

Moth Phenology

The charts in this document form the basis of the Moth Phenology article by Phil Dean in the Devon Moth Group Annual Report 2019 which provides an interpretation of a selection of species showing particular phenological shifts.

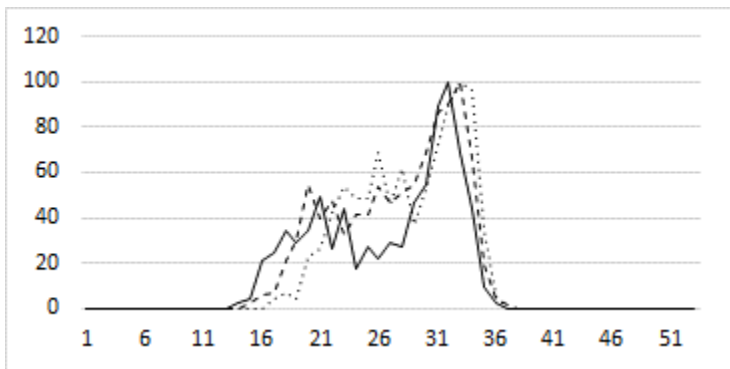
The data behind the charts are taken from the Devon Moth Group database which now exceeds 1 million records spanning over 100 years – although the majority of these are from the last 50 years. This huge amount of data enables examination of adult moth flight times to see changes in earliest, peak and latest flight dates ; changes in the relative sizes of generations for those species which are multivoltine ; and where a second generation has emerged (for example Light Emerald *Campaea margaritaria*).

The 134 species below were selected using a fairly simple process:

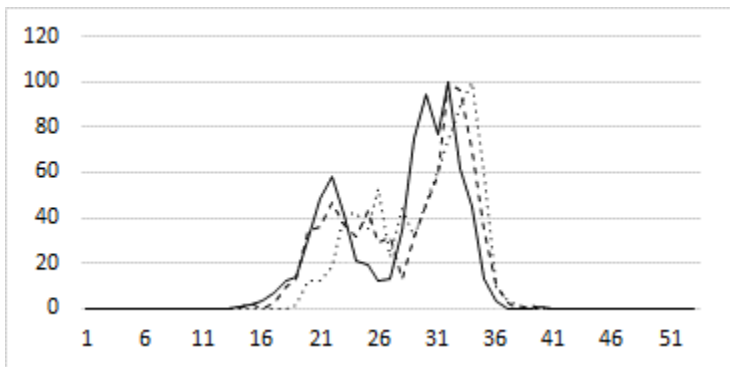
- Each species should have more than 2000 records. This both reduces the amount of analysis work but, rather more importantly, the greater the number of records the better the statistical accuracy of the results.
- Average flight patterns were calculated over three time periods covering the last 50 years – 1969 to 1985 ; 1986 to 2002 ; and 2003 to 2018.
- The numbers of records for each species in each week of the year during the three time periods were extracted from the database and represented graphically.
- The maximum value for each time period was normalised to 100. This removes the variability caused by the hugely increased number of annual records submitted to the data base. For example, this was 7643 in 1969 but 75147 in 2018. It thus becomes easier to relate flight times from one period to another.

In the charts the y-axis shows the number of records per week where the maximum value is normalised to 100. The x-axis is the week number. The three time periods are shown dotted (···) for time period 1969 to 1985 ; dashed (- - -) for years 1986 to 2002 ; and a solid line (—) for 2003 to 2018.

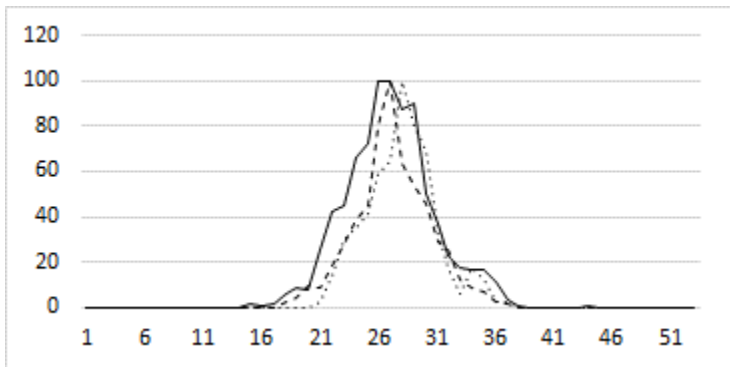
65.001 *Falcaria lacertinaria* Scalloped Hook-tip



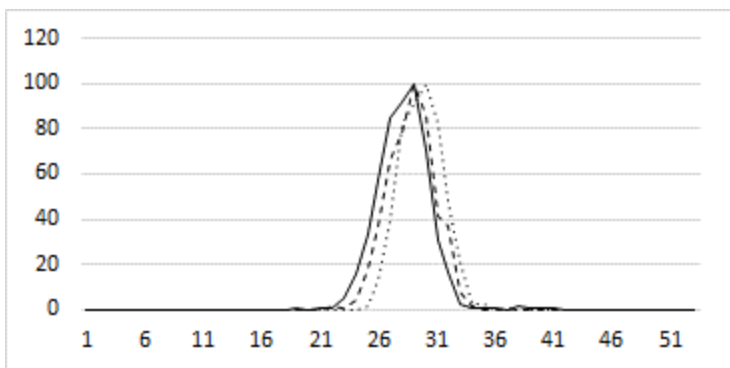
65.005 *Drepana falcataria* Pebble Hook-tip



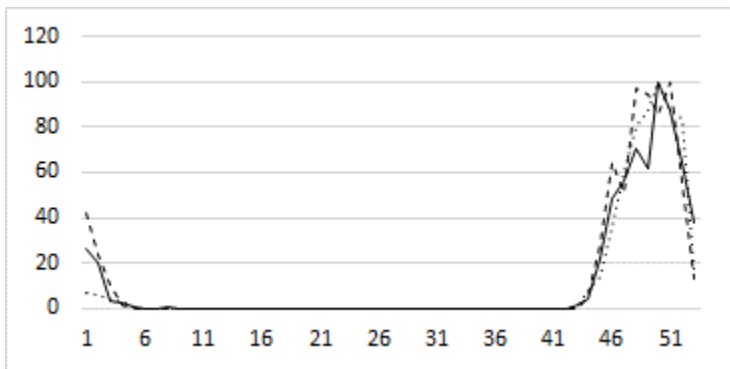
65.008 *Thyatira batis* Peach Blossom



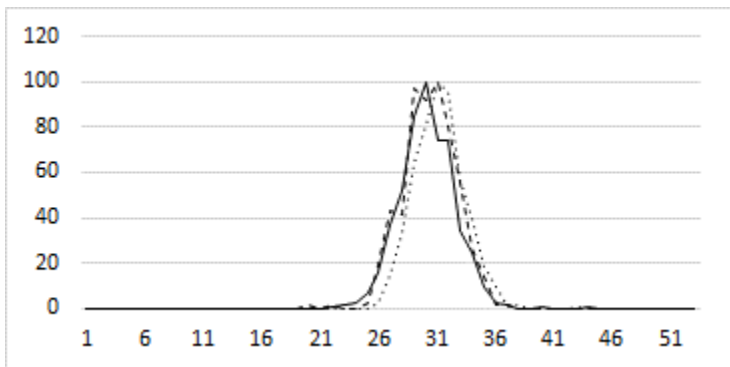
65.009 *Habrosyne pyritoides* Buff Arches



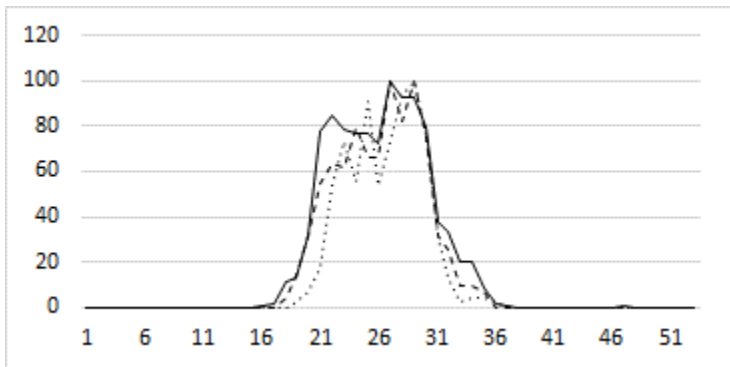
66.001 *Poecilocampa populi* December Moth



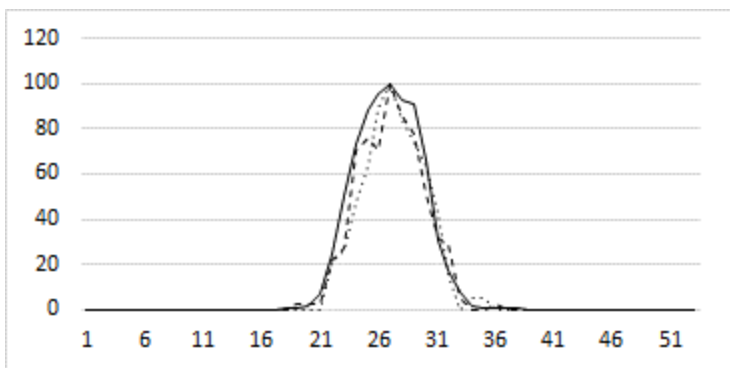
66.01 *Euthrix potatoria* Drinker



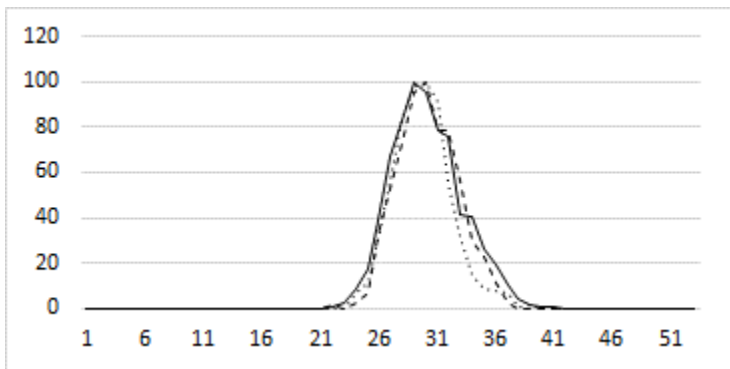
69.003 *Laothoe populi* Poplar Hawk-moth



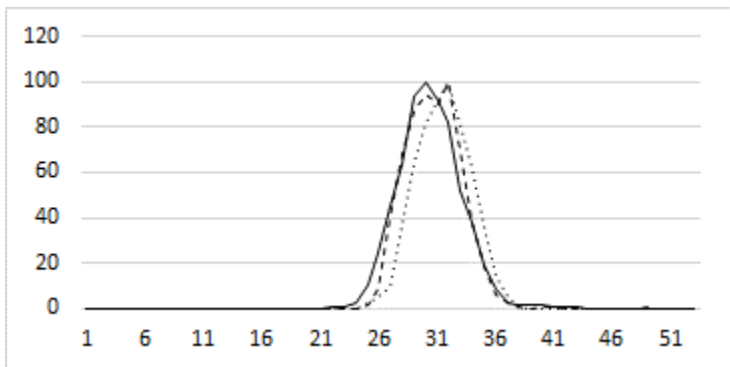
69.016 *Deilephila elpenor* Elephant Hawk-moth



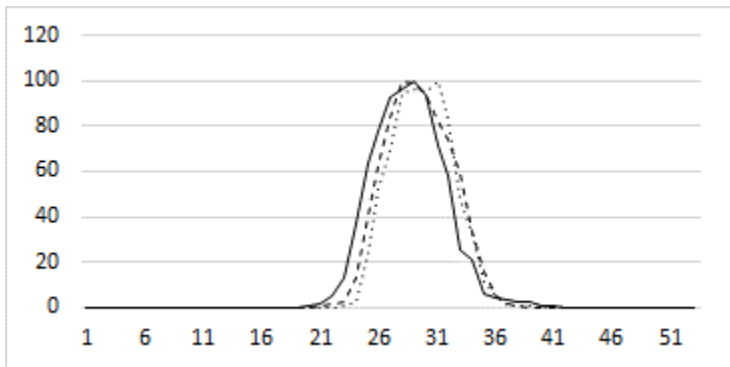
70.011 *Idea dimidiata* Single-dotted Wave



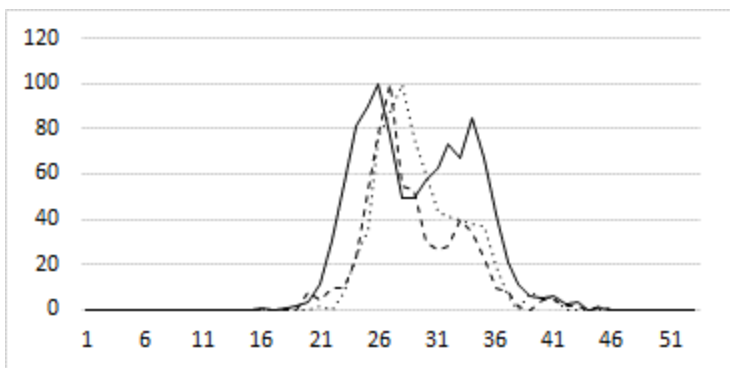
70.013 *Idea biselata* Small Fan-footed Wave



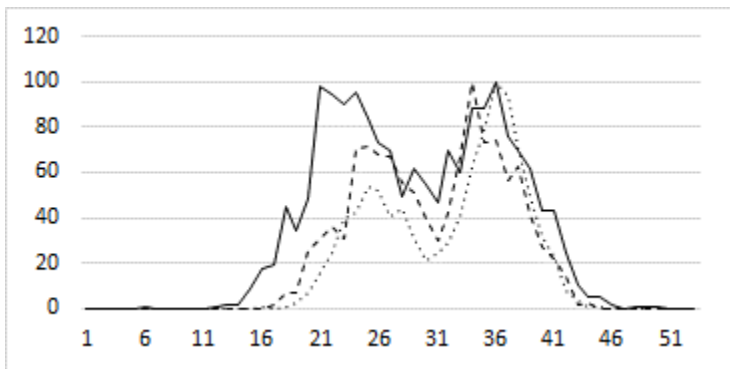
70.016 *Idea aversata* Riband Wave



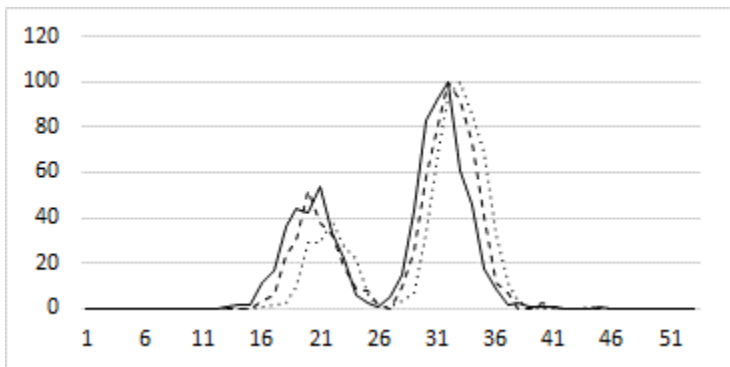
70.029 *Timandra comae* Blood-Vein



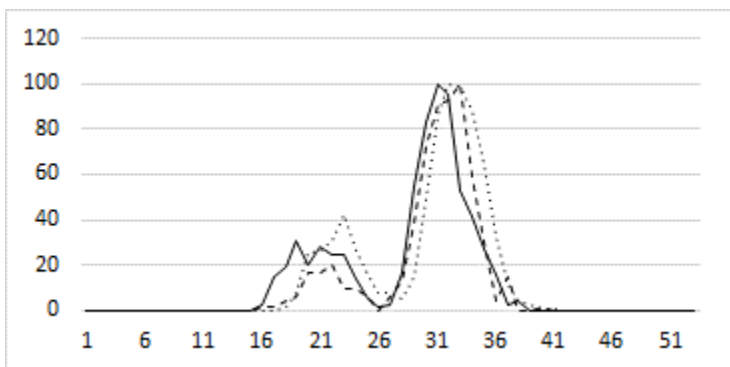
70.049 *Xanthorhoe fluctuata* Garden Carpet



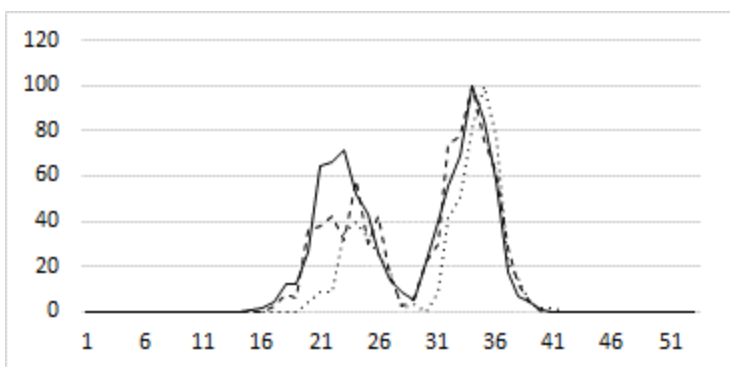
70.051 *Xanthorhoe spadicearia* Red Twin-spot Carpet



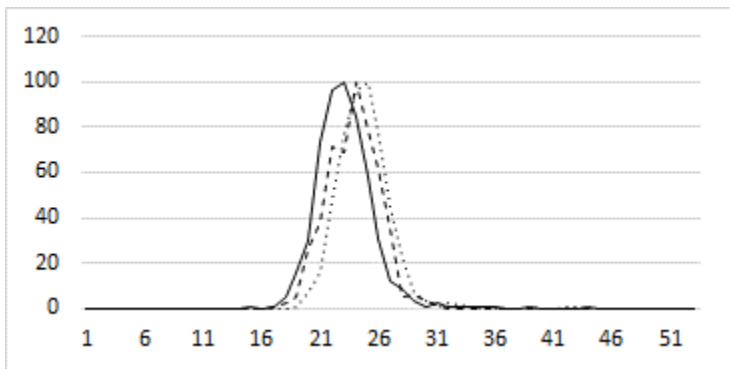
70.052 *Xanthorhoe ferrugata* Dark-barred Twin-spot Carpet



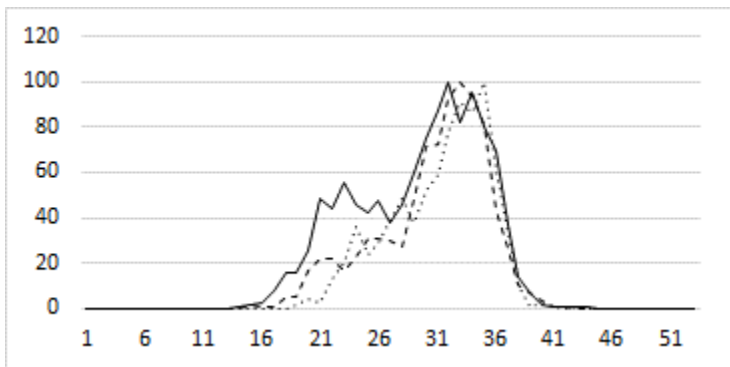
70.053 *Xanthorhoe designata* Flame Carpet



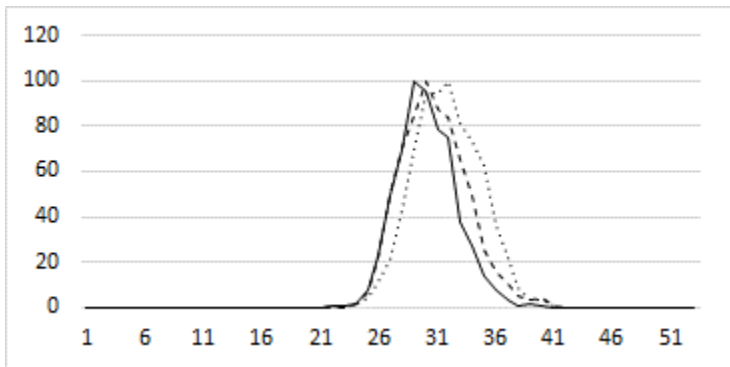
70.054 *Xanthorhoe montanata* Silver-ground Carpet



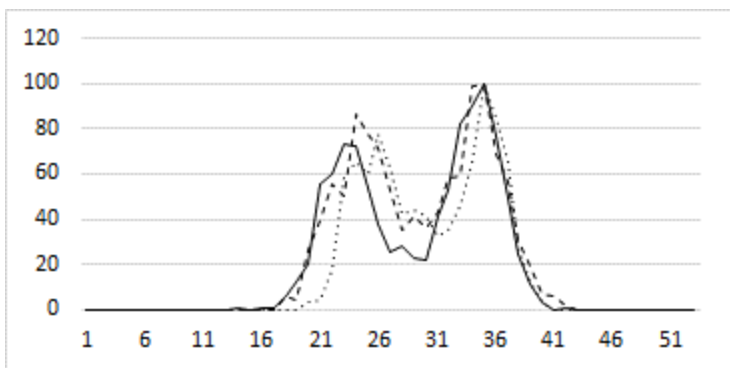
70.061 *Epirrhoe alternata* Common Carpet



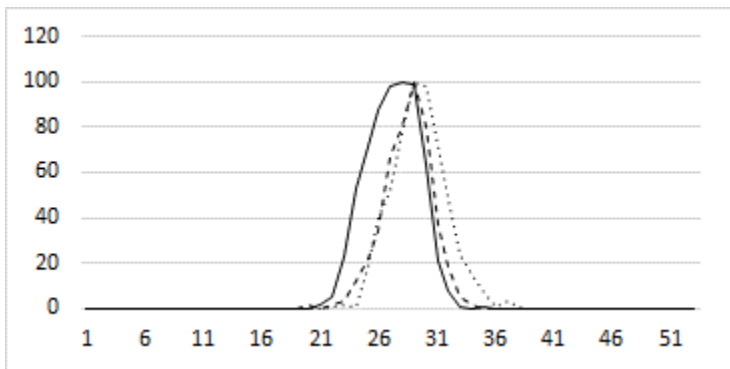
70.074 *Hydriomena furcata* July Highflier



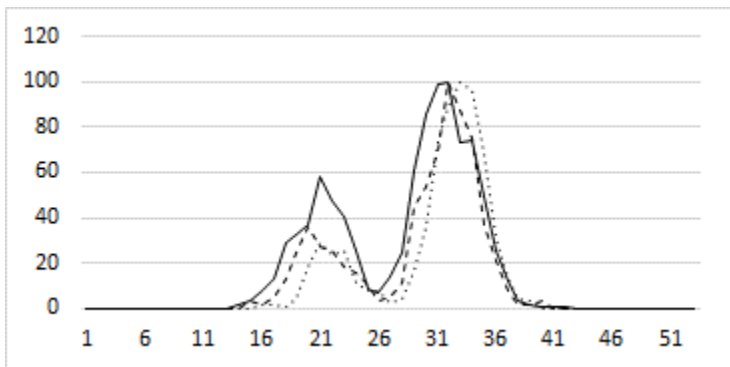
70.087 *Cosmorhoe ocellata* Purple Bar



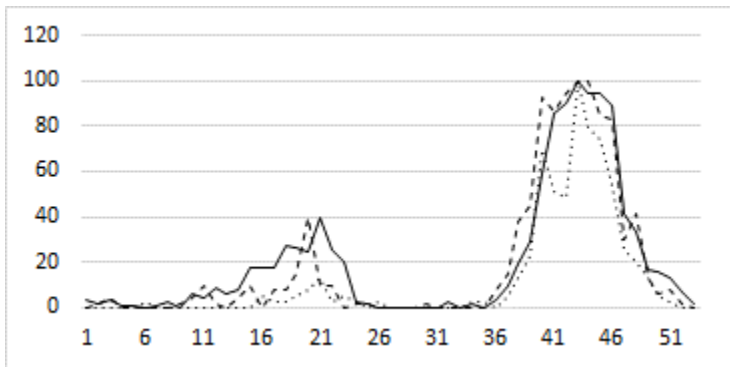
70.093 *Gandaritis pyraliata* Barred Straw



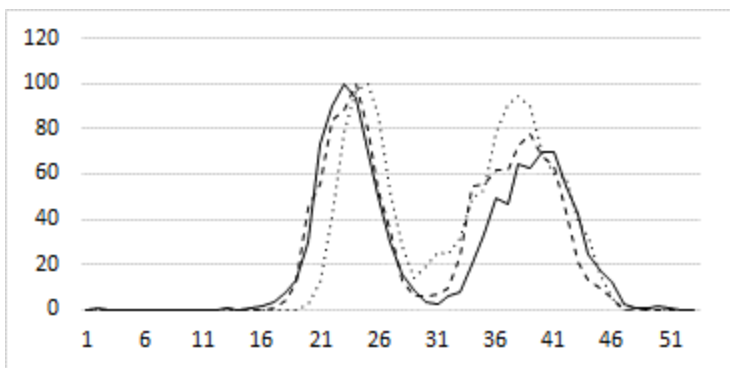
70.094 *Ecliptopera silaceata* Small Phoenix



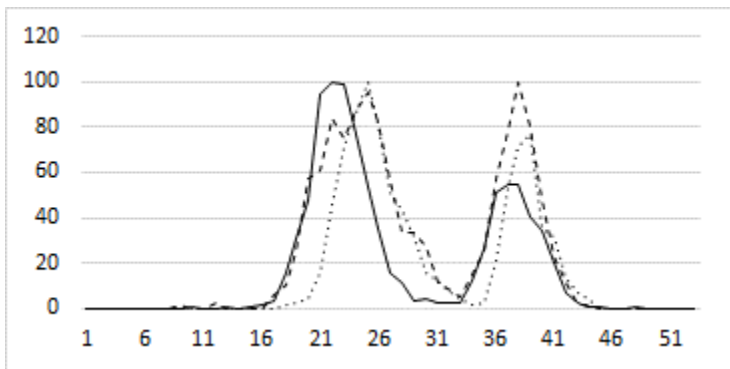
70.095 *Chloroclysta siterata* Red-Green Carpet



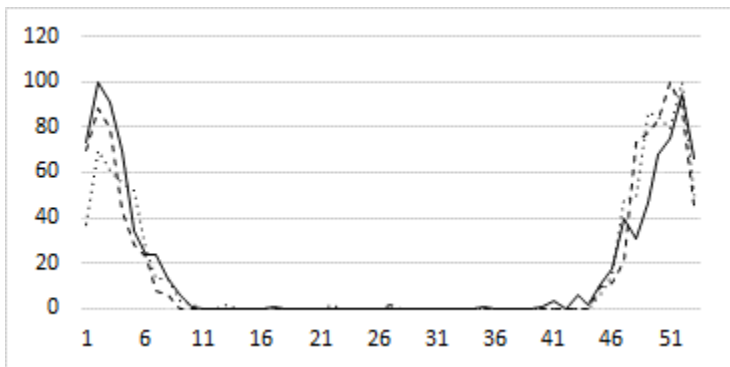
70.097 *Dysstroma truncata* Common Marbled Carpet



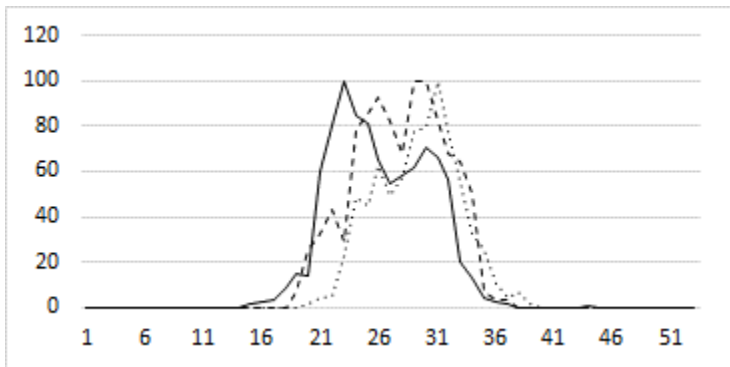
70.1 *Colostygia pectinataria* Green Carpet



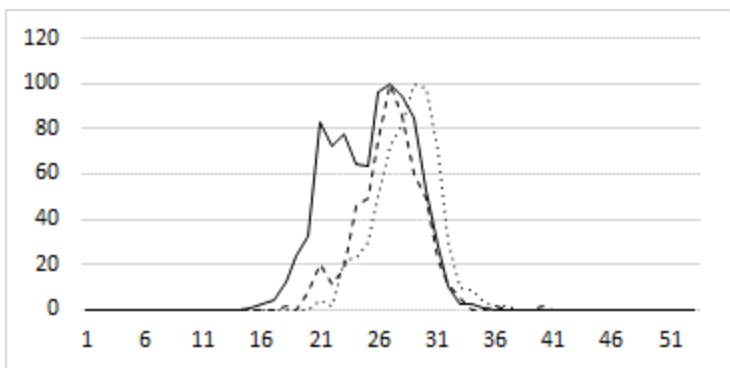
70.106 *Operophtera brumata* Winter Moth



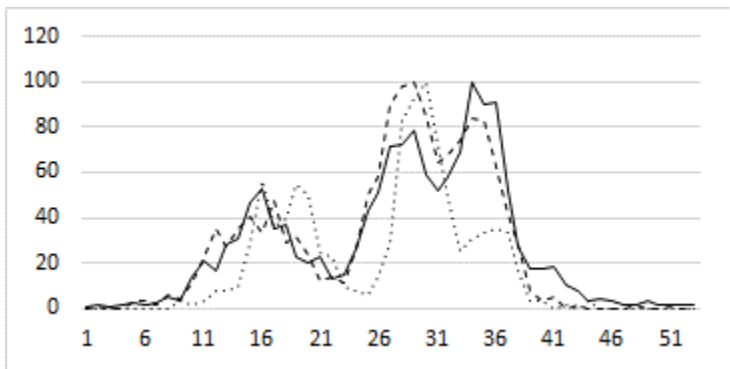
70.132 *Perizoma affinitata* Rivulet



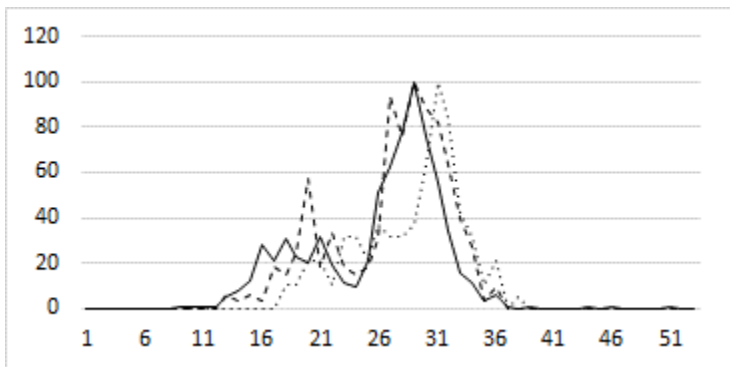
70.138 *Perizoma flavofasciata* Sandy Carpet



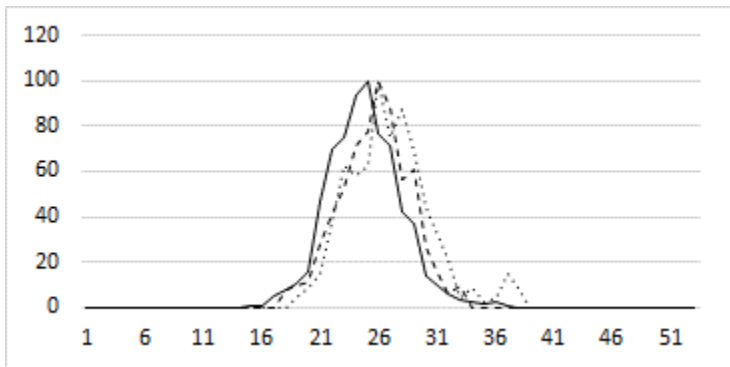
70.141 *Gymnoscelis rufifasciata* Double-striped Pug



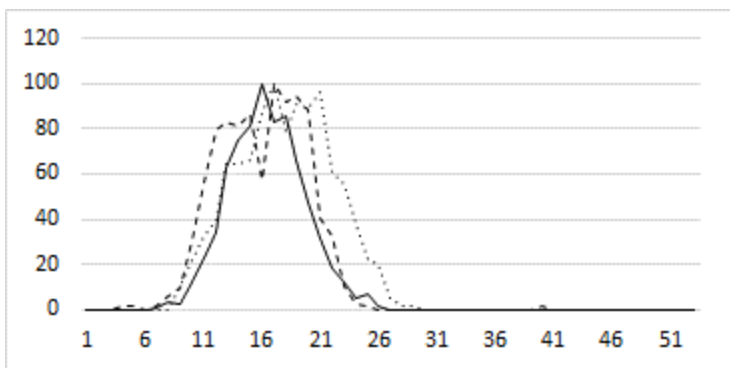
70.142 *Chloroclystis v-ata* V-Pug



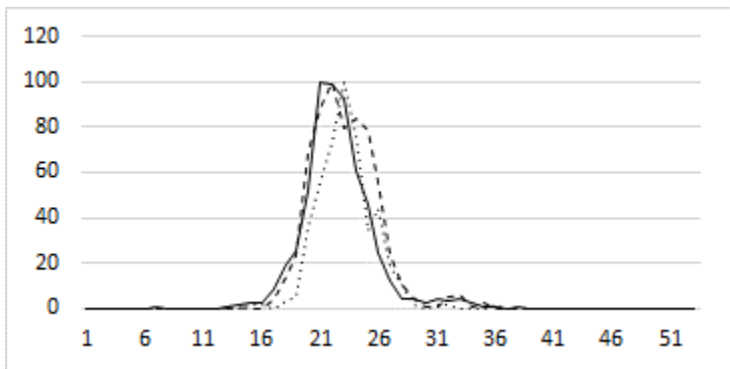
70.151 *Eupithecia pulchellata* Foxglove Pug



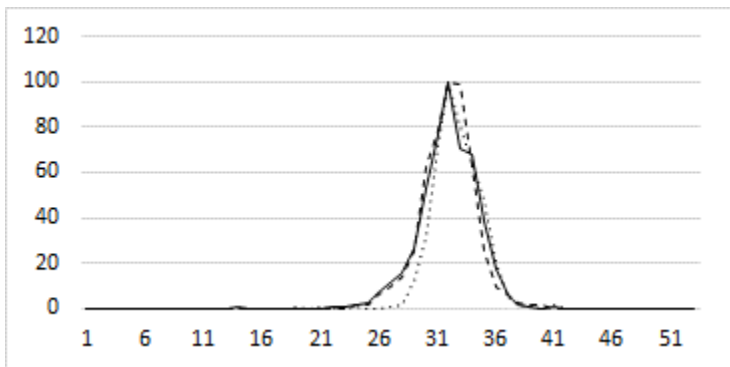
70.156 *Eupithecia abbreviata* Brindled Pug



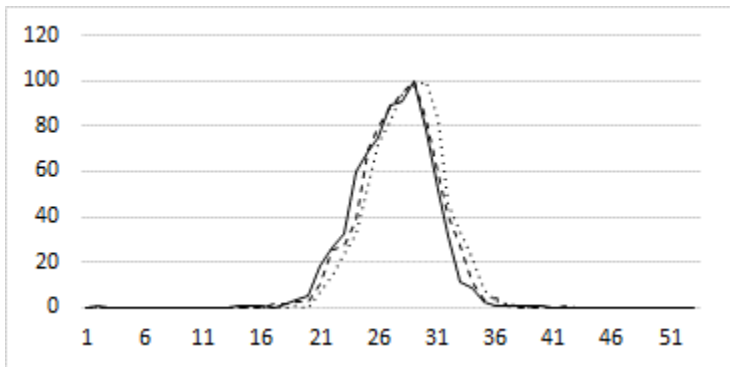
70.183 *Eupithecia vulgata* Common Pug



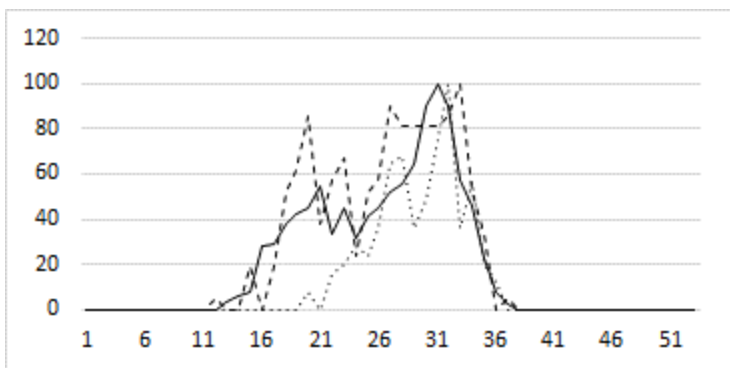
70.205 *Abraxas grossulariata* Magpie



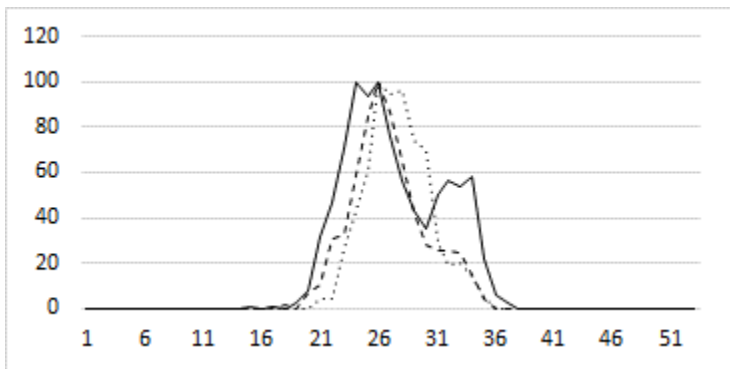
70.207 *Lomaspilis marginata* Clouded Border



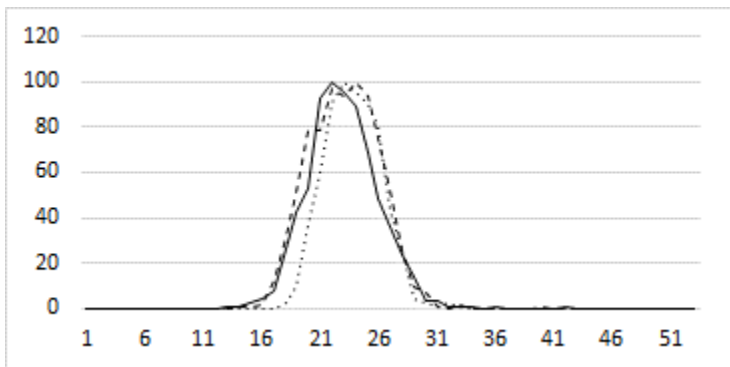
70.208 *Ligdia adustata* Scorched Carpet



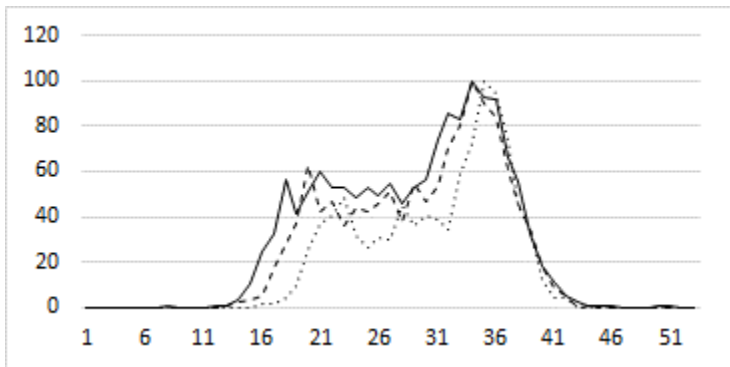
70.212 *Macaria alternata* Sharp-angled Peacock



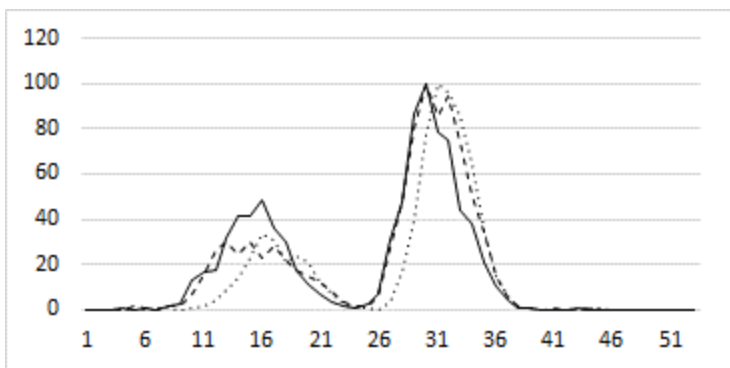
70.222 *Petrophora chlorosata* Brown Silver-line



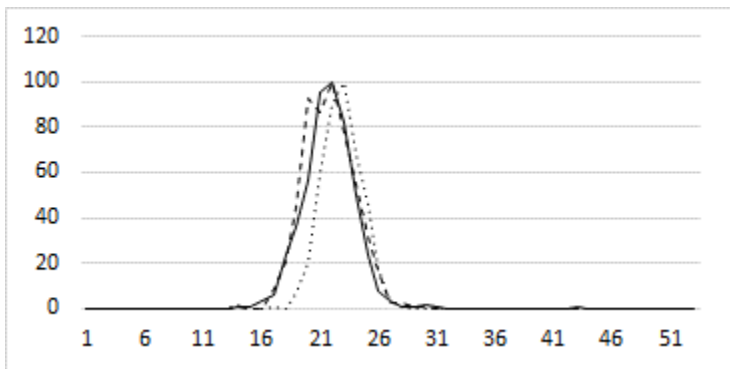
70.226 *Opisthograptis luteolata* Brimstone Moth



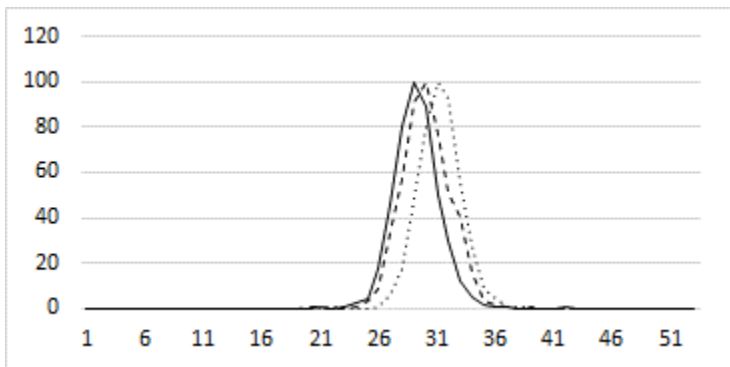
70.237 *Selenia dentaria* Early Thorn



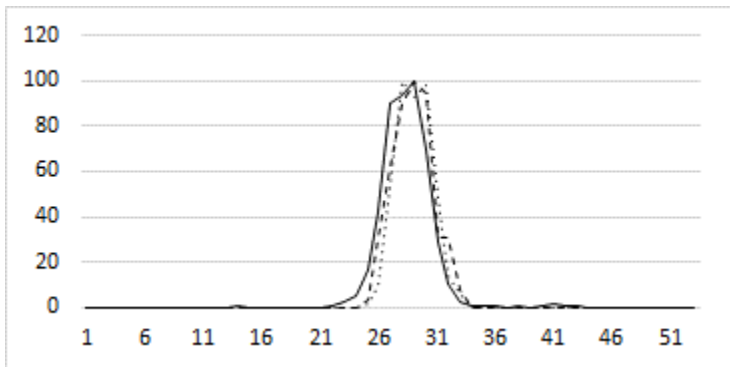
70.24 Odontopera bidentata Scalloped Hazel



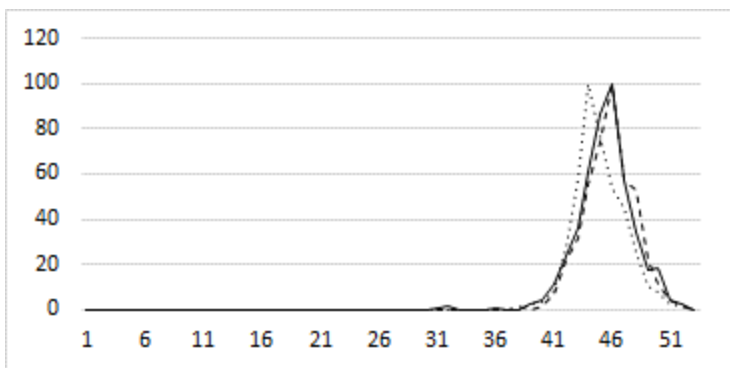
70.241 Crocallis elinguaris Scalloped Oak



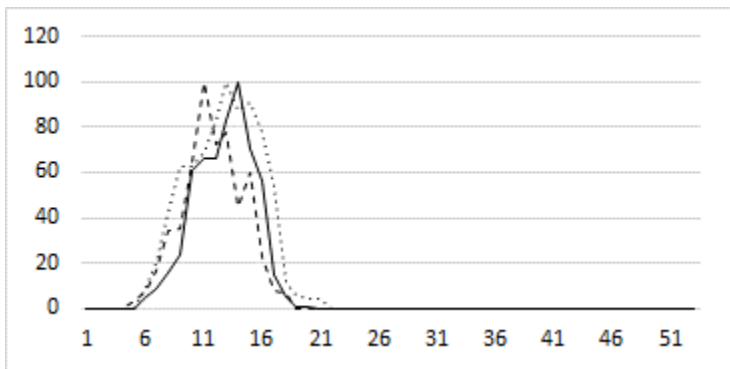
70.243 Ourapteryx sambucaria Swallow-tailed Moth



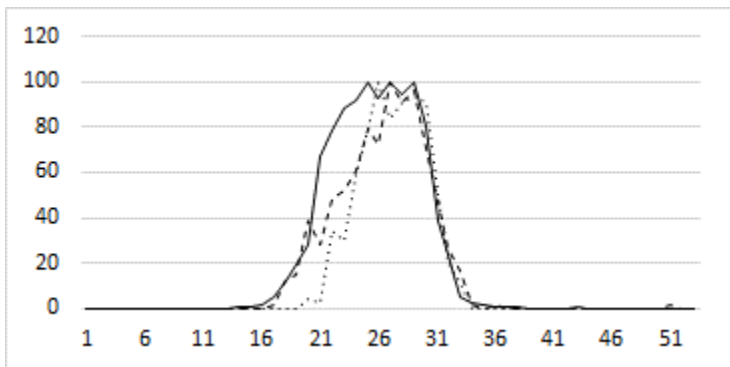
70.244 Colotois pennaria Feathered Thorn



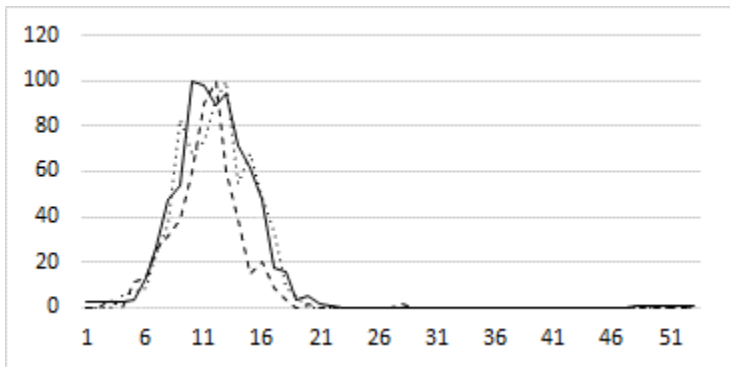
70.245 *Alsophila aescularia* March Moth



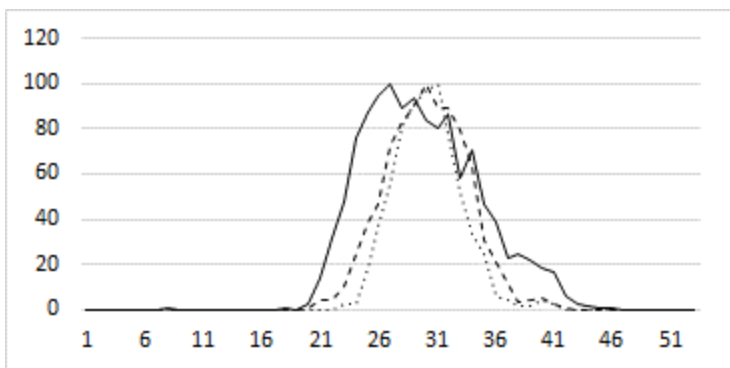
70.252 *Biston betularia* Peppered Moth



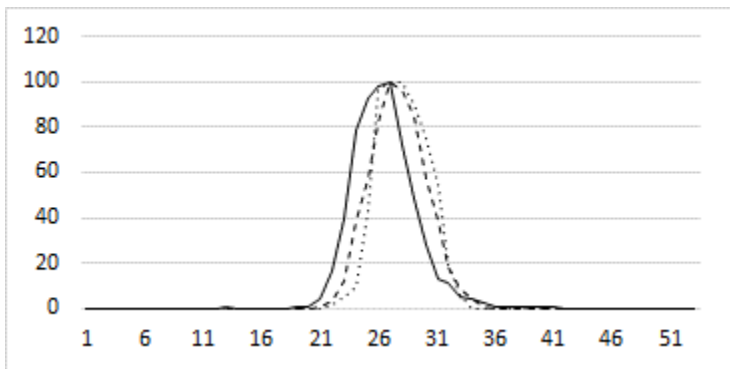
70.255 *Agriopsis marginaria* Dotted Border



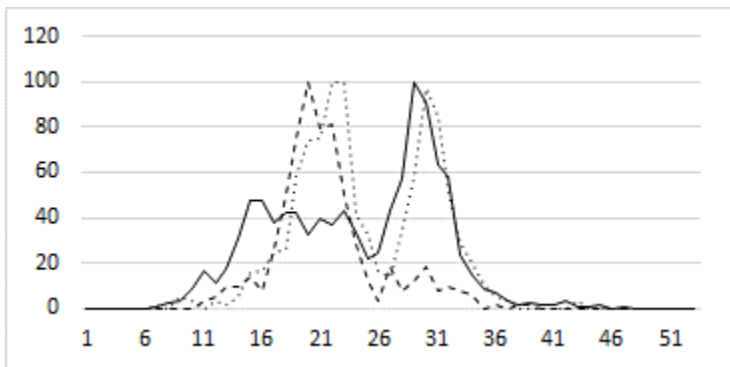
70.258 *Peribatodes rhomboidaria* Willow Beauty



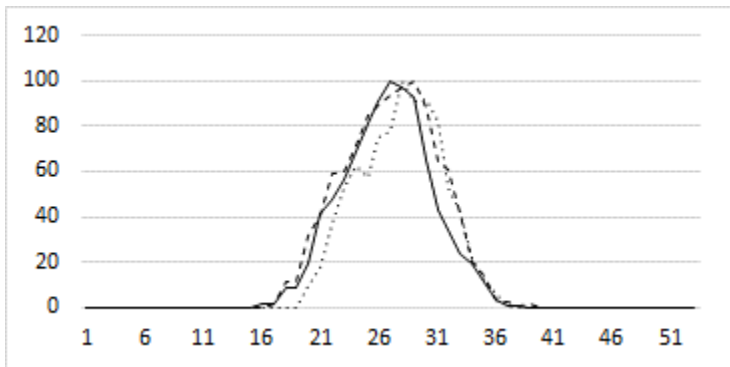
70.265 *Alcis repandata* Mottled Beauty



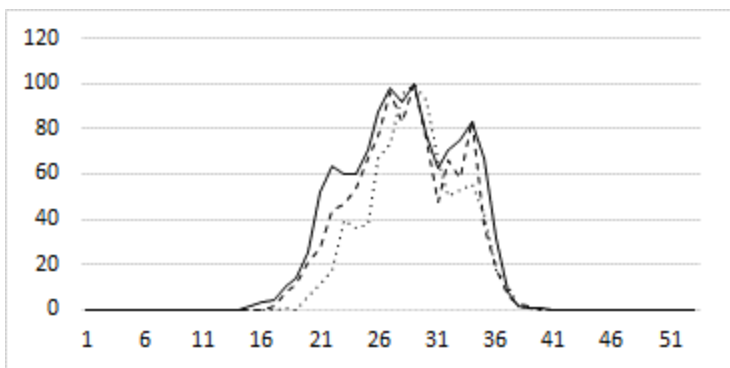
70.27 *Ectropis crepuscularia* Engrailed



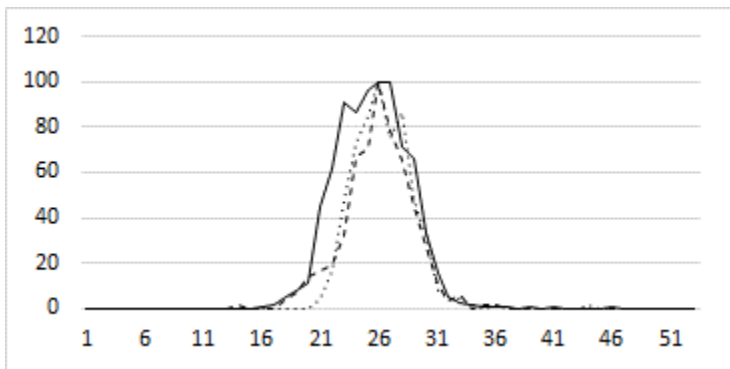
70.277 *Cabera pusaria* Common White Wave



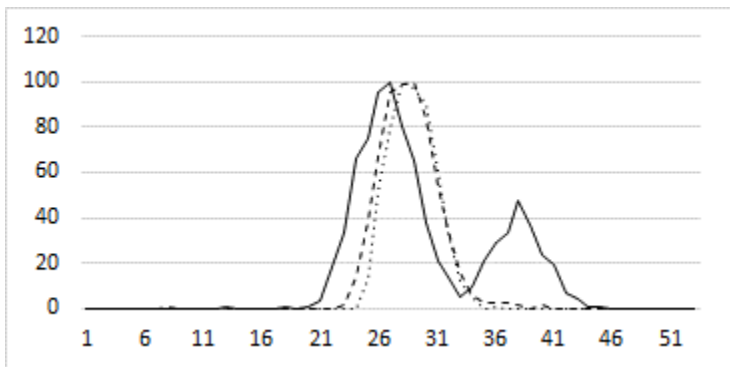
70.278 *Cabera exanthemata* Common Wave



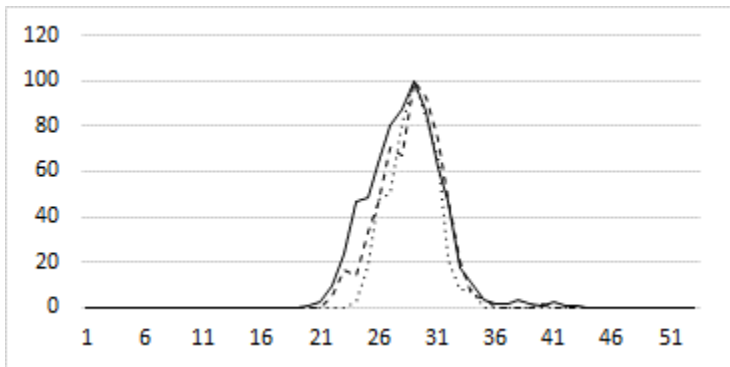
70.28 *Lomographa temerata* Clouded Silver



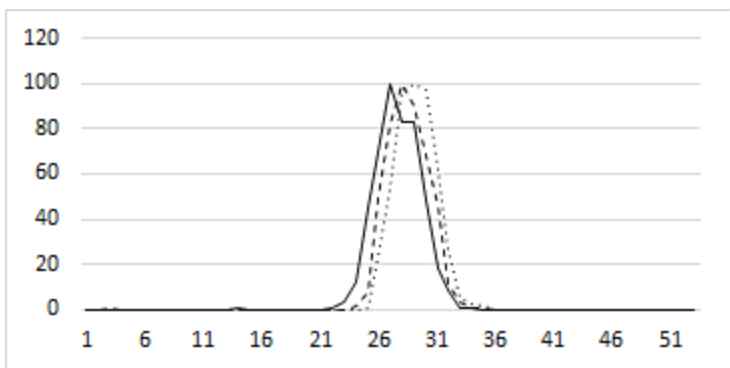
70.283 *Campaea margaritaria* Light Emerald



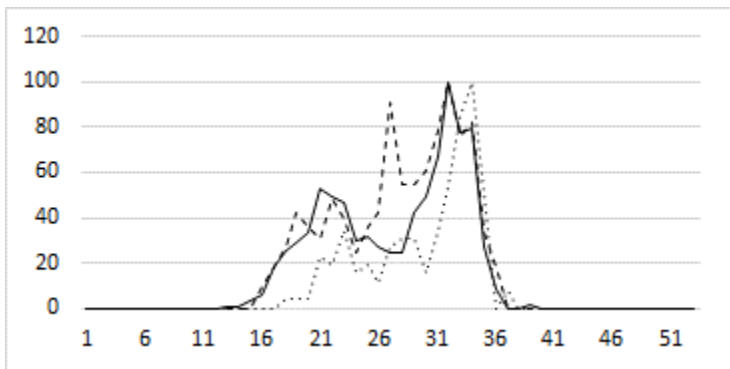
70.288 *Cleorodes lichenaria* Brussels Lace



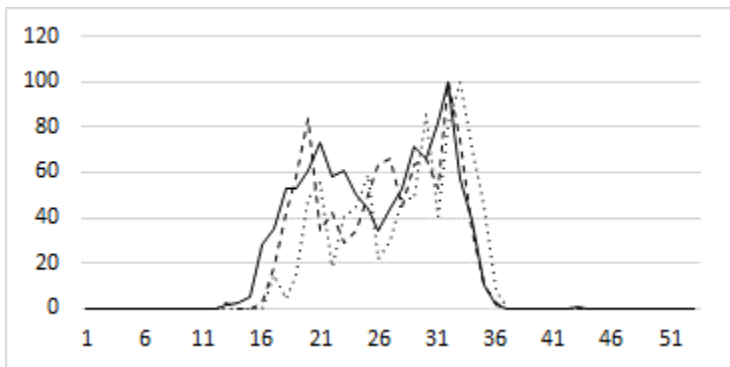
70.305 *Hemithea aestivaria* Common Emerald



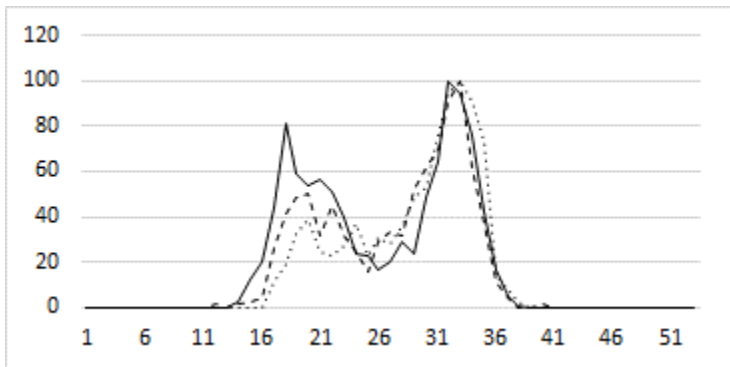
71.012 *Notodonta dromedarius* Iron Prominent



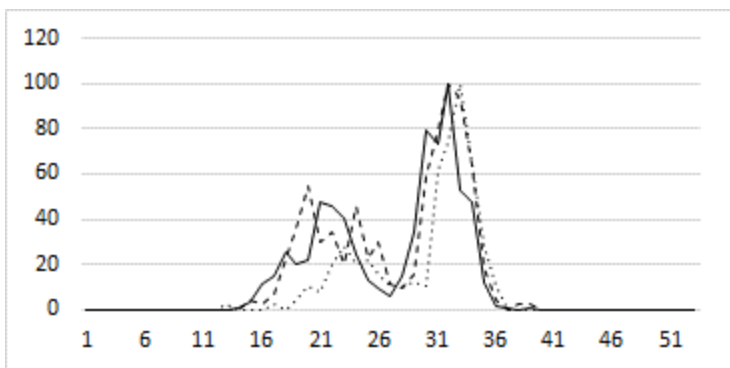
71.013 *Notodonta ziczac* Pebble Prominent



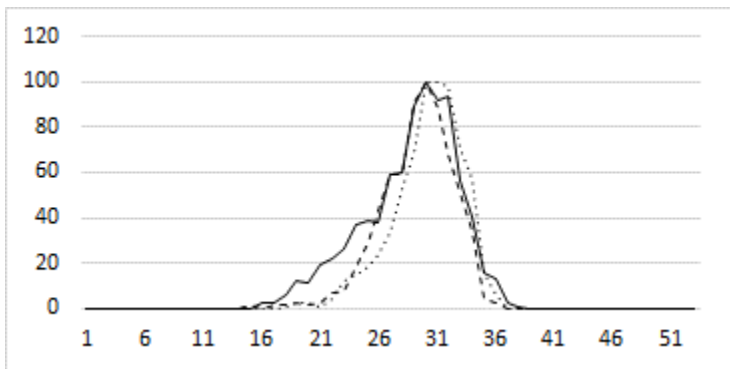
71.018 *Pheosia gnoma* Lesser Swallow Prominent



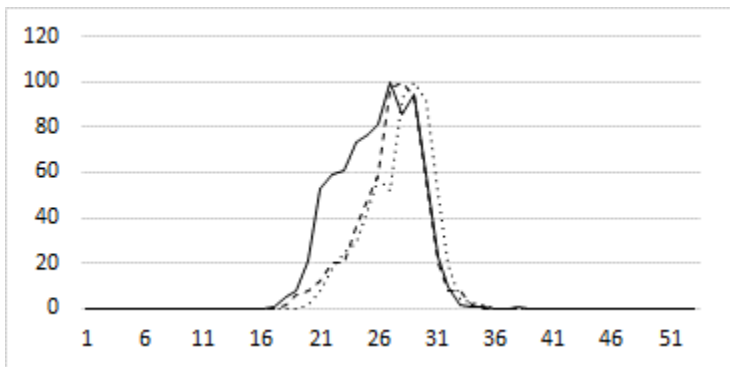
71.02 *Pterostoma palpina* Pale Prominent



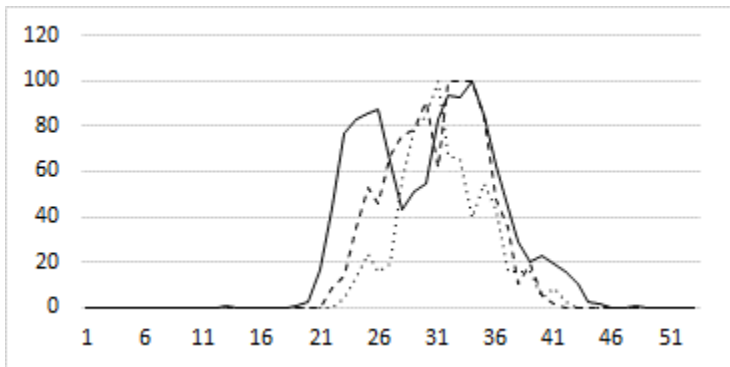
71.021 *Ptilodon capucina* Coxcomb Prominent



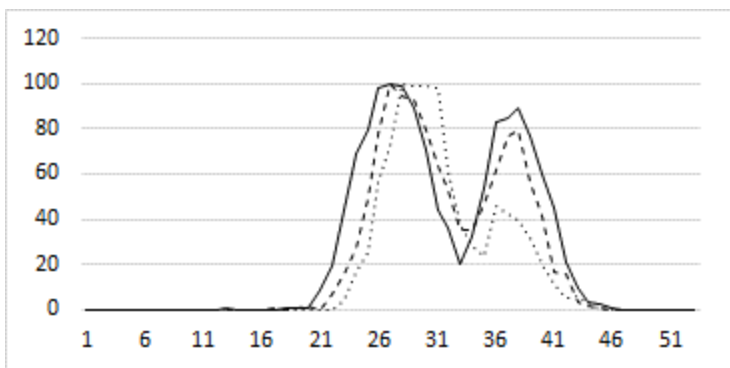
71.025 *Phalera bucephala* Buff-tip



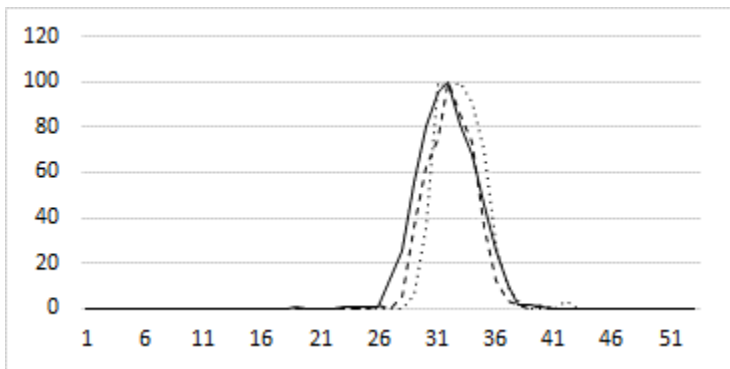
72.002 *Rivula sericealis* Straw Dot



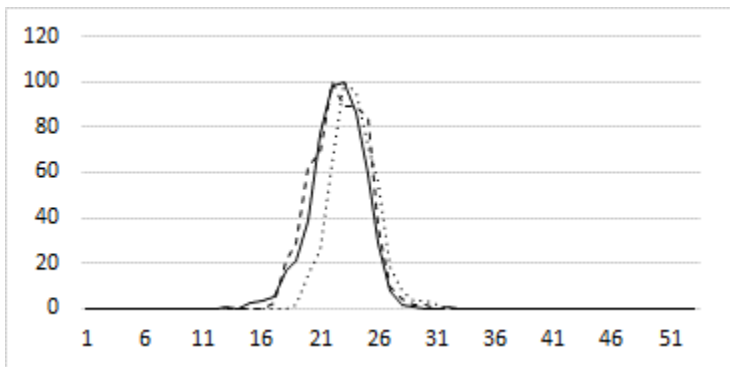
72.003 *Hypena proboscidalis* Snout



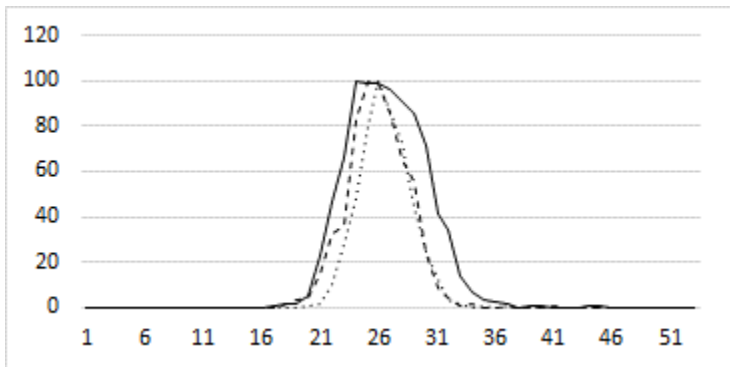
72.01 *Lymantria monacha* Black Arches



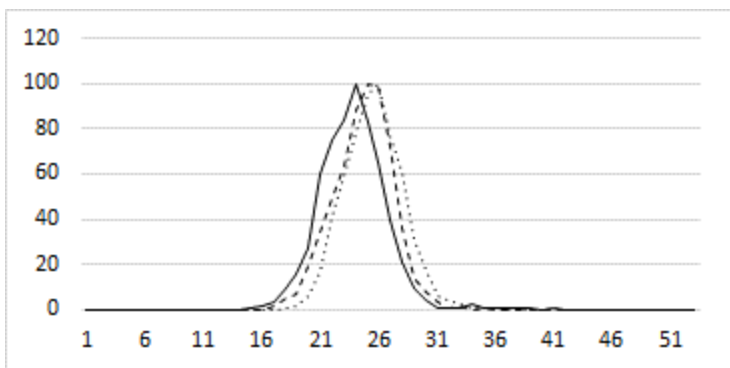
72.015 *Calliteara pudibunda* Pale Tussock



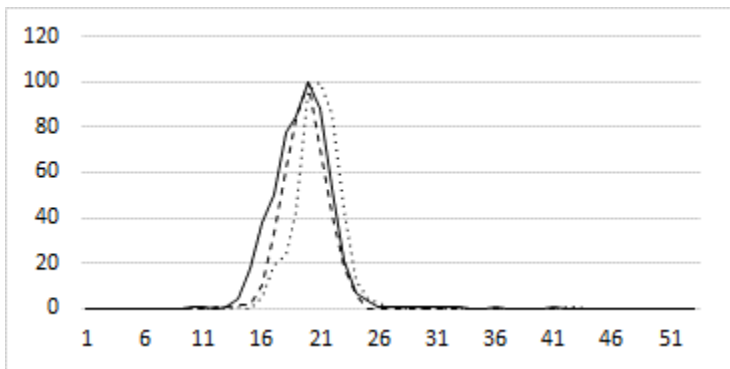
72.019 *Spilosoma lutea* Buff Ermine



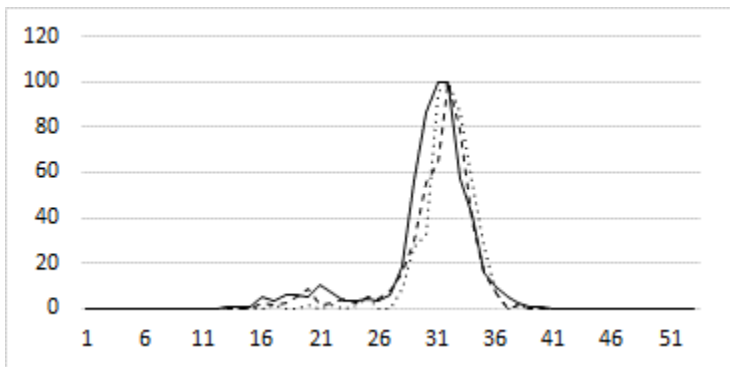
72.02 *Spilosoma lubricipeda* White Ermine



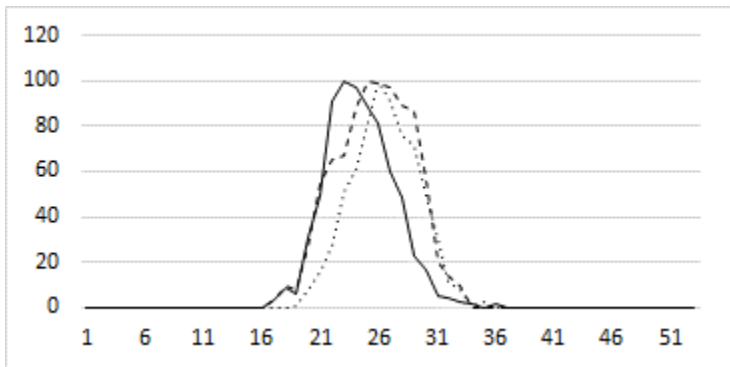
72.022 *Diaphora mendica* Muslin Moth



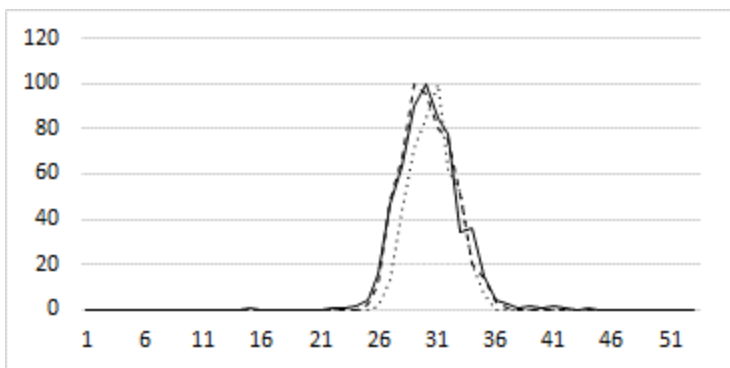
72.024 *Phragmatobia fuliginosa* Ruby Tiger



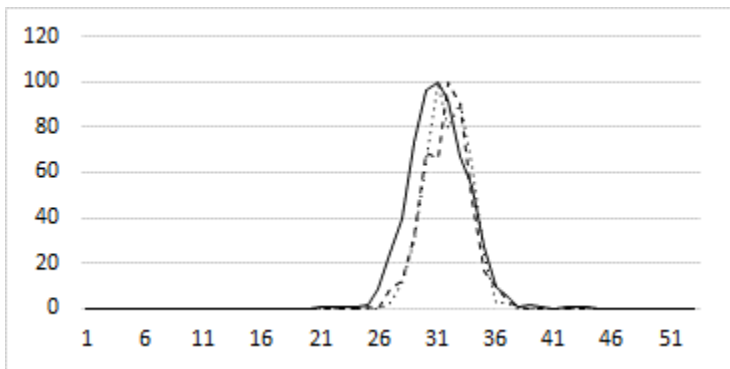
72.031 *Tyria jacobaeae* Cinnabar



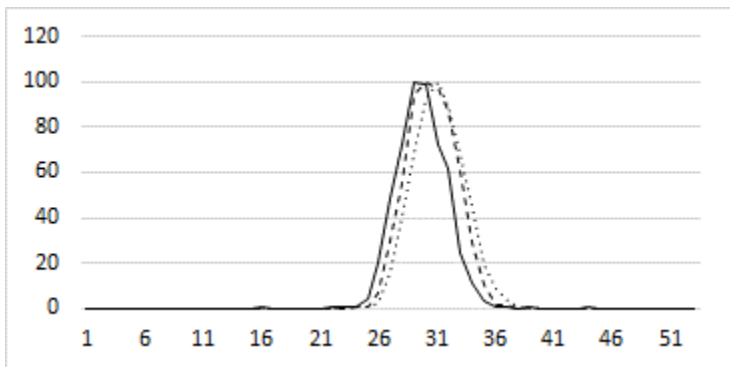
72.035 *Miltochrista miniata* Rosy Footman



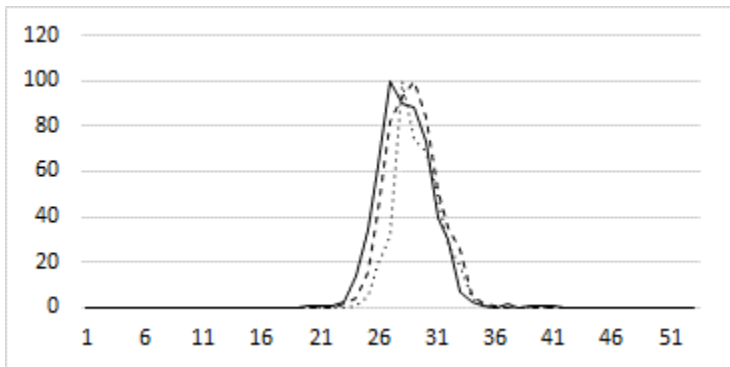
72.044 *Eilema griseola* Dingy Footman



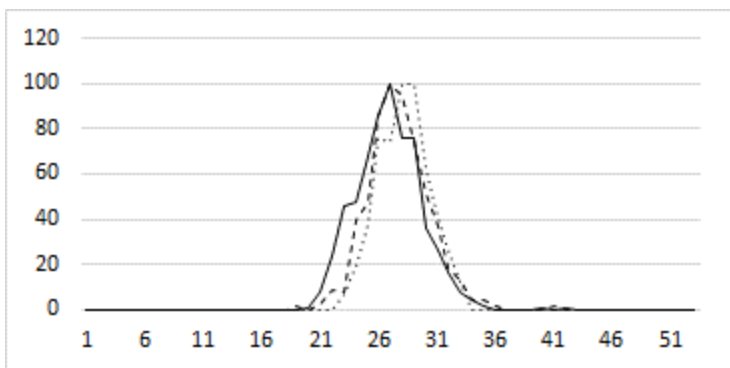
72.045 *Eilema lurideola* Common Footman



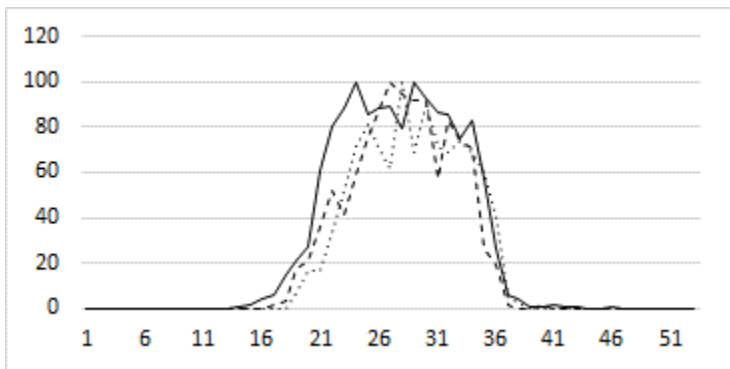
72.053 *Herminia tarsipennalis* Fan-foot



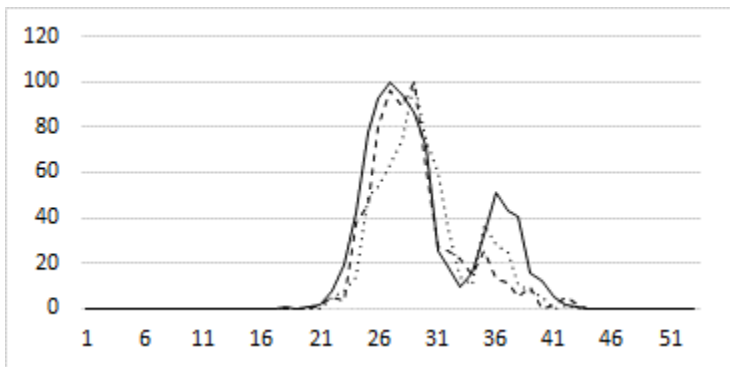
72.055 *Herminia grisealis* Small Fan-foot



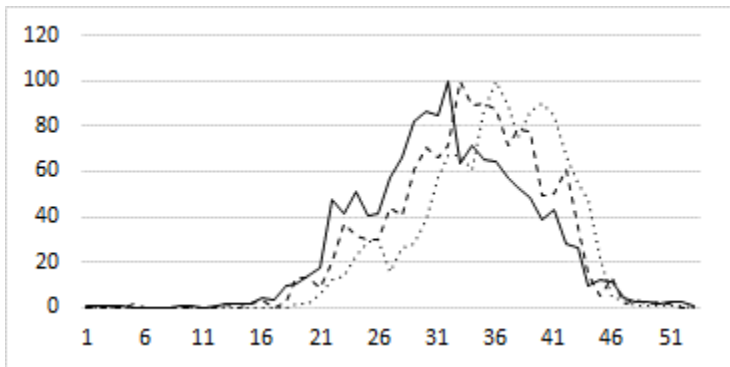
73.001 *Abrostola tripartita* Spectacle



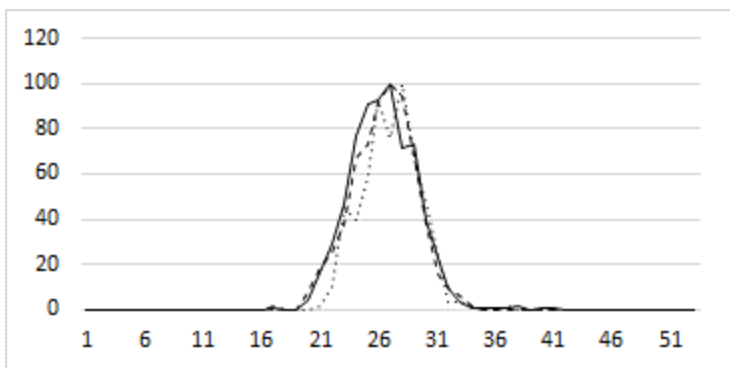
73.012 *Diachrysia chrysis* Burnished Brass



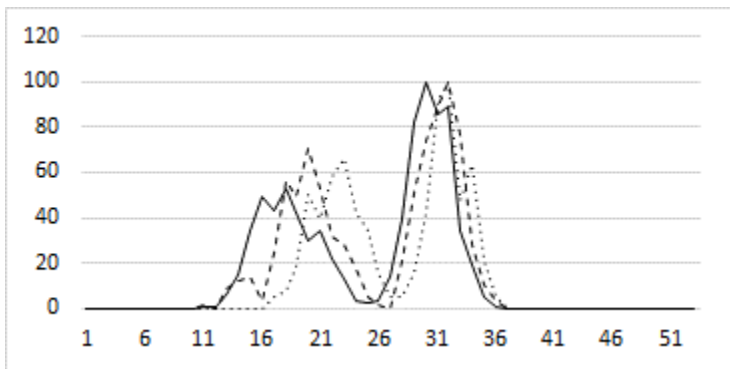
73.015 *Autographa gamma* Silver Y



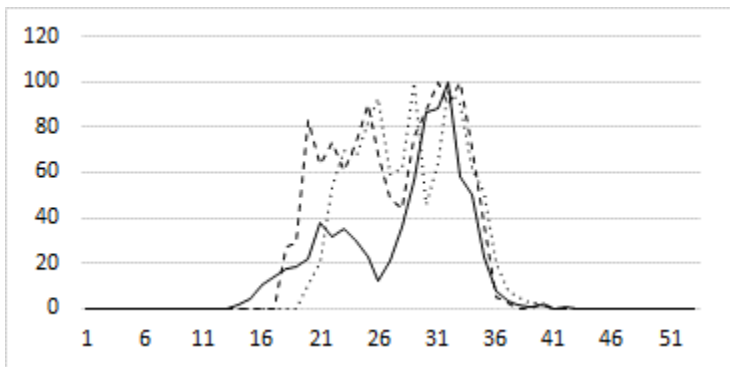
73.024 *Deltote pygarga* Marbled White Spot



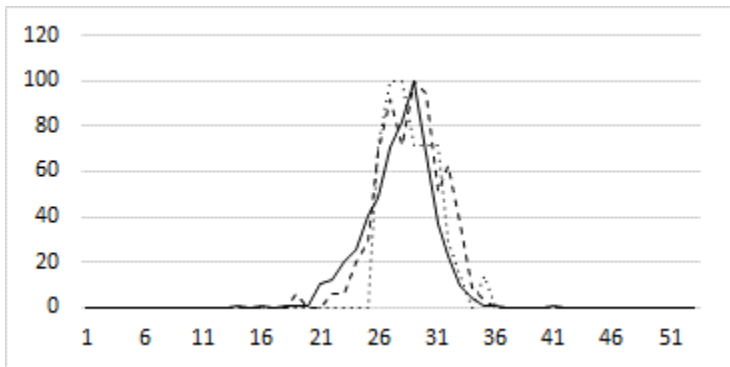
73.032 *Colocasia coryli* Nut-tree Tussock



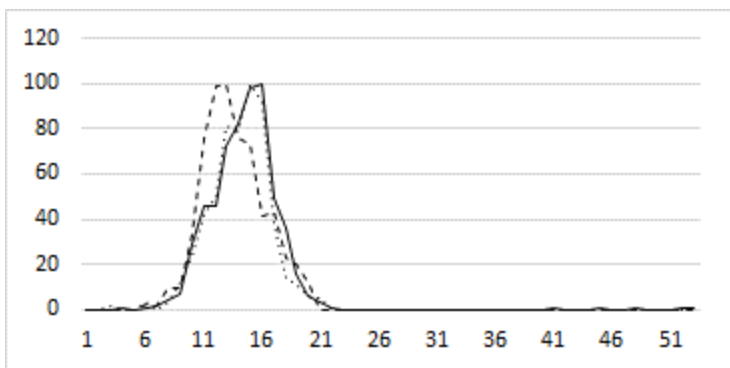
73.045 *Acronicta rumicis* Knot Grass



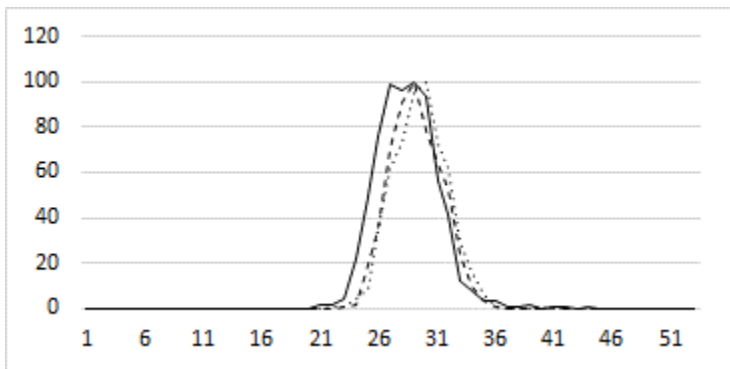
73.047 *Craniophora ligustri* Coronet



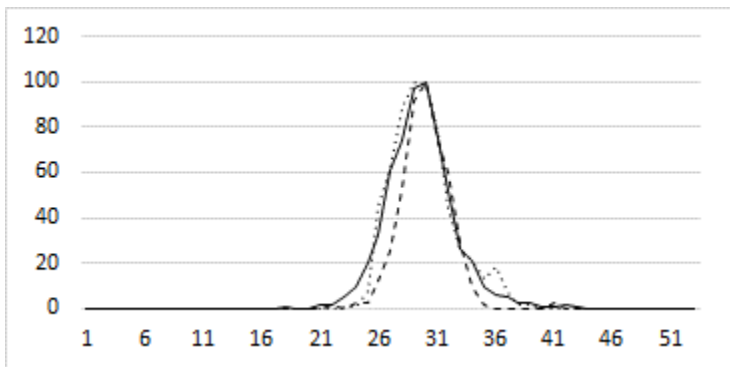
73.069 *Xylocampa areola* Early Grey



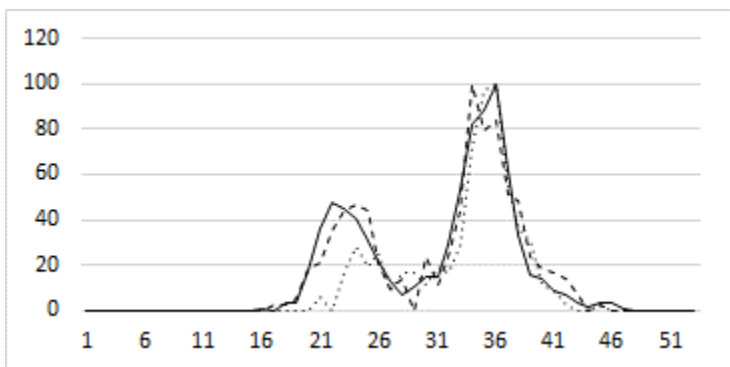
73.096 *Hoplodrina octogenaria* Uncertain



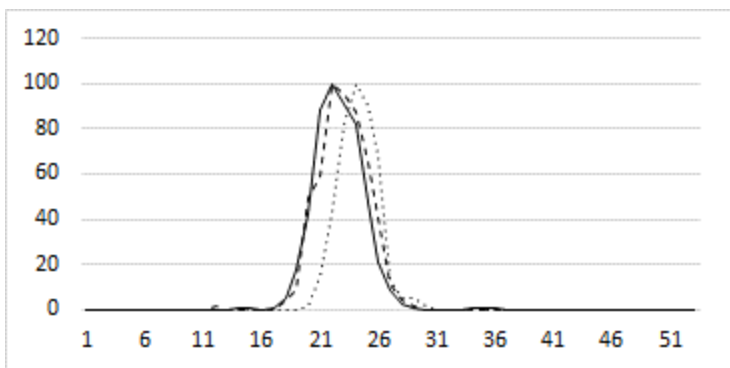
73.097 *Hoplodrina blanda* Rustic



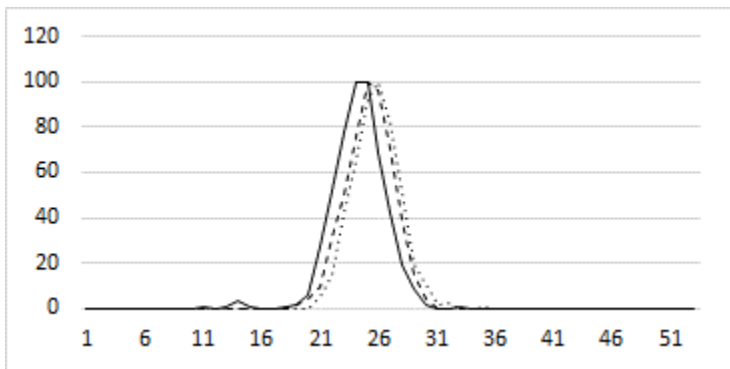
73.099 *Hoplodrina ambigua* Vine's Rustic



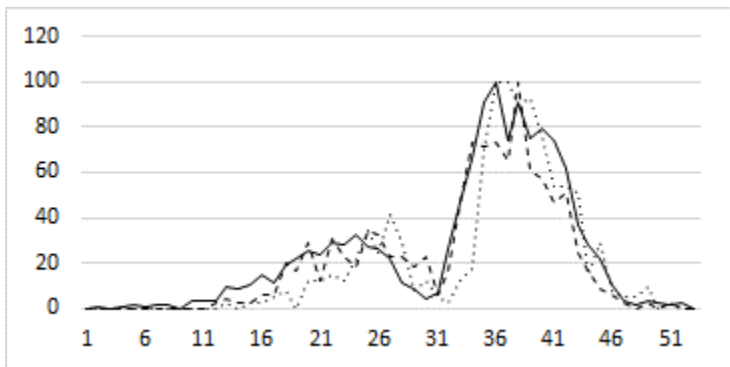
73.101 *Charanyca trigrammica* Treble Lines



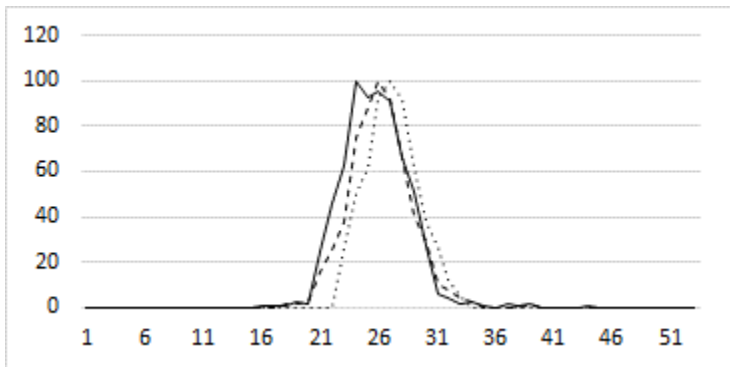
73.102 *Rusina ferruginea* Brown Rustic



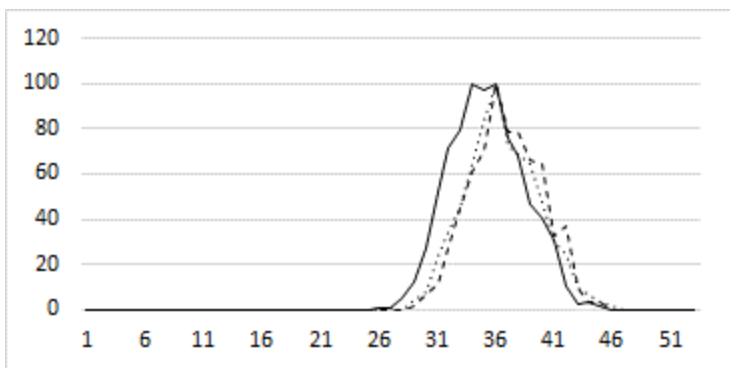
73.113 *Phlogophora meticulosa* Angle Shades



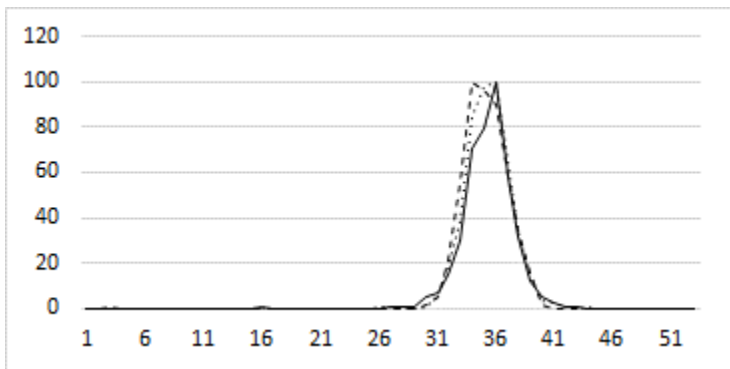
73.114 *Euplexia lucipara* Small Angle Shades



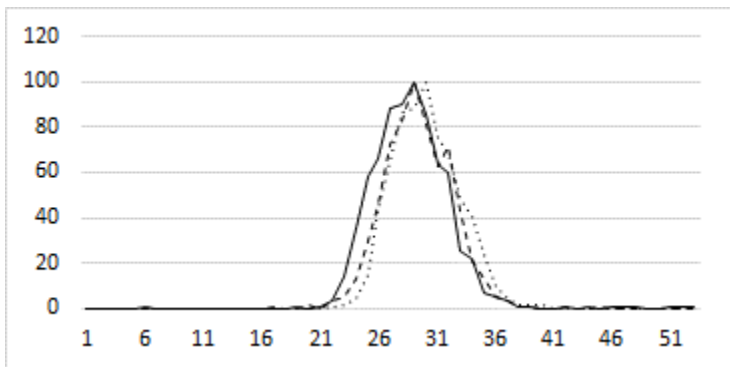
73.123 *Hydraecia micacea* Rosy Rustic



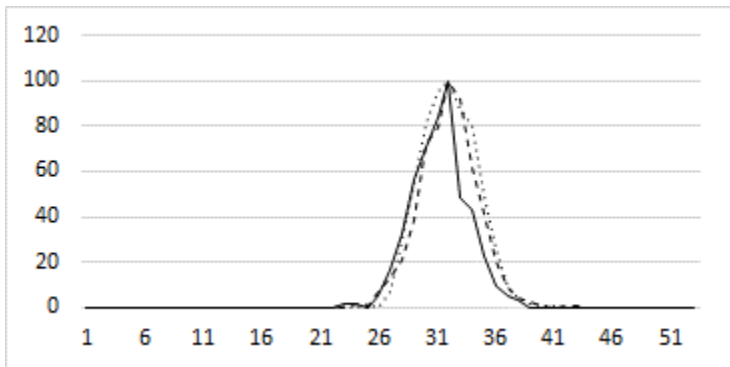
73.131 *Luperina testacea* Flounced Rustic



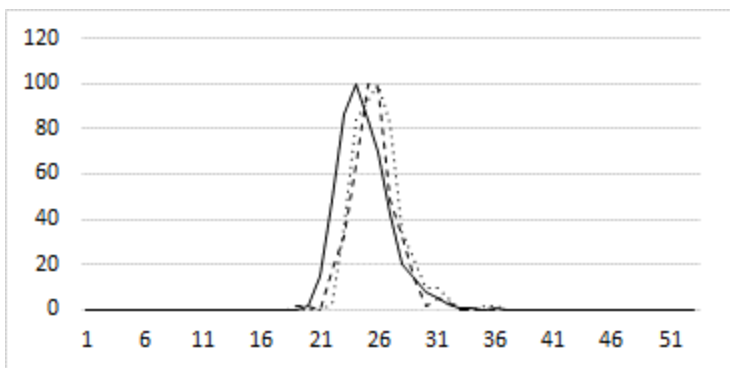
73.162 *Apamea monoglypha* Dark Arches



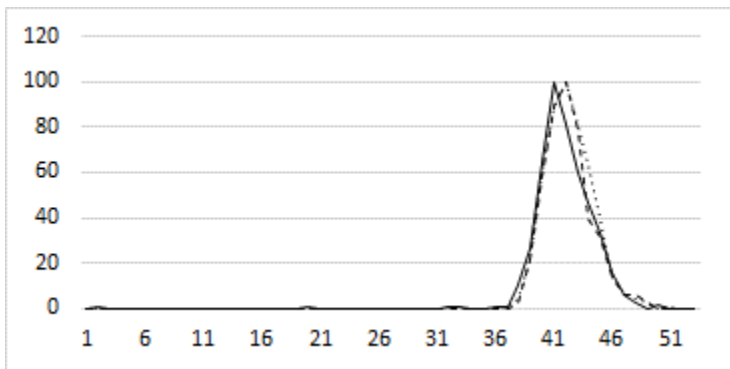
73.169 *Mesapamea secalis* Common Rustic



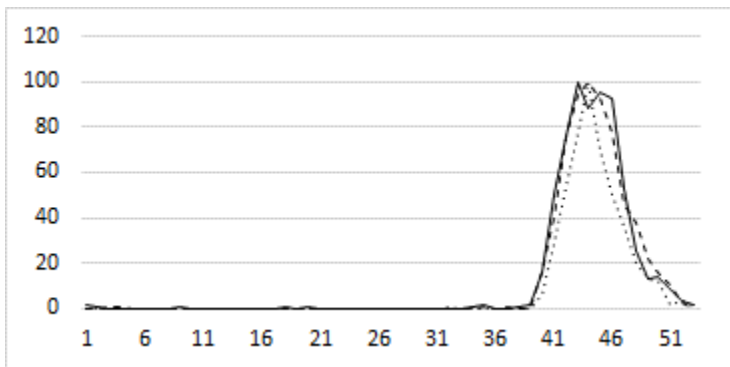
73.176 *Oligia fasciuncula* Middle-barred Minor



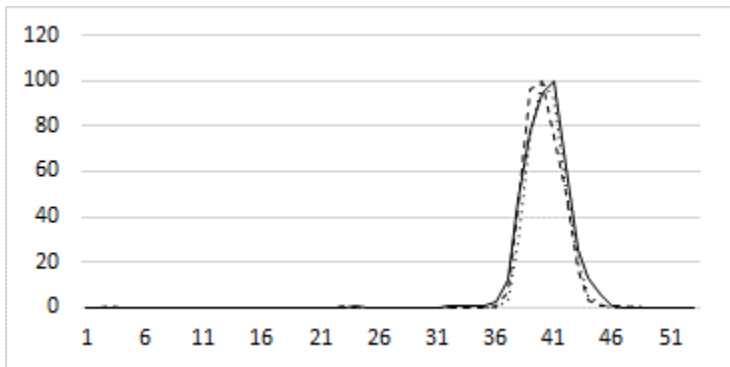
73.186 *Agrochola lychnidis* Beaded Chestnut



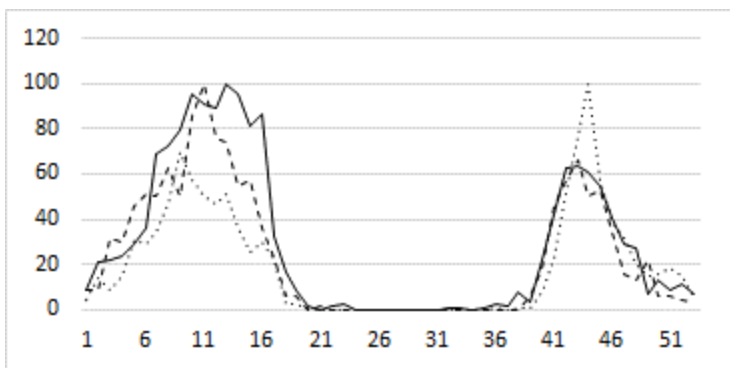
73.19 *Agrochola macilenta* Yellow-line Quaker



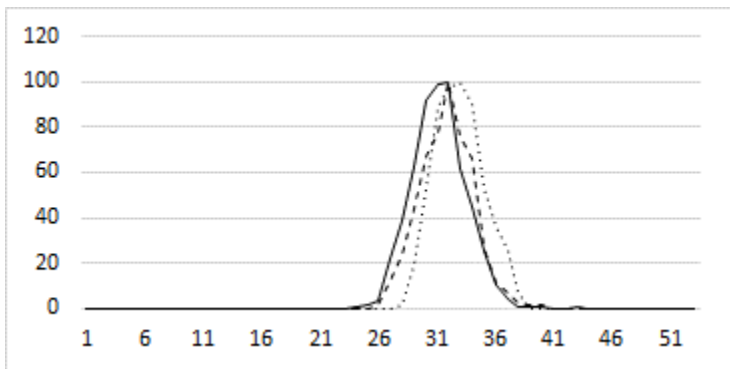
73.193 *Omphaloscelis lunosa* Lunar Underwing



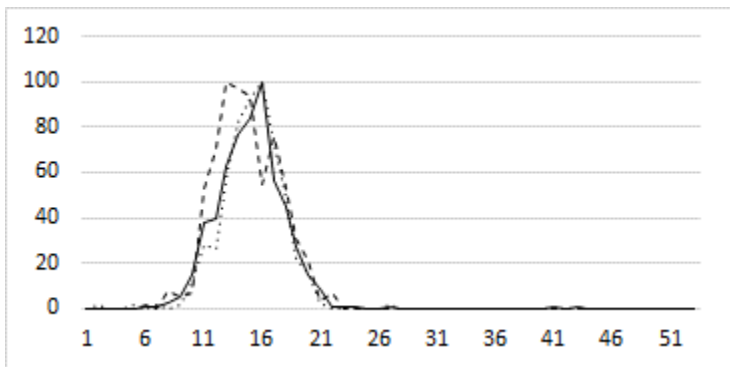
73.194 *Conistra vaccinii* Chestnut



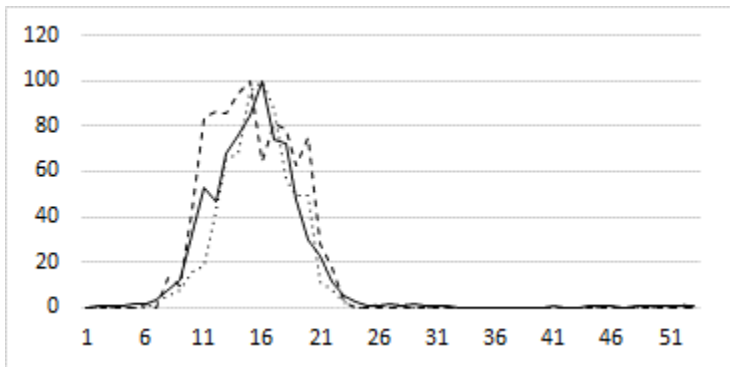
73.216 *Cosmia trapezina* Dun-bar



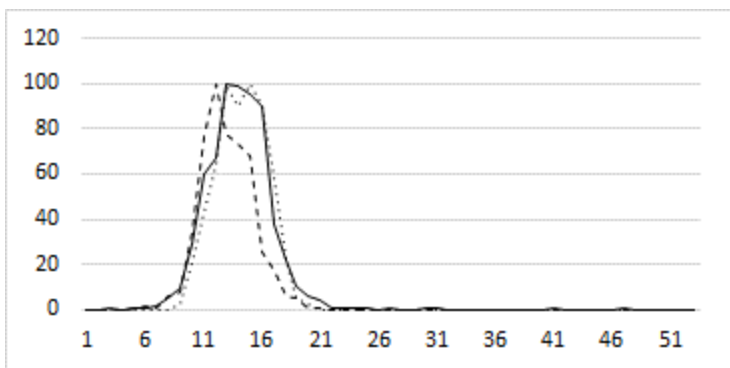
73.242 *Orthosia incerta* Clouded Drab



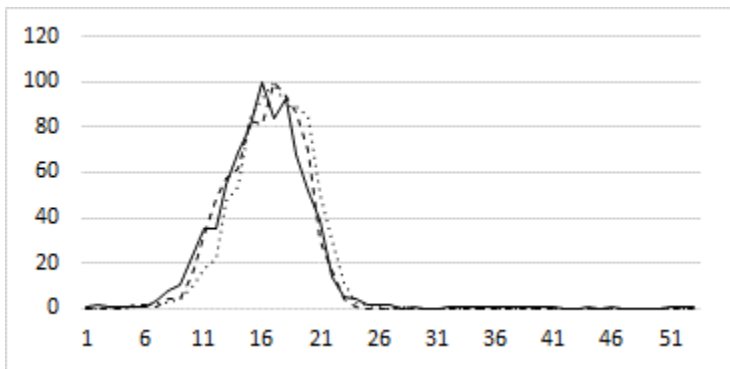
73.244 *Orthosia cerasi* Common Quaker



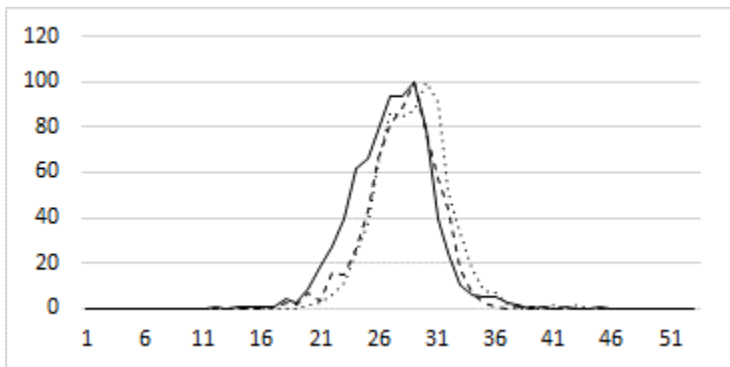
73.245 *Orthosia cruda* Small Quaker



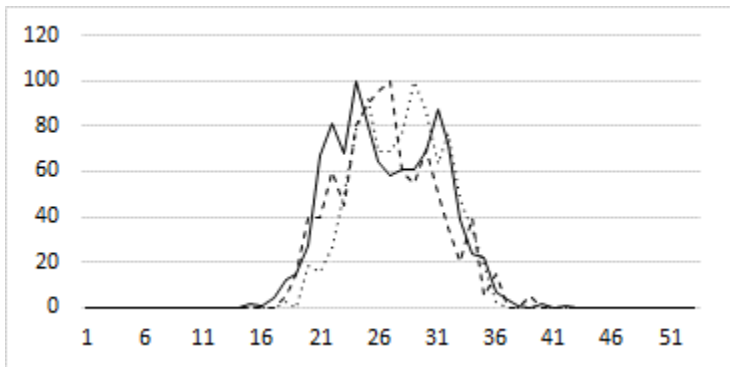
73.249 *Orthosia gothica* Hebrew Character



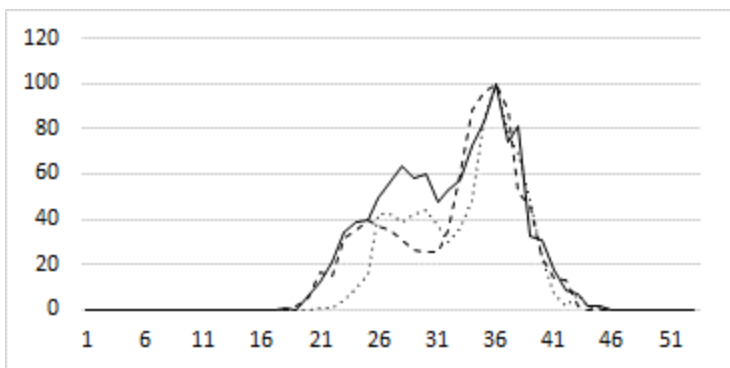
73.267 *Lacanobia oleracea* Bright-line Brown-eye



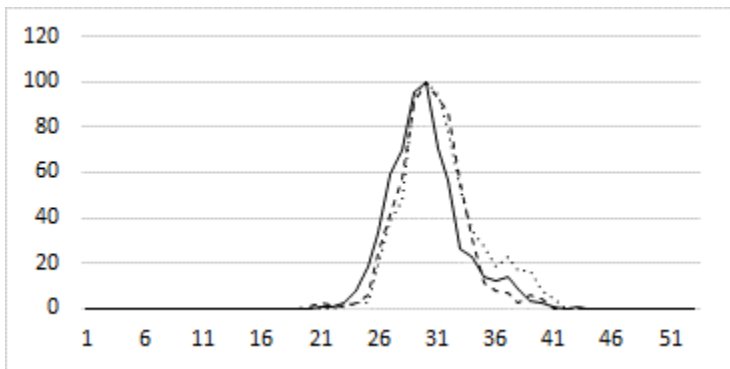
73.281 *Hadena bicruris* Lychnis



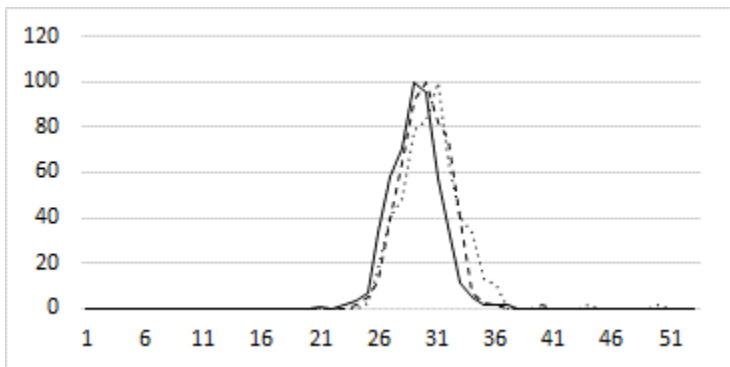
73.291 *Mythimna pallens* Common Wainscot



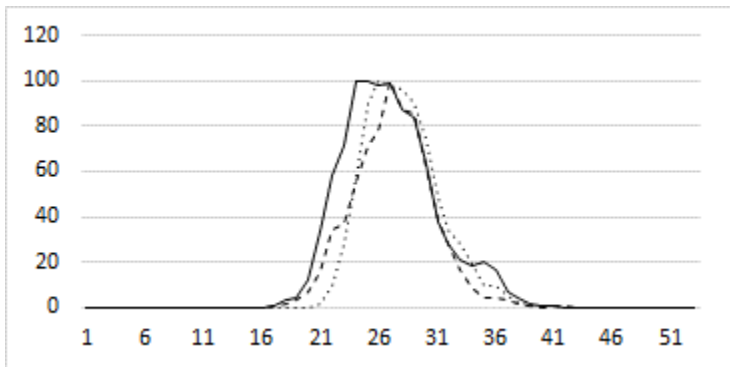
73.293 *Mythimna impura* Smoky Wainscot



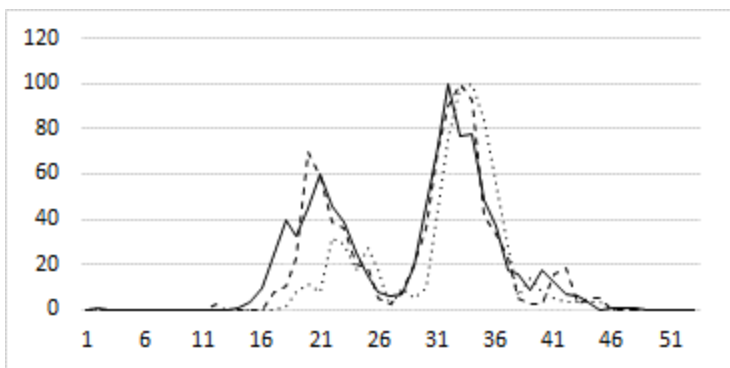
73.298 *Mythimna ferrago* Clay



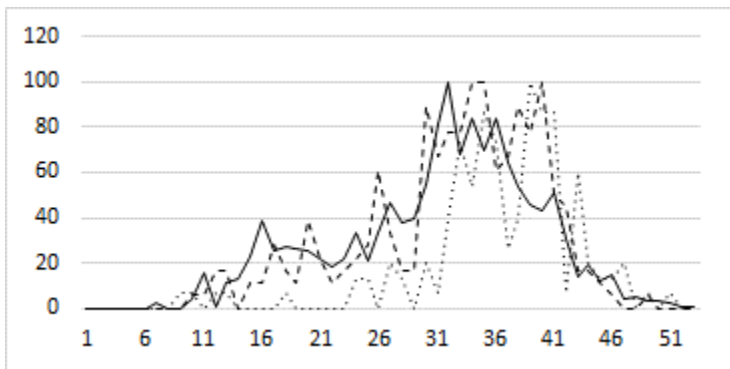
73.317 *Agrotis exclamatoris* Heart & Dart



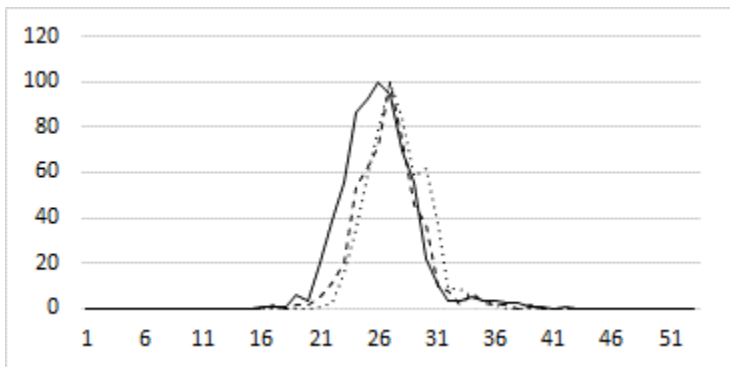
73.325 *Agrotis puta* Shuttle-shaped Dart



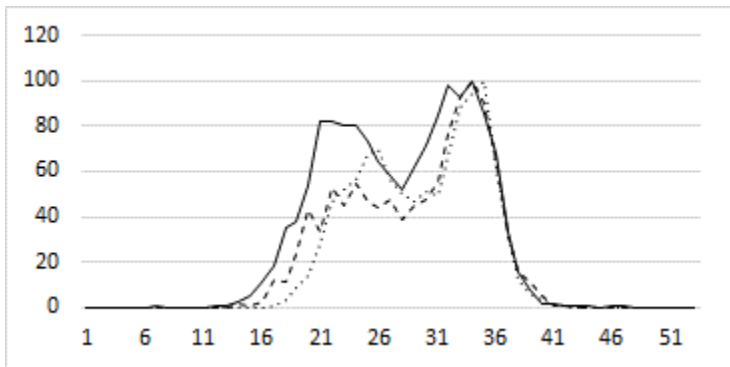
73.327 *Agrotis ipsilon* Dark Sword-grass



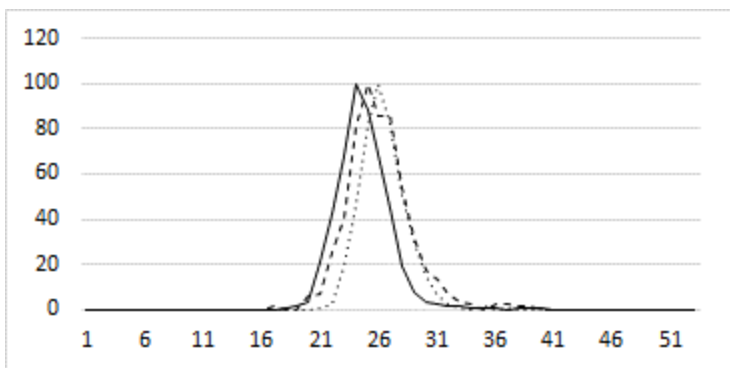
73.328 *Axylia putris* Flame



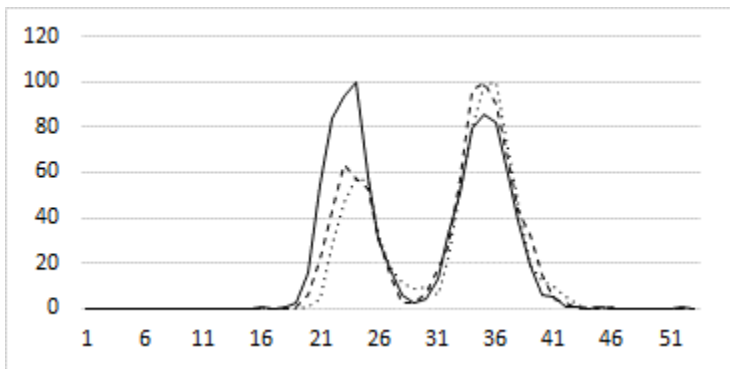
73.329 *Ochropleura plecta* Flame Shoulder



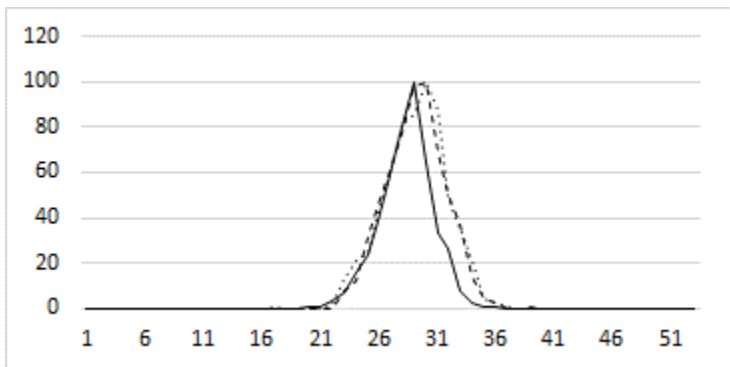
73.333 *Diarsia mendica* Ingrailed Clay



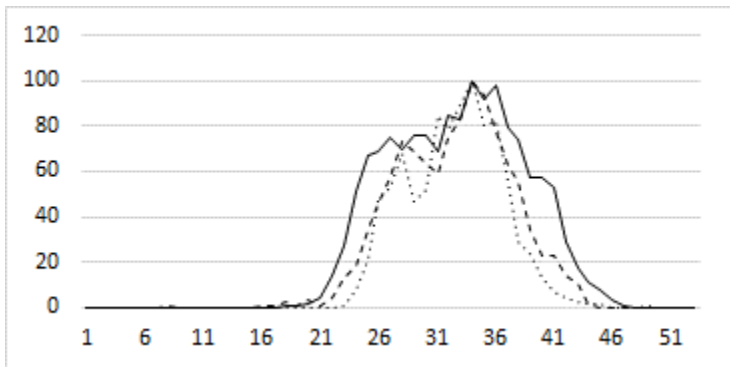
73.334 *Diarsia rubi* Small Square-spot



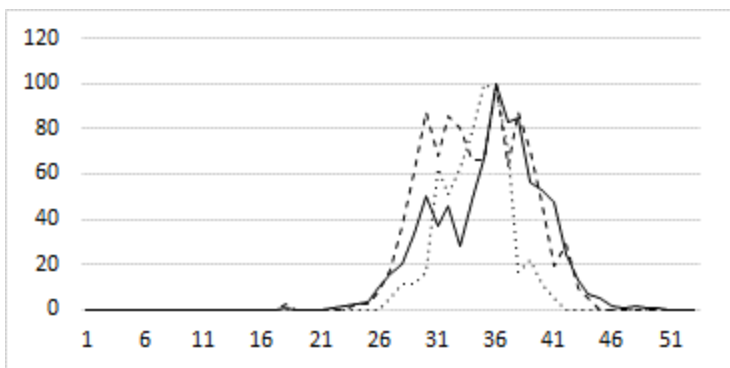
73.338 *Lycophotia porphyrea* True Lover's Knot



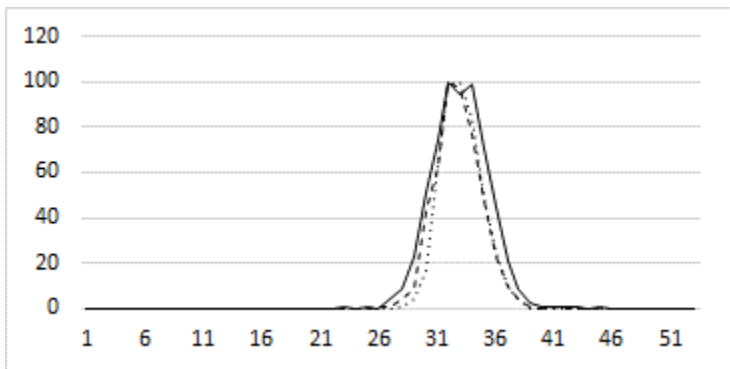
73.342 *Noctua pronuba* Large Yellow Underwing



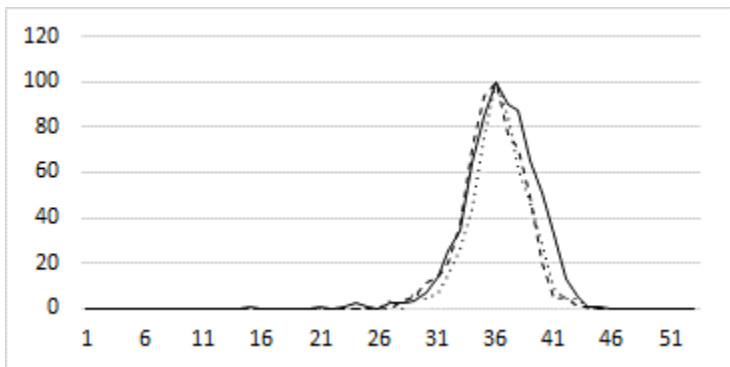
73.345 *Noctua comes* Lesser Yellow Underwing



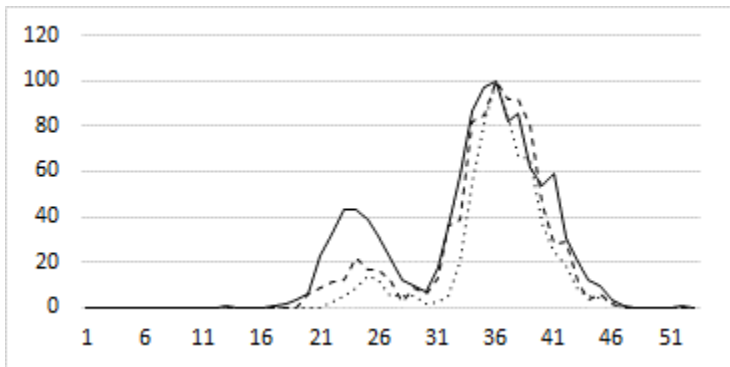
73.348 *Noctua janthe* Lesser Broad-bordered Yellow Underwing



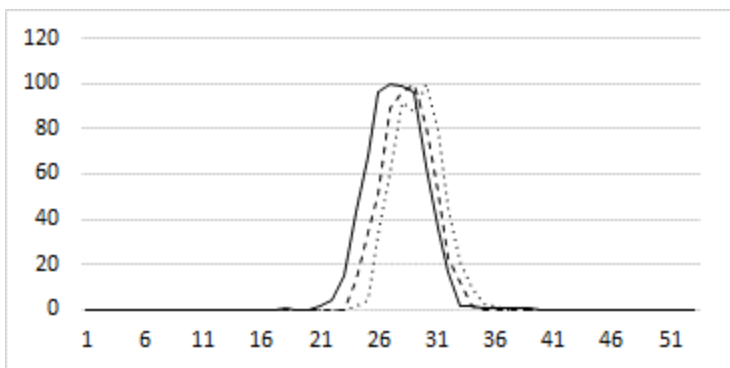
73.357 *Xestia xanthographa* Square-spot Rustic



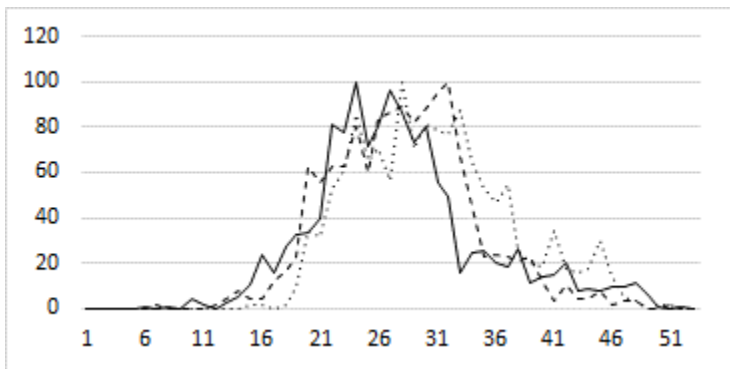
73.359 *Xestia c-nigrum* Setaceous Hebrew Character



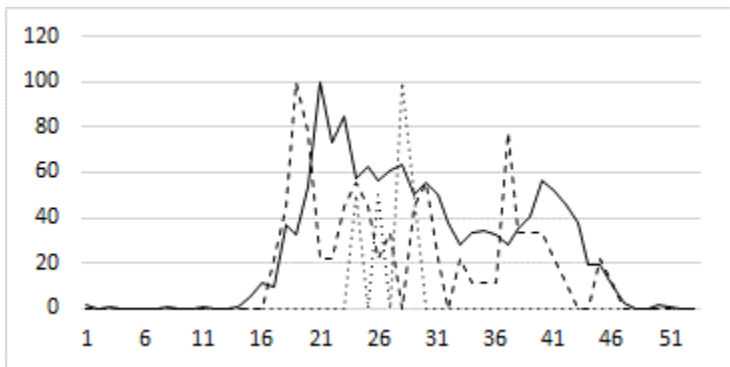
73.361 *Xestia triangulum* Double Square-spot



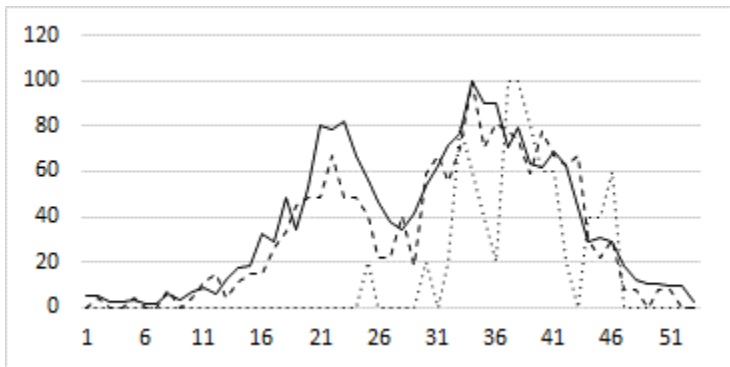
18.001 *Plutella xylostella* Diamond-back Moth



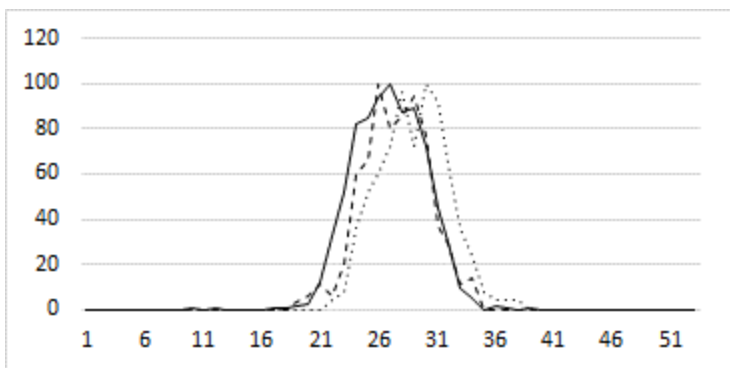
28.024 *Tachystola acroxantha*



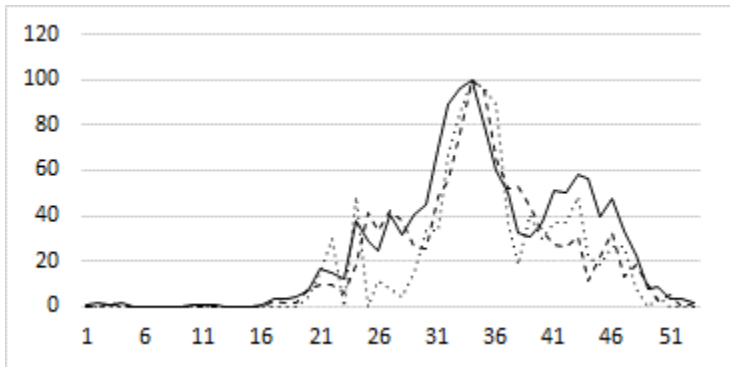
49.039 *Epiphyas postvittana* Light Brown Apple Moth



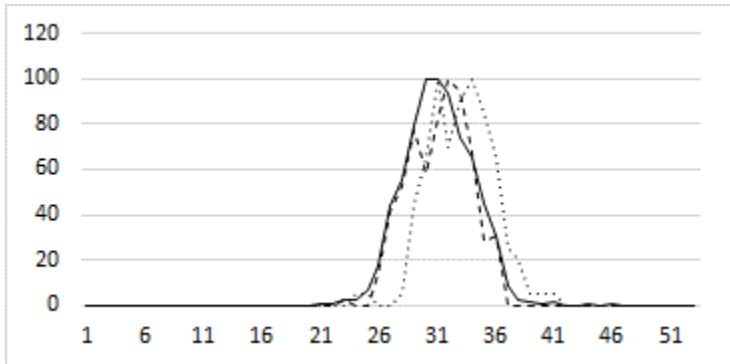
63.025 *Anania hortulata* Small Magpie



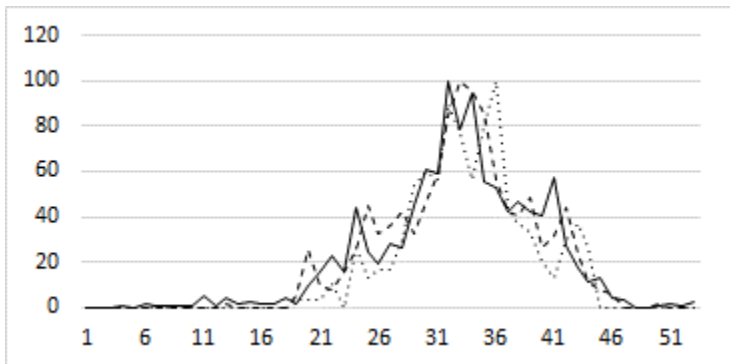
63.031 *Udea ferrugalis* Rusty-dot Pearl



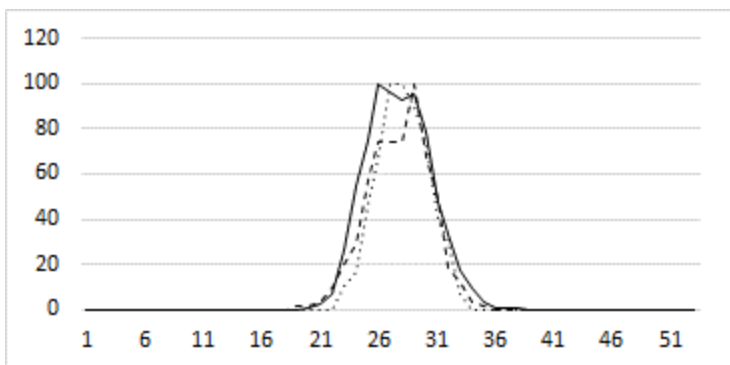
63.038 *Pleuroptya ruralis* Mother of Pearl



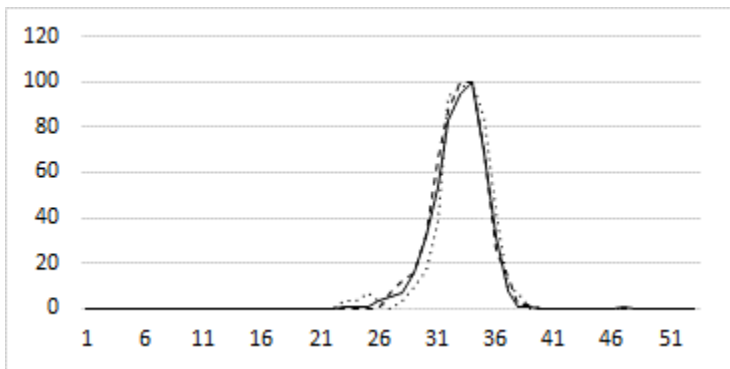
63.052 *Nomophila noctuella* Rush Veneer



63.08 *Chrysoteuchia culmella*



63.089 *Agriphila tristella*



63.093 *Agriphila straminella*

