[Observations on the exterior morphology and biological characteristics of *Azpeytia shirakii* Hurkmans]

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Abstract

The morphological characteristics, life history and habits of *Azpeytia shirakii* Hurkmans, the new pest of *Gastrodia elata* Blume (Orchidaceae), were observed by means of field investigation and indoor breeding. The results showed that it produced two generations per year in Yichang (Hubei Province), overwintered as a pupa, began to emerge in early April of the following year, pupated during the summer from late June to mid-August, and began to pupate and overwinter in late October. The peak oviposition period of the first generation is in May; the peak period of emergence of the first-generation larvae is from late May to mid-June; the peak oviposition period of the second generation is from late August to early September, and the peak emergence period of the second-generation larvae is in early September to early October. The syrphid is active during the day, mating mainly concentrated between 10:00-17:00; the eggs are usually laid in dark, humid places with humus; the overwintering pupae in the soil can crawl to the surface layer when the weather is fine, returning to the hole when it cools.

Introduction

Gastrodia elata Blume is a perennial herbaceous heterotrophic plant of the Orchidaceae. In China's precious traditional medicine it has the functions of calming convulsions, dispelling wind, calming the liver, calming wind, sedation, analgesia, lowering blood pressure, anti-inflammation, and delaying aging［1-2］. It is also one of the important Chinese medicinal materials for China's export earnings. With the gradual increase in the demand for *Gastrodia elata* in domestic and foreign markets, in recent years the enthusiasm of farmers to plant *Gastrodia elata* has also gradually increased. However, with the continuous expansion of the planting area, the occurrence of diseases and insect pests is also becoming more and more serious, which often leads to the degradation of quality and the decrease of yield year by year, and some crops are even destroyed completely [3].

Azpeytia shirakii Hurkmans (Diptera: Syrphidae) was first recorded in Japan but only 3 males were recorded [4]. In 2007, Korean scholars also found it in South Korea and made a supplementary description of its morphology [5]. Existing studies have found that the larvae can harm the bulbs of *Gastrodia elata* in Japan [6]. When the author conducted a field survey in Yichang, Hubei Province, he found that the larvae damaged *Gastrodia elata* bulbs and harmed more than 60% of the local *Gastrodia elata* planting area. At present, there is no report of *Azpeytia shirakii* damaging *Gastrodia elata* in China. Therefore, the author systematically observed its external morphology and biological characteristics, a new pest harmful to *Gastrodia elata*, in order to provide scientific basis for future control work.

1 Materials and methods

1.1 Study sites

The test sites are located in the three *Gastrodia elata* planting areas in Anqiaohe Village (1000 m above sea level), Shuiyuesi Town, Yichang City, Hubei Province (1000 m above sea level), Sancha Village (1100 m above sea level) and Dashuitian Village (1200 m above sea level), Dengcun Township. The levels are basically the same.

1.2 Source of tested insects

From 2005 to 2008, the author continuously collected in the field and kept indoors the various stages of *Azpeytia shirakii*, and made specimens of the adults, and preserved the larvae and pupae in alcohol bottles for later use.

1.3 Main equipment

The main equipment for the test includes a camera (Ottimo Shotone 598), Nikon Fx-35 dissecting mirror (product of Shanghai Qianxin Instrument Co., Ltd.), insect needles, insect cages and mesh covers, etc.

1.4 Observation method

1) Morphological characteristics. The morphology of adults, larvae, and pupae was observed and photographed using a Nikon Fx-35 dissecting microscope.

2) Life history and habits. Field surveys were carried out at three *Gastrodia elata* planting areas in Anqiaohe Village, Shuiyuesi Town, Zhangcunping Forest Farm, and Dashuitian Village, Dengcun Township, Yichang City, Hubei Province, and combined with indoor artificial breeding methods to study the life history of *Azpeytia shirakii* and habits for systematic observation.

Field observation. We selected a hemp sample of about 1 m² in the study site, choosing 10 investigation points for each village, and recorded in detail each time the stage changes and living habits of *Azpeytia shirakii* in the field, and took pictures with a camera at the same time. A certain number of pupae were collected in the wild and brought back to Fengjiawan (100 m above sea level) in Yichang City to raise them in insect cages. They were observed twice a day, and we recorded the activities of each larval stage and took pictures.

2 Results

2.1 Morphological characteristics

1) Adult insects. Body length 13-15 mm; wingspan 16-18 mm. The shortness of the compound eye seam is approximately equal to the length in front of the single eye on the top of the head. Head oval, slightly narrower than thorax. The top of the head is dark brown, covered with long black hairs, and the back of the head is black, covered with short yellow hairs. Brown frontal triangle located in the middle of the head slightly raised. Frons black, mostly bare but all covered with yellowish down. Straight face, no central protrusion. Face black, covered with short brown hairs. Face laterally with a protruding beak. The 1st and 2nd segments of the antennae are yellow; the base of the 3rd segment is round, its length is about 2-3 times that of the 2nd segment, the back is yellow, covered with black hairs, the ventral surface is black. The antennae are bare, the arista has 1/3 of base yellow, the rest black, and the entire arista is not covered with hairs.

The back of the thorax is black and shiny, and there are two yellow stripes on the back panel [notum]: the shape looks like a "‖"¨. There is a yellow stripe on each side of the middle of the thorax perpendicular to the two yellow stripes. But neither 2 yellow stripes in the center of the back panel [?]. The whole stripe looks like a "廾" character.

The prothorax, mesothorax, and mesothorax all have short yellow hairs but shorter than the yellow hairs on the anterior, middle, and mesothoracic sides. Prothorax and scapular coat clearly visible. Most of the scutellum is yellow with a small part near the hind thorax with a little black; the whole scutellum is covered with yellow down, and the yellow hair is about the same length. The ventral plates of the front, middle and hind thorax are black covered with short yellow down.

The bases, trochanters, femora and tibiae of the fore, mid and hind feet are black and covered with long ragged yellow hairs, except for the tibia ends of the hind feet which are yellow. The fore-, mid- and hind-tarsi and ventral surface of the anterior tarsus are all yellow. Partially yellow dorsally [?]. A little black hair on each segment is shorter than basal, trochanter, femur and tibia on the long hair [?]. The femora of the hind legs are enlarged, the tibia is slightly curved, the base is thinner, and the ventral surface is free of spines.

The wing is transparent, the wing nerves light brown; R4+5 and M1+2 closed. There is a pseudo-vein between R4+5 and M1+2.

The abdomen is flat, wider than the thorax, and about 1.5 times as long. The 2nd abdominal segment is the longest and the 4th abdominal segment is the shortest and widest. The abdomen is black and shiny, covered with short yellow hairs but the yellow hairs on both sides of the abdomen are longer. The 2nd, 3rd and 4th abdominal segments all have "八"-shaped yellow stripes and are brighter. The "八" shaped stripes start from the midline of the anterior edge of each abdominal segment, but the starting points are not connected and are evenly spaced about 0.1 mm from the midline. The end point is at the posterior border angle on both sides of each abdominal segment. The number of dark brown hairs on the back of the abdomen is less than that on the back (Figure 1-1).

[Figure 1. Four stages of *Azpeytia shirakii*: 1 - adult; 2 - egg; 3 - larva; 4 - pupa]

2) Eggs. Long oval, like a rice grain, silvery white, about 1 mm long (Figure 1-2).

3) Larvae. Neither thoracic nor abdominal legs. The head is thinner, the abdomen thicker. The body colour is from light brown to dark brown.

L1 larvae are powdery white, body length 1-3 mm; L2 larvae are light brown, body length 4-8 mm; mature L3 larvae are dark brown, body length 13-15 mm, reaching about 17 mm when crawling (Figure 1-3).

4) Pupa. Pupa long, oval, about 11-13 mm long; the dark-brown pupal shell is thick and very flexible. It is usually difficult to pierce its epidermis. The entire pupal abdomen is wrinkled; there are many protrusions on the epidermis; there are 4 on the back of each body segment; there are 3 on the side of the abdomen; there are 3 on the ventral surface of the abdomen; there are 2 to 5 black hairs on each protrusion; shorter (Figure 1-4).

2.2 Life history

The complete metamorphosis of *Azpeytia shirakii* goes through four stages of egg, larva, pupa and adult in its life. Since 2006, through field investigation and indoor observation, it has been found that the hoverfly produces two generations per year in Yichang, Hubei Province, and overwinters as a pupa in the soil or in the damaged *Gastrodia elata* bulbs. In the insect cages in the urban area of Yichang City (100 m above sea level), most began to emerge in the first ten days of April of the following year, while at the three altitudes of the study villages (Anqiaohe, Sancha, Zhangcun and Dashuitian) in planting areas above 1000 m, the eclosion time will be delayed by about 25 days, that is, eclosion will begin in late April.

After eclosion the adult looks for food while looking for a mate, and after mating it starts to lay eggs. The eggs of the first generation are first seen in early May, and mid- to late-May is the peak oviposition period; first-generation larvae are first seen in mid- to late-May, and from mid-June is the peak period of emergence; from late June to mid-August, larvae begin to pupate and they survive as pupae until mid-August; from mid-August to early September is the second-generation adult period; from mid-August to late August is the peak period of adulthood. The eggs of the second generation are first seen in mid-August; the peak oviposition period is in late August; the larvae of the second generation are seen in late August, and the peak occurrence period is from late August to late September; the larvae begin to pupate and overwinter in mid-October, and they survive as pupae until the end of April of the following year, when they begin to emerge.

2.3 Biology

1) **Adults**. After the overwintering pupae of *Azpeytia shirakii* began to emerge in late April, the adults searched for food while looking for a mate. The peak mating period mainly occurs in early and mid-May, and most of them choose to mate on the back of leaves, trunks and weeds under clear and sunny conditions. The mating time is mainly concentrated in 10:00-17:00. During mating, the males are generally more active. The mating posture is mostly male and female tails connected. The head is reversed. When the male approaches the female, the mating organ at the end of the male abdomen stretches out until it meets the female's ovipositor. During the mating process, they can stay still for a long time without being disturbed until the mating ends. If disturbed, they will crawl to avoid the disturbance, but will not fly away, nor will it end the copulation. About 10 days after mating, oviposition begins. When ovipositing, females

choose a place with humus. Eggs are scattered in the soil layer or under the soil in crevices at a depth of about 1 cm, on the pupal tunnel or on the underside of leaves near the ground. The total duration of oviposition can reach about 12 days. Generally after 7 days the eggs start to hatch. Adults have obvious tropism to immature manure and decayed organic matter. Adults are diurnally active, in the morning and evening or at night, very active after 9:00 am on sunny days, flying faster especially when disturbed. In cold or windy and rainy weather, the adults often cannot escape disturbances. The lifespan of adults is generally 15-20 days.

2) **Larvae**. *Azpeytia shirakii* larvae begin to bore and damage *Gastrodia elata* after hatching. The survey found that the larvae mostly bore into the young growth point of the corm or the new hemp part until the whole plant was eaten or rotted. With the increase of larval age, food intake gradually increased and the tunnel diameter also gradually increased up to 5 ~ 8 mm. The larvae have negative phototaxis. The entire larval stage lives in the corm of *Gastrodia elata*, and no larvae were seen climbing out of the soil surface. Larvae like to live in the bulbs at suitable temperatures, in moist (low-lying troughs) and fertile areas, so the bulbs are often damaged in hemp pits more seriously. On dry slopes and sandy soils damage usually seldom occurs, and is not serious.

3) **Pupa**. The mature larvae of the first generation pupate on the spot; the pupation site is often in the place of the damage, especially near the bottom fungus [?]. The pupa is oblong and dark brown. Artificial breeding observations found that the second generation pupae (overwintering) can climb out from the soil surface through the pupal tunnel dug by themselves when the temperature rises in the middle and late March of the following year. The pupa basks in the sun, but the very obvious pupa retreats back into the chrysalis to avoid the cold after the temperature drops at 15:00 in the afternoon.

3 Discussion

According to the feeding habits of the larvae, hoverflies can be divided into five types: predatory, herbivorous, fungivorous, saprophagous and omnivorous. Among the currently known hoverflies, 34% are predatory, 21% are herbivorous and fungivorous, and 45% are scavenging and omnivorous. Herbivorous hoverflies mainly include *Eumerus*, *Merodon*, *Portevinia* and *Cheilosia* [7]. In general, the larvae of herbivorous species are usually closely connected with their own host plants [8]. The observations indicate that the larvae of *Azpeytia shirakii* belong to the herbivorous type.

The mating time of the adults is mainly concentrated between 10:00-17:00, and they usually choose a dark and humid place with humus to lay eggs. Overwintering pupae can dig holes and climb out of the soil surface by themselves when the weather is fine, and retreat back into the pupal passage when it is cold. When controlling the hoverfly, according to their habits, in fine weather from November to April of the next year we can adopt the method of artificially catching overwintering pupae; intensively killing the overwintering pupae can effectively reduce the population base of the next year and reduce the harm. Why the overwintering pupae can dig their own holes and climb out of the soil surface to move freely is a mechanism that remains to be further studied.

In addition, the author has not found any natural enemies of *Azpeytia shirakii* in field surveys. Whether there are such natural enemies under natural conditions in the wild needs further investigation and research in the future.

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天麻蚜蝇外部形态及生物学特性的观察*

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摘要 采用野外调查和室内饲养的方法,观察了天麻蚜蝇 *Azpeytia shirakii* Hurkmans 的形态特征、生活史及习性。结果表明:天麻蚜蝇在湖北省宜昌地区1年发生2代,以蛹越冬,翌年4月下旬开始羽化,6月下旬至8月中旬化蛹越夏,10月下旬开始化蛹越冬;第1代产卵高峰期在5月;第1代幼虫高峰期在5月下旬至6月中旬;第2代产卵高峰期在8月下旬至9月上旬;第2代幼虫高峰期在9月上旬至10月上旬。天麻蚜蝇属白昼活动型,成虫交尾时间主要集中在10:00—17:00,产卵多选择在阴暗潮湿、有腐殖质的地方;土壤中的越冬蛹在天气晴朗时可自行掘洞爬出土壤表面,遇冷则退缩回洞中。

关键词 天麻蚜蝇;形态特征;生活习性

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天麻 *Gastrodia elata* Blume 为兰科天麻属多年生草本异养植物,具有定惊、祛风、平肝、息风、镇静、镇痛、降压、抗炎、延缓衰老等功效[1-2],是中国传统的名贵中药材,也是中国出口创汇的重要中药材之一。近年来,随着国内外市场对天麻需求量的逐步增加,农民种植天麻的积极性也逐渐提高。但随着种植面积的不断扩大,其病虫害的发生也日趋严重,往往导致天麻品质退化、产量逐年降低,有的甚至出现绝收现象[3]。

天麻蚜蝇 *Azpeytia shirakii* Hurkmans(双翅目 Diptera:食蚜蝇科 Syrphidae)首次记录于日本,但只记录了3只雄虫[4]。2007年韩国学者在韩国也发现了天麻蚜蝇并对其形态进行了补充描述[5]。已有的研究发现天麻蚜蝇在日本可危害草本异养植物天麻的球茎[6]。笔者在湖北省宜昌地区进行野外调查时,发现天麻蚜蝇危害天麻球茎,在当地的天麻种植区危害面积达60%以上。目前,在中国尚无天麻蚜蝇危害天麻的报道。为此,笔者对危害天麻的新害虫天麻蚜蝇的外部形态及生物学特性进行了系统观察,旨在为今后的防治工作提供科学依据。

1 材料与方法

1.1 试验场地

试验场地设在湖北省宜昌市水月寺镇安桥河村(海拔1 000 m)、樟村坪林场三岔村(海拔1 100 m)和邓村乡大水田村(海拔1 200 m)3个天麻种植基地,栽培管理水平基本一致。

1.2 供试虫源

笔者于2005年至2008年不间断在野外采集和室内饲养天麻蚜蝇的各个虫态,并将成虫制成标本,幼虫和蛹浸泡在酒精瓶中保存备用。

1.3 主要设备

供试主要设备包括照相机(OTTIMO SHOTONE 598)、Nikon Fx-35 解剖镜(上海千欣仪器有限公司产品)、昆虫针、养虫笼及网罩等。

1.4 观察方法

1)形态特征。采用 Nikon Fx-35 型解剖镜对成虫、幼虫和蛹进行形态观察和拍照。

2)生活史及习性。在湖北省宜昌市水月寺镇安桥河村、樟村坪林场三岔村、邓村乡大水田村3个天麻种植基地进行野外调查,并结合室内人工饲养的方法对天麻蚜蝇的生活史及习性进行系统观察。

野外观察在试验场地选取1 m^2 左右的麻窖,每个村选10个调查点,每次详细记录野外天麻蚜蝇各虫态变化的情况和生活习性,同时用照相机拍照。在野外采集一定数量的蛹带回宜昌城区冯家湾(海拔100 m)养虫笼中饲养。每天定点观察2次,记录各虫态的活动情况并拍照。

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2 结果与分析

2.1 形态特征

1)成虫。体长 13～15 mm，翅展 16～18 mm。复眼接缝短，约等于头顶前单眼之前的长度。头部椭圆形，略窄于胸。头顶黑褐色，被黑色长毛，后头部黑色，被短黄绒毛。单眼褐色，呈三角型位于头顶中部，略隆起。额黑色，大部分裸露，但均覆盖淡黄色绒毛。颜平直，无中突，颜面黑色，覆盖褐色短绒毛，侧观颜面，喙突出。触角第 1 节和 2 节黄色；第 3 节基部圆形，其长度约为第 2 节的 2～3 倍，背面黄色，覆盖黑毛，腹面黑色；触角芒裸，触角芒着生在第 3 节的 1/3 处(基部)，触角芒的 1/3(基部)为黄色，其余均为黑色，整个触角芒均不覆盖毛状物。

胸部背板黑色且具光泽，背板上具有 2 条黄色条纹，形似“‖”字状，中胸两侧各有 1 条黄色条纹，分别与背板中央的 2 条黄色条纹垂直，但都止于背板中央的 2 条黄色条纹，整个条纹看起来呈"廾"字状。前胸、中胸和后胸背板均具短黄色绒毛，但都短于前、中和后胸侧板上的黄毛。前胸肩胛被毛，明显可见。小盾片大部分黄色，靠近后胸少部分带少许黑色，整个小盾片均覆盖黄色绒毛，但以小盾片腹缘处尤为浓密，绒毛的长度和前、中、后胸的侧板上的黄毛长度相当。前、中和后胸的腹板均为黑色，覆盖短黄色绒毛。除后足的胫节端部为黄色之外，前足、中足和后足的基节、转节、腿节和胫节都为黑色，且覆盖参差不齐的黄色长毛。前足、中足和后足的跗节和前跗节的腹面均为黄色，背面不全为黄色，有少许黑色，各节上的毛状物要短于基节、转节、腿节和胫节上的长毛。后足腿节膨大，胫节略弯曲，基部较细，腹脊无刺。翅透明，翅痣浅褐色，R_{4+5}室与 M_{1+2}室关闭，R_{4+5}与 M_{1+2}之间有 1 条伪脉。

腹部扁平，宽于胸部，长度约为胸部的 1.5 倍。第 2 腹节最长，第 4 腹节最短且最宽。腹部黑色发亮，覆盖短黄色绒毛，但腹部两侧缘的黄毛较长。第 2 腹节、3 腹节和 4 腹节均具有“八”字形黄色条纹且较亮，“八”字形条纹起于每个腹节前缘正中线，但起点并不相连，且均距中线约 0.1 mm，终点于每个腹节两侧的后缘角。腹部背面黑褐色，绒毛的数量较背面少(图 1-1)。

1.成虫 Adult；2.卵 Ovum；3.幼虫 Larva；4.蛹 Pupae.

图 1 天麻蚜蝇的 4 个虫态

Fig.1 Four morphologies of *Azpeytia shirakii* Hurkmans

2)卵。长椭圆形，米粒状，银白色，长约 1 mm(图 1-2)。

3)幼虫。既无胸足也无腹足，头部较细，腹部较粗，体色由浅褐色至茶褐色。初期幼虫粉白色，体长 1～3 mm，中期幼虫淡棕色，体长 4～8 mm，老熟幼虫深褐色，体长 13～15 mm，爬行时体长可达 17 mm 左右(图 1-3)。

4)蛹。围蛹，长椭圆形，长约 11～13 mm，黑褐色，蛹壳较厚且柔韧性极好，通常很难刺破其表皮。整个蛹腹部多皱纹，表皮上有很多突起，每个体节的背上有 4 个，腹部侧面有 3 个，腹部腹面有 3 个，每个突起上有 2～5 根黑色的毛，但毛均较短(图 1-4)。

2.2　生活史

天麻蚜蝇属完全变态，一生要经过卵、幼虫、蛹和成虫 4 个虫态。2006 年以来，通过野外调查和室内观察发现，天麻蚜蝇在湖北省宜昌地区 1 年发生 2 代，以蛹在土壤内或受害的天麻球茎中越冬。在宜昌市城区(海拔 100 m)的养虫笼中，多在翌年 4 月上旬开始羽化；而在水月寺镇安桥河村、樟村坪林场三岔村、邓村乡大水田村 3 个海拔 1 000 m 以上的天麻种植基地，羽化的时间要推迟 25 d 左右，即 4 月下旬开始羽化。成虫羽化后，边寻找食物边寻找配偶，交配后即开始产卵，第 1 代卵 5 月初初见，5 月中下旬为产卵盛期；第 1 代幼虫 5 月中旬初见，5 月下旬至 6 月中旬为发生盛期；6 月下旬幼虫开始化蛹越夏，一直持续到 8 月中旬；8 月中旬至 9 月上旬为第 1 代成虫期，8 月中旬至下旬为成虫高峰期。第 2 代卵于 8 月中旬初见，8 月下旬为产卵盛期；第 2 代幼虫始见于 8 月下旬，8 月下旬至 9 月下旬为发生盛期；10 月中旬幼虫开始化蛹越冬，一直延续至翌年 4 月底开始羽化。

2.3　生活习性

1)成虫。天麻蚜蝇越冬蛹在 4 月下旬开始羽化后，成虫边寻找食物边寻找配偶。交尾盛期主要发生在 5 月上中旬，且多选择在晴朗、有阳光的情况下，于树叶、树干和杂草等的背面交尾。交尾时间主要集中在 10:00－17:00。交尾时，一般雄虫都较为主动，交配姿势多为雌雄尾部相连，头部反向，即呈“一”字形。当雄虫接近雌虫后，雄虫腹部末端的交配器向后伸出，直至与雌虫的产卵器相接。交尾过程中，不受到干扰可长期不动，直至交尾结束。如果受到干扰，则爬动以躲避干扰，但不会飞走，也不会结束交尾。交配后约 10 d 左右开始产卵，产卵时多选择有腐殖质的地方，在其附近 1 cm 左右的土层或土缝下、蛹道或近地面背光的叶片上，卵散产。产卵总历期可达 12 d 左右。一般经过 7 d 后卵才开始孵化。成虫对未腐熟的粪肥、腐败有机物等有明显的趋性。成虫属白昼活动型，早晚或夜间潜伏，晴天上午 9:00 以后十分活跃，飞翔速度较快，特别是受到外界干扰时，飞行速度更快。阴冷或大风多雨的天气，成虫常躲避不出。成虫寿命一般在 15～20 d。

2)幼虫。天麻蚜蝇幼虫孵化后就开始钻蛀危害天麻。调查发现其幼虫多从天麻球茎的幼嫩生长点或新生麻部蛀入，直至整个天麻被取食或腐烂。随着幼虫日龄的增大，取食量逐步增加，蛀道也逐步加大，达 5～8 mm。幼虫具有负趋光性，整个幼虫期均生活在天麻的球茎中，未见幼虫爬出土壤表层。幼虫喜欢生活在适温、潮湿(低洼落槽)、肥沃地段的天麻球茎中，因而在这种麻窖中常常被其危害的情况更为严重。干燥的坡地、沙土通常很少发生，危害情况也不严重。

3)蛹。第 1 代老熟幼虫就地化蛹，化蛹场所常在其危害的地方，尤其是靠近底层菌材的地方。围蛹，长椭圆形，黑褐色。人工饲养观察发现，第 2 代蛹(越冬蛹)在翌年 3 月中下旬气温回升时，蛹能通过自己挖掘的蛹道爬出土壤表层，特别是晴朗的中午，可见网罩内的沙土表面有正在晒太阳的蛹和明显的蛹道，在下午 15:00 气温下降之后，蛹又退缩回蛹道内避寒。

3　讨　论

按照幼虫的食性来分，食蚜蝇幼虫可分为 5 种类型，分别为捕食性、植食性、菌食性、腐食性和杂食性。目前已知的食蚜蝇中，34%为捕食性，21%为植食性和菌食性，45%为腐食性和杂食性。植食性的食蚜蝇主要包括平颜蚜蝇属 *Eumerus*、齿腿蚜蝇属 *Merodon*、颜突蚜蝇属 *Portevinia* 和黑蚜蝇属 *Cheilosia*[7]。通常情况下植食性各个种类的幼虫习性通常都是与它们自己的寄主植物紧密相连的[8]。观察结果表明，天麻蚜蝇幼虫属于植食性类型。

天麻蚜蝇成虫交尾时间主要集中在 10:00－17:00，通常选择阴暗潮湿、有腐殖质的地方产卵。越冬蛹在天气晴朗时可自行掘洞爬出土壤表面，遇冷则退缩回蛹道中。在防治天麻蚜蝇时，可根据这个生活习性，在 11 月份至翌年 4 月的晴朗天气，采用人工捕捉越冬蛹的方法，集中杀死越冬蛹，即可有

效降低翌年的虫口基数，减少危害。天麻蚜蝇越冬蛹为何能自行掘洞，且爬出土壤表面自由活动，其机理尚待进一步研究。

另外，笔者在野外调查中暂时没有发现天麻蚜蝇的天敌。野外自然条件下，是否存在天麻蚜蝇的天敌，也还有待今后作进一步地调查和研究。

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Observation on Outside Morphological and Biological Characteristics of the *Azpeytia shirakii* Hurkmans

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Abstract The indoor and outdoor survey and observation have been applied to study the morphological characteristics，life cycle and habits of the new pests of *Azpeytia shirakii* Hurkmans(Diptera:Syrphidae) in *Gastrodia elata* Blume. The results showed that the pest proliferates two generations in one year，and lives over-winter via pupae. Adults will appear in early April in the second year. In late June to the middle August，larvae will live over-summer through pupation and over-winter via pupae in the late October. The peak time of oviposition of the first generation is in May，and the peak time of larva emergenceis in late May to the middle June. The peak time of oviposition of the second generation is in late August to the early September，and the peak time of larva emergence is from early September to early October. *A. shirakii* is active mainly in the daytime. And the mating time is generally during 10:00—17:00，and the sites of ovipositon were chosen in damp places with organic waste around. The over-winter pupae may crawl to the surface layer of soil during sunny days and return to the hole when it encounters coldness.

Key words *Azpeytia shirakii* Hurkmans; morphological characteristics; life habits

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