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A new developed method « leaf - island » for observations on thrips in the laboratory

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Summary

For studies of and observations on thrips in the laboratory the «Leaf-Island» method was developed. From leaves leaf discs, 2,5 cm in diameter, are punched out and are laid with the underside up on a layer of wet cotton in small transparent petri dishes of 5,5 diameter. The thrips are placed on the leaf discs and with a syringe the dishes are carefully filled up to 2/3 rds with water, so that a «Leaf-Island» is created. The petri dish covers are put on the dishes. A hole of 2,5 diameter has been punched in the center of the covers and a piece of gauze bonded over the hole.

With this method the thrips are maintained in a natural environment and losses due to escape or hiding of the organisms are low. In addition an observation under the binocular microscope is always possible. This method also does not require plenty of room and several replicates can be carrier out simultanously.

Introduction

Observations on larger insects and pest organisms can be conducted without any problem in the laboratory and several methods have been developed. With the observation on minute insects and mites however some difficulties have to be encountered. Because of their small size these organisms easily can escape from cages or hide themselves and this frequently affects the results of experiments. Therefore special methods are necessary which should also allow continuous observations on the organisms.

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Different methods have been developed for observations on Terebrantia as well as Tubulifera thrips in the laboratory. Either the thrips were hold in leaf cages (Lewis, 1973) or were placed on a whole leaf, which was kept inside a plastic vial (Beavers and Ewart, 1971). In both cases the petioles of the leaves were put into a jar filled with water, which kept the leaves turgid. Other methods are based upon a different principle; whole leaves or leaf pieces were placed on a piece of cheese-cloth which was kept moist by a continuous water supply (Munger, 1942; Tashiro, 1967; Beavers and Oldfield, 1970). Gilstrap and Oatman (1976) placed excised leaves or leaf discs on a water-soaked sponge pad. Each leaf or leaf disc was ringed with a strip of CellucottanR providing an arena for the thrips. Cages, which had one end covered with a screening, were placed over the arenas.

The new developed method, which will be described in the following, can be conducted easily and allows accurate and continuous observations on the thrips.

Method

With this method small transparent plastic petri dishes, 5,5 cm in diameter, are used. As Figure 1 shows, a 5 mm layer of normal surgical cotton

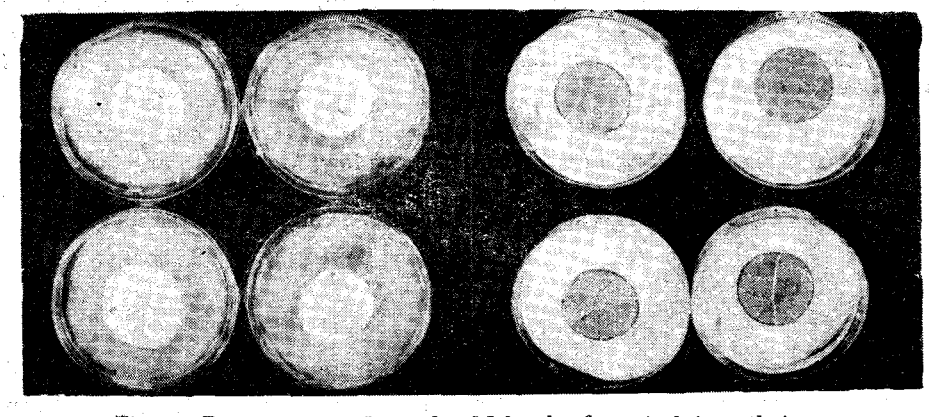

Fig. 1. Preparation of a «Leaf-Island» for studying thrips - uncoverd and covered.

having the same diameter is placed in the petri dishes. A syringe is used to give water into the dishes until the cotton is watersoaked and forms a smooth surface. From some leaf a leaf disc, 2,5 cm in diameter, is punched out. With a pair of tweezers the leaf disc is placed with the leaf underside up on the wet cotton in the center of the petri dish. In own studies leaves of cotton and green beans were used. Under a binocular microscope the thrips

are placed carefully on the leaf discs with the moistened tip of a camel hair brush (No. 00). Care has to be taken to keep the disturbance of the thrips at a minimum and to avoid any injury. After the transfer more water is injected from all sides around the leaf disc with a syringe into the petri dish until the dishes are filled to 2/3 rds with water. Caution is necessary not to spill any water on the leaf disc. By this a «Leaf-Island» is created since the leaf disc is floating and does not lie upon the cotton anymore. The petri dish covers are put on the dishes to give protection from external influences. A 2,5 cm diameter hole was punched in the center of the covers and a piece of gauze was bonded over the hole. This permits a sufficient air supply and air circulation and prevents fogging of the inside of the cover. Since the gauze of the cover is located directly above the leaf disc, the thrips are especially prevented from evaporation.

The petri dishes prepared in the described manner were hold in cabinets with controlled climatic conditions at 25°C and 50± 10% relative humidity. A 12-hr photophase (6-22h) was maintained in the cabinets by 14 flourescent tubes and the light intensity was approximately 4000 Lux on the level of the petri dishes. Every 2 or 3 days the evaporated water was replaced with a syringe. With this method cotton leaves could be kept turgid for 10 - 15 days, green bean leaves for 10 - 16 days.

Beside for studies of the biology this method also is very suitable for studies on the relationship between a predator as *Scolothrips longicornis* Priesner or *Scolothrips sexmaculatus* (Pergande) and its prey.

In own experiments using this method *S. longicornis* was placed on leaf discs, which had previously been infested with *Tetranychus urticae* Koch as its prey. As can be seen from table 1 the cotton and been leaves mostly remained in a condition suitable to support the mites and thrips for more than 10 days.

Table 1. Lastingness of cotton and green bean leaves infested with **Tetranychus urticae** and **Scolothrips longicornis**

Plant species	Percentage of tender leaves (days)									
	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
Cotton	97	92	80	60	51	31	22	11	3	0
Green Beans	95	88	75	52	44	25	17	6	0	0

In this way also the facundity and developmental time could be studied. For determination of fecundity the hatched larvae were counted since eggs of *S. longicornis* are inserted into the leaf tissue. The total developmental time for one generation lies between 11 - 14 days (Şengonca, 1983), so that in most cases the development can be completed on the same leaf disc.

Also, this method proved to be suitable for studies of the effectivity of predatory thrips. By counting the prey density on the leaf disc before the thrips was present and after the removal of the thrips it was possible to determine exactly the prey consumption over a distinctive period (for example 24 hours or even over the whole life time of the predator).

Conclusions

This method which has been developed for conducting studies of thrips shows some advantages in comparison to other methods:

- With the use of this method the organisms are held in a natural environment, as far as this can be accomplished under experimental conditions.
- Escape or hiding of the organisms is greatly reduced, so that the results of experiments obtained are quite accurate.
- During the whole experiment the organisms can be observed under the binocular misroscope at any time.
- Experiments set up according to this method do not require plenty of room and several replicates can be carried out simultanously (Fig. 2).
- This method can be conducted easily and no fastidious material is necessary.

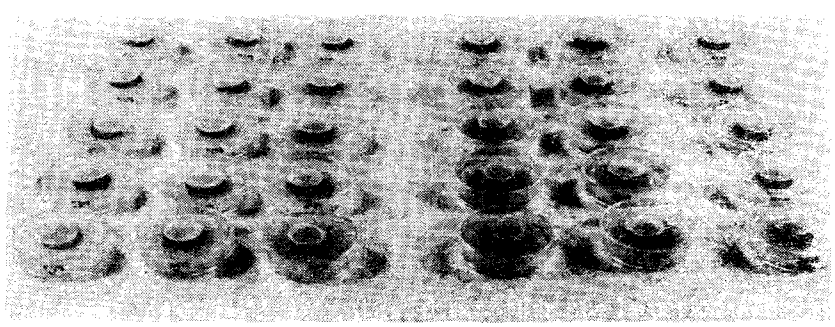

Fig. 2. Arrangement of an experiment using the «Leaf-Island» method

Probably this method will prove to be favorable for studies of minute insects and mites in general. Up to now similar methods have been developed and utilized in the work with mites and predatory mites (Rodriguez, 1953; Putman, 1962; Laing and Osborn, 1973; Schmidt, 1977; Ohnesorge, 1981; Zebitz et al., 1981 a.o.).

Özet

Laboratuvarda Thrips araştırmalarında kullanılmak üzere geliştirilen yeni bir yöntem : «Yaprak Adası»

Bu çalışmayla, laboratuvarda yürütülen Thrips araştırmalarında ve gözlemlerinde kullanılmak üzere «Yaprak Adası» yöntemi geliştirilmiştir. Bu yönteme göre, ağzı keskin bir boru yardımı ile 2,5 cm çapında kesilen yuvarlak yaprak parçası, alt yüzü yukarıya gelecek şekilde, bir 5,5 cm çapındaki plastik petri kutusu içinde bulunan ıslak pamuk tabakası üzerine konulmaktadır. Thrips'ler çok dikkatli olarak ince bir fırça ile yaprak üzerine bırakıldıktan sonra, bir injeksiyon iğnesi yardımıyla yaprak parçasının etrafına çepe çevre su verilerek petri kutusu 2/3'üne kadar doldurulmakta ve bir yaprak adası oluşturulmaktadır. Daha sonra petri kutusunun kapağı kapatılmaktadır. Kapağın tam ortasına 2,5 cm çapında bir yuvarlak delik açılarak tülbent bezi yapıştırılmıştır.

Bu yöntemle, Thrips'lere tüm deneme süresince doğal bir yaşama yeri oluşturulmakta ve Thrips'lerin kaçma ve saklanmaları büyük ölçüde önlenebilmektedir. Bunun dışında bu yöntem, Thrips'lerin binokular altında sürekli gözlenebilme olanağını sağlamaktadır. Ayrıca bu yöntemle, büyük bir deneme yerine gerek kalmadan, birçok tekerrür bir arada ve küçük bir yerde kolaylıkla yürütülebilmektedir.

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