

POLLINATION ECOLOGY AND FLORAL FUNCTION OF BROWN'S PEONY (*PAEONIA BROWNII*) IN THE BLUE MOUNTAINS OF NORTHEASTERN OREGON

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Brown's peony (*Paeonia brownii*) is one of only two peony species that are native to the western hemisphere. The two species are found in western North America growing almost exclusively in the wild. The Brown's peony grows north of the California peony and at higher elevations. We wanted to find out more about the flowers and pollinators that visited the flowers of this wild cousin of the ornamental peony. At a location that encompassed a prairie habitat in the Blue Mountains of Northwestern Oregon, we examined the flower's pollen for sterility and for its interaction with the carpel (whether it was self-compatible with its own pollen or strictly a cross-pollinated flower). We investigated the flower's insect visitors and determined which visitors were potential pollinators. We also measured the nectar quantitatively and qualitatively.

The Brown's peony flowers in early spring when night time temperatures can be below freezing. When the globe-shaped buds begin to open, the peony secretes abundant nectar from a disc that encircles the carpel located inside the flower which is unusual for a species in this genus. Most peonies do not possess a floral nectary.

It also produces abundant pollen. We found that about 50% of the pollen grains we measured were sterile whether sampled from the anther, stigma or insect visitors. Whether because of the relatively high percentage of pollen sterility or some other reason yet to be determined, the insects we observed were foraging the flower only for the nectar. The flower may bloom up to two weeks and in that time the nectar is secreted from lobes of the disc and available.



A pendant flower of Brown's peony (Paeonia brownii) with a vespine wasp seeking nectar. Photograph Nan Vance

The primary insects that carried the pollen grains of the peony were large vespine wasp queens newly emergent from their hibernation. Important visitors were the large flower flies (Syrphidae) that in appearance are bumble bee mimics (*Criorhina caudata*) often carried >200 grains of pollen on their bodies. Small to medium size solitary bees also visited the flowers. They often carried the peony pollen with the pollen grains of other co-flowering species.

Our study of the pollen-carpel interaction revealed that the flower is self compatible; however, the stigma is receptive mostly before pollen from the anthers on the same flower is shed therefore making self-pollination an uncommon occurrence. The pollen amounts found on the stigmas of naturally insect-pollinated flowers varied

widely, successful fertilization may be limited by low pollination rates.

The usually 5 carpels develop into follicles that contain the developing seed. The seed production was about 20% but the round seeds are large and viable. On average there were about 4 viable seeds per follicle.

For this long-lived perennial herb, adapted to environments that vary widely in temperature and moisture, we speculate that the low production of seed may be sufficient for this

species' persistence. However, more studies are needed across the species' range to determine whether pollination success is dependent on the composition of its pollinators which may vary from location to location, or if its low fecundity is sufficient for population maintenance.