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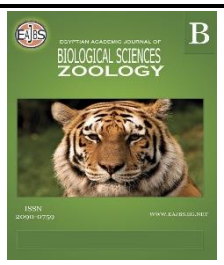

# Occurrence and Seasonal Fluctuations of True Spider's Population Inhabiting Pomegranate Orchards in Assiut Governorate, Upper Egypt

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**ABSTRACT**

Spiders are a significant predatory group across many agricultural crop systems. In Egypt, pomegranate is one of the most considerable fruit crops. Unfortunately, pomegranate fruits are attacked by a range of insect pests. These pests reduce the quality and marketing of pomegranate fruits. So, the present study focuses on identifying true spiders inhabiting economically important pomegranate orchards at Assiut.

The pitfall trap method was conducted for a survey of two years (during the 2020 and 2021 growing seasons) to determine the composition and abundance of spiders' species in pomegranate plants in the experimental farm, Faculty of Agriculture, Assiut University, 31° 11' 21.4188" E; "27° 10' 48.4824" N". The canonical corresponded analysis (CCA) is unimodal method to analyze the spiders' species community composition response to ecological factors. In total, 12 spider genera were identified from 11 families. *Hogna ferox* was the most dominant species which represented the highest number during the whole study period. The results of CCA in both growing seasons revealed that spiders' species community composition was mainly related to relative humidity, while wind velocity ($W.V._{MIN}$) had the slightest effect on the collected species.

So, the main objective of this study is to discuss the functional response of environmental factors to the abundance of spiders' species as well as their effective role in integrated pest management (IPM) programs and achieve sustainable development goals (SDGs) particularly biodiversity goal for pomegranate orchards.

## INTRODUCTION

Spiders (Arthropoda: Chelicerata: Arachnida: Araneae) are a highly precious component of the earth's ecosystem. They are predatory in feeding habits, consuming mostly insects, keeping their population under check, and hardly posing any danger to humans. They also serve as ecological indicators owing to their extreme sensitivity towards their habitat disturbances (Singh *et al*.,2023). Most spiders are predators and recognized as critical bioindicators of environmental change caused naturally or due to anthropogenic stress (Rutkowski *et al*., 2019; Stojanowska *et al*., 2020; and Singh, 2024). Although spiders are

diverse arachnid order, they are obligate predators and can usefully feed and consume lepidopteran insect larvae. On the other hand, spiders feed on and consume phytophagous mites (Ahmed *et al*., 2014). Spiders' diversity and their interaction in the Horticultural crops, Agricultural landscape, orchards, and vineyards have been investigated (Salman *et al*., 2019; D' Alberto *et al*., 2012; and Manthen *et al*., 2023). The ecology and role of various predators and parasitoids in regulating pests on pomegranates have also been investigated (Samada and Tambunan, 2020; Hegazy *et al*., 2021).

Studies of spiders within pomegranate plantations were mostly of general account (Sarma *et al*., 2013; Sugumaran *et al*., 2019) and there are few attempts to investigate functional ecology. There are still large research gaps that need detailed investigations to explore the role of spiders in agroecosystems in regulating pests (Manthen *et al*., 2023).

In Egypt, pomegranate is one of the most important fruit crops. Farmers, in Upper Egypt especially Assiut governorate, depend on pomegranates for exportation as a basic source of income (Arafat *et al*., 2019; Mousa, 2023). Unfortunately, pomegranate fruits are attacked by a range of insect pests. A few studies have also addressed the role of spiders in controlling insect pests on pomegranates (Ghavami, 2008; Mousa, 2023).

So, the present study aimed to conduct a survey of spiders and to study the dominance and abundance of this group. Also, the effects of environmental factors on the abundance of spider families represented in pomegranate plantations.

## MATERIALS AND METHODS

**Studied Area:**

In the present investigation, samples were collected from pomegranate orchards in the experimental farm, Faculty of Agriculture, Assiut University, Assiut, Egypt 31° 11' 21.4188" E Longitude; "27° 10' 48.4824" N" Latitude during 2020 and 2021 successive growing seasons.

**Method of Collection and Separation:**

All spiders were collected using the pitfall trap method for a survey during 2020 and 2021 growing seasons to identify the composition and abundance of spiders' species. Pitfall traps were prepared with a wide – mouth ½ liter fruit glass jar. The jars were embedded in the soil at the sites (north, south, east, west, and center) 3 traps/one direction. The top of each jar is adjusted at the same level as the soil surface and partially filled with water with drops of liquid soap for killing and working as a preserving agent. Every week, the contents of the traps are poured through a fine mesh filter to separate them from the liquid (Abdel-Galil *et al*., 2007).

**Preservation and Examination:**

Spider specimens were placed in a 10-centimeter-diameter Petri dish that was filled with 70% alcohol. The examination was conducted in the Biological Control Lab, Plant Protection Department, Assiut University, with the aid of a trinocular stereomicroscope Leica DC150 and with the HDMI MULTI-OUTPUT HD (Toup Cam_120) camera, Finally, each specimen was kept in a glass vial (3x5cm) containing 70% ethyl alcohol (Quasin and Uniyl, 2010).

**Methods Used for Identification:**

Specimens were identified using taxonomical knowledge that is currently accessible. Numerous catalogs, publications, and keys were utilized to identify the recorded species. The following description and literature were used to identify the obtained specimens, some at the species level and others at the genus or family level according to Jocqué and Dippenaar_Schoeman (2006), El-Hennawy (2006; 2010), and Aboulnasr *et al*., (2018).

**Methods Used for Ecological Studies:**

The weather parameters that were recorded were temperature (°C), relative humidity

(%), and wind velocity (Knots). These data were obtained from the farm meteorological research station of Assiut University's Faculty of Agriculture and were labelled as $T_{MIN}$, $T_{MAX}$, RH, $W.V._{MIN}$, and $W.V._{MAX}$.

**Dominance and Abundance Percentages of Spiders' Species:**

The dominance and abundance of the collected spiders were conducted according to the following formula used by Abdel-Galil, *et al*. (2005):

| | |
|---|---|
| **•D= t/T. 100, where**<br>D= Dominance percentage.<br>t= Total number of each species individuals collected during the collecting period.<br>T= Total number of all species individuals collected during the collecting period. | **•A = n/N. 100, where**<br>A= Abundance percentage.<br>n = Total number of samples in which each species appeared.<br>N = Total number of samples taken all over the collecting period. |

Also, the values calculated according to Engelmann (1978) as follows: subrecedent (below 1.3%), recedent (1.3- 3.9%), subdominant (4-12.4%), dominant (12.5-39.9%) and eudominant (40-100%).

**Statistical Analysis:**

**Canonical Corresponded Analysis:**

The program Canonical for Windows 4.5 was used for canonical corresponded analysis (CCA) as an unimodal method to analyze the response of the spiders' species community composition to ecological factors.

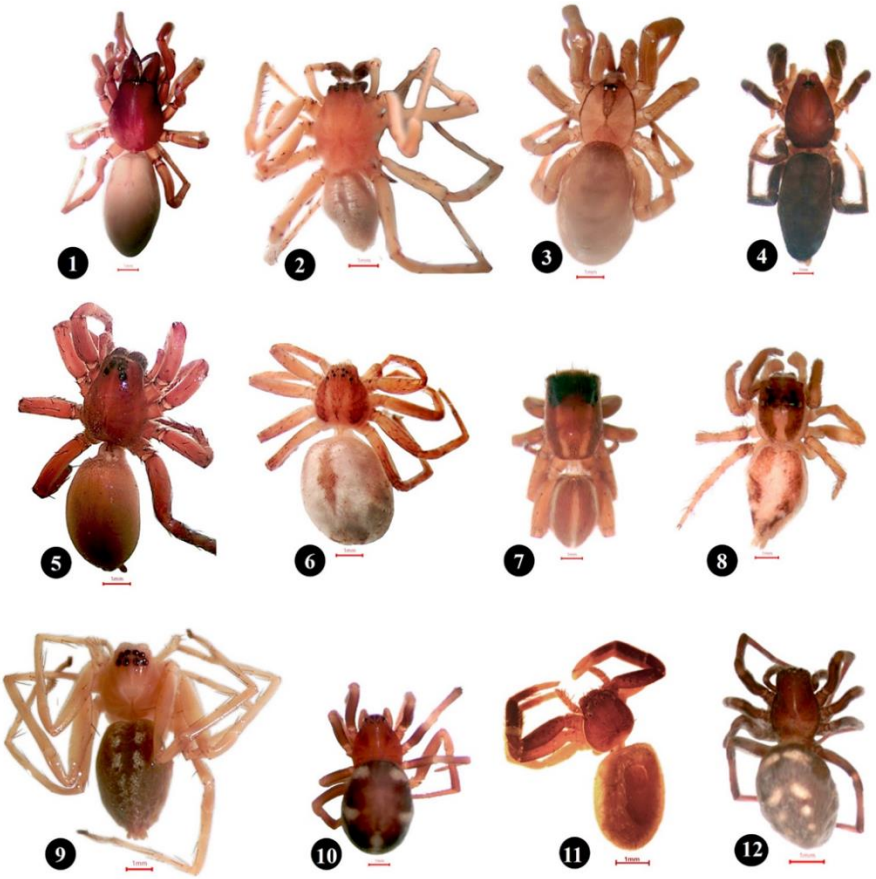
## RESULTS

In the present study, a total number of 163 specimens belonging to 11 families that included 12 genera and 8 species during 2020 and 2021 successive growing seasons and all habitus of 12 identified spiders were shown in Figures (1-12). The taxonomic families of Dysderidae, Eutichuridae, Filistatidae, Gnaphosidae, Lycosidae, Philodromidae, Salticidae, Sparassidae, Theridiidae, Thomosidae, and Titanoecidae commonly sorted in Table (1). Genera were characteristic as shown in Table (2). Dominance and the abundance of spider's species in pomegranate plants indicated that *Hogna ferox* was the most dominant species with a value (of 36% dominance) and (37% abundance) which was the greatest number for the whole period of study, while *Xysticus* sp., and *Zelotes lateus* were the most recedent species represented by the lowest number as shown in Figure (13).

Concerning the results of canonical corresponding analysis (CCA) ordination was performed on the recorded 12 spiders' species and the corresponding studied weather factors include temperature ($T_{MAX}$) and ($T_{MIN}$), relative humidity, and wind velocity ($W.V._{MAX}$) and ($W.V._{MIN}$) performed in the diagram of canonical correspondence analyses of the year 2020 that was shown in Figure (14). The first two CCA axes together account for 75.1% of the relations between weather factors and spider's species. Additionally, the CCA results showed that the composition of spiders' species communities was primarily correlated with relative humidity (RH), followed by temperature ($T_{MIN}$), temperature ($T_{MAX}$), and wind velocity ($W.V._{MAX}$). However, wind velocity ($W.V._{MIN}$) had the smallest effect on the collected species.

Temperature ($T_{MAX}$), temperature ($T_{MIN}$), and wind velocity ($W.V._{MIN}$) showed a positive correlation with 6 spiders' species number including 1, 5, 10, 6, 8, and 11. However, it showed a negative correlation with 6 spiders' species numbers including 2, 3, 4, 7, 9, and 12. The canonical correspondence analyses (CCA) diagrams for the 12 spiders' species that

were seen in 2021 along with the associated weather factors are displayed in Figure (14). The present results demonstrated that the first two CCA axes accounted for around 73.6 % of the relations between spider's species and weather factors. Also, the spider's species community composition is mainly related to relative humidity followed by temperature ($T_{MAX}$, $T_{MIN}$) and wind velocity ($W.V._{MAX}$). However, wind velocity ($W.V._{MIN}$) had the smallest effect on the collected species in 2021. Temperature ($T_{MAX}$) and temperature ($T_{MIN}$) showed a positive correlation with 6 spiders' species number including 1, 3, 5, 6, 8, and 9. However, it showed a negative correlation with only 3 spiders' species number including 7, 10, and 12.




**Figs. (1–12):** Habitus of spiders inhabiting pomegranate orchards as follows:
1 *Dysdera crocota*; 2 *Cheiracanthium* sp.; 3 *Filistata insidiatrix*; 4 *Zelotes laetus*; 5 *Hogna ferox*; 6 *Pulchellodromus glaucinus*; 7 *Phlegra* sp.; 8 *Plexippus clemens;* 9 *Eusparassus* sp.; 10 *Steatoda erigoniformis*; 11 *Xysticus* sp.; 12 *Nurscia albomaculata.*

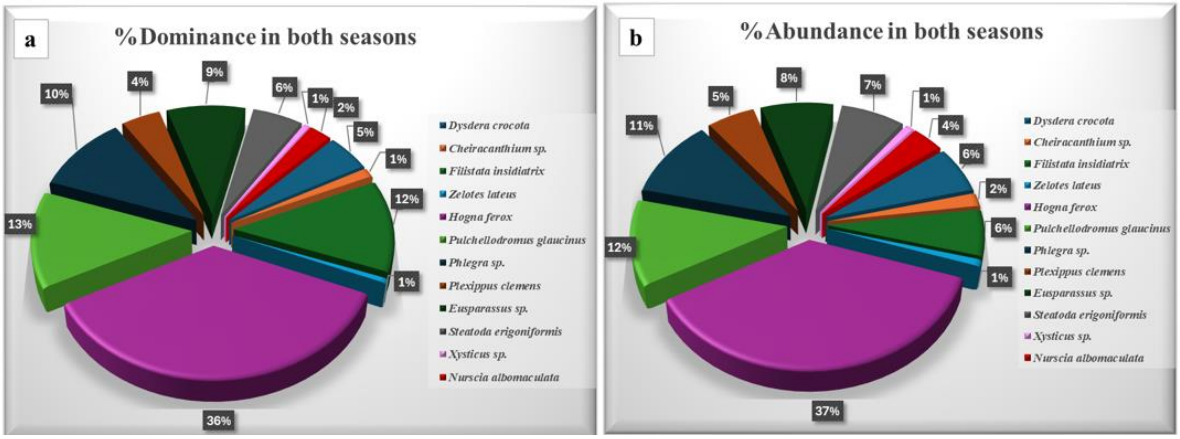



**Fig. (13):** Dominance (a) and abundance (b) of spider genera during both growing seasons (2020 and 2021).

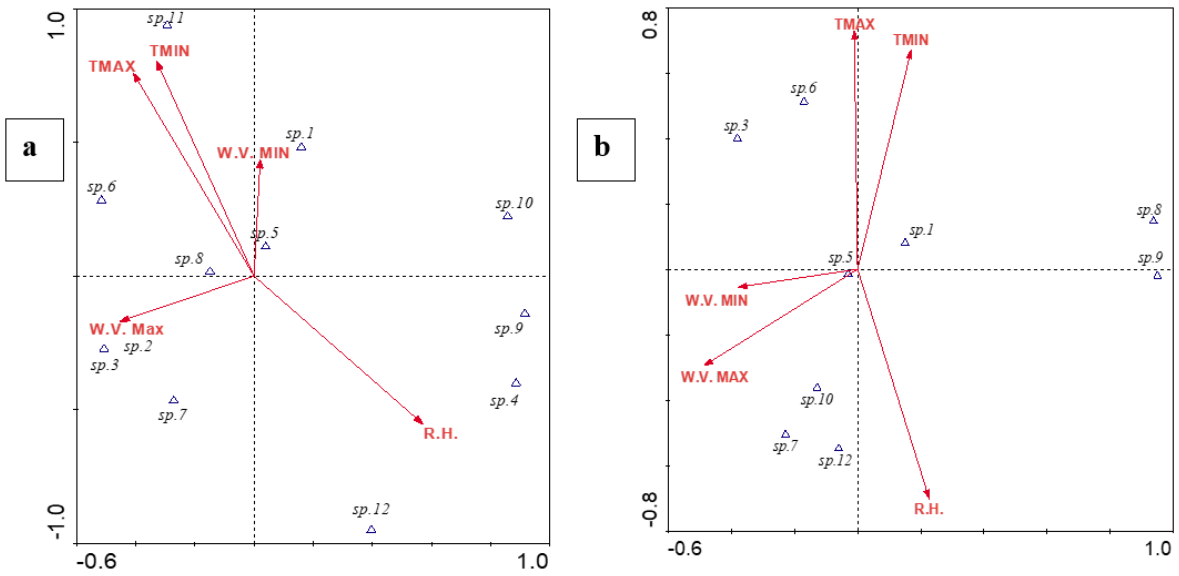



**Fig. 14:** Diagrams showing the ordination of the canonical correspondence analyses (CCA) of the recorded 12 spiders' species and the corresponding weather factors ($T_{MIN}$, $T_{MAX}$, RH, $W.V._{MIN}$, and $W.V._{MAX}$) sampled from pomegranate orchards in Assiut governorate (a) during 2020 and (b) 2021 growing seasons.

**Table 1:** Taxonomic list of terrestrial spiders inhabiting pomegranate plantation collected by pitfall trap during 2020 and 2021 growing seasons in Assiut Governorate, Egypt.

| **Taxa of True Spiders** | | **Pitfall Trap Method** | |
|---|---|---|---|
| **Order** | | | |
| Family | | **Dominant** | **Abundant** |
| Scientific Name | Common Name | | |
| **Araneida (Araneae, Aranei)** | | | |
| Dysderidae | | | |
| *Dysdera crocota*, C.L. Koch, 1837 | Woodlouse Spider | ***SD** | **SA** |
| Eutichuridae | | | |
| *Cheiracanthium* sp. C. L. Koch, 1839 | Yellow Sac Spiders | **SR** | **R** |
| Filistatidae | | | |
| *Filistata insidiatrix* (Forskål, 1775) | Crevice Weaver | **SD** | **SA** |
| Gnaphosidae | | | |
| *Zelotes laetus* (Cambridge, 1872) | Ground spider | **SR** | **SR** |
| Lycosidae | | | |
| *Hogna ferox* (Lucas, 1838) | Wolf Spiders | **D** | **EA** |
| Philodromidae | | | |
| *Pulchellodromus glaucinus* (Simon, 1870) | Philodromid Crab Spiders | **D** | **A** |
| Salticidae | | | |
| a. *Phlegra* sp. Simon, 1876 | Jumping Spiders | **SD** | **A** |
| b. *Plexippus clemens* (Cambridge, 1872) | Jumping Spiders | **SD** | **SA** |
| Sparassidae | | | |
| *Eusparassus* sp. Simon, 1903 | Huntsman Spiders | **SD** | **SA** |
| Theridiidae | | | |
| *Steatoda erigoniformis* (Cambridge, 1872) | Cobweb Spiders<br>Comb-Footed Spiders | **SD** | **SA** |
| Thomisidae | | | |
| *Xysticus* sp. C. L. Koch, 1835 | Crab Spiders | **SR** | **SR** |
| Titanoecidae | | | |
| *Nurscia albomaculata* (Lucas, 1846) | Rock weavers | **R** | **SD** |

***SR** subrecedent (below 1.3%), ***R*** recedent (1.3- 3.9%), ***SD*** subdominant (4-12.4%), ***D*** dominant (12.5-39.9%), ***ED*** eudominant (40-100%), ***SA*** subabundant (4-12.4%), ***A*** abundant (12.5-39.9%), and ***EA*** euabundant (40-100%).

**Table 2:** Several key morphological characteristics of the collected spider genera are compared, considering that they are all araneomorphs.

| Taxa | Body size | Carapace | Sternum | Eyes | Chelicerae | Legs |
|---|---|---|---|---|---|---|
| **Family: Dysderidae** ***Dysdera crocota*** **C.L. Koch, 1837 (Long-fanged six-eyed spiders)** | 9-15mm | Dark-red in color and longer than wide. | Joined the carapace by intercostal sclerites. | Six; in a compact group near the clypeal edge. | Free, well-developed; subchelate; cheliceral furrow with 3-5teeth; fangs well developed; lamina absent. | Two or three claws; at least tibiae and metatarsi of hind legs with setae. |
| **Family: Eutichuridae** ***Cheiracanthium* sp.** **C. L. Koch, 1839 (Forest-floor spiders)** | 5-13mm | Yellow in color and it's longer than wide. | Oval, flat; apex with an obtuse angle. | Eight; in two rows (4:4); posterior varies between genera. | Sturdy; cheliceral teeth present. | Long, moderately strong; their color is yellow, rather paler than the cephalothorax, furnished with hairs of different lengths and strength, and more than the ordinary number of spines; each tarsus ends with two claws and a scopula between them. |
| **Family: Filistatidae** ***Filistata insidiatrix*** **(Forskål, 1775) (Crevice weavers)** | 7-14mm | The Cephalic region is distinctly narrowed in front; usually densely covered with fine setae. | Short, oval, or subcircular; deeply indented to accommodate coxae; fused to labium. | Eight; in a compact group, two appear white and are easily differentiate. | Dorsally free but ventrally connected by a thin membrane; fangs short; cheliceral furrow with lamina. | Three dentate claws; legs fairly long with numerous spines, paired setae ventrally on tibiae and joint. Metatarsi; autopsy at patella-tibial. |
| **Family: Gnaphosidae** ***Zelotes laetus*** **(Cambridge, 1872) (Flat-bellied ground spiders)** | 3-7mm | Ovoid, smoothly convex, rather low; usually with distinct fovea. | Flat, ovoid; apex pointed. | Eight; small, in two rows (4:4); anterior eyes rounded, posterior median eyes flattened in shape; all eyes with silvery sheen except anterior median eyes. | Short, robust; cheliceral margins provided with teeth, retro margin with unusual, serrated keel or rounded laminae. | Usually dark; tarsi with two dentate claws and weak claw tufts; trochanters not notched; metatarsi III and IV with a preening comb; distal segments with two rows of long trichobothria. |
| **Family: Lycosidae** ***Hogna ferox*** **(Lucas, 1838) (Wolf spiders)** | 13-22mm | Brownish and longer than wide, and covered with dense setae. | Oval to scutiform. | Eight; in three rows (4:2:2); all dark in color; unequal in size; anterior row with four small eyes; second row with two large eyes and third row with two eyes of intermediate size. | Strong, with toothed cheliceral furrow; condyle prominent. | Yellowish brown with three claws, scopula, spines, and trochanters notched. |
| **Family: Philodromidae** ***Pulchellodromus glaucinus*** **(Simon, 1870) (Small huntsman spiders)** | 2-4mm | Slightly flattened; clothed in soft recumbent setae; shape varies from as long as wide to elongated. | Apex an obtuse point between coxae IV. | Eight: in two rows (4:4); usually equal in size; both eyes recurved, posterior row strongly recurved in Tibellus. | Cheliceral furrow are usually without teeth. | Two claws; legs I, III, and IV almost equal in length, leg II is usually longer, sometimes much longer; tarsi I and II with claw tufts and scapulae; trochanters with or without notches; anterior tibiae with a series of long spines. |
| **Family: Saltisidae (Jumping spiders)** — ***Phlegra* sp. Simon, 1876** | 3-8mm | Brownish square-fronted; decorated with two longitudinal white strips. | The oval, and in front is wider than the base of the labium. | The ocular quadrangle is hardly one-third as long as the carapace and is eight in number, in three or four rows. | Inner margin with one tooth, several teeth; chelicerae sometimes enlarged and projecting in males. | Two claws usually with claw tufts; rather short; anterior pair in some genera longer or stronger than other legs, frequently decorated with tufts of setae. |
| **Family: Saltisidae (Jumping spiders)** — ***Plexippus clemens*** **(Cambridge, 1872)** | 5-7mm | Yellowish, with a paler patch on the upper surface of the ocular area. | Also, it is yellow color. | Eight in number, each of the intermediate eye rows is nearer to that on its side of the hinder row than to the lateral but is in the same straight line. | Small, conical, and, with the labium, maxillae, and sternum. | Yellow; the former differ but little in length; they are moderately long and strong and are furnished with few hairs and fine spines. |
| **Family: Sparassidae** ***Eusparassus* sp.** **(Large huntsman spiders / giant crab spiders)** | 6-26mm with a leg span of up to 100mm | Broadly oval, narrower in eye region; fovea present; covered with a dense layer of line setae. | Longer than wide to almost circular; apex pointed. | Eight eyes in 2 rows (4:4) with the posterior eye row evenly spaced, equal in size to the size of eyes in the anterior row, with the median eyes usually the largest. | With 2 anterior and 4 to 5 posterior teeth. | With a distinct yellow-brownish color. Tarsi and metatarsi with large scopulae (adhesive hairs) on the tarsus and metatarsus. |
| **Family: Theridiidae** ***Steatoda erigoniformis*** **(Cambridge, 1872) (Cobweb spiders/comb-footed spiders)** | 2-4mm | In females' orange to light brown, smooth, while in males it is dark brown with granulation. | Scutiform to triangular; attenuated posteriorly. | Eight in two rows, eyes usually encircled by a brownish ring. | Variable: sometimes very long; cheliceral teeth absent or few. | Dark-brown on proximal segments, lighter on distal segments legs moderately long to very long; with no or few spines, none on femora, tibiae, and metatarsi; tarsi usually tapering towards tip. |
| **Family: Thomisidae** ***Xysticus* sp.** **C. L. Koch, 1835 (Crab spiders)** | 3-8mm | Truncated anteriorly, moderately high, slightly convex above and approximately as long as wide. | Heart-shaped. | Eight; in two rows, both eye-rows slightly recurved. Lateral eyes on separate, low tubercles, distinctly larger than median eyes. | Cheliceral teeth absent; cusps or small denticles sometimes on promargin. | Short, stout, and usually spiny; two anterior pairs longer and thicker than two posterior pairs; claws with denticles. |
| **Family: Titanoecidae** ***Nurscia albomaculata*** **(Lucas, 1846) (Rock weavers)** | 5-7mm | Yellow-brown color, narrowly margined with black. | Oval. | Eight; in two slightly procurved rows; posterior eye row broader than anterior eye row; posterior eyes with canoe-shaped tapetum. | Fairly long, swollen at base; both margins with two or three teeth; chillum well developed. | They are moderately long and strong and are furnished with hairs and a few spines and with three tarsal claws. Its color is a dull brownish yellow deepening at the extremities of the joints, thus giving them a kind of indistinctly annulate look. |

## DISCUSSION

Spiders play a crucial role in pest control by acting as naturally occurring biological control agents (NOBCA) in various ecosystems, including agricultural settings like pomegranate orchards. Knowledge about the spider fauna inhabiting pomegranate orchards in Upper Egypt especially; Assiut Governorate is sorely insufficient compared to adjacent Governorates. For example, about 22 Genera and 25 spiders' species belonging to 17 families inhabiting different orchard trees were recorded in Sohag Governorate (Mohafez *et al*., 2010) compared with 18 families, 27 genera and 21 species were identified (El-Gepaly *et al*., 2018) while the results of (Ahmed *et al*., 2014) inhabiting pomegranate orchard in Assiut Governorate revealed 20 families without mentioned to the genera or species. This fact emphasizes the importance of conducting additional studies on the spider fauna in this severely understudied Governorate. In the present study, 12 genera, in addition to four unidentified spiders' species, belonging to 11 families were recorded in pomegranate orchard trees in Assiut Governorate.

The present study revealed that *Hogna ferox* was the most dominant species which represented the highest number during both growing seasons, followed by *Pulchellodromus glaucinus*. However, *Xysticus* sp., and *Zelotes lateus* were the most recedent species represented by the lowest number. These results agreed with the result of Aboulnasr (2018) revealed that the highest eudominant family was Lycosidae with frequency (91.7%) and the highest eudominant species was *Pulchellodromus glaucinus*. Also, El-gendy (2016) revealed that *Pulchellodromus glaucinus* (Family: Philodromidae) is recorded as one of the most abundant species at Menoufia Governorate. Faragalla and Al-Ghamdi (2002) revealed that Wolf spiders (Lycosidae) were the predominant spiders in all habitats, according to a study on the seasonal occurrence of the major true spiders (Araneida) in certain crop systems in Western Saudi Arabia. While (El-Gepaly *et al*., 2018) represented that the Salticidae, Cheiracanthiidae, and Dictynidae families were the most dominant with frequency percentages of 38.86%, 11.52 %, and 10.86 %, respectively.

Various environmental factors such as (temperature, humidity, and wind velocity) and other factors like prey availability can influence the seasonal fluctuation of true spiders in pomegranate orchards. The results of the present study support those of Kato *et al*. (1995), which indicated that the species composition varied by season. Additionally, anticipated seasonal variations in the climate would affect spider abundance. The CCA results showed that relative humidity had the highest impact on the species community composition of spiders, followed by temperature ($T_{MIN}$), temperature ($T_{MAX}$), and wind velocity ($W.V._{MAX}$). Wind velocity ($W.V._{MIN}$) had the smallest impact on the collected species. Abdelhafez (2017), using CCA, found that humidity had the strongest correlation with the species community composition of spiders, followed by soil pH, wind speed, and air/soil temperature. Additionally, Hussien (2015), found that temperature and relative humidity had the strongest correlations with the relative abundance of collected species, while the remaining environmental factors under study-particularly evaporation-have negligible influence. By understanding these seasonal patterns and environmental influences, it would be better to manage the pomegranate orchard to support beneficial spider populations, enhancing natural pest control.

## CONCLUSION

Knowledge about the spider fauna inhabiting pomegranate orchards in Upper Egypt especially, Assiut Governorate is hugely inadequate. Thus, the present study focuses on identifying spiders inhabiting economically important pomegranate orchards. Results of 12 genera from 11 families were recorded, in addition to four unidentified spiders' species, belonging to 11 families. *Hogna ferox* was the most dominant species, representing the highest number during both growing seasons. Concerning the CCA for both growing seasons

data revealed that spiders' species community composition was mostly related to relative humidity.

Finally, this study indicated the functional response of environmental factors to the abundance of spider families and their effective role in integrated pest management (IPM) programs for pomegranate orchards. In conclusion, certain spider families tend to be more dominant and abundant due to their adaptability and effectiveness in pest control. Further studies need to understand the relationship between spider families and different pomegranate pests to contract programs in pest management pomegranate of serious pomegranate insect pests. Also, with the aim to enrich the agroecosystem with a diversity of beneficial fauna.

**List of Abbreviation**

| Full name | Abbreviation |
|---|---|
| The Canonical Corresponded Analysis | CCA |
| Subrecedent (below 1.3%), | SR |
| Recedent (1.3- 3.9%), | R |
| Subdominant (4-12.4%), | SD |
| dominant (12.5-39.9%), | D |
| Eudominant (40-100%), | ED |
| Subabundant (4-12.4%), | SA |
| Abundant (12.5-39.9%) | A |
| Euabundant (40-100%). | EA |
| Integrated Pest *SA* Management | IPM |
| Sustainable Development Goals | SDGs |

**Declarations:**

**Ethical Approval:** This study has been granted by the Research Ethics Committee of Faculty of Agriculture at Assiut University in accordance with Egyptian laws and university guidelines for the care of animals (approval no. 03-2024-0009).

**Competing interests:** The authors declare there are no conflicts of interest regarding the publication of this article.

**Author's Contributions:** The authors have equal distributions.

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## ARABIC SUMMARY

**التواجد والتذبذب الموسمي لتعداد العناكب الحقيقة التي تقطن بساتين الرمان في محافظة أسيوط، صعيد مصر**

**جهاد محمد نائل أبو النصر[1]، ساره محمد عصام الدين موسي [2]، مرفت أحمد بدوي محمود[3]**

1 جامعة أسيوط - كلية العلوم - قسم علم الحيوان والحشرات – أسيوط- مصر

2 جامعة أسيوط - كلية الزراعة - قسم وقاية النبات – أسيوط- مصر

3 جامعة جنوب الوادي – كلية العلوم قنا- علم الحيوان- قنا- مصر

تعد العناكب من مجموعة المفترسات عبر العديد من أنظمة المحاصيل الزراعية. ويعتبر الرمان أحد أهم محاصيل الفاكهة في مصر. ولسوء الحظ، تتعرض ثمار الرمان للهجوم من قبل مجموعة من الآفات الحشرية. وتقلل هذه الآفات بشكل رئيسي من جودة وتسويق ثمار الرمان. لذلك، تركز الدراسة الحالية على تعريف العناكب الحقيقية التي تسكن بساتين الرمان المهمة اقتصاديا بأسيوط.

تم استخدام المصائد الأرضية لمدة عامين خلال موسمي زراعة متتاليين (2020 م و2021 م) لتحديد التركيب النوعي ووفرة العناكب في بستان الرمان بالمزرعة التجريبية لكلية الزراعة، جامعة أسيوط، 31° 11' 21.4188" شرقًا؛ "27° 10' 48.4824" شمالًا". تم استخدام التحليل المطابق الكنسي (CCA) كطريقة أحادية النمط لتحليل استجابة مجتمع أنواع العناكب للعوامل البيئية. أظهرت النتائج تواجد 12 جنسًا من العناكب تابعاً 11 عائلة. كان *Hogna ferox* هو النوع الأكثر انتشارًا والذي مثل أعلى تعدد خلال فترة الدراسة بأكملها. وكشفت نتائج CCA في كلا موسمي الزراعة أن مجتمع أنواع العناكب كان أعلى ارتبطاً بالرطوبة النسبية (RH)، في حين كانت سرعة الرياح الصغرى ($W_{MIN}$) أقل تأثيراً على الأنواع التي تم جمعها.

لذا، فإن الهدف الرئيسي من هذه الدراسة هو مناقشة الاستجابة الوظيفية للعوامل البيئية لوفرة أنواع العناكب وكذلك دورها الفعال في برامج الإدارة المتكاملة لمكافحة الآفات (IPM) وتحقيق أهداف التنمية المستدامة (SDGs) وخاصة فيما يتعلق بالتنوع البيولوجي في بساتين الرمان.

**الكلمات المفتاحية:** العناكب، رتبة العنكبوتيات، المكافحة الحيوية، الرمان، التحليل المطابق الكنسي (CCA)