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Latest Results of Solar Terms Butterfly Survey Show Peak Butterfly Species Number and Population in 15 years

Ching Ming Festival, also the fifth solar terms “Bright and Clear” in traditional Chinese lunisolar calendar, is around the corner. **Green Power** has since 2005 launched the Solar Terms Butterfly Survey to study the relationship between butterfly species and the solar terms. Summarizing results in 2019 (surveys conducted from “Moderate Cold” in February 2019 through “Winter Solstice” in January 2020), the number of butterfly species and population both hit record high. In the meantime, 2019 was the warmest year on record in Hong Kong. This may reflect the fact that climate change is impacting local butterfly ecology.

The 2019 Solar Terms Butterfly Survey showed a record high butterfly species of 127 and individuals of over 7,800—both peak figures in the 15-year study. The number of individual butterflies was a sharp 50% increase as compared with previous average in the past. In addition, five species were first put on record, including Sullied Sailer (*Neptis soma*) and Tiny Grass Blue (*Zizula hylax*) (both graded as Very Rare species), Swallowtail (*Papilio xuthus*) and Banded Awl (*Hasora chromus*) (both Rare species), as well as Tailless Line Blue (*Prosotas dubiosa*), which was first recorded in Hong Kong a decade ago and has yet to be ranked by the Agriculture, Fisheries and Conservation Department.

The 15-year Solar Terms Butterfly Survey identifies three peak periods of butterfly diversity: “Vernal Equinox” (mid March), “Corn-on-Ear” (early June) and “Winter Commences” (early November). In 2019, another peak appeared in “Great Heat” (mid July) besides the three usual ones.

Matthew Sin, Senior Environment Affairs Manager of Green Power explained that temperature starts to get warm in “Vernal Equinox” (mid March) when butterflies in pupa stage undergo ecdysis after the winter, hence forming the first peak. In 2019, average temperature in February and March was 4.4 degrees Celsius higher than in the past, and butterfly number recorded was also increased by 3.8-fold. The more noticeable increase included families of Satyrinae, Danaidae, Lycaenidae, Papilionidae, Nymphalidae and Pieridae. The ecdysis may begin earlier in warmer weather, which also stimulates plant growth and

increases food source for butterflies. This resulted in the drastic rise in butterfly population in the Spring of 2019.

“Great Heat” in mid July is usually unfavourable for butterfly activity due to the hot weather. However, an abnormal peak was recorded in 2019 – butterfly number was doubled that of the past average. Sin pointed out that this might have to do with the weather as the average temperature was two degrees Celsius lower than average during “Great Heat”. On the other hand, Red-base Jezebel (*Delias pasithoe*) was the main species recorded. Considering the fact that there had been irregular booming of population of the species in the past, whether the peak record was associated with weather is hard to say.

Another peak appears in “Winter Commences” (early November), it was no exception in 2019. What is surprising is that there was an 80% increase from past record. Sin elaborated that if there was no tropical cyclone warning signal no. 8 or above in September or October, there would be more butterflies during Winter Commences. This was the case in 2019, when no typhoon came around the whole autumn. Butterfly survival was stabilized. Furthermore, rainfall in August of 2019 was higher than average, with food plants for larvae thriving, so was the population of butterflies in Winter Commences.

Sin pointed out that the Solar Terms Butterfly Survey had been carried out in Shing Mun Country Park and Tai Po Kau Nature Reserve over the years, both under proper environmental protection. Analysis from climate data showed that change in butterfly species and population might be related to climatic variation. Sin alerted about the potential impacts of global warming on local ecosystem.

“Our 2019 Butterfly Survey showed that change in climate had induced a sharp increase in butterfly population. In the long term, this may not be a good thing.” Sin remarked. Butterflies are poikilotherms and if weather turns warm with fewer cold days, the change in their activity period may not match flowering period of their food source and affect their survival and reproduction. At the same time, butterflies are important pollinators and food of other animals particularly birds. Any change in their activity will influence plants and animals that depend on them. Nonetheless, it takes time for any conclusion to be made on the impacts of climate change, Sin commented.