

WILHELM PIECK-Universität Rostock  
Sektion Biologie  
Forschungsgruppe Phyto-Entomologie  
Rostock

FRITZ PAUL MÜLLER

## Incidence of the aphid *Acyrtosiphon gossypii* MORDVILKO on legumes and on cotton

(Homoptera: Aphididae)

With 2 text figures

Some recently published papers have shown the aphid *Acyrtosiphon sesbaniae* KANAKARAJ DAVID to be an efficacious vector for viruses of cultivated Fabaceae. KAISER & SCHALK (1973) carried out transmission experiments with the circulative pea leaf roll virus which can cause serious losses in food legume crops in Iran and obtained high transmission rates with *A. sesbaniae*. In the Northern Province of the Sudan ABU SALIH et al. (1973) ascertained the efficient transmissibility of the Sudanese broad bean mosaic virus by *A. sesbaniae* on *Vicia faba*. The book of SCHMUTTERER (1963) relates *A. sesbaniae* as an effective vector of the pea mosaic virus in central Sudan.

During a visit in the Hudeiba Research Station in the Northern Province of the Sudan the present author found *Vicia faba* crops heavily infested by *A. sesbaniae*. Despite of the considerable virus transmitting ability and the mass infestation of particularly suitable host plants there exists no survey on the biology, host range and geographical distribution of the aphid. This paper will fill up this gap.

### Taxonomy

EASTOP (1971) treats *A. sesbaniae* KANAKARAJ DAVID which had been described in 1956 from southern India from the papilionaceous plant *Sesbania grandiflora* as a synonym of *Acyrtosiphon gossypii* MORDVILKO, 1914. The original description of MORDVILKO relates to aphids living on cotton in the Amu-Darja delta in West Asia. EASTOP had no informations on positive transfer records between Leguminosae and Malvaceae and supposed the aphid might exist in a number of populations with individual host plant preferences. He wrote specimens from *Gossypium* tend to have a relatively longer cauda than specimens from Leguminosae, and therefore *sesbaniae* might be at least subspecifically distinct.

The collection of the present author contains apterous and alate viviparous females both from Fabaceae and from Malvaceae. The former were taken from *Vicia faba* and from *Pisum sativum* in the Hudeiba Research Station, Sudan. The other samples were collected by Miss I. A. SHURAVLEVA in Taschkent from *Gossypium hirsutum* and by Sayed MUSA ABDALLA AHMED in the Wad Medani Research Station in central Sudan from *okra* (*Hibiscus esculentus*), respectively. However, the comparison of biometric data obtained from mounted specimens did not reveal any substantial morphological differences.

### Geographical distribution

According to EASTOP the distribution area includes India, Sikkim, Iraq, Turkey, Israel, Egypt, Algeria, Sudan, and Turkestan, and perhaps also Japan and Korea. It must be added Iran (KAISER & SCHALK 1973), delta of Wolga and southern Ukraine (MORDVILKO

1914, SHAPOSHNIKOV 1964), and Crimea (BOSHKO 1957). In Central Asia *A. gossypii* is an important pest of cotton, e.g. in the Turkmen, Usbek, Tajik and Kasach SSR. *Acyrtosiphon skrjabini* MORDVILKO, 1914, described from *Malva neglecta* and from Kirghizia almost certainly relates to the same species.

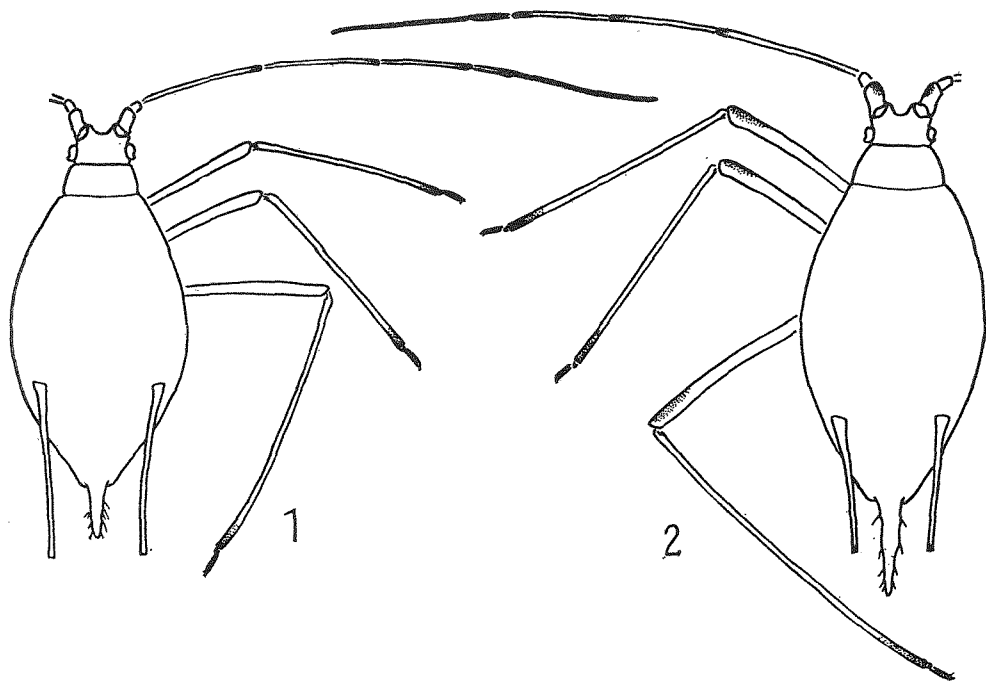


Fig. 1—2. Apterous viviparous female: Fig. 1. *Acyrtosiphon gossypii* MORDVILKO. — Fig. 2. *Acyrtosiphon pisum* (HARRIS). Note the relative length of the siphunculi. Magnification in both figures 15×

### Host plants and biology

Hitherto known host plants of apparently higher importance belong to the families Malvaceae, Fabaceae, and Brassicaceae. The differences in the systematic position of these host plants as well as the extended distribution areas had brought on that the species was described under several names.

Even in recent publications *gossypii* and *sesbaniae* are regarded to be two different taxa. DAOUD & EL-HAIDARI (1968) found the aphid in Iraq and referred samples from *Brassica rapa* and some Leguminosae (*Medicago sativa*, *Phaseolus aureus*, *Pisum sativum*, *Trifolium alexandrinum*, *Vicia faba*) to *gossypii* whereas aphids taken from *Trigonella foenum-graecum* are listed under *sesbaniae*. SZELEGIEWICZ (1963) having received the aphid from Iraq in a sweep sample without knowledge of the host plant registered it as *gossypii* and added that it apparently seems to be closely related with *sesbaniae*.

Already in 1929 NEVSKY has pointed out the connection between the incidence on cotton and on Leguminosae on the other hand. He found *A. gossypii* in dense colonies on stems and on the underside of the leaves of *Gossypium hirsutum* and *G. herbaceum*, but conspicuously such infestation appeared relatively late in the season. NEVSKY considers cotton merely a second-rate host plant and some Leguminosae the main hosts. In his book several Fabaceae are listed, among others *Vicia faba* and *Alhagi camelorum*, and perennial Leguminosae are supposed to be the overwintering sites.

SHURAVLEVA (1956) lists besides cotton 25 plant species on which *A. gossypii* had been found by her. 18 of these seem to be typical or at least frequently accepted food plants. Into the latter Fabaceae, Malvaceae, Brassicaceae, Convolvulaceae, Asteraceae and Rosa-

ceae (*Rubus caesius*) are included. Apparently *Alhagi camelorum* represents an important winter host in Central Asia. *Alhagi maurorum* has been found colonized by the aphid in Israel (SWIRSKI 1963).

Rather little is known about the annual life cycle. Of course, in countries without cold winter the propagation turns permanently parthenogenetic. In Central Asia, however, the species performs a characteristic holocycle, and there oviparous females and males have been observed and described (DAVLETCHINA 1956, NARZIKULOV & UMAROV 1969) from *Alhagi camelorum*.

Although the aphid had been collected from *Medicago sativa* in one case (DAOUD & EL-HAIDARI 1968), alfalfa does not belong to the well suitable food plants. A transfer experiment from *Sesbania grandiflora* to *Medicago sativa* by KANAKARAJ DAVID gave negative result. During my visit in the Hudeiba Research Station, Sudan, I could not find a single specimen in an alfalfa field which bordered directly on a heavily infested *Vicia faba* field. Observations in the Sudan as well as informations in the literature result in the statement that broad bean is one of the mostly preferred plants.

With regard to its economic importance the aphid requires increasing attention. When found on Leguminosae *A. gossypii* may be mistaken for the pea aphid, *Acyrtosiphon pisum* (HARRIS).

### Recognition in the field

*A. gossypii* has been figured by several authors. Only in two cases the drawings show the whole aphid. The best visible morphological character consists in the considerable length of the siphunculi. Their relative length amounts from 0,37—0,47 of body length in the apterous viviparous females and from 0,32—0,41 in the alate viviparous females, respectively. The corresponding proportions in *A. pisum* are 0,22—0,28 and 0,18—0,26. The subjoined drawings demonstrate this main distinguishing character.

A very simple and useful feature for distinguishing *A. gossypii* from the likewise coloured green forms of *A. pisum* by naked eye offers the different presence of wax rime on the body surface in adult specimens. In *A. pisum* only the larvae are covered with slight waxy exsudation. The fullgrown specimens of *A. pisum* do not possess such a dust covering and being therefore within the colonies designated by a darker colour impression comparatively to the larvae. Thus in the colonies of *A. pisum* the adult aphids are discernible at first sight. In *A. gossypii*, however, adult apterae and alatae as well as the larvae are uniformly greyish green by wax powder. Already the appearance of the colonies on Leguminosae permits the statement whether *A. pisum* or *A. gossypii* is present.

In the above mentioned mass infestation on *Vicia faba* it was noticed that the colonies were sitting on the upperside of the young leaves. *A. pisum*, however, settles the lower surface of the leaves and the higher parts of the stems.

### Conclusions

The distribution area hitherto known of *A. gossypii* extends at least from Central Asia to Egypt and Sudan. The chief hosts of the aphid belong to the families Malvaceae and Fabaceae. In Central Asia the aphid is of economic importance by attacking cotton. However, in the Near East and farther westward Leguminosae, particularly *Vicia faba*, seem to be the most preferred hosts. In the Sudan no infestation of cotton has been recorded although *Vicia faba* is often settled on a large scale. Alfalfa does not belong to the well suitable food plants. Owing to the occurrence on Fabaceae, *A. gossypii* may be mistaken for the similar looking pea aphid, *Acyrtosiphon pisum* (HARRIS).

Obviously the species comprises biological races with different host acceptability and subsequently different virus transmission qualities. In this respect *A. gossypii* agrees with other noxious aphid species having worldwide distribution, e.g. *Myzus persicae* (SULZER), *Aphis craccivora* KOCH, *Aphis frangulae* KALTENBACH, *Schizaphis graminum* (RONDANI). Like *Acyrtosiphon gossypii* the biological races of the latter aphids differ from another not only by the host range but also by the generation cycle (F. P. MÜLLER 1966).

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## Summary

No morphological differences could be found between cotton infesting specimens of *Acyrtosiphon gossypii* MORDVILKO from Central Asia and aphids on *Vicia faba* and *Pisum sativum* in the Northern Province of the Sudan. The latter are designated in literature *Acyrtosiphon sesbaniae* KANAKARAJ DAVID and are known to transmit viruses of Leguminosae. According to Russian publications *A. gossypii* represents a serious cotton pest in Central Asia, there settling Fabaceae too and hibernating by typical holocycle on perennial Fabaceae especially on the desert plant *Alhagi camelorum*.

In the Sudan the aphid was found on *Pisum sativum* and in large colonies on *Vicia faba*, but the present author could not find it on *Medicago sativa*. In central Sudan it was collected from the malvaceous plant *Hibiscus esculentus* thus showing that like in Central Asia Malvaceae may be settled in Africa too. Likely by sequence of biological race differentiation the aphid owns its outstanding economic importance in Central Asia as a cotton pest, whereas in the Near East and farther westward the occurrence on legumes requires attention.

When being found on Fabaceae the aphid may be mistaken for the pea aphid, *Acyrtosiphon pisum* (HARRIS). Therefore some simply visible distinguishing characters for recognition in the field are given.

## Zusammenfassung

Zwischen Baumwoll- befallenden *Acyrtosiphon gossypii* MORDVILKO aus Mittelasien und Aphiden von *Vicia faba* und *Pisum sativum* aus der Nordprovinz des Sudan konnten keine morphologischen Unterschiede gefunden werden. Die letzteren Aphiden werden in der Literatur mit *Acyrtosiphon sesbaniae* KANAKARAJ DAVID bezeichnet und sind als Überträger von Viren der Leguminosen bekannt. Nach der russischen Literatur ist *A. gossypii* in Mittelasien ein wichtiger Baumwollschädling, besiedelt dort Fabaceen ebenfalls und überwintert in diesen Gebieten mit einem typischen Holozyklus an ausdauernden Fabaceen, besonders an der Wüstenpflanze *Alhagi camelorum*.

Im Sudan wurde die Blattlaus auf *Pisum sativum* und in umfangreichen Kolonien an *Vicia faba* gefunden, aber der Verfasser konnte sie nicht an *Medicago sativa* feststellen. Im mittleren Sudan wurde sie von dem Malvengewächs *Hibiscus esculentus* gesammelt. Damit konnte nachgewiesen werden, daß wie in Mittelasien auch in Afrika Malvaceen besiedelt werden. Wahrscheinlich infolge Aufspaltung in biologische Rassen hat die Art in Mittelasien ihre hauptsächlichste wirtschaftliche Bedeutung als Baumwollschädling, während im Nahen Osten und weiter westlich das Auftreten an Hülsenfrüchten Beachtung erfordert.

Die Aphide kann mit der Erbsenblattlaus *Acyrtosiphon pisum* (HARRIS) verwechselt werden, wenn sie an Fabaceen gefunden wird. Deshalb werden einige leicht sichtbare Unterscheidungsmerkmale zum Erkennen im Feldbestand mitgeteilt.

## Резюме

Между поражающей хлопчатку *Acyrtosiphon gossypii* (MORDVILKO) из Средней Азии и видами тли с *Vicia faba* и *Pisum sativum* из северной провинции Судана не было найдено никаких морфологических различий. Два последних вида тлей обозначаются в литературе как *Acyrtosiphon sesbaniae* KANAKARAJ DAVID и известны в качестве переносчиков вирусных болезней бобовых. Согласно советской литературе *Acyrtosiphon gossypii* является в Средней Азии основным вредителем хлопчатны, заселяет там также Fabaceae и перезимовывает в этих областях с прохождением типичного голоцикла на многолетних Fabaceae в особенности на пустынном растении *Alhagi camelorum*. — В Судане тля была найдена на *Pisum sativum* и в обширных колониях на *Vicia faba*. Однако автор не смог установить ее наличие на *Medicago sativa*. В среднем Судане тля была собрана с представителя мальвовых *Hibiscus esculentus*. Тем самым было доказано, что как в Средней Азии, так и в Африке заселяются мальвовые. По всей вероятности, вследствие расщепления на биологические расы этот вид в Средней Азии приобрел свое хозяйственное значение, главным образом, как вредитель хлопчатны, в то время как на Ближнем Востоке и западнее на него следует обращать внимание как на вредителя бобовых. — Тля может быть спутана с гороховой тлей *Acyrtosiphon pisum* (HARRIS), если ее находят на Fabaceae. Поэтому сообщаются отдельные легко заметные различительные признаки для распознавания в полевых условиях.

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