoes) provide only pollen, the main source of protein for bees. Other flowers (e.g. clovers) provide both nectar and pollen, thus providing both protein and carbohydrates.

There are hundreds of different bee species in Minnesota. Different types of bees prefer different flowers. Some of these preferences are due to the physical size or shape of the bees and the flowers. Some flowers have long tubes with nectar at the bottom. Long-tongued bees are the only bees able to reach the nectar. Other preferences are based on nutritional needs. Some bees are only able to raise their young with pollen from particular plants. These bees are called "specialists". Other bees are "generalists" and will collect pollen from a wide range of plants.

There are also seasonal differences in the activity of different bee species. Many bee species forage as adults for only a few weeks out of the year, with different species emerging throughout the spring and summer, into early fall. The rest of the year, the young are developing in nests that are underground or in cavities. Each bee was provided with a pollen ball, a mixture of pollen and nectar, left there by their mother. They will emerge the following season. Many other bee species, including honey bees and bumble bees, are present through the entire spring, summer and early fall.

**Providing a diverse array of plants will help ensure that you support a diverse array of bee species. Do your best to provide blooming flowers from April to September.**

[www.beelab.umn.edu](http://www.beelab.umn.edu)



*Halictus confusus* on *Salvia nemorosa*  
Photo by Karl Fjeld



*Apis mellifera* on *Salvia nemorosa*  
Photo by Heather Olson



*Bombus morio* on *Monarda*  
Photo by Karl Fjeld



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This list is not inclusive of all plants that bees will visit in Minnesota. These are flowers that are particularly attractive to bees and can be easily integrated into most landscapes.

🌳 = Tree 🌸 = Herbaceous plant 🌿 = Shrub ☉ = Full sun ☺ = Part-shade ● = Shade

Early=March to May Mid=June to July Late=August to September

Scientific name	Common name	Habit	Sun	Native	Bloom time	Honey bees	Other bees
<i>Crataegus crus-galli</i>	Hawthorn	🌳	☉	X	Early	X	X
<i>Geranium maculatum</i>	Wild geranium	🌸	●	X	Early		X
<i>Penstemon grandiflorus</i>	Large beardtounge	🌸	☉	X	Early		X
<i>Salix discolor</i>	Pussy willow	🌿	☉☺	X	Early	X	X
<i>Coreopsis lanceolata</i>	Lanceleaf coreopsis	🌸	☉☺●	X	Early to Mid	X	X
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	🌸	☉☺●	X	Early to Mid	X	X
<i>Lupinus perennis</i>	Wild lupine	🌸	☉☺	X	Early to Mid		X
<i>Aranucus dioecus</i>	Goatsbeard	🌸	☉☺●	X	Mid	X	X
<i>Echinacea angustifolia</i>	Purple coneflower	🌸	☉	X	Mid	X	X
<i>Lobelia siphilitica</i>	Blue lobelia	🌸	☉☺	X	Mid		X
<i>Pycnanthemum tenuifolium</i>	Slender mountain mint	🌸	☉	X	Mid	X	X
<i>Agastache foeniculum</i>	Anise hyssop	🌸	☉☺	X	Mid to Late	X	X
<i>Asclepias incarnata</i>	Swamp milkweed	🌸	☉☺	X	Mid to Late	X	X
<i>Borago officinalis</i>	Borage	🌸	☉☺		Mid to Late	X	X
<i>Chamaecrista fasciculata</i>	Partridge pea	🌸	☉	X	Mid to Late	X	X
<i>Cirsium discolor</i>	Bicolor thistle	🌸	☉	X	Mid to Late	X	X
<i>Dalea purpurea</i>	Purple prairie clover	🌸	☉	X	Mid to Late	X	X
<i>Eupatorium maculatum</i>	Joe-pye weed	🌸	☉☺	X	Mid to Late	X	X
<i>Eupatorium perfoliatum</i>	Common boneset	🌸	☉☺	X	Mid to Late	X	X
<i>Helianthus spp.</i>	Sunflowers	🌸	☉☺●	X	Mid to Late	X	X
<i>Hylotelephium telephium</i>	Autumn joy sedum	🌸	☺●		Mid to Late	X	X
<i>Impatiens capensis</i>	Jewelweed	🌸	☉	X	Mid to Late	X	X
<i>Liatris aspera</i>	Rough blazingstar	🌸	☉☺	X	Mid to Late	X	X
<i>Monarda fistulosa</i>	Beebalm	🌸	☉	X	Mid to Late	X	X
<i>Nepeta x faassenii</i>	Catmint	🌸	☉☺		Mid to Late	X	X
<i>Origanum vulgare</i>	Oregano	🌸	☉☺		Mid to Late	X	X
<i>Ratibida pinnata</i>	Yellow coneflower	🌸	☉	X	Mid to Late		X
<i>Silphium perfoliatum</i>	Cup plant	🌸	☉	X	Mid to Late	X	X
<i>Trifolium hybridum</i>	Alsike clover	🌸	☉☺		Mid to Late	X	X
<i>Vernonia fasciculata</i>	Ironweed	🌸	☉	X	Mid to Late	X	X
<i>Veronicastrum virginicum</i>	Culver's root	🌸	☉☺	X	Mid to Late		X
<i>Solidago rigida</i>	Stiff goldenrod	🌸	☉☺	X	Late	X	X
<i>Symphotrichum lateriflorum</i>	Calico aster	🌸	☉	X	Late	X	X

Content and design by Elaine Evans, evan0155@umn.edu



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## Bee Friendly Plants

Plant	Flowering Time & Color						N - Nectar
	May	Jun	Jul	Aug	Sep	Oct	P - Pollen
Prunus spp. (Plums, cherries)	white						N & P
Malus spp. (cultivated and crabapples)	white						N & P
Rubus spp. (raspberry, blackberry)	white						N
Wild Mustard ( <i>Brassica arvensis</i> (L.))	yellow						N & P
Beardtongue ( <i>Penstemon grandiflorus</i> )	lavender						N & P
Chives ( <i>Allium schoenoprasum</i> )	pink						N & P
Swamp rose ( <i>Rosa palustris</i> )	pink						P
Golden Alexanders ( <i>Zizia aurea</i> )	yellow						N & P
Red Milkweed ( <i>Asclepias incarnata</i> )		red	pink				N & P
Culver's root ( <i>Veronicastrum virginicum</i> )		white					N
Leadplant ( <i>Amorpha canescens</i> )		purple					N & P
Blue False Indigo ( <i>Baptisia australis</i> )		blue					N & P
Smooth Penstemon ( <i>Penstemon digitalis</i> )		white					N & P
Rattlesnake Master ( <i>Eryngium yuccifolium</i> )		white					N & P
Blue Sage ( <i>Salvia azurea</i> )		blue					N
Purple Prairie Clover ( <i>Dalea purpurea</i> )			purple				N & P
Western Sunflower ( <i>Helianthus occidentalis</i> )			yellow				N & P
Catmint ( <i>Nepeta x faassenii</i> )			purple				N
Onion ( <i>Allium spp.</i> )			white	pink			N & P
Cup plant ( <i>Silphium perfoliatum</i> )			yellow				N & P
Borage ( <i>Borago officinalis</i> )			lavender				N & P
Great Blue Lobelia ( <i>Lobelia siphilitica</i> )			blue				N
Bergamot ( <i>Monarda fistulosa</i> )			lavender				N
Blue Vervain ( <i>Verbena hastata</i> )			blue				N
Fireweed ( <i>Epilobium angustifolium</i> )			pink				N
Lavender Hyssop ( <i>Agastache foeniculum</i> )			purple				N
Purple Coneflower ( <i>Echinacea purpurea</i> )			purple				N
Dotted Mint ( <i>Monarda punctata</i> )			lavender				N
Ironweed ( <i>Vernonia fasciculata</i> )			red				N
Downy Sunflower ( <i>Helianthus mollis</i> )				yellow			N & P
Obedient Plant ( <i>Physostegia virginiana</i> )				pink			N
Joe Pye Weed ( <i>Eupatorium maculatum</i> )				pink			N & P
Dense Blazingstar ( <i>Liatris spicata</i> )				purple/pink			N
Blanket Flower ( <i>Gaillardia x grandiflora</i> )				red	yellow		N & P
Stiff Goldenrod ( <i>Solidago rigida</i> )				yellow			N & P
Sedum x 'Autumn Joy' ( <i>Hylotelephium telephium</i> )				pink			N & P
Woodland Sunflower ( <i>Helianthus strumosus</i> )				yellow			N & P
New England Aster ( <i>Symphotrichum novae-angliae</i> )				purple			N & P

Karl Foord, Extension Educator and Professor - University of Minnesota



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