Zeitschrift: Mitteilungen der Schweizerischen Entomologischen Gesellschaft = Bulletin de la Société Entomologique Suisse = Journal of the Swiss Entomological Society

Herausgeber: Schweizerische Entomologische Gesellschaft

Band: 36 (1963-1964)

Heft: 1-2

Artikel: Quatrième symposium européen d'acarologie

Autor: Mathys, G.

DOI: https://doi.org/10.5169/seals-401446

MITTEILUNGEN DER SCHWEIZERISCHEN ENTOMOLOGISCHEN GESELLSCHAFT
BULLETIN DE LA SOCIÉTÉ ENTOMOLOGIQUE SUISSE
Band XXXVI Heft 1 u. 2 30. Juni 1963

Quatrième Symposium européen d'acarologie

Lausanne, 27–29 septembre 1962

G. MATHYS

Stations fédérales d'essais agricoles, Lausanne (Domaine de Changins-sur-Nyon)

A l'occasion du Quatrième Symposium européen d'acarologie, qui a groupé récemment à Lausanne trente-huit biologistes représentant douze pays, les sujets se rattachant aux problèmes suivants ont fait l'objet de communications et de discussions : taxonomie, prédateurs, phénomènes de résistance, bio-écologie et lutte intégrée (forme de lutte antiparasitaire). En publiant un résumé des différents exposés, nous désirons donner une vue d'ensemble de cette réunion et attirer l'attention des spécialistes sur ces travaux qui paraissent in extenso dans diverses revues étrangères. Les exposés de G. Dosse (page 49) et de R. Gasser (page 60) sont reproduits conformément au contexte de leurs auteurs.

1. Taxonomie

Acarus telarius versus *Tetranychus urticae*.

G. L. VAN EYNDHOVEN, Zoölogisch Museum, Amsterdam.

Under this title a paper has been published in Entomologische Berichten (Netherlands), 22 (9) : 179–183, 1962, which gives full details.

As to the future and definite scientific names for the commonest spider mites about which there has always been much confusion, it is proposed to choose a logical solution, namely :

Acarus telarius L. 1758, now *Eotetranychus telarius* (L. 1758), for the lime tree (linden) spider mite on *Tilia* ;

Tetranychus urticae C. L. KOCH 1836 for the common greenish spider mite on many host plants, with the typical host plant *Urtica dioica* L.

As in this confused matter other conceptions are possible, the International Commission of Zoological Nomenclature will be requested to make a definite decision.

Nomenklaturfragen zum *Tetranychus urticae-telarius*-Komplex.

H. B. BOUDREAUX, Louisiana State University, Baton Rouge.
G. DOSSE, Landwirtschaftliche Hochschule, Hohenheim-Stuttgart.

Unter strikter Berücksichtigung der Nomenklaturregeln und nach Durchsicht der gesamten einschlägigen Literatur, schlagen die Autoren folgende Namengebungen vor, die der internationalen Nomenklaturkommission unterbreitet worden sind :

Tetranychus urticae KOCH : grüne Form der gemeinen Spinnmilbe.

Tetranychus telarius KOCH : rote Form der gemeinen Spinnmilbe (bis anhin *Tetranychus cinnabarinus* BOISD.)

Eotetranychus tiliarium HERM. : auf der Linde *(tilia)* vorkommende gelbe Spinnmilbe.

The usefulness of new taxonomic characters in females of the genus *Tetranychus* DUFOUR (Acari : Tetranychidae).

H. B. BOUDREAUX, Louisiana State University, Baton Rouge.
G. DOSSE, Landwirtschaftliche Hochschule, Hohenheim-Stuttgart.

The results of this study demonstrate that to some extent the cuticular lobes are useful taxonomic characters. If groups were separated on the basis of lobe characters, an entirely different arrangement would be obtained from the species groups of PRITCHARD and BAKER (1955), which were elevated to subgeneric rank by WAINSTEIN (1960).

For observing dorsal lobes we have used the specific area bounded by the second and third pair of dorsomedial hysterosomal setae as defined by PRITCHARD and BAKER (1955, p. 10). A proper study of cuticular lobes is impossible unless proper mounting techniques are employed.

The *Rhizoglyphus echinopus* of FUMOUZE and ROBIN.

G. L. VAN EYNDHOVEN, Zoölogisch Museum, Amsterdam.

When we study the morphology of *Rhizoglyphus*-species we find that, for instance, mites from *Hyacinthus* possess long *setae scapulares internae*, where as mites from potatoes and *Narcissus* possess very short *setae scap. int.* only. This difference is correlated with a round penis structure for the long haired species, and with a conical penis structure for the short haired species.

As FUMOUZE & ROBIN for their *Hyacinthus*-mite give a detail figure of the round penis structure, they must have described a long haired species, notwithstanding the fact that they did not draw these hairs. This is confirmed by *Hyacinthus*-material from many different origins, which always shows the long haired form.

In her book "The Mites of Stored Food", Mrs. HUGHES has chosen the short haired species to be named *Rhizoglyphus echinopus*, as the *setae scap. int.* had not been drawn. She chose the name *callae* for the long haired species. So this cannot be right ; the long haired form, belonging to *Hyacinthus*, has to bear the name *echinopus*.

It is wrong to consider *Rhizoglyphus echinopus* FUM. and ROB. as the type species of the genus. The genus was established by CLAPARÈDE in 1867 for a short haired species from potatoes and Georgine (*Dahlia*), which is confirmed by a detail figure of the conical penis structure, and he emphatically indicated his species *Rhiz. robini* as its type species.

As there exist various short haired species, their names are not yet quite certain. Probably the name *Rhizoglyphus robini* will prove to be a *nomen oblitum*.

LITERATURE

CLAPARÈDE, E., 17.II.1869. *Studien an Acariden.* Zeits. wiss. Zool. **18** (4), 493–507, tab. XXXV, XXXVIII.

EYNDHOVEN, G. L. VAN, 1961. *Artunterschiede beim Genus Rhizoglyphus (Acar.).* Verh. XI. int. Kongr. Ent., Wien, **1**, 274–276, f. 1–4.

FUMOUZE, A. & ROBIN, C., VII.1868. *Observations sur une nouvelle espèce d'Acariens du genre Tyroglyphus.* J. Anat. Phys., **5** (3), 287–306, tab. 20–21.

HUGHES, A. M., 1961. *The Mites of Stored Food.* Min. of agr., Techn. Bull. **9**, London.

Considérations sur le genre *Bryobia*.

G. MATHYS, Stations fédérales d'essais agricoles, Lausanne.

L'absence d'une redescription néotypique de l'espèce *Bryobia praetiosa* KOCH (1836) constitue un obstacle pour les recherches sur le genre *Bryobia*. L'étude de spécimens récoltés au Bösnergarten à Regensburg (lieu d'origine de *B. praetiosa*) révèle des particularités morphologiques qui permettent de distinguer ces représentants de ceux décrits par DUGÈS (1834, Paris) sous la désignation de *B. cristata*. Ces différences morphologiques, valables aussi bien pour les femelles que pour les mâles, et la dissimilitude des cycles évolutifs de ces deux représentants du complexe *praetiosa* justifient l'établissement de néotypes de *B. praetiosa* et *B. cristata*.

The course of an experimental crossing between *Tetranychus dianthica* DOSSE and *T. telarius* KOCH (= *cinnabarinus* BOISDUVAL).

G. DOSSE, Institute of Plant Protection, Agricultural University, Stuttgart-Hohenheim, Germany.

The experimental crossing of red spider mites of the *Tetranychus telarius-urticae*-complex, of different origin and different host-plants, which has for several years been carried out at Baton Rouge and also at Hohenheim has revealed, in common with the British and Dutch trials, that by a crossing of the "red" and "green" types, a first generation can always be produced. The red colour is always dominant in the offspring. Only once, both at Baton Rouge and Hohenheim, has it been possible to produce a generation beyond the F_1 and thus to bring about the gradual re-establishment of a population.

By the crossing of red types with red we obtained very different results. Not all females of the first generation of such a crossing were unfertile, as in the first case. There were three types of females : 1) those which layed eggs normally, 2) hybrids, which produced no eggs, and 3) those which were smaller in build, and died after deposition of the first egg.

With the first type of female only a certain percentage of the deposited eggs developed to normal offspring. Many of them shrank in the course of development and the embryo either died in the egg, or the larva died shortly after hatching.

In all our experiments we selected females at random from the available population and simultaneously carried out reciprocal crossings. In the following generations sister pairs were used, and thus only in the parental generation were males of a strange origin introduced, as taken from the female population. Later of course the sons, grandsons, etc. were made use of the further breeding. In every generation the number of deposited eggs as well as the percentage of shrunken ones were recorded and also the occurrence of unfertile hybrids and the male-female-ratio of the red spider mites which developed to adults. In every new generation only a definite number of pairs were used. The results of our Hohenheimer crossing trials, with origins from Germany, the Netherlands, Spain and America, will be published.

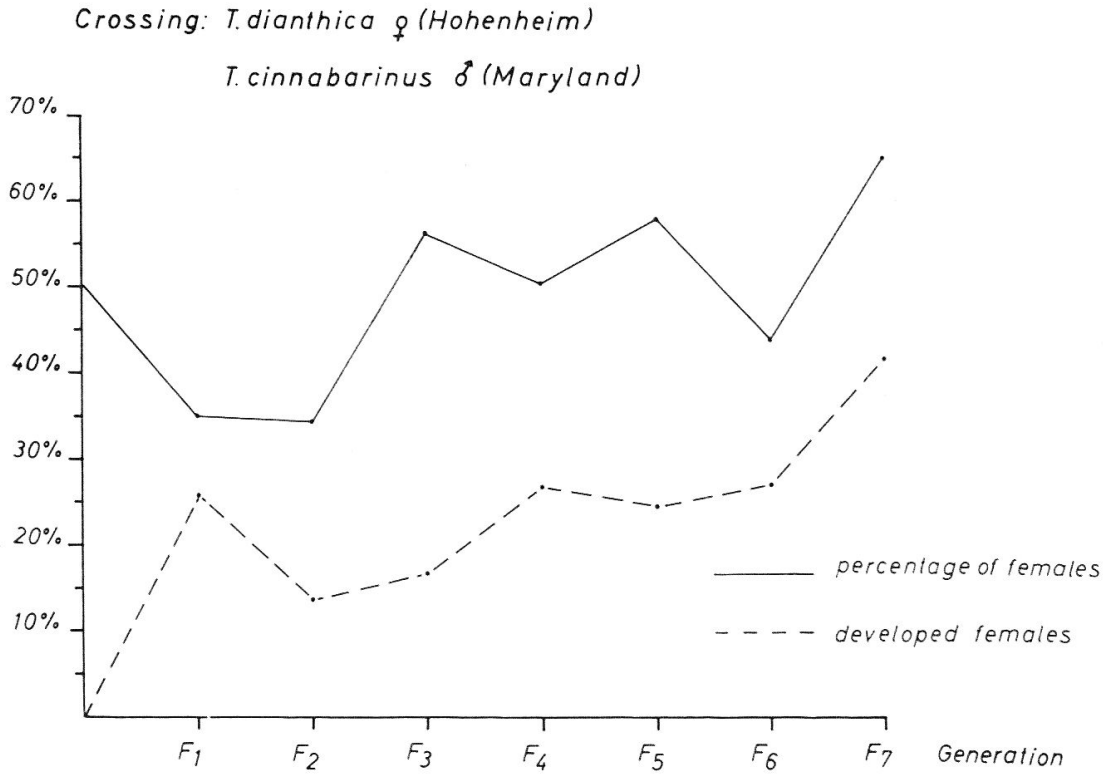


Fig. 1. Crossing experiment : *T. dianthica* x *T. cinnabarinus*.

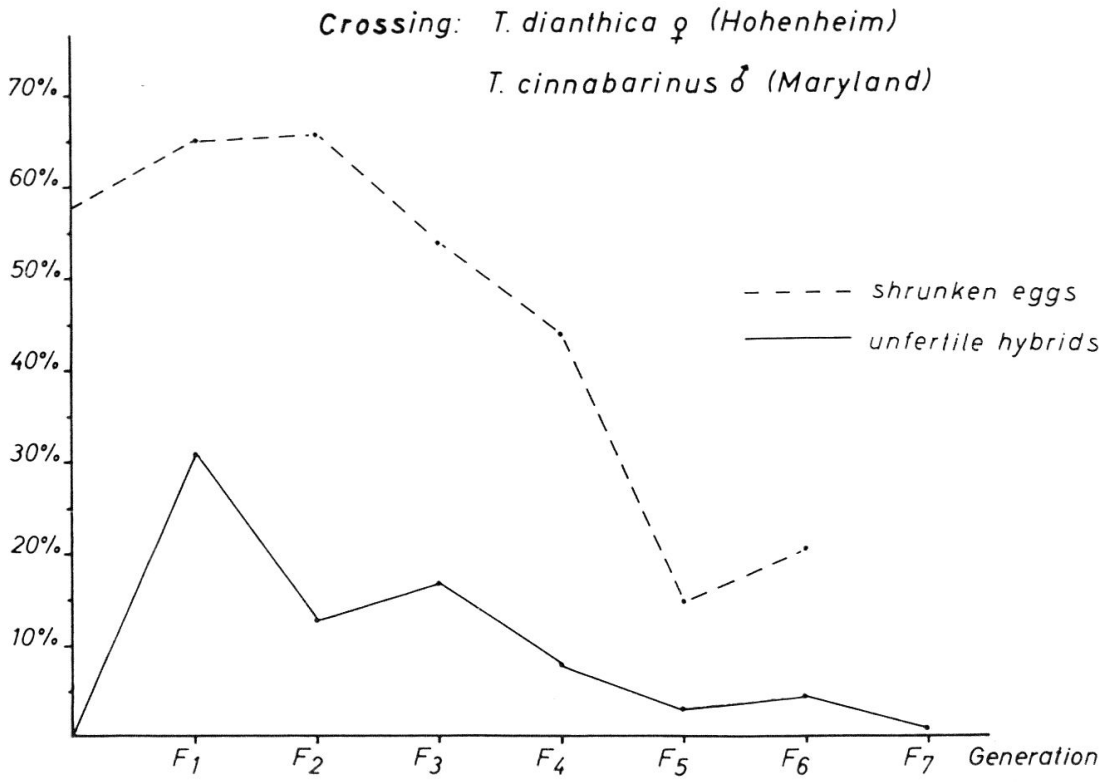


Fig. 2. Crossing experiment : *T. dianthica* x *T. cinnabarinus*, percentage of shrunken eggs and unfertile hybrids.

Here, by means of an example, it will be explained briefly in which way a certain crossing is carried out. We made use of a female of the Hohenheimer greenhouse type, *T. dianthica* and a male of *T. telarius* (= *cinnabarinus*) from Maryland. While in the case of a reciprocal crossing (*T. telarius-cinnabarinus* Maryland female with a *dianthica*-male) a normal egg deposition took place and solely hybrids developed in the F_1-generation, which were unfertile and brought the population to a halt, we obtained different results in the former experiment. The entire offspring was collected and in every generation the fertility of the females was tested. The unfertile hybrids and a number of the egg depositing females were preserved for histological and morphological comparisons and thus the material for further breeding usually amounted to 9 to 16 pairs. As can be anticipated there was a great differentiation in the behaviour of the egg-laying females in all generations. For instance egg deposition and lifespan varied considerably more than in a normal population.

On the average P_1-mother spiders had the longest lifespan as compared with the female offspring up to the 7th generation. 58% of the eggs deposited by them were not viable and shrunk together (fig. 1).

In the F_1-generation the lifespan of the females which were incorporated in these experiments decreased, while the number of shrunken eggs increased to 65%. Out of the healthy eggs 35% developed into

females, of which 30,7% were unfertile hybrids ; 65% developed into males (fig. 2).

In this experiment we have up to date reached the 7th generation. The lifespan of the females continued to decrease, with fluctuations, it now being scarcely half that of the P_1-mother. In the F_2-generation the percentage of shrunken eggs increased slightly to a total of 66%, thereafter decreasing steadily. Similarly, the number of unfertile hybrids showed a downward tendency, which was not strictly continuous from generation to generation, although the intervening upward trends were negligible.

The curves of the shrunken eggs and the unfertile hybrids indicated an increasing normalization in the course of the generations, and similarly the female — male — ratio, which at first showed a considerable male surplus, altered in favour of the females.

From this experiment it can be seen that the genetical influence of the once-used strange male continuously decreases in the course of development, and that a population resembling that of the original female partner is built up progressively.

A repetition of this experiment has, due to labour-technical difficulties, only been attempted at a later stage, here the 3rd generation has now been reached. It follows the same course. Both experiments are being continued by us until the unfertile hybrids have disappeared completely over 2–3 generations and the percentage of dying eggs resembles that of a population existing under natural conditions.

The above described example shows how, when different sexes of related types are brought together, the crossing of a combination may have negative results, while in the case of a reciprocal combination offspring can be produced. Thus a red spider mite population may be built up over a period of time. This might be a case of gyno-genesis, where the male sperma either initiates a development without entering the egg, or where the male nucleus does not fuse with the egg, but degenerates in the egg. Genetical examinations should be attempted to clarify this question.

LITERATURE

BOUDREAUX, H. B. and DOSSE, G. *The Usefulness of New Taxonomic Characters in the Females of the Genus Tetranychus Dufour. (Acari : Tetranychidae.)* Acarologia *5*, 13–33, 1963.

— *Concerning the Names of Some Common Spider Mites.* (In print.)

BUND, C. F. VAN DE and HELLE, W. *Investigations on the Tetranychus urticae complex in North-West Europe (Acari : Tetranychidae).* Ent. expl. and appl. 3,142–156, 1960.

DOSSE, G. and BOUDREAUX, H. B. *Some Problems of Spider Mite Taxonomy Involving Genetics and Morphology.* (In print.)

HUSSEY, N. W. and PARR, W. J. *A genetic study of the colour forms found in populations of the greenhouse red spider mite, Tetranychus urticae Koch.* Ann. appl. Biol. 46, 216–220, 1958.

2. Prédateurs

Experiments with the predator *Phytoseiulus riegeli* DOSSE on glasshouse-cucumbers.

L. BRAVENBOER, Proefstation Naaldwijk, Holland.

In Holland the area of cucumbers grown in glasshouses increases rapidly. Predators of the main pest, a red spider (*T. urticae* KOCH), never occur on this crop. Some years ago, DOSSE sent us a predatory mite, *Phytoseiulus riegeli* DOSSE which proved to be very effective as a biological agent in spider mite control on cucumbers. Introduced at the right moment and in sufficient numbers, this predator could keep mite-populations at sufficient low densities for 4–5 months.

These promising results are due to several factors.

1. The life-cycle of *P. riegeli* is very short, only half of that of *T. urticae*.
2. The predator is very active and consequently covers a great leafarea in a short time.
3. The outbreak of red spider on cucumbers starts on a very few plants, on which high populations are built up. On these plants high populations of *P. riegeli* can be reared and eventually distributed to other plants, on which new outbreaks of spider mites take place.
4. Besides powdery mildew *(Erysiphe cichoraearum)* few other pests or diseases occur in cucumber growing under glass. This disease can be controlled by Karathane, which is harmless to *P. riegeli*.

Premières expériences avec *Phytoseiulus riegeli* DOSSE en Suisse.

W. VOGEL, Laboratoire Dr. Maag, Dielsdorf.

La lutte chimique contre les araignées rouges sur concombres en serre est très difficile parce que la récolte des fruits dure quelques mois, pendant lesquels il est quasiment impossible de respecter les délais d'attente. En outre, les phénomènes d'accoutumance constituent une menace constante.

Dès l'été 1962, nous avons entrepris des élevages et essais pratiques avec *T. urticae* KOCH et *P. riegeli* DOSSE. *P. riegeli* est d'une voracité telle qu'il est difficile de disposer toujours de suffisamment de *T. urticae* pour assurer l'alimentation du prédateur. Celui-ci convient donc très bien pour la lutte biologique en serres. Les essais et les applications pratiques montrent que *P. riegeli* est détruit par différents produits antiparasitaires.

Studies on the effect of insecticides on the predators of the red spider mite in Egypt, U.A.R.

M. H. HASSANEIN, Assiut University

Certain chlorinated hydrocarbon, phosphorous and carbamate insecticides were tested in the laboratory and in field experiments during the 1959 and 1960 cotton growing seasons in order to study their effect on the predators of the cotton economic pests.

From a comparison of the probit log concentration of poisons and of the toxicity index (SUN 1950), the order of efficacy of the toxic materials used as follows :

a) Parathion, gusathion, sevin, meta-iso-systox, chlorthion, dipterex, lindane, endrin dieldrin, DDT and toxaphene for the egg masses and the first instar of *Coccinella undecimpunctata.*

b) Parathion, gusathion, meta-iso-systox, chlorthion, sevin, dipterex, lindane, endrin, DDT, dieldrin and toxaphene for the last instar larvae of *Coccinella undecimpunctata.*

c) Parathion, gusathion, meta-iso-systox, sevin, chlorthion, dipterex, lindane, endrin, DDT, dieldrin and toxaphene for the pupal stage of *Coccinella undecimpunctata.*

d) Parathion, gusathion, sevin, chlorthion, meta-iso-systox, dipterex, lindane, endrin, DDT, dieldrin and toxaphene for the adult stage of *Coccinella undecimpunctata.*

e) Parathion, gusathion, chlorthion, meta-iso-systox, lindane, endrin, dieldrin, DDT and toxaphene for the adult stage of *Phaederus alfierii.*

It was evident that the resistance of different instars larvae of *Coccinella undecimpunctata* to any of the tested insecticides increased consistently as the development proceeded.

Field results indicated that all the tested materials were toxic to the beneficial predators (*Coccinella undecimpunctata*, *Chrysopa vulgaris*, *Paederus alfierii*, and *Scymnus* sp.).

LITERATURE

SUN, Y. E., 1950. *Toxicity index and proved method of comparing the relative toxicity of insecticides.* Jour. Econ. Ent., 1, 45–53.

Observations on the ecology of predatory mites (Phytoseiidae) on fruit-trees.

M. VAN DE VRIE, Proefstation voor de Fruitteelt, Wilhelminadorp.

A study was made of the distribution of both prey (*Metatetranychus ulmi* KOCH) and predators (*Typhlodromus* sp.) during the vegetation

period on the leaves and of the distribution of the predatory mites in their hibernation sites during winter.

From these studies the following conclusions can be drawn :

1. During winter the following species were found on the stems and branches : *Typhlodromus bakeri* (GARMAN), *T. barkeri* (HUGHES), *T. masseei* NESBITT and *Zetzellia mali* EWING.
2. On the twigs and spurs *Typhlodromus pyri* SCHEUTEN, *T. tiliarum* OUDMS and *Phytoseius macropilis* (BANKS) are found in winter. These species leave these sites and move to the developing leaves and flowers early in spring. They do not feed in winter.
3. The distribution of *Typhlodromus pyri* and *T. tiliarum* on leaves during the vegetation period is in accordance with the Poisson-distribution. There is no obvious correlation between the numbers of predatory and phytophagous mites present on one leaf though a high number of predatory mites often corresponds with a low number of phytophagous mites and the reverse.
4. The distribution of predatory mites in relation to the leaf area and the age of the leaves was studied in early summer, mid-summer and autumn. It was found that the mites were distributed uniformly over small and large leaves.
5. The species present on stems and branches reproduce till late in autumn and start again early in spring, while the species present on shots and spurs in winter, only reproduce on the leaves in spring and summer.
6. The decrease in numbers of predatory mites during winter seems to depend on the lack of suitable hibernation sites.

The influence of some pesticides on predatory mites (Phytoseiidae) of *Metatetranychus ulmi* KOCH

M. VAN DE VRIE, Proefstation voor de Fruitteelt, Wilhelminadorp.

The influence on predatory mites of acaricides, insecticides and fungicides used on fruit trees in the Netherlands, was studied in laboratory and field trials.

From these observations it appeared that the acaricides chlorbenside, chlorfenson, tetrasul and Kelthane had very little influence on the longevity of adult mites of *Typhlodromus pyri* SCHEUTEN and *Typhlodromus tiliarum* OUDEMANS which are the predominant species on apple in the Netherlands.

All insecticides containing organo-phosphoric esters were highly toxic.

The insecticides Isolan and Thiodan had no direct harmful influence.

The fungicides Captan and T.M.T.D., which are frequently used against scab, caused no mortality, while Karathane and Eradex, which

are used for the control of apple-powdery-mildew, were highly toxic. Wepsyn, an experimental fungicide, was not toxic.

In laboratory trials no influence of fenson, chlorobenside, Captan and Wepsyn on the total egg production of the predatory mites during a 20-day period could be found.

3. Résistance

Einführungsreferat über Resistenzprobleme.

R. GASSER, J. R. Geigy, Basel.

Als Grundlage einer Diskussion über Milbenresistenz werden zuerst *Definition* der Resistenz (BROWN, 1958) und *Toleranz* (HOSKINS & GORDON, 1956) gegeben. Zur Diskussion der *Genetik*, *Biologie* und *Ökologie* resistenter Stämme wird speziell hervorgehoben, dass wir bei den Milben wie bei den Insekten, die widerstrebendsten Resultate finden, die jeweils für den betreffenden Stamm und die gegebenen Umweltsfaktoren zutreffend sind, die aber zeigen, dass solche Beobachtungen nicht verallgemeinert werden dürfen. Zur *Vererbung der Resistenz* fand HELLE (1962b), dass ein einziger Vererbungsfaktor für die Resistenzentwicklung von *T. urticae* gegenüber Parathion verantwortlich ist, was das Ergebnis von TAYLOR und SMITH (1956) für Malathion bestätigt. DITTRICH (1961) hingegen erklärt die Resistenz von *T. urticae* gegenüber Demeton mit der Polymerie-Hypothese. Der Resistenzfaktor soll für beide Geschlechter dominant sein. Zum Thema der Vigor-Faktoren seien folgende Publikationen angeführt: DITTRICH 1960, GASSER 1957, HELLE 1962a, SABA 1961. Die Untersuchungen von CHABOUSSOU (1960) und BEYE (1960, 1961) mit Insektiziden und Akariziden lassen eine Beeinflussung der physiologischen Vorgänge in der Pflanze erkennen, die ihrerseits wieder die Milbe in ihren Vigor-Faktoren beeinflussen kann. Der Hinweis von CHABOUSSOU, eine optimale Ernährung der Pflanze mit gleichzeitiger Ernährungsstörung der parasitierenden Schädlinge anzustreben, führt zur Milbenbekämpfung. Mit einem abwechslungsweisen Einsatz chemisch verschiedener akarizider Verbindungen, in genügend hoher Konzentration, lässt sich die Resistenzerscheinung verzögern, d. h. die Wirksamkeit der Präparate länger erhalten, wobei gleichzeitig der Erhaltung der Nützlingspopulation die notwendige Aufmerksamkeit zu schenken ist.

LITERATUR

BEYE, F. *Vergleich der pflanzenphysiologischen Wirkungen von Insektizidpräparaten in Modellversuchen.* Ang. Botanik, XXXV, 3, S. 146–153, 1961.

CHABOUSSOU, F. *Etat actuel de la lutte chimique contre les tétranyques nuisibles aux arbres fruitiers en Europe.* Annales des Epiphyties, N° 1, p. 77–93, 1958.

— *Sur deux cas de pullulations de tétranyques en corrélation avec les taux d'azote et de potassium dans les feuilles.* Rev. Zool. agric. et appl., N° 7–9, p. 85–97, 1960.

DITTRICH, V. *Populationsgenetische Untersuchungen an normalen und phosphorsäureester-resistenten Stämmen von Tetranychus urticae Koch.* Ztschr. ang. Entomologie, 48, 1, S. 34–57, 1961.

GASSER, R. *Über den Stand der Resistenz von Spinnmilben gegenüber Akariziden.* Verhandlungen des IV. Int. Pfl.schutz-Kongresses, Hamburg, 1957, Bd. I, S. 643–646, 1959.

HELLE, W. *Genetics of resistance to organophosphorous compounds and its relation to diapause in Tetranychus urticae Koch (Acari).* Tijdschrift over Planteziekten, Jg. 68, 1962 a.

— *Crossbreeding experiments with some species of the Tetranychus urticae group.* Ent. exp. and appl., 5, S. 159–165, 1962 b.

SABA, F. *Über Entwicklung und Rückgang der Giftresistenz bei Tetranychus urticae Koch und deren Abhängigkeit von der Wirtspflanze.* Ztschr. ang. Entomologie, **48**, 265–293, 1961.

L'évolution de la résistance aux esters phosphoriques en Belgique.

G. VANWETSWINKEL, Centre de Recherches de Gorsem, Belgique.

En 1958, les premiers cas douteux de résistance se sont manifestés dans quelques exploitations et, en 1960, on a pu démontrer l'existence de populations d'araignée rouge *(Metatetranychus ulmi)* réellement résistantes aux esters phosphoriques.

Les observations suivantes ont été faites en relation avec l'apparition de la résistance :

— Les vieilles plantations où l'on utilise les esters phosphoriques à raison de plusieurs traitements par an depuis 1950 sont particulièrement exposées à la résistance.

— Entre 1950 et 1960 on réalise un total de 76 traitements aux esters phosphoriques.

— Dans trois exploitations, on enregistre un retard d'environ un mois dans l'éclosion d'œufs d'hiver.

En 1961 et 1962, la résistance a fait son apparition également dans des exploitations où, depuis quatre à cinq ans, 18 traitements aux esters phosphoriques sont appliqués. Actuellement, les esters phosphoriques sont en grande partie remplacés par différents acaricides à base d'autres matières actives.

The Chemical Control of Resistant Strains of *Metatetranychus ulmi* KOCH on Fruit Trees in the Netherlands.

M. VAN DE VRIE, Proefstation voor de Fruitteelt, Wilhelminadorp.

In orchards were resistance against organo-phosphoric compounds exists the following spray programme is advised. The first generation of *M. ulmi* can be controlled by ovo-larvicides prior to or after the flowering period of apple.

During the summer the frequent applications of powdery mildew-fungicides (Karathane, Eradex or Acricid) can keep the mite population

at a low level, but as soon as these applications are ceased (end of July–beginning of August) an application of Kelthane will be necessary to prevent the building up of a new population and also the production of winter eggs.

These spray programmes include three different types of chemicals, each material being used at most suitable period. These frequent changes seem to be the most efficient method to prevent the development of resistance against acaricides.

4. Bio-écologie

The Hatching Period of Winter Eggs of *Metatetranychus ulmi* Koch.

G. H. L. Dicker, East Malling Research Station, England

Hatching has been studied in the field by isolating short lengths of lateral or terminal shoot with a sticky band and removing the larvae at two-day intervals, and on apple seedlings in a gauze insectary.

In 1960 and 1961, 50% hatch occurred respectively nine and seventeen days earlier in an orchard which had been sprayed regularly with acaricides in previous years than in a nearby one where acaricides had never been used. Studies in other regularly sprayed orchards showed that the date of 50% hatch could vary by as much as 31 days in the same district. The variation in time of hatching, between individual sample units, was greatest for mites from the unsprayed orchard.

Mites were collected from three sites in July, 1961, reared on apple seedlings, and the eggs kept under similar conditions during the winter. In 1962 the hatching period of each culture occurred in the same order as was previously observed in the field.

These results suggest :

1. One or more factors influencing the hatching period of winter eggs are inherited.
2. Populations in unsprayed orchards are more heterogeneous with regard to time of hatching than those in orchards where acaricides have been used.
3. The use of acaricides may eliminate certain components of the original population, thereby altering the hatching period.

Der Einfluss der Februartemperatur auf die Dynamik der Spinnmilbenpopulation in der Hopfenkultur.

Miljeva Kac, Institut für Hopfenkultur, Zalec, Yougoslavien.

Die Prognose für den zu erwartenden Spinnmilbenbefall durch *T. urticae* Koch ist in der Hopfenkultur aus pflanzenschutztechnischen und ökonomischen Gründen von besonderer Bedeutung. Insbesondere

ist es wichtig abzuklären, wann das Gradationsmaximum der Population zu erwarten ist, damit beizeiten mit systemischen Mitteln die Population in Schach gehalten werden kann. Früh eintretende Massenvermehrungen mit Höchstwerten im Juni und Juli sind besonders gefährlich.

Elfjährige Beobachtungen im Savinjatal lassen erkennen, dass ein Zusammenhang besteht zwischen dem Zeitpunkt des Gradationsmaximums und den Bedingungen, denen die Winterweibchen ausgesetzt sind. Die mittlere Februartemperatur spielt dabei eine entscheidende Rolle ; sie bildet das Hauptelement für die Befallsprognose, indem hohe mittlere Februartemperaturen für eine rasche Populationsentwicklung entscheidend sind.

Some nutritional requirements of *Tyrophagus infestans* (OUD.), *Carpoglyphus lactis* (L.) and *Acarus siro* L. (Acaroidea).

JAN BOCZEK, Skierniewice, Osada Palacowa.

49 artificial diets containing first of all different proteins were checked for the determination of food components required by *Tyrophagus infestans* (OUD.), *Carpoglyphus lactis* (L.) and *Acarus siro* L. : 1. Time of development of one generation, 2. mortality during development, 3. longevity of adulte mites and 4. fecundity of females were observed with mites reared on these artificial diets. Check foods (wheat germs and yeast) or total lack of food were used as controls. Besides energetic substances, mineral salts and vitamins, *T. infestans* needed casein or gelatin ; *C. Lactis*-gelatin ; *A. siro*-casein or gluten. Better results were obtained with the mixture of simple sugars than with starch. Cholesterol did not influence the development of these mites. An artificial diet gave results comparable to check foods for *T. infestans*. Out of the four biological values the fecundity of females was the most influenced by the kind of food.

New Bio-Ecological Elements of Spray Warnings with *Bryobia rubrioculus* SCHEUTEN.

N. JACOB, Institut de Cercetari Horti-Viticole, Bucarest.

1. Active populations and hibernating eggs of *Bryobia rubrioculus* SCHEUT. develop a binomial-negative distribution on the injured host plants.
2. In order to relate the population fluctuations to a series of ecological and economical elements, of practical importance, the general methodology of sequential analysis has been used to forecast the mite occurrence ; the proper time has been determined for applying the acaricides ; the chemicals used for the control of this pest have been characterized.

3. For each application of the sequential analysis the following parameters have been determined numerically, analytically and graphically : limit probability (L(m)) of infestation classes or of efficient areas, elements of sequential plant (d_1, d_2) and average number of infested elements of the host plant (E(n)) according to each infestation class or biological area.

Studies on the effect of certain synthetic organic insecticides on the build up and increasing population of the red spider mites in Egypt, U.A.R.

M. H. HASSANEIN, Assiut University.

The present investigations were conducted in Egypt from 1958–1962, in order to study the effect of certain synthetic organic insecticides on the build up of red spider on cotton.

The results indicate that there is an obvious increase in the number of red spider mites in plots treated with chlorinated hydrocarbon compounds and carbamate insecticides.

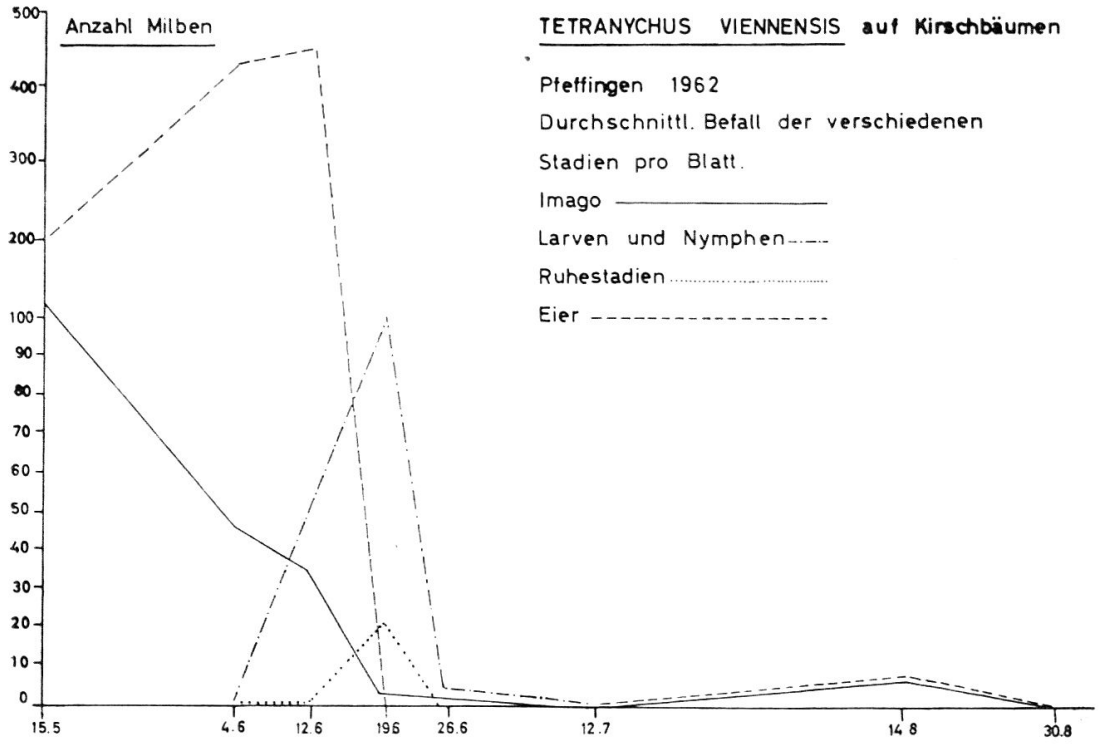
The materials can be arranged according to their effect on the build up of the red spider mite population in decreasing order as follows : Sevin, Toxaphene-DDT, Toxaphene-DDT-Rothane, Toxaphene-Dilane, E. 992, Toxaphene-Delnav, Toxaphene-Methyl parathion, control and Lebaycid.

It is obvious that Lebaycid as a phosphorous compound used for the control of cotton leaf worm of the boll worm has an acaricidal effect and decreases the population of the red spider mites.

Beobachtungen über *Tetranychus viennensis* ZACHER (Fig. 3)

R. GASSER, J. R. Geigy, Basel.

Auf dem Geigy-Versuchsgut Pfeffingen, am Nordhang des Jura gelegen, wurden Ende April 1962 an einigen Kirschbäumen starke, weisse Gespinste beobachtet, die den Stamm und die Leitäste, sowie Kurztriebe mit Blättern und Blütenknospen vollständig überdeckten. Die in diesen Gespinsten massenhaft auftretenden Milben identifizierten sich als leuchtend rubinrote Winterweibchen von *T. viennensis*. Laut MÜLLER (1957) überwintern von dieser Art nur befruchtete Weibchen. Die Ei-Ablage dauerte von Mitte Mai bis gegen Mitte Juni, wobei die Eier hauptsächlich auf der Blattunterseite, längs der Mittelrippe deponiert wurden. Die durchschnittliche Ei-Zahl pro Blatt stieg auf 450 an, während die Anzahl Weibchen von über 100 pro Blatt auf 1–2 absank. Anfangs Juni schlüpften die ersten Larven, worauf die Population an beweglichen Stadien Mitte Juni wieder bis 100 pro Blatt anstieg. Infolge der kühlen Witterung und zahlreicher Niederschläge anfangs Juli verringerte sich die Population, so dass nur sehr



wenig Imagines zur Ei-Ablage gelangten. So kamen wir dieses Jahr lediglich auf 1–2 Generationen, während MÜLLER deren 4–5 für die Gegend von Stuttgart beschrieb. Ebenso im Gegensatz zu MÜLLER beobachteten wir zahlreiche Tiere bei der Ei-Ablage auf den Wiesenpflanzen unter den Bäumen. In Bekämpfungsversuchen mit Phosphorverbindungen (z. B. Phenkapton) und chlorierten Kohlenwasserstoffen (z. B. Chlorbenzilat, Chlorpropylat) bestätigten sich die guten Erfahrungen von MÜLLER.

LITERATUR

MÜLLER, G. F. W. *Morphologie, Biologie und Bekämpfung der Weissdornspinnmilbe, Tetranychus viennensis Zacher.* Höfchen-Briefe, 10, 1–60, 1957.

5. Lutte intégrée

Die integrierte Schädlingsbekämpfung

H. J. DE FLUITER, Instituut voor Plantenziektenkundig Onderzoek, Wageningen.

Während bei der reinen biologischen Schädlingsbekämpfung die Nützlinge (Räuber, Parasiten, Mikroorganismen und Virosen) allein die

Schädlinge im Schach halten sollen, wird bei der *integrierten Methode* eine Kombination des Effektes der Nützlinge mit demjenigen der chemischen Pflanzenschutzmittel und aller andern Massnahmen angestrebt. Bei der integrierten Schädlingsbekämpfung stehen bestimmte Nützlinge im Vordergrund, die dem Verfahren ein biologisches Gepräge verleihen. Eine Arbeitsgruppe der CILB (Commission internationale de lutte biologique) befasst sich mit den Problemen der integrierten Schädlingsbekämpfung. Diese unterscheidet sich von der *harmonischen Schädlingsbekämpfung* dadurch, dass bei letzterer die Nützlinge nicht die entscheidende Rolle zu spielen brauchen und alle Massnahmen dahin tendieren, die Schädlinge durch einen geeigneten, harmonischen Einsatz von verschiedensten Bekämpfungsmitteln (z. B. Zusammenspiel von Düngung, Kulturmassnahmen, Pflanzenschutzmittel, etc.), unschädlich zu machen.

Die Notwendigkeit eines Ausbaues der Kenntnis über die Milbenfeinde ergibt sich immer wieder bei der Lösung von praktischen Integrationsmethoden. Insbesondere sollte man noch über den Effekt der Schädlingsmittel auf diese Nützlingskategorie besser orientiert sein und allgemein über weitgehende, präzise biologische Daten verfügen, die es erlauben, gegebenenfalls im rechten Zeitpunkt auch mit polyvalenten Schädlingsmitteln arbeiten zu können, ohne die Nützlingspopulation zu ruinieren.