

Greetings Mr./Madam Chair, members of the Committee, I'm Kathrin Volochenko of the **Nonpartisan League**.

As the current owner of an interstate trucking company and a student of entomology in general, I have first-hand knowledge of some aspects of how the beekeeping industry operates. And as such I do not support **Senate Bill 2343** and ask that this committee recommends a "**Do Not Pass**" as well.

If this bill does pass both chambers and becomes law, it would be devastating and ruinous to the honey **and pollination** industry as a whole.

Below is an excerpt from "**Time is honey: circadian clocks of bees and flowers and how their interactions may influence ecological communities**" <https://pmc.ncbi.nlm.nih.gov/articles/PMC5647282/#RSTB20160256C47>

*"Although plants are sessile, plant organs demonstrate a surprising degree of movement. Circadian-regulated leaf movements were first reported by de Mairan in 1729 [46] and are still routinely used as markers for studying circadian rhythms in plants. In 1880, Darwin & Darwin published a book describing circumnutations, the elliptical bending movements executed by plant organs, including roots, hypocotyls, branches and flower stalks as they grow [47], proposing that these movements are controlled by an internal apparatus. Much more recently, heliotropism (solar tracking) in the shoot apices (tips) of young sunflowers (*Helianthus annuus*) has been shown to be controlled by the circadian system [48]. The apices shift from east-facing in the morning to west-facing in the evening and then back, and disruption of circadian control of heliotropism results in a loss of biomass. In older sunflowers, at anthesis (flower opening and anther dehiscence) the apices stop solar tracking and permanently face east. The authors of the study examined the implications of floral direction by comparing flowers set to face east or west and showed that east-facing flowers warm up more rapidly in the early morning and that this warming is associated with a fivefold increase in the number of pollinator visits. (emphasis mine)*

The flowers of many plants open and then stay open permanently. However, in a range of species belonging to a large number of families, flowers open and

close to match environmental conditions. **Pollination success may be strongly dependent on the timing of flower opening and closure [49], which determines the pollinator's ability to access the reward and the reproductive organs of the flower.** *(emphasis mine)* Although most research has focused on flower opening in diel conditions, circadian rhythms have also been demonstrated for several species [19] including day bloomers such as field marigold (*Calendula arvensis*), common daisy (*Bellis perennis*) and kalanchoe (*Kalanchoë blossfeldiana*), and night bloomers such as night-blooming jasmine [33,50–53]. In at least some plants, entrainment of flower opening is flower-autonomous [16,19,50,51]. For example, in field marigold the opening and closing follow the light/dark regime that each flower is subjected to, and leaf and buds on the same plant can be differentially entrained. Importantly, pollinators can have a role in setting the closure pattern of flowers; pollination of smooth hawkbeard (*Crepis capillaris*) causes rapid (within 1–2 h) flower closing; young flowers will reopen the following day [54].

Circadian petal movement can be a result of differential growth or, possibly less commonly [19], of cell expansion and contraction mediated by ion uptake. In kalanchoe [55], there is uptake of potassium ions during the day, which elevates cell osmolarity and increases turgor pressure resulting in cell expansion in the upper epidermis and petal opening. At night, ion levels decrease leading to low cell pressure and flower closure. By contrast, in marigolds circadian flower opening is caused by differential growth of petal parts [16,56]. Plant growth is controlled by hormones such as methyl jasmonate, ethylene, auxin and gibberellins and, in a number of different species, the circadian system has been shown to regulate hormone synthesis, signal reception and processing [57]. Not surprisingly, hormones can also play a role in circadian-controlled petal opening. For example, in kalanchoe, application of methyl jasmonate causes a shorter period of flower opening [58].”

The point that I’m making here is that at certain times of the blooming season and at different times during the day, blooms have adapted to the movement of the sun and to the preferences of different pollinators. An example would be if there is a canola field in full bloom next to a state of federal highway and a bee yard is ½ mile from that canola field and there are no other such fields within 2-3 miles of that bee yard (typically a bee will fly 2-3 miles to a pollen,

water or nectar source), the bees will cross that highway to access and pollinate that canola field at a certain time of the day. The same goes for Sunflowers, Alfalfa, Sweet Clover and any other crop that is totally dependent on pollinators such as the honey bee.

Now for the hired pollinator side of the apiary business; after the bloom and growing season is completed here in North Dakota, as with neighboring northern tier states, the bees are loaded onto semi flatbed and stepdeck trailers and are hauled to California to begin pollinating almonds and chestnuts. Usually this takes place in the end of October and first part of November when the bees are moved, though actual pollination takes place later in the spring. Then as needed by the farmers the bees are placed accordingly by the apiarist with the particular fruit or vegetable blooming season, usually ending with avocados in late April early May. The hives are moved by the apiarists to different parts of the Imperial and San Joaquin Valleys and the surrounding hills when the farmers are ready for **pollination services**.

As you can see, being in the apiary business is complicated and hard work. And I've hardly scratched the surface as to the true complexities of this business. It's obvious that we the human race, along with many species of animals are either directly or indirectly dependednt on the ability of pollinators such as the common honey bee to firstly pollinate, and secondly, produce honey in that order of importance.

My testimony in part, is derived from experience from transporting live colonies and working with different apiarists in the couse of conducting business. If some details are inaccurate, then that's on me, however the essence of the process, such as the reasons for hive movements are accurate.

I have no idea as to why such a bill as this would even be considered, if for the sake of minor inconvenience of bees hitting a windshield or perhaps in the fall when the hives are moved from their spots/yard and gathered elsewhere in preparation for transport for the winter, that are what I call "orphan bees" that

are looking for their home and end up in garages and around light colored buildings hoping to find their hive again. Bees on a windshield are a small price to pay when the benefit is food on the table.

Therefore it is imperative that all of us, everyone, must recognize our fellow apiarists and support them in every way, because quite literally our lives depend on them.

Thank you for your time and attention.