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Estimating Parasitoid Wasp Assemblages on Fragmented Land : Do Habitat and Trap Type Matter?

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ABSTRACT

Parasitoid wasps are a hyper-diverse monophyletic group of Apocrita (Hymenoptera) that typically oviposit inside or on an arthropodal host, whereafter the wasp larvae obtain nutritional resources for development. Although some species are well-studied as agents in biological control, little is known about the biology of the less diverse and less abundant superfamilies; and even less about assemblages of parasitoid wasp taxa within a given habitat. The aim of the present study was twofold: to estimate parasitoid wasp assemblages within two habitats common in central and northern New Jersey, USA, and to develop a protocol to increase the yield and diversity of parasitoid wasps collected through the use of different trap types, across different months, and in different habitats. Specimens of Chalcidoidea and Ichneumonoidea were most frequently collected; with more Chalcidoidea collected than Ichneumonoidea, which was surprising for the latitude of the study location. Meadow habitats yielded more parasitoid wasps than wooded habitats, and yellow pan traps captured more specimens than flight intercept or malaise traps. Potential factors underlying these outcomes may include availability of hosts, competition, developmental time of the parasitoid offspring, temporal dispersal of adults, and gregarious oviposition. A trapping protocol is suggested, in which strategically utilizing yellow pan traps in a meadow habitat during July would give the highest trapping success in terms of count by unit effort.

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Estimating parasitoid wasp assemblages on fragmented land: do habitat and trap type matter?

by

Matthew Charles Christopher Havers

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INTRODUCTION

The life history of parasitoid wasps has been well-studied; generally, parasitoid wasps deposit eggs either externally or internally on the pre-adult developmental stages of other arthropods (Godfray 1994; Goulet & Huber 1993; Sharkey et al. 2012; Quicke 1997). The parasitoid larva inevitably kills the host invertebrate, but there are exceptions within this diverse group that function as pollinators, such as the fig wasp (Chalcidoidea) (Godfray 1994), or herbivores like the gall-forming cynipids (Quicke 1997). This parasitoid life history may be a key driver to speciation (Sharkey et al. 2012; Peters et al. 2017) and the resulting high biodiversity of this monophyletic group of Hymenoptera. The group includes herbivores, predators, pollinators and parasitoids that can occupy pivotal roles in terrestrial ecosystems (Quicke 1997). The family Braconidae, for example, is one of the most diverse families of parasitoid wasps, and braconid species are known to parasitize every life stage of species in all the insect orders with holometabolous development (Brajković et al. 1999).

Estimates of the number of species of Hymenoptera may be as many as one million species, described and undescribed (Grimaldi & Engle 2005; Agular et al. 2013). The two most diverse parasitoid superfamilies, Ichneumonoidea (ICH) and Chalcidoidea (CAL), are conservatively estimated to comprise at least 47,000 species, while liberal estimates including undescribed species may exceed 650,000 species (Mills, 2009). Genetic barcoding techniques have revealed that parasitoid wasps underwent a major adaptive radiation 281 million years ago.

Analysis of 3256 protein-coding genes of 173 species indicates that parasitoid wasps are monophyletic and originated from a single endophytic ancestor (Peters et al. 2017). Parasitoid wasp radiation may have occurred primarily through ecological speciation, i.e. influenced more by ecological factors such as predators and resource acquisitioning than by geographic barriers (Mayhew 2007). Prey switching may also have been important in the speciation of parasitoid wasps (König et al. 2015). The deep constriction of the first and second abdominal segments (the so-called "wasp-waist") is also thought to have influenced adaptive radiation of the Hymenoptera because of increased abdominal mobility (Vilhelmsen et al. 2010).

Ecological habitat and its modification can have multiple effects on parasitoid abundance, diversity, and community ecology. Plant diversity has been shown to have a strong, positive association with arthropod diversity (including parasitoids), whereas low plant diversity can create a herbivore dominated ecosystem with lower arthropod abundance influencing ecosystem function (Haddad et al. 2009). However, deforestation for agriculture can still result in regionally high parasitoid diversity due to ease of finding hosts although host quality can diminish (Laliberte & Tylianakis 2010). However, fragmentation can create a bottom-up trophic cascade in plant-herbivore-parasitoid tritrophic food webs, leading to local parasitoid extinctions and lower parasitism rates (Fenoglio et al. 2012). Parasitoid diversity can depend on several factors in a habitat and individual species can have specific responses to habitat fragmentation (Didham et al. 1996; Lennartsson 2002). For example, a study in the Czech Republic demonstrated that the abundance of host-specific families of Chalcidoidea are largely reliant on the location of hosts, unlike the more generalist Ichneumonids, for which plant diversity and canopy stratification can have a greater effect on diversity (Šigut et al. 2018). However, species richness and abundance of ichneumonids were adversely impacted by anthropogenic change in Warsaw (Sawoniewiczs 1986).

There are many types of sampling methods and traps used to collect invertebrates. However, the kinds of insects collected can vary among trap types, potentially creating bias in the sample. Two active collection methods commonly used, vacuum and sweep netting, were found to be biased with respect to size, type, developmental stage, and species diversity of the arthropods collected, when implemented in the same habitat in Oklahoma (Doxon et al. 2011). Sweep netting is inexpensive, easy to use, and standardized efforts (per sweep, per area, etc.) allow for replicability (McCravy 2018). But this technique also has drawbacks, including problems of interobserver reliability when more than one person collects samples. Also, insect species with fast locomotion are less likely to be sampled and unswept vegetation will go unsampled (McCravy 2018). Malaise traps, however, are more effective for producing a sample that accurately represents community composition, especially with small mesh size for collection of Hymenoptera (Noyes 1989). Unfortunately, malaise traps can be costly and time consuming to manage. Pan traps are also effective for trapping small Hymenoptera (McCravy & Ruholl 2017; Noyes 1989) and can be deployed in a transect with minimal effort and expense. However, pan traps tend to capture a large number of pollinators (McCravy & Ruholl 2017), producing a large bycatch that requires significant processing time and can be compromised by environmental factors like evaporation and precipitation, which requires almost daily maintenance. Used in concert, as in a study of Illinois forest and prairie habitats, malaise traps and pan traps can be highly effective (McCravy & Ruholl 2017; McCravy et al. 2019).

The present study examined parasitoid biodiversity in two nature preserves with fragmented deciduous forest and transitional meadows. I sampled woodland and meadow habitats using three types of traps commonly employed in collection of parasitoid wasps. This permitted the estimation of count-based parasitoid wasp abundance in habitats that are representative of most preserved land in rural central and northern New Jersey, U.S.A. I was particularly interested in how factors like seasonality, habitat, site, trap type, and individual traps may be associated with estimates of parasitoid wasp superfamily abundance and diversity. These results may be used to develop trapping protocols that maximize yield of parasitoid wasps of specific superfamilies and increase accuracy of estimation of parasitoid biodiversity.

METHODS

Study Sites and Habitat Delineations

The two habitat types sampled in this study are defined as “woodland” and “meadow”. They are delineated by the vegetation found within. The two woodland habitats were characterized in this study as a fragmented mixed deciduous forest ecosystem with a clearly defined canopy and subcanopy of woody plants, a sparse herbaceous layer and ever-present vegetative detritus in multiple stages of decomposition. The meadow habitats were characterized in this study as a transitional tract of field with no canopy and a dominating layer of non-woody, herbaceous plants commonly found in the local geographical region.

Maureen Ogden Preserve:

The Maureen Ogden Preserve (MOP) is a 92.27 hectare preserve acquired by the New Jersey Conservation Foundation in 2010 from a private citizen located in Long Valley, NJ, with an average temperature of 10.594 C and an average annual precipitation of 133.075cm. The Maureen Ogden Preserve is part of the Highlands physiographic province of New Jersey and part of the Appalachian Highlands geographical region of the United States (https://www.nj.gov). MOP is located atop limestone and Gneiss bedrock and contains loamy soils (Collins & Anderson 1973). The Preserve is in fragmented land and surrounded by a small farm to the southwest, a horse stable business to the west, and small patches of suburban homes to the north, south, and east. The two habitats sampled for this study were "woodland" and "meadow". The woodland habitat was a mixed deciduous forest containing a canopy dominated by several species of *Quercus* and *Acer,* a subcanopy dominated by *Carpinus caroliniana, Fagus grandifolia* and *Betula lenta*, and an herbaceous layer containing *Daucus carota, Eupatorium rugosum,* and *Aster vimineus*. The forest floor was covered with a layer of dead deciduous leaves throughout the year and fallen trees. The meadow habitat vegetation was dominated by *Lobelia spp, Solidago spp, Agrostis spp, Andropogon virginicus, and Setaria viridis*. *Salix spp* and *Rhus spp.* made up an extremely sparse shrub layer.

Hill & Dale/Hell Mountain Preserve:

The Hill and Dale Preserve (HD) is located approximately 22.4 km south by southwest of MOP (Figure 1) and is a 120.60 hectare tract of land owned by the New Jersey Conservation Foundation and is located in Lebanon, NJ, with annual precipitation 150.96cm and average temperature of 10.78 Degrees Celsius (https://www.usclimatedata.com). HD is part of the Piedmont physiographic province of New Jersey and part of the Appalachian Highlands geographic region of the United States (https://www.nj.gov). The bedrock largely consists of shale, argillite, and sandstone with well, to moderately well-drained, loamy soil (Collins & Anderson 1973). The Preserve is surrounded by small farms and suburban/rural neighborhoods. There is a small spring creek that flows into the Rockaway Creek bordering the preserve. As with MOP, the two habitats chosen for trap placement were "woodland" and "meadow". The woodland consisted of a mixed deciduous forest whose canopy is dominated by several *Quercus* and several *Acer* species. The subcanopy was dominated by *Fagus grandifolia* and *Betula lenta,* and the herbaceous layer patched with *Gaultheria procumbens, Monotropa uniflora,* and

Daucus carota. The meadow habitat used in this study had a very similar vegetation abundance (dominated by *Lobelia spp, Solidago spp, Agrostis spp, Andropogon virginicus,* and *Setaria viridis*), but with no *Salix spp* or *Rhus spp.*

Collection Methods:

The collection period of this study was 5/18/17 to 10/25/17. All traps used passive collection methods to mitigate bias in human sampling effort and the traps ran continuously (i.e. as soon as one sample was collected the trap was reset). The traps used for collection (Figure 2) included malaise traps (MT), flight intercept traps (FI), and yellow pan traps (PT). The flight intercept traps were constructed from black mosquito netting with an aperture of 1.7 x 0.8mm with cord attached to each corner by 0.94 cm brass grommets (General Tools & Instruments New York, New York 10013). The flight intercept traps were 125cm x 70cm and suspended approximately 40cm above the ground. Directly below the netting were two rows of five .355L blue plastic bowls (Signature Home Pleasanton, CA 94566) (Figure 2). The traps were placed in areas that showed characteristics of flight paths such as openings through vegetation that act as flight corridors for insects. For example, moths that fly parallel to hedgerows (Coulthard et al. 2016) and several species of Hymenoptera, Coleoptera, and Lepidoptera where individuals are known to disperse through vegetative corridors in rainforests (Hill 1995). Blue bowls (instead of yellow) and a larger mesh size were used to construct these flight intercept traps to minimize overlap in materials used for the three trap types. This was to ensure that each trap type was as unique as possible. Additionally, blue pan traps are known to be successful for capturing Hymenoptera (Cambell & Hanula 2007).

The malaise traps were Towne's style malaise traps invented by Swedish entomologist René Edmond Malaise and are a popular flying insect collection method. The dimensions of the malaise traps (MT) were L165 x W115 x H190 cm comprised of polyester netting (96 x 26 | 680 µm aperture). A plastic kill jar at the top of the trap had a volume of 500ml (Figure 2).

To create the yellow pan traps (often called the Moericke pan trap), 25 0.355L disposable, yellow plastic bowls (Dart Container Corporation Mason, MI 48854) were placed evenly in a square grid with an area of 16 square meters containing 25 bowls arranged in the grid equidistant from each other. The bowls were secured to the ground by a pair of 30cm long bamboo skewers (Figure 2). When set, a solution of iodized salt (Morton Salt Inc, Chicago, IL 60606), dishwashing soap (Procter & Gamble Cincinnati, OH 45202), and tap water was placed in each bowl. The ratio of the solution was 5ml of soap to approximately 11.625g of salt per 1L of water. The 0.355L blue bowls used in FI contained the same solution as the yellow pan traps (PT). Dish soap was used to break the surface tension of the solution, allowing insects to fall into the solution and perish. Salt was placed in the solution to slow evaporation. The amount of solution administered to the bowls varied depending on current and predicted future weather over the next few days. This variation was required for two reasons: 1) to prevent the bowls from overflowing with rain, or (2) to prevent evaporation during sunny, hot days. For the MT killjars, 225ml of 70% isopropyl rubbing alcohol (Better Living Brands LLC Pleasanton, CA 94566) was used. The volatility of the isopropyl alcohol aided in the insect collection of the kill jar and facilitated the preservation of samples.

After the samples were transported to the laboratory, all specimens of Hymenoptera were separated and the bycatch disposed of. The total hymenopterans were then counted from each trap (the 25 yellow bowls set up in a grid considered 1 PT) after each sampling session. All non-parasitoid hymenopterans were preserved in 70% ethanol and preserved for potential later study. The remaining parasitoid wasps were then identified to the 11 superfamilies and counted. Identifications were aided by Goulet & Huber, 1993.

Trap Placement:

One of each type of trap was placed in each of the two habitats (Figure3). In MOP a Malaise Trap (MT) was placed in the woodland habitat (Lat 40° 49', 32.9"N; 74° 45' 4.6''W; altitude 325.9m). The yellow pan traps (PT) placed in MOP were located at 40° 49' 25.5" N, 74° 44' 59.5" W (altitude 275.6m) in the meadow habitat. A flight intercept trap (FI) was also placed in the meadow habitat located at MOP (40° 49' 28" N, 74* 44' 59.9" W). Hill & Dale Preserve had a PT (40° 41' 6.5" N; 74° 46' 47.8" W) and a FI (40° 41' 74.3"N; 74° 46' 46.8" W) set in the woodland habitat. The PT was set at an elevation of 87.3m and the FI had an elevation of 91.7m. A MT was placed in the meadow habitat (40° 41' 0.6" N; 74° 46' 46.1" N) at an elevation of -25.167m.

Statistical Analysis:

All analyses were performed in JMP Pro (JMP®, Version *14.2*. SAS Institute Inc., Cary, NC, 1989-2019). Collection days varied due to environmental variables such as precipitation or aridity so the data were normalized so that each sample took place across 10 days, with each trap actively running for 170 days total; with samples collected and traps reset every ten days. Data were normalized prior to statistical analyses. Differences in counts were expressed graphically and over time, with the two x-factors being days (0-170) and months (May, June, July, August, September, October). The bivariate Pearson's correlation was performed among the eleven superfamilies collected to determine whether any relationships occurred. It was decided *a priori* that only relationships between 0.5-1.0 & -0.5- -1.0 would be reported in the Results; although the full correlation table can be found in the Appendix (pg. 104). Non-parametric Wilcoxon/Kruskal-Wallis Tests were performed to elucidate any potential effect a number of independent variables would have on the number of parasitoid wasps collected as a whole and at the superfamily level. The independent variables included Months (6 levels= May, June, July, August, September & October), Trap (6 levels= HDFI, HDMT, HDPT, MOPFI, MOPMT, & MOPPT; with HD and MOP denoting Hill & Dale and Maureen Ogden respectively, and FI, MT, and PT denoting Flight Intercept, Malaise Trap, and Yellow Pan Trap, respectively), Trap Type (3 levels= Flight Intercept, Malaise Trap, Pan Trap), Habitat (2 levels= Meadow & Woodland), and Site (2 levels= HD & MOP). Comparisons on all pairs using the Steel-Dwass Method were performed *post-hoc*. A Bonferroni correction was administered to the study-wide alpha level of 0.05 in analyses using the factors Month and Trap. The adjusted alpha value for these analyses was 0.0033. When the factors Trap Type, Habitat, and Site contained the highest mean of a dependent variable (superfamily), then that factor was considered the preferable factor to use when attempting to collect parasitoid wasps of that taxon. Means, degrees of freedom, critical values, and p-values were reported where applicable; but a list of means tables, Wilcoxon/Kruskal-Wallis tables, and pair comparison tables can be found in the Appendices (pg. 56).

RESULTS

A total of 8287 parasitoid wasps, representing all of the 11 Superfamilies found on the North American continent, was collected during the 170 day sampling period (Figure 4). The average number of the 11 superfamilies collected per sampling effort (sampling effort being 10-day periods) is found in Table 1.

Table 1. Total Parasitoid wasps collected throughout the 170 day sampling period, N, and the average number of parasitoid wasps collected per 10-day sampling effort. Superfamilies: Ichneumonoidea (ICH), Chalcidoidea (CAL), Diaprioidea (DIA), Proctotrupoidea (PRC), Cynipoidea (CYN), Platygastroidea (PLT), Ceraphronoidea (CER), Evanioidea (EVN), Mymarommatoidea (MYM), Stephanoidea (STF).

SF	ICH	CAL	DIA	PRC	CYN	PLT	CER	EVN	MYM	STF	TRI
N	2291	2758	650	918	645	623	177	75	90	29	45
Mean	134.76	162.24	38.24	54	37.94	36.65	10.41	4.1	5.29	1.71	2.65

There was variation among the different superfamilies in seasonal patterns of abundance. Ichneumonoidea exhibited two distinct peaks in capture frequency (Figure 5), one between June and July; and one in September. Chalcidoidea were captured in two distinct peaks, one in July and the second in August/September. Diaprioidea and Proctotrupoidea had one distinct peak in August (Figure 5). Cynipoidea had one distinct peak in July. Platygastroidea reported one peak in July. Ceraphronoidea were collected in two distinct peaks in the sampling period, the largest being in June and a second peak in September (Figure 6). Evanioidea had one distinct peak in June. Mymarommatoidea had 1 distinct peak in July. Stephanoidea had two small peaks in July and September. Trigonalioidea had one distinct peak in June and a smaller peak in September and October.

There appeared to be associations among certain families in patterns of seasonal abundance. For example, Ichneumonoidea exhibited a notable, positive correlation with Chalcidoidea, Cynipoidea, and Platygastroidea. Chalcidoidea had a strong, positive relationship with the superfamilies Cynipoidea and Platygastroidea, and a notable, positive relationship with Mymarommatoidea. The strongest positive association occurred between Diaprioidea and Proctotrupoidea (Table 2).

Table 2: Correlation table showing notable and strong relationships among Superfamilies and the associated p-values (in parenthesis). Weak relationships are red, notable relationships in yellow, and strong relationships in green.

Row	ICH	CAL	DIA	PRC	CYN	PLT	MYM
ICH	1 (<0.0001)	0.7617 (<0.0001)	0.354 (0.0003)	0.3303 (0.0007)	0.7392 (<0.0001)	0.6837 (<0.0001)	0.4984 (<0.0001)
CAL	0.7817 (<0.0001)	1 (<0.0001)	0.1089 (0.2758)	0.0818 (0.4139)	0.8125 (<0.0001)	0.8282 (<0.0001)	0.5148 (<0.0001)
DIA	0.354 (0.0003)	0.1089 (0.2758)	1	0.9967 (<0.0001)	0.2819 (0.0041)	0.1379 (0.1669)	-0.0281 (0.7791)
PRC	0.3303 (0.0007)	0.0818 (0.4139)	0.9967 (<0.0001)	1 (<0.0001)	0.2527 (0.0104)	0.1169 (0.2420)	-0.0282 (0.7791)
CYN	0.7392 (<0.0001)	0.8125 (<0.0001)	0.2819 (0.0041)	0.2527 (0.0104)	1 (<0.0001)	0.8625 (<0.0001)	0.469 (<0.0001)
PLT	0.6837 (<0.0001)	0.8282 (<0.0001)	0.1379 (0.1669)	0.1169 (0.2420)	0.8625 (<0.0001)	1 (<0.0001)	0.5627 (<0.0001)
MYM	0.4984 (<0.0001)	0.5148 (<0.0001)	-0.0281 (0.7791)	-0.0282 (0.7781)	0.469 (<0.0001)	0.5627 (<0.0001)	1 (<0.0001)

Habitat Type and Study Site.

Habitat type was significantly associated with the number of all parasitoid wasps collected (df=1, H=48.5615, p<0.0001, Figure 10). The meadow habitat collected an average of

10.21 per trap per day and accounted for 69.13% of the total parasitoid wasps collected; while the woodland habitat collected an average of 4.56 per trap per day and contained 30.87% of all parasitoid wasps collected. Habitat type was also significantly associated with collection frequencies of Ichneumonoidea, Chalcidoidea, Cynipoidea, Platygastroidea, Evanioidea, Mymarommatoidea, Stephanoidea, and Trigonalioidea. There was no statistically significant association between habitat type and collection frequency of Diaprioidea, Proctotrupoidea, and Ceraphronoidea (Table 3). All Superfamilies were collected more often in the meadow habitat with the exceptions of Diaprioidea and Proctotrupoidea.

Table 3: Results of the Wilcoxon Rank Sums Test for each Superfamily and habitat.

SF	**ICH**	**CAL**	**DIA**	**PRC**	**CYN**	**PLT**	**CER**	**EVN**	**MYM**	**STF**	**TRI**
df	1	1	1	1	1	1	1	1	1	1	1
H	6.7452	22.4225	0.0017	0.0097	15.7841	22.9777	0.0097	18.3791	22.6328	9.5558	8.8196
p	0.0094	<0.0001	0.9671	0.9217	<0.0001	<0.0001	0.1748	<0.0001	<0.0001	0.0022	0.0030

Overall, more parasitoids were collected at HD than at MOP (df=1, H=7.5764, p=0.0059). HD had an average of 9.08 parasitoid wasps collected per trap per day and accounted for 61.47% of all parasitoid wasps collected; while MOP had an average of 5.69 collected per trap per day and contained 38.53% of all parasitoid wasps collected. There were significant differences between sites in the frequency of Ichneumonoidea, Diaprioidea, Proctotrupoidea, Cynipoidea, and Ceraphronoidea collected; all of which were collected more often at the Hill & Dale Preserve. There were no significant differences between sites in the number of

Chalcidoidea, Platygastroidea, Evanioidea, Mymarommatiodea, Stephanoidea, and Trigonalioidea collected (Table 4).

Table 4: Results of the Wilcoxon Rank Sums Test between each Superfamily and site.

SF	**ICH**	**CAL**	**DIA**	**PRC**	**CYN**	**PLT**	**CER**	**EVN**	**MYM**	**STF**	**TRI**
df	1	1	1	1	1	1	1	1	1	1	1
H	25.8354	0.072	9.0017	11.1290	5.8395	0.6087	6.5177	1.3186	0.7857	2.9973	1.3414
p	<0.0001	0.7888	0.0027	0.0008	0.0157	0.4353	0.0107	0.2420	0.3754	0.0834	0.2468
Site	HD	*na*	HD	HD	HD	*na*	HD	*na*	*na*	*na*	*na*

Month.

Seasonality was significantly associated with the number of all parasitoid wasps collected (df=5, H=30.7256, p<0.0001), with the highest overall average frequency in June (10.1718) and accounting for 23.59% of all parasitoid wasps collected (Figure 7). Overall, the collection means were significantly different (Bonferroni corrected alpha = 0.0033) between three seasons: June, mean=7.6210 versus May, mean=3.5657; October, mean=4.1253 versus July, mean=10.1718; and October versus June). However, when superfamilies were analyzed separately by month, time of year was not significantly associated with the number of parasitoid wasps collected from each superfamily.

Trap Type.

Trap type had a significant effect on the overall number of parasitoid wasps collected (df=2, H=194.3048, p<0.0001)(Figure 9). The flight intercept traps had an average of 0.7513 parasitoid wasps caught per trap per day and represented 3.36% of all parasitoid wasps caught and the malaise traps had a mean of 8.6938 and represented 39.23% of all parasitoid wasps caught; while the pan traps had a mean of 12.7142 and represented 57.38% of parasitoid wasps caught. The Steel-Dwass Method indicated all 3 pairs of means were statistically significantly different from each other at alpha-values 0.05 Trap type had a significant effect on collection frequency of all superfamilies except Evanioidea (Table 5).

Table 5: Results of the Kruskal-Wallis Rank Sums Test among each Superfamily and statistically significant Steel-Dwass pairs and the 3 trap types.

SF	**ICH**	**CAL**	**DIA**	**PRC**	**CYN**	**PLT**	**CER**	**EVN**	**MYM**	**STF**	**TRI**
df	2	2	2	2	2	2	2	2	2	2	2
H	61.4321	38.3320	57.3077	48.2210	31.2152	32.7980	17.6964	0.1247	9.2589	8.6349	27.6905
p	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.9395	0.0098	0.0133	<0.0001
Pairs With p<0.05	PT/FI MT/FI	PT/FI MT/FI	PT/FI PT/MT MT/FI	PT/FI PT/MT MT/FI	PT/FI MT/FI	PT/FI MT/FI	PT/FI MT/FI PT/MT	None	MT/FI	PT/FI MT/FI	PT/FI MT/FI PT/MT

Individual traps captured a significantly different number of all parasitoid wasps collected (df=5, H=275.1012, p<0.0001), with HDMT having the highest mean 15.5 collected per day, and accounting for 34.98% of the parasitoid wasps collected, followed by HDPT (mean=14.3, 32.27% of total parasitoid wasps collected in this study)(Figure 8). Steel-Dwass pairwise comparisons, however, indicated no statistically significant difference between the means of HDPT & HDMT at the corrected alpha-value of 0.0033. The Steel-Dwass Method indicated 9 of the 15 pairs to have a statistically significant difference in means (alpha= or < 0.0033; Appendix p.g 57). Individual traps had a statistically significant effect on each Superfamily when they were analyzed individually (Table 6).

Table 6: Results of the Kruskal-Wallis Rank Sums Test between Superfamily and the individual traps.

SF	ICH	CAL	DIA	PRC	CYN	PLT	CER	EVN	MYM	STF	TRI
df	5	5	5	5	5	5	5	5	5	5	5
H	73.5007	38.3320	69.1735	63.8609	64.7385	64.8692	31.3063	18.6881	41.0786	20.6262	49.9320
p	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0022	<0.0001	0.0010	<0.0001

DISCUSSION

The large number of chalcids and ichneumonids collected in the present study is unsurprising. These taxa are the two most abundant and species-rich of the parasitoid wasp superfamilies and are known to compete for the same host species (Frederick et al. 1927; Zhang et al. 2017). Indeed, chalcid and ichneumonid larvae have been observed to attack each other if both are found in the same host; as observed in the host larvae of the Lepidopteran *Zygaena filipendulae* in Serbia (Žikic et al. 2013). The superfamily Chalcidoidea represented the highest number of parasitoid wasps in this study and the meadow habitat yielded 88.25% of the chalcids collected. Chalcids are extremely abundant in habitats with canopy-less vegetation, and a diverse assemblage of herbaceous plants and grasses (Kruess & Tscharntke 2002; Todorov et al. 2017); although in studies of urban systems in California and Mexico, there was a decrease in abundance with increased herbaceous richness (Morales et al. 2018). Even in monoculture habitats, such as rice fields, chalcids can be diverse. For example, a chalcid biodiversity survey of rice fields in Northern Iran found no fewer than 16 species from eight families (Hossein et al. 2016). Conversely, a study in Minnesota exploring the relationship between plant functional group diversity and arthropod diversity in an old field found that chalcids were the most abundant superfamily of arthropods within the scope of the study (Symstad et al. 2000). While chalcids are largely parasitoids of other arthropods (Goulet & Huber 1993; Quicke 1997), they also function as pollinators and pests through seed parasitization (Kant et al. 2013). These factors may be indicative of the high chalcid abundance in the meadow habitat of the present study. A biodiversity study of the family Eulophidae (Chalcidoidea) using malaise traps in the herb-shrub layer of a site in Israel proved to be extremely effective at capturing specimens of this taxon

(Yefremova et al. 2013). Micro hymenopteran chalcids are also known to have unusually large dispersal circumferences. One study demonstrated that eulophid species can disperse up to 88 km in a single growing season to locate Mexican bean beetle larvae (Stevens et al. 1975). Long distance dispersal is also necessary for chalcids with hosts that inhabit scattered substrate such as manure (Smith 1988; Southwood 1978; Southwood 1981). Indeed one mymarid species (Hymenoptera: Chalcidoidea) disperses over one km offshore to parasitize its host on oyster bars (Antolin & Strong 1987). This evidence suggests that at least some chalcids collected in the present study may not have spent the entire growing season at the study sites.

Ichneumonids were the second most abundant superfamily of parasitoid wasps collected in this study. A biodiversity study in Sub-Arctic Canada revealed that 75% of all hymenopteran specimens were from Ichneumonoidea and 91% of all hymenopteran specimens collected and identified were parasitoid wasps using DNA barcoding to identify molecular operational taxonomic units (Stalhut et al. 2013) In the present study, malaise traps were the most successful collection method based on the number of individuals caught for Ichneumonoidea; although not significantly different from the pan traps; while the meadow habitat yielded a larger mean number of ichneumonids than the woodland habitat. These results are quite surprising for several reasons. Woodland canopies are known to contain a high diversity and abundance of ichneumon wasps, especially in tall tree canopies (Fraser 2007). Previous studies suggest that old growth forests yield a higher number of ichneumonids than secondary growth communities in the rainforests of Costa Rica and Panama (Shapiro & Pickerling 2000). Biodiversity surveys of Ichneumonoidea in Spain using malaise traps and pan traps detected higher diversity of Ichneumonoidea in ash forests than in a canopy-less habitat while implementing malaise traps, although yellow pan traps collected higher abundances and diversity than malaise traps in the canopy-less habitat (Mazón & Bordera 2008). This is consistent with the lack of difference between the two trap types in the present study. These results align with other studies of the biology and ecology of Ichneumonoidea, a highly diverse superfamily (Quicke 2015), with large abundances and biodiversity at latitudes found within the two study sites. A long ovipositor adapted for parasitizing larvae in rotting trees is a common morphological trait found within the Superfamily(Quicke 2015). Relative abundance of several ichneumonid families can also be associated with the vertical stratification of their hosts in broadleaf deciduous forests (Šigut et al. 2018). Similarly, vertical stratification might explain why fewer ichneumonids than chalcids were collected in the present study, when most research suggests that Ichneumonoidea are the most abundant superfamily at the latitudes of the study sites (Fraser 2007; Shapiro & Pickerling 2000). Additionally, studies of ichneumonid assemblages in Ghana suggest the cosmopolitan subfamily Rhyssinae favors primary forests and habitats with a substantial amount of dead wood (Hopkins et al. 2019). Hence adding malaise traps to the canopy of deciduous forests might yield a more accurate sample.

The large number of Proctotrupoidea and Diaprioidea specimens collected in late summer from the pan traps in the woodland habitat could potentially be explained by gregarious oviposition; which has been found in small-bodied species in both superfamilies (Mayhew 1998). However body size has also shown a positive, linear relationship in terms of amount of eggs laid regardless of gregariousness (Segoli & Rosenheim 2015). Interestingly Diaprioidea was once considered a family of Proctotrupoidea by earlier taxonomists due to similar morphology and life history (Quicke 1997). Members of Proctotrupoidea and Diapridea have been known to parasitize hosts found in leaf litter (Early & Dugdale 1994; Madl 2015). Leaf litter covered the top soil in both woodland habitats in this study.

Cynipoidea are known for gall-forming in *Quercus* leaves and many other herbaceous plants and are most diverse in temperate zones of the northern hemisphere (Ronquis et al. 2015). However parasitoid cynipids do exist and make up around 30% of species within the superfamily (Stone et al. 2002). These species parasitize larvae of holometabolous insects in pine cones, rotting wood, and larvae-formed galls found in organs of woody and herbaceous plants (Ronquis 1999; Ronquis et al. 2015; Buffington et al. 2011). The meadow habitat yielded 80.37% of the cynipids collected in this study; however, like Ichneumonoidea, a more effective sampling technique would include malaise traps in the canopy because of their galling nature in oaks. However in Maine Cynipoidea exhibited little difference in abundance among vertical gradients in fragmented habitat consisting of forest and lowland blueberry patches (Karem et al. 2006).

Platygastroidea is a superfamily of parasitoid wasp in which all members are parasitoids of arthropods, are common in nearctic regions, and have been successfully used in biocontrol to reduce the host population size to ineffectual numbers (Petrov 2013). Unfortunately, most of the biology that is known for Platygastroidea comes from biological control studies which represent only a few genera of Platygastroidea diversity (Austin et al. 2005). The meadow habitat of the present study yielded nearly 85% of the total Platygastroidea collected, and there was no difference in the yield between MOPPT and HDMT. Graphical representation of the data indicated no sharp peaks or depressions in the frequencies of Platygastroidea collected throughout the seasons, rather the curve was parabolic over time. This could potentially be associated with the propensity for Platygastroidea to parasitize multiple life stages of its arthropod hosts. For instance, the majority of scelionid species (Platygastroidea) parasitize the egg stage of their hosts; while the majority of species found in Platygastridae (Platygastroidea) parasitize the larval and nymphal stages (Austin et al. 2005).

Evanioidea comprised less than one percent of all the parasitoid wasps collected in this study. The biology and ecology of Evanioidea found in North America and Europe might limit the group to relatively low abundance. For example, North American Aulacidae (Evanioidea) parasitize larvae of woodwasps (Xiphydriidae) (Carlson 1979; Gauld & Bolton 1996); a host-type with long larval stages that can last years. An evanioid female lays a single egg into an egg of the woodwasp and when the host larva hatches so does the parasitoid. The larval parasitoid causes delays in host larval development, often causing the host larva to feed for years before the parasitoid eats its way out of the host to pupate (Thompson 1960; Smith 1996). Xiphydriidae (Evanioidea) larvae commonly feed on tree species in *Acer, Quercus, Betula, Fagus,* and *Rhus* (Townes 1951; Smith 1996; 2001); all species that were found among the two study sites. The majority of Evanioidea were caught in the meadow habitat, which is not surprising because many adult Aulacidae and Gasteruptiidae feed on the nectar or pollen of herbaceous plants (Jennings & Austin 2004). The large early summer spike in collection is consistent with evidence that suggests many North American Evaniodea metamorphose into adulthood from May-July (Smith 1996). These long generation times and patterns of solitary oviposition may be associated with the small numbers of Evanioidea caught while trapping and a multi-year trapping effort may be required to collect a more accurate abundance estimate of Evanioidea.

Trigonalidea are known to be very diverse and cosmopolitan, but not particularly abundant (Carmean & Kimsey 1998). This lack of abundance was observed in the present study, with Trigonalidea specimens representing only 0.53% of all parasitoid wasps collected; and only 45 individuals were captured during the 170 day study period. The rarity of the superfamily in this study could potentially be due to the very specialist life history many northern hemisphere species exhibit. Although some species parasitise the larvae of sawflies and yellow jackets directly (Carmean et al. 1981), many require two hosts to complete one generation. The female deposits hundreds or sometimes thousands of eggs on a leaf, after which a phytophagous sawfly larvae may consume them. Once the eggs are consumed, the Trigonalidae larvae hatch into the host gut. When an ichneumonid wasp subsequently super parasitizes the host larva, or a yellow jacket preys on the sawfly larva (Carmean et al. 1981; Clausen 1940), the Trigonalidea larva will either attack the eggs of the Ichneumonoidea, or travel with the yellow jacket female as it transports the host back to its nest. The Trigonalidea larva will then attack the larvae of the yellow jacket (Carmean 1991). Remarkably, while many Trigonalidea eggs will hatch in a host, only one Trigonalidea adult has ever been recorded to emerge from the host (Carmean 1991). This “two hosts, one offspring” extreme specialist life history is possibly associated with the small number of Trigonalidea collected in the present study. The effectiveness of MOPPT relative to the other traps for collection of Trigonalidea could potentially be due to the large number of ichneumonids and braconids collected in that trap, and the large number of yellow jackets caught in MOPPT (observational data).

Mymarommatidea are some of the smallest hymenoptera, with adult body length usually between 0.3-0.8 mm (Gibson et al. 2007). While considered rare, micro hymenopterans are generally difficult to collect, often requiring small mesh size in traps for success (Darling & Packer 1988). The small mesh aperture of the malaise traps used in this study seemed to aid in the collection of Mymarommatidea, with the malaise traps capturing 71% of mymarommatid specimens. However 94.4% of the Mymarommatidea in this study were collected in the meadow habitat, even though most Mymarommatidea are known to inhabit deciduous forest, especially amongst the leaf litter (Clouatre et al. 1989). Conversely, Mymarommatiodea have also been associated with low vegetation in earlier studies (Bakkendorf 1948). Clearly more field studies of Mymarommatoidea are needed, especially because approximately half of all known species are extinct and their biology only theorized from amber and fossils (Engel & Grimaldi 2007).

Also uncommon in the present study were the Stephanoidea, which are known to be extremely rare and considered the most basal superfamily of Apocrita, being ichneumonid-like in appearance (Sharkey et al. 2012). Stephanoids are most common in the subtropics (Hong et al. 2011). The superfamily primarily parasitizes the larvae of xylophagous Hymenopterans and Coleopterans (Goulet & Huber 1993). Interestingly, in this study the meadow habitat yielded more Stephanoidea than the woodland habitat. Other than phylogeny, little is known about the biology of Stephanoidea, save for the North American species *Schlettererius cinctipes*, which has been used as successful biological control against xylophagous hymenopterans in Tasmania (Hong et al. 2011). It is unclear the effect ecological factors play on the abundance of Stephanoidea and research into the ecology of this superfamily is needed.

Ceraphronoidea is one of the least speciose superfamilies and little is known about the biology of the group. Interestingly, however, Ceraphronoidea are known to parasitize a wide range of hosts that are not usually hosts for most families of parasitoid wasps, such as the

Neuroptera and Mecoptera, and can also be hyperparasitoids of parasitoids of the braconid family of wasps (Ichneumonoidea) (Goulet & Huber 1993; Johnson & Musetti 2004). A wide range of hosts could potentially be a factor in why habitat type was not significantly associated with collection of Ceraphronoidea in the present study.

Interestingly, there were no notable negative relationships among the superfamilies in the present study. The lack of negative relationships might seemingly be explained by a lack of competitive exclusion among adults; and while this was once a favored hypothesis (Price 1972), it was most likely due to the difficulty of diagnosing competitive behavior in adults. More recent studies indicate that in the presence of competitors, ichneumonid and platygastroid wasps alter niche sizes to minimize competition (Baur & Yeargan 1995; Bogran et al. 2002) or directly engage in competitive exclusion (Sorribus et al. 2010). Furthermore, there is evidence that parasitoids of different species that attack the same host have evolved life history traits that minimize antagonistic behaviour (Harvey et al. 2013). These include changes in egg load, searching strategies, ability to differentiate if a host is already parasitised, and ability to utilize different host developmental stages (Elzinga et al. 2013; Hawkins 1994). These strategies, compounded by temporal factors that can have effects on community dynamics such as habitat size (Pedersen & Mills 2004), are all variables that a relationship would not convey.

The low specimen yield of the FI traps could possibly have been due to the aperture of the mesh used in the present study. Evanioidea was the only superfamily with the highest (although not significant) yield in the flight intercept traps. A count-based study performed in Pinery Provincial Park in southern Ontario suggested that while larger mesh sizes in malaise trap might be efficient in collecting Aculeata and Ichneumonidae, smaller mesh aperture collected more micro hymenopterans (Darling & Packer 1988). The low yield was also surprising because the bottom of the trap implemented blue pan traps, which have been successful in collecting hymenopterans in South Carolinian woodlands (Campbell & Hanula 2007). While there was a statistically significant difference in the number of parasitoid wasps collected in malaise traps versus yellow pan traps, there was no statistical significance between the Maureen Ogden Preserve yellow pan trap (MOPPT) and the Hill & Dale Preserve malaise trap (HDMT). Both trap types were located in the meadow habitat, which yielded more total parasitoid wasps. This could potentially indicate there is no trapping bias in the meadow habitat in terms of implementing a yellow pan trap or a malaise trap.

CONCLUSION

The yellow pan traps overall were most effective for collection of parasitoids, although the malaise trap in the meadow habitat yielded the most parasitoid wasps of all individual traps. The meadow habitat yielded a larger number of specimens than the woodland. The summer seasons were the most successful time to collect. Ichneumonoidea and chalcidoidea were the most abundant superfamilies of parasitoid wasps collected. Surprisingly more chalcidoidea were collected than Ichneumonoidea. There may be two reasons for this. Ichneumonoidea sampling was incomplete without traps in the canopy of the woodland and the large dispersal area that some families in Chalcidoidea exhibit could suggest some of the Chalcidoidea collected were not resident and were dispersing to another area. Therefore, it is possible that Ichneumonoidea were undersampled and Chalcidoidea over-sampled. The rare occurrences of Evanioidea and Trigonaloidea were likely products of the life histories of some species; namely that Evanoidea parasitizes host species with multi-year larval stages and the extreme specialist nature of many Trigonaloidea families. The lack of habitat preference exhibited by Ceraphronoidea could potentially be attributed the diverse array of hosts the group parasitises. The larger Ichneumonoidea and Chalcidoidea superfamilies exhibit a similarly diverse host list; however, both superfamilies were found in the meadow more than the woodland habitat with statistical significance.

The results of this study can be used to formulate a protocol for successful trapping of all, or any, of the 11 parasitoid wasp superfamilies in a mixed-oak, fragmented forest with transitional fields (Table 7). Interestingly some trap types seem to have similar trapping efficacy for certain families, especially malaise and yellow pan traps. Flight intercept traps were clearly less effective than the other trap types and the mesh size used here to construct the traps is not recommended. The success of the malaise and yellow pan traps indicates that a combination of the two trap types be implemented; either by placing pans below the netting of the malaise traps or to deploy the two in tandem. It would be helpful to replicate these recommendations at different latitudes of the USA to better understand the community composition of parasitoid wasp superfamilies and to determine if community structure changes across latitudinal gradients. These trapping protocols could further be employed to examine variation in abundance and community composition associated with urbanization and habitat fragmentation at more local scales.

Table (7): Trapping protocol based on the results and design of this study. P-values marked with an * indicate there was no statistical significant difference between the means of the malaise trap and yellow pan trap. P-values marked with a ^ indicate the opposite.

SF	Season/P-value	Habitat/P-value	Trap Type/P-value
Parasitoid Wasps	Mid Summer/ <0.0001	Meadow/ <0.0001	Yellow Pan Trap <0.0001
Ichneumonoidea	Mid Summer/ 0.5549	Meadow/ 0.0094	Malaise Trap/ <0.0001*
Chalcidoidea	Mid Summer/ 0.1889	Meadow/ <0.0001	Yellow Pan Trap/ <0.0001^
Diaprioidea	Late Summer/ 0.3204	Woodland/ 0.9671	Yellow Pan Trap/ <0.0001
Proctotrupoidea	Late Summer/ 0.5010	Woodland/ 0.9217	Yellow Pan Trap/ 0.0001
Cynipoidea	Mid Summer/ 0.0786	Meadow/ <0.0001	Yellow Pan Trap/ <0.0001^
Platygastroidea	Mid Summer/ 0.5579	Meadow/ <0.0001	Yellow Pan Trap/ <0.0001^
Ceraphronoidea	Early Summer/	Meadow/	Yellow Pan Trap/

	0.0088	0.1748	0.0001
Evanioidea	Early Summer/ 0.0061	Meadow/ <0.0001	Flight Intercept/ 0.9395
Mymarommatoidea	Mid Summer/ 0.7006	Meadow/ <0.0001	Malaise Trap/ 0.0098*
Stephanoidea	Early Summer/ 0. 1963	Meadow/ 0.0020	Yellow Pan Trap/ 0.0133^
Trigonalidea	Mid Summer/ 0.2644	Meadow/ 0.0030	Yellow Pan Trap/ <0.0001

LITERATURE CITED

Agular AP, Deans AR, Engel MS, Forshage M, Huber JT, Jennings JT, Johnson NF, Lelej A, Longino JT, Lohrmann V (2013). Order Hymenoptera. *Zootaxa,* vol. 3703, pp. 51-62

Antolin MF & Strong DR (1987). Long-distance dispersal by a parasitoid (*Anagrus delicatus,* Mymaridae) and its host. *Oecologia,* vol. 73, pp. 288-292.

Austin AD, Johnson NF, Dowton M (2005). Systematics, evolution, and biology of scelionid and platygastrid wasps. *Annual Review of Entomology*, vol. 50, pp. 553-82. DOI: 10.1146/annurev.ento.50.071803.130500

Bakkendorf O (1948). A comparison of a mymarid from Baltic amber with a recent species, Petiolaria anomala (Micro-Hym.). *Entomologiske Meddeleleser,* vol. 25, pp. 213-218.

Baur ME, Yeargan KV (1995). Host selection and larval interactions among three primary parasitoids of Plathypena scabra (Lep.: Noctuidae). *Entomophaga*, vol. 40, pp. 357–66

Bogran CE, Heinz KM, Ciomperlik MA (2002). Interspecific competition among insect parasitoids: field experiments with whiteflies as hosts in cotton. *Ecology*, vol. 83, pp. 653–68

Brajković M, Krunić M, Tomanović Ź, Stanisavljević LJ (1999). Morphological adaptations of the ovipositor of braconid wasps (Braconidae: Hymenoptera) associated to biological characteristics of their hosts. *Acta entomologica serbica*, vol. 4 (1/2), pp. 107-125.

Buffington M, Nieves-Aldrey JL (2011). Revision of Plectocynipinae(Hymenoptera:Figitidae) with descriptions of a new genus and three new species from Chile. *Proc Entomol Soc Wash*, vol. 13, pp. 91–108.

Campbell, JW & Hanula, JL (2007). Efficiency of Malaise traps and colored pan traps for collecting flower visiting insects from three forested ecosystems. *Journal of Insect Conservation.* Vol. 11, pp.399-408. DOI: 10.10007/s10841-006-9055-4.

Carlson RW (1979). Superfamily Evanioidea. *Catalog of Hymenoptera in America North of Mexico,* vol. 1, pp. 1109-1118.

Carmean D, Akre RD, Zack RS, Reed HC (1981). Notes on the yellowjacket parasite Bareogonalis(sic) canadensis (Hymenoptera: Trigonalidae). *Entomological news*, vol. 92, pp. 23-26.

Carmean D (1991). Biology of the Trigonalyidae (Hymenoptera), with notes on the vespine parasitoid Bareogonaloscanadensis, *New Zealand Journal of Zoology*, vol. 18 (2), pp.209-214. DOI: 10.1080/03014223.1991.10757968

Carmean D & Kimsey L (1998). "Phylogenetic revision of the parasitoid wasp family Trigonalidae (Hymenoptera)". *Systematic Entomology*, vol 23 (1), pp. 35–76. doi:10.1046/j.1365-3113.1998.00042.x. ISSN 1365-3113.

Clouatre, A., D. Coderre, and D. Gagnon. (1989). Habitat of a new Mymarommatidae found in southern Quebec, Canada (Hymenoptera: Terebrantes). *The Canadian Entomologist*, vol. 12, pp. 825-826.

Coulthard E, McCollin D, & Littlemore J(2016).The use of hedgerows as flight paths by moths in intensive farmland landscapes. *Journal of Insect Conservation*.,Vol. 20: (345). https://doi.org/10.1007/s10841-016-9864-z

Darling DC, Packer L (1988). Effectiveness of malaise traps in collecting hymenoptera: the influence of trap design, mesh size, and location. *The Canadian Entomologist,* vol. 120, pp. 787-796. DOI:10.4039/Ent120787-8

Didham RK, Ghazoul J, Stork NE et al (1996). Insects in fragmented forests: a functional approach. *Trends in Ecology and Evolution,* vol. 11(6), pp. 255–260

Doxon ED, Davis CA, Fuhlendorf SD (2001). Comparison of two methods for sampling invertebrates: vacuum and sweep-net sampling. *Journal of Field Ornithology*, vol. 82(1), pp. 60–67

Elzinga JA, Zwakhals K, Harvey JA, Biere A (2007). The parasitoid complex associated with the herbivore Hadena bicruris (Lepidoptera: Noctuidae) on Silene latifolia (Caryophyllaceae) in the Netherlands. *Journal of Natural History*, vol. 41, pp. 101–23

Engel, M.S.; Grimaldi, D.A. (2007) New false fairy wasps in Cretaceous amber from New Jersey and Myanmar (Hymenoptera: Mymarommatoidea). *Transactions of the Kansas Academy of Science,* vol. 110, pp. 159–168.

Early & Dugdale (1994). Fustiserphus (Hymenoptera: Proctotrupidae) parasitises Lepidoptera in leaf litter in New Zealand. *New Zealand Journal of Zoology*, vol. 21(33), pp. 249-252, DOI: 10.1080/03014223.1994.9517992.

Fenoglio MAS, Srivastava D, Valladares G, Cagnolo L, Salvo A (2012). Forest fragmentation reduces parasitism via species loss at multiple trophic levels. *Ecology*, 93(11), 2012, pp. 2407–2420.

Fraser SEM, Dythan C, Mayhew PJ (2007).Determinants of parasitoid abundance and diversity in woodland habitats. *Journal of Applied Ecology* vol. 44, pp. 352–361.doi: 10.1111/j.1365-2664.2006.01266.x

Frederick C, Muesbeck M, Dohanian SM (1927). A Study in Hyperparasitism, with Particular Reference to the Parasites of *Apanteles melanoscelus (ratzeburg).* U.S. Department of Agriculture.

Gauld I & Bolton B (1996). The Hymenoptera (2nd Ed.). London and Oxford University Press.

Geroff RK, Gibbs J, McCravy KW (2014). Assessing bee (Hymenoptera: Apoidea) diversity of an Illinois restored tallgrass prairie: Methodology and conservation considerations. *Journal of Insect Conservation*, vol.18, pp. 951–964.

Gibson GAP, Read J, Hube JT (2007). Diversity, Classification and Higher Relationships of Mymarommatoidea (Hymenoptera). *Journal of Hymenopteran Research,* Vol. 16(1), pp. 51-146.

Godfray, HCJ (1994). Parasitoids: Behavioral and Evolutionary Ecology. Princeton University Press. ISBN: 0691000476.

Goulet H & Huber JT (1993). Hymenoptera of the World: An Identification Guide to Families. Agriculture Canada. ISBN: 0660149338.

Grimaldi DA, Engle MS (2005). Evolution of Insects (Cambridge University Press).

Haddad HM, Crutsinger GM, Gross K, Haarstad J, Knops JMH, Tillman D (2009). Plant species loss decreases arthropod diversity and shifts trophic structure. *Ecology Letters.* Vol. 12(10), pp. 1029-1039. https://doi.org/10.1111/j.1461-0248.2009.01356.x

Harvey JA, Poelman EH, Tanaka T (2013). Intrinsic Inter- and Intraspecific Competition in Parasitoid Wasps. *Annual Review of Entomology*, vol. 58, pp. 333–51.

Hawkins BA (1994). Pattern and Process in Host-Parasitoid Interactions. Cambridge, UK: Cambridge Univ. Press

Hill CJ (1995). Linear Strips of Rain Forest Vegetation as Potential Dispersal Corridors for Rain Forest Insects. *Conservation Biology*, Vol. 9(6), pp. 1559-1566 .https://www.jstor.org/stable/2387199

Hong CD van Achterberg C, Xu ZF (2011). A revision of the Chinese Stephanidae (Hymenoptera, Stephanoidea). *ZooKeys* (110): 1–108. doi:10.3897/zookeys.110.918.

Hopkins T, Roininen H, Sääksjärvi IE (2019). Extensive sampling reveals the phenology and habitat use of Afrotropical parasitoid wasps (Hymenoptera: Ichneumonidae: Rhyssinae). *R. Soc. open sci*, vol. 6: 190913. http://dx.doi.org/10.1098/rsos.190913

Hossein H, Bayegan ZA, Zargaran MR (2016). Species Diversity of Chalcidoidea (Hymenoptera) in the Rice Fields of Iran. *J. Entomol. Res. Soc.*, vol. 18(1), pp. 99-111. SSN:1302-0250

Jamkova A, Hadrava J, Skuhrovec J, Jansta P (2019). Reproductive strategy as a major factor determining female body and fertility of a gregarious parasitoid. *Journal of Applied Entomology,* vol. 143(4), pp 441-450. http://doi.org/10.1111/jen.12615

Jennings, J.T. & Austin, A.D. (2004) Biology and host relationships of aulacid and gasteruptiid wasps (Hymenoptera: Evanioidea): a review. In: Rajmohana, K., Sudheer, K., Girish Kumar, P. & Santhosh, S. (Eds.), *Perspectives on Biosystematics and Biodiversity*. University of Calicut, Kerala, India, pp. 187–215.

Johnson NF & Musetti L (2004. Catalog of the systematic literature of the superfamily Ceraphronoidea (Hymenoptera). *Contributions of the American Entomological Institute*, vol. 33 (2), pp. 1-149.

Kant K, Sharma YK, Mishra BK, Vishal MK and Meena SR (2013). Management of chalcid wasp (Systole albipennis) (Eurytomidae: Hymenoptera) in coriander: a pest of field and quarantine significance. *Indian Journal of Agricultural Sciences*, vol. 83 (10), pp.1043–1045.

Karem K, Woods SA, Drummond F, Stubbs C (2006). Sampling Native Wasps Along Both Vertical and Horizontal Gradients in the Maine Lowbush Blueberry Landscape. *Environmental Entomology*, Vol. 35(4), pp. 1083–1093, https://doi.org/10.1603/0046-225X-35.4.1083.

König K et al. (2015) Does early learning drive ecological divergence during speciation processes in parasitoid wasps? *Proc. R. Soc. B*, vol. 282. https://doi.org/10.1098/rspb.2014.1850

Kruess A & Tscharnke T (2002). Contrasting responses of plant and insect diversity to variation in grazing intensity. *Biological Conservation*, vol. 106, pp. 293–302.

Laliberté E, Tylianakis JM (2010). Deforestation homogenizes tropical parasitoid–host networks. *Ecology.* vol. 91(6), pp. 1740-1747. https://doi.org/10.1890/09-1328.1.

Lennartsson T (2002). Extinction thresholds and disrupted plant pollinator interactions in fragmented plant populations. *Ecology*, vol. 83, pp. 3060–3065

Lu Z Y, Ran H F, Liu W X, Qu Z G, Li J C (2013). Mass rearing methods of Mythimna separata (Walker) and its parasitoid, Microplitis tuberculifer (Wesmael). *Journal of Environmental Entomology*, vol. 35, pp. 683–687.

Madl M (2015). A catalogue of the families Ceraphronidae, Megasplidae (Ceraphronoidea), Diapriidae (Diaprioidea) and Proctotrupidae (Proctotrupoidea) of the malagasy subregion (Insecta: Hymenoptera). *Linzen Biol. Beitr.,* vol. 47(1), pp. 621-652.

Mayhew PJ (1998). The evolution of gregariousness in parasitoid wasps. *Proc. R. Soc. Lond.* Vol 265, pp. 383-389.

Mayhew PJ (2007). Why are there so many insect species? Perspectives from fossils and phylogenies. *Biol. Rev. Camb. Philos. Soc.*, vol. 82, pp. 425 – 454. doi:10. 1111/j.1469-185X.2007.00018.x

Mazón M, Bordera S (2008). Effectiveness of two sampling methods used for collecting Ichneumonidae (Hymenoptera) in the Cabañeros National Park (Spain). *European Journal of Entomology,* vol. 105, pp. 879-888. ISSN 1210-5759 (print), 1802-8829 (online).

McCravy KW, Ruholl JD (2017). Bee (Hymenoptera: Apoidea) diversity and sampling methodology in a Midwestern USA deciduous forest. *Insects*, vol. 8(81).

McCravy K (2018). A review of sampling and monitoring methods for beneficial arthropods in agrosystems. *Insects,* vol. 9(4), pp. 170. Doi: 10.3390/insects9040170.

McCravy KW, Geroff RK, Gibbs J (2019). Bee (Hymenoptera: Apoidea: Anthophila) functional traits in relation to sampling methodology in a restored tallgrass prairie. *Florida Entomologist,* vol. 102(1), pp. 134-140. http://doi.org/10.1653/024.102.0122

Mills N (2009). *Encyclopedia of Insects (2nd Ed.).* Elsevier, pp. 748-750. ISBN: 978-0123741448.

Morales H, Ferguson BG, Marín LE, Gutiérrez DN, Bichier P, Philpott SM (2018). Agroecological Pest Management in the City: Experiences from California and Chiapas. *Sustainability,* vol. 10, pp. 2068. doi:10.3390/su10062068

Noyes, JS (1989). A study of five methods of sampling Hymenoptera (Insecta) in a tropical rainforest, with special reference to Parasitica. *Journal of Natural History*, vol. 23, pp. 285–298.

Pedersen BS, Mills NJ (2004). Single versus multiple introduction in biological control: the roles of parasitoid efficiency, antagonism and niche overlap. *Journal of Applied Ecology*, vol. 41, pp. 973–84

Peters RS. Krogmann L, Mayer C, Rust J, Misof B, Niehuis O (2017). Evolutionary History of the Hymenoptera. *Current Biology,* Vol. 27(7), pp. 1013-1018. Doi: https://doi.org/10.1016/j.cub.2017.01.027.

Petrov S (2013). Three new species of Trissolcus Ashmead (Hymenoptera: Platygastroidea: Scelionidae) from Bulgaria. *Biologia*, vol. 68(2): 324-329. DOI: 10.2478/s11756-013-0151-0

Price PW (1972). Parasitoids utilizing the same host: adaptive nature of differences in size and form. *Ecology,* vol. 53, pp.190–95.

Quicke DLJ (1997). Parasitic Wasps. Springer Netherlands. ISBN: 041258350x.

Quicke DLJ (2015). The Braconid & Ichneumonid Parasitoid Waps: Biology, Systematics, Evolution and Ecology. Wiley-Blackwell. ISBN: 978-1-118-90705-4.

Ronquist F (1999). Phylogeny, classification and evolution of the Cynipoidea. *Zool Scr*., vol. 28, pp. 139–164.

Ronquist F, Nieves-Aldrey J-L, Buffington ML, LiuZ, Liljeblad J, Nylander JAA (2015). Phylogeny,EvolutionandClassification of Gall Wasps:ThePlotThickens.*PLoSONE,* vol.10 (5): e0123301.doi:10.1371/journal.pone.012330

Segoli M, Rosenheim JA (2015). The effect of body size on oviposition success of a minute parasitoid in nature. *Ecological Entomology,* vol. 40(4), pp. 483-485. https://doi.org/10.1111/ecn.12194

Shapiro BA, Pickerling J (2000). Rainfall and parasitic wasp (Hymenoptera: Ichneumonoidea) activity in successional forest stages at Barro Colorado Nature Monument, Panama, and LaSelva Biological Station, Costa Rica. *Agricultural and Forest Entomology,* vol. 2, pp. 39-47.

Sharkey et. al. (2012) Phylogenetic relationships among superfamilies of Hymenoptera. *Cladistics* vol. 28, pp. 80-112.

Šigut M, Šigutová H, Šipoš J, Pyszko P, Kotásková N, Drozd P (2018). Vertical canopy gradient shaping the stratification of leaf chewer–parasitoid interactions in a temperate forest. *Ecology and Evolution.* Vol. 8, pp. 7297–7311. DOI: 10.1002/ece3.4194.

Smith, L (1988). Dispersal behavior of two Pteromalid parasitoids of house fly pupae in a dairy environment (Hymenoptera: Chalcidoidea). *Advances in Parasitic Hymenopteran Research,* pp. 333-344.

Smith, D R (1996). Aulacidae (Hymenoptera) in the mid-Atlantic states, with a key to species of eastern North America. *Proceedings of the Entomological Society of Washington,* vol. 94**,** pp. 274-291.

Smith DR (2001). World catalogue of the family Aulacidae (Hymenoptera). *Contributions to Entomology, International,* vol. 4, pp. 263-319.

Sorribas J, Rodriguez R, Garcia-Mari F (2010). Parasitoid competitive displacement and coexistence in citrus agroecosystems: linking species distribution with climate. *Ecol. Appl*., vol. 20, pp. 1101–13.

Southwood, TRE (1978). Escape in space and time-concluding remarks. In H. Dingle (ed), *Evolution of Insect Migration and Diapause*. Springer-verlag, New York.

Southwood, TRE (1981). Ecological aspects of insect migration. In D.J. Aidley (ed.): *Animal Migration,* Cambridge University Press, Cambridge, pp. 197-208.

Stevens LM, Steinhauer AL, Coulson JR (1975). Supression of Mexican bean beetle on soybeans with annual inoculative releases of *Pediobius foveolatus. Environmental Entomology,* vol 4, pp. 947-957.

Stahlhut JK, Fernández-Triana J, Adamowicz SJ, Buck M, Goulet H, Hebert PDN, Huber JT, Merilo MT, Sheffield CS, Woodcock T, Smith MA (2013). DNA barcoding reveals diversity of Hymenoptera and the dominance of parasitoids in a sub-arctic environment. *BMC Ecology 2013*, vol. 13(2). Doi: http://www.biomedcentral.com/1472-6785/13/2.

Stone GN, Schönrogge K, Atkinson RJ, Bellido D, Pujade-Villar J (2002). The Population Biology of Oak Gall Wasps (Hymenoptera: Cynipidae). Annual Review of Entomology, vol. 47(1), pp. 633-668.

Symstad AJ, Siemann E, Haarstad J (2000). An experimental test of the effect of plant functional group diversity on arthropod diversity. *OIKOS*, vol.89, pp. 243–253.

Todorov IA, Askew RR, Parvanov D (2017). Pteromalid Fauna (Chalcidoidea: Pteromalidae) in the Grasslands of Vitosha Mountain, Bulgaria: Generic Composition, Diversity, Abundance and Phenology. *Acta zool. bulg*., vol. 69(1), pp. 37-42.

Townes HK (1951). Family Gasteruptiidae. *Hymenoptera of America North of Mexico,* pp. 655-661.

Vilhelmsen, L., Miko´ , I., and Krogmann, L. (2010). Beyond the wasp-waist: structural diversity and phylogenetic significance of the mesosoma in apocritan wasps (Insecta: Hymenoptera). *Zool. J. Linn. Soc.*, vol. 159, 22–194.

Wang ZZ, Liu YQ, Shi M, Huang JH. Chen XX (2019). Parasitoid wasps as effective biological control agents. *Journal of Integrative Agriculture,* vol. 18, no. 4, pp. 705-715.

Yefremova Z, Kravchenko V, Strakhova I, Yegorenkova E (2013). Use of the Malaise trap to assess the biodiversity of parasitoids (Hymenoptera: Eulophidae) in Israel. *Israel Journal of Entomology,* vol. 43, pp. 81-89.

Zhang YM, Gates MW, Shorthouse JD (2017). Revision of Canadian Eurytomidae (Hymenoptera, Chalcidoidea) associated with galls induced by cynipid wasps of the genus *Diplolepis* Geoffroy (Hymenoptera, Cynipidae) and description of a new species. *Journal of Hymenopteran Research,* vol. 61, pp. 1-29. https://10.3897/jhr.61.13466.

Žikic V, Stankovic SS , Petrovic A , Ilic-Milosevic M and Van Achterberg K (2013). Parasitoid complex of *Zygaena filipendulea* (Lepidoptera: Zygaenidae). *Arch. Biol. Sci., Belgrade*, vol. 65 (3), pp.1027-1035. DOI:10.2298/ABS1303027Z.

<u>FIGURES</u>

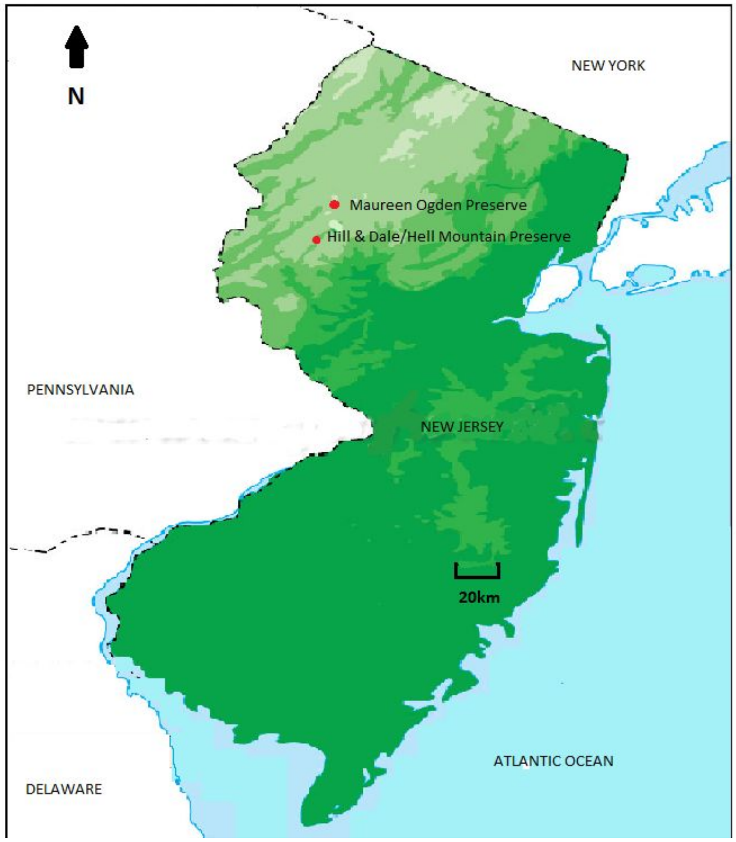


Figure 1: Map of New Jersey indicating the two study sites: Maureen Ogden Preserve (Northernmost) & Hill & Dale/ Hell Mountain Preserve

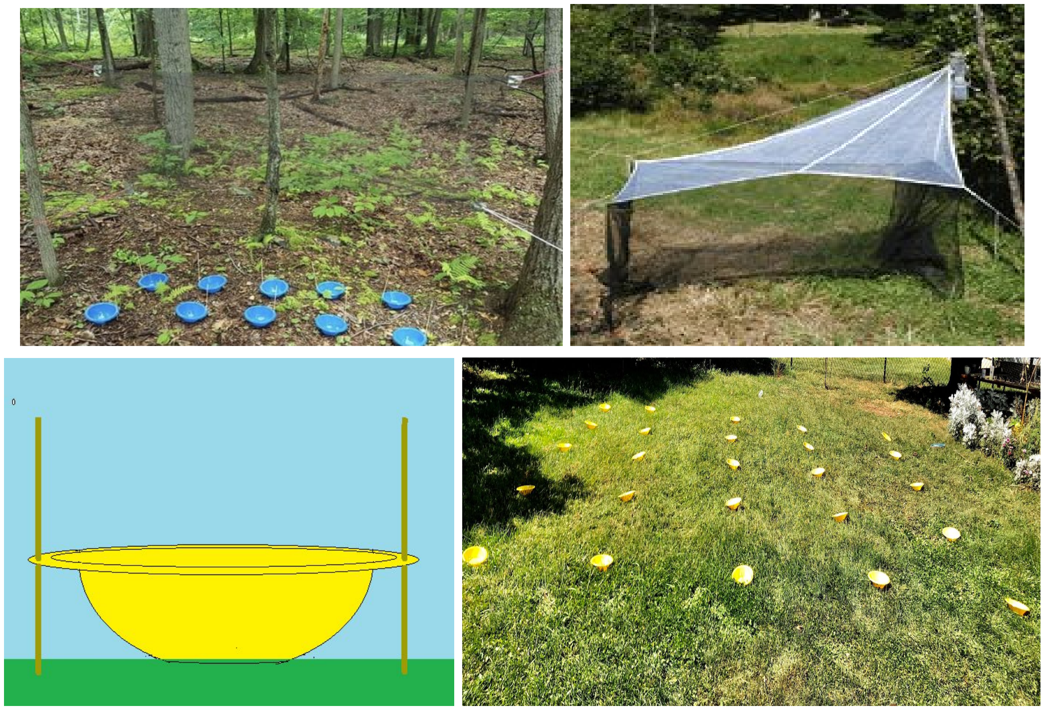


Figure 2: (top left) A flight intercept trap set up in the Hill & Dale Preserve. (top right)The same make and model as the malaise traps used in this study. (bottom right) A 16 square meter grid of yellow pan traps. (bottom left) Illustration of how the yellow bowls were secured to the ground with bamboo skewers.

Figure 3: (left) Satellite image of the Hill & Dale/ Hell Mountain Preserve and the placements of the three traps HDPT, HDFI, and HDMT. (right) Satellite image of the Maureen Ogden Preserve and the placements of the three traps MOPMT, MOPFI, MOPPT.

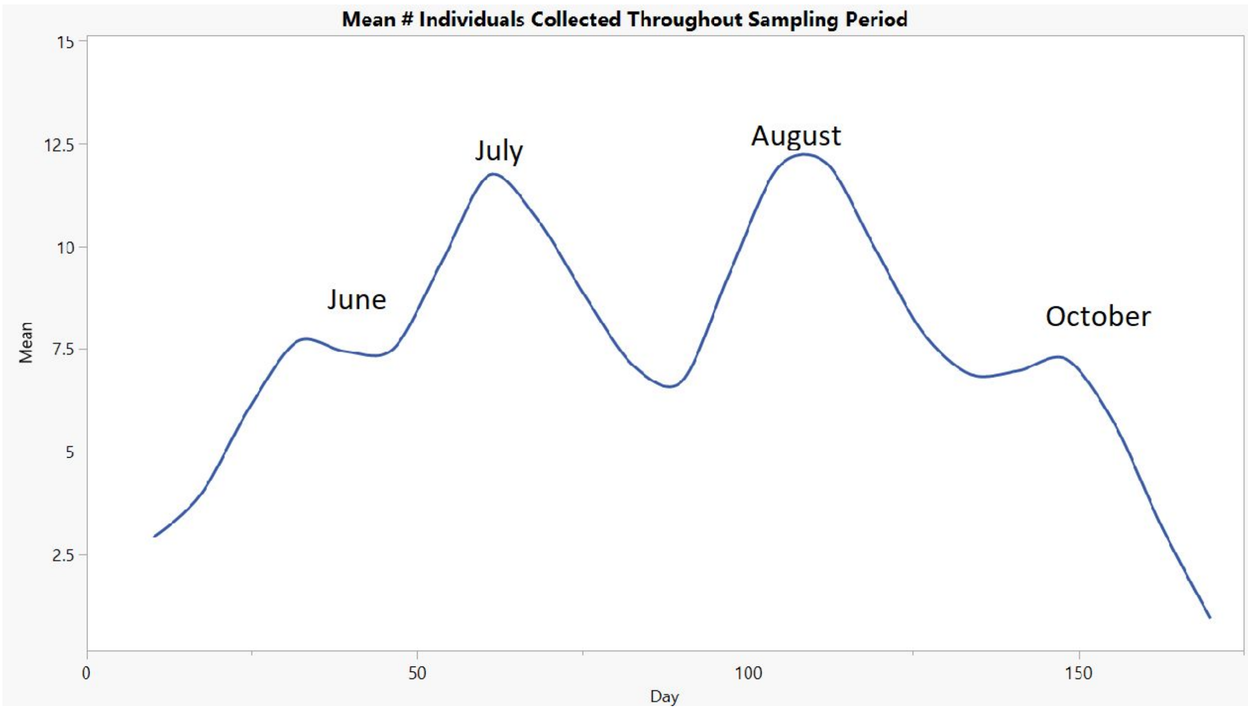


Figure 4: Mean number of individual parasitoid wasps collected per day in all six traps during the 170 day sampling period. Each population peak is labeled with the Month in which the peak occurred.

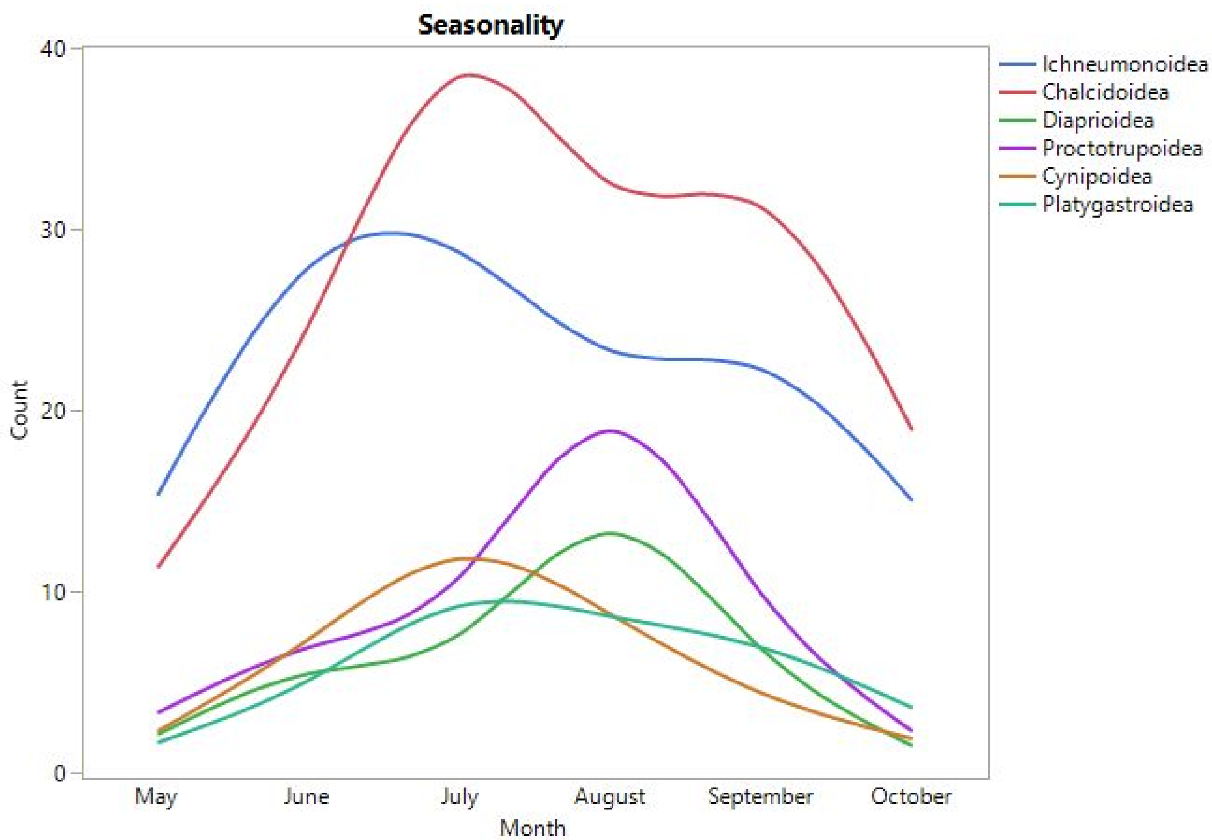


Figure 5: Mean number of individuals from Ichneumonoidea, Chalcidoidea, Diaprioidea, Proctotrupoidea, Cynipoidea, and Platygastroidea collected per day throughout the months.

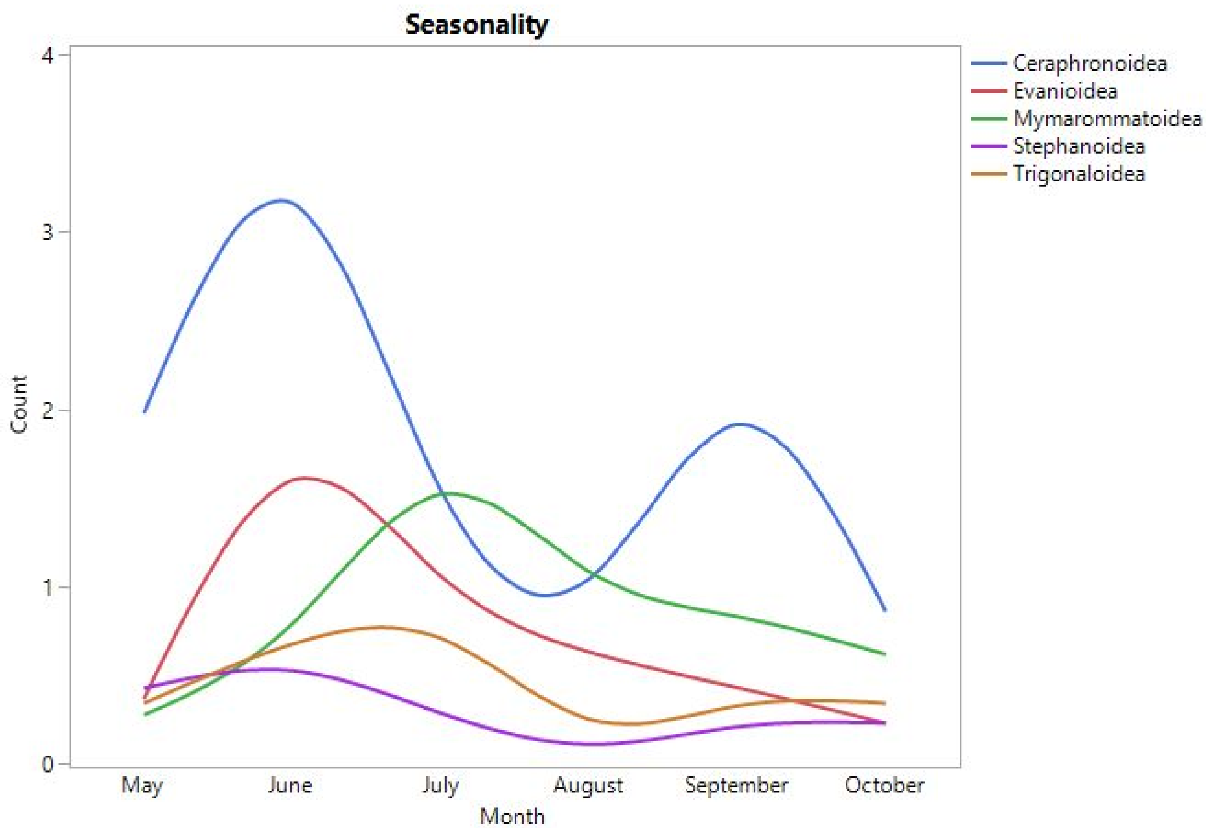


Figure 6: Mean number of individuals from Ceraphronoidea, Evanioidea, Mymarommatoidea, Stephanoidea, and Trigonaloidea collected per day throughout the months.

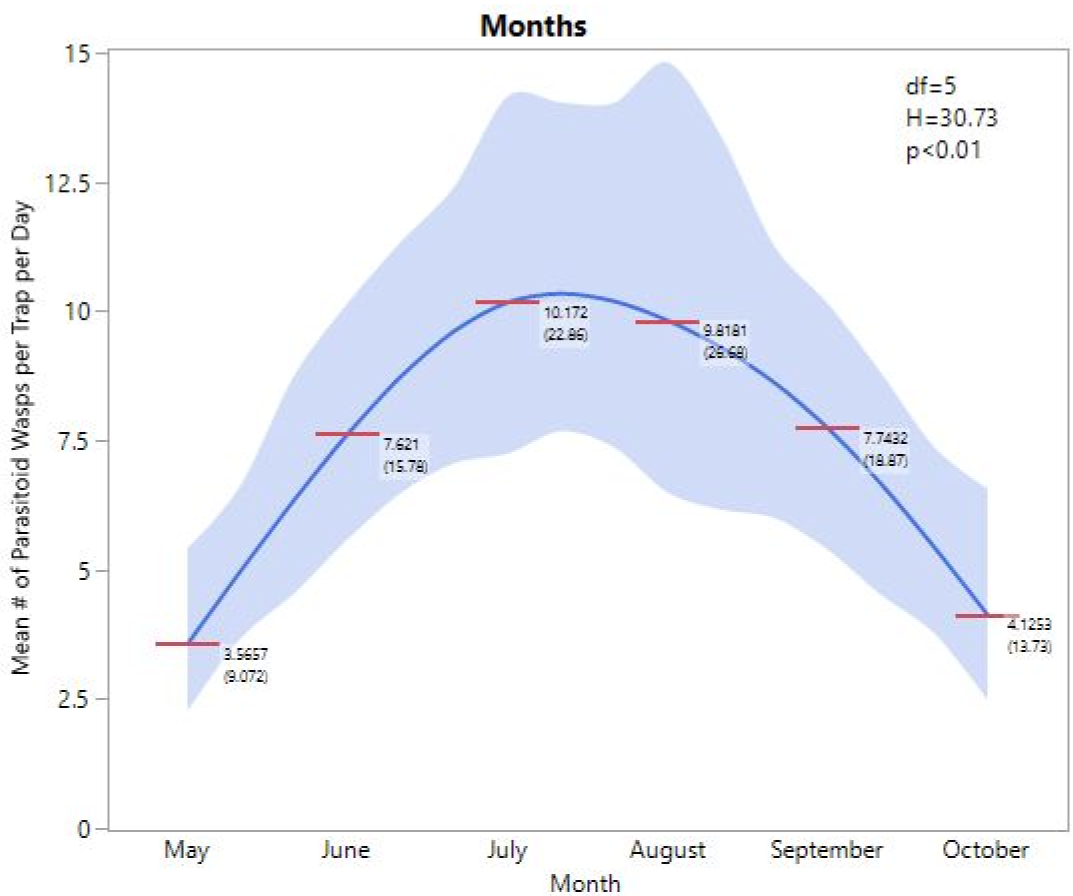


Figure 7: Abundance curve of average number of parasitoid wasps caught per trap per day in respects to month, bootstrapped. Means and standard deviations (in parenthesis) are included for each month.

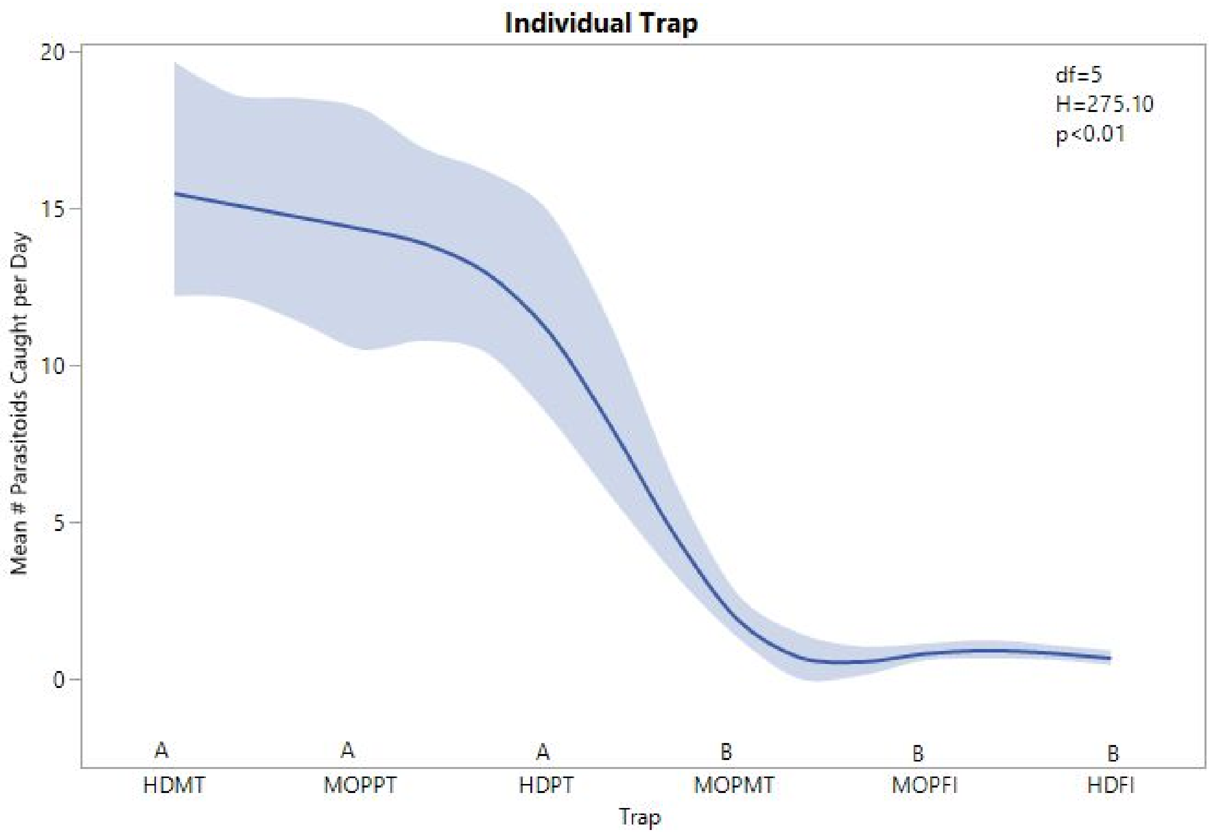


Figure 8: Abundance curve containing average number of parasitoid wasps caught per trap per day (bootstrapped). Different letters denote that the means were significantly different from each other.

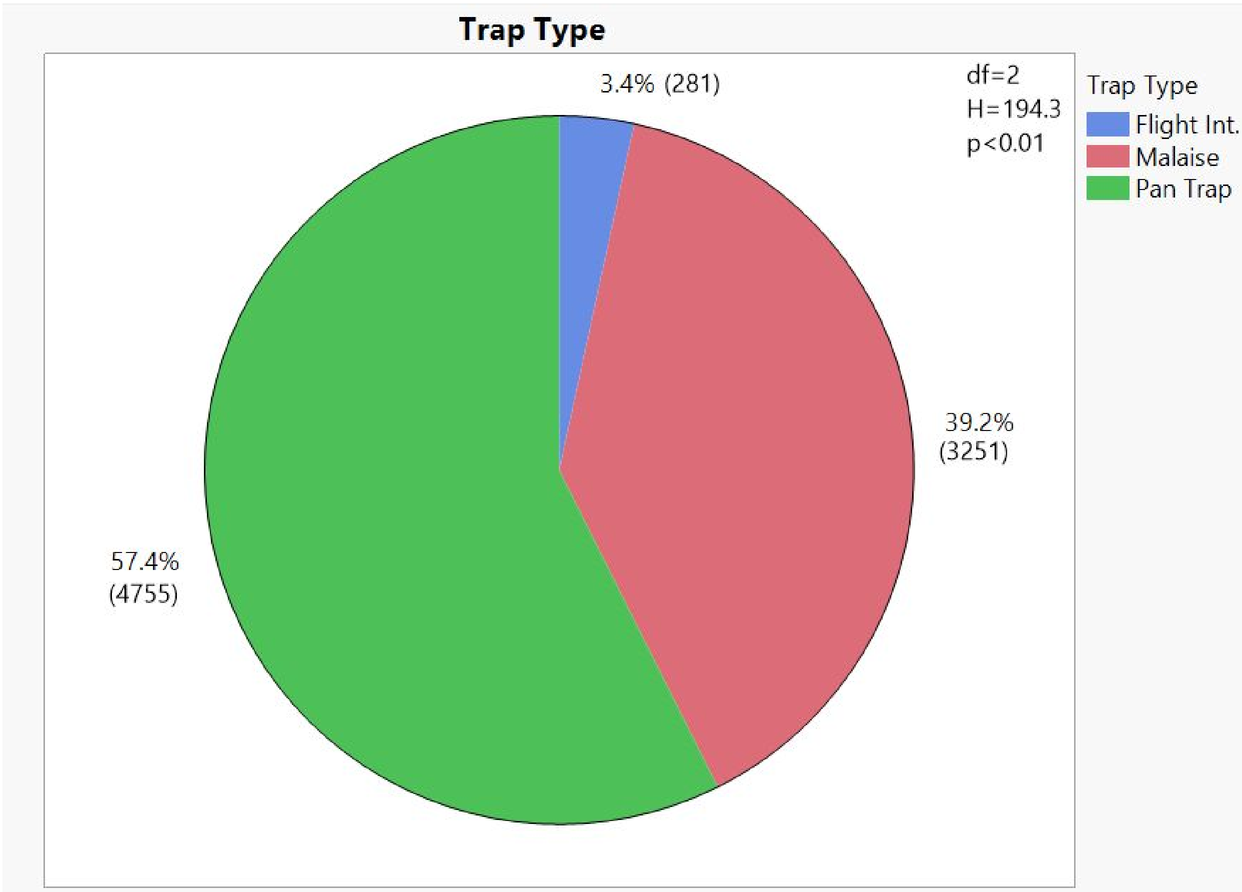


Figure 9: Percentages and sums for the total number of parasitoid wasps collected in each trap type.

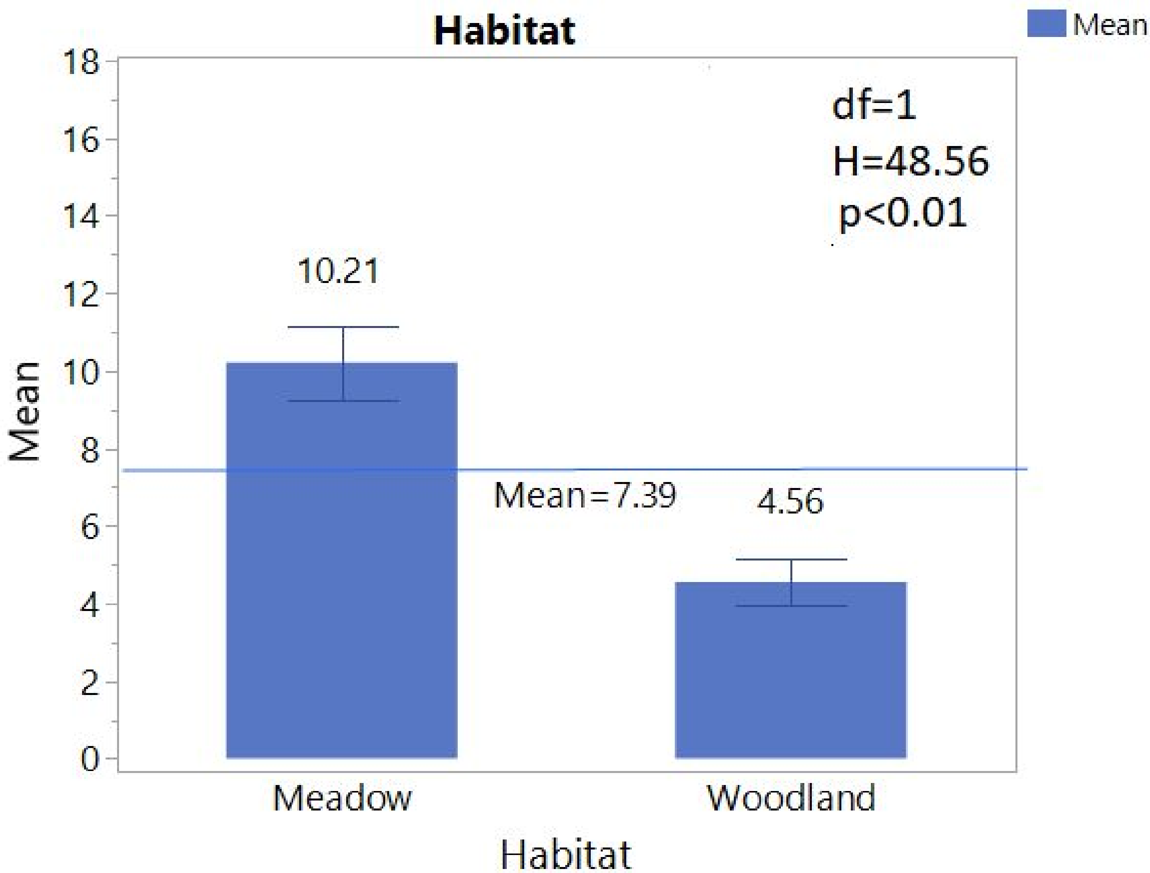


Figure 10: Average number of parasitoid wasps caught per trap per day in respects to habitat.

APPENDICES

Please Note: Late Spring=May, Early Summer=June, Mid Summer=July, Late Summer=August, Early Fall=September, and Mid Fall=October.

Parasitoid Wasps Cumulatively and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	132	3.5657121	9.0722212	0.7896355	1.2021233	5.9293009
Early Summer	198	7.6209949	15.775278	1.1211002	4.2861169	10.955873
Mid Summer	198	10.171768	22.861355	1.6246857	5.3389001	15.004635
Late Summer	198	9.8181313	26.677629	1.8958965	4.1785073	15.457755
Early Fall	198	7.7431818	18.871944	1.3411706	3.7536718	11.732692
Mid Fall	198	4.1252525	13.734512	0.9760693	1.2217904	7.0287147

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	132	65810.0	74118.0	498.561	-2.470
Early Summer	198	125532	111177	634.000	3.606
Mid Summer	198	121547	111177	613.874	2.605
Late Summer	198	110806	111177	559.626	-0.093
Early Fall	198	107902	111177	544.957	-0.823
Mid Fall	198	98406.5	111177	497.003	-3.208

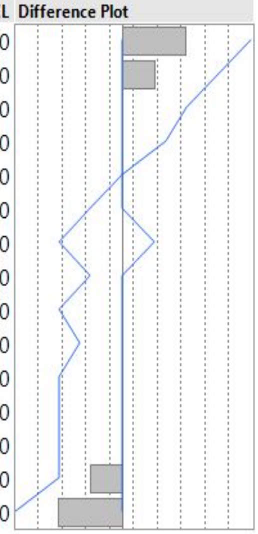
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
30.7256	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Early Summer	Late Spring	41.2879	10.41615	3.96383	0.0010*	1.00000	0.00000	2.000000	
Mid Summer	Late Spring	34.2866	10.36686	3.30733	0.0121*	0.50000	0.00000	1.500000	
Late Summer	Late Spring	17.2412	10.18625	1.69259	0.5367	0.00000	0.00000	1.000000	
Early Fall	Late Spring	12.5505	10.11011	1.24138	0.8165	0.00000	0.00000	0.670000	
Mid Fall	Late Spring	-0.4861	10.01925	-0.04852	1.0000	0.00000	0.00000	0.000000	
Early Fall	Late Summer	-5.4747	10.95462	-0.49977	0.9962	0.00000	-0.50000	0.000000	
Mid Summer	Early Summer	-6.6768	11.30234	-0.59074	0.9917	0.00000	-1.00000	0.500000	
Mid Fall	Early Fall	-16.0657	10.81180	-1.48594	0.6734	0.00000	-0.50000	0.000000	
Late Summer	Mid Summer	-19.1566	11.16285	-1.71610	0.5210	0.00000	-1.00000	0.000000	
Mid Fall	Late Summer	-21.5202	10.88392	-1.97725	0.3554	0.00000	-0.67000	0.000000	
Early Fall	Mid Summer	-23.5253	11.11717	-2.11612	0.2788	0.00000	-1.00000	0.000000	
Late Summer	Early Summer	-25.3838	11.20481	-2.26544	0.2083	0.00000	-1.00000	0.000000	
Early Fall	Early Summer	-30.1869	11.16401	-2.70394	0.0744	0.00000	-1.00000	0.000000	
Mid Fall	Mid Summer	-41.2980	11.05978	-3.73407	0.0026*	-0.50000	-1.00000	0.000000	
Mid Fall	Early Summer	-49.6970	11.11074	-4.47288	0.0001*	-1.00000	-1.67000	0.000000	



Parasitoid Wasps Cumulatively and Individual Traps

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	187	0.6736952	1.5503608	0.1133736	0.3362021	1.0111883
HDMT	187	15.475989	27.205891	1.9894918	9.5536263	21.398352
HDPT	187	11.094118	23.728227	1.7351798	5.9287961	16.259439
MOPFI	187	0.828877	1.87696	0.1372569	0.4202876	1.2374664
MOPMT	187	1.9117112	4.6304968	0.3386155	0.9037133	2.9197092
MOPPT	187	14.334225	25.786485	1.8856945	8.7208475	19.947602

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	187	71558.0	105001	382.663	-8.594
HDMT	187	135094	105001	722.428	7.734
HDPT	187	122719	105001	656.251	4.553
MOPFI	187	74872.5	105001	400.388	-7.743
MOPMT	187	84345.0	105001	451.043	-5.308
MOPPT	187	141415	105001	756.227	9.358

1-Way Test, ChiSquare Approximation

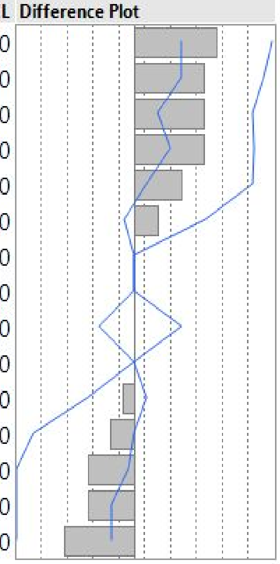
ChiSquare	DF	Prob>ChiSq
275.1012	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
MOPPT	HDFI	127.075	10.81025	11.7550	<.0001*	3.50000	2.00000	5.83300
MOPPT	MOPFI	122.487	10.83242	11.3074	<.0001*	3.00000	2.00000	5.50000
HDMT	HDFI	112.492	10.72720	10.4866	<.0001*	3.00000	1.00000	5.00000
MOPPT	MOPMT	104.080	10.91406	9.5363	<.0001*	3.00000	1.50000	5.10000
HDPT	HDFI	86.947	10.52312	8.2624	<.0001*	2.00000	0.50000	5.00000
MOPPT	HDPT	27.305	11.08966	2.4622	0.1355	1.00000	-0.45000	3.00000
MOPMT	HDFI	23.722	9.93388	2.3880	0.1603	0.00000	0.00000	0.00000
MOPMT	MOPFI	17.348	10.00931	1.7331	0.5097	0.00000	0.00000	0.00000
MOPPT	HDMT	8.481	11.13084	0.7620	0.9738	0.00000	-1.50000	2.00000
MOPFI	HDFI	7.412	9.71615	0.7628	0.9737	0.00000	0.00000	0.00000
HDPT	HDMT	-19.524	11.05861	-1.7655	0.4883	-0.50000	-2.00000	0.50000
MOPMT	HDPT	-67.096	10.68449	-6.2798	<.0001*	-1.00000	-4.30000	0.00000
MOPFI	HDPT	-82.283	10.57005	-7.7846	<.0001*	-2.00000	-5.00000	-0.25000
MOPMT	HDMT	-90.802	10.84909	-8.3696	<.0001*	-2.00000	-5.00000	-1.00000
MOPFI	HDMT	-107.503	10.75948	-9.9914	<.0001*	-3.00000	-5.00000	-1.00000

Difference Plot



Parasitoid Wasps Cumulatively and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	374	0.7512861	1.7208692	0.088984	0.5763129	0.9262593
Malaise	374	8.6938503	20.637364	1.0671327	6.5955	10.792201
Pan Trap	374	12.714171	24.798615	1.2823059	10.192716	15.235626

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	374	146431	210001	391.525	-12.916
Malaise	374	219439	210001	586.735	1.917
Pan Trap	374	264134	210001	706.239	10.998

1-Way Test, ChiSquare Approximation

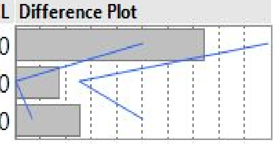
ChiSquare	DF	Prob>ChiSq
194.3048	2	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
Pan Trap	Flight Int.	209.4037	15.12331	13.84642	<.0001*	3.000000	2.000000	4.000000
Malaise	Flight Int.	130.5401	14.73866	8.85699	<.0001*	0.670000	0.000000	1.000000
Pan Trap	Malaise	80.0695	15.54057	5.15229	<.0001*	1.000000	0.250000	2.000000

Difference Plot



Parasitoid Wasps Cumulatively and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	561	10.21303	22.631673	0.95551	8.3362088	12.089852
Woodland	561	4.5598414	14.716262	0.6213211	3.3394368	5.7802459

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	561	351381	315002	626.348	6.969
Woodland	561	278622	315002	496.652	-6.969

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
48.5616	1	<.0001*

Parasitoid Wasps Cumulatively and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	561	9.0812674	21.73145	0.9175026	7.2791004	10.883434
MOP	561	5.6916043	16.332718	0.6895679	4.3371487	7.0460599

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	561	329371	315002	587.114	2.752
MOP	561	300632	315002	535.886	-2.752

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
7.5764	1	0.0059*

Ichneumonoidea and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	15.158333	18.571995	5.3612733	-4.861059	35.177726
Early Summer	18	28.005556	31.380032	7.3963446	2.7481669	53.262944
Mid Summer	18	28.777778	26.319989	6.2036809	7.5931536	49.962402
Late Summer	18	23.016667	25.965662	6.1201652	2.1172361	43.916097
Early Fall	18	22.473889	26.147823	6.1631009	1.4278394	43.519938
Mid Fall	18	14.925556	25.299681	5.9631921	-5.437836	35.288947

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	527.500	618.000	43.9583	-0.936
Early Summer	18	1044.50	927.000	58.0278	1.029
Mid Summer	18	1049.00	927.000	58.2778	1.068
Late Summer	18	918.000	927.000	51.0000	-0.075
Early Fall	18	932.500	927.000	51.8056	0.044
Mid Fall	18	781.500	927.000	43.4167	-1.275

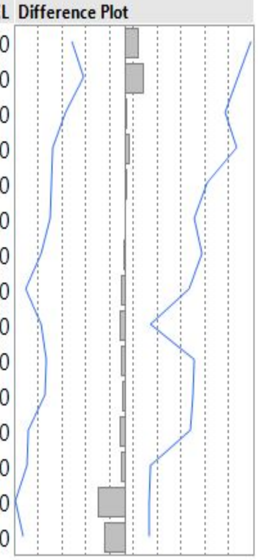
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
3.9619	5	0.5549

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Early Summer	Late Spring	4.58333	3.277185	1.39856	0.7280	7.5000	-28.0000	67.50000	
Mid Summer	Late Spring	4.30556	3.272432	1.31571	0.7765	10.0000	-22.0000	61.00000	
Late Summer	Late Spring	2.22222	3.271700	0.67923	0.9843	1.0000	-32.0000	54.00000	
Early Fall	Late Spring	1.94444	3.275358	0.59366	0.9915	2.3500	-39.0000	60.00000	
Mid Summer	Early Summer	0.50000	3.507136	0.14257	1.0000	1.0000	-39.5000	44.00000	
Early Fall	Late Summer	0.00000	3.504872	0.00000	1.0000	0.0000	-40.0000	37.50000	
Mid Fall	Late Spring	-0.69444	3.272798	-0.21219	0.9999	-0.5000	-45.0000	41.66000	
Early Fall	Mid Summer	-1.61111	3.506683	-0.45944	0.9974	-2.0000	-53.0000	34.50000	
Mid Fall	Late Summer	-2.00000	3.502607	-0.57100	0.9929	-2.4000	-45.0000	14.00000	
Early Fall	Early Summer	-2.11111	3.507814	-0.60183	0.9909	-1.5850	-42.0000	37.00000	
Late Summer	Early Summer	-2.16667	3.500794	-0.61891	0.9897	-1.0000	-42.5000	36.50000	
Late Summer	Mid Summer	-2.55556	3.502154	-0.72971	0.9783	-2.5000	-52.0000	35.00000	
Mid Fall	Early Fall	-2.72222	3.505325	-0.77660	0.9715	-2.0000	-52.3300	14.00000	
Mid Fall	Mid Summer	-5.16667	3.502154	-1.47528	0.6802	-14.0000	-58.5000	13.00000	
Mid Fall	Early Summer	-5.44444	3.504872	-1.55339	0.6294	-11.0000	-54.5000	13.00000	



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	1.0588235	1.1169483	0.2708998	0.1244696	1.9931775
HDMT	17	54.47	28.105993	6.8167045	30.958665	77.981335
HDPT	17	25.970588	22.846957	5.5412011	6.8585624	45.082614
MOPFI	17	1.1764706	1.4245742	0.34551	-0.01522	2.368161
MOPMT	17	12	9.4172714	2.2840238	4.1222274	19.877773
MOPPT	17	40.117647	20.12114	4.8800934	23.285832	56.949462

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	328.000	875.500	19.2941	-4.919
HDMT	17	1389.50	875.500	81.7353	4.617
HDPT	17	1076.50	875.500	63.3235	1.803
MOPFI	17	324.000	875.500	19.0588	-4.955
MOPMT	17	834.500	875.500	49.0882	-0.364
MOPPT	17	1300.50	875.500	76.5000	3.817

1-Way Test, ChiSquare Approximation

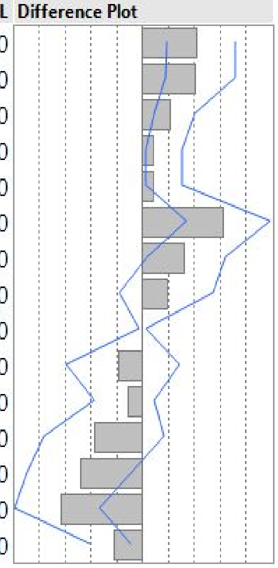
ChiSquare	DF	Prob>ChiSq
73.5007	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
MOPPT	HDFI	16.9412	3.408075	4.97089	<.0001*	36.9000	16.5000	63.0000
MOPPT	MOPFI	16.9412	3.395236	4.98969	<.0001*	36.5000	16.0000	63.0000
HDPT	HDFI	16.4118	3.407290	4.81666	<.0001*	19.5000	8.5000	35.5000
MOPMT	MOPFI	15.8235	3.392610	4.66412	<.0001*	8.0000	2.0000	27.0000
MOPMT	HDFI	15.7647	3.406767	4.62747	<.0001*	8.0000	2.0000	27.0000
HDMT	HDFI	15.2353	3.404150	4.47551	0.0001*	55.0000	29.5000	86.5000
MOPPT	MOPMT	13.8824	3.414084	4.06620	0.0007*	28.5000	3.0000	56.0000
MOPPT	HDPT	7.4706	3.414084	2.18817	0.2432	17.0000	-16.0000	47.5000
MOPFI	HDFI	-0.1176	3.314205	-0.03550	1.0000	0.0000	-2.0000	2.0000
MOPPT	HDMT	-5.4118	3.415128	-1.58464	0.6088	-16.5000	-51.5000	25.0000
MOPMT	HDPT	-8.4118	3.412779	-2.46478	0.1347	-9.5000	-32.5000	8.0000
HDPT	HDMT	-10.1176	3.415128	-2.96260	0.0361*	-32.0000	-66.5000	15.0000
MOPMT	HDMT	-14.0588	3.413823	-4.11820	0.0005*	-42.3000	-78.0000	-7.5000
MOPFI	HDMT	-15.3529	3.387878	-4.53173	<.0001*	-55.0000	-86.5000	-29.0000
MOPFI	HDPT	-16.3529	3.393923	-4.81830	<.0001*	-19.0000	-35.5000	-8.0000

Difference Plot



Ichneumonoidea and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	1.1176471	1.2619059	0.2164151	0.6773473	1.5579468
Malaise	34	33.235	29.842804	5.1179986	22.822354	43.647646
Pan Trap	34	33.044118	22.381461	3.838389	25.234857	40.853379

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	652.000	1751.00	19.1765	-7.809
Malaise	34	2224.00	1751.00	65.4118	3.359
Pan Trap	34	2377.00	1751.00	69.9118	4.447

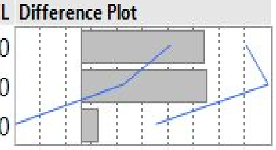
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
61.4321	2	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Pan Trap	Flight Int.	33.41176	4.777719	6.993246	<.0001*	26.50000	19.0000	35.50000	
Malaise	Flight Int.	31.17647	4.773767	6.530790	<.0001*	27.00000	9.0000	40.00000	
Pan Trap	Malaise	3.35294	4.794733	0.699297	0.7639	3.50000	-14.0000	16.00000	



Ichneumonoidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	31.921373	30.001383	4.2010339	23.483348	40.359398
Woodland	51	13.009804	17.373385	2.4327605	8.1234607	17.896147

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	3014.00	2626.50	59.0980	2.594
Woodland	51	2239.00	2626.50	43.9020	-2.594

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
6.7452	1	0.0094*

Ichneumonoidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	34	40.220294	29.073952	4.9861416	30.075913	50.364676
MOP	68	13.588235	19.410895	2.3539168	8.8897977	18.286673

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	34	2466.00	1751.00	72.5294	5.079
MOP	68	2787.00	3502.00	40.9853	-5.079

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
25.8354	1	<.0001*

Chalcidoidea and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	11.416667	17.510819	5.0549381	-7.458847	30.29218
Early Summer	18	24.333333	24.912789	5.8720007	4.2813466	44.38532
Mid Summer	18	39.055556	52.268506	12.319805	-3.0147	81.125811
Late Summer	18	31.861111	45.558561	10.738256	-4.808395	68.530617
Early Fall	18	31.583333	42.102117	9.9235641	-2.304124	65.470791
Mid Fall	18	18.75	32.556399	7.6736168	-7.454231	44.954231

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	411.500	618.000	34.2917	-2.141
Early Summer	18	1092.00	927.000	60.6667	1.445
Mid Summer	18	1053.00	927.000	58.5000	1.102
Late Summer	18	913.500	927.000	50.7500	-0.114
Early Fall	18	953.000	927.000	52.9444	0.224
Mid Fall	18	830.000	927.000	46.1111	-0.848

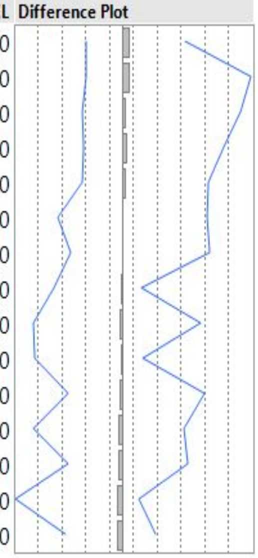
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
7.4564	5	0.1889

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Early Summer	Late Spring	8.47222	3.276089	2.58608	0.1006	6.50000	-32.5000	56.0000	
Mid Summer	Late Spring	5.97222	3.270968	1.82583	0.4489	6.50000	-33.0000	115.0000	
Late Summer	Late Spring	5.41667	3.270602	1.65617	0.5610	2.00000	-36.0000	106.5000	
Early Fall	Late Spring	5.06944	3.277185	1.54689	0.6337	3.75000	-34.5000	91.0000	
Mid Fall	Late Spring	3.40278	3.269870	1.04065	0.9042	2.00000	-36.0000	77.0000	
Early Fall	Late Summer	0.83333	3.509172	0.23747	0.9999	0.50000	-58.0000	76.5000	
Mid Summer	Early Summer	0.22222	3.508719	0.06333	1.0000	0.25000	-47.0000	78.0000	
Mid Fall	Late Summer	-1.50000	3.505778	-0.42787	0.9982	-1.00000	-62.0000	17.5000	
Early Fall	Mid Summer	-1.72222	3.509398	-0.49075	0.9965	-2.50000	-80.0000	70.0000	
Mid Fall	Early Fall	-2.11111	3.508267	-0.60175	0.9909	-1.00000	-79.0000	17.7500	
Early Fall	Early Summer	-2.44444	3.509624	-0.69650	0.9824	-2.25000	-49.2500	73.5000	
Late Summer	Mid Summer	-2.77778	3.507588	-0.79193	0.9690	-3.00000	-80.0000	55.0000	
Late Summer	Early Summer	-3.66667	3.508945	-1.04495	0.9027	-3.50000	-49.0000	58.5000	
Mid Fall	Mid Summer	-4.22222	3.502833	-1.20537	0.8345	-4.50000	-96.0000	15.0000	
Mid Fall	Early Summer	-5.50000	3.508041	-1.56783	0.6199	-4.50000	-51.0000	30.0000	



Chalcidoidea and Individual Traps

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	2.1176471	3.5850358	0.8694989	-0.881321	5.1166152
HDMT	17	69.705882	38.959538	9.4490759	37.115298	102.29647
HDPT	17	11.470588	13.070088	3.169962	0.5371471	22.404029
MOPFI	17	4.0588235	4.175383	1.0126791	0.5660158	7.5516312
MOPMT	17	5.4705882	3.5199014	0.8537015	2.5261066	8.4150699
MOPPT	17	69.382353	43.87323	10.640821	32.681348	106.08336

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	341.000	875.500	20.0588	-4.798
HDMT	17	1375.50	875.500	80.9118	4.488
HDPT	17	870.000	875.500	51.1765	-0.045
MOPFI	17	546.000	875.500	32.1176	-2.956
MOPMT	17	708.500	875.500	41.6765	-1.496
MOPPT	17	1412.00	875.500	83.0588	4.816

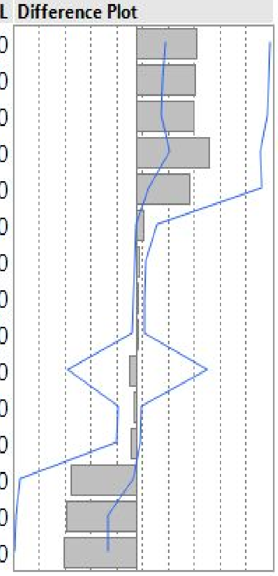
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
64.5971	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
MOPPT	HDFI	16.7059	3.409121	4.90035	<.0001*	54.5000	26.500	119.500	
MOPPT	MOPFI	16.5882	3.412518	4.86100	<.0001*	53.0000	23.000	118.500	
MOPPT	MOPMT	16.2941	3.413040	4.77408	<.0001*	51.5000	22.500	118.000	
HDMT	HDFI	15.0000	3.405197	4.40503	0.0002*	66.0000	29.500	111.000	
MOPPT	HDPT	14.9412	3.413562	4.37700	0.0002*	48.0000	11.000	113.000	
HDPT	HDFI	12.3529	3.403364	3.62963	0.0039*	6.2500	0.000	19.000	
MOPMT	HDFI	11.3529	3.402578	3.33657	0.0110*	3.0000	-1.500	8.000	
MOPFI	HDFI	7.1765	3.392610	2.11532	0.2792	1.5000	-3.000	7.500	
MOPMT	MOPFI	5.1176	3.403888	1.50347	0.6621	1.5000	-4.500	7.000	
MOPPT	HDMT	-1.5882	3.414867	-0.46509	0.9973	-5.5000	-61.500	63.000	
MOPMT	HDPT	-5.7059	3.408859	-1.67384	0.5492	-2.5000	-17.000	4.000	
MOPFI	HDPT	-9.4118	3.407290	-2.76224	0.0637	-4.5000	-18.000	3.000	
HDPT	HDMT	-13.2353	3.413823	-3.87697	0.0015*	-58.5000	-104.500	-2.500	
MOPMT	HDMT	-14.0588	3.413040	-4.11915	0.0005*	-63.0000	-108.000	-25.500	
MOPFI	HDMT	-14.6471	3.411473	-4.29347	0.0003*	-65.0000	-109.000	-26.000	



Chalcidoidea and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	3.0882353	3.956622	0.6785551	1.7077046	4.468766
Malaise	34	37.588235	42.482166	7.2856313	22.765507	52.410964
Pan Trap	34	40.426471	43.358291	7.4358856	25.298048	55.554894

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	887.000	1751.00	26.0882	-6.134
Malaise	34	2084.00	1751.00	61.2941	2.362
Pan Trap	34	2282.00	1751.00	67.1176	3.769

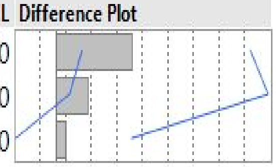
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
38.3320	2	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Pan Trap	Flight Int.	27.61765	4.789328	5.766497	<.0001*	19.00000	6.5000	48.50000	
Malaise	Flight Int.	23.14706	4.787861	4.834530	<.0001*	8.00000	3.5000	53.00000	
Pan Trap	Malaise	3.55882	4.794229	0.742314	0.7383	2.50000	-10.0000	19.00000	



Chalcidoidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	47.715686	45.599151	6.3851583	34.890718	60.540654
Woodland	51	6.3529412	8.832352	1.2367767	3.8688022	8.8370802

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	3333.50	2626.50	65.3627	4.732
Woodland	51	1919.50	2626.50	37.6373	-4.732

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
22.4225	1	<.0001*

Chalcidoidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	51	27.764706	38.163871	5.3440108	17.030944	38.498467
MOP	51	26.303922	39.65187	5.5523724	15.151653	37.45619

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	51	2586.50	2626.50	50.7157	-0.265
MOP	51	2666.50	2626.50	52.2843	0.265

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
0.0718	1	0.7888

Diaprioidea and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	2.0833333	3.1682612	0.9145982	-1.331844	5.4985109
Early Summer	18	5.6111111	7.6399791	1.8007603	-0.538211	11.760433
Mid Summer	18	7.3333333	11.478881	2.7055982	-1.905872	16.572538
Late Summer	18	13.611111	35.925395	8.4676967	-15.30478	42.527004
Early Fall	18	6.6111111	11.633566	2.7420579	-2.752598	15.974821
Mid Fall	18	1.5555556	2.3507751	0.554083	-0.336553	3.4476645

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	508.500	618.000	42.3750	-1.161
Early Summer	18	1068.00	927.000	59.3333	1.265
Mid Summer	18	1051.00	927.000	58.3889	1.112
Late Summer	18	967.500	927.000	53.7500	0.360
Early Fall	18	911.500	927.000	50.6389	-0.135
Mid Fall	18	746.500	927.000	41.4722	-1.621

1-Way Test, ChiSquare Approximation

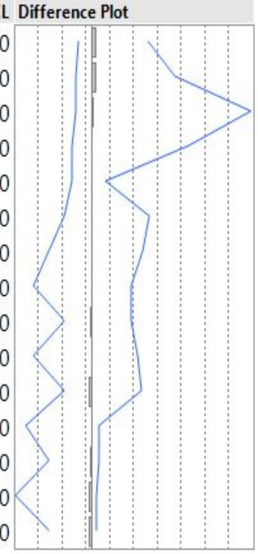
ChiSquare	DF	Prob>ChiSq
5.8566	5	0.3204

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
Early Summer	Late Spring	5.00000	3.211495	1.55691	0.6271	1.00000	-4.0000	17.00000
Mid Summer	Late Spring	4.65278	3.198419	1.45471	0.6932	1.00000	-5.0000	25.00000
Late Summer	Late Spring	3.12500	3.172107	0.98515	0.9228	0.50000	-5.0000	48.00000
Early Fall	Late Spring	2.29167	3.104965	0.73807	0.9772	0.00000	-6.0000	29.00000
Mid Fall	Late Spring	-0.06944	3.088339	-0.02249	1.0000	0.00000	-6.0000	4.00000
Mid Summer	Early Summer	-0.11111	3.472568	-0.03200	1.0000	0.00000	-8.5000	17.50000
Early Fall	Late Summer	-1.33333	3.405877	-0.39148	0.9988	0.00000	-13.0000	15.50000
Late Summer	Mid Summer	-1.50000	3.465476	-0.43284	0.9981	0.00000	-17.5000	12.00000
Late Summer	Early Summer	-1.88889	3.469825	-0.54438	0.9943	-0.50000	-8.5000	12.00000
Early Fall	Mid Summer	-2.33333	3.432570	-0.67976	0.9842	0.00000	-17.5000	14.00000
Early Fall	Early Summer	-2.55556	3.441576	-0.74255	0.9766	-1.00000	-8.5000	15.00000
Mid Fall	Early Fall	-2.72222	3.340944	-0.81481	0.9649	0.00000	-20.0000	2.00000
Mid Fall	Late Summer	-4.00000	3.397945	-1.17718	0.8479	-0.50000	-13.0000	2.00000
Mid Fall	Mid Summer	-6.16667	3.407275	-1.80985	0.4593	-1.00000	-23.0000	1.50000
Mid Fall	Early Summer	-6.83333	3.425627	-1.99477	0.3452	-1.00000	-13.0000	1.50000

Difference Plot



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	0.4117647	0.6900021	0.1673501	-0.165439	0.988968
HDMT	17	3.5294118	2.7469903	0.666243	1.2314887	5.8273348
HDPT	17	28.529412	34.093837	8.26897	0.0091024	57.049721
MOPFI	17	0.2352941	0.4372373	0.1060456	-0.130465	0.6010536
MOPMT	17	0.5882353	0.6183469	0.1499712	0.0709733	1.1054973
MOPPT	17	4.9411765	3.7160225	0.9012678	1.8326348	8.0497181

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	493.500	875.500	29.0294	-3.514
HDMT	17	1031.00	875.500	60.6471	1.428
HDPT	17	1539.00	875.500	90.5294	6.107
MOPFI	17	430.500	875.500	25.3235	-4.094
MOPMT	17	588.000	875.500	34.5882	-2.644
MOPPT	17	1171.00	875.500	68.8824	2.717

1-Way Test, ChiSquare Approximation

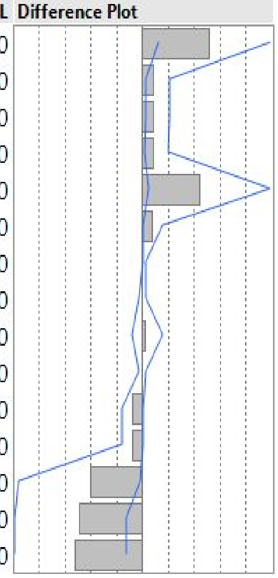
ChiSquare	DF	Prob>ChiSq
69.1735	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
HDPT	HDFI	16.8235	3.355630	5.01352	<.0001*	21.0000	5.0000	40.0000
MOPPT	MOPFI	15.2353	3.283948	4.63932	<.0001*	3.5000	1.0000	8.5000
MOPPT	HDFI	14.8824	3.335650	4.46161	0.0001*	3.5000	1.0000	8.5000
MOPPT	MOPMT	14.2353	3.339122	4.26319	0.0003*	3.5000	0.5000	8.0000
HDPT	HDMT	14.1765	3.409643	4.15776	0.0005*	18.0000	2.0000	40.0000
HDMT	HDFI	11.8235	3.288558	3.59535	0.0044*	3.0000	0.0000	6.5000
MOPMT	MOPFI	5.1765	2.900304	1.78480	0.4756	0.0000	0.0000	1.0000
MOPMT	HDFI	3.1765	3.054759	1.03984	0.9045	0.0000	-1.0000	1.0000
MOPPT	HDMT	3.1765	3.404150	0.93312	0.9380	1.0000	-3.5000	6.5000
MOPFI	HDFI	-1.9412	2.738776	-0.70878	0.9810	0.0000	-1.0000	1.0000
MOPMT	HDMT	-11.0000	3.311246	-3.32201	0.0115*	-3.0000	-6.5000	0.0000
MOPFI	HDMT	-12.7647	3.221474	-3.96238	0.0010*	-3.0000	-6.5000	0.0000
MOPPT	HDPT	-12.9412	3.413040	-3.79169	0.0021*	-16.5000	-39.0000	-0.5000
MOPMT	HDPT	-16.8824	3.370735	-5.00851	<.0001*	-20.0000	-40.0000	-5.0000
MOPFI	HDPT	-16.9412	3.316087	-5.10878	<.0001*	-21.0000	-40.0000	-5.0000

Difference Plot



Diaprioidea and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	0.3235294	0.5758045	0.0987497	0.1226217	0.5244371
Malaise	34	2.0588235	2.4641819	0.4226037	1.1990298	2.9186172
Pan Trap	34	16.735294	26.713189	4.5812741	7.4146218	26.055966

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	924.000	1751.00	27.1765	-6.019
Malaise	34	1619.00	1751.00	47.6176	-0.958
Pan Trap	34	2710.00	1751.00	79.7059	6.980

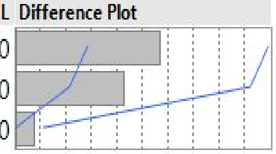
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
57.3077	2	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Pan Trap	Flight Int.	32.02941	4.670720	6.857489	<.0001*	8.000000	4.000000	14.00000	
Pan Trap	Malaise	24.32353	4.767740	5.101690	<.0001*	6.000000	3.000000	13.00000	
Malaise	Flight Int.	16.55882	4.422536	3.744192	0.0005*	1.000000	0.000000	1.50000	



Diaprioidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	2.9019608	3.2954812	0.4614597	1.9750918	3.8288298
Woodland	51	9.8431373	23.459005	3.2849177	3.2451859	16.441089

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	2632.50	2626.50	51.6176	0.038
Woodland	51	2620.50	2626.50	51.3824	-0.038

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
0.0017	1	0.9671

Diaprioidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	51	10.823529	23.153147	3.2420891	4.3116018	17.335457
MOP	51	1.9215686	3.0452792	0.4264244	1.06507	2.7780672

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	51	3063.50	2626.50	60.0686	2.997
MOP	51	2189.50	2626.50	42.9314	-2.997

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
9.0017	1	0.0027*

Proctotrupoidea and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	3.2941667	4.8927636	1.4124192	-1.979911	8.5682447
Early Summer	18	7.0616667	11.098754	2.6160013	-1.871579	15.994912
Mid Summer	18	10.416667	16.441885	3.8753895	-2.817197	23.650531
Late Summer	18	19.408333	52.121967	12.285266	-22.54397	61.360641
Early Fall	18	9.5527778	16.677481	3.93092	-3.870714	22.97627
Mid Fall	18	2.3694444	2.9758409	0.7014124	-0.025772	4.7646609

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	512.000	618.000	42.6667	-1.110
Early Summer	18	946.000	927.000	52.5556	0.165
Mid Summer	18	1012.00	927.000	56.2222	0.751
Late Summer	18	1018.00	927.000	56.5556	0.805
Early Fall	18	1005.00	927.000	55.8333	0.689
Mid Fall	18	760.000	927.000	42.2222	-1.481

1-Way Test, ChiSquare Approximation

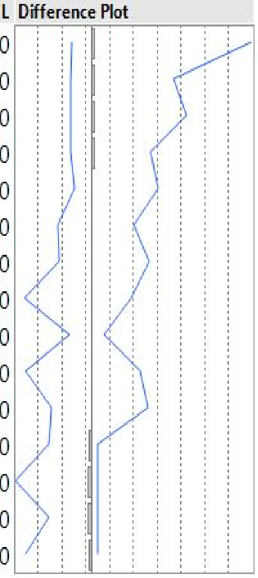
ChiSquare	DF	Prob>ChiSq
4.3439	5	0.5010

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
Late Summer	Late Spring	4.09722	3.245244	1.26253	0.8054	1.50000	-8.5000	69.05000
Mid Summer	Late Spring	3.75000	3.217826	1.16538	0.8534	1.50000	-8.7000	35.70000
Early Fall	Late Spring	3.68056	3.233046	1.13842	0.8654	1.00000	-8.7000	41.50000
Early Summer	Late Spring	2.91667	3.215593	0.90704	0.9449	1.00000	-8.7000	25.50000
Mid Summer	Early Summer	1.55556	3.471883	0.44804	0.9977	0.42000	-7.5000	29.00000
Late Summer	Early Summer	1.27778	3.486937	0.36645	0.9991	0.25000	-14.3000	18.30000
Early Fall	Early Summer	0.94444	3.477821	0.27156	0.9998	0.00000	-13.8000	24.95000
Late Summer	Mid Summer	0.00000	3.486482	0.00000	1.0000	0.00000	-28.8000	17.30000
Mid Fall	Late Spring	0.00000	3.166818	0.00000	1.0000	0.00000	-9.5000	5.80000
Early Fall	Mid Summer	-0.22222	3.480330	-0.06385	1.0000	0.00000	-28.3000	21.45000
Early Fall	Late Summer	-0.22222	3.490350	-0.06367	1.0000	0.00000	-17.3000	24.45000
Mid Fall	Early Summer	-3.61111	3.439500	-1.04989	0.9009	-1.00000	-18.3000	2.90000
Mid Fall	Mid Summer	-4.50000	3.437192	-1.30921	0.7801	-1.50000	-32.8000	2.50000
Mid Fall	Late Summer	-5.05556	3.461122	-1.46067	0.6895	-1.25000	-18.3000	2.90000
Mid Fall	Early Fall	-5.16667	3.452397	-1.49654	0.6665	-1.00000	-28.4500	2.90000

Difference Plot



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	0.9405882	1.2860913	0.311923	-0.135258	2.0164344
HDMT	17	4.5294118	2.9179969	0.7077182	2.0884376	6.9703859
HDPT	17	41.241176	49.519656	12.010281	-0.183199	82.665552
MOPFI	17	0.8235294	1.2740337	0.3089985	-0.24223	1.889289
MOPMT	17	1.0588235	1.184303	0.2872357	0.0681258	2.0495213
MOPPT	17	5.4117647	4.0935746	0.9928377	1.9873917	8.8361377

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	517.000	875.500	30.4118	-3.257
HDMT	17	1054.50	875.500	62.0294	1.624
HDPT	17	1547.00	875.500	91.0000	6.104
MOPFI	17	482.000	875.500	28.3529	-3.575
MOPMT	17	548.000	875.500	32.2353	-2.975
MOPPT	17	1104.50	875.500	64.9706	2.079

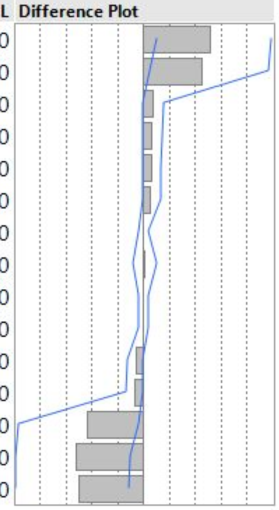
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
63.8609	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
HDPT	HDFI	16.5882	3.382876	4.90359	<.0001*	30.4500	5.8000	58.0000	
HDPT	HDMT	14.7059	3.410428	4.31203	0.0002*	27.0000	2.8000	57.0000	
MOPPT	MOPFI	13.4118	3.355098	3.99743	0.0009*	4.5000	0.0000	9.0000	
MOPPT	HDFI	13.0000	3.367825	3.86006	0.0016*	4.0000	0.0000	8.6700	
MOPPT	MOPMT	12.5294	3.367560	3.72062	0.0027*	4.0000	0.0000	8.0000	
HDMT	HDFI	12.4118	3.359876	3.69411	0.0030*	3.0000	0.0000	8.0000	
MOPMT	MOPFI	2.0000	3.141068	0.63673	0.9883	0.0000	-2.0000	2.0000	
MOPPT	HDMT	1.7059	3.402317	0.50139	0.9961	0.5000	-4.5000	6.0000	
MOPMT	HDFI	0.9412	3.178302	0.29613	0.9997	0.0000	-2.0000	2.0000	
MOPFI	HDFI	-0.9412	3.098789	-0.30372	0.9997	0.0000	-2.0000	2.0000	
MOPMT	HDMT	-12.0588	3.357223	-3.59190	0.0044*	-3.0000	-7.5000	0.0000	
MOPFI	HDMT	-12.9412	3.348717	-3.86452	0.0016*	-4.0000	-8.0000	0.0000	
MOPPT	HDPT	-13.8824	3.414345	-4.06589	0.0007*	-25.8000	-57.0000	-2.2000	
MOPFI	HDPT	-16.7059	3.371528	-4.95499	<.0001*	-30.4500	-58.0000	-5.8000	
MOPMT	HDPT	-16.8235	3.387615	-4.96619	<.0001*	-29.4500	-58.0000	-6.7000	



Proctotrupoidea and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	0.8820588	1.2619316	0.2164195	0.4417501	1.3223676
Malaise	34	2.7941176	2.8126275	0.4823616	1.8127455	3.7754898
Pan Trap	34	23.326471	39.086193	6.7032268	9.6886531	36.964288

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

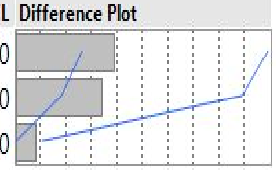
Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	999.000	1751.00	29.3824	-5.405
Malaise	34	1602.50	1751.00	47.1324	-1.064
Pan Trap	34	2651.50	1751.00	77.9853	6.473

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
48.2210	2	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Pan Trap	Flight Int.	29.94118	4.732344	6.326923	<.0001*	7.500000	5.040000	19.30000	
Pan Trap	Malaise	22.97059	4.778776	4.806793	<.0001*	6.600000	3.500000	17.30000	
Malaise	Flight Int.	14.23529	4.611272	3.087065	0.0057*	1.500000	0.000000	2.00000	

Proctotrupoidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	3.5882353	3.5548641	0.4977805	2.5884137	4.5880569
Woodland	51	14.413529	33.952052	4.7542383	4.8643608	23.962698

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	2641.00	2626.50	51.7843	0.095
Woodland	51	2612.00	2626.50	51.2157	-0.095

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
0.0097	1	0.9217

Proctotrupoidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	51	15.570392	33.559363	4.6992507	6.1316693	25.009115
MOP	51	2.4313725	3.296998	0.4616721	1.5040769	3.3586682

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	51	3118.50	2626.50	61.1471	3.333
MOP	51	2134.50	2626.50	41.8529	-3.333

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
11.1290	1	0.0008*

Cynipoidea and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	2.3333333	3.5696532	1.0304701	-1.514519	6.1811852
Early Summer	18	7.2777778	8.5478278	2.0147423	0.39774	14.157816
Mid Summer	18	11.972222	17.686379	4.1687195	-2.263319	26.207764
Late Summer	18	8.6944444	9.9234406	2.3389774	0.7071934	16.681695
Early Fall	18	4.3888889	5.5241597	1.3020569	-0.057437	8.8352147
Mid Fall	18	1.9166667	3.2095904	0.7565077	-0.666692	4.5000251

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	488.000	618.000	40.6667	-1.372
Early Summer	18	1001.50	927.000	55.6389	0.663
Mid Summer	18	1160.00	927.000	64.4444	2.082
Late Summer	18	1036.00	927.000	57.5556	0.971
Early Fall	18	860.000	927.000	47.7778	-0.595
Mid Fall	18	707.500	927.000	39.3056	-1.961

1-Way Test, ChiSquare Approximation

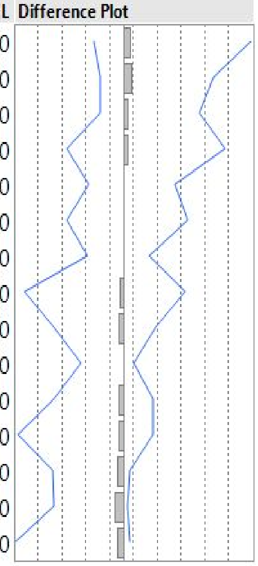
ChiSquare	DF	Prob>ChiSq
9.8850	5	0.0786

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
Mid Summer	Late Spring	6.87500	3.245613	2.11824	0.2777	1.75000	-7.0000	29.50000
Late Summer	Late Spring	4.93056	3.186418	1.54737	0.6334	2.00000	-5.5000	21.00000
Early Summer	Late Spring	4.16667	3.186042	1.30779	0.7809	1.00000	-5.5000	17.50000
Mid Summer	Early Summer	3.00000	3.487620	0.86019	0.9558	1.00000	-13.0000	23.50000
Early Fall	Late Spring	2.15278	3.153178	0.68273	0.9839	0.00000	-8.0000	12.00000
Late Summer	Early Summer	0.72222	3.443881	0.20971	0.9999	0.00000	-13.0000	15.00000
Mid Fall	Late Spring	-0.27778	3.142527	-0.08839	1.0000	0.00000	-8.5000	6.00000
Late Summer	Mid Summer	-2.77778	3.487620	-0.79647	0.9682	-0.75000	-23.0000	14.50000
Early Fall	Early Summer	-2.94444	3.423541	-0.86006	0.9558	-1.00000	-16.0000	7.50000
Mid Fall	Early Fall	-3.33333	3.393738	-0.98220	0.9238	0.00000	-10.0000	2.50000
Early Fall	Late Summer	-3.88889	3.423309	-1.13600	0.8664	-1.00000	-16.0000	7.00000
Early Fall	Mid Summer	-5.61111	3.478505	-1.61308	0.5898	-1.00000	-24.5000	7.00000
Mid Fall	Early Summer	-5.66667	3.420062	-1.65689	0.5605	-1.50000	-16.5000	1.50000
Mid Fall	Late Summer	-6.16667	3.420294	-1.80296	0.4637	-2.00000	-16.0000	1.00000
Mid Fall	Mid Summer	-8.72222	3.473025	-2.51142	0.1207	-1.50000	-25.0000	1.50000

Difference Plot



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	0.6470588	0.7859052	0.19061	-0.01037	1.3044873
HDMT	17	15.235294	9.3976687	2.2792694	7.3739197	23.096669
HDPT	17	6.5	6.7938391	1.647748	0.8167912	12.183209
MOPFI	17	0.4705882	0.6242643	0.1514063	-0.051624	0.9928002
MOPMT	17	0.2941176	0.5606588	0.1359797	-0.174887	0.7631221
MOPPT	17	14.764706	15.58256	3.7793259	1.729522	27.79989

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	560.000	875.500	32.9412	-2.885
HDMT	17	1362.00	875.500	80.1176	4.451
HDPT	17	1058.50	875.500	62.2647	1.671
MOPFI	17	505.000	875.500	29.7059	-3.389
MOPMT	17	426.000	875.500	25.0588	-4.112
MOPPT	17	1341.50	875.500	78.9118	4.263

1-Way Test, ChiSquare Approximation

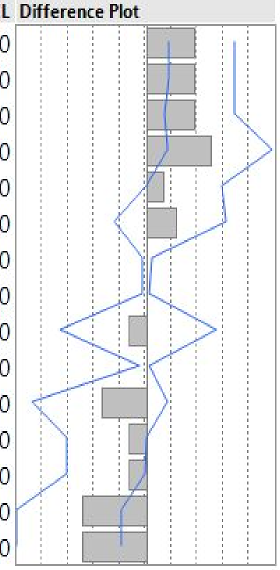
ChiSquare	DF	Prob>ChiSq
64.7385	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
MOPPT	MOPMT	16.7059	3.338054	5.00468	<.0001*	9.5000	4.5000	17.5000
MOPPT	MOPFI	16.4706	3.356692	4.90679	<.0001*	9.5000	4.5000	17.5000
MOPPT	HDFI	16.2941	3.373114	4.83059	<.0001*	9.5000	3.5000	17.5000
HDMT	HDFI	14.8235	3.361468	4.40984	0.0002*	13.0000	4.0000	25.0000
HDPT	HDFI	11.5882	3.355630	3.45337	0.0073*	3.5000	0.0000	15.0000
MOPPT	HDPT	7.8824	3.410428	2.31125	0.1894	6.0000	-6.5000	16.0000
MOPFI	HDFI	-1.7059	3.037202	-0.56166	0.9934	0.0000	-1.0000	1.0000
MOPMT	MOPFI	-2.5294	2.890762	-0.87500	0.9525	0.0000	-1.0000	0.5000
MOPPT	HDMT	-2.7059	3.413040	-0.79281	0.9688	-3.5000	-17.5000	14.0000
MOPMT	HDFI	-3.9412	2.966840	-1.32841	0.7693	0.0000	-1.5000	0.5000
HDPT	HDMT	-8.9412	3.412256	-2.62031	0.0923	-9.0000	-23.0000	4.0000
MOPFI	HDPT	-12.7059	3.334581	-3.81034	0.0019*	-3.5000	-16.0000	0.0000
MOPMT	HDPT	-14.0000	3.313399	-4.22527	0.0003*	-3.5000	-16.0000	-0.5000
MOPFI	HDMT	-15.0588	3.342323	-4.50550	<.0001*	-13.0000	-26.0000	-5.0000
MOPMT	HDMT	-15.4118	3.317431	-4.64569	<.0001*	-13.0000	-26.0000	-5.0000

Difference Plot



Cynipoidea and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	0.5588235	0.7045814	0.1208347	0.3129835	0.8046636
Malaise	34	7.7647059	10.023635	1.7190392	4.2672942	11.262118
Pan Trap	34	10.632353	12.557932	2.1536675	6.2506834	15.014022

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	1065.00	1751.00	31.3235	-4.963
Malaise	34	1788.00	1751.00	52.5882	0.264
Pan Trap	34	2400.00	1751.00	70.5882	4.695

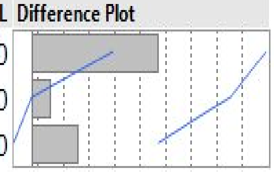
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
31.2152	2	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Pan Trap	Flight Int.	28.61765	4.712219	6.073073	<.0001*	7.000000	4.50000	13.00000	
Malaise	Flight Int.	11.67647	4.516092	2.585526	0.0263*	1.000000	0.00000	11.00000	
Pan Trap	Malaise	9.50000	4.771743	1.990887	0.1144	2.500000	-1.00000	7.00000	



Cynipoidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	10.156863	12.408662	1.7375603	6.6668702	13.646855
Woodland	51	2.4803922	4.8300733	0.6763455	1.1219122	3.8388722

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	3208.50	2626.50	62.9118	3.970
Woodland	51	2044.50	2626.50	40.0882	-3.970

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
15.7841	1	<.0001*

Cynipoidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	51	7.4607843	8.9374734	1.2514966	4.9470794	9.9744892
MOP	51	5.1764706	11.172208	1.5644221	2.0342364	8.3187048

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	51	2980.50	2626.50	58.4412	2.413
MOP	51	2272.50	2626.50	44.5588	-2.413

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
5.8395	1	0.0157*

Platygastroidea and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	1.7083333	2.4721938	0.7136609	-0.956529	4.3731961
Early Summer	18	5.0277778	6.7659881	1.5947587	-0.41808	10.473635
Mid Summer	18	9.3333333	13.768036	3.2451573	-1.748384	20.41505
Late Summer	18	8.5694444	10.648738	2.5099317	-0.00159	17.140478
Early Fall	18	6.9583333	10.075542	2.374828	-1.151342	15.068009
Mid Fall	18	3.5833333	4.3326734	1.0212209	0.0960197	7.070647

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	469.000	618.000	39.0833	-1.570
Early Summer	18	998.000	927.000	55.4444	0.630
Mid Summer	18	1024.00	927.000	56.8889	0.862
Late Summer	18	995.500	927.000	55.3056	0.608
Early Fall	18	926.000	927.000	51.4444	-0.004
Mid Fall	18	840.500	927.000	46.6944	-0.769

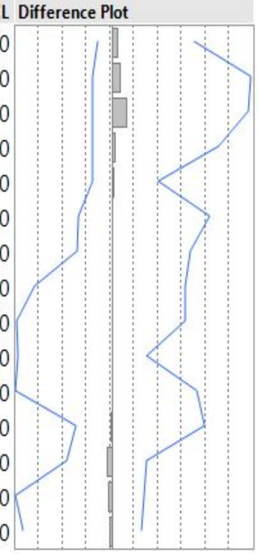
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
3.9416	5	0.5579

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Early Summer	Late Spring	5.41667	3.231935	1.67598	0.5478	1.00000	-3.0000	17.00000	
Mid Summer	Late Spring	5.00000	3.217454	1.55402	0.6290	1.50000	-4.0000	28.50000	
Late Summer	Late Spring	4.30556	3.173616	1.35667	0.7530	3.00000	-4.0000	28.00000	
Early Fall	Late Spring	2.98611	3.193549	0.93504	0.9375	0.50000	-4.0000	22.00000	
Mid Fall	Late Spring	2.63889	3.172107	0.83190	0.9617	0.25000	-4.0000	9.50000	
Mid Summer	Early Summer	0.77778	3.486709	0.22307	0.9999	0.00000	-7.0000	20.00000	
Late Summer	Early Summer	0.61111	3.471197	0.17605	1.0000	0.00000	-7.2500	16.00000	
Early Fall	Late Summer	-0.44444	3.427943	-0.12965	1.0000	0.00000	-16.0000	15.00000	
Late Summer	Mid Summer	-0.61111	3.445724	-0.17735	1.0000	0.00000	-19.7500	15.00000	
Mid Fall	Early Fall	-1.66667	3.427017	-0.48633	0.9967	0.00000	-19.5000	7.00000	
Early Fall	Mid Summer	-1.77778	3.460205	-0.51378	0.9957	0.00000	-20.0000	17.50000	
Early Fall	Early Summer	-1.88889	3.474625	-0.54362	0.9943	-0.25000	-7.5000	19.00000	
Mid Fall	Early Summer	-3.00000	3.468223	-0.86500	0.9548	-1.00000	-9.5000	7.00000	
Mid Fall	Mid Summer	-3.33333	3.445724	-0.96738	0.9283	-0.75000	-20.0000	6.50000	
Mid Fall	Late Summer	-3.55556	3.407275	-1.04352	0.9032	-0.50000	-18.5000	6.00000	



Platygastroidea and Individual Traps

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	0.2941176	0.5944752	0.1441814	-0.203175	0.7914103
HDMT	17	14.705882	11.094845	2.6908952	5.4247792	23.986985
HDPT	17	4.8235294	3.9367705	0.9548071	1.5303268	8.116732
MOPFI	17	1.1764706	2.0686739	0.5017271	-0.554025	2.9069658
MOPMT	17	0.5294118	0.7388883	0.1792067	-0.088686	1.1475095
MOPPT	17	15.117647	11.820968	2.867006	5.2291244	25.00617

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	420.000	875.500	24.7059	-4.159
HDMT	17	1320.00	875.500	77.6471	4.059
HDPT	17	1001.00	875.500	58.8824	1.143
MOPFI	17	612.000	875.500	36.0000	-2.404
MOPMT	17	502.000	875.500	29.5294	-3.410
MOPPT	17	1398.00	875.500	82.2353	4.772

1-Way Test, ChiSquare Approximation

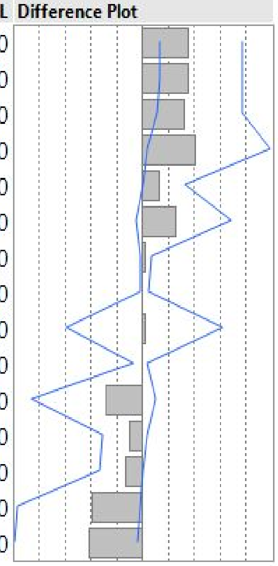
ChiSquare	DF	Prob>ChiSq
62.8692	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
MOPPT	HDFI	16.9412	3.338054	5.07517	<.0001*	11.0000	4.0000	23.5000
MOPPT	MOPMT	16.9412	3.368884	5.02872	<.0001*	11.0000	4.0000	23.5000
MOPPT	MOPFI	16.2353	3.396024	4.78068	<.0001*	10.0000	3.5000	23.5000
HDMT	HDFI	15.1765	3.318774	4.57291	<.0001*	12.5000	1.0000	30.0000
HDPT	HDFI	12.7059	3.264622	3.89199	0.0014*	4.0000	0.0000	10.0000
MOPPT	HDPT	10.6471	3.407552	3.12455	0.0220*	8.0000	-1.5000	21.0000
MOPFI	HDFI	5.8824	3.099365	1.89792	0.4033	0.5000	-0.5000	2.0000
MOPMT	HDFI	2.5882	2.914100	0.88818	0.9495	0.0000	-0.5000	1.5000
MOPPT	HDMT	0.4118	3.412779	0.12065	1.0000	0.5000	-18.0000	19.0000
MOPMT	MOPFI	-3.0000	3.177461	-0.94415	0.9350	0.0000	-2.0000	1.0000
HDPT	HDMT	-9.2941	3.410166	-2.72541	0.0703	-8.5000	-26.0000	3.0000
MOPFI	HDPT	-10.0000	3.364913	-2.97185	0.0351*	-3.0000	-9.5000	1.0000
MOPMT	HDPT	-11.9412	3.313399	-3.60391	0.0042*	-4.0000	-10.0000	0.0000
MOPFI	HDMT	-13.5882	3.383930	-4.01552	0.0008*	-12.0000	-29.5000	-0.5000
MOPMT	HDMT	-14.4706	3.351909	-4.31712	0.0002*	-12.5000	-30.0000	-1.0000

Difference Plot



Platygastroidea and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	0.7352941	1.5642081	0.2682595	0.1895161	1.2810721
Malaise	34	7.6176471	10.569438	1.8126436	3.9297959	11.305498
Pan Trap	34	9.9705882	10.127177	1.7367965	6.4370491	13.504127

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	1032.00	1751.00	30.3529	-5.193
Malaise	34	1822.00	1751.00	53.5882	0.510
Pan Trap	34	2399.00	1751.00	70.5588	4.680

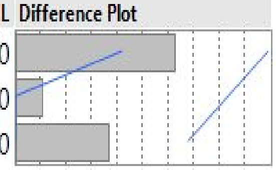
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
32.7980	2	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Pan Trap	Flight Int.	28.02941	4.711194	5.949535	<.0001*	6.000000	4.000000	9.500000	
Malaise	Flight Int.	14.20588	4.578551	3.102703	0.0054*	1.000000	0.000000	8.000000	
Pan Trap	Malaise	10.02941	4.771467	2.101955	0.0894	3.500000	0.000000	6.500000	



Platygastroidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	10.333333	11.325487	1.5858855	7.1479886	13.518678
Woodland	51	1.8823529	3.1094023	0.4354034	1.0078195	2.7568864

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	3330.00	2626.50	65.2941	4.790
Woodland	51	1923.00	2626.50	37.7059	-4.790

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
22.9777	1	<.0001*

Platygastroidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	51	6.6078431	9.0219531	1.2633261	4.0703779	9.1453083
MOP	51	5.6078431	9.6152554	1.3464051	2.903509	8.3121773

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	51	2741.00	2626.50	53.7451	0.777
MOP	51	2512.00	2626.50	49.2549	-0.777

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
0.6087	1	0.4353

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	1.93	1.768641	0.5105627	0.0235211	3.8364789
Early Summer	18	3.2405556	2.6201403	0.617573	1.131638	5.3494731
Mid Summer	18	1.5	2.093407	0.4934208	-0.184957	3.1849567
Late Summer	18	1	1.3719887	0.3233808	-0.104296	2.1042962
Early Fall	18	1.9722222	3.0701227	0.7236349	-0.49888	4.4433249
Mid Fall	18	0.8327778	1.1718101	0.2761983	-0.110397	1.7759528

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	702.500	618.000	58.5417	0.891
Early Summer	18	1314.00	927.000	73.0000	3.465
Mid Summer	18	894.500	927.000	49.6944	-0.287
Late Summer	18	787.000	927.000	43.7222	-1.251
Early Fall	18	836.500	927.000	46.4722	-0.807
Mid Fall	18	718.500	927.000	39.9167	-1.865

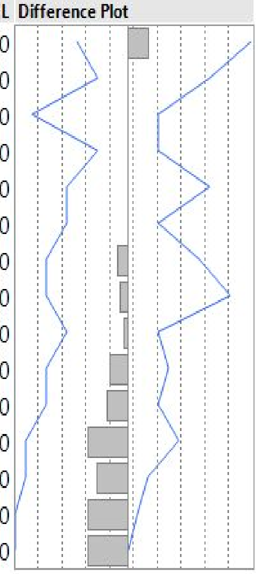
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
15.4085	5	0.0088*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Early Summer	Late Spring	4.1667	3.261070	1.27770	0.7974	1.00000	-2.50000	6.000000	
Early Fall	Late Summer	0.3889	3.317343	0.11723	1.0000	0.00000	-1.50000	4.000000	
Mid Fall	Early Fall	-1.1667	3.281985	-0.35548	0.9993	0.00000	-4.67000	1.500000	
Mid Fall	Late Summer	-1.2778	3.370978	-0.37905	0.9990	0.00000	-1.50000	1.500000	
Early Fall	Mid Summer	-1.6667	3.373096	-0.49411	0.9964	0.00000	-3.00000	4.000000	
Late Summer	Mid Summer	-1.8333	3.413093	-0.53715	0.9947	0.00000	-3.00000	1.500000	
Mid Summer	Late Spring	-2.8472	3.226744	-0.88238	0.9508	-0.50000	-4.00000	3.500000	
Early Fall	Late Spring	-2.8472	3.141765	-0.90625	0.9451	-0.41500	-4.00000	5.000000	
Mid Fall	Mid Summer	-3.8333	3.417276	-1.12175	0.8726	-0.17000	-3.00000	1.500000	
Late Summer	Late Spring	-4.4444	3.200664	-1.38860	0.7340	-0.91500	-4.00000	2.000000	
Mid Fall	Late Spring	-5.5556	3.191674	-1.74064	0.5047	-1.00000	-4.00000	1.500000	
Early Fall	Early Summer	-7.6111	3.448027	-2.20738	0.2342	-2.00000	-5.00000	2.500000	
Mid Summer	Early Summer	-8.7222	3.475310	-2.50977	0.1211	-1.50000	-5.00000	1.000000	
Late Summer	Early Summer	-10.8889	3.472568	-3.13569	0.0212*	-2.00000	-5.50000	0.500000	
Mid Fall	Early Summer	-12.1667	3.473025	-3.50319	0.0061*	-2.00000	-5.50000	0.000000	



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	1.2347059	1.8736699	0.4544317	-0.332664	2.8020756
HDMT	17	2.5294118	1.8995936	0.4607191	0.9403563	4.1184672
HDPT	17	2.7647059	2.7676572	0.6712555	0.4494945	5.0799173
MOPFI	17	0.3529412	0.5799975	0.14067	-0.132241	0.8381229
MOPMT	17	0.47	0.7319238	0.1775176	-0.142272	1.0822718
MOPPT	17	3.0588235	2.9148454	0.7069538	0.6204857	5.4971613

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	750.500	875.500	44.1471	-1.142
HDMT	17	1148.50	875.500	67.5588	2.499
HDPT	17	1101.00	875.500	64.7647	2.063
MOPFI	17	511.500	875.500	30.0882	-3.333
MOPMT	17	576.500	875.500	33.9118	-2.737
MOPPT	17	1165.00	875.500	68.5294	2.650

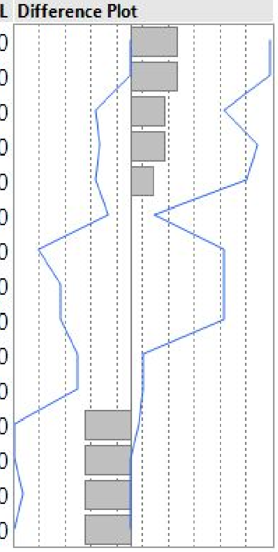
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
31.3063	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
MOPPT	MOPFI	12.4118	3.312053	3.74745	0.0025*	2.00000	0.00000	6.000000	
MOPPT	MOPMT	11.7059	3.363853	3.47990	0.0067*	2.00000	0.00000	6.000000	
HDMT	HDFI	7.9412	3.363058	2.36130	0.1700	1.50000	-1.50000	4.000000	
MOPPT	HDFI	7.7647	3.366502	2.30646	0.1913	1.50000	-1.33000	5.500000	
HDPT	HDFI	6.6471	3.349781	1.98433	0.3513	1.00000	-1.50000	5.000000	
MOPMT	MOPFI	1.8824	3.093896	0.60841	0.9905	0.00000	-1.00000	1.000000	
MOPPT	HDPT	1.1176	3.396286	0.32908	0.9995	0.00000	-4.00000	4.000000	
MOPPT	HDMT	0.7647	3.395236	0.22523	0.9999	0.00000	-3.00000	4.000000	
HDPT	HDMT	-0.4118	3.387878	-0.12154	1.0000	0.00000	-3.00000	4.000000	
MOPMT	HDFI	-2.9412	3.227831	-0.91119	0.9438	0.00000	-2.33000	0.500000	
MOPFI	HDFI	-4.7647	3.096488	-1.53875	0.6391	0.00000	-2.33000	0.500000	
MOPMT	HDPT	-10.3529	3.347918	-3.09235	0.0243*	-2.00000	-5.00000	0.330000	
MOPFI	HDPT	-11.0000	3.284219	-3.34935	0.0105*	-2.00000	-5.00000	0.000000	
MOPMT	HDMT	-11.8824	3.362263	-3.53403	0.0055*	-2.00000	-4.67000	0.000000	
MOPFI	HDMT	-12.4706	3.310438	-3.76705	0.0023*	-2.00000	-5.00000	0.000000	



Ceraphronoidea and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	0.7938235	1.4371837	0.246475	0.2923664	1.2952806
Malaise	34	1.4997059	1.7611695	0.3020381	0.8852048	2.114207
Pan Trap	34	2.9117647	2.802787	0.480674	1.9338261	3.8897033

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

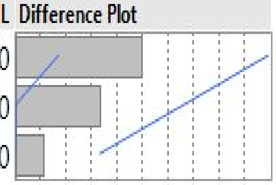
Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	1262.00	1751.00	37.1176	-3.542
Malaise	34	1725.00	1751.00	50.7353	-0.185
Pan Trap	34	2266.00	1751.00	66.6471	3.730

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
17.6964	2	0.0001*

Nonparametric Comparisons For Each Pair Using Wilcoxon Method

q*	Alpha
1.95996	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Pan Trap	Flight Int.	19.00000	4.678890	4.060792	<.0001*	1.500000	0.5000000	3.000000	
Pan Trap	Malaise	11.23529	4.754463	2.363105	0.0181*	1.000000	0.0000000	2.000000	
Malaise	Flight Int.	9.70588	4.597686	2.111036	0.0348*	0.330000	0.0000000	1.000000	

Ceraphronoidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	1.9803922	2.3193982	0.3247807	1.3280509	2.6327334
Woodland	51	1.4898039	2.1620273	0.3027444	0.881724	2.0978839

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	2825.00	2626.50	55.3922	1.353
Woodland	51	2428.00	2626.50	47.6078	-1.353

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
1.8409	1	0.1748

Ceraphronoidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	51	2.1762745	2.2783415	0.3190316	1.5354806	2.8170684
MOP	51	1.2939216	2.1421523	0.2999613	0.6914315	1.8964116

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	51	3000.00	2626.50	58.8235	2.550
MOP	51	2253.00	2626.50	44.1765	-2.550

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
6.5177	1	0.0107*

Evanioidea and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	0.3333333	0.6513389	0.1880254	-0.368767	1.035434
Early Summer	18	1.6388889	2.1060526	0.4964014	-0.056246	3.3340238
Mid Summer	18	1.0277778	0.9151056	0.2156925	0.2912209	1.7643346
Late Summer	18	0.63	0.9626434	0.2268972	-0.144819	1.4048194
Early Fall	18	0.4261111	0.6721619	0.1584301	-0.114903	0.9671257
Mid Fall	18	0.2222222	0.6467617	0.1524432	-0.298348	0.7427925

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	507.500	618.000	42.2917	-1.276
Early Summer	18	1158.50	927.000	64.3611	2.265
Mid Summer	18	1162.00	927.000	64.5556	2.299
Late Summer	18	921.000	927.000	51.1667	-0.054
Early Fall	18	845.000	927.000	46.9444	-0.799
Mid Fall	18	659.000	927.000	36.6111	-2.623

1-Way Test, ChiSquare Approximation

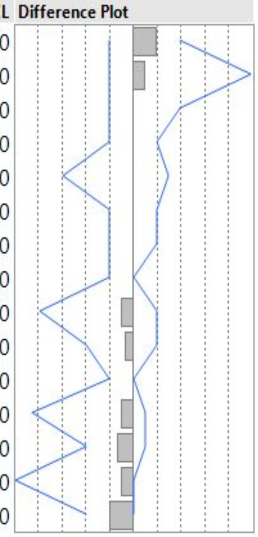
ChiSquare	DF	Prob>ChiSq
16.2854	5	0.0061*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
Mid Summer	Late Spring	6.59722	3.028837	2.17814	0.2479	1.00000	-1.00000	2.000000
Early Summer	Late Spring	6.18056	3.016160	2.04915	0.3145	0.50000	-1.00000	5.000000
Late Summer	Late Spring	2.56944	2.818759	0.91155	0.9437	0.00000	-1.00000	2.000000
Early Fall	Late Spring	1.52778	2.746471	0.55627	0.9937	0.00000	-1.00000	1.000000
Mid Summer	Early Summer	-0.94444	3.401680	-0.27764	0.9998	0.00000	-3.00000	1.500000
Early Fall	Late Summer	-1.72222	3.134042	-0.54952	0.9941	0.00000	-1.00000	1.000000
Mid Fall	Late Spring	-1.73611	2.127407	-0.81607	0.9647	0.00000	-1.00000	1.000000
Mid Fall	Early Fall	-4.38889	2.667262	-1.64547	0.5682	0.00000	-1.00000	0.000000
Late Summer	Early Summer	-4.61111	3.314949	-1.39101	0.7326	-0.50000	-4.00000	1.000000
Late Summer	Mid Summer	-5.38889	3.311835	-1.62716	0.5804	-0.33000	-2.00000	1.000000
Mid Fall	Late Summer	-5.50000	2.769448	-1.98596	0.3503	0.00000	-1.00000	0.000000
Early Fall	Early Summer	-6.00000	3.277145	-1.83086	0.4457	-0.50000	-4.33000	0.500000
Early Fall	Mid Summer	-6.94444	3.293572	-2.10848	0.2827	-0.66500	-2.00000	0.500000
Mid Fall	Early Summer	-8.94444	3.014252	-2.96738	0.0356*	-0.50000	-5.00000	0.000000
Mid Fall	Mid Summer	-9.27778	3.067753	-3.02429	0.0300*	-1.00000	-2.00000	0.000000

Difference Plot



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	0.5882353	1.6885209	0.4095265	-0.824253	2.0007234
HDMT	17	1.0594118	1.0684888	0.2591466	0.1655953	1.9532282
HDPT	17	0.1764706	0.3509441	0.0851164	-0.117103	0.4700437
MOPFI	17	1.1764706	1.3800043	0.3347002	0.022064	2.3308771
MOPMT	17	0.2352941	0.533785	0.1294619	-0.21123	0.6818181
MOPPT	17	1.1764706	1.3800043	0.3347002	0.022064	2.3308771

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	733.000	875.500	43.1176	-1.424
HDMT	17	1076.00	875.500	63.2941	2.006
HDPT	17	661.000	875.500	38.8824	-2.146
MOPFI	17	1062.00	875.500	62.4706	1.865
MOPMT	17	659.000	875.500	38.7647	-2.166
MOPPT	17	1062.00	875.500	62.4706	1.865

1-Way Test, ChiSquare Approximation

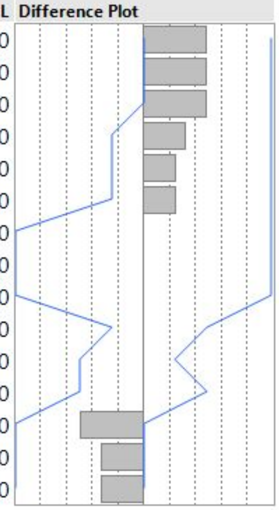
ChiSquare	DF	Prob>ChiSq
18.6881	5	0.0022*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
MOPFI	HDPT	7.82353	3.035441	2.57739	0.1028	1.00000	0.00000	2.000000
MOPPT	HDPT	7.82353	3.035441	2.57739	0.1028	1.00000	0.00000	2.000000
MOPPT	MOPMT	7.52941	2.977635	2.52866	0.1158	1.00000	0.00000	2.000000
HDMT	HDFI	6.94118	3.145322	2.20683	0.2344	0.67000	-0.50000	2.000000
MOPFI	HDFI	6.23529	3.090726	2.01742	0.3322	0.50000	-0.50000	2.000000
MOPPT	HDFI	6.23529	3.090726	2.01742	0.3322	0.50000	-0.50000	2.000000
MOPFI	HDMT	0.11765	3.285033	0.03581	1.0000	0.00000	-2.00000	2.000000
MOPPT	HDMT	0.11765	3.285033	0.03581	1.0000	0.00000	-2.00000	2.000000
MOPPT	MOPFI	0.00000	3.248474	0.00000	1.0000	0.00000	-2.00000	2.000000
MOPMT	HDPT	-0.35294	2.411721	-0.14634	1.0000	0.00000	-0.50000	1.000000
HDPT	HDFI	-1.17647	2.645077	-0.44478	0.9978	0.00000	-1.00000	0.500000
MOPMT	HDFI	-1.52941	2.538123	-0.60258	0.9909	0.00000	-1.00000	1.000000
MOPMT	MOPFI	-7.52941	2.977635	-2.52866	0.1158	-1.00000	-2.00000	0.000000
MOPMT	HDMT	-8.23529	3.043066	-2.70625	0.0740	-0.67000	-2.00000	0.000000
HDPT	HDMT	-8.58824	3.096488	-2.77354	0.0618	-0.67000	-2.00000	0.000000

Difference Plot



Evanioidea and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	0.8823529	1.547524	0.2653982	0.3423963	1.4223096
Malaise	34	0.6473529	0.9309243	0.1596522	0.3225381	0.9721678
Pan Trap	34	0.6764706	1.113841	0.1910222	0.2878331	1.0651081

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	1795.00	1751.00	52.7941	0.345
Malaise	34	1735.00	1751.00	51.0294	-0.123
Pan Trap	34	1723.00	1751.00	50.6765	-0.218

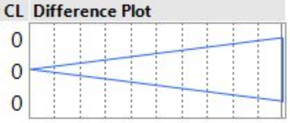
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
0.1247	2	0.9395

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Pan Trap	Malaise	-0.20588	4.269252	-0.048224	0.9987	0	0.000000	0	
Malaise	Flight Int.	-1.14706	4.309167	-0.266190	0.9617	0	-0.330000	0	
Pan Trap	Flight Int.	-1.38235	4.300601	-0.321432	0.9446	0	0.000000	0	



Evanioidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	1.137451	1.2598664	0.1764166	0.7831078	1.4917941
Woodland	51	0.3333333	1.0376255	0.1452966	0.0414965	0.6251702

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	3200.00	2626.50	62.7451	4.283
Woodland	51	2053.00	2626.50	40.2549	-4.283

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
18.3792	1	<.0001*

Evanioidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	51	0.6080392	1.2040881	0.1686061	0.269384	0.9466944
MOP	51	0.8627451	1.2291397	0.172114	0.517044	1.2084462

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	51	2470.00	2626.50	48.4314	-1.166
MOP	51	2783.00	2626.50	54.5686	1.166

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
1.3686	1	0.2420

Mymarommatoidea and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	0.2778333	0.6002637	0.1732812	-0.369212	0.9248782
Early Summer	18	0.7592778	1.0590739	0.2496261	-0.093157	1.6117129
Mid Summer	18	1.5555556	3.3294095	0.7847493	-1.124244	4.2353548
Late Summer	18	1.0555556	2.6617602	0.6273829	-1.086861	3.1979724
Early Fall	18	0.8333333	1.504894	0.3547069	-0.377937	2.0446033
Mid Fall	18	0.6111111	1.4507154	0.3419369	-0.556551	1.7787735

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	535.500	618.000	44.6250	-0.998
Early Summer	18	1003.50	927.000	55.7500	0.782
Mid Summer	18	1037.00	927.000	57.6111	1.127
Late Summer	18	905.500	927.000	50.3056	-0.216
Early Fall	18	920.000	927.000	51.1111	-0.067
Mid Fall	18	851.500	927.000	47.3056	-0.772

1-Way Test, ChiSquare Approximation

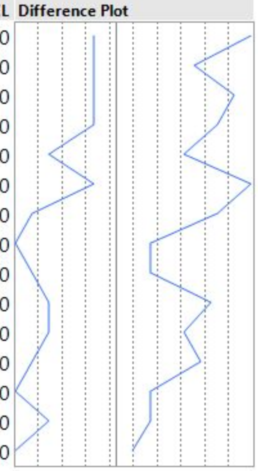
ChiSquare	DF	Prob>ChiSq
2.9962	5	0.7006

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
Mid Summer	Late Spring	3.95833	2.830628	1.39839	0.7281	0	-0.66700	4.000000
Early Summer	Late Spring	3.68056	2.828935	1.30104	0.7846	0	-0.66700	2.333000
Early Fall	Late Spring	1.59722	2.658753	0.60074	0.9910	0	-0.66700	3.500000
Late Summer	Late Spring	1.45833	2.658753	0.54850	0.9941	0	-0.66700	3.000000
Mid Summer	Early Summer	0.88889	3.185034	0.27908	0.9998	0	-2.00000	2.000000
Mid Fall	Late Spring	0.41667	2.553076	0.16320	1.0000	0	-0.66700	4.000000
Early Fall	Late Summer	0.16667	2.941223	0.05667	1.0000	0	-2.50000	3.000000
Mid Fall	Early Fall	-0.94444	2.861623	-0.33004	0.9995	0	-3.00000	1.000000
Mid Fall	Late Summer	-1.00000	2.861346	-0.34949	0.9993	0	-2.50000	1.000000
Early Fall	Early Summer	-1.27778	3.081692	-0.41464	0.9984	0	-2.00000	2.833000
Late Summer	Early Summer	-1.88889	3.080146	-0.61325	0.9901	0	-2.00000	2.000000
Early Fall	Mid Summer	-1.94444	3.083237	-0.63065	0.9888	0	-2.50000	2.500000
Late Summer	Mid Summer	-2.44444	3.081692	-0.79322	0.9688	0	-3.00000	1.000000
Mid Fall	Early Summer	-3.11111	3.016621	-1.03132	0.9075	0	-2.00000	1.000000
Mid Fall	Mid Summer	-3.50000	3.016621	-1.16024	0.8557	0	-3.00000	0.500000

Difference Plot



Mymarommatoidea and Individual Traps

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	0.1177059	0.2620994	0.0635684	-0.101547	0.3369583
HDMT	17	3.6470588	3.7113201	0.9001273	0.5424508	6.7516668
HDPT	17	0.0588235	0.1660528	0.0402737	-0.080084	0.1977307
MOPFI	17	0.2352941	0.3999081	0.096992	-0.099239	0.5698268
MOPMT	17	0.1176471	0.2811479	0.0681884	-0.11754	0.352834
MOPPT	17	1.1176471	1.2689736	0.3077713	0.0561203	2.1791738

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	691.000	875.500	40.6471	-1.936
HDMT	17	1407.00	875.500	82.7647	5.588
HDPT	17	641.500	875.500	37.7353	-2.457
MOPFI	17	779.500	875.500	45.8529	-1.005
MOPMT	17	687.500	875.500	40.4412	-1.973
MOPPT	17	1046.50	875.500	61.5588	1.794

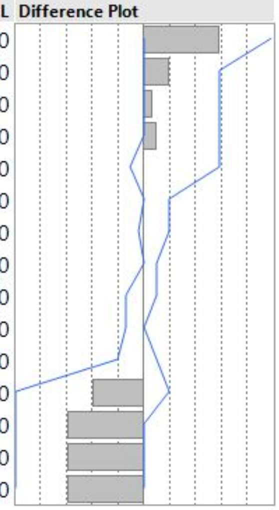
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
41.0786	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
HDMT	HDFI	13.4118	3.192013	4.20166	0.0004*	3.00000	0.00000	5.000000	
MOPPT	HDPT	8.0000	2.833779	2.82309	0.0539	1.00000	0.00000	3.000000	
MOPPT	HDFI	7.5294	2.911346	2.58623	0.1006	0.33300	0.00000	3.000000	
MOPPT	MOPMT	7.3529	2.910428	2.52641	0.1164	0.50000	0.00000	3.000000	
MOPPT	MOPFI	6.0588	3.035148	1.99622	0.3444	0.00000	-0.50000	3.000000	
MOPFI	HDPT	3.2941	2.408763	1.36756	0.7466	0.00000	0.00000	1.000000	
MOPFI	HDFI	2.1176	2.537069	0.83468	0.9611	0.00000	-0.16700	1.000000	
MOPMT	HDPT	1.0588	2.100420	0.50410	0.9960	0.00000	0.00000	0.500000	
MOPMT	HDFI	-0.1176	2.268124	-0.05187	1.0000	0.00000	-0.66700	0.500000	
HDPT	HDFI	-1.2941	2.102541	-0.61550	0.9900	0.00000	-0.66700	0.000000	
MOPMT	MOPFI	-2.1765	2.533202	-0.85918	0.9560	0.00000	-1.00000	0.500000	
MOPPT	HDMT	-9.0000	3.334581	-2.69899	0.0754	-2.00000	-5.00000	1.000000	
MOPFI	HDMT	-12.8824	3.260797	-3.95068	0.0011*	-3.00000	-5.00000	0.000000	
MOPMT	HDMT	-13.3529	3.192572	-4.18250	0.0004*	-3.00000	-5.00000	0.000000	
HDPT	HDMT	-13.5882	3.149852	-4.31393	0.0002*	-3.00000	-5.00000	0.000000	



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	0.1765	0.3382437	0.0580083	0.0584812	0.2945188
Malaise	34	1.8823529	3.150418	0.5402922	0.7831201	2.9815858
Pan Trap	34	0.5882353	1.0406189	0.1784647	0.2251462	0.9513244

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	1470.50	1751.00	43.2500	-2.330
Malaise	34	2094.50	1751.00	61.6029	2.854
Pan Trap	34	1688.00	1751.00	49.6471	-0.520

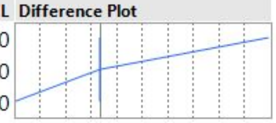
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
9.2589	2	0.0098*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Malaise	Flight Int.	11.9706	4.143338	2.88912	0.0108*	0	0.00000	2.000000	
Pan Trap	Flight Int.	4.4706	3.790728	1.17935	0.4655	0	0.00000	0.000000	
Pan Trap	Malaise	-8.1765	4.274750	-1.91274	0.1350	0	-1.00000	0.000000	



Mymarommatoidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	1.6666667	2.6658332	0.3732913	0.916889	2.4164443
Woodland	51	0.0980588	0.2385068	0.0333976	0.0309777	0.1651399

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	3233.00	2626.50	63.3922	4.753
Woodland	51	2020.00	2626.50	39.6078	-4.753

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
22.6328	1	<.0001*

Mymarammatoidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	51	1.2745294	2.7036604	0.3785882	0.5141127	2.0349462
MOP	51	0.4901961	0.8915727	0.1248452	0.2394372	0.740955

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	51	2739.50	2626.50	53.7157	0.882
MOP	51	2513.50	2626.50	49.2843	-0.882

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
0.7857	1	0.3754

Stephanoidea and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	0.4166667	0.7929615	0.2289083	-0.438094	1.2714271
Early Summer	18	0.5277778	0.6524213	0.1537772	0.0026522	1.0529034
Mid Summer	18	0.2783333	0.3798026	0.0895203	-0.027365	0.5840316
Late Summer	18	0.0972222	0.2592252	0.0611	-0.111425	0.3058693
Early Fall	18	0.2083333	0.607853	0.1432723	-0.28092	0.6975865
Mid Fall	18	0.2222222	0.4991823	0.1176584	-0.179563	0.6240077

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	632.500	618.000	52.7083	0.188
Early Summer	18	1113.50	927.000	61.8611	2.106
Mid Summer	18	1001.00	927.000	55.6111	0.832
Late Summer	18	815.000	927.000	45.2778	-1.263
Early Fall	18	806.000	927.000	44.7778	-1.365
Mid Fall	18	885.000	927.000	49.1667	-0.470

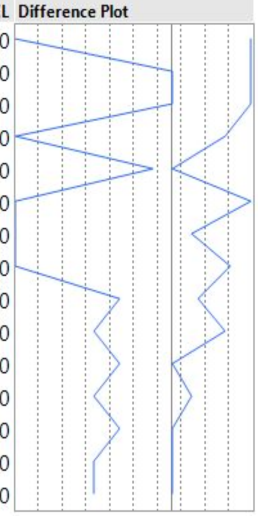
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
7.3434	5	0.1963

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Early Summer	Late Spring	2.01389	2.808972	0.71695	0.9800	0	-2.00000	1.000000	
Mid Fall	Early Fall	1.55556	2.279306	0.68247	0.9839	0	0.00000	1.000000	
Mid Fall	Late Summer	1.22222	2.425068	0.50400	0.9960	0	0.00000	1.000000	
Mid Summer	Late Spring	0.69444	2.748650	0.25265	0.9999	0	-2.00000	0.670000	
Early Fall	Late Summer	-0.61111	2.111946	-0.28936	0.9997	0	-0.25000	0.000000	
Mid Fall	Late Spring	-0.90278	2.430056	-0.37150	0.9991	0	-2.00000	1.000000	
Late Summer	Late Spring	-1.73611	2.291601	-0.75760	0.9744	0	-2.00000	0.250000	
Early Fall	Late Spring	-2.01389	2.127970	-0.94639	0.9344	0	-2.00000	0.750000	
Mid Fall	Mid Summer	-2.38889	2.860514	-0.83513	0.9610	0	-0.67000	0.330000	
Mid Summer	Early Summer	-3.38889	3.122118	-1.08545	0.8874	0	-1.00000	0.670000	
Early Fall	Mid Summer	-4.16667	2.669047	-1.56111	0.6243	0	-0.67000	0.000000	
Mid Fall	Early Summer	-4.27778	2.923903	-1.46304	0.6880	0	-1.00000	0.250000	
Late Summer	Mid Summer	-4.33333	2.769734	-1.56453	0.6221	0	-0.67000	0.000000	
Early Fall	Early Summer	-5.22222	2.762849	-1.89016	0.4082	0	-1.00000	0.000000	
Late Summer	Early Summer	-5.94444	2.849116	-2.08642	0.2943	0	-1.00000	0.000000	



Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	0	0	0	0	0
HDMT	17	0.4123529	0.5839577	0.1416306	-0.076142	0.9008475
HDPT	17	0.1470588	0.433543	0.1051496	-0.21561	0.5097279
MOPFI	17	0.1764706	0.4740509	0.1149742	-0.220084	0.5730255
MOPMT	17	0.2058824	0.4351301	0.1055346	-0.158114	0.5698791
MOPPT	17	0.7647059	0.752447	0.1824952	0.135266	1.3941458

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	646.000	875.500	38.0000	-2.653
HDMT	17	995.000	875.500	58.5294	1.379
HDPT	17	785.000	875.500	46.1765	-1.043
MOPFI	17	795.500	875.500	46.7941	-0.921
MOPMT	17	837.500	875.500	49.2647	-0.434
MOPPT	17	1194.00	875.500	70.2353	3.684

1-Way Test, ChiSquare Approximation

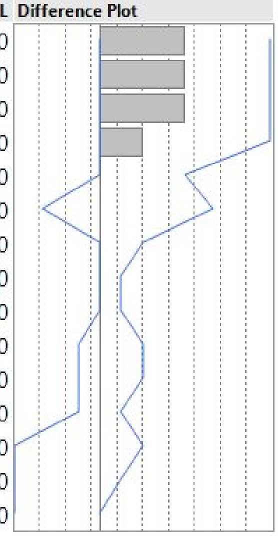
ChiSquare	DF	Prob>ChiSq
20.6262	5	0.0010*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
MOPPT	HDFI	9.94118	2.731280	3.63975	0.0037*	1.000000	0.00000	2.000000
MOPPT	HDPT	7.88235	2.968942	2.65494	0.0845	1.000000	0.00000	2.000000
MOPPT	MOPFI	7.47059	2.960525	2.52340	0.1172	1.000000	0.00000	2.000000
MOPPT	MOPMT	7.05882	3.022789	2.33520	0.1799	0.500000	0.00000	2.000000
HDMT	HDFI	6.94118	2.410982	2.87898	0.0460*	0.000000	0.00000	1.000000
MOPPT	HDMT	4.82353	3.145322	1.53356	0.6425	0.000000	-0.67000	1.330000
MOPMT	HDFI	3.94118	1.911127	2.06223	0.3073	0.000000	0.00000	0.500000
HDPT	HDFI	2.94118	1.680866	1.74980	0.4986	0.000000	0.00000	0.250000
MOPFI	HDFI	2.94118	1.680866	1.74980	0.4986	0.000000	0.00000	0.250000
MOPMT	HDPT	1.05882	2.412460	0.43890	0.9979	0.000000	-0.25000	0.500000
MOPMT	MOPFI	0.88235	2.413199	0.36564	0.9992	0.000000	-0.25000	0.500000
MOPFI	HDPT	0.00000	2.269302	0.00000	1.0000	0.000000	-0.25000	0.250000
MOPMT	HDMT	-3.35294	2.834093	-1.18307	0.8451	0.000000	-1.00000	0.500000
MOPFI	HDMT	-3.94118	2.746250	-1.43511	0.7055	0.000000	-1.00000	0.250000
HDPT	HDMT	-4.47059	2.748197	-1.62674	0.5807	0.000000	-1.00000	0.000000

Difference Plot



Stephanoidea and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	0.0882353	0.3420214	0.0586562	-0.031102	0.2075722
Malaise	34	0.3091176	0.5178005	0.0888021	0.1284485	0.4897868
Pan Trap	34	0.4558824	0.6811048	0.1168085	0.2182337	0.6935311

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

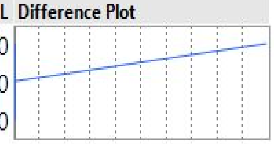
Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	1441.50	1751.00	42.3971	-2.830
Malaise	34	1832.50	1751.00	53.8971	0.742
Pan Trap	34	1979.00	1751.00	58.2059	2.084

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
8.6349	2	0.0133*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Pan Trap	Flight Int.	10.20588	3.560465	2.866447	0.0116*	0	0	0.5000000	
Malaise	Flight Int.	7.94118	3.387085	2.344546	0.0499*	0	0	0.0000000	
Pan Trap	Malaise	3.14706	4.082447	0.770876	0.7209	0	0	0.0000000	

Stephanoidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	0.4511765	0.6494633	0.0909431	0.268512	0.633841
Woodland	51	0.1176471	0.3583048	0.0501727	0.0168722	0.2184219

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	2984.50	2626.50	58.5196	3.087
Woodland	51	2268.50	2626.50	44.4804	-3.087

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
9.5558	1	0.0020*

Stephanoidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	51	0.1864706	0.4460575	0.0624605	0.0610149	0.3119263
MOP	51	0.3823529	0.6232033	0.0872659	0.2070742	0.5576317

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	51	2426.00	2626.50	47.5686	-1.727
MOP	51	2827.00	2626.50	55.4314	1.727

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
2.9973	1	0.0834

Trigonaloidea and Month

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
Late Spring	12	0.3333333	0.8876254	0.2562354	-0.623469	1.2901352
Early Summer	18	0.6666667	1.2485285	0.294281	-0.338258	1.6715914
Mid Summer	18	0.7222222	1.2744344	0.3003871	-0.303554	1.7479982
Late Summer	18	0.2222222	0.5483189	0.12924	-0.219113	0.6635571
Early Fall	18	0.3333333	0.8401681	0.1980295	-0.342907	1.0095739
Mid Fall	18	0.3333333	1.0289915	0.2425356	-0.494889	1.1615555

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Late Spring	12	578.500	618.000	48.2083	-0.545
Early Summer	18	1055.50	927.000	58.6389	1.513
Mid Summer	18	1065.00	927.000	59.1667	1.625
Late Summer	18	857.000	927.000	47.6111	-0.822
Early Fall	18	870.500	927.000	48.3611	-0.662
Mid Fall	18	826.500	927.000	45.9167	-1.182

1-Way Test, ChiSquare Approximation

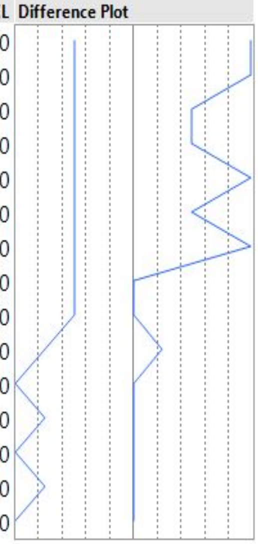
ChiSquare	DF	Prob>ChiSq
6.4548	5	0.2644

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
Mid Summer	Late Spring	3.12500	2.650634	1.17896	0.8471	0	-1.00000	2.000000
Early Summer	Late Spring	3.05556	2.655598	1.15061	0.8600	0	-1.00000	2.000000
Mid Summer	Early Summer	0.27778	3.070081	0.09048	1.0000	0	-1.00000	1.000000
Early Fall	Late Summer	0.16667	2.278262	0.07316	1.0000	0	-1.00000	1.000000
Early Fall	Late Spring	0.00000	2.129095	0.00000	1.0000	0	-1.00000	2.000000
Late Summer	Late Spring	-0.06944	2.127970	-0.03263	1.0000	0	-1.00000	1.000000
Mid Fall	Late Spring	-0.62500	1.938963	-0.32234	0.9995	0	-1.00000	2.000000
Mid Fall	Late Summer	-0.66667	2.111195	-0.31578	0.9996	0	-1.00000	0.000000
Mid Fall	Early Fall	-0.77778	2.111571	-0.36834	0.9991	0	-1.00000	0.000000
Early Fall	Early Summer	-3.55556	2.770021	-1.28358	0.7942	0	-1.50000	0.500000
Early Fall	Mid Summer	-3.66667	2.766294	-1.32548	0.7710	0	-2.00000	0.000000
Late Summer	Early Summer	-3.94444	2.767154	-1.42545	0.7115	0	-1.50000	0.000000
Late Summer	Mid Summer	-4.11111	2.761987	-1.48846	0.6717	0	-2.00000	0.000000
Mid Fall	Early Summer	-4.44444	2.669344	-1.66500	0.5551	0	-1.50000	0.000000
Mid Fall	Mid Summer	-4.50000	2.666667	-1.68750	0.5401	0	-2.00000	0.000000

Difference Plot



Trigonaloidea and Individual Traps

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 99.67%	Upper 99.67%
HDFI	17	0	0	0	0	0
HDMT	17	0.4117647	0.7338957	0.1779959	-0.202157	1.025686
HDPT	17	0.3529412	0.6063391	0.1470588	-0.154276	0.8601583
MOPFI	17	0	0	0	0	0
MOPMT	17	0.0588235	0.2425356	0.0588235	-0.144063	0.2617104
MOPPT	17	1.8235294	1.6671568	0.4043449	0.4289129	3.2181459

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HDFI	17	671.500	875.500	39.5000	-2.461
HDMT	17	918.000	875.500	54.0000	0.508
HDPT	17	908.500	875.500	53.4412	0.393
MOPFI	17	671.500	875.500	39.5000	-2.461
MOPMT	17	717.000	875.500	42.1765	-1.911
MOPPT	17	1366.50	875.500	80.3824	5.931

1-Way Test, ChiSquare Approximation

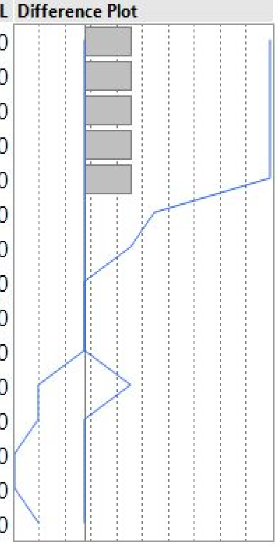
ChiSquare	DF	Prob>ChiSq
42.9320	5	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
3.67110	0.0033

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
MOPPT	HDFI	12.9412	2.979131	4.34394	0.0002*	1.000000	0.00000	4.000000
MOPPT	MOPFI	12.9412	2.979131	4.34394	0.0002*	1.000000	0.00000	4.000000
MOPPT	MOPMT	12.4118	3.036909	4.08697	0.0006*	1.000000	0.00000	4.000000
MOPPT	HDPT	9.8235	3.196756	3.07297	0.0258*	1.000000	0.00000	4.000000
MOPPT	HDMT	9.3529	3.217599	2.90681	0.0425*	1.000000	0.00000	4.000000
HDMT	HDFI	4.9412	2.104236	2.34820	0.1749	0.000000	0.00000	1.500000
HDPT	HDFI	4.9412	2.100420	2.35247	0.1733	0.000000	0.00000	1.000000
MOPMT	HDFI	0.9412	1.000000	0.94118	0.9358	0.000000	0.00000	0.000000
MOPMT	MOPFI	0.9412	1.000000	0.94118	0.9358	0.000000	0.00000	0.000000
MOPFI	HDFI	0.0000	0.000000	0.00000	1.0000	0.000000	0.00000	0.000000
HDPT	HDMT	-0.2353	2.743003	-0.08578	1.0000	0.000000	-1.00000	1.000000
MOPMT	HDPT	-4.0000	2.262222	-1.76817	0.4865	0.000000	-1.00000	0.000000
MOPMT	HDMT	-4.0588	2.269302	-1.78858	0.4731	0.000000	-1.50000	0.000000
MOPFI	HDMT	-4.9412	2.104236	-2.34820	0.1749	0.000000	-1.50000	0.000000
MOPFI	HDPT	-4.9412	2.100420	-2.35247	0.1733	0.000000	-1.00000	0.000000

Difference Plot



Trigonaloidea and Trap Type

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Flight Int.	34	0	0	0	0	0
Malaise	34	0.2352941	0.5672274	0.0972787	0.0373791	0.4332091
Pan Trap	34	1.0882353	1.4432213	0.2475104	0.5846716	1.591799

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Flight Int.	34	1343.00	1751.00	39.5000	-3.896
Malaise	34	1635.00	1751.00	48.0882	-1.104
Pan Trap	34	2275.00	1751.00	66.9118	5.005

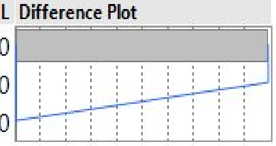
1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
27.6905	2	<.0001*

Nonparametric Comparisons For All Pairs Using Steel-Dwass Method

q*	Alpha
2.34370	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL	Difference Plot
Pan Trap	Flight Int.	17.97059	3.714871	4.837474	<.0001*	1.000000	0	1.000000	
Pan Trap	Malaise	12.79412	4.081425	3.134718	0.0049*	0.000000	0	1.000000	
Malaise	Flight Int.	5.97059	2.359391	2.530563	0.0306*	0.000000	0	0.000000	



Trigonaloidea and Habitat

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
Meadow	51	0.745098	1.2975845	0.1816982	0.3801465	1.1100496
Woodland	51	0.1372549	0.4009792	0.0561483	0.0244777	0.2500321

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
Meadow	51	2956.00	2626.50	57.9608	2.965
Woodland	51	2297.00	2626.50	45.0392	-2.965

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
8.8196	1	0.0030*

Trigonaloidea and Site

Means and Std Deviations

Level	Number	Mean	Std Dev	Std Err Mean	Lower 95%	Upper 95%
HD	51	0.254902	0.5689688	0.0796716	0.0948769	0.414927
MOP	51	0.627451	1.2800123	0.1792376	0.2674417	0.9874602

Wilcoxon / Kruskal-Wallis Tests (Rank Sums)

Level	Count	Score Sum	Expected Score	Score Mean	(Mean-Mean0)/Std0
HD	51	2498.00	2626.50	48.9804	-1.154
MOP	51	2755.00	2626.50	54.0196	1.154

1-Way Test, ChiSquare Approximation

ChiSquare	DF	Prob>ChiSq
1.3414	1	0.2468

Superfamily Correlation Tables

Correlations

	ICH Count	CAL Count	DIA Count	PRC Count	CYN Count	PLT Count	CER Count	EVN Count	MYM Count	STF Count	Tri Count
ICH Count	1.0000	0.7817	0.3540	0.3303	0.7392	0.6837	0.4340	0.2358	0.4984	0.4457	0.4340
CAL Count	0.7817	1.0000	0.1089	0.0818	0.8125	0.8282	0.3760	0.2586	0.5148	0.3766	0.4983
DIA Count	0.3540	0.1089	1.0000	0.9967	0.2819	0.1379	0.2369	-0.0348	-0.0281	0.0739	0.0623
PRC Count	0.3303	0.0818	0.9967	1.0000	0.2527	0.1169	0.2292	-0.0363	-0.0282	0.0721	0.0395
CYN Count	0.7392	0.8125	0.2819	0.2527	1.0000	0.8625	0.3994	0.2350	0.4690	0.3243	0.4784
PLT Count	0.6837	0.8282	0.1379	0.1169	0.8625	1.0000	0.3900	0.2158	0.5627	0.3064	0.4338
CER Count	0.4340	0.3760	0.2369	0.2292	0.3994	0.3900	1.0000	0.1674	0.2525	0.2735	0.2954
EVN Count	0.2358	0.2586	-0.0348	-0.0363	0.2350	0.2158	0.1674	1.0000	0.2291	0.1666	0.1236
MYM Count	0.4984	0.5148	-0.0281	-0.0282	0.4690	0.5627	0.2525	0.2291	1.0000	0.1343	0.0667
STF Count	0.4457	0.3766	0.0739	0.0721	0.3243	0.3064	0.2735	0.1666	0.1343	1.0000	0.4329
Tri Count	0.4340	0.4983	0.0623	0.0395	0.4784	0.4338	0.2954	0.1236	0.0667	0.4329	1.0000

The correlations are estimated by Row-wise method.

	ICH Count	CAL Count	DIA Count	PRC Count	CYN Count	PLT Count	CER Count	EVN Count	MYM Count	Tri Count
ICH Count	<.0001	<.0001	0.0003	0.0007	<.0001	<.0001	<.0001	0.0170	<.0001	<.0001
CAL Count	<.0001	<.0001	0.2758	0.4139	<.0001	<.0001	<.0001	0.0087	<.0001	<.0001
DIA Count	0.0003	0.2758	<.0001	<.0001	0.0041	0.1669	0.0165	0.7287	0.7791	0.5339
PRC Count	0.0007	0.4139	<.0001	<.0001	0.0104	0.2420	0.0205	0.7171	0.7781	0.6933
CYN Count	<.0001	<.0001	0.0041	0.0104	<.0001	<.0001	<.0001	0.0174	<.0001	<.0001
PLT Count	<.0001	<.0001	0.1669	0.2420	<.0001	<.0001	<.0001	0.0293	<.0001	<.0001
CER Count	<.0001	<.0001	0.0165	0.0205	<.0001	<.0001	<.0001	0.0927	0.0105	0.0026
EVN Count	0.0170	0.0087	0.7287	0.7171	0.0174	0.0293	0.0927	<.0001	0.0206	0.2158
MYM Count	<.0001	<.0001	0.7791	0.7781	<.0001	<.0001	0.0105	0.0206	<.0001	0.5055
Tri Count	<.0001	<.0001	0.5339	0.6933	<.0001	<.0001	0.0026	0.2158	0.5055	<.0001

Pairwise Correlations

Variable	by Variable	Correlation	Count	Lower 95%	Upper 95%	Signif Prob
CAL Count	ICH Count	0.7817	102	0.6925	0.8474	<.0001*
DIA Count	ICH Count	0.3540	102	0.1713	0.5131	0.0003*
DIA Count	CAL Count	0.1089	102	-0.0874	0.2971	0.2758
PRC Count	ICH Count	0.3303	102	0.1451	0.4931	0.0007*
PRC Count	CAL Count	0.0818	102	-0.1145	0.2719	0.4139
PRC Count	DIA Count	0.9967	102	0.9951	0.9978	<.0001*
CYN Count	ICH Count	0.7392	102	0.6361	0.8163	<.0001*
CYN Count	CAL Count	0.8125	102	0.7341	0.8696	<.0001*
CYN Count	DIA Count	0.2819	102	0.0925	0.4516	0.0041*
CYN Count	PRC Count	0.2527	102	0.0613	0.4263	0.0104*
PLT Count	ICH Count	0.6837	102	0.5643	0.7751	<.0001*
PLT Count	CAL Count	0.8282	102	0.7554	0.8808	<.0001*
PLT Count	DIA Count	0.1379	102	-0.0581	0.3237	0.1669
PLT Count	PRC Count	0.1169	102	-0.0794	0.3045	0.2420
PLT Count	CYN Count	0.8625	102	0.8027	0.9052	<.0001*
CER Count	ICH Count	0.4340	102	0.2616	0.5795	<.0001*
CER Count	CAL Count	0.3760	102	0.1959	0.5316	<.0001*
CER Count	DIA Count	0.2369	102	0.0445	0.4124	0.0165*
CER Count	PRC Count	0.2292	102	0.0364	0.4056	0.0205*
CER Count	CYN Count	0.3994	102	0.2222	0.5511	<.0001*
CER Count	PLT Count	0.3900	102	0.2115	0.5432	<.0001*
EVN Count	ICH Count	0.2358	102	0.0433	0.4114	0.0170*
EVN Count	CAL Count	0.2586	102	0.0675	0.4313	0.0087*
EVN Count	DIA Count	-0.0348	102	-0.2277	0.1608	0.7287
EVN Count	PRC Count	-0.0363	102	-0.2292	0.1593	0.7171
EVN Count	CYN Count	0.2350	102	0.0424	0.4107	0.0174*
EVN Count	PLT Count	0.2158	102	0.0223	0.3938	0.0293*
EVN Count	CER Count	0.1674	102	-0.0280	0.3505	0.0927
MYM Count	ICH Count	0.4984	102	0.3365	0.6316	<.0001*
MYM Count	CAL Count	0.5148	102	0.3560	0.6448	<.0001*
MYM Count	DIA Count	-0.0281	102	-0.2214	0.1673	0.7791
MYM Count	PRC Count	-0.0282	102	-0.2215	0.1672	0.7781
MYM Count	CYN Count	0.4690	102	0.3021	0.6080	<.0001*
MYM Count	PLT Count	0.5627	102	0.4134	0.6825	<.0001*
MYM Count	CER Count	0.2525	102	0.0610	0.4260	0.0105*
MYM Count	EVN Count	0.2291	102	0.0362	0.4055	0.0206*
Tri Count	ICH Count	0.4340	102	0.2617	0.5796	<.0001*
Tri Count	CAL Count	0.4983	102	0.3364	0.6316	<.0001*
Tri Count	DIA Count	0.0623	102	-0.1338	0.2537	0.5339
Tri Count	PRC Count	0.0395	102	-0.1562	0.2322	0.6933
Tri Count	CYN Count	0.4784	102	0.3131	0.6156	<.0001*
Tri Count	PLT Count	0.4338	102	0.2614	0.5794	<.0001*
Tri Count	CER Count	0.2954	102	0.1070	0.4632	0.0026*
Tri Count	EVN Count	0.1236	102	-0.0726	0.3106	0.2158
Tri Count	MYM Count	0.0667	102	-0.1295	0.2578	0.5055